THE CONTRIBUTION OF PSYCHOSOCIAL FACTORS TO SOCIOECONOMIC DIFFERENCES IN FOOD PURCHASING

Loretta McKinnon

B.A, BSc

Submitted in fulfilment of the requirements for the degree of

Doctor of Philosophy

Institute of Health and Biomedical Innovation,

School of Public Health

Faculty of Health

Queensland University of Technology

November 2012

Keywords

Attitude, belief, cost, diet, disease, education, expense, finance, food, food purchasing, fruit, grocery, health, illness, income, motivation, nutrition, nutrition concerns, nutrition knowledge, nutrition label, psychosocial, satisfaction with diet, socioeconomic position, socioeconomic status, taste, values, vegetable, weight concerns.

Abstract

In developed countries the relationship between socioeconomic position (SEP) and health is unequivocal. Those who are socioeconomically disadvantaged are known to experience higher morbidity and mortality from a range of chronic diet-related conditions compared to those of higher SEP. Socioeconomic inequalities in diet are well established. Compared to their more advantaged counterparts, those of low SEP are consistently found to consume diets less consistent with dietary guidelines (i.e. higher in fat, salt and sugar and lower in fibre, fruit and vegetables). Although the reasons for dietary inequalities remain unclear, understanding how such differences arise is important for the development of strategies to reduce health inequalities.

Both environmental (e.g. proximity of supermarkets, price, and availability of foods) and psychosocial (e.g. taste preference, nutrition knowledge) influences are proposed to account for inequalities in food choices. Although in the United States (US), United Kingdom (UK), and parts of Australia, environmental factors are associated with socioeconomic differences in food choices, these factors do not completely account for the observed inequalities. Internationally, this context has prompted calls for further exploration of the role of psychological and social factors in relation to inequalities in food choices. It is this task that forms the primary goal of this PhD research.

In the small body of research examining the contribution of psychosocial factors to inequalities in food choices, studies have focussed on food cost concerns, nutrition knowledge or health concerns. These factors are generally found to be influential. However, since a range of psychosocial factors are known determinants of food choices in the general population, it is likely that a range of factors also contribute to inequalities in food choices. Identification of additional psychosocial factors of

relevance to inequalities in food choices would provide new opportunities for health promotion, including the adaption of existing strategies.

The methodological features of previous research have also hindered the advancement of knowledge in this area and a lack of qualitative studies has resulted in a dearth of descriptive information on this topic.

This PhD investigation extends previous research by assessing a range of psychosocial factors in relation to inequalities in food choices using both quantitative and qualitative techniques. Secondary data analyses were undertaken using data obtained from two Brisbane-based studies, the Brisbane Food Study (N=1003, conducted in 2000), and the Sixty Families Study (N=60, conducted in 1998). Both studies involved main household food purchasers completing an interviewer-administered survey within their own home. Data pertaining to food-purchasing, and psychosocial, socioeconomic and demographic characteristics were collected in each study.

The mutual goals of both the qualitative and quantitative phases of this investigation were to assess socioeconomic differences in food purchasing and to identify psychosocial factors relevant to any observed differences. The quantitative methods then additionally considered whether the associations examined differed according to the socioeconomic indicator used (i.e. income or education). The qualitative analyses made a unique contribution to this project by generating detailed descriptions of socioeconomic differences in psychosocial factors.

Those with lower levels of income and education were found to make food purchasing choices less consistent with dietary guidelines compared to those of high SEP. The psychosocial factors identified as relevant to food-purchasing inequalities were: taste preferences, health concerns, health beliefs, nutrition knowledge, nutrition concerns, weight concerns, nutrition label use, and several other values and beliefs unique to particular socioeconomic groups. Factors more tenuously or inconsistently related to socioeconomic differences in food purchasing were cost concerns, and perceived adequacy of the family diet.

Evidence was displayed in both the quantitative and qualitative analyses to suggest that psychosocial factors contribute to inequalities in food purchasing in a collective manner. The quantitative analyses revealed that considerable overlap in the socioeconomic variation in food purchasing was accounted for by key psychosocial factors of importance, including taste preference, nutrition concerns, nutrition knowledge, and health concerns. Consistent with these findings, the qualitative transcripts demonstrated the interplay between such influential psychosocial factors in determining food-purchasing choices.

The qualitative analyses found socioeconomic differences in the prioritisation of psychosocial factors in relation to food choices. This is suggestive of complex cultural factors that distinguish advantaged and disadvantaged groups and result in socioeconomically distinct schemas related to health and food choices. Compared to those of high SEP, those of lower SEP were less likely to indicate that health concerns, nutrition concerns, or food labels influenced food choices, and exhibited lower levels of nutrition knowledge. In the absence of health or nutrition-related concerns, taste preferences tended to dominate the food purchasing choices of those of low SEP. Overall, while cost concerns did not appear to be a main determinant of socioeconomic differences in food purchasing, this factor had a dominant influence on the food choices of some of the most disadvantaged respondents included in this research.

The findings of this study have several implications for health promotion. The integrated operation of psychosocial factors on food purchasing inequalities indicates that multiple psychosocial factors may be appropriate to target in health promotion. It also seems possible that the inter-relatedness of psychosocial factors would allow health promotion targeting a single psychosocial factor to have a flow-on affect in terms of altering other influential psychosocial factors. This research also suggests that current mass marketing approaches to health promotion may not be effective across all socioeconomic groups due to differences in the priorities and main factors of influence in food purchasing decisions across groups.

In addition to the practical recommendations for health promotion, this investigation, through the critique of previous research, and through the

substantive study findings, has highlighted important methodological considerations for future research. Of particular note are the recommendations pertaining to the selection of socioeconomic indicators, measurement of relevant constructs, consideration of confounders, and development of an analytical approach.

Addressing inequalities in health has been noted as a main objective by many health authorities and governments internationally. It is envisaged that the substantive and methodological findings of this thesis will make a useful contribution towards this important goal.

Table of Contents

List of Figures

List of Tables

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: _____

Date: _____

GLOSSARY

The following terms and definitions are used in this thesis.

Diet: The kinds of food that a person, animal, or community habitually eats [1].

Dietary behaviour: Refers to behaviours that precede food and nutrient intake including food purchasing, food preparation and cooking.

EMM: Estimated marginal mean. This is used when groups are being compared to take into account in estimates that the groups may be different sizes.

Food choices: An encompassing term used to refer to both food and nutrient intake and the behaviours preceding this outcome including food preparation, cooking and purchasing.

***Healthy[1]:** When used in reference to dietary behaviour; behaviour most consistent with the Australian dietary guideline recommendations [2]. These guidelines promote selection and consumption of foods comparatively high in fibre and low in fat, salt and sugar.

PCA: Principal Component Analysis.

'Recommended' and 'regular': When used in reference to food choices, 'recommended' choices refer to those food choices most consistent with Australian dietary guideline recommendations[2] and current health promotion. 'Regular' choices refers to options that are less consistent with dietary guidelines than the 'recommended' options.

Significance: Findings are reported as 'significant' if $p \leq 0.05$, or highly significant if $p \leq 0.001$).

Socioeconomic Position (SEP): An individual or group's relative position in society based on social, educational or economic grounds. A detailed description of the concept is included in the background chapter (page 2).

[1] *These definition have been used in previous publications in this field of research [2-4].

Acknowledgments

I would like to dedicate this thesis to my supervisors, Professor Gavin Turrell and Dr Katrina Giskes, two people I admire deeply, not only as exceptional researchers, but as people. Throughout my studies they have extended warmth, compassion and good humour towards me, along with excellent academic advice. Their doors were always open, either for a laugh or for a cry, and for this I am extremely grateful.

I would also like to thank my former supervisors Professor Beth Newman and Associate Professor Carla Patterson who assisted me earlier on in my studies and my industry partner Queensland Health. Thank you to my friends and family for supporting me, especially since while undertaking this research I have not felt able to love and support you in the way that I would normally have liked to.

Thank you in particular to: Danette Langbecker, Natalie McKinnon, Bryce Tunny, Danielle Smyth, Kellie Simpson, Lee Walmsley, Lawrence Kranen, Roger Grattan, Sheree Rye, Tracey Di Sipio, Elisabeth Winkler, Katja Saris, Melissa Newton, Helen Fields, Bruce Jones, Lyle Turner, Sharon Hebdon, Mary Clark, Colin and Margaret Reid, Jenny, Don, Vanessa and Robert McKinnon, Tanya, Aziz and Miriam Abdul Jalil, Carolyn Grant, Trish Gould, Kyoko Miura, Abbey Diaz, Anna Finnane, Judith Meiklejohn, Matthew Triggs, Nick Graves, Mark Wellard, Ryan Brydges, Douglas McKinnon, Max and Fresia Mezina, QUT cleaning staff, Josie Auster, Vanessa Beesley, Rebecca Ramsey, Jasmine O'Brien, Ellen Strickland, Karen Remm, Sue and Keith Pitman, Chad McCormick, Pavla Vaneckova, Xin Qi, Wei wei Yu, Xiaoyu Wang, Xiaofang Ye, Cunrui Huang, Yuming Guo, Yan Bi, Jiajia Wong, Monika Janda, Sandi Hayes, Shilu Tong, Bonnie MacFarlane, Jeff Smith, Susan Evans, Diana Vötter, Kasia Alderman, Karen Hughes, Julie-Anne Carroll, Kimberly Alexander, Kate Halton, Gary Sparks, Tim and Frances Waugh, Shannyn Pickford, Steve Urry, Lloyd Reed, Jade Buller, Gaylene Francis, Clare Macaulay, Lee-ann Wilson, Rachael Bradhurst, Diana Battistutta, Carmel Stafford and Ha Le.

Thanks to all my friends from swimming, yoga, and running who spurred me on each day to manage my back pain and keep on going, your bright welcome always made my day. Thanks in particular to John, Jenny, Kerry, Carol, Linda, Kimberly, Karen, Rod, Rohan, Nicole, Stacey, Marijka, Maureen, Arianne, Leah, Candace, Sean, and all my friends from the Australian School of Yoga and Meditation, Brisbane City Yoga, New Farm Power Yoga, and the Healthstream Pool. Thank you to the members of the IHOP research group and the HABITAT study team for your continued support throughout my research.

Chapter 1: **Background and Introduction**

This thesis investigates the contribution of psychosocial factors to socioeconomic differences in food purchasing. This chapter commences by outlining the context for this research and providing definitions of key terms and pertinent background information. The theoretical framework that guides this project will then be presented, followed by the research aims and limitations of the study. The chapter will conclude with an outline of the thesis document.

1.1 CONTEXT FOR THIS RESEARCH

Associations between socioeconomic position (SEP) and health have been observed for centuries [3] across regions including ancient Greece, Egypt, China [4], and Europe [5]. Health is generally found to increase across increasing socioeconomic groups [6–8], with some variation in the patterning of the relationship observed (e.g. linear or curvilinear, or steeper or more moderate gradients) depending on the socioeconomic indicator considered [6-8].

Health inequalities are observed for both men and women and at every stage of the life course (birth, infancy, childhood and adolescence, and adulthood) and irrespective of how SEP and health are measured [6-9]. In developed countries those with lower levels of income and education and in less prestigious occupations have higher morbidity and mortality rates for a range of chronic preventable conditions [3, 7, 10-20]. Low SEP is associated with the prevalence of many diet-related conditions, including type 2 diabetes [21-25], heart disease [26-30], obesity [31-41], high blood pressure [29, 42, 43], low bone mineral density [44], stroke [26, 45] and certain diet-related cancers [46-48].

Although differences in diet across socioeconomic groups are well established [13, 49-58], our understanding of the factors contributing to such inequalities remains limited [11, 59-61]. Broadly, the factors identified as potentially contributing to dietary inequalities can be classified as either environmental or individual-level (psychosocial) factors [10, 62]. Environmental factors relate to the proximity of

outlets to purchase food, and the price, quality and availability of food. Individual-level, or psychosocial factors relate to characteristics of the individual and their social network, for example, weight concerns, health concerns and the food taste preferences of individuals and family members.

Studies conducted in Australia [63-66] and internationally [67-75] present mixed findings regarding the association of environmental factors with socioeconomic differences in food choices. However, regardless of the region considered, environmental factors rarely account for a high proportion of observed socioeconomic differences in food choices [64, 73, 76, 77]. Psychosocial factors are known to play an influential role in food choices among the general population [78-80] and have been associated with inequalities in food choices in the limited amount of previous research on this topic [62, 76]. This context has prompted calls for further exploration of the contribution of psychosocial factors to inequalities in food choices [11, 13, 59, 64, 73, 75, 81-85], and it is this task that forms the focus of this PhD research.

1.2 DEFINITIONS AND BACKGROUND

1.2.1 Defining socioeconomic position

There is little agreement among researchers in terms of the most appropriate means of conceptualising and measuring SEP [6]. Terms such as socioeconomic class, social class, socioeconomic inequality, and socioeconomic status [6, 86, 87] are all commonly used. Lynch and Kaplan [5] broadly define socioeconomic position as "the social and economic factors that influence what position(s) individuals and groups hold within the structure of society"[5] (p14). This definition reinforces the multifaceted nature of SEP, in that individuals may be distinguished in terms of their relative association with the means of production, their ownership and control of resources, education, lifestyle, social networks, and influence or honour within the community [4, 88]. Research taking a life course perspective of SEP (e.g. considering the occupation/education/income of both individuals and their parents) provides further evidence of the multidimensional nature of SEP [89-92].

The term SEP is used throughout this thesis as it is encompassing of the many facets of the construct reported in the literature.

1.2.2 Defining food purchasing

The majority of research investigating socioeconomic differences in food choices focuses on food and nutrient intake [63, 93], which is typically measured in terms of grams of specific nutrients consumed per day or percentage contribution of particular nutrients to overall dietary intake [63, 94]. Relatively few studies have investigated the behaviours that necessarily precede food and nutrient intake. Such behaviours include: food purchasing (e.g. selecting a cereal low in sugar as opposed to a high-sugar option), preparation (e.g. removing fat from meat), cooking (e.g. steaming rather than boiling vegetables) and consumption practices (e.g. adding butter to bread or vegetables). Although understudied, investigation of these behaviours represents an important opportunity to better understand and potentially alter actual consumption and subsequent health consequences. *Figure 1.1* depicts the temporal ordering of dietary behaviours leading to food and nutrient intake.

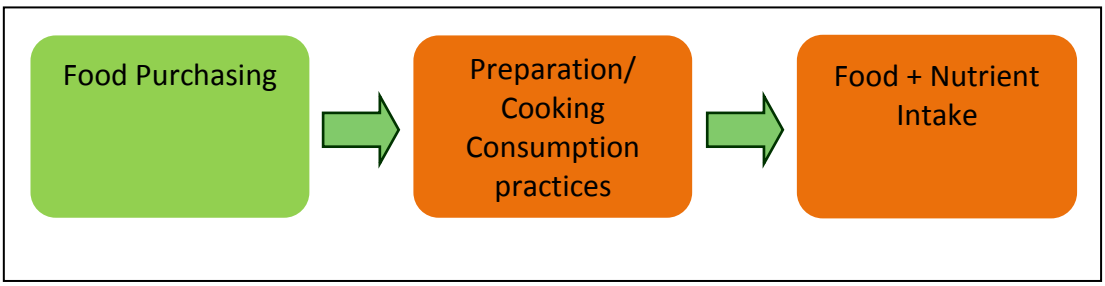


Figure 1.1.Dietary behaviours preceding food and nutrient intake.

Throughout this thesis the term 'food choices' will be used as an encompassing term to refer to either food and nutrient intake or the behaviours that precede this outcome (i.e. food purchasing, preparation and consumption practices).

1.2.3 Summary of research describing socioeconomic differences in food choices

In developed countries, socioeconomic differences in food choices are well established, with those of low SEP found to make choices less consistent with recommendations issued by medical and nutrition authorities. This phenomenon is

observed across many regions and regardless of the way that food choices and SEP are measured.

Regions where such inequalities in food choices have been observed include the UK [49, 95-98], US [99-101], Europe [102-105], Australia [51, 106-110] and in Nordic countries [111, 112]. In these areas, inequalities are reported regardless of whether food choices are assessed through self-reported food and nutrient intake [42, 95, 97, 98, 101, 103-108, 110, 112, 113], via proxy measures of food and nutrient intake (e.g. plasma vitamin C levels [96] or other biomarkers [42, 97, 101]) or through the assessment of food purchasing [13, 63, 99, 114]. Inequalities in food choices also persist regardless of the socioeconomic indicator used (e.g. occupation [63, 95, 96, 104, 108, 110, 112], education [63, 96, 98, 101, 104, 106, 110, 115], income [63, 101, 106, 110, 115], childhood SEP [92] or area-level deprivation [59, 63, 96]). In addition to individual observational studies conducted at a single time point, socioeconomic gradients in food choices have been further confirmed in meta-analyses [102, 116], systematic reviews [56, 117] and longitudinal population analyses [92, 101].

Compared to those of high SEP, the food choice profile of those of low SEP is typified by the selection of foods/diets that are comparatively higher in fat [49, 50, 54, 56, 63, 92, 108, 110, 118] (in particular saturated fat [49, 104, 111]), sugar [63, 104, 110, 119] and salt [63, 92, 98], and lower in fibre [13, 53, 54, 56, 110, 118], fruit [51, 54, 56, 63, 92, 95, 96, 99, 101, 102, 106, 110, 117, 118, 120-123], vegetables [50, 51, 54, 56, 95, 101, 102, 104, 106, 112, 115, 117, 118, 120-122] and certain vitamins and minerals [51, 52, 59, 101, 104, 115]. Among the foods and nutrients noted in dietary guidelines, socioeconomic differences in fruit and vegetable choices appear to be the most documented. Salt appears to be the least confirmed, being examined in relatively few studies and with several studies noting that socioeconomic differences were not observed in relation to this nutrient [100, 110]. Despite this body of evidence indicating how socioeconomic groups differ in their food choices, there is still limited understanding of why such inequalities exist and are perpetuated [63, 76, 106]. It is proposed that exploring the behaviours that precede food and nutrient intake may be useful for understanding why

socioeconomic differences in diet occur and subsequently devising strategies to address these inequalities. Among the behaviours that precede food and nutrient intake, food purchasing was selected as the dietary indicator of interest for several reasons. The study of food purchasing may particularly illuminate socioeconomic differences in food choices due to the unique level of measurement of this behaviour. While food and nutrient intake is almost always measured at the level of the individual [50, 83, 124], purchasing is typically measured at the household level [16, 125]. Studies of food and nutrient intake may focus on the intakes of any individual household member, including adults [126-128], adolescents [107, 129] or children [130-132], and may include foods purchased and consumed anywhere, for example, restaurant meals or takeaway food are commonly reported in food-and-nutrient measures such as food diaries. In contrast, studies concerning food purchasing generally refer to food purchased by the female head of the household for consumption within the home and by all members of the household [133-135]. Therefore, these studies generally consider food choices in a more discrete context compared to studies using measures of food and nutrient intake

Concentrating on foods purchased for home consumption is important, as this is where most food is consumed [136, 137] and where healthy dietary habits may develop [138]. Those of low SEP spend proportionately more of their food budget on food purchased for at-home consumption compared to other income groups [139]. This context makes consideration of at-home consumption important for ultimately understanding why the diets of those of low SEP are the least consistent with current dietary guidelines. The home food environment also necessarily reflects the interactive influence of household members [125], more so than most studies concerned with the food and nutrient intake of individuals. Therefore, focussing on food purchasing for at-home consumption allows the consideration of both intrapersonal (e.g. own taste preferences) and interpersonal factors (e.g. children's taste preferences) on food choices.

Research investigating food purchasing also frequently has a broader scope compared to studies of food and nutrient intake in terms of the type of factors examined in relation to food choices. For example, in addition to factors that

influence actual consumption (e.g. taste preferences), factors unique to purchasing can be considered. Such factors may include perceived availability and quality of food available in stores [58, 106, 114], in-store behaviour (e.g. buying items on special) and issues of food transportation and storage [140, 141]. Reasons for qualitative differences in the foods selected may also come to light in explorations of food purchasing, for example, choices between bulk buying, the format of food (e.g. powdered or dried), and the quality or freshness of the foods selected. Some of these choices may have implications for adherence with dietary guidelines (e.g. full-cream milk might be available in bulk, when low-fat options are recommended according to dietary guidelines, therefore, the format of the product selected may affect compliance with dietary guidelines).

Awareness, understanding, and use of nutrition labels and associated product marketing (e.g. claims regarding fat content) may also be considered. Many of these issues are not addressed in studies measuring food and nutrient intake; however, they have been implicated in the food choices made by the general population. Consideration of such factors may be important in order to develop a comprehensive understanding of why socioeconomic groups differ in their food choices [81].

An understanding of food purchasing is likely to have practical utility since this behaviour has been identified as promising in terms of opportunities for intervention [94, 110, 142-146]. Opportunities for health promotion could include: radio, television or internet, in-store displays and/or product labelling. In store displays could provide information on dietary guidelines in a manner intended to target low SEP consumers. For example, stores in disadvantaged areas could be targeted or simplified language could be used to reduce the extent to which poor literacy hinders the uptake of information. In addition to aiding the development of new health promotion strategies, knowledge of the factors that contribute to socio-economic differences in food purchasing can allow assessment of existing health promotion messages including dietary guidelines [147]. Much health promotion is focused on encouraging people to make healthy food choices when shopping [148-152], therefore, studying food purchasing behaviour can illuminate the reach and

impact of such initiatives. The literature review that follows this chapter will include studies considering both food and nutrient intake and food purchasing due to a dearth of research that specifically examines food purchasing.

1.2.4 Defining psychosocial factors

Psychosocial factors have been broadly defined by social epidemiologists [153, 154]. Martikainen et al. [153] conducted a review specifically of studies exploring psychosocial determinants of health detailing the terminology, ideology and methods used in such studies. They note that a search of Medline retrieved an array of terms used in relation to psychosocial concepts, for example, 'psychosocial causation', 'psychosocial influences', 'psychosocial risk factors', 'psychosocial mechanisms', 'psychosocial environment', 'psychosocial context', 'psychosocial resources', 'psychosocial well-being' and 'psychosocial health' [153]. The authors posit that the range of terms displayed in the literature reflects the diverse sociological, psychological and social epidemiological paradigms used by researchers [153].

For the purposes of this thesis, the general definition of 'psychosocial' presented by Martikainen et al. [153] will be used, that is, "psychosocial, as pertaining to the influence of social factors on an individual's mind or behaviour and to the interrelation of behaviour and social factors"[2]. The authors comment that according to this definition, it may be more accurate if 'psychosocial' influences on health were in fact referred to as 'social-psychological' explanations of health. The latter terminology emphasises the perspective that psychosocial factors should be considered those factors that do not purely reflect either social or psychological domains. Or in other words, do not exclusively reflect either the "structural characteristics of societies or psychological characteristics of individuals" [153].

The authors do not provide examples, and it is difficult to identify any single psychological or social factors that are purely one or the other, rather than having some degree of overlap. The taste preferences of individuals, for example, have a biological basis unique to the individual [155, 156]; however, they are also the

[2] Martikainen et al. [153] sourced this definition from the Oxford English Dictionary.

result of social influences, for example, the foods with which we are presented as children [157, 158] and which are consumed by our peers [159]. In any case, the use of the term 'psychosocial factors' in this research is aligned with the perspective of Martikainen et al. [153] in acknowledging the factors depicted by this encompassing term to be the result of both individual psychological and social influences.

1.2.5 Psychosocial factors as contributors to socioeconomic differences in food choices

Socioeconomic inequalities in food choices are likely to be the result of many interacting factors, including characteristics of the individual and the social and environmental contexts in which they live [55, 78, 133]. The association of environmental factors with socioeconomic differences in diet has been examined in many regions, predominantly utilising measures relating to the availability, cost and quality of food [160]. There has been some debate about the assessment of the impact of environmental factors on diet, with criticism being directed at authors who perpetuate the notion of the existence of 'food deserts' (places where healthy food is not available and/or is costly and of poor quality) without sufficient evidence to support this claim [140, 161, 162].

In general, studies conducted in the US find the greatest environmental variation in terms of access to affordable, healthy food [160, 163]. Although some studies conducted outside the US also suggest that environmental factors contribute to inequalities [13, 68], this is not always found to be the case [64, 69-75]. In particular this has not been found to be the case in the two studies investigating the influence of environmental factors in Brisbane [13, 64, 164, 165]. These studies suggest that in Brisbane, living in an affluent or disadvantaged area does not influence the procurement of food above and beyond personal characteristics, for example, household income or education [64]. Even in studies where environmental factors are associated with socioeconomic variation in food and nutrient intake or dietary behaviours, such factors frequently do not account for all the observed socioeconomic variation in diet or diet-related behaviours [64, 73, 76].

Multiple psychosocial factors have been identified as related to either diet or dietary behaviours, and/or with SEP, making such factors potential candidates for contributing to inequalities in diet. Such factors include taste preferences, nutrition

knowledge, weight concerns, cost concerns, health concerns and availability concerns. These relationships have led researchers to suggest further investigation of psychosocial factors as being fruitful in improving understanding of socioeconomic gradients in diet and health [11, 13, 64, 73, 81-85]. The specific psychosocial factors selected for investigation in this study were based on a review of the literature and are described in the methods chapter (Chapter 5:).

1.3 A CONCEPTUAL FRAMEWORK OF SOCIOECONOMIC POSITION, FOOD CHOICES AND HEALTH

Some studies have investigated the relationship between food choices and groups of psychosocial factors using theories or models that predict (or describe) individual behaviour. Such models tend to be developed in either the behavioural or social sciences [166]. Examples of theories/models that have been investigated with regard to food choices in the general population include: the Theory of Planned Behaviour [167, 168], Social Cognitive Theory [169-171], The Health Belief Model [172, 173] and the Transtheoretical Model (stages of change) [174-177]. The components of these models/theories are outlined in Appendix A.

Examples of psychosocial components of these models used in research exploring food choices include self efficacy [178], perceived locus of control [78, 95, 179] and motivation [171]. These types of models focus largely on the influence of individuals on their own behaviour. Such theories have been criticised for overestimating the level of autonomy that individuals have over their behaviour [180] and for not adequately considering relevant social and structural factors that influence behaviour [121, 147, 181]. Since the focus of this research is on understanding how psychosocial factors contribute to socioeconomic differences in household food purchasing (households potentially comprising multiple individuals), none of these theories pertaining to individual behaviour are relied upon exclusively in this research. Instead, a socio-ecological model is applied that has the capacity to explore the components of such models in addition to numerous other factors. For example, individual nutrition knowledge may be considered along with the taste preferences of family members. The socio-ecological approach has been used in

other recent research investigating inequalities in health behaviours, including food choices [61, 182].

The socio-ecological approach was selected after consideration of the models of food choice constructed in reference to the general population [80, 183, 184] and the literature regarding socioeconomic inequalities in food choices. This approach was considered the most relevant to this investigation for several reasons. Notably, this framework incorporates numerous theories and perspectives from a range of disciplines including theories devised to explain the behaviour of individuals [185]. The approach is multi-level, in that it allows intra- and inter-personal influences on food choices to be considered in addition to broader social and environmental level factors [185-187]. The socio-ecological model also facilitates a range of methods to be used and allows subjects to be considered either as individuals or as members of groups [187]. The socio-ecological model may be useful in further developing health promotion strategies that have been largely based on the individual with little emphasis on their social or environmental context [187, 188].

A graphical presentation of the socio-ecological model that guides this PhD research is depicted in *Figure 1.2*. This figure indicates that both environmental and psychosocial factors are likely to contribute to socioeconomic differences in food choices (including food purchasing and preparation), subsequent inequalities in food and nutrient intake, and ultimately inequalities in health. Examples of psychosocial factors include taste preferences, nutrition knowledge and health concerns. Examples of environmental influences include the objectively measured availability and cost of food. The components of the relationships explored in this project are highlighted with bold lines. Thus, the overall focus of this research is to investigate the contribution of psychosocial factors to socioeconomic differences in food purchasing.

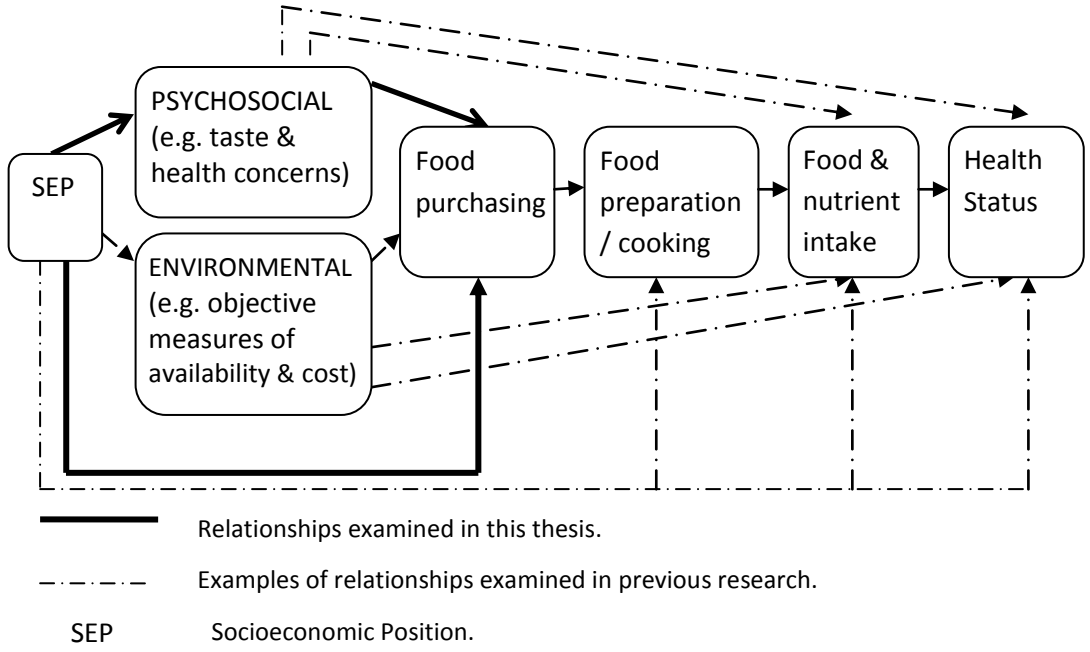


Figure 1.2. Overview of the relationship between socioeconomic position, food choices and health highlighting the focus of this investigation.

1.4 SUMMARY OF CURRENT RESEARCH AND AIMS OF THIS INVESTIGATION

Despite a wealth of descriptive data on socioeconomic differences in food and nutrient intake, the reasons underlying inequalities in diet remain unclear [63, 76]. Food purchasing, although under-researched, is usually an essential precursor to dietary intakes [63], and represents a useful intervention point at which to influence food and nutrient intakes. Multiple psychosocial factors have been identified as contributors to food and nutrient intake in the general population [55, 78, 189-193] and some of these factors are also associated with SEP [81, 82, 189, 194-199]. Yet few studies have sought to examine how psychosocial factors might contribute to socioeconomic differences in food choices. It is against this backdrop, that this research investigation emerges. The primary aim of this research can be summarised as follows:

To investigate whether psychosocial factors contribute to socioeconomic differences in food purchasing choices.

Specifically, it is of interest whether socioeconomic groups differ in the extent to which their food choices are consistent with dietary guidelines. However, for brevity

the less specific terminology ‘inequalities in food choices’ will be used throughout this thesis.

1.5 DELIMITING THIS STUDY

The focus of this study is on the food-purchasing behaviours of adults, rather than of children, adolescents or the elderly. Food choices have been found to differ according to age [102, 200-204], warranting consideration of adults as a discrete research population.

This research investigates food-purchasing at the population level and is specifically concerned with differences between socioeconomic groups. Other population sub-groups, such as ethnic or Indigenous groups are not examined specifically in this investigation. Other groups not considered include institutionalised populations such as those in hospitals or in prisons, those with specific dietary conditions (e.g. those with eating disorders) or who are engaging in dietary modification or supplementation practices.

1.6 THESIS STRUCTURE

This thesis commences with a review of the literature pertinent to assessing the contribution of psychosocial factors to socioeconomic differences in food choices (Chapter 2). Chapter 3 defines the focus of the thesis and the methodological approach devised to extend previous research and meet the PhD research objectives.

This investigation involved the secondary analysis of data from two sources. The Brisbane Food Study is described in Chapter 4, followed by the quantitative methods of this PhD research (Chapter 5) and the quantitative results obtained (Chapter 6). The Sixty Families Study and the qualitative methods applied in this PhD investigation are described in Chapter 7. The results of the qualitative analyses are presented in Chapter 8. This thesis concludes with a discussion chapter (Chapter 9), wherein the implications of the study results are considered in light of previous research and a number of recommendations are made.

Chapter 2: **Literature Review**

2.1 INTRODUCTION AND STRUCTURE OF THE LITERATURE REVIEW

This chapter provides a targeted review of literature relevant to assessing whether psychosocial factors contribute to inequalities in food choices. The following information will be presented:

The search strategy, inclusion criteria and focus of the literature review

- A description of what is currently known regarding psychosocial factors implicated in inequalities in food choices (substantive findings)
- Sampling and analytical considerations regarding all studies included in the literature review and a further methodological critique of the studies most relevant to this investigation
- Chapter conclusions

2.2 SEARCH STRATEGY

The literature review was conducted via searches of several electronic databases including Medline, Web of Science, ScienceDirect, Google scholar, Blackwell Synergy, Social Science Citation Index, CINAHL, ProQuest (Sociological Abstracts), and ProQuest Sociology. Search terms related to SEP (e.g. income), food choices (e.g. diet, food, shopping) and psychosocial factors (e.g. taste, cost) were used.

2.3 INCLUSION CRITERIA

2.3.1 Inclusion criteria based on publication date

All articles selected for inclusion in the review must have been published after 1995. This selection criterion was applied after an initial broad review of the literature indicated that the breadth of psychosocial factors considered, would not be reduced by imposing this limit. The one exception to this cut-off is the seminal work conducted by Charles and Kerr in 1988 [135], which is included in this review.

2.3.2 Inclusion criteria based on sample considerations

All studies examined considered non-institutionalised adults in developed countries. These stipulations were necessary since SEP, food choices and psychosocial factors are known to vary according to all of these conditions (i.e. across the life course [92, 205], depending on whether individuals are institutionalised [206] or ill [207], and between developed and developing countries [208, 209]). Studies were also excluded when all participants were selected due to having a particular medical condition or health risk factor (e.g. being overweight [210] or a smoker [211]).

2.3.3 Inclusion criteria based on research focus

The aim of the literature review was to assess current evidence regarding the contribution of psychosocial factors to socioeconomic differences in food choices. As noted in Chapter 1, throughout this thesis 'food choices' is used as an encompassing term to denote food purchasing, preparation, cooking, and food and nutrient intake. This literature review will include studies that consider psychosocial factors in relation to any of these outcomes due to a dearth of studies examining food purchasing. In addition, studies using alternative food choice measures were recognised as providing information highly relevant to this investigation.

The pathways explored in this review are shown with dotted lines in *Figure 2.1*. The solid line is included in acknowledgement of other pathways between SEP and food choices (that may not include psychosocial factors).

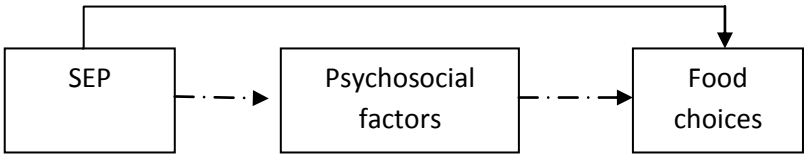


Figure 2.1 Pathways of interest in this literature review depicted with dotted lines.

In order for a pathway between SEP, psychosocial factors and food purchasing to be plausible, the following assumptions must hold:

1. Socioeconomic groups must differ in terms of their food choices (as established in Chapter 1).

2. Psychosocial factors must be related to food choices.

3. Socioeconomic groups must differ in terms of psychosocial factors.

These three assumptions are typical of a mediation analysis [212]. Although formal assessment of mediation is a quantitative research approach, these criteria are pertinent for the selection of both quantitative and qualitative literature relevant to the research objectives of this thesis.

The first assumption (assumption 1) is necessary to ascertain that there are differences in an outcome that require explanation. The premise of a mediation analysis is to establish whether differences in an outcome (in this case, food choices) across an independent variable (in this case, SEP) are at least partially explained by a third 'mediating' variable (in this case, psychosocial factors) [212]. In order for psychosocial factors, to partially explain socioeconomic differences in food choices these factors must be associated with both food choices (assumption 2) and SEP (assumption 3). For example, in order for weight concerns to be viewed as contributing to socioeconomic differences in food choices, it would be important to show that weight concerns are relevant to food choices in the population overall (assumption 2). In addition, it would be important to ascertain that socioeconomic groups differed either qualitatively or quantitatively in terms of their weight concerns (assumption 3). For example, quantitatively the proportion of individuals that are concerned about their weight may differ across socioeconomic groups, or qualitatively, respondents across socioeconomic groups may express different types of weight concerns.

The first assumption is well established, therefore, this review will concentrate on studies that, as a minimum, investigate psychosocial factors (assumptions 2 and 3). This focus will allow a detailed review of the studies most relevant to the objectives of this PhD investigation.

It became apparent that study types differed in the extent to which they facilitated understanding the contribution of psychosocial factors to inequalities in food

choices. Studies were categorised into five types according to their focus and design features. Both quantitative and qualitative studies were able to be classified according to this structure. The study types labelled A to E are presented in *Figure 2.2*.

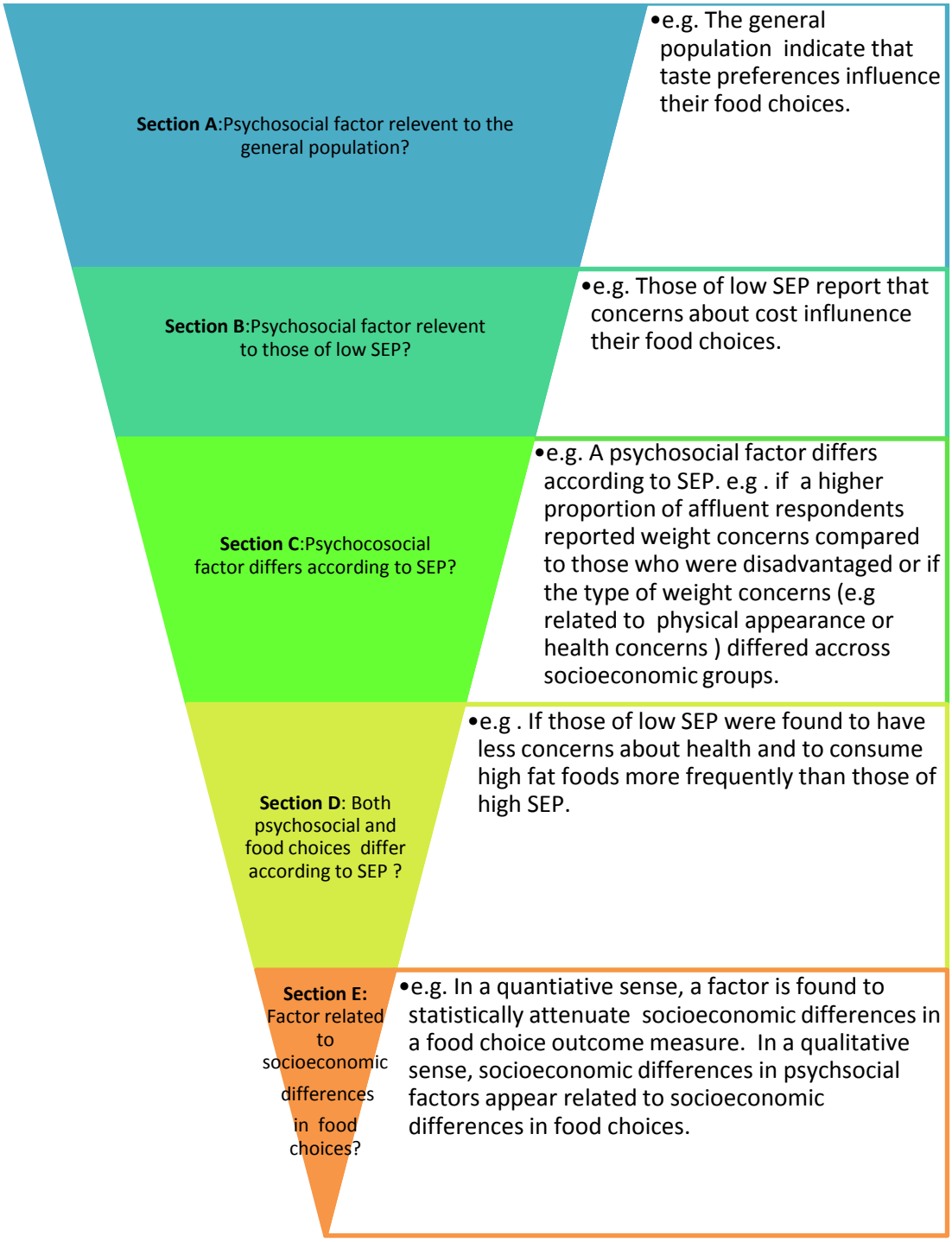


Figure 2.2.Spectrum of focus of studies investigating psychosocial factors as potential contributors to socioeconomic inequalities in food choices.

The majority of research derived from the literature review was located in the upper parts of the funnel (i.e. sections A and B). These studies considered the influence of psychosocial factors on food choices among the general population (Section A) and among disadvantaged populations specifically (Section B). Study types A and B are useful for identifying and providing background information on psychosocial factors relevant to inequalities in food choices.

The studies located in section C of the pyramid, are more directly relevant to the goals of this research, as they assess whether psychosocial factors vary according to SEP, an essential element if they are to contribute to socioeconomic differences in food choices. The lowest portions of the funnel, sections D and E, represent the body of research that is the least developed, yet most relevant to the objectives of this research. That is, studies that consider socioeconomic differences in both psychosocial factors and food choices and hence, allow for the influence of psychosocial factors on inequalities in food choices to be assessed.

This literature review will incorporate substantive findings from all study types presented in *Figure 2.2*. In addition, a separate section will discuss in more detail some important methodological features of the studies assessed and how these have influenced the current state of knowledge in this area. Particular attention will be paid to the research scope and methodological characteristics of the study types most relevant to this PhD research, that is, studies that as a minimum explore socioeconomic differences in psychosocial factors (Sections C, D and E of *Figure 2.2*.). The substantive and methodological review of previous studies presented in this chapter was integral to determining the approach required to advance knowledge in this field as will be demonstrated in the methodology chapter (Chapter 3).

2.4 SUBSTANTIVE FINDINGS OF THE LITERATURE REVIEW: IDENTIFICATION OF PSYCHOSOCIAL FACTORS THAT MAY CONTRIBUTE TO SOCIOECONOMIC DIFFERENCES IN FOOD CHOICES

In order to be considered in this review, psychosocial factors had to be relevant to making food choices, and to have been subject to socioeconomic comparisons in at

least a single publication. Twenty-two psychosocial factors were identified as meeting these criteria.

Some models devised to explain food choices in the general population present a categorisation of psychosocial factors into themes (two examples of such models are included in Appendix B) [78-80]. However, none provided sufficient categories to comprehensively group the 22 factors identified in this review. It was further determined that categorisation of factors could produce artificial distinctions between factors, which may be misleading. For example, cost concerns, weight concerns and convenience concerns are all 'concerns', but there is no evidence to suggest that these factors have more in common in relation to food choices compared to other factors such as nutrition knowledge or health beliefs. In addition, across the literature there was little consistency in terms of the concepts referred to when authors used terms such as beliefs, attitudes, perceptions, motivations, values or concerns. This added further complexity to any attempt to categorise psychosocial factors. In light of these issues, each psychosocial factor identified is listed separately in Box 1 and addressed separately in the ensuing discussion of the literature.

The titles assigned to refer to each psychosocial factor presented in Box 1 were devised to be encompassing, to give a broad overview of the types of psychosocial factors considered, rather than depicting every possible variant of each psychosocial factor. For example, the title 'nutrition knowledge' was used to include studies that considered any or all components of nutrition knowledge, including: knowledge of the relationship between diet and disease, knowledge of the nutrient content of foods, or knowledge of dietary guidelines. As much as possible, the titles assigned to psychosocial factors were identical to the terms used in the studies that considered them.

When factors could be studied in an objective or subjective manner (e.g. 'objectively-measured' availability, compared to 'perceived' availability), factors are only considered in a subjective manner in this review. This is consistent with the focus of this research on psychosocial rather than environmental factors.

Box 1: List of 22 psychosocial factors identified as potentially contributing to socioeconomic differences in food choices [ab]

Availability/Access to food and shopping
Access to cooking and storage facilities
Convenience/Time
Cooking confidence
Cost concerns
Ethical concerns
Habit/tradition
Health beliefs
Health concerns
Food perishability/Wastage concerns
Mood
'Natural' content of food
Lack of control over food choices
Nutrition concerns
Nutrition label use
Nutrition knowledge
Motivation to achieve or maintain a healthy diet[d]
Preferences of other household members
Quality and freshness concerns
Social support
Taste preferences
Weight concerns

[a] The titles used to refer to psychosocial factors used in this table are generally verbatim from publications reporting on these factors..

[b] Composite factors (e.g. perceived importance of price relative to importance of nutrition [213] were not included in the total of 22 factors).

The following sections will describe what is currently known about each individual psychosocial factor identified from the literature review. Three subsections are provided for each factor reflecting the different levels of information available from the study types shown in *Figure 2.2* (page 16). These sections include:

- **Definition and background**
  A description of the psychosocial factor and known relevance to food choices in the general population, and, where informative, evidence from studies considering only those of low SEP.

- **Evidence of socioeconomic differences**
  Summary of socioeconomic differences observed in relation to the psychosocial factor. Followed by, additional evidence from studies that as well as considering socioeconomic differences in the psychosocial factor, also assess a food choice outcome (when these study types had been conducted in relation to the factor).

- **Descriptive information***
  Descriptive information regarding socioeconomic differences in the factor. This section predominantly includes qualitative studies. Some studies considering only those of low SEP are included when they provide descriptive information relevant to understanding inequalities in food choice.

* Due to a dearth of qualitative studies in this field descriptive information was not available for all psychosocial factors. Therefore, this third section is only included for factors for which this information was available.

2.4.1 Availability/access to food and shopping

Definition and background

The term 'access' is commonly used in reference to the number, proximity, size, or opening hours of shopping outlets in a given area [64, 65, 106, 164, 214] or the distance of travel required to access the nearest shopping facilities [70, 215]. In contrast, 'availability' is commonly used in reference to the quality, price and presence or absence of particular food types within shops [65, 134, 165, 216, 217]. Studies commonly intertwine factors related to cost or 'affordability' in their consideration of availability and access [58, 70, 83, 106, 216, 218]. However, cost factors will be considered separately to access/availability factors in this literature review.

In accordance with the focus of this thesis, this review is concerned with perceived food access and availability rather than objective measures [64, 65, 68, 71-76, 106, 164, 214, 219, 220]. Perceived availability of food has been found to influence food

choices among the general population [114, 221, 222] and among those of low SEP specifically [61, 106, 223]. Typically, those who perceive that they have better access to healthy food are found to purchase/consume healthy food more frequently [224].

Evidence of socioeconomic differences in availability/access to food and shopping

Nine studies (six quantitative, three qualitative) investigated socioeconomic differences in perceptions of access or availability of shopping facilities and/or food[3] [58, 61, 106, 107, 114, 134, 135, 188, 195]. Most of these studies found the food choices of those of low SEP to be influenced by availability and access concerns to a greater extent than those of high SEP; however, three studies found no socioeconomic differences with regard to this factor [61, 107, 195].

The features of all nine studies were examined in an attempt to understand the incongruent study findings. Underlying demographic differences in the socioeconomic groups compared may have contributed to differences in study findings, especially since few studies provided stratified results. Therefore, the gender composition of the socioeconomic groups compared in each study was considered. Females are known to be the 'gate-keepers' of the food that enters a household [133-135, 188, 225]. Therefore, it may be that availability/access concerns are less likely to be reported as having an important influence on food choices by males as they may be less commonly responsible for obtaining food. Consequently if a higher proportion of those of low SEP in a sample were male (compared to the proportion among those of high SEP) this could explain why those of low SEP were not found to exhibit greater food availability or access concerns compared to those of higher SEP. Differences in the gender distribution across

[3] The Food Choice Questionnaire (FCQ) asked how important it was that the food selected for daily consumption " Is easily available in shops and supermarket" Several studies used the FCQ [78, 194]; however, these studies are not included in this availability/access section because the item was grouped with four other items to form a factor called 'convenience'; therefore, results pertaining to availability/access specifically were not reported. As an aside, this item was not very highly correlated with the other 'convenience' type factors it was combined with in the original study detailing how this measure was designed (0.59 factor loading) [78].

socioeconomic groups in each study did not appear to account for the variation in findings observed.

Socioeconomic differences in access/availability concerns could also be obscured by underlying age differences across socioeconomic groups being compared. For example, elderly or teenage respondents may perceive greater difficulty in accessing food due to mobility or transport concerns [226]. Across studies there was little evidence to suggest that differences in the age profile of the socioeconomic groups compared accounted for the differences in study findings.

Findings also did not appear to differ consistently according to the measures of SEP used or the food choices referred to. The factor that did stand out as being an important influence of study findings was the way that food access or availability concerns were measured. It appeared that the studies that found socioeconomic differences in concern regarding food access/availability, measured this factor in specific and anchored terms. For example, these studies asked about availability/access concerns in relation to specific food types (e.g. fruit and vegetables) [58, 114, 134] or to particular access or availability concerns (e.g. ability to obtain childcare to allow access to stores, or perception of access to transport)[188]. The studies that did not find socioeconomic differences in food access/availability concerns tended to refer to this factor in a more general sense [61, 107, 195]. For example, comparing whether the proportion of respondents that ranked 'availability' as being one of the top 3 factors influencing food choices (among a list of 15 factors) differed across socioeconomic groups [195].

Two studies considered availability/access concerns in mediation analyses; however, both studies included this factor in a block with numerous other factors, which the authors classified as 'environmental' (including cost concerns) [106]. Therefore, it was impossible to ascertain the individual mediating effect of this factor. The block of variables in which perceived access/availability was included, was found to mediate socioeconomic differences in food choices in one study [106], but not in the other [107].

Descriptive information regarding socioeconomic differences in availability/access concerns

Qualitative research among those of low SEP has provided descriptive information on the way access concerns are prioritised among other psychosocial factors influencing food choices. For example, in a low income sample, access concerns were found to influence food choices decisions to a lesser extent compared to time concerns [227]. In addition, qualitative research provides insight as to the type of access concerns experienced by those of low SEP and their relative prioritisation. Among access factors, physical access to food purchasing outlets has been described as being less influential in food choices compared to access factors such as managing transportation and childcare, among those of low SEP [227].

2.4.2 Access to cooking and storage facilities.

Definition and background

Multiple studies have sought to identify the main influences on food choices in the general population [78-80, 189]. The literature review did not identify any studies of the general population wherein access to cooking and storage facilities was identified as a dominant determinant of food choices.

Evidence of socioeconomic differences in access to cooking and storage facilities

Two studies were located that assessed differences in concern regarding access to cooking and storage facilities across socioeconomic groups. These studies both considered household income as the socioeconomic indicator, and found those of low income to be more concerned about access to cooking and storage facilities compared to those of high income [107, 188]. In the study that considered a food choice outcome measure, those with lower levels of household income were found to engage in food purchasing choices less consistent with dietary guidelines [107]. Namely, those with lower levels of household income consumed a more narrow variety of fruit and vegetables, and consumed this food group less frequently compared to respondents who were more affluent.

2.4.3 Convenience/time concerns

Definition and background

The term 'convenience' has been used to refer to the ease of conducting many activities involved in the procurement and preparation of food. Studies that consider time concerns as a specific aspect of convenience focus on issues such as time available to go shopping, to prepare food, and to manage food choices in light of work commitments [55, 228, 229]. In general, convenience concerns are assessed using several items (relating to time and other convenience issues), which are combined to form a convenience concern score. Some composite items include those that ask respondents about the priority given to: making time for food shopping,; making time to cook, choosing foods that are easy to prepare and quick to cook and choosing foods that can be purchased locally [14, 78]. Regardless of how it is measured, convenience has been reported to influence food choices [14, 55, 78, 189, 223, 228-231]. However, research regarding whether convenience concerns contribute to food choices less consistent with dietary guidelines is inconclusive [232].

Evidence of socioeconomic differences in convenience/time concerns

Seven quantitative studies assessed whether convenience/time concerns varied according to SEP using a variety of survey items and socioeconomic indicators. The findings from these studies were inconsistent. Almost equal proportions of these studies found convenience/time concerns to be more common among those of low SEP [189, 194] or to be more common among those of high SEP [188, 229, 233]. The remaining studies found the importance of convenience concerns to be related to some socioeconomic indicators but not others [195] or to be unrelated to SEP [78].

The way convenience concerns were measured (i.e. whether convenience was enquired about in general or whether time concerns were focused upon), the socioeconomic indicator used or the region of data collection did not appear to be related to the study findings. No studies were located that investigated whether convenience/time concerns mediated socioeconomic differences in a food choice outcome measure.

Descriptive information regarding socioeconomic differences in convenience/time concerns

Qualitative research provides further insight into the importance and nature of convenience concerns across socioeconomic groups. In particular, such research has found no differences in the degree to which women residing in different socioeconomic areas express that time concerns influence their food choices [61, 134]. However, the nature of such concerns has been found to vary, with those of middle and low SEP expressing more time concerns regarding work and those of high SEP expressing more time concerns related to family commitments [61]. However, in the study where this observation was made, a lower proportion of those of high SEP were working compared to those of lower SEP [61]. Therefore, the finding regarding work-related time concerns is as would be expected in this context.

These qualitative study findings highlight the possibility that convenience and time concerns may be differentially related to SEP, depending on the measure of SEP used. For example, those with low levels of education may seek convenient food options because they do not have cooking skills [145, 234], while for those in employment compared to those who are unemployed, time may be more important in food choices [235, 236]. Therefore, the practice of combining elements of convenience and time in the measures used in studies and the use of different indicators of SEP may help to explain the lack of consistency in quantitative studies considering this topic.

2.4.4 Cooking skills/ confidence

Definition and background

Internationally, it has been noted as a goal by government and medical authorities to improve cooking skills and confidence with an aim to improve diet quality [234, 237-239]. Those of low SEP have been found to use cooking techniques that do not enhance compliance with dietary guidelines [240]. In interventions conducted with those of low SEP in particular, improving cooking skills has been found to improve diet quality and cooking confidence [234].

Evidence of socioeconomic differences in cooking skills/confidence

Increased cooking confidence was associated with higher levels of income [145, 196], education [145] and social class/occupation [196]. A single study was located that measured a food choice outcome (vegetable purchasing) and SEP in addition to cooking confidence [145]. However, since no differences in vegetable purchasing were observed according to SEP, it was not investigated whether cooking confidence mediated socioeconomic differences in food choice [196].

Descriptive information regarding socioeconomic differences in cooking skills/confidence

Cooking skills appear to be acquired in different ways across socioeconomic groups. Those of low SEP have been found more likely to develop skills from cooking classes, while those of high SEP have been found more likely to develop skills from cook books [196]. Across socioeconomic groups, the mother is known to have a dominant role in imparting cooking skills [196].

2.4.5 Cost concerns

Definition and background

In a similar manner to how availability/access concerns were addressed, this investigation is concerned with the influence of respondents' perceptions of food costs on food choices, rather than the influence of objectively measured food costs. Perceived cost concerns are usually studied specifically in relation to the cost of food [55, 78, 189] rather than other expenses related to food choices such as food transportation [188, 223, 241]. Among the general population, cost concerns are frequently associated with dietary choices; however, they are rarely noted as a main determinant in food choices [55, 57, 78, 189]. In contrast, in studies conducted among only those of low SEP, cost concerns are often noted as a dominant influence on food choice decision making [83, 242, 243].

Evidence of socioeconomic differences in cost concerns

Cost concerns were considered more commonly than any other psychosocial influence in relation to inequalities in food choices [58, 62, 78, 106, 107, 114, 189, 194, 195, 213, 241, 244, 245]. Approximately half of the studies located used

household income as a socioeconomic indicator, while the remaining studies used occupation [194, 195], education [58, 77, 106, 244, 245] or employment status [244].

The type of cost concerns considered in relation to SEP were concern regarding the cost of: food in general [62, 78, 189, 194, 195, 241, 244], healthy food in general [213], specific recommended foods [114], fruit and vegetables [58, 106, 107] or take-away food [106]. In all instances apart from one[4], those of low SEP reported cost concerns as being more influential in their food choices compared to those of high SEP.

These findings are consistent with studies that use scanner data to assess socioeconomic differences in food purchasing [81, 82]. Such studies have found those of low SEP, or who live in areas of relative disadvantage, to be more likely to purchase products that tend to be cheaper, for example: no brand products [81, 82], bulk products [82] or lower quality but cheaper products (e.g. mince meat with higher levels of fat) [82] compared to those of higher SEP. The authors surmise that this indicates that those of low SEP are more influenced by cost concerns when making food choices. The contribution of this type of economic data to health research is often overlooked; however, it has value in its objectivity and ability to capture a large amount of data both in terms of the number of individuals and the number of goods that can be surveyed [246]. These findings are also consistent with a number of studies that find those of low SEP to experience higher levels of concern and stress about financial matters in general compared to those of higher SEP [245, 247].

Six studies purported to investigate the attenuating impact of cost concerns on inequalities in food choices. Three of these studies were conducted in Australia [62, 106, 114][5] and three were conducted in Europe [58, 77, 245]. Half of these studies, were unable to assess whether cost concerns specifically mediated socioeconomic differences in food choices, due to the modelling approach used [58, 77, 106].

[4] Household income was not associated with whether recommended grocery items were perceived to be more expensive than regular items [114].
[5] Two of these studies using the same dataset but used different cost concerns variables [62, 114].

Specifically, in these studies cost concerns were not included in models separately, but only included with a block of other (sometimes unrelated[6]) factors [58, 77, 106].

The block variable approach may have also resulted in the socioeconomic indicator selected for analyses perhaps not being the most relevant to cost concerns, with each of these studies using education as the socioeconomic indicator (a single study also used income [106]). Using a socioeconomic indicator less relevant to cost concerns would reduce the likelihood of this factor being seen to mediate socioeconomic differences in food choices [62][7].

Of the studies that included cost concerns separately in models assessing mediation, two studies found cost concerns to mediate socioeconomic differences in food choices [62, 245], while the remaining study did not [114].

Therefore, differences in study findings are likely due to differences in the measurement of cost concerns. The studies that found cost concerns to mediate inequalities in food purchasing both used general cost concerns measures. One study used a measure constructed from three items (e.g. agree or disagree with the statement "When buying food for my family my choice is influenced by the price of the food")[62]. The other study considered financial concerns in general, based on two questions which were, 'Have you had any difficulty getting by on the household income?' (scored 1–4, 1= 'No difficulty whatsoever' to 4 = 'Great difficulty') and 'How is the current financial situation of the household?' (scored 1–5, 1 = 'Have to go into debt', 5 = 'Still have a lot of money left')[245].

[6] Often the block of variables were unrelated, for example, the study conducted by Hupkens [77] included cost concerns in a block of variables that also included 'permissiveness' (that refers to the level to which food is restricted) and health concerns. Therefore, they were measuring the attenuating impact of psychosocial factors in general rather than cost concerns specifically.

[7] Two of the studies found the block of variables (in which cost concerns were included) to mediate socioeconomic differences in food choices; however, both emphasised that this was to a very small extent [58, 77]. These findings that psychosocial factors had negligible impact on reducing inequalities in food choices may in part be due to the methodological features of the studies, including the selection of socioeconomic indicator and food choice outcome measure. For example Giskes [58] used fruit and vegetable consumption, whereas findings may have differed had other food choices been considered. These findings emphasise the desirability of having a theoretical basis for model specifications [62].

The study that did not find that cost concerns mediated socioeconomic differences in food purchasing assessed cost perceptions in relation to 14 specific grocery foods [114]. For each food, respondents were asked whether they felt the choice consistent with dietary guidelines (e.g. high fibre bread) cost more than the 'regular' option (e.g. white bread), or whether they felt that they cost the same. Responses for all 14 foods were combined to form an index reflecting the extent to which respondents felt that the dietary guideline recommended version of foods cost more than 'regular' options [114].

In summary, cost concerns constituted the most frequently researched psychosocial factor in studies investigating socioeconomic differences in food choices. However, few studies had research designs that enabled consideration of the individual attenuating impact of cost concerns on inequalities in food choices. The findings from studies assessing mediation varied according to the conceptualisation and measurement of cost concerns. Specifically general financial concerns [245] and concern regarding the cost of food [62] mediated socioeconomic differences in food choices, while concern regarding recommended items having a greater cost than regular items did not [114].

Descriptive information regarding socioeconomic differences in cost concerns

Three qualitative studies (one Australian [61], one Dutch [134] and one British [135]) compared the influence of cost concerns specifically, across socioeconomic groups. Both the Australian and Dutch studies used area level SEP to classify respondents [61, 134], while the British study primarily used respondent occupation [135]. All studies concurred with many of the quantitative studies in finding respondents of low SEP more likely to express cost concerns compared to those of high SEP. However, the studies elaborated on the specific cost-concerns expressed across socioeconomic groups. Specifically, those of low SEP were reported to be more likely to express cost concerns regarding the cost of healthy foods in general or regarding specific healthy foods such as vegetables, compared to their more advantaged counterparts [61, 135]. These qualitative studies also found that cost concerns were prioritised ahead of other influences on food purchasing by those of

low SEP [61, 134, 135]) (further discussion of socioeconomic differences in the prioritisation of psychosocial factors is presented in Section 2.5).

2.4.6 Ethical concerns

Definition and background

Ethical concerns in relation to food choices pertain to animal and ecological welfare, religious beliefs and country of origin concerns [118, 248, 249]. While members of the general population have noted this factor as influencing food choices [249], it has not been reported whether this factor either enhances or hinders compliance with dietary guidelines.

Evidence of socioeconomic differences in ethical concerns

The three studies investigating socioeconomic differences in ethical concerns delivered mixed findings. This factor was not found to differ according to education [118] or income [78]. However, this factor was associated with occupation, with a higher proportion of those in more prestigious occupations indicating that ethical concerns influenced their food choices, compared to the proportion of those in less prestigious occupations [194]. No studies appear to have studied socioeconomic differences in ethical concerns and considered a food choice outcome.

2.4.7 Habit/tradition

Definition and background

'Habit' is often defined as automatic and mindless behaviour [250]. Many studies of the general population have found respondents attribute their food choices at least in part to habit [55, 78, 250, 251]. In the context of food choices the term 'tradition' often refers to foods that may be consumed by particular ethnic or cultural groups [252] or foods that were consumed in childhood [157]. Those who have been exposed to traditional foods in childhood have been found more likely to make traditional food choices later in their life, compared to peers who were not exposed to traditional foods [252]. Often adults are nostalgic about the foods consumed in childhood and express a preference for these foods in later life [157]. Such choices

may pertain to particular types of foods (e.g. particular vegetables), brands of foods (e.g. a brand of tea) or variety of product (e.g. full cream milk).

Evidence of socioeconomic differences in the influence of habit/tradition on food choices

The three quantitative studies that considered socioeconomic differences in themes related to habit and tradition were all conducted in the UK [78, 194, 195]. All found those of low SEP to be more concerned about habit/familiarity in their food choices compared to those of high SEP.

Two studies used 'The Food Choice Questionnaire' [78] and used the term 'familiarity' to describe the theme measured [78, 194]. The 'familiarity' measure was constructed from three items with respondents rating their agreement that it was important that the food they ate on a typical day: "Is what I usually eat", "Is familiar" and "Is like the food I ate when I was a child" [78, 194]. In these studies regardless of whether occupation [194] or individual income [78] was considered, those of low SEP indicated that familiarity was more important in their food choices, compared to those of high SEP.

The third study referred to the theme they measured as 'habit'[195]. Respondents were asked to nominate which three of a list of 15 factors influenced their food choices to the greatest extent and among these factors 'habit' was listed. The study found higher proportions of those with low levels of education and in less prestigious occupations nominated habit as an important influence on their food choices [195] compared to those who were more affluent. It does not appear that any studies have measured socioeconomic differences with regard to this theme while also measuring a food choice outcome measure.

Descriptive information regarding socioeconomic differences in habit/tradition

Qualitative studies have found those of low SEP more likely to favour traditional eating practices [135] or foods [61, 93]. Socioeconomic differences in 'neophobia' (reluctance to try new foods) appears to have only been investigated in a single study of teenagers; however, this study provided some evidence to suggest that those of low SEP were less inclined to try new foods than those of high SEP [253].

This reluctance among those of low SEP to try new foods, and preference for tradition may contribute to the lower uptake of new foods options that comply with dietary guidelines, for example, reduced fat products [108].

2.4.8 Health beliefs

Definition and background

Both health concerns and health beliefs have been considered as potential influences on food choices among the general population [254-257]. For the purposes of this thesis the term 'health beliefs' is used to refer to an individual's prioritisation of their health relative to other life concerns [118] and to specific beliefs about health [95]. In contrast, the term 'health concerns' is used in reference to consideration of the extent to which health concerns influence food choices. Weight concerns are considered separately to health concerns in this thesis, due to weight concerns not necessarily being related to health concerns [258, 259].

'Health beliefs' or 'health as a value' are terms often used in reference to the prioritisation that an individual places on health relative to other considerations in their life [260]. Some examples of health beliefs investigated in the general population include:

- Beliefs about the degree to which adverse health outcomes can be prevented [254];
- Perceptions of one's level of control over their own health (health locus of control) [254-257], including belief in the role of chance on health [95];
- Belief in the relationship between diet and disease [261];
- Belief in one's ability to perform health related behaviours (self-efficacy);
- The personal evaluation of one's own health status [95, 245] and life expectancy [95].

Many of these beliefs are components of The Health Belief Model, devised to explain health behaviours in the general population [169]. A number of these

beliefs have been associated with food choices more consistent with dietary guidelines in the general population [262].

Evidence of socioeconomic differences in health beliefs

Socioeconomic groups have also been found to differ in a range of health beliefs, therefore, only a selection will be noted here. Compared to those of high SEP, those of low SEP have been found to:

- Rate their health status less favourably [10, 20, 95, 263-265]* and have lower perceived life expectancy [95]*.
- Be less likely to believe that individuals can influence their own health (health locus of control) [266] and be more likely to perceive health outcomes to be beyond their control [95]*.
- Be less likely to believe that individually they are capable and effective at influencing their own health (self efficacy) [264].
- Be less likely to believe that, diet influences health [100].
- Be less likely to think about the future [95] or about things they could do to improve their health [95]*.

Few studies appear to have assessed socioeconomic differences in health beliefs and in addition considered a food choice outcome. The beliefs listed above that have been associated with both SEP and a food choice outcome measure are noted with an asterisks (*).

Descriptive information regarding socioeconomic differences in health beliefs

Qualitative studies including those of only low SEP have provided supportive information to the studies presented above that find socioeconomic differences in health beliefs. Specifically this population has been found to present a 'disconnect' between diet and health, often tending to attribute health outcomes to external causes rather than causes within their individual control [243, 267]. With regard to health risks such as being overweight, those of low SEP have been found more likely

to be concerned about aesthetics, physical function or social ostracisation rather than long term health consequences [267].

2.4.9 Health concerns

Definition and background

Studies in the general population typically assess the extent to which health concerns influence respondents' food choices using a Likert scale [78, 189, 231]. These scales assessed either the level of agreement that health influenced food choices or the level of importance placed on health when making food choices. For example, in a UK study respondents were asked to indicate the extent to which daily food choices were influenced by health on a scale of 1–4 ranging from 'not at all important' through to 'very important' [78]. Taking health considerations into account when making food choices was generally associated with making food choices more consistent with dietary guidelines in these studies considering the general population [55, 78, 189, 231, 268].

Evidence of socioeconomic differences in health concerns

Seven quantitative studies considered whether health concerns differed according to SEP, measured by either education [76, 77, 195] occupation [95, 188, 194, 195, 244] or income [78, 188]. Three of these studies additionally included a food choice measure, with two studies considering whether health concerns mediated socioeconomic differences in food choices. Due to the diversity in how health concerns were measured, and resulting inability to group studies according to this criterion, the four studies that did not consider a food choice measure will be described first, followed by the three that did.

The four studies that assessed socioeconomic differences in health concerns across socioeconomic groups (without assessing mediation in food choices) used various measures of health concerns. The first study used a basic measure of health concerns by assessing whether the proportion of respondents nominating 'eating a healthy diet' as being among the three most important factors in food choice (among a list of 15 factors) differed according to education or occupation [195]. A

higher proportion of respondents with high levels of education and in more prestigious occupations were found to nominate health as one of the three main influences on food choices, compared to their less advantaged counterparts [195]. The second study also used a relatively simple method of assessing health concerns asking respondents to indicate whether they agreed or disagreed that they were concerned about what they ate (the authors describe this as assessing health concerns) [188]. The study found those in more prestigious occupations and with higher incomes to be more concerned about what they ate compared to those in less prestigious occupations and concluded from this that the former group was more concerned about their health when making food choices [188].

The third and fourth studies both used the Food Choice Questionnaire [78, 194]. This questionnaire includes six items that enquire about the influence of health considerations on food choices. Respondents are asked to rate the importance of the health consideration included in each item on a scale of 1–4 ('not at all important' to 'very important'). Responses were then combined to form an 'importance of health' score. In both studies, no socioeconomic differences were observed with regard to this overall importance of health score.

The characteristics of these two studies require consideration. These studies both used individual measures of SEP, namely occupation [194] and personal income [78]. Therefore, since both the psychosocial factor and socioeconomic indicator were measured at the same level (individual) it seems unlikely that these contrary findings were due to a mismatch between psychosocial factor and socioeconomic indicator as appeared to be the case when null findings were observed in other studies [77, 107]. Both studies used the Food Choice Questionnaire (FCQ); therefore, it could be something about this measure that resulted in health concerns not being observed across socioeconomic groups.

Another distinctive feature of these studies was that use of samples that were approximately half male and half female [78, 194]. Neither study provided gender-adjusted results showing the relationship between health concerns and SEP due to this not being possible with the statistical techniques used (chi-square test [78] and

independent sample *t*-test [194][8]). Since gender is known to be associated with both health concerns [269, 270] and SEP [271, 272] not adjusting for this factor may have influenced the observed relationship (or lack of a relationship) between health concerns and SEP.

The next three studies to be discussed all considered socioeconomic differences in a food choice outcome in addition to measuring health concerns. The first study of this type assessed health concerns using more questions, but the questions pertained to health concerns in a broader context to the previously described studies [95]. The investigation assessed health concerns in terms of the propensity to think about doing things to stay healthy, extent of cognition about the future, perceived life expectancy, perceived health and belief in the influence of chance on health [95]. Those in less prestigious occupations were found to think less frequently about things to do to improve their health, to think less about the future, and to have lower perceived life expectancy and lower perceived health [95]. In addition, those in less prestigious occupations were found to have more fatalistic views regarding health and were more likely to perceive health outcomes to be beyond their control [95]. Frequency of consumption of fruits and vegetables were associated with occupation and with many of these health concerns. However, the authors did not statistically consider the attenuating impact of health concerns socioeconomic differences in the food choice measure [95].

The final two studies considered did take this extra step in assessing whether health concerns mediated socioeconomic differences in food choices. Education was used as the socioeconomic indicator in each case [76, 77]. In both studies while health concerns were asked in relation to food purchasing, mediation was assessed with regard to food intake, considering either consumption of fruit and vegetable (serves per day) [76] or fat and fibre (grams per day) [77]. The studies measured health concerns in a similar fashion, either asking respondents to indicate on a scale of 1–5 the <u>importance</u> of health when shopping ('a little' to 'very') [76] or the <u>frequency</u>

[8] One study did conduct multiple linear regression models regarding some psychosocial factors, but health concerns was not subject to this due to being discarded from further analyses on the basis of the *t*-test results, which by virtue of their nature cannot adjust for gender [194].

health was taken into account when shopping ('never' to 'always') [77]. The study that asked about importance of health when shopping did not report on the relationship between SEP and this factor [76], the study that asked about the frequency with which health was taken into account when food shopping found that higher levels of education were associated with greater frequency of taking health into account when food shopping [77]. When modelling the association between SEP and food choices, both studies included health concerns in a block with several other variables. In each study the block of variables (including health concerns) was found to mediate socioeconomic differences in food choices [76, 77].

To summarise, in five of the seven studies, those of high SEP were found to be either more cognisant of health in general, and/or to be more influenced by health concerns when making food choices.

Two studies considered whether health concerns mediated socioeconomic differences in food choices. Education was used as the socioeconomic indicator in each case [76, 77]. In both studies health concerns were asked in relation to food purchasing. In contrast, in these studies mediation of socioeconomic differences was assessed with regard to food intake, considering either consumption of fruit and vegetable (serves per day) [76] or fat and fibre (grams per day) [77].

Both studies measured health concerns in a similar fashion, either asking respondents to indicate on a scale of 1–5 the importance of health when shopping ('a little' to 'very') [76] or the frequency health was taken into account when shopping ('never' to 'always') [77]. The study that asked about importance of health when shopping did not report on the relationship between SEP and this factor [76], the study that asked about the frequency with which health was taken into account when food shopping found that higher levels of education were associated with greater frequency of taking health into account when food shopping [77]. Both studies when modelling the association between SEP and food choices included health concerns in a block with several other variables. In each study the block of variables (including health concerns) was found to mediate socioeconomic differences in food choices [76, 77].

Descriptive information regarding socioeconomic differences in health concerns

Three qualitative studies considered whether the propensity for health concerns to influence food choices differed across socioeconomic groups [61, 134, 135]. One of these studies did not mention whether socioeconomic differences in health concerns were observed [61], while another noted that health concerns did not differ according to SEP without further elaboration on this issue [134]. The third study described socioeconomic differences in the prioritisation of health concerns relative to other influences on food choices [135]. The authors note that affluent respondents were more likely to report the 'goodness' of food as being a determinant of food choices, in contrast to those of low income where providing a filling meal was the dominant objective [135].

The single qualitative study that did not find socioeconomic differences in health concerns had some unique methodological features that may have contributed to their findings. The study investigated health concerns as an enabler of fruit and vegetable consumption [134]. Both high and low socioeconomic groups were found equally likely to note health concerns as an enabler to the consumption of fruit and vegetables [134]. All respondents in this study (regardless of SEP) indicated that fruit and vegetables were readily available in their household, therefore, perhaps it would not be expected that large differences in the psychosocial factors influencing food and nutrient intake would be observed since household availability was similar (presumably households would not continue to buy a lot of produce that they did not eat). In addition, fruit and vegetables have been found to be reported as healthy food choices among all socioeconomic groups [223] making the response that health concerns promote fruit and vegetables likely to be universal.

However, there is a final methodological characteristic of this study that should not be overlooked in the interpretation of their finding that socioeconomic groups did not differ in terms of their health concerns. A much higher proportion of respondents of high SEP included in the study were male (67%, 16/24) compared to those of low SEP (36%, 9/14). Females are known to have greater concerns regarding health than males [273, 274], therefore, the gender distribution of each

socioeconomic group may explain why health concerns appeared to be of equal influence across socioeconomic groups rather than being of less importance to those of low SEP as found in the majority of existing literature.

2.4.10 Food perishability/ wastage concerns

Definition and background

Concerns regarding food wastage have been reported to influence food choices in the general population [275]. The most commonly reported concern was that food would deteriorate in quality before it is eaten and would then need to be disposed of, resulting in wastage [188].

Evidence of socioeconomic differences in food perishability/wastage concerns

Studies regarding socioeconomic differences in wastage concerns are mixed with some studies reporting wastage concerns to be more common among those of high SEP [188], while others finding this factor to be of greater concern to those of low SEP [107]. In the latter study, concern regarding food storage was noted, not wastage per se; however, it was noted by the author that storage concerns were likely an issue due to concern that food would be wasted [107].

Descriptive information regarding socioeconomic differences in food perishability/ wastage concerns

The study that found those of high SEP provided some useful contextual information for interpreting their results [188]. They noted that those of high SEP reported less issues with regard to carrying or transporting food [188]. They proposed that this may have enabled those of high SEP to purchase more food than they could realistically eat, making wastage more of an issue for this socioeconomic group [188]. They also postulated that those of high SEP may be more likely to purchase foods more prone to perishability, such as fruits and vegetables, compared to those of low SEP [188].

2.4.11 Mood

Definition and background

Through the development of the Food Choice Questionnaire (FCQ), 'mood' was identified as one of nine main influences on food choices among the general population [78]. A factor analyses resulted in a mood scale comprising six items. The items and their factor loadings were reported as presented in *Figure 2.3*:

It is important to me that the food I eat on a typical day: Loading Factor —Mood
Helps me cope with stress 0·79
Helps me to cope with life 0·79
Helps me relax 0·78
Keeps me awake/alert 0·60
Cheers me up 0·60
Makes me feel good 0·57

Figure 2.3. Items that constituted the 'mood' factor scale as reported by Steptoe et al. (1995).

The items presented in *Figure 2.3* collect data on a respondent's self-assessment of the role of mood in food choices. However, in general when 'mood' has been assessed in relation to actual food choices, authors refer to respondents' positive or negative affect [276, 277]. These studies show contrasting results with some finding positive mood increased consumption of foods high in sugar, fat and salt [276], while others finding the reverse to be true [277].

Evidence of socioeconomic differences in the influence of mood on food choices

The studies that have considered socioeconomic differences in the influence of mood on food choices, all used the Food Choice Questionnaire [78, 118, 194]. Therefore, it was respondents' self assessment of the role of mood in determining food choices that was being considered. Respondents with higher levels of, education [118], personal income [78] and in more prestigious occupations [194], were less likely to indicate that mood influenced their food choices compared to their more disadvantaged counterparts. All relationships were graded; however, only the relationship between mood and education and occupation were significant [118, 194].

A single study measured a food choice outcome measure in addition to the perceived influence of mood on food choices [118]. Those with lower levels of education reported making dietary choices less consistent with guidelines in addition to making food choices more based on mood, compared to those with higher levels of education [118]. Analyses were not undertaken to assess the extent to which mood mediated socioeconomic differences in food choices [118].

2.4.12 'Natural' content of food

Definition and background

In the general population food choices have been reported to be influenced in part by concerns regarding the natural content of foods, including the presence or absence of chemicals, additives and preservatives [249, 278].

Evidence of socioeconomic differences in concern regarding the 'natural' content of food

Concern regarding the natural content of foods has not been found to vary according to income [78], although it has been found to vary according to occupation [194]. Those in more prestigious occupations reported that this factor influenced their food choices to a greater extent than those in less prestigious occupations [194].

Descriptive information regarding socioeconomic differences in concern regarding the 'natural' content of food

During the development of the Food Choice Questionnaire [78] correlations were examined among the psychosocial scales constructed. Among all psychosocial scales the strongest correlation was observed between the 'natural content' and 'health' scales [78]. Therefore, while insufficient research has been conducted to establish that concerns regarding the natural content of foods promote healthier food choices, this factor was correlated with health concerns, a factor that is associated with healthier food choices [78].

2.4.13 Lack of control over food choices

Definition and background

In several studies considering the determinants of food choices, respondents indicated that they did not control their food choices. This type of response was particularly pertinent when respondents were discussing reasons why they did not engage in dietary change for example consuming more vegetables or lowering their fat intake [279]. The type of situations that resulted in a perceived lack of control over food choices included when someone else in the household determined all food choices [195], or made all food preparation decisions [279]

In a general population study, 8% of respondents noted this reason as the principal influence on their daily food choices [195]. In a study of only those of low SEP, 6% of respondents provided this response as a barrier to reducing their fat intake [279]. Perhaps as testament to this factor not appearing to be a main influencer of food choices, socioeconomic comparisons of this factor have only been made in a single study [195].

Evidence of socioeconomic differences in lack of control over food choices

In the single study that considered socioeconomic differences in control over food choices, this factor was associated with education [195]. When asked about the determinants of their food choices those with tertiary levels of education were less likely to provide this response compared to those with lower levels of education. However the differences observed were non-significant [195]. It does not appear that socioeconomic differences with regard to this factor have been assessed along with a food choice outcome measure.

2.4.14 Nutrition concerns

Definition and background

'Nutrition concerns' is the term used throughout this review to refer to the collection of studies that investigate concerns about either nutrition in general, or concern regarding the presence of specific nutrients (e.g. salt [205, 280], or fat [281]) when making food choices (the use of nutrition labels specifically is

addressed in a subsequent section). When measuring nutrition concerns in a general sense, studies have used a single question where respondents indicate on a scale (usually scaled 1–5), whether 'nutrition' is 'very important' through to 'not at all important' to them when making food choices [189, 198]. These studies find higher levels of concern regarding nutrition to correspond with food consumption more consistent with dietary guidelines [189, 198].

Evidence of socioeconomic differences in nutrition concerns

Six studies, conducted in either the US [189, 282-284] or the UK [194, 198], investigated socioeconomic differences in nutrition concerns. Most of these studies assessed the importance of nutrition in reference to food choices in general [189, 194, 198, 283], while two studies investigated concerns regarding specific nutrients [282, 284]. The studies that asked about nutrition concerns in general all used a single question to rate the importance of this factor (very important to not at all important). All but one of these studies found no socioeconomic differences in relation to this factor [283]. This study found those with higher levels of education, and those currently employed to be more concerned about nutrition, compared to their less advantaged counterparts [283]. The authors indicate that these findings could reflect different priorities among those who are employed compared to the unemployed; however, they do not describe what these differing priorities may be. There were no obvious methodological differences in this study (compared to others that measured nutrition concerns in a general sense) that would account for the different findings observed.

The two studies that asked respondents about concerns regarding specific nutrients differed in their modelling approach and findings. No socioeconomic differences in nutrient concerns were reported when this factor was assessed as part of a composite variable that combined concerns regarding specific nutrients with weight concerns and concerns regarding meeting several dietary guideline recommendations (e.g. 'choose a diet with plenty of fruits and vegetables')[284]. However, socioeconomic differences in nutrient concerns were observed when concern regarding specific nutrients were considered separately [282]. Specifically

increasing concern about specific nutrients was observed across increasing income and education groups [282]. Nutrient concerns regarding specific nutrients were not associated with employment status [282].

Two studies assessed socioeconomic differences in nutrition concerns in addition to a food choice outcome measure. One study was among those that considered nutrition concerns in a general sense [189]. The authors found those of low income to consume fast food more often than those in higher income groups; however, no socioeconomic differences were observed with regard to fruit and vegetable, cheese, or breakfast cereal consumption [189]. The study did not conduct analyses to assess whether nutrition concerns mediated the observed socioeconomic differences in take-away food consumption, likely because nutrition concerns were not associated with SEP [189]. In contrast, in the study where nutrition concerns (measured as part of a composite variable) were not associated with SEP, the authors proceeded to assess this factor as a mediator of socioeconomic differences in food choices [284]. As would be expected in this context, nutrition concerns were not found to mediate socioeconomic differences in food choices [284].

Due to the relatively simple, non-specific measurement of nutrition concerns in most of the studies concerning nutrition concerns, this factor should not be excluded as potentially contributing to socioeconomic differences in food choices.

2.4.15 Nutrition knowledge

<u>Definition of concern regarding nutrition knowledge and relationship with food choices in the general population.</u>

Nutrition knowledge is acknowledged to have multiple components [49, 50, 62]. Sims [285] describes three elements of nutrition knowledge essential for behaviour change. These include: an awareness of the relationship between diet and disease, knowledge of which foods contain the nutrients necessary for a healthy diet, and an understanding of the nature of healthy dietary practices (hereafter, knowledge of dietary guidelines) [285]. Some authors further differentiate the components of nutrition knowledge, for example, by assessing comprehension of specific terms, such as cholesterol, or by evaluating practical knowledge regarding the

implementation of recommended dietary practices [50, 286]. Rather than focussing on these distinctions, throughout this thesis nutrition knowledge will largely be referred to in terms of the three broad components of this construct articulated by Sims [285].

In studies of the general population higher levels of nutrition knowledge are often associated with food and nutrient intake [190-192]. However, this relationship is not always confirmed [49, 50]. Differences in the focus of nutrition knowledge questions (e.g. focussing on well publicised food choices, such as, fat intake) [50], only measuring some components of nutrition knowledge [49, 62], and the use of unvalidated measures [50] may contribute to inconsistent findings in this area. Nevertheless, a major focus of health campaigns internationally has been on increasing nutrition knowledge, with the aim of improving diet [49, 286]. Supporting continuation of these efforts, interventions to increase nutrition knowledge have been associated with dietary improvement [287, 288].

Relationships observed between nutrition knowledge and socioeconomic position

Ten quantitative studies considered whether nutrition knowledge varied across socioeconomic groups. Seven of these studies reported using measures that captured multiple aspects of nutrition knowledge [50, 57, 62, 76, 289-292]. Several studies did not purport to be measuring nutrition knowledge per se but used measures relevant to known elements of this construct, for example, knowledge of the relationship between diet and disease [57, 62] and/or knowledge of dietary guidelines [62].

Higher levels of nutrition knowledge were associated with area-level SEP [290], education [50, 62, 289, 292], occupation [50, 57, 98, 289, 291], and employment status [289, 290]. That is, those residing in more affluent areas, who had higher levels of education, income, or occupational prestige and/or were employed, exhibited higher levels of nutrition knowledge compared to their less affluent counterparts. The single study that indicated that nutrition knowledge was not related to SEP, used household income as the socioeconomic measure and did not provide any details regarding how nutrition knowledge was measured [241].

Some measures of nutrition knowledge used in these studies had the capacity for subscales to be created reflecting the primary three aspects of nutrition knowledge [62, 286, 289]. This type of information is useful for planning health promotion strategies to target the areas of nutrition knowledge that are most lacking. Two studies assessed socioeconomic differences in terms of individual nutrition knowledge components [290, 291], with most studies reporting only on the composite nutrition knowledge score [50, 62, 289] .

Four of the 10 studies considering nutrition knowledge went beyond simply assessing whether SEP was related to nutritional knowledge, and assessed the degree to which nutritional knowledge mediated socioeconomic differences in food choices using various statistical modelling techniques [50, 62, 76, 292]. Three of these studies were conducted in Australia [62, 76, 292] and the fourth was conducted in England [50]. The studies all considered education as a socioeconomic indicator, and one study additionally considered occupation [50].

The studies varied in terms of whether food and nutrient intake [50, 76, 292] or food purchasing [62] was considered in relation to nutrition knowledge. The food choice outcome measures focused on grocery items [62, 292], fruit and vegetables [50, 62, 76, 292] or fat [50, 292]. All studies found nutrition knowledge to mediate differences in the diet or diet-related outcome measure considered regardless of the measure of SEP used. The one exception was that Ball Crawford [76] did not assess the mediating impact of nutrition knowledge on fruit consumption across education groups, as nutrition knowledge was not related to fruit consumption at the bivariate level of analyses [76]. The fact that nutrition knowledge was not related to fruit consumption (therefore, was not considered in a model assessing mediation) could well be due to differences in the measurement of nutrition knowledge. The two studies that found nutrition knowledge related to food choices (hence proceeded to assess mediation) created indices of nutrition knowledge based on 20–110 items [50, 62]. The study by Ball Crawford [76] that found a dietary outcome (fruit consumption) not to vary according to nutrition knowledge, used a nutrition knowledge measure constructed from only eight items [76].

Respondents were then split into the dichotomous groups 'all correct' or 'one or more incorrect' [76]. Therefore, it is understandable that the dichotomous nutrition knowledge variable constructed was not related to some measures of food choice as it had a reduced capacity to differentiate respondents compared to the nutrition knowledge indices constructed in the other studies.

The forward step-wise block modelling approach used by these authors [76], would have also minimised the variation that was proposed to be related to 'individual' type variables (of which nutrition knowledge was included) in that these were the last 'block' of variables to be added to the models[9]. The inclusion of nutrition knowledge in a block with several other variables made it impossible to determine the extent that nutrition knowledge individually mediated socioeconomic differences in food choices. Therefore, there were several methodological and analytical features that made the study conducted by Ball Crawford [76] less likely to detect socioeconomic differences in nutrition knowledge, and that would have minimised the observed influence of 'individual' type variables, such as nutrition knowledge, in the multivariable models used.

Descriptive information regarding socioeconomic differences in nutrition knowledge

A single study was located that assessed socioeconomic differences in some themes relevant to nutrition knowledge. Coveney [293] investigated differences in lay knowledge of food and health among 40 parents that lived in disadvantaged (N=20) compared to advantaged areas (N=20). The concepts examined relate most closely to knowledge of the relationship between diet and disease and knowledge of recommended dietary practices. Those residing in more affluent areas were more likely to express concern regarding the relationship between diet and health, while those from disadvantaged areas were more likely to express concern about the relationship between outward appearance and physical function [293]. The study also found those of high SEP to use more technical terms when referring to relationships between diet and health and more likely to report awareness of

[9] The authors used a forwards stepwise regression adding environmental, social then individual level blocks of variables to the models. Therefore, the environmental and social blocks of variables had greater capacity to account for variation due to being added earlier to the model.

current nutrition recommendations [293]. These findings are consistent with quantitative findings that find those of low SEP exhibit lower levels of nutrition knowledge compared to those of high SEP [50, 62, 241, 289-291].

Some recent research indicates that nutrition knowledge may be an effect modifier of the relationship between SEP and food choices. Specifically, food choices were only associated with SEP among those with high levels of nutrition knowledge. This indicates that having a high level of education or income may only result in superior food choices when nutrition knowledge is high.

2.4.16 Nutrition label use

Definition and background

Nutrition labels appear on many food products to indicate the content of particular nutrients such as sugar, sodium, fat and fibre [294]. Nutrition labels have been found to influence food choices in the general population [193, 198, 295, 296]. In particular, use of nutrition labels has been associated with food choices more consistent with dietary guidelines, [198, 295, 297] including greater intake of fruit and vegetables [297].

Evidence of socioeconomic differences in nutrition label use

Four studies were identified that were relevant to understanding differences in nutrition label use across socioeconomic groups. However, only two of these studies investigated whether different proportions of socioeconomic groups used labels [298, 299]. Those with higher levels of education [298, 299] and income [299] more likely to report using nutrition labels. The other authors commented on differences in the proficiency of label use and differences in the influence of label use on food choices across socioeconomic groups.

The first study, found 80% of their sample to be 'label readers', however, those with higher levels of education were more proficient at using nutrition labels [296]. Proficiency was assessed using 15 items that were combined to produce three label-reading proficiency sub-scales [296]. The second study found use of nutrition labels to be an effect modifier on the relationship between household income and food

choices [300]. The measurement of nutrition label use was based on a single survey item. The item asked respondents "when you buy foods, do you use the nutrition panel that tells the amount of calories, protein, fat, and such in a serving of a food often, sometimes, rarely or never". Respondents who answered 'often' or 'sometimes' were classified as 'users' all other respondents (apart from those with missing data presumably) were classified as 'non-users' in the analyses. In both high income and low income groups, those who used nutrition labels made food choices more consistent with dietary guidelines than those who did not use nutrition labels [300]. There was a greater distinction in food choices between those who used labels and those who did not in the higher income group. This may indicate that those of high income were more able to act on their reading of nutrition labels; however, those of low income may have had restraints such as cost concerns impacting on whether they could purchase healthier food choices according to their reading of labels. This is plausible given that cost concerns have been found to be more common among those of low SEP [62, 77, 106] (the section on cost-concerns appeared previously) and that food items recommended by dietary guidelines are sometimes found to be more costly compared to 'regular' items [114].

2.4.17 Motivation to achieve or maintain a healthy diet

Definition and background

Much health promotion involves increasing nutrition knowledge and changing health beliefs and attitudes with the presumption that this will motivate the population to make positive dietary changes [78, 171, 188]. In a meta-analysis of studies conducted in the general population the majority of people surveyed (71%) were reported to agree or strongly agree that they did not need to make changes to their diet as it was perceived to already be healthy enough [229]. However, it is known that in many regions a substantial proportion of the population do not meet current dietary guideline recommendations [301, 302]. Therefore, perceptions of the adequacy of diet appear to influence motivation to change the diet and therefore, represent a barrier to making food choices consistent with dietary guidelines.

Evidence of socioeconomic differences in motivation to achieve or maintain a healthy diet

Those of low SEP have been found to be less motivated to maintain a healthy diet or to improve their diet [107, 195, 229], compared to those of high SEP. A single study considering socioeconomic differences in motivation to change the diet also considered a food choice outcome measure [107]. The study found those of low SEP to be less motivated to make dietary changes and to consume a more narrow range of fruit and vegetables, compared to those of higher SEP [107]. No studies were identified that assessed the mediating impact of motivation on inequalities in food choices.

2.4.18 Preferences of other household members

Definition and background

The preferences of other household members (e.g. taste preferences and suitability for children) are acknowledged as important determinants of household food choices among the general population [61, 135, 195, 303, 304].

Evidence of socioeconomic differences in the influence of the preferences of other household members on food choices

Qualitative research has found the male head of the household to exert a more dominant influence on food choices in households of low SEP compared to those of high SEP [135]. Since males are known to prefer less healthy food choices [305], their dominance on food choices in low SEP households has been postulated to contribute to the poorer diets of disadvantaged households [135]. Parents of lower SEP have been found to be more permissive in terms of allowing children to consume foods high in sugar, such as soft drinks, more frequently [77, 306]. However, when permissiveness was examined as a potential mediator of socioeconomic differences in food choices, this factor was only found to have a small attenuating effect [77].

An Irish quantitative study found no socioeconomic differences in the extent to which the preferences of other household members influenced food choices, according to either occupational prestige or education [195]. The type of food choices respondents were asked to consider is likely to have influenced the results

obtained. The study asked respondents about factors that influenced the food that they selected each day for their individual consumption [195]. Therefore, it may be expected that 'other household members' would have been less frequently noted as influencing food choices, compared to if respondents were asked about food choice decisions made for the household.

In summary, there is some evidence to suggest that the preferences of males and children have a greater influence on food choices in households of low SEP compared to more advantaged households. However, this represents an under-studied influence in relation to food choice inequalities.

2.4.19 Quality and freshness concerns

Definition and background

Food quality is known to have an influence on food choices [307]; however, it is not usually identified as a major determinant of food choices in the general population. A single study that included a sample from 15 countries from the European Union, found 'quality/freshness' to be the most important influence on food choice nominated by most respondents in all of the regions surveyed [244]. The factor was listed among 14 other psychosocial factors including habit, price, taste and convenience [244].

Evidence of socioeconomic differences in quality and freshness concerns

The two studies that explored socioeconomic differences in the influence of food quality concerns on food choices produced inconsistent results. However, quality concerns were asked about in different contexts in each study. One study found no differences across household income groups in terms of whether 'quality' was noted as a barrier to increasing fruit and vegetable consumption [107]. The other study found that 'quality/freshness' concerns were noted to be among the three most important influences on food choices for a greater proportion of those with low levels of education compared to those with higher levels of education [244].

The study that found no socioeconomic differences with regard to quality and freshness concerns did find socioeconomic differences in the amount and frequency

of fruit and vegetables consumed [107]. It does not appear that quality and freshness concerns have been assessed as attenuators of socioeconomic differences in food choices.

2.4.20 Social support

Definition and background

Social support has been found to have an influence on food choices among the general population [304, 308]. Those of low SEP have been found to have lower levels of social support in general [309, 310]. However, among those of low SEP, those with greater levels of social support have been found to be more successful in increasing their fruit and vegetable consumption [178, 311]. Therefore, this factor may be a fruitful target for improving the food choices of those of low SEP.

Evidence of socioeconomic differences in social support

Support from friends and family members [76, 245] and social participation [112] have been found to partially mediate socioeconomic differences in fruit and/or vegetable consumption.

2.4.21 Taste preferences

Definition and background

Taste preferences have been found to be among the most influential predictors of food choices in studies of the general population that consider a range of psychosocial variables [55, 78, 157, 189, 193, 229, 231]. In such studies, for a high proportion of respondents, taste was considered more important in determining food choices than factors related to cost [189, 229, 312], nutrition [189], health [191, 312, 313], weight [189], availability [229, 312] and convenience [189, 312]. Therefore, due to the known importance of this factor it will be described here in more detail relative to the descriptions of other factors.

The term ‘food preferences’ is frequently used in reference to a person’s reported liking or disliking of particular foods [16, 314]. As noted by Rozin [315] ‘preference’ implies the availability of more than one option and a subsequent choice between these options. Preferences may be determined by a number of factors including

health concerns, convenience and cost in addition to taste [316]. Therefore, it is possible that an individual might prefer an option that they don't necessarily 'like' the most. As Rozin [315] explains, "a dieter, for example, may prefer cottage cheese to ice cream, but like ice cream better". It is difficult to identify literature that focuses specifically on taste with many studies also capturing other aspects of preference [316]. As this research is primarily concerned with many psychosocial factors that shape preferences, the terms 'taste' or 'taste preferences' will be used throughout the thesis in reference to the investigation of the influence of taste on food choices as distinct to other aspects of preference.

Taste preferences develop very early in life [317], with some evidence to suggest that what a mother consumes during pregnancy can determine the taste preferences of her children [158]. The term "taste' has been used to describe aspects of food including flavour, aroma, texture and hedonic characteristics [316, 318-321] and it appears that people judge whether they like or dislike the taste of particular foods based on such sensory characteristics of the food [322].

There is evidence to suggest that exposure to foods is relevant to taste preference [323]. Specifically, in studies considering infants or children those exposed to particular food tastes (for example, salty foods) or foods (e.g. capsicum) or are more likely to accept or enjoy these foods when they are subsequently given them compared to those who were not exposed, or exposed to such foods less frequently [323, 324]. Therefore, as exposure is relevant to the development of taste preferences it is important to understand the factors responsible for exposure to foods. One concept relevant to food exposure is neophobia, which describes the evolutionary hesitancy of humans to try unfamiliar foods [325, 326]. Strategies to overcome food neophobia and encourage the trial of new or novel foods have been investigated extensively [171, 327, 328]. Among the most effective ways to encourage trialling of new foods is to indicate that the taste is favourable, this has been found to be a greater enticement to trying new foods than information about the food's nutritional or other benefits [329]. Therefore, taste, and taste expectations appear to have an important influence on whether new foods are tried

and adopted, and therefore may influence the uptake of many new foods consistent with dietary guidelines, for example, newly developed reduced fat [330] or low-calorie products [331].

In addition to direct experience, social, cultural [321, 332] and psychological factors (beliefs, attitudes and expectations) [333] inform whether an individual will report liking the taste of a particular food [16, 318]. Such factors include the dietary norms of the social group that an individual belongs to, meanings and symbolism attached to food, and attitudes, beliefs and expectations – particularly regarding certain classes of food (e.g. healthy foods, or ethnic foods) [16]. As noted by Drewnowski [318] few studies investigating taste preferences involve actual tasting of the food, instead preferences are assessed on checklists of food names, therefore, assessing attitudes towards the verbal concept of food, since actual food is not presented to respondents [318].

Marketing can also be important in determining taste preferences [321]. Children have been found to prefer the taste of branded products when presented the same product with and without branding [334]. In addition, children who had previously been more exposed to the product's branding (via television and/or regular consumption of the branded product) were more likely to prefer the taste of that branded product compared to those children who were less exposed to the product branding [334]. Adults' taste preferences also appear to be influenced by branding [335, 336]. Adults have reported greater liking for more popular brands, despite not actually preferring the taste of these products in blind taste tests [335, 336].

Similarly, adults' taste preferences have been found to accord more with their values, than the actual product tasted [337]. For example, the taste evaluations of respondents sampling vegetarian or meat dishes were more aligned with their values rather than corresponding with what they actually tasted [337]. The authors of the study explain "respondents who ate the vegetarian alternative did not rate the taste and aroma less favourably than those who ate the beef product. Instead, what influenced taste evaluation was what they thought they had eaten and whether that food symbolised values that they personally supported [337]. This

type of research exemplifies the complex nature of taste preferences and in particular the psychosocial influences on taste, in addition to physiological phenomena.

Evidence of socioeconomic differences in taste preferences

Seven quantitative studies were located that investigated socioeconomic differences in taste preferences. Respondents were generally asked either whether or not taste preferences influenced their food choices (in general) or to rate the importance of taste preference on food choices. Studies that considered whether or not taste was a factor influencing food choices enquired about the main factors influencing food choices using open-ended questions [61] or asked what were the main barriers to intake of specific foods (e.g. fruit and vegetables) [107]. It was then noted whether there was variation across socioeconomic groups in terms of the proportion of respondents reporting that taste preferences influenced their food choices [61, 107], or in the ways that taste preference was found to influence food choices [61]. In studies that considered the importance of taste preferences, respondents were usually asked about the importance of taste in relation to food choices in general[10], with importance indicated on a likert scale (1–5, not at all important to very important) [78, 189, 194] or by nominating the most important factors influencing food choices from a list of (at least 15) psychosocial factors, which included taste preferences [195, 229].

Across the studies that used these varying methods of assessing the role of taste in food choices, generally no socioeconomic differences were found. Specifically, the influence of taste on food choices was not found to differ according to income [107, 189], occupation [194, 195], education [229], employment status [195, 229] or area-level SEP [61]. Two studies represented exceptions to the overall findings of studies of this type, as they did observe socioeconomic differences in the influence of taste

[10] Glanz [189] asked the importance of taste on food choices made in three consumption situations, namely, for at-home consumption, eating out for lunch and eating out for dinner. However, this is still relatively general compared to studies that consider taste in relation to specific foods or food groups.

on food choices. Specifically, taste preferences were found to be more influential to those of high SEP as measured by either personal income [78] or education [195].

Consideration of the study that did find differences in the importance of taste according to income [78], compared with those studies that did not [107, 189] raises some important methodological considerations. In one of the two studies in which the influence of taste was not found to vary according to income, a household-level measure of income was used [107]. In contrast, in the study that did find the influence of taste to be associated with income, an individual-level measure of income was used [78]. It is intuitive that a factor measured at the level of the individual might display a stronger relationship with a socioeconomic indicator also measured at the individual level (compared to household or area-level), thus differences in the socioeconomic indicator selected between studies may have contributed to the contrasting study findings observed[11]. The other study that found the influence of taste to be unrelated to SEP did use an individual-level measure of income [189]; however, the socioeconomic analyses were based on a Pearson's Correlation Co-efficient, therefore, these analyses were unadjusted for potential confounders such as gender or age, which are known to be related to both taste preferences [205, 338-341] and SEP [91, 271]. Therefore, differences in controlling for extraneous but confounding factors, may have contributed to the observed inconsistencies in study findings.

The second study that did find socioeconomic differences in taste preferences used a substantially different methodology compared to the other studies described [16]. The study examined socioeconomic differences in reported liking for specific foods. Data regarding reported liking (or disliking) for 15 food options recommended by dietary guidelines (e.g. wholemeal bread and unsweetened fruit juice) was used to create an index reflecting respondents liking for foods recommended by dietary guidelines. On average, those in the lowest income group liked less food choices recommended by dietary guidelines, as reflected by lower healthy food preference

[11] The studies also differed in terms of whether barriers to fruit or vegetable intake were referred to [107] or influences on daily food selection in general [78], which may also have contributed to the different study findings.

index scores [16]. The study also measured respondents' food purchasing behaviours and therefore, was able to investigate whether taste preferences for healthy foods mediated the observed socioeconomic differences in the purchase of recommended grocery foods. Taste preferences for 'Recommended' foods were found to mediate socioeconomic differences in food purchasing by approximately 10% [16].

Due to the limited number of studies investigating socioeconomic differences in the influence of taste preferences it is not possible to draw firm conclusions regarding the likely contribution of this factor to socioeconomic differences in food choices. As taste preference is often noted as the most influential factor on food choices [55, 78, 157, 189, 193, 229], and has been found to vary socioeconomically in the single study that considered actual food preference, further consideration of this factor in relation to inequalities in food choices is warranted.

Descriptive information regarding socioeconomic differences in taste preferences

A single qualitative study was located that investigated socioeconomic differences in the importance of taste preferences. The authors asked respondents about their main considerations in "choosing what to buy and/or cook for meals at home?" with the preferences of family and others being prompted specifically once participants had initially responded. The findings of this study were consistent with the bulk of the quantitative studies in finding no socioeconomic differences in the importance of taste in food choices.

2.4.22 Weight concerns

Definition and background

Studies have measured 'weight concerns' or 'weight control' in a number of ways. Many studies addressing 'weight concerns' as a primary focus, and particularly those studying populations at risk of eating disorders, use the Stanford Weight Concerns Scale (SWCS) [342, 343]. This scale includes a range of factors pertaining to weight concerns including: fear of weight gain, worry over weight and body shape, importance of weight, dieting history and perceived fatness [342, 344, 345].

Studies of the general population, not specifically concerned with weight concerns use some items similar to those contained in the SWCS or assess weight concerns in alternative ways. An example of a simple means of assessing weight concerns is to ask respondents to rate how important 'weight control' is on a scale of importance ranging from 1–5 [189]. Regardless of the measure used, weight concerns are generally reported to influence food choices in the general population [78, 189].

Evidence of socioeconomic differences in weight concerns

Socioeconomic differences in weight concerns (or body image) appear to have been investigated much more frequently in children or adolescents [346-349] than among adults. The studies that consider adults measure weight concerns in a variety of ways. This diversity provides insight into several aspects of the relationship between SEP and weight concerns; however, it results in few aspects of the relationship being well established. Several studies appeared to have the capacity to evaluate socioeconomic differences in weight concerns but did not do this. For example, some studies found particular weight control practices and concerns to be associated with BMI differentially across socioeconomic groups [38, 350]. However, actual socioeconomic differences in weight control practices were not reported [38, 350]. Another study collected data on the importance of 'slimming' across socioeconomic groups; however, as less than 10% of the overall sample noted 'slimming' as an important factor in food choices, no socioeconomic analyses were undertaken regarding this factor [195]. In total, six studies were located that considered socioeconomic differences in weight concerns. Study findings varied across weight concern measures. Household income groups were not found to differ in the priority given to weight concerns relative to other life concerns [197]. This finding comes from a study that was solely focused on socioeconomic differences in weight concerns and utilised a 15-item scale to assess this factor [197].

The importance of weight concerns in daily food choices was also not found to differ according to either personal income [189] or occupation [194]. Both studies assessing the importance of weight concerns in daily food choices had some

methodological features that may be relevant to these findings. One of the studies did not adjust analyses for any potential confounders, as a Pearson's Correlation Co-efficient was used (despite the authors noting that the importance of weight concerns was associated with both age and gender) [189]. The other study, while adjusting for gender, used a sample where those of high occupational prestige (dentists) were predominantly male, while those of low occupational prestige (porters) were predominantly female [194]. Studies like these where socioeconomic groups are characteristically very different [210], (particularly in a factor relevant to psychosocial factors and food choices, as gender is) make study findings less generalisable as they confuse to an extent whether the findings pertain to socioeconomic groups or to groups distinguished by some other feature (e.g. weight status [210]) .

Socioeconomic groups were found to differ with regard to several specific measures of weight concerns. Specifically, those of high SEP were more likely to express concerns about their weight [197, 351], to perceive that they were overweight [352] and to monitor their weight more closely [352] compared to those of low SEP. More affluent respondents also reported that lower levels of weight change would be required for them to notice or take action [197].

Although only six studies assessed socioeconomic differences in weight concerns, trends in their findings were evident in terms of two study features. First, socioeconomic differences do not appear to be observed when weight concerns are referred to in a general sense, for example, importance in selection of food for daily consumption [189, 194]. However, differences were observed when weight concerns were asked about in more direct and detailed ways, for example, assessing how much weight respondents would have to gain before indicating they would do something about it [197]. Second, the studies that did not find socioeconomic differences in weight concerns both used mixed-gender samples, and either did not adjust for gender [189] or selected a sample where socioeconomic groups had a very different gender profile (i.e. those in the high prestige occupation were mainly male, while those in the low prestige occupation

were mainly female) [194]. The single study that used a mixed gender sample, but in which gender did not appear to be associated with SEP, did find socioeconomic differences regarding weight concerns. The studies that used exclusively female samples also both found socioeconomic differences with regard to some aspect of weight concerns [197, 352]

In summary, across socioeconomic groups, weight concerns appear to have equal priority relative to other life concerns [197]. However, at least among women, those of high SEP are more concerned about their weight [351], just as they may also be more concerned about a number of other factors compared to those of lower SEP. No studies appear to have assessed socioeconomic differences in weight concerns in addition to food choices to allow an analysis of mediation to be performed.

Descriptive information regarding socioeconomic differences in weight concerns

As further evidence that those of high SEP have greater levels of weight concerns compared to those of low SEP, those of high SEP have been found more likely to engage in weight control practices compared to those in less advantaged groups [351, 353]. Compared to those of high SEP, those of low SEP have been found to perceive more barriers in relation to weight loss, including that weight loss would require: a substantial financial outlay, cooking skills and would necessitate eating differently to other household members [351, 354].

2.5 SOCIOECONOMIC DIFFERENCES IN THE PRIORITISATION OF PSYCHOSOCIAL FACTORS THAT INFLUENCE FOOD CHOICES

In concluding the presentation of substantive findings from the literature, the few studies that consider potential differences in the prioritisation of psychosocial factors across socioeconomic groups will be discussed. Differences in the relative importance of psychosocial factors in food choices across socioeconomic groups were reported from data collected in five studies (all conducted outside of Australia) [57, 78, 135, 194, 195, 244]. Some of these studies, while not commenting explicitly on the relative influence of psychosocial factors across

socioeconomic groups, provided data to enable such comparisons to be made [78, 194, 195].

Collectively these studies indicate that taste is among the most important influences on food choices across socioeconomic groups [78, 188, 195], which is consistent with general population findings [55, 157, 189, 193, 231]. However, in addition to taste, those of high SEP were found to make food choices predominantly based on concerns regarding health [135, 194, 195, 244] and convenience [188, 195] while those of low SEP were found to be most influenced by cost [78, 118, 135, 188, 195, 244] and familiarity/habit [118, 195].

Although based on scanner data (rather than measurement of psychosocial factors directly), the findings of several studies conducted in the US support this notion that the purchase decisions of those of high SEP are more orientated by health, while the purchase choices of those of low SEP are more driven by cost considerations [81, 82, 355].

2.6 SUMMARY OF SUBSTANTIVE FINDINGS OF THE LITERATURE REVIEW

2.6.1 The identification of psychosocial factors likely to contribute to socioeconomic differences in food choices

This review found only a few psychosocial factors to be commonly and/or consistently associated with SEP, these were: nutrition knowledge, health concerns, health beliefs, habit/tradition and cost concerns. Those of high SEP exhibited higher levels of nutrition knowledge and were found to consider health more frequently when making food choices. Habit/tradition and cost concerns were found to be more important among those of low SEP. The qualitative literature provided further information about how socioeconomic groups differed in terms of these factors and accordingly how these factors operate to produce inequalities in food choices.

Factors such as weight concerns, convenience, food access/availability, nutrition concerns and taste preferences were more tenuously associated with SEP, being found to differ between socioeconomic groups in half or fewer of the studies that considered them. A common trend observed was that when respondents were asked about the importance of a psychosocial factor in food choices in general, no

socioeconomic differences were found [61, 107, 189, 194, 195]. However, when questions regarding psychosocial factors were presented in more anchored and specific terms, socioeconomic differences were observed [16, 197, 352].

The literature review revealed a number of relatively unexplored factors that may be relevant to socioeconomic differences in food choices. Specifically, 12 of the 23 psychosocial factors identified in the literature review had been investigated in less than three studies. These factors were cooking confidence, ethical concerns, food perishability/wastage concerns, mood, 'natural' content of food, lack of control over food choices, motivation, quality and freshness concerns, nutrition label use, habit/tradition, social support, and access to cooking and storage facilities.

Differences in the food-choice outcome measure and socioeconomic indicator considered appeared to contribute to variation in study findings. These and other methodological features that may have influenced study findings will be reiterated in the following section.

2.7 METHODOLOGICAL FINDINGS OF THE LITERATURE REVIEW

In this section some general sampling features of the studies included in the literature will be addressed. This will be followed by a more detailed methodological critique of a subset of studies most relevant to this research enquiry.

2.7.1 Sample characteristics of the studies included in this literature review.

Sampling and analytical considerations relevant to respondent gender

Studies considering food choices often use predominantly female samples [61, 76, 77, 124, 197, 243, 289, 356-358]. When the decision is made to recruit only women this is usually made on the basis of women being likely to be the main household food purchaser and due to their known role as food gatekeepers in many households [133-135, 188, 225]. Even when female-only samples were not deliberately recruited, often samples were predominantly female when the criteria for participation was to be the person primarily responsible for household meal

planning [300], food purchasing [62, 146, 240, 300, 359] or cooking [145, 300]. Such samples recruited approximately 70% female samples [62, 145, 300].

The quantitative studies that recruited equal proportions of males and females [50, 112, 134, 194, 195, 198, 223] tended to be studies that did not have, as a criteria for inclusion that the person recruited was responsible for food purchasing, preparation or cooking. In some cases these studies revealed different hierarchies of influence, or completely different psychosocial factors of relevance to food choices compared to those studies that included only or predominantly women [188, 194, 195, 223]. One theme in particular that was raised as important in these equal-gender samples was lack of control over food choices [195, 223, 279]. This theme was raised as a barrier to making healthy food choices [223, 279] or selected in response to being asked what influenced daily food choices [195]. Examples of the way this theme was described in various studies include, 'no control over food preparation' (separate to 'eat predominantly at restaurants'), [279] 'unable to choose my food' [223], and 'someone else decides on most of the food I eat' [195]. Since this factor was only detected in half-male samples it may be indicative of gender based differences in food choice decision making.

It is important to understand the perspectives of both males and females with regard to food choices. However, with gender differences regarding food choices so well established [93, 107, 360-363] it seems that inclusion of both males and females in samples without adjustment or stratification of results could potentially obscure findings regarding socioeconomic differences. This problem is exemplified in the study conducted by Crossley and Khan [194] that investigated differences in diet-related psychosocial factors according to occupation. The gender distribution of the sample was 53% male. The more prestigious of the two occupational groups compared was predominantly male (70%), while the less prestigious occupational group was predominantly female (57%) [194]. The authors showed that psychosocial factors of importance varied according to both gender and occupation; therefore, both factors were included in multivariable models. While adjustment of this type may sometimes be effective, when socioeconomic groups differ

substantially in a factor of importance, it does reduce the generalisability of the findings. For example, a study that compared predominantly old men of low-income with young women of high-income, is not very useful in helping us understand socioeconomic differences in the community overall if the gender distribution of each socioeconomic group is not representative of the wider population.

In qualitative research in particular, where understanding context is a primary objective, methods that engage both heads of the household would appear particularly useful. This approach would allow a verification of sorts, regarding why particular foods are selected for in home consumption. While this method has been used when assessing food choices in the general population [133, 364], it has rarely been used in studies considering socioeconomic differences relevant to diet [293].

Sampling and analytical considerations relevant to respondent age

Age is an important demographic feature to be considered in this field of research, since it is known to be associated with both food choices [365] and psychosocial factors [189, 366]. Variation in SEP has been found to vary depending on the age group considered [367]. This means that the socioeconomic differences observed in a sample may be partially dependent on the age group of the respondents considered.

The age range of research participants was generally similar across studies; however, the average age differed. Some examples of the age range and average age observed include; 18–45 (mean 32) [356], 18–40 (mean 26) [124], 18–39 (median 30) [289] and 19–39 [358]. Studies that utilised third parties (e.g. market research companies, or government sources) to collect data sometimes had wider age ranges [95, 195, 198, 359]. For example, the studies conducted by Kearney et al. [137] and Wardle and Steptoe [95] that used market research and government data respectively, had no upper age cut-off for participant inclusion (the minimum age cut-off for each study was 15 and 16 years, respectively) [95, 195].

Studies usually did not provide a mean age for each socioeconomic group considered. This type of information is useful, as can be observed in the study by Jeffrey and French 1996 [197]. The authors cite the steadily increasing mean age

across the household income groups considered, with those earning less than $10 000 having a mean age of 29.2, those earning $20 000-30 000 having a mean age of 33.2 and those earning greater than $40 000 having a mean age of 37.8. While most studies adjust for age, this level of reporting is valuable to provide insight into whether income-group specific differences in age are present in the data. This information may be particularly important in qualitative studies to better understand whether some of the socioeconomic differences observed may be attributable to differences in age.

Sampling and analytical considerations relevant to household size and composition

Household composition is known to have an important influence on food choices [115, 223, 368, 369]. Both being married (for men and women) and having children (for women) have been associated with engaging in food behaviours more consistent with dietary guidelines compared to those who are single or without children [115, 355]. Household composition also has an important impact on the financial and other resources available within a household [182].

Despite this knowledge, household composition was not always considered in the studies reviewed. When household type was reported, sometimes substantial differences were observed in the type of households recruited to represent each socioeconomic group considered. For example, a qualitative Australian study (N=56), reported substantial differences in the distribution of household type across socioeconomic groups [61]. Over half of the respondents of middle SEP (9/19) lived alone, compared to a much smaller proportion of respondents of low (2/18) or high (0/19) SEP. When studies comparing socioeconomic differences include a range of household types without adjusting or noting potential household composition affects, it may obscure the intended exploration of socioeconomic differences.

2.7.2 Methodological characteristics of the subset of studies most relevant to this PhD investigation.

This section provides a further critique of the studies most relevant to this investigation. That is, those studies that belong to sections C, D or E of the pyramid previously presented in *Figure 2.2* (page 16) (a simplified version of *Figure 2.2* is

presented below in *Figure 2.4)*. The distinguishing feature of these studies is that they make socioeconomic comparisons, rather than only reporting findings for the general population as a whole or for those of low SEP.

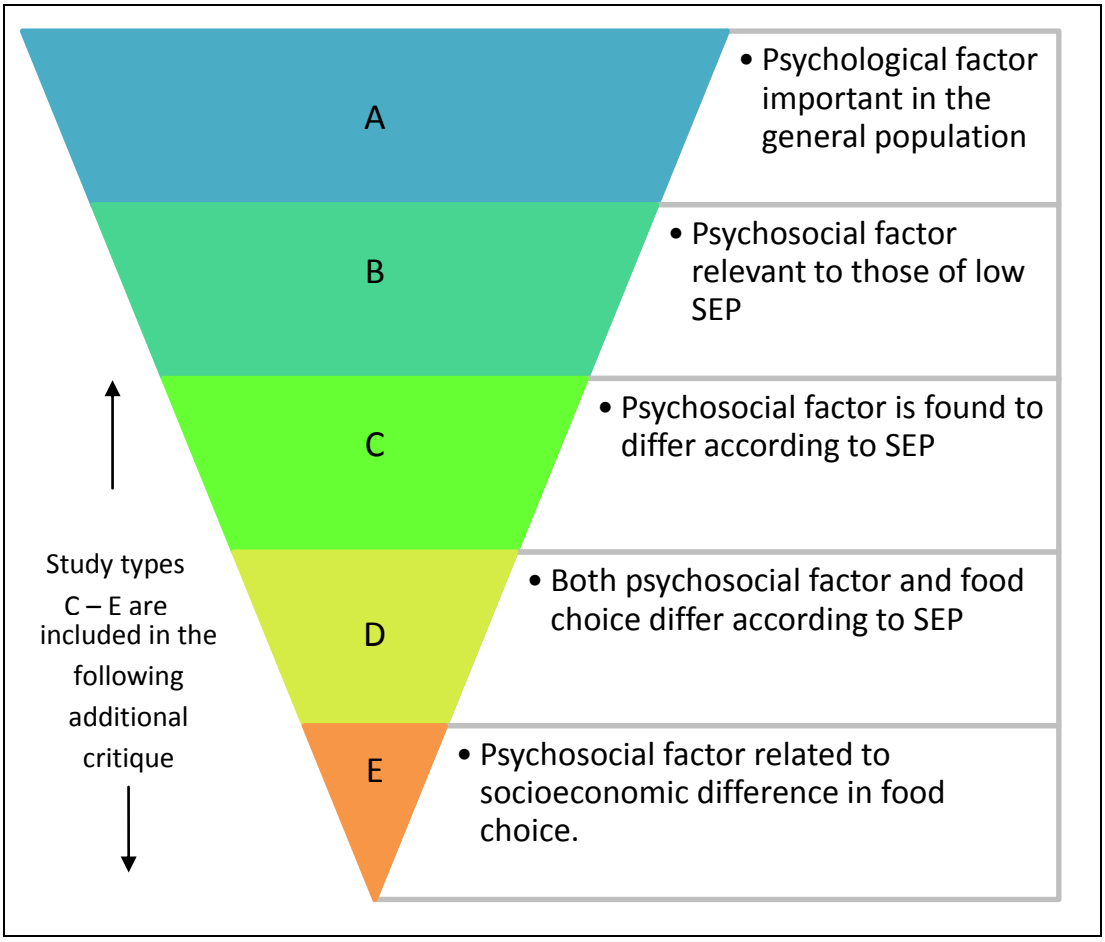


Figure 2.4. Simplified version of Figure 2.2: (Spectrum of the focus of studies relevant to investigating the contribution of psychosocial factors to inequalities in food choices).

Only quantitative studies are considered in this section, as it was felt that the methodological features of the few relevant qualitative studies were adequately discussed in the previous substantive findings section (Section 2.4).

In total 35 quantitative studies were located as belonging to section C–E of *Figure 2.4*. Although the literature review undertaken for this study did not represent a systematic review, reviewing the characteristics of the studies located is useful for

several reasons. In particular, the additional critique of the studies most relevant to this investigation will clarify the knowledge gaps in this field, by highlighting the focus of previous research and the type of research design and analytical techniques that have been applied.

Number of psychosocial factors considered simultaneously in quantitative studies

Both the quantitative and qualitative studies reviewed often shared the goal of identifying factors contributing to inequalities in diet or diet-related behaviour. Quantitative studies typically asked respondents about the influence of a number of specific psychosocial factors. In contrast, most qualitative studies included open-ended questions allowing respondents to nominate an infinite number of psychosocial factors as influencing their food choices. Therefore, a comparison of the number of psychosocial factors considered across studies was only relevant when comparing across quantitative studies.

Although some quantitative studies measured multiple psychosocial factors, not all factors were subject to socioeconomic comparisons [57, 229] This was particularly common in large national studies [188, 244]. For several of these studies the investigation of socioeconomic differences did not constitute a main research objective, however, socioeconomic data were collected enabling such comparisons to be made (e.g. [57, 107, 229]). In some instances, authors noted that the analyses undertaken were limited due to a lack of resources [57], others indicated that they decided to only explore socioeconomic differences in the factors that varied most in the general population [195, 229]. For example, in one study, socioeconomic comparisons were only undertaken for the two psychosocial factors (taste and time concerns) found to be most commonly noted as important in food choice decision making in the general population [229], although 23 psychosocial factors were considered in this study (at least 10 of which were found to be important influences on food choices in the sample overall) [229]. In another study that measured 15 psychosocial factors, socioeconomic comparisons were only made in relation to a single factor (although data enabling comparisons on all factors was provided) [195]. Therefore, it appears that there are data currently available that would allow

socioeconomic comparisons across multiple psychosocial factors yet this task is frequently not undertaken.

The complexity of food choices is commonly noted in the literature [14, 55, 78, 133, 191, 213, 222, 251, 297, 370, 371]. It does not make intuitive sense that individuals would make food choices based on single factors, for example, convenience or health concerns [78]. It seems much more likely that many psychosocial factors reflecting both societal, familial and personal influences would influence food purchasing [112, 133]. Consequently, consideration of a range of psychosocial factors is likely to be more realistic than considering individual factors in isolation and may also allow for the relative influence of factors to be assessed [78].

According to this perspective, it was of interest to determine the breadth of psychosocial factors subject to socioeconomic comparisons in the studies reviewed, and this information is presented in *Figure 2.5* .

If data from the same study were reported in several publications the maximum number of psychosocial factors considered in any single publication is presented. For example, two studies published by Caraher [188, 196] and one by the Health Education Authority (HEA) [57] report on data collected as part of the 1993 Health and Lifestyles Survey. Since one publication using these data compared eight psychosocial factors [188] while the others compared either one [196] or six factors [57], this study is represented in *Figure 2.5* as a study considering eight factors.

Many publications postulate how a variety of factors might combine to produce inequalities in food choices [98, 372]. However, it is evident from *Figure 2.5* that few studies actually measure a range of psychosocial factors. As shown in *Figure 2.5*, 21 of the 35 quantitative studies reviewed (60%) considered socioeconomic differences in one or two psychosocial factors.

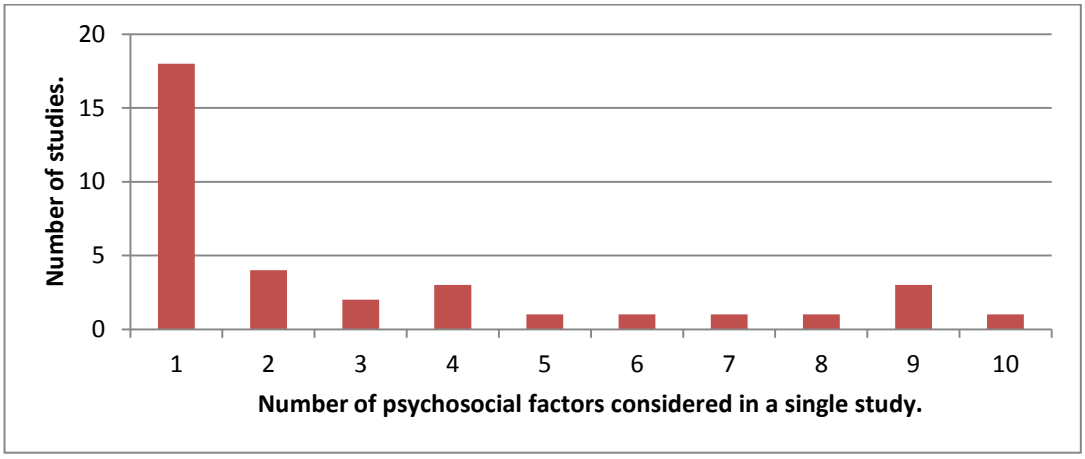


Figure 2.5. Summary of the number of psychosocial factors considered in 35 studies relevant to investigating the contribution of psychosocial factors to socioeconomic differences in food choices.

Type of psychosocial factors considered in quantitative studies.

Some psychosocial factors have been considered in relation to inequalities in food choices more frequently than others, as depicted in *Figure 2.6* (further details provided in Appendix C). An important observation from *Figure 2.6* is that in quantitative research comparing socioeconomic differences in psychosocial factors, cost concerns have been explored more frequently compared to other psychosocial factors. Cost factors were considered by 13 of the 35 quantitative studies that considered socioeconomic differences in psychosocial factors (37%). Nutrition knowledge and health concerns were also investigated in a relatively high number of studies (29% and 26%, respectively).

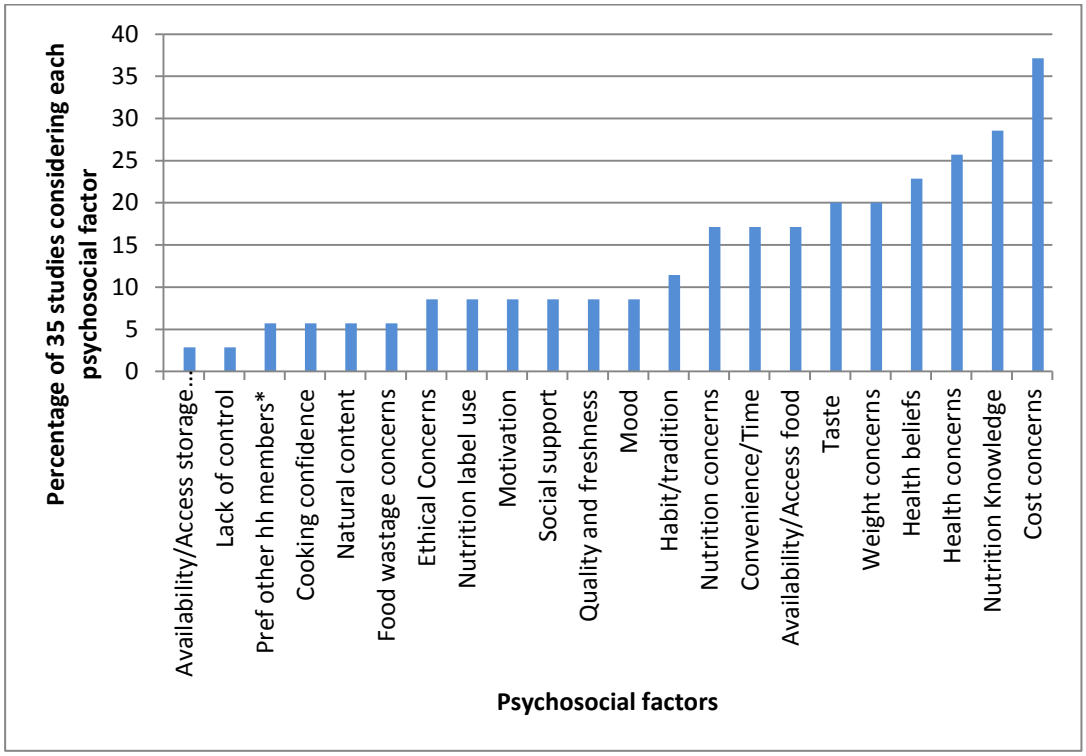


Figure 2.6. The proportion of 35 quantitative studies that investigated each of 22 psychosocial factors.

Continuum of methods applied to research the contribution of individual psychosocial factors to inequalities in food choices

In addition to some psychosocial factors being more commonly explored than others, there are also differences in the degree to which particular psychosocial factors have been investigated as contributing to inequalities in food choices. As outlined previously in *Figure 2.2* (page 16, simplified version included below), there is a continuum in the methods used to consider the contribution of psychosocial factor to socioeconomic inequalities in food choices.

Simplified version of Figure 2.2: Spectrum of the focus of studies relevant to investigating the contribution of psychosocial factors to inequalities in food choices, Sections A & B not shown.

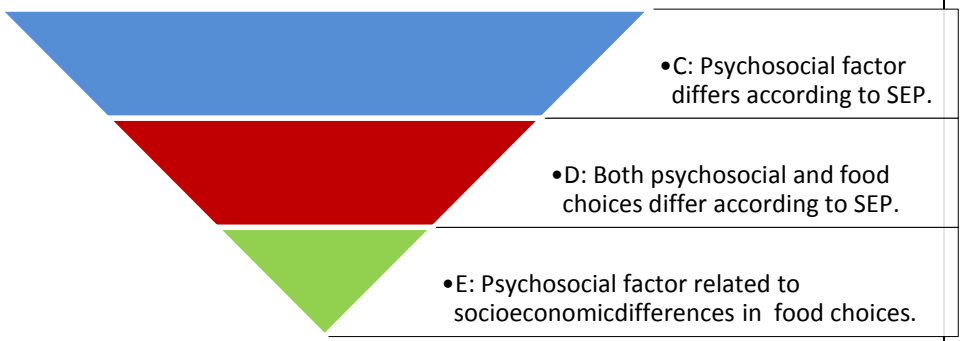


Figure 2.7 presents the extent to which each of the 22 psychosocial factors identified in the literature review have been examined in relation to this research topic. It is evident that the most frequently examined factors (e.g. health and cost concerns), have also been more commonly subject to the type of analyses most informative for assessing their contribution to inequalities in food choices. In the figure below this is reflected by the most commonly studied factors generally being investigated by more studies using study approach E (shown in green).

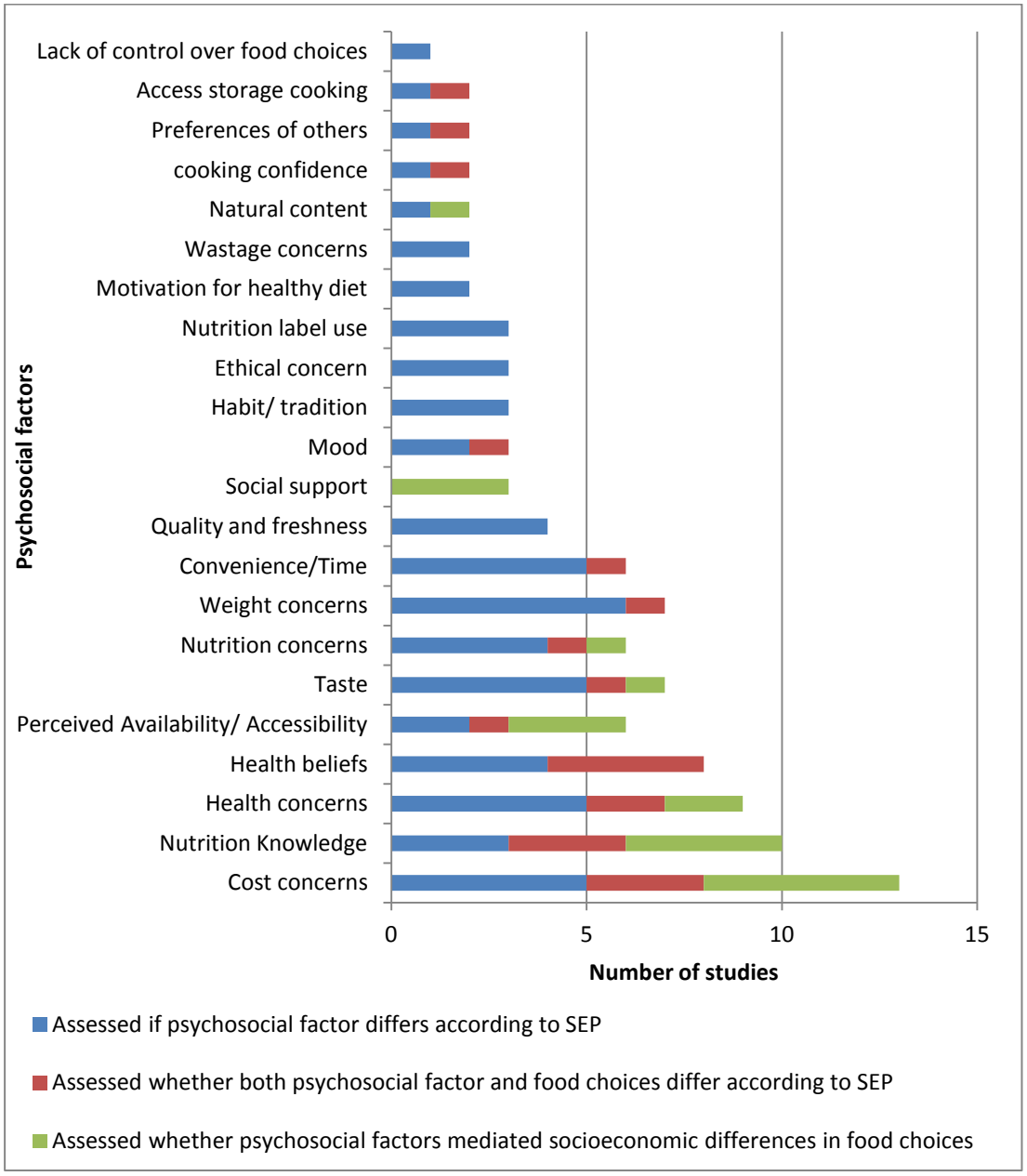


Figure 2.7. Extent to which particular psychosocial factors have been considered in relation to inequalities in food choices.

In total, only eight of the twenty two psychosocial factors considered in this review have been included in statistical models to assess their ability to mediate socioeconomic differences in food choices (as shown by the inclusion of a green section of the bars in Figure 2.7. These were among the most commonly researched factors in general and included cost concerns, nutrition knowledge, taste preferences and perceived availability/access.

The studies that considered mediation [16, 50, 62, 76, 77, 106, 112, 114, 213, 245, 300] all had particular methodological features that limited the extent to which they could contribute to addressing the main research objective of this PhD investigation.

Those limitations specific to the exploration of particular psychosocial factors were presented in the relevant sections on individual psychosocial factors presented earlier in this chapter. Therefore, comments here pertain to methodological limitations that applied to the studies overall. First, only two (of the nine) studies considered a breadth of psychosocial factors (i.e. four factors), with one or two factors considered in all the other studies) [76, 77]. Also only three studies [50, 62, 106] considered multiple socioeconomic variables allowing various pathways between socioeconomic position, psychosocial factors and food choices to be explored.

Several studies were limited in investigating the attenuating impact of individual psychosocial factors on socioeconomic differences in food choices due to psychosocial factors being entered simultaneously into models (i.e. as blocks of variables) [54, 76, 106] The factors included in such blocks were often apparently unrelated (e.g. a block of variables including both health and cost concerns [77]). In these instances when mediation was observed it was difficult to extrapolate what these findings meant specifically in terms of health promotion or policy recommendations. Instead authors could only comment on whether the group of psychosocial factors considered appeared to contribute to inequalities in food choice. Some authors who use this approach surmise from their findings that psychosocial factors contribute to inequalities in food choices to a very small or negligible extent [76, 77]. Since the factors that they include in their block of models (e.g. cost [77], health concerns [76, 77] and nutrition knowledge [76]) are among those most commonly associated with SEP in studies that consider these factors individually exemplifies the different perspective obtained with a block modelling approach.

Several studies considering mediation still found intra-personal psychosocial variables to mediate socioeconomic differences in food intake even though they had design and analytical design features that would have minimised the degree to which this was shown [76, 77] . In the study conducted by Ball et al. [76], blocks of variables were entered in an ordered fashion. This resulted in the blocks of variables entered first having a greater opportunity to account for variation than those entered later. The authors entered environmental factors first, followed by social then individual level factors. Examples of each include, density of supermarkets in area, social support for healthy eating and nutrition knowledge [76].

Theoretically in a forwards stepwise regression approach (which is the approach utilised by Ball et al. [76]), it is preferable to use a temporal rationale to determine the order in which blocks are entered. The authors do provide a rationale that possibly more 'distal environmental-level factors' may influence more 'proximal, individual-level factors'. However, the measures used do not seem to intuitively fit this theory. It is doubtful that store-density (an environmental-level factor measured) would precede/predict, social support for healthy eating (a social-level factor measured), or that social support for healthy eating would predict nutrition knowledge (an individual-level factor measured). Therefore, without a sound basis for doing so, it seems that the modelling approach used resulted in psychosocial factors (both social and individual) being less likely to be found to account for variation due to their later insertion in the models, after environmental variables. Similarly, in instances where environmental variables were not added to the models, mediation in variation was more likely to be attributed to social-level factors, than to individual-level factors, due to the earlier inclusion of social factors in the models.

In contrast, to Ball et al. [76] who do acknowledge mediation (albeit a small mediating effect), Hupkens et al. [77] are dismissive of the mediating influence of psychosocial factors displayed in their consideration of dietary differences across education groups. It would appear that the selection of education as a socioeconomic indicator when assessing the influence of cost concerns is likely to

have minimised findings regarding mediation, compared to if a more relevant indicator, such as income was used (all other studies that assessed cost concerns as mediators of dietary inequalities used income as the indicator) [62, 106, 114]. It is also curious that the authors would expect a large decrease in inequalities with only three psychosocial factors inserted, when there are likely to be multiple factors that account for socioeconomic differences in food choice. As was the case for Ball et al. [76], the findings on mediation presented by Hupkens et al. [77] were not particularly informative, due to an unrelated block of variables being entered into models simultaneously. Therefore, the individual mediating influence of the three psychosocial factors that made up the block could not be determined.

2.8 CHAPTER CONCLUSIONS

This review of existing literature has outlined the substantive findings regarding the contribution of psychosocial factors to socioeconomic differences in food choices. Most importantly, from this review it is apparent that there is a dearth of studies investigating this important topic. This critique has also highlighted characteristics of previously applied study designs and analytical methods that have not been conducive to assessing the contribution of psychosocial factors to inequalities in food choices. Given that these limitations could be overcome and psychosocial factors of importance identified, it then becomes apparent that there is very scarce qualitative data available to assist with interpreting these data and understanding how socioeconomic differences in psychosocial factors may operate to produce inequalities in diet. The following chapter (Chapter 3) will outline how the findings of this literature review were used to determine the focus and methodological features of this investigation.

Chapter 3: **Methodological Approach**

3.1 CHAPTER CONTENTS

This chapter provides a rationale for the methodological approach applied in this PhD investigation. An important conclusion from the literature review was that a mixed-methods design would be useful for addressing the goals of this PhD research. The specific details of the quantitative and qualitative methods employed in this investigation are described in the subsequent methods chapters (Chapters 5 and 7). The current chapter will primarily describe the rationale for, and an overview of, the mixed-methods approach used. A summary of the methodological and analytical considerations that arose from the literature review will be presented, followed by the research objectives of this investigation.

3.2 RATIONALE FOR THE MIXED-METHODS APPROACH

There has been considerable controversy about combining research methods [373]. This debate focuses on the concern regarding the ontological and epistemological implications of combining methods [374]. Traditionally, quantitative methods consider social phenomena as measurable and observable. Quantitative researchers are assumed to be objective in their research and there are considered to be underlying natural laws or a pre-existing (social) reality that the researcher reveals through the application of empirical methods [375]. This perspective is known as a positivist ontology [376]. In contrast, qualitative methods are referred to as being 'inductive or constructivist' in their research approach. Social reality is considered as a social construction and the researcher is depicted as having a subjective role in the research process [376].

These divergent epistemologies led to the 'incompatability thesis', which posits that the ontologies on which these methods are based are so different that they should

never be combined [373]. This argument has largely been discounted, and with the continued and useful application of mixed-methods the 'compatibility thesis' and 'pragmatism paradigms' have emerged [377]. According to these movements the historic dualism of qualitative and quantitative methods is overstated [378]. Proponents of mixed methods argue that the research question should be paramount to with a pragmatic approach applied to the selection of method/s [375, 379]. They reason that not only are quantitative and qualitative methods compatible, but that the mixing of methods has a number of advantages [376, 377, 380].

The combining of research methods has been argued to be useful in countering the weakness of individual techniques and in enhancing the validity and reliability of study findings [381]. In addition, mixed-methods research strategies are promoted as providing a deeper and more comprehensive understanding of a given study area, compared to single-method approaches [279, 380, 382-385]. Although debate remains about the best means of combining research methods and the most suitable methods to combine (e.g. quantitative and qualitative methods, or two types of qualitative methods) [386, 387], this approach is now common practice and is argued to be the current 'gold standard' for studying phenomena [388]. Particularly in health research, the dominant quantitative approach has been criticised for failing to adequately capture the complexity of factors that contribute to health inequalities [389]. Several authors have recommended the use of mixed-methods in response to this concern [279, 383, 384].

As expressed by Miles and Huberman [390] 'numbers and words are both needed if we are to understand the world' [390] (p40). In the most basic sense the combination of research methods allows both 'what?' and 'how' types of questions to be addressed. For example, in the context of the current study, what are the psychosocial factors related to socioeconomic differences in food purchasing, and how do socioeconomic groups vary in terms of these factors? The reported strengths of quantitative studies include the objectivity and generalisability of study findings [384, 391]. Qualitative research methods are noted as useful in exploring

relatively unexplored or complex research topics [392, 393]. Qualitative research is particularly valued for the rich descriptions and contextual information that it can provide, which can enhance understanding of the topics under study [384, 390].

In the literature pertinent to the contribution of psychosocial factors to inequalities in food choices, qualitative and quantitative methods have been frequently combined. However, rarely are the findings from both methods integrated; instead, generally one method is used in a 'pilot' phase prior to the main method being applied in the full study. For example, qualitative investigations often precede and inform quantitative methods by identifying psychosocial factors to be explored in the quantitative research [58, 223, 291]. This practice commonly results in the identification of psychosocial factors of relevance (to inequalities in food choices) from both types of analysis.

Very few studies have used qualitative methods to provide detailed descriptions of socioeconomic variation in psychosocial factors, relevant to understanding how these factors operate to produce inequalities in food choices. The focus of quantitative studies on identification of factors of importance, in isolation of detailed descriptions of these factors has often resulted in study findings that are difficult to interpret in terms of the implications for health promotion or public health policy. One author articulates well the limitations of their quantitative study in terms of identifying a psychosocial factor that was of utmost importance in food choices, yet not developing an understanding of what this factor meant [195].

"The attribute `quality/freshness' appears to be of considerable importance to almost all demographic groups. Of course the attribute `quality' in terms of food could include aspects of health-giving properties, safety and taste, etc. A drawback of the present study is, however, that it gives no indication of what the term quality may mean to the consumers"[195].

A mixed-methods approach was deemed to be the most appropriate methodology for addressing the goals of this research; to identify and describe psychosocial factors that contribute to inequalities in food purchasing choices. The quantitative

analyses preceded the qualitative analyses. This allowed psychosocial factors of importance to be indentified from both types of analyses prior to generating detailed descriptive information regarding relevant factors.

Greene et al. [385] developed a widely used framework for classifying mixed-methods studies. The authors identified five common purposes of a mixed-methods design from a review of 57 studies. The two purposes that best describe the application of mixed methods in this PhD research are triangulation [383, 385] and complementarity [394]. Greene et al. [385] describes these two purposes as follows:

"TRIANGULATION seeks convergence, corroboration, correspondence of results from the different methods".

"COMPLEMENTARITY seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method' [385]".

Thus, this PhD research employs a combination of qualitative and quantitative methods to identify and describe psychosocial factors likely to contribute to inequalities in food choices. It is anticipated that this combination of methods will provide a more comprehensive and rigorous assessment of the relationships under study than if either method was used alone. The qualitative component in particular adds to a very small group of studies that provide descriptive information regarding socioeconomic differences in psychosocial factors relevant to inequalities in food choices.

3.3 SUMMARY OF SUBSTANTIVE AND METHODOLOGICAL CONSIDERATIONS ARISING FROM THE LITERATURE REVIEW

3.3.1 Socioeconomic differences in psychosocial factors are generally under-researched

- A review of the literature identified 22 psychosocial factors as potential contributors to inequalities in food choices. Over half of these factors (12/22) have been considered in three or less studies. Therefore, in most cases it is impossible to draw firm conclusions about their relationship with SEP and/or food choices.

- Several under-researched psychosocial factors (such as nutrition label use) are associated with food choices in the general population and are associated with SEP in the small number of studies where they are assessed. Such factors therefore, warrant further investigation in relation to socioeconomic differences in food choices.
- While some more commonly investigated psychosocial factors are known to have composite parts (e.g. nutrition knowledge is recognised to have at least three components) these are rarely assessed separately. Such analyses may facilitate a better understanding of how the factor overall operates to influence inequalities in food choices. In addition, this information may guide more specific recommendations in terms of health promotion or policy development.
- While a substantial number of qualitative studies investigate the relationship between psychosocial factors and food choices in samples including only those of low SEP, much fewer studies compare across socioeconomic groups. Therefore, descriptive information regarding socioeconomic differences in psychosocial factors is scarce.

3.3.2 A breadth of psychosocial factors is rarely considered

- While some studies collect data on a range of psychosocial factors, multiple psychosocial factors are rarely assessed in relation to inequalities in food choices. Approximately two-thirds (57%) of the quantitative studies reviewed examined one or two psychosocial factors. Given that food choice decisions are known to be complex, consideration of a range of factors is likely to enhance our understanding of the likely contributors to inequalities in food choices.

3.3.3 Findings on the contribution of psychosocial factors to socioeconomic differences in food purchasing are inconclusive

- Few studies that consider socioeconomic differences in psychosocial factors also consider a food choice outcome measure. Of those that do, not all assess whether psychosocial factors mediate inequalities in food choices.
- Even among psychosocial factors investigated in several studies there often appears to be no consensus across study findings. This may be due to differences in the measurement of socioeconomic, psychosocial or food choice measures across studies.
- While age and gender are normally taken into account, many studies conduct analyses that do not adjust for other potential confounders of the relationships under study including household size and composition.
- Some modelling approaches minimise the likelihood that psychosocial factors will be observed to mediate inequalities in food choices. In particular placing psychosocial factors into models last reduces their potential to account for any observed variation, relative to factors entered into the models first.
- In some studies psychosocial factors are only included in models assessing mediation as part of a block of factors, therefore, the individual influence of the factor cannot be ascertained. This has been the case even with regard to more commonly researched psychosocial factors; for example, it appears that no study has investigated the individual attenuating impact of health concerns on socioeconomic differences in food choices.
- Some studies provide overall results from attenuating models without exploring (or at least without presenting for the reader) the composite elements of the overall relationship. Studies that describe the relationship between component elements, for example, between SEP and food choices, and psychosocial factors and SEP provide a means of better understanding and interpreting the final model results. This practice of building up to the overall findings is noted as best practice when assessing mediation [395].

3.3.4 Selection of socioeconomic indicators and investigation of unique pathways between SEP, psychosocial factors and food choices

- Many studies that investigate socioeconomic differences in psychosocial factors contrast two socioeconomic levels (e.g. high and low SEP). While this allows differences between the groups to be observed, considering three groups (e.g. high, middle and low SEP) provides further information regarding whether and how a factor is related to socioeconomic position. Comparing multiple levels of SEP allows the observation of whether psychosocial factors appear to become more or less important as SEP increases, or if some factors are relevant to only particular levels of SEP (e.g. in a sample comparing three levels of income a particular psychosocial factor may only be relevant to the food choices of those in the highest income group).

- Many studies employ sampling procedures that are likely to restrict participation among those who are most disadvantaged [396, 397]. Postal surveys, for example, may exclude those who are homeless, or telephone surveys may exclude those who do not have a telephone connected [397, 398]. Disadvantaged persons are less likely to be listed on the electoral roll, and therefore, are less likely to be included in studies deriving a sample from this source [397]. Studies that employ these and other conventional sampling techniques may produce socioeconomically truncated samples. Hence, socioeconomic differences in the phenomena under study are likely to be an underestimate of the actual socioeconomic variation that exists within the community.

- Few authors appear to be circumspect in their selection of socioeconomic indicators. Research findings may be most meaningful when the socioeconomic indicator/s selected are an appropriate conceptual match for the psychosocial factor/s under study. Income, for example, may be a more relevant indicator of SEP to consider when exploring cost concerns compared to a measure of education. In part, this may be due to current income being more closely related to current cost concerns in a temporal

sense, since education may have been obtained some time ago in the past [399]. In addition, income as a reflection of an individual's access to financial resources is likely to be more relevant to cost concerns than the resources that come from having an education, such as the ability to uptake, assess and recall information.

- Often socioeconomic indicator selection appears to be based on where the study was conducted, and consequently, what measures the authors had ready access to (e.g. occupation in the UK, income or education in the US) [104, 399]. While it is recommended that socioeconomic indicator selection be based on practical considerations, it is also desirable for the measures selected to represent a suitable conceptual match with the phenomena under study [87, 89]. For example, when assessing socioeconomic differences in the psychosocial characteristics of individuals or in household food purchasing, an individual-level (e.g. education) or household-level (e.g. income) may provide more relevant information than an area-level socioeconomic indicator depending on the research questions under study.
- Few studies focus on more than one socioeconomic indicator in their analyses. When an additional indicator is included it is generally used for adjustment purposes. The evaluation of multiple indicators can enable exploration of unique, indicator-specific, pathways between SEP, psychosocial factors and food choices. Consideration of more than one socioeconomic indicator also generally facilitates a more comprehensive understanding of socioeconomic differences in the phenomena under study compared to when a single indicator is used [90, 104].

This chapter has provided a rationale for the application of a mixed methods approach in this PhD research. It has also provided a summary of pertinent issues that arose from the literature review, which were integral to the planning of this investigation, including the development of the following research objectives:

3.4 RESEARCH OBJECTIVES

This investigation had four research objectives:

1. *To determine whether socioeconomic groups differ in the extent to which food purchasing choices are consistent with dietary guidelines.*

2. *To investigate whether psychosocial factors contribute to socioeconomic differences in food purchasing choices.*

3. *To assess whether the relationships observed between socioeconomic position, psychosocial factors and food purchasing differ according to the socioeconomic indicator considered.*

4. *To describe socioeconomic differences in psychosocial factors likely to contribute to food purchasing inequalities.*

A series of research questions were devised to meet these objectives. These questions are shown along with the methods used to address them in Figure 3.1. Figure 3.1 emphasises the application of the mixed-methods design, wherein some research questions were addressed using either quantitative or qualitative methods, whereas others were addressed using both types of analyses.

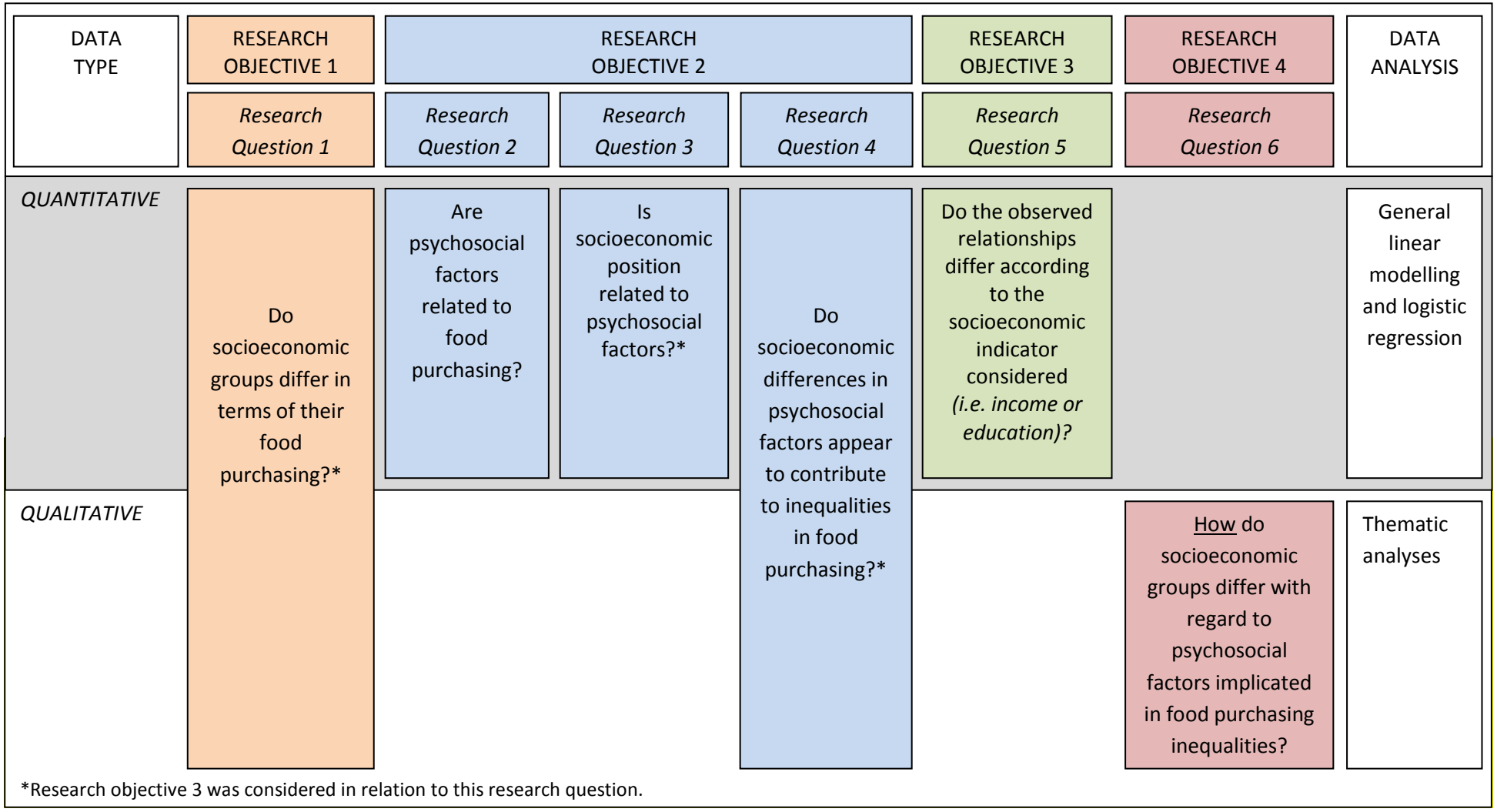


Figure 3.1. Overview of the mixed-methods research design used in this thesis.

The quantitative analyses preceded and informed the qualitative phase of this PhD investigation. Thus, true to the chronology of this research, the following chapters will describe the methods and results pertaining to the quantitative analyses followed by those pertaining to the qualitative analyses. The thesis will conclude with a unified summary and discussion of the mixed-methods results.

Chapter 4: **Description of the Brisbane Food Study Methods**

4.1 CHAPTER CONTENTS

This chapter describes the quantitative data source that was subject to secondary analysis in this investigation (the Brisbane Food Study) including the research design, sampling and survey content. The assessment of the BFS to address the goals of this PhD research is described in the chapter to follow (Chapter 5).

4.2 OVERVIEW OF THE BRISBANE FOOD STUDY

The Brisbane Food Study (BFS) was conducted in 2000. This multi-level, observational study aimed to examine socioeconomic differences in the extent to which food purchasing was consistent with dietary guidelines. The study also examined both area-level and individual-level factors as potential contributors to food purchasing inequalities [400]. Environmental-level data were collected through an environmental audit and included factors such as food-shop density and opening hours of shops compared across advantaged through to disadvantaged census collectors districts (CCDs) across Brisbane [164]. Individual-level data were collected from main household food purchasers through a survey administered face-to-face in respondents' homes (N=1003). Examples of individual-level data collected include psychosocial factors such as nutrition knowledge, weight concerns and taste preferences. While the environmental data derived from the BFS have been the focus of previous investigations [64, 164, 165], this PhD investigation examines the individual-level data collected.

4.3 BRISBANE FOOD STUDY PILOT STUDY

The Ethics Committee, Queensland University of Technology provided ethical approval for the BFS including the preceding pilot study. The pilot study included 60 households ranging in socioeconomic position (N=20 Low SEP, N=20 Medium SEP and N=20 High SEP) and was undertaken to trial different aspects of the proposed study. In particular, the pilot study was devised to test the usability of the BFS questionnaire and to determine the most effective way to administer it in terms of cost, participant burden and likely response rates [400].

4.4 GEOGRAPHIC SCOPE AND REFERENCE POPULATION

The BFS was undertaken in the Brisbane City Statistical Sub-Division (SSD) and included households residing in private dwellings. As defined by the Australian Bureau of Statistics (ABS), 'private dwelling' included houses, flats, and home units. Households considered to be in non-private dwellings, for example, hotels, motels and hostels, and persons in hospitals, nursing or supported-care homes, prisons and military establishments, were not included in the BFS. A household was defined as either a group of two or more (related or unrelated) people who usually reside within the same private dwelling, and who make common provision for food and other essentials for living, or, a person living in a private dwelling who makes provision for his/her own food and other essentials for living without combining with any other person.

4.5 BRISBANE FOOD STUDY SAMPLING CONSIDERATIONS

4.5.1 Rationale for sample size

This rationale for the sample size of the BFS (N=1000 households) has been described elsewhere [400, 401]. The following excerpt identifies the key factors taken into account in determining the sample size for the study.

> "Decisions about appropriate sample sizes were underpinned by a range of considerations, including cost and operational constraints, the aims of the study, the level of disaggregation (influence of the clustered sample and hence potential design effects) and the accuracy of survey estimates, the 'pioneering

nature' of the study and its emphasis on description and explanation rather than hypothesis testing" [400] (p. 12).

4.5.2 Rationale for sample design

The BFS used a two-stage clustered sampling technique, wherein geographic areas were selected within Brisbane, and from these areas households were selected. The detailed procedure for selecting both areas and households is described in the sections to follow. The two-stage clustered sampling design facilitated several study objectives. As a primary focus of the BFS was to examine area-level differences in food purchasing, the clustered sampling technique enabled adequate representation of areas (Census Collector's Districts, CCDs) across Brisbane that differed in terms of their socioeconomic characteristics. Sampling in clusters also promoted the inclusion of a socioeconomically diverse sample, including those of low SEP who have been found less likely to participate in research studies and who are often under-represented in studies using conventional data collection techniques [397, 401]. For example, in studies that draw a sample from the electoral roll and subsequently send a mail survey, participation by the most disadvantaged individuals may be limited if these individuals are not registered on the electoral roll, do not have a permanent address to receive mail, or do not have the literacy skills required to complete a survey [397].

4.5.3 Area-level sample selection (selection of clusters)

The principal area-level sampling units used in the BFS were Census Collectors Districts (CCDs). Census collectors districts are the smallest geographic unit in the Australian Standard Geographical Classification (ASGC) [402]. There were 1517 contiguous CCDs in the Brisbane SSD in 2000 that (on average) consisted of 220 households [403]. Within Brisbane, CCDs are deemed to be relatively homogenous with regard to the socioeconomic profile of the households that they contain.

The stratified, clustered sampling process first required all 1517 Brisbane CCDs to be ranked in terms of area-level SEP. Ranking was determined based on each CCDs Index of Relative Socioeconomic Disadvantage (IRSD) score, which is a composite

index of socioeconomic disadvantage. The IRSD is calculated by the Australian Bureau of Statistics (ABS) based on area-level information, such as: the proportion of low-income households, proportion of residents with low levels of education, and the amount of public housing and unemployment in the area [64].

Once CCDs were ranked by IRSD score they were divided into 10 equal groups. Five CCDs were randomly selected from each of the 10 stratum, using systematic without-replacement probability proportional-to-size sampling. This resulted in a sample of 50 non-contiguous CCDs from which households were then selected. The complete sampling process is presented in *Figure 4.1*.

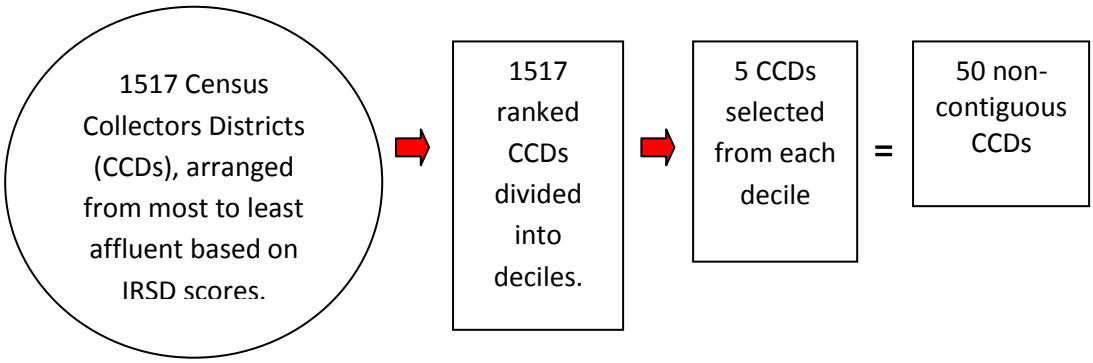


Figure 4.1. The procedure for selecting CCDs prior to selecting households for the BFS data collection.

Table 4.1. presents the socioeconomic characteristics of the 50 CCDs (represented in each of 10 strata). As expected, strong, and often graded, associations were observed with regard to social and economic characteristics across the sample stratum. That is, the lowest socioeconomic stratum had higher levels of unemployment, dwellings without motor vehicles, single parents, low-income families and labourers and fewer people residing in these areas held tertiary-level qualifications compared to the higher socioeconomic stratum.

Table 4.1. Comparing the sample strata in terms of socioeconomic characteristics (Mean %) [a,bc]

Socio-economic Strata	Unemploy-ment rate	Dwellings with no motor vehicles	Single parent Families	Low income families [d]	Labourers	Tertiary Qualifi-cations
1 (low)	18.5 (7.7)	32.0 (13.5)	16.4 (7.8)	50.6 (10.7)	15.8 (6.1)	31.4 (16.5)
2	11.5 (3.6)	21.0 (10.7)	10.1 (5.4)	42.7 (8.1)	11.3 (4.5)	44.1 (12.8)
3	11.9 (4.7)	14.0 (4.3)	12.1 (2.7)	36.4 (7.0)	11.0 (2.5)	46.0 (4.5)
4	13.8 (2.9)	19.1 (11.0)	7.7 (2.6)	30.4 (4.2)	7.2 (2.9)	64.8 (9.8)
5	6.8 (2.4)	13.2 (6.9)	11.0 (4.5)	27.4 (4.7)	6.7 (2.6)	58.8 (8.9)
6	6.7 (1.3)	13.4 (6.9)	11.0 (2.0)	28.4 (4.4)	7.5 (1.1)	61.5 (7.3)
7	6.4 (2.3)	12.5 (4.9)	8.2 (1.2)	23.6 (3.4)	4.3 (1.5)	68.3 (5.9)
8	5.5 (1.8)	9.0 (6.1)	8.7 (0.3)	26.1 (6.5)	4.4 (2.5)	68.4 (6.2)
9	5.4 (1.3)	5.2 (3.7)	7.2 (1.1)	15.3 (3.7)	5.0 (1.6)	68.7 (7.4)
10 (high)	5.1 (2.6)	6.3 (7.6)	7.2 (2.7)	16.5 (7.9)	3.2 (1.1)	81.5 (9.7)
Overall mean	9.2 (5.4)	14.6 (10.6)	10.0 (4.3)	29.7 (14.2)	7.7 (4.6)	59.3 (16.6)

[a] This table is replicated from Hewitt et al. [400]. [b] Based on 1996 Census data. [c] Mean and standard deviation for the five Census Collectors Districts (CCDs) in each stratum. [d] Families receiving $20 000 pa or less.

4.5.4 Household- level sample selection (selection of households)

The 1003 households selected for inclusion in the study consisted of approximately 20 households drawn from each of the 50 selected CCDs using simple random sampling [64]. This process first required assigning an identification number to each residential property in the CCD using cadastre maps (BIMAPs) provided by the Brisbane City Council and then randomly selecting households (by identification number) from each CCD. In excess of 1000 properties were selected to allow for replacements for non-contacts and refusals.

Some properties contained more than one private dwelling (e.g. unit blocks), when this was the case a single dwelling was selected at random (using random number cards). Within households, individuals were not selected via a random sampling procedure. Instead, in accordance with the objectives of the BFS, a purposeful approach was used and the person primarily responsible for food shopping was selected. In instances where food shopping was shared between household members the selection of the appropriate household member to participate was not obvious. Data obtained in the pilot study was used to develop scenarios to assist the interviewer to select the appropriate person to participate in the study.

4.6 DEVELOPMENT OF THE SURVEY INSTRUMENT

The BFS questionnaire was based on previous work conducted by Turrell [13, 16, 109], a literature review, and subsequent development through the BFS pilot study. The questionnaire was designed to investigate the main influences on socioeconomic differences in food purchasing, including psychosocial factors, and factors within the shopping environment including food accessibility, availability and prices.

Before administering the BFS questionnaire in the pilot study and subsequently the full study, the level of reading required to undertake the survey was formally assessed using two tests. The Flesch Reading Ease score is rated on a 100-point scale, with higher scores indicating that a document is easier to understand. Documents generally score between 60 and 70 points on this scale. The BFS survey scored 72.7, meaning it was deemed easier to read than the average document. The Flesch-Kincaid Grade Level score (used to rate US grade-school level documents) usually generates scores of 7–8 and the score for the BFS survey was 5.7, providing further support that the BFS was relatively easy to read. In addition to these formal tests of readability, interviewers and respondents were asked for suggestions on how to make comprehension and completion of the survey as straightforward as possible. Several wording and structural changes were made on the basis of this feedback.

Three modes of survey administration were trialled in the pilot study including: long interview, self-administration with a short interview, and a self-administered mail survey. It was determined that the optimal method of administration was a combination of these approaches. Therefore, the BFS questionnaire was primarily self-administered, with an interviewer present to respond to any questions, and to collaborate directly with the respondent to complete some of the more complex survey questions when required. This approach was chosen for several reasons. First, it was considered that having an interviewer present would optimise response rates and data quality, due to the complexity of some survey questions. Second, it was predicted that this approach would allow for greater inclusion of those with

literacy and/or numeracy issues (issues common among those of low SEP [404, 405]). Third, this method allowed a validity check of the participant's pantry and fridge to determine that they had the foods that they reported purchasing in the questionnaire (the details of the validity check will be provided on page 112, after all BFS survey items have been defined).

4.7 OVERVIEW OF THE SURVEY INSTRUMENT

The BFS household survey included 64 questions presented over 39 pages. Some excerpts from the survey will be included in this section to add clarity to the description of the survey. The survey is presented in full in Appendix D.

The survey commenced by asking about food purchasing, followed by area-level (shopping environment) and individual-level (psychosocial) information. Details of income, education and demographic characteristics (e.g. age) were collected towards the end of the survey. Specific components of the BFS were selected for consideration in this PhD investigation based on the thesis goals and literature review. These components are shown in *Figure 4.2*.

FOOD PURCHASING CHOICES	PSYCHOSOCIAL FACTORS	SOCIOECONOMIC FACTORS
Grocery Items Fruit Vegetables	Knowledge of diet-disease relationship Knowledge of nutrient sources Knowledge of dietary guidelines Concern regarding the nutrient content of food Use of nutrition labels Cost concerns Taste preferences (regular choices) Taste preferences (recommended choices) Weight concerns Health concerns Perceived adequacy of the diet	Household income Respondent education **DEMOGRAPHIC FACTORS** Age Gender Household size Household composition

Figure 4.2. List of factors covered by the BFS survey items selected for use in this investigation.

4.8 BFS SURVEY ITEMS REGARDING FOOD PURCHASING CHOICES

A main objective of the study was to determine whether SEP was related to food purchasing choices consistent with Australian Dietary Guidelines [406]. Therefore, questions relating to foods purchased formed a core component of the BFS survey. Three criteria were used to select individual foods for inclusion in the BFS.

(i) Included as part of the '5 core food groups'

The Australian Guide to Healthy Eating [407] lists the following five core food groups as being essential for a healthy diet [407];

- Bread, cereals, rice, pasta, noodles
- Vegetables, legumes
- Fruit
- Milk, yoghurt, cheese
- Meat, fish, poultry, eggs, nuts, legumes.

Each core group is comprised of a number of foods that supply nutrients necessary for good health. While the BFS was not able to include all foods from all core groups, a representation of food items across the five core groups was achieved. For example, while all fruits and vegetables are recommended, listing all varieties of fruit and vegetables would have been impractical. Therefore, 40 types of fruit and vegetables (19 fruit and 21 vegetables) were selected for inclusion in the survey based on the types consumed most frequently by the population according to the 1995 National Nutrition Survey [408].

In addition to the five core food groups, some fats and oils were also selected from the 'extra' foods category for inclusion in the BFS[12]. The National Nutrition Survey [408] indicated that fats and oils are prominent in the diets of Australians, with 75% of the population consuming them on a regular basis. In addition, fats and oils were found to constitute approximately 11% of the total dietary fat intake of the average Australian adult [408], therefore, it was important for the BFS to collect information on this food group.

(ii) The 'recommended' *alternatives had to be consistent with the Dietary Guidelines for Australians*

The Brisbane Food Study was predominantly concerned with the qualitative choices made with regard to foods selected for household consumption [400]. The dietary guideline recommendations for Australian adults [406] provided a useful frame of reference to assess such food choices as these guidelines predominantly promote choices within the five core food groups according to current health and medical recommendations. In particular, these guidelines recommend selecting foods relatively low in fat, salt, and sugar, and high in dietary fibre (the dietary guidelines are presented in Appendix E). Foods were selected for inclusion in the BFS based on the ability to distinguish between options of a given food type based on the dietary guidelines referring to nutrient content. That is, some grocery foods were selected for inclusion because they differed in fat content; these were milk, cheese and

[12] Fats and oils were removed from the Core food Groups in 1994, as they increase energy intake without providing any substantial nutritional content.

yoghurt and others were selected because options differed in terms of sugar (fruit juice, canned fruit), salt (margarine, baked beans) or fibre (bread, rice, pasta). According to these distinctions, throughout this thesis food choices recommended by dietary guidelines (e.g. reduced fat milk) will be referred to as 'recommended' choices in contrast, to 'regular' choices (e.g. full cream milk).

In relation to fats and oils, it is now accepted that poly- and mono-unsaturated fats can lead to positive health outcomes by improving the blood lipid profile [406]. The 'recommended' choices of oils and spreads included in the BFS survey reflect this in addition to other dietary guidelines (e.g. low in salt, or low in fat). It should be noted that only dietary guidelines pertaining to adults were considered when selecting foods for inclusion in the BFS survey. Children and adolescents have different dietary needs and corresponding guidelines that were not dealt with in this study [409].

(iii) Widely available and regularly consumed

The 1996–1997 Apparent Consumption of Foodstuffs [410] was used to identify foods widely available in Australia. Although this report did not distinguish between food that was actually consumed (i.e. purchased and/or eaten) compared to that which was wasted (i.e. not sold or thrown out), it did provide an indication of the foods widely available in Australia.

Foods regularly eaten in Australia were identified based on the 1995 National Nutrition Survey (NNS) [408]. The NNS was undertaken in 1995 and recorded food and beverage intake for people aged two years and over across all Australian states and territories. In the 1995 NHS at least 65% of Australians reported consuming cereals and cereal products, vegetables, milk and milk products, meat and poultry the day before the interview, with around 50% reporting the consumption of fruit [408]. Therefore, the BFS included specific products from each of these categories. The BFS also collected information on items consumed by a relatively small proportion of Australians according to the 1995 NNS. Examples of such foods are legumes and fish, which were consumed by 7% and 18% of Australians, respectively in the 24 hours preceding the survey. These foods were included in the BFS as they

were highly recommended for consumption in the 1998 Australian Guide to Healthy Eating [407].

4.8.1 BFS survey items regarding grocery foods

According to the criteria described above, 16 grocery foods were selected for inclusion in the BFS. These foods were bread, rice, pasta, baked beans, fruit juice, tinned fruit, milk, cheese, yoghurt, beef mince, chicken, tinned fish, vegetable oil, margarine, butter and solid cooking fat. *Table 4.2* presents the 'regular' and 'recommended' choices of each food.

Table 4.2. 'Regular' and 'Recommended' choices of the 16 BFS grocery items [a].

Food-type	'Recommended' [b]	'Regular'
Bread	Wholemeal, multigrain, white high in fibre, rye, soy and linseed	White
Rice	Wholemeal or brown	White
Pasta	Wholemeal or brown	White
Baked Beans	Salt-reduced or unsalted	Regular salt
Fruit Juice	No added sugar (unsweetened)	Added sugar, fruit drink (5-35% juice)
Tinned Fruit	In natural juice	In syrup
Milk	Reduced fat (Trim), low fat (Skim), high calcium (Physical, Shape), high calcium skim (Physical), high iron (Life), high protein (Lite White), reduced lactose (Lactaid), no cholesterol (Dairy Wise), soy or soy & linseed (Skim)	Extra Creamy, full cream, soy or soy & linseed (full cream)
Cheese	Reduced Fat (25% less fat), low fat (<10% fat)	Regular fat
Yoghurt	Low-fat (plain and fruit)	Regular fat (plain and fruit)
Beef Mince	Lean (trim/premium)	Regular (Choice/Fine Grade)
Chicken	Breast fillet without skin, thigh fillet without skin, drumstick without skin	Breast fillet with skin, thigh fillet with skin, drumstick with skin, wings, whole chicken with skin
Tinned Fish	In spring water	In oil, in brine
Vegetable Oil	Canola, sunflower, safflower, olive, corn, soy sesame	peanut, sesame, blended edible, macadamia
Margarine	Salt-reduced, fat-reduced	Regular salt, regular fat
Butter	Salt-reduced, unsalted	Regular salt
Solid Cooking Fat	Margarine, solidified oil	Solid animal fat (lard, beef dripping), vegetable shortening

[a] This table is reproduced from the BFS Report [400]. [b] Food options endorsed in dietary guideline publications and considered consistent with minimal risk for the development of diet-related diseases.

A separate item was used to assess the purchase of each grocery food type. Respondents were first asked whether they purchased a given food type at all, and if so which option/s were usually selected. The question regarding rice is provided below as an example (*Figure 4.3*).

When shopping, what type of rice do you USUALLY buy?

(You can tick more than one)

☐ I do not buy rice . PLEASE GO TO NEXT QUESTION

☐ White rice (include regular, Basmati, Jasmine, Arborio, etc.)

☐ Wholemeal rice (brown)

Figure 4.3. Brisbane Food Study survey question pertaining to rice purchasing.

4.8.2 BFS survey items regarding the variety of fruit and vegetables purchased

As all fruit and vegetables are considered 'recommended' foods, the selection of specific fruits and vegetables for inclusion in the BFS was based on two of the food selection criteria previously noted (i.e. included as part of the '5 core food groups' and being widely available). Regular consumption of a variety of fruit and vegetables is encouraged in the Australian dietary guidelines [411]. Many fruits and vegetables are widely available in Australia, making a large number of fruits and vegetables candidates for inclusion in the BFS. To maximise applicability to respondents, a representative selection of 19 fruits and 21 vegetables were chosen from those found to be consumed frequently by Australians according to the 1995 National Nutrition Survey Food Frequency Questionnaire [408]. The fruit and vegetables included in the BFS are shown in *Table 4.3.*

Table 4.3. Fruit and vegetables included in the BFS survey

Fruit (19 types)		*Vegetables (21 types)*	
Kiwi Fruit	Honey Dew-Melon	Broccoli	Cauliflower
Paw-Paw	Apricot	Capsicum	Green Beans
Orange	Nectarine	Brussels Sprouts	Tomatoes
Mandarin	Pear	Sweet Potato	Cucumber
Strawberry	Peach	Silverbeet/Spinach	Potatoes
Rockmelon	Grapes or Berries	Peas	Lettuce
Grapefruit	Water Melon	Chinese Cabbage	Celery
Mango	Apple	Cabbage	Onions
Banana	Plum	Pumpkin	Eggplant
Pineapple		Zucchini/Squash	Mushrooms
		Carrots	

Respondents were provided with the list of 19 fruits and asked "When shopping for fresh fruit, how often do you buy these types?" There were five response options for this question ranging from 'never buy' to 'always buy'. Respondents were asked to answer assuming all fruits were in season and to exclude fruit juice and tinned or dried fruit. The actual survey question pertaining to fruit purchasing is shown in

Figure 4.4 (this figure shows an abbreviated list of two fruits, the full question, question 18, listing all fruits is included in Appendix D).

18. When shopping for fresh fruit, how often do you buy these types?

For seasonal fruits, indicate how often when in season
Do NOT include fruit juice, tinned fruit and dried fruit
Circle one number on each line

I do not buy fruit . PLEASE GO TO NEXT QUESTION

	Always	Nearly Always	Sometimes	Rarely	Never
Kiwi Fruit	1	2	3	4	5
Paw Paw	1	2	3	4	5
Orange	1	2	3	4	5

Figure 4.4. Extract of Brisbane Food Study question pertaining to the types of fruit purchased.

Data on vegetable purchasing were collected in an identical manner, with respondents asked to assume all vegetables were in season and to include fresh and frozen vegetables, but to exclude tinned or dried vegetables (see question 19, Appendix D).

The food purchasing items described in this section were used to construct the main outcome measures used in this PhD Investigation. This reflects the shared goal of the BFS and this PhD research to explore food purchasing in terms of compliance with dietary guidelines.

4.9 BFS SURVEY ITEMS REGARDING PSYCHOSOCIAL FACTORS

Due to the pioneering nature of the BFS, data were collected on a range of psychosocial factors [400], these were: nutrition knowledge, concern regarding the nutrient content of food, nutrition label use, cost concerns, taste preferences, weight concerns, health concerns, and perceived adequacy of the diet.

4.9.1 BFS survey items regarding nutrition knowledge

The Brisbane Food Study Questionnaire (2000) included 20 items that collectively assessed three acknowledged dimensions of nutrition knowledge (knowledge of the diet-disease relationship, knowledge of nutrient sources, and knowledge of dietary guidelines) [285]. The response options for each item were, true, false or not sure. To reduce response acquiescence, questions were mixed in terms of whether a 'true' or 'false' response was correct (the 20 items are shown in full in Appendix D, question 41).

4.9.2 BFS survey items regarding concern related to the nutrient content of food

Respondents were asked how influential either the nature or quantity of four nutrients were in their food selection. The nutrients examined were salt, sugar, fibre and fat, as all were referred to in the 1998 Australian Guide to Healthy Eating [407]. These nutrients are all still referred to in the current (2003) dietary guidelines for Australian adults [2], and in the latest 2011 draft [412]. Respondents were asked the extent to which they agreed or disagreed with four statements regarding their concern about the nutrient content of foods. For example, *"When buying food for my family, I try to choose food that is low in salt"*. The response options were, 'strongly agree', 'agree', 'not sure', 'disagree' or 'strongly disagree' (the four items are shown in full in Appendix D, question 40).

4.9.3 BFS survey items regarding the use of labels

A single item addressed whether nutrition labels influenced respondents' food choices. The question wording was *"When buying food for my family, my choice is influenced by what I read on food labels"*. The response options were, 'strongly agree', 'agree', 'not sure', 'disagree' or 'strongly disagree'.

4.9.4 BFS survey items pertaining to food cost concerns

The BFS survey included items that measured three types of cost concerns: general food cost concerns, concern regarding the cost of healthy food (hereafter 'healthy food cost concerns") and perception that recommended foods cost more than regular options. There were 20 items in total dispersed over two questions. An example of one of the general cost concern items is, "*Sometimes my family cannot afford to buy enough food for our needs"* and example of one of the healthy foods cost concern items is "*Generally speaking, healthy and nutritious foods are expensive".* The response options for all questions were, 'strongly agree', 'agree', 'not sure', 'disagree' or 'strongly disagree' (all general cost concern and concern regarding the cost of healthy food items are included in Appendix D, question 40).

A battery of 15 items was used to assess respondents' perception of the cost of 'regular' compared to 'recommended' food choices of 15 grocery foods. The 'regular' and 'recommended' options of each food type were named and respondents were asked to indicate which choice they felt cost more, whether they felt both cost the same or whether they were unsure. The item for orange juice is provided below (*Figure 4.5*) as an example.

Which food do you believe is the most expensive to purchase?

On each line, please tick the food which you think costs more. If you think the foods cost about the same, or are not sure, tick one of these boxes instead.

Give your answer for when the foods are NOT on special

WHICH FOOD COSTS MORE?

		OR…	
THIS ONE?	**OR THIS ONE?**	**About same price**	**Not sure**
☐ Orange fruit drink	☐ 100% pure orange juice with no-added sugar	☐	☐

Figure 4.5. Excerpt of BFS survey related to perception that recommended grocery food choices cost more than regular choices.

4.9.5 BFS survey items pertaining to taste preferences

The BFS measured taste preferences for 12 grocery foods and included one item pertaining to taste preferences for vegetables (in general, no specific vegetables

were named). The questions used a hedonic scale to assess liking for each food type, which is a common method of assessing taste preferences [128, 413, 414]. There were five response options available as shown in the following example regarding wholemeal bread (*Figure 4.6*).

Do you like or dislike these foods?

Please give an answer even if you usually don't eat them
Use the following scale to indicate your liking by circling the number which best describes your feeling about the food.

1. I like this food. It tastes good.
2. I can take or leave this food. It tastes OK.
3. I dislike this food. It tastes awful.
4. I've never tried this food, but would try it if I had the opportunity.
5. I've never tried this food, and never intend to try it.

	I like this food	I can take or leave this food	I dislike this food	I've never tried but will try	I've never tried and won't try
Wholemeal bread	1	2	3	4	5

Figure 4.6. Excerpt of BFS survey related to taste preferences for regular and recommended grocery food items and vegetables.

4.9.6 BFS survey items pertaining to weight concerns, health concerns and perceived adequacy of the diet

Single BFS survey items assessed weight and health concerns, while two BFS survey items addressed the perceived adequacy of the diet. These items are shown below in *Figure 4.7*.

To what extent do you agree or disagree with these statements:

(Circle ONE number on each line)

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
When buying food for my family, my choice is influenced by concerns about their health	1	2	3	4	5
When buying food for my family, my choice is influenced by concerns about their weight	1	2	3	4	5
My family's diet is OK and does not need to be changed	1	2	3	4	5
Overall, my family's diet consists mainly of healthy and nutritious food	1	2	3	4	5

Figure 4.7. Excerpt of question 40 of BFS survey, showing items regarding weight concerns, health concerns and perceived adequacy of the diet.

4.10 BFS SURVEY ITEMS PERTAINING TO SOCIOECONOMIC INDICATORS

The BFS measured the socioeconomic characteristics of geographical areas, households and individuals. The socioeconomic indicator measured at the household-level was *income*, the individual-level indicators were *education* (respondent and partner) and *occupation* (respondent and partner). Among these measures, household income and respondent education were examined in this PhD investigation (the rationale for this choice is presented below).

4.10.1 BFS survey items pertaining to household income

At the household level, income was measured by asking respondents for an estimation of the household's total annual income, including wages, pensions, allowances, and investment profits. Respondents were asked to indicate which of 14 income categories applied to their household, and could answer in weekly, fortnightly or annual terms. The annual yearly income categories ranged from under $2079 to $78,000 or more. The actual question is shown in *Figure 4.8*

Please tick the TOTAL amount of income received by ALL members of your household (including pensions, allowances and investments).
(Choose ONE line only)

PER year	OR	PER fortnight	OR	Per week
☐ $1–2,079		☐ $1–79		☐ $1–39
☐ $2080–4159		☐ $80–159		☐ $40–79
☐ $4160–6239		☐ $160–239		☐ $80–119
☐ $6240–8319		☐ $240–319		☐ $120–159
☐ $8320–10 399		☐ $320–399		☐ $160–199
☐ $10 400–15 599		☐ $400–599		☐ $200–299
☐ $15 600–20 799		☐ $600–799		☐ $300–399
☐ $20 800–25 999		☐ $800–999		☐ $400–499
☐ $26 000–31 199		☐ $1000–1199		☐ $500–599
☐ $31 200–36 399		☐ $1200–1399		☐ $600–699
☐ $36 400–41 599		☐ $1400–1599		☐ $700–799
☐ $41 600–51 999		☐ $1600–1999		☐ $800–999
☐ $52 000–77 999		☐ $2000–2999		☐ $1000–1499
☐ $78 000 or more		☐ $3000 or more		☐ $1500 or more

Figure 4.8. The BFS question that assessed household income.

4.10.2 BFS survey items pertaining to respondent education

As shown in *Figure 4.9*, respondents were asked to report the highest level of qualification attained since leaving school.

46. Since leaving school, have you completed a trade certificate or any other educational qualification?

☐ No . PLEASE GO TO QUESTION 48

☐ Yes

47. What is the highest qualification you have completed since leaving school? (Tick ONE only)

☐ Trade or business certificate

☐ Apprenticeship

☐ Associate diploma

☐ Undergraduate diploma

☐ Bachelor degree

☐ Post Graduate diploma

☐ Masters degree

☐ Doctorate

☐ Other (please specify) :

_____

Figure 4.9. Brisbane Food Study questions that assessed respondent education.

As discussed in the literature review, the selection of socioeconomic indicators often appeared to influence findings on whether psychosocial factors were related to socioeconomic position or socioeconomic differences in food choices. The multifaceted nature of SEP is well known [89, 415], and it is a criticism of work in this field that authors often do not justify their selection of socioeconomic indicators [62, 416].

Household income and respondent education were selected as the socioeconomic indicators to be included in this PhD research for several reasons. Importantly, each of these indicators has been associated with food purchasing choices [62-64] and psychosocial factors [50, 62, 145]. Area-level measures have been used in previous research investigating the relationship between psychosocial factors and socioeconomic difference in food choices [61, 64, 69, 134]. However, for this research it was decided that it would be most appropriate to use socioeconomic indicators measured at the same level as either the dependent or independent

variables. The dependent variables (food purchasing choices) used in this investigation pertained to households, while the independent variables (psychosocial factors) pertained to both individuals and households. Therefore, income (measured at the household level) and education (measured at the individual level) were deemed to be more applicable in these analyses than area-level measures of SEP.

Income and education are conceptually relevant to many of the psychosocial factors considered in this PhD research. For example, theoretically, it follows that income as would be reflective of the financial resources available to a household [91, 399]. Therefore, this socioeconomic indicator is likely to be particularly relevant to the extent to which cost concerns influence food purchasing. Education, is likely to contribute to an individual's ability to obtain, interpret and apply information [62, 91, 399], therefore, this measure of SEP is likely to be related to psychosocial factors such as nutrition knowledge and nutrition label use.

It was decided to not use occupation as a socioeconomic indicator in this research due to the sample being predominantly female (N=781/1003, 77.9%) and a substantial proportion of this group being unemployed (N=445/1003, 44.4%), and therefore, not able to be distinguished according to this factor. The use of dual socioeconomic indicators allows assessment of whether the pathways that operate between SEP, psychosocial factors and food purchasing choices are unique depending on the socioeconomic indicator considered.

There is a body of research discussing the merit of using various socioeconomic indicators (e.g. income, occupation and education) in research considering health inequalities [88, 89, 417, 418]. It is generally recognised that the assessment of different socioeconomic indicators enhances our understanding of socioeconomic differences in health in unique ways. Therefore, the consideration of more than one socioeconomic indicator in health inequalities research is advantageous [89, 91].

4.11 BFS SURVEY QUESTIONS PERTAINING TO DEMOGRAPHIC MEASURES

Respondent age, gender, household size and household composition were all collected from the question shown below in *Figure 4.10*.

Q34. Who lives with you in your household?

Please describe your relationship with every person living in your household as well as their sex and age (don't forget yourself!). If there are children living with you part-time, please indicate for how many days per week, fortnight or month.

Person	This person's relationship to you	Sex (Circle)	Age	If part-time child, number of days:
1	YOURSELF	F M		
2		F M		
3		F M		

Figure 4.10. Excerpt of BFS question used to assess respondents' age, gender, household size, and composition (the actual question included space for up to 10 household members).

4.12 DATA COLLECTION

Eight interviewers were recruited to administer the BFS survey. Three days of training was undertaken by all interviewers prior to the commencement of the interviews. They received a training manual, which included an overview of the expected work load and duties. This document described how to select and approach households and how to conduct interviews. The interviewers also observed a simulated interview and conducted at least one interview with a project team member in attendance.

Data collection was conducted between September and December 2000 and commenced with a letter of invitation being personally delivered to each selected dwelling (see Appendix F). The letter outlined the nature of the study and the means by which households were selected to participate. In addition, the letter explained that an interviewer would visit in the next two days to determine if anyone in the household was willing to participate and if so, to schedule an interview time. Potential respondents were further advised in the letter, that a $10

gratuity would be provided to compensate for any inconvenience caused by participation[13]. Respondents were also provided a guarantee of confidentiality and anonymity pertaining to involvement in the study in this correspondence. In total, 2123 letters were delivered during the data-collection period.

In the event that no contact was made with a member of a household on the second visit, a second letter was left for the household residents. Careful attention was paid to scheduling of visits during this two-day recruitment period, to maximise the likelihood of making contact with potential respondents. For example, repeat visits were scheduled for different days (i.e. weekdays and weekends) and different times of day (i.e. morning, afternoon or evening) to the previous visit/s. If, after three separate visits, no contact had been made with a household member the household was classified as a 'non-contact'. This occurred in 24.3% (517/2123) of cases.

When residents were home when the interviewer called and the timing was suitable, the survey was administered immediately. Usually, however, an appointment was made for another time. A consent package was left with the respondent to read and sign prior to the interview (see Appendix G). The survey was completed by the respondent, with an interviewer present to assist when necessary. In instances where the respondent had limited numeracy, literacy or vision, the interviewer read the survey aloud and filled out responses on behalf of the participant. In a small number of cases (n≈20), the interviewer left the survey with the respondent and returned to collect the survey at a later date.

4.13 RESPONSE ANALYSIS

4.13.1 Response rate

Interviewers established eligibility to participate in the study on the first contact with household members. Ineligible persons included those who could not speak English to a level reasonable for them to complete the interview, if they exhibited

[13] The provision of a gratuity has been used in other studies investigating diet-related behaviours [419].

an obvious mental/cognitive disorder or certain physical disabilities (e.g. deafness), if they were elderly and infirm or if the interviewer perceived them as representing a safety risk [400]. Of those who were contacted (N=1606), 6.2% (N=100) were deemed ineligible for participation in the study due to at least one of these reasons, leaving 1506 eligible contacts. A further 488 of this group (32.4%) refused to participate while 18 (1.7%) of selected households that initially agreed, failed to keep their appointment, resulting in a final sample of 1000. This equates to a final response rate of 66.4% (1000/1506 x 100%) [401]. After the data were collected it was discovered that three extra interviews had been conducted [401]. While these three additional cases were not included in the response rate calculations, all 1003 cases have been considered in previous published analyses of the BFS [401].

4.13.2 Profile of those who refused to participate

Of the 488 individuals (32.4%) who refused to participate in the BFS, 134 (27.4%) agreed to complete a four-question non-response card that allowed some socio-demographic and purchasing characteristics to be compared with those who agreed to participate. According to the non-response analysis, non-respondents were generally older and less educated than those who agreed to participate [401]. This indicates that those of low SEP (i.e. with lower levels of education) may have been relatively under-sampled in this study. Therefore, the results may underestimate actual socioeconomic differences in the community if the sample was socioeconomically truncated with those of low SEP being less inclined to participate. This is a known issue in health inequalities research [397, 401].

Bread purchasing was the only food purchasing outcome measure collected for non-participants. Non-participants exhibited adherence to dietary guidelines to the same extent as participants with regard to their bread purchasing.

4.14 VALIDITY OF THE BFS DATA COLLECTION

The questions used in the Brisbane Food Study although frequently published [94, 114] have not been subject to formal validity testing. An audit was conducted both in the pilot study and during the BFS proper to assess the validity of data collected.

Measures related to food purchasing were audited as it was felt that the validity of these items would give a general indication of the validity of the BFS data overall. The validity of the grocery purchasing measures was assessed in 42 of the 60 households that participated in the pilot study preceding the BFS. Interviewers used a food checklist to confirm whether the foods identified by the participant in their survey responses were present in their household. A small representation of food types was selected for the validity check, including milk, bread, butter, cheese and juice. As both 'recommended and 'regular' alternatives were included, this equated to 25 potential food choices to be confirmed, the actual number depending on the number the respondent reported purchasing (see Table 4.2 for a full list of all regular and recommended grocery food types). Overall a high level of consensus was observed: most items (15/25) had agreement above 80% between the audit and the questionnaire, out of the remaining foods, seven items had agreement above 70%, with only three below 70%.

During data collection for the main BFS, a second validity check was undertaken on fruit juice and cheese to verify that the purchase patterns reported were consistent with the contents of the participant's refrigerator or pantry for these foods. This information was obtained by the interviewer as a simple 'check' at the conclusion of the interview. This check indicated that respondents did validly report their food purchasing [400].

The following chapter will describe the quantitative methods applied to the BFS data to meet the objectives of this PhD research.

Chapter 5: **Quantitative methods used in the secondary analyses of the Brisbane Food Study**

5.1 CHAPTER CONTENTS

This chapter describes the procedures used to prepare and analyse the Brisbane Food Study data to meet the research goals of this PhD investigation. A detailed account of the rationale for the analyses selected will be provided.

5.2 DATA CLEANING

The BFS data were checked for inconsistent values and outliers prior to variable construction and statistical analyses. When there were inconsistencies or outliers, original paper surveys and/or other survey responses, were referred to and a judgement made and documented. The amount of inconsistent data found was minimal, which was likely due to the survey being interviewer administered. The data cleaning process revealed a small amount of missing data. Thirty-three respondents (3.0% of 1003) were identified as lacking sufficient data for the proposed analyses, reducing the original sample of 1003 to 970. The protocol for addressing missing data is described in Section 5.4.

The resultant sample of 970 respondents used in this PhD investigation were mainly female (N=763, 78.7%), and just under half the sample were 45 years old or older (46.4%, N= 450). These, along with other sample characteristics, are presented in *Table 5.1*.

Table 5.1. Characteristics of the 970 respondents that formed the sample for this PhD investigation.

CHARACTERISTIC		FREQUENCY (N = 970)	%
Gender	Male	207	21.3
	Female	763	78.7
Age	Under 25	84	8.7
	25–34	218	22.5
	35–44	218	22.5
	45–54	178	18.4
	55–64	116	12.0
	Over 65	156	16.1
Household income	<$25 999	241	24.8
	$26 000–51 999	306	31.5
	$52 000–77 999	192	19.8
	>$78 000	206	21.2
	Missing	25	2.6
Respondent education	No post school	401	41.3
	Vocational Qualification	183	18.9
	Diploma	103	10.6
	Bachelor or higher	262	27.0
	Missing	21	2.2
Household type	Single-Alone	161	16.6
	Group House	81	8.4
	Sole Parent + children	57	5.9
	Couple – children	355	36.6
	Couple + children	316	32.6
Household size	1	161	16.6
	2	315	32.5
	3	198	20.4
	4	179	18.5
	≥5	117	12.1

5.3 CONSTRUCTION OF THE VARIABLES USED IN THIS RESEARCH

Some of the variables constructed for use in this investigation have been derived in an identical manner to those presented in previous publications, others, while still using BFS data have been constructed differently. In addition many new variables have been constructed for use in this research. Variables constructed from BFS data and reported in previous publications include: measures of grocery purchasing [13, 62, 64, 114, 420], cost concerns [62, 114], nutrition knowledge, [62] and taste preferences [16, 360]. The following sections describe the construction of all

measures used in this Investigation and explain how and why they differ to previously published measures where applicable.

5.3.1 CONSTRUCTION OF FOOD PURCHASING OUTCOME VARIABLES

Construction of a grocery purchasing index

The grocery purchasing index used in this research was derived in an identical manner to several previous BFS [13, 62, 64, 114, 420] and other publications [421]. From respondents' reporting of their purchase of each individual grocery food, four purchasing patterns were identified. The four groups were 'do not purchase this food', 'purchase the recommended version of this food exclusively', 'purchase both "regular" and "recommended" versions of this food' ('mixed purchasers'), or 'purchase the regular version of this food exclusively'. The percentage of respondents in each purchasing category for each grocery food is shown in Appendix H. Most of the 16 grocery foods were staples in the households sampled, being purchased by at least 80% of households. The only food not purchased by a high proportion of households was solid cooking fat, which was purchased by 17% of households (165/970)

Scores were assigned to each of the four purchasing patterns. Respondents that did not purchase a particular grocery food were given a score of '0' for this food, those who purchased exclusively 'regular' choices were scored '1', mixed purchasers were scored '2' and exclusively 'recommended' purchasers scored '3'. According to this scoring, purchasing more consistent with dietary guidelines resulted in higher scores. A grocery purchasing index was constructed by adding scores for all 16 grocery foods then dividing by the total number of grocery foods purchased. Index scores were then re-scaled to range from 0–100 (Mean 51.4, SD 17.5) with higher scores reflecting greater compliance with dietary guidelines. The distribution of grocery purchasing index scores is shown in *Figure 5.1*.

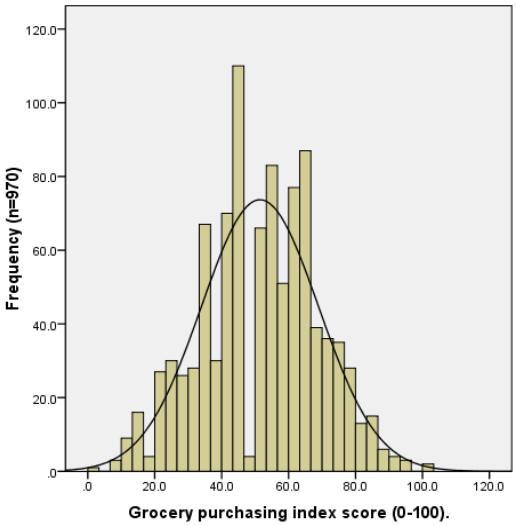


Figure 5.1. Distribution of grocery purchasing index scores.

Construction of the fruit and vegetable purchasing indices

The BFS survey question pertaining to fruit purchasing asked respondents to indicate their frequency of purchase of each of 19 fruits by selecting a single option on a five point scale ranging from 'always buy' (1) to 'never buy' (5). The fruit purchasing index measure used in this research was derived in an identical manner to that used in a previous publication [63]. This method of index construction isolated the variety of fruit purchased as an alternative to previous means of construction, which encompassed both 'variety' and 'frequency' aspects of fruit purchasing [94], making it impossible to discern either aspect separately.

The first step in generating index scores reflecting the variety of fruit purchased was to assign the purchasing pattern of each of the 19 fruits to one of two scores. The responses 'always buy', 'nearly always buy' or 'sometimes buy', were scored '1' and the responses 'rarely buy' or 'never buy' were scored '0'.

Therefore, those who purchased fruit at least sometimes, were distinguished from those who rarely or never bought a given fruit. Responses for the purchase of all fruits were then summed to create a fruit-purchasing variety index score for each respondent. This index was then re-scaled to range from 0 to 100. A vegetable purchasing index was constructed in an identical manner to the fruit index using those 21 items pertaining to vegetable purchasing. The mean fruit variety and

vegetable variety index scores were respectively 66.1 (SD 20.7) and 74.1 (SD 16.1), with higher scores reflecting a wider variety of fruits/vegetables purchased. The distributions of the fruit and vegetable purchasing indices are shown in *Figure 5.2*.

.

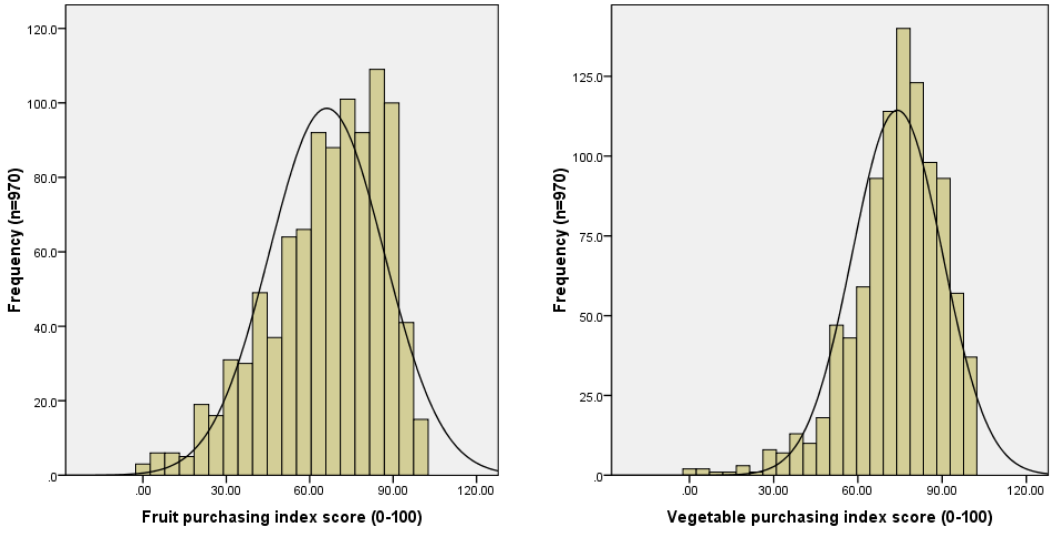


Figure 5.2. Distribution of fruit and vegetable purchasing variety index scores.

5.3.2 CONSTRUCTION OF PSYCHOSOCIAL VARIABLES

This section describes the construction of 15 psychosocial factors used in this investigation. Several of these psychosocial variables represent factor scales derived from Principal Components Analyses (PCA). These variables will be described first, followed by variables that were constructed by other methods. Briefly with regard to the PCA, Question 40 of the BFS survey contained 16 items, which measured the perceived influence of a variety of psychosocial factors on food purchasing. Each of the 16 items had five response options: strongly agree (1), agree (2), not sure (3), disagree (4) and strongly disagree (5). All scores were reversed from the original response categories (i.e. 5=1, 4=2, 3=3, 2=4, 5=1) so that higher scores indicated higher levels of agreement with each item, 'not sure' remained coded as '3'.

Principal Components Analyses (PCA) was used to investigate whether responses to any of the 16 items were correlated, hence representing a common theme or

potentially multiple themes. In this manner the PCA was used as a data reduction strategy [422] and to provide further support for combining items rather than only relying on their conceptual relatedness at face value. The first four psychosocial variables described in this section, namely nutrition concerns, general food cost concerns, healthy food cost concerns and perceived adequacy of the diet, were all derived using this method. Therefore, to avoid repetition only the aspects of this process unique to each factor will be discussed in each section with all generic information on the PCA procedure presented in Appendix I. All factor scales derived from PCA were re-scaled to range from 0 to 100.

Construction of concern regarding the nutrient content of food scale

Question 40 contained five questions that gauged respondent concern regarding the four nutrients salt, sugar, fat (two items on fat) and fibre when food shopping. PCA results showed four of the five items regarding nutrition concerns to be highly correlated (Cronbach's α =0.809 [286]), therefore, responses to these items were combined to generate a 'nutrition concern' factor scale score for each respondent The mean score of the sample (N=970) for this scale was 63.49 (SD 17.98). The composite items and their factor loadings were as follows:

- *When buying food for my family, I try to choose food that is low in fat (0.792);*
- *My purchasing choice is influenced by the type of fat in food (e.g. saturated or unsaturated) (0.713);*
- *When buying food for my family, I try to choose food that is low in salt (0.710)*
- *When buying food for my family, I try to choose food that is low in sugar (0.710)*

The mean score of the sample (N=970) for this scale was 63.49 (SD 17.98).

Construction of general food cost concern and healthy food cost concern scales

Two distinct cost concern themes were identified from the PCA: concern about the cost of food in general (hereafter 'general food cost concern') (Cronbach's α = 0.647) and concern regarding the cost of healthy food specifically (hereafter 'healthy food cost concern') (Cronbach's α = 0.704).

General food cost concerns factor score

The three items that contributed to the scale 'general food cost concern' were the same as those identified as constituting a theme in a previous BFS publication [62].

The items and their factors loadings were as follows:

- *Sometimes my family cannot afford to buy enough food for our needs (0.755)*
- *When buying food for my family, my choice is influenced by the price of the food (0.755)*
- *Sometimes my family cannot afford to buy healthy and nutritious food (0.708)*

The mean score of the sample (N=970) for this scale was 42.14 (SD 18.84).

Healthy food cost concerns factor score

This appears to be the first time a factor regarding concern about healthy food specifically has been generated from BFS data. The items that constituted the scale were highly correlated (Cronbach's α = 0.704) indicating that they did represent an underlying theme. The actual composite items and their factors loadings were as follows:

- *Generally speaking, healthy and nutritious foods are expensive (0.820)*
- *My family needs to spend a lot of money to buy healthy and nutritious food (0.839)*

The mean score of the sample (N=970) for this scale was 47.14 (SD 17.13).

Construction of a 'perceived adequacy of the diet' scale

PCA suggested that responses to the two items referring to the perceived adequacy of the family diet were correlated (Cronbach's α = 0.62). The items that contributed to the scale and their factors loadings were as follows:

- *My family's diet is ok and does not need to be changed (0.762)*
- *Overall my family's diet consists mainly of healthy and nutritious foods (0.766).*

The mean score of the sample (N=970) for this scale was 67.9 (SD 17.13).

The remaining 11 psychosocial variables were constructed from methods other than PCA, each of which will now be described.

Construction of nutrition knowledge variables

Previously, BFS data have been used to construct an index of 'dietary knowledge' [62]. This index reflected a combination of three commonly acknowledged components of nutrition knowledge, namely knowledge of the relationship between diet and disease, knowledge of the nutrient content of foods and knowledge of dietary guidelines [285]. For this Investigation, indices were created to reflect the separate aspects of nutrition knowledge. The true/false items that contributed to each of the three nutrition knowledge subscales were as follows:

Knowledge of the relationship between diet and disease
A high intake of plant food combined with a low salt intake may protect against high blood pressure Adequate calcium intake may reduce the risk of osteoporosis Choosing salt-reduced food provides no health benefits Dietary fibre from wholemeal foods combined with an adequate intake of drinking water prevents constipation Choosing wholemeal bread provides no health benefits A high intake of saturated fat can protect against heart disease Low sugar intake may decrease the risk of dental cavities
Knowledge of the nutrient content of foods
Milk and milk products such as cheese and yogurt are the best sources of iron Meat, poultry and fish are the best sources of calcium Fruit is a poor source of vitamin C Wholegrain breads are good sources of fibre Saturated fats are found in large quantities in butter, lard and dripping. Dark green and orange vegetables like spinach, broccoli, carrots and pumpkin are low in vitamin A
Knowledge of dietary guidelines
Bread, cereal, fruit and vegetables should make up the smallest part of our diet It is better for health to choose lean meat (with little visible fat) It is better for health to limit those foods which contain high levels of sugar such as soft-drinks, cordial and biscuits It is recommended that adults have some milk, cheese or yogurt every day It is recommended that we eat fat and oil in limited amount Adults should choose full cream milk instead of skim or trim milk Meat, fish, chicken and eggs should make up the largest part of our diet

The approach of considering three components of nutrition knowledge was taken to make findings comparable with other studies that also measured these individual aspects of this factor [423, 424]. In addition, as the focus of this research is to understand the contribution of psychosocial factors to inequalities in food

purchasing, it was determined that analysing the components of nutrition knowledge separately would yield greater insight compared to only studying these factors collectively.

The response options for each nutrition knowledge item were; 'true', 'false' or 'not sure'. Responses were dichotomised into the categories: 'correct' (correct response given) or 'not correct' (including incorrect response and don't know). This classification of responses is known as a 'strict' scoring protocol in that both incorrect and 'don't know' responses are considered equally reflective of a lack of knowledge [62] and has been applied to true/false knowledge questions in previous research examining dietary behaviour [62, 425].

'Don't know' and 'false' were both coded as zero and correct responses as '1'. Scores for items pertaining to each of the three indices were then were summed, divided by the number of items answered and then adjusted to range from 0 to 100 – with higher values reflecting greater knowledge with regard to the particular aspect of nutrition knowledge being considered. The descriptive statistics of each of the nutrition knowledge indices are included in *Table 5.2*.

Table 5.2. Descriptive statistics of nutrition knowledge indices (N=970)[a]

Psychosocial Factor	Mean (s.d)	Median (range)
Knowledge of diet-disease relationship	80.7 (21.3)	85.7 (range 0–100)
Knowledge of nutrient sources	67.6 (18.6)	66.7 (range 0–100)
Knowledge of dietary guidelines	79.5 (12.7)	85.7 (range 0–100)

[a] Although both means and medians are presented, the median and range are the most informative statistics for these variables as they did not meet all the criteria to be considered normally distributed. Full details on the normality tests undertaken are provided in Appendix J.

Construction of nutrition label use variable

A single item addressed whether nutrition labels influenced respondents' food choices. The question wording was 'When buying food for my family, my choice is influenced by what I read on food labels'. The response options were, 'strongly agree', 'agree', 'not sure', 'disagree' or 'strongly disagree'. The research questions of this investigation determined the way responses to this question were coded. Specifically, it was of interest whether labels influenced food choices or not, rather

than the degree to which they influenced choices. Therefore, it was proposed to collapse 'strongly agree' and 'agree' responses to form a single 'agree' category and to combine 'strongly disagree' and 'disagree' responses to form a single 'disagree' category.

Prior to collapsing categories, the characteristics of respondents in each group was investigated. Those respondents who 'strongly agreed' did not differ from those who 'agreed' in terms of age, gender, income and education, therefore, both groups were combined to form an 'agree' category. The same was true of those who 'strongly disagreed' and 'disagreed'; therefore, they were combined to form a 'disagree' category. Those who indicated they were 'not sure' were initially retained as a third category. Approximately 10% of respondents (9.8%, N=95) were in this category. To maximise power, and due to use of nutrition labels (agree) being the factor of interest, the possibility of combining 'disagree' and 'don't know' categories into one group was investigated and actioned. Those who disagreed, versus those who did not know whether labels influenced their food purchasing, were not significantly different in terms of gender, age, SEP, or food purchasing. As further support for combining the 'don't know' and the 'disagree' categories, the 'don't know' group was more similar to the 'disagree' than to the 'agree' group with regard to all of the above characteristics considered. The frequency distributions for the original and derived categories of nutrition label use are shown in *Table 5.3*.

Table 5.3 Frequency of agreement that reading nutrition labels influences food choices (N=970), original survey response categories and derived variable categories).

Frequency of agreement that reading nutrition labels influences food choices			
Original BFS data collection categories % (N).		Categories derived for the current study % (N).	
Strongly agree	21.3 (207)	Agree	64.4 (625)
Agree	43.1 (418)		
Don't know	9.8 (95)	Don't Know/Disagree	35.6% (345)
Disagree	22.8 (221)		
Strongly disagree	3.1 (29)		

Construction of variable reflecting perception that 'recommended' food choices cost more than 'regular' choices

The BFS questionnaire (question 31) contained items that assessed respondents' perception of whether 'recommended' food choices cost more than 'regular' choices for each of 15 grocery foods.

Four response options were possible for each item, including '"recommended" option costs more', '"regular" option cost more', 'both options cost the same' or 'unsure'. An index score for the perception that 'recommended' food costs more was created by adding up the number of items to which respondents indicated that the 'recommended' food type was more expensive and dividing this by the total number of the 15 items that they answered. Index scores were then re-scaled to range from 0 to 100.

A total of 106 respondents (10.6% of the original sample of 1003) had missing or invalid responses (e.g two or more responses) for at least one third of the items that comprised Question 31. To maintain these individuals in the analyses it was decided to treat this measure as a categorical rather than a continuous variable. To maximise statistical power, while maintaining enough levels of the variable to observe graded trends, tertiles were created among those with index scores and

those 106 respondents without sufficient data formed a fourth 'missing' category[14]. The distribution of respondents into each category is shown in *Table 5.4*.

Table 5.4. Distribution of respondents with regard to the perception that 'recommended' food choices cost more than 'regular' choices.

Categories of agreement that recommended food costs more than 'regular' options (N, %)				
Tertile[a] 1 (agree for the highest number of foods)	Tertile 2 [a]	Tertile 3 [a] (agree for the lowest number of foods)	Missing	Total
293 (30.2)	322 (33.2)	249 (25.7%)	106 (10.9%)	970 (100)

[a] Tertile 1 includes those who believed the 'recommended' option cost more for the highest number of foods, compared to Tertile 3, comprising those who believed the 'recommended' option cost more for the lowest number of foods. Tertile 2 was the intermediate category.

Construction of taste preference indices

Two previous studies have used a measure of respondents' taste preferences for 'recommended' foods using similar items to those used in the BFS survey [16, 360]. Whereas these previous studies measured taste preference only for 'recommended' foods, the BFS survey measured preference for both 'recommended' and 'regular' foods. This PhD used this data to create indices reflecting respondents' preferences for both 'regular' and 'recommended' foods.

The taste preference question in the BFS was worded "Do you like or dislike these foods?" followed by a list of 13 foods The response options for each food were: 'I like this food', 'I can take or leave this food', 'I dislike this food', 'I've never tried but will try', and 'I've never tried and won't try'.

The first step in constructing the preference index for 'recommended' foods was to score all responses. If a respondent liked a given food (as expressed by selecting the response "I like this food it tastes good" they were assigned a score of '1', all other responses were coded as '0'[15]. An overall score for liking of 'recommended' foods was calculated by summing all scores for liking of the 'recommended' food items.

[14] The missing group did not differ from other groups in terms of age, gender, or food purchasing outcome measures.

[15] The protocol for missing data is described in detail in a subsequent section.

This score was then divided by the number of questions respondents had tried, and then all scores were scaled to range from 0 to 100. An identical method was used to subsequently construct an index to reflect respondents' preference for 'regular' foods. It was determined that only those who answered at least three-quarters of the questions that formed the index would receive an index score, with those who answered less items to be assigned to a missing group[16.] All 970 respondents that comprised the final sample received index scores for both regular and recommended taste preferences. Mean scores for these indices are presented in *Table 5.5*.

Table 5.5. Descriptive statistics of respondent taste preferences for 'regular' and 'recommended' food choices (N=970).

Taste preferences	Mean (s.d)[a]
'Regular' foods	51.4 (27.9)
'Recommended' foods	64.7 (21.3)

[a] Mean and s.d. are presented as all variables were normally distributed (for details of the assessment of normality for individual variables see Appendix J).

The majority of research on the influence of exposure on taste preference has been conducted with infants and children [427]. Such studies generally find increased exposure to particular foods being associated with greater liking for these foods [323]. As discussed in the literature review, it is possible for individuals to express a preference for foods that they may have never tried. However, the response structure of the BFS survey directed respondents to either indicate their degree of liking for the food or whether they had never tried it, multiple responses were not allowed.

It was investigated whether in the BFS sample, there were socioeconomic differences in terms of the number of foods in the taste preferences question that respondents had tried. To do this the two never-tried categories, that is, never tried

[16] This protocol in response to missing data when creating indices is in line with that described by Babbie [426].

but will, and never tried and won't, were combined in a new variable with respondents receiving a score of '1' if they nominated either of these responses.

All other responses, including missing responses, were coded as '0'. The characteristics of non-triers were only investigated for foods where the non-triers represented at least 5% of the sample of (49/970). This was the case for four of the 13 foods included in Question 33, which were trim milk, reduced-fat cheddar cheese, reduced-salt margarine and fruit drink. Cross-tabulations between each socioeconomic measure and each food were generated along with chi-squared statistics to indicate whether any differences were significant. No graded or significant associations were observed between education and the propensity to try any of the four foods considered. Fewer respondents in the lowest income group had tried trim milk, reduced-fat cheddar and fruit drink, however, differences were small (at most 5.7% more non-triers in the lowest income group versus the highest group) and no differences were significant. Therefore, exposure to foods was not maintained as a potential mediator of socioeconomic inequalities in food purchasing to be included in the final models.

Construction of health concern and weight concern variables

Health and weight concerns were each measured by a question with identical wording, apart from the terms 'health' or 'weight' being interchanged. The question read: "When buying food for my family, my choice is influenced by concerns about their health/weight". The response options were 'strongly agree', 'agree', 'don't know', 'disagree' and 'strongly disagree'. As agreement was the factor of interest, the two 'agree' responses were combined to form one category and the 'don't know' and 'disagree' responses were combined to form another. The distribution of responses to each of the questions is shown in *Table 5.6*.

Table 5.6. Distribution of responses regarding health and weight concern (N=970).

	Agree (N, %)	Disagree + Don't Know (N, %)	Total (N, %)
Weight concern	576 (59.4)	394 (40.6)	970 (100)
Health concern	849 (87.5)	121 (12.5)	970 (100)

Summary of all psychosocial variables constructed

In total, 13 psychosocial variables were constructed from the BFS data. These variables were broadly classified as belonging to five psychosocial themes as shown in *Table 5.7*.

Table 5.7. List of the 13 psychosocial variables constructed, categorised into five psychosocial themes.

Psychosocial theme	Items
Nutrition knowledge	Knowledge of diet-disease relationship Knowledge of nutrient sources Knowledge of dietary guidelines
Nutrition Concerns	Concern regarding the nutrient content of food. Nutrition label use
Cost Concerns	General cost concerns Cost concern healthy[a] foods Perception that 'recommended' [b] food choices cost more than 'regular' choices.
Taste Preferences	Respondent's preference for 'recommended'[b] food choices. Respondent's preference for 'regular'[b] food choices.
Other	Weight concerns Health concerns Perceived adequacy of the diet

[a] Questions used the term 'healthy' specifically, therefore, it was the respondent's definition of the term that was being assessed. [b] 'Recommended' foods denotes food choices recommended in dietary guidelines, for example, reduced-fat milk, while 'regular' foods denotes regular or standard choices, for example, full cream milk..

5.3.3 CONSTRUCTION OF SOCIOECONOMIC AND DEMOGRAPHIC VARIABLES

Construction of household income variable

The income variable used in this research was derived by collapsing the 14 category income variable (ranging from $1–2079 to ≥$78 000 per annum) into quartiles.

Dividing the sample in to four even groups in this manner (ranging from those with the most through to the least income) was considered to be an objective approach to categorising the variable as no meaningful income thresholds have been established with regard to dietary inequalities. This approach also maximised statistical power (by producing even group numbers) while maintaining enough categories for socioeconomic gradients to be observed. The resulting income groups comprised those of low (≤ $25 999), mid-low ($26 000–51 999), mid-high ($52 000–77 999) and high (≥ $78 000) income and a 'missing' income group (comprising those who did not respond to this question). The distribution of the sample into the four income categories is shown in *Figure 5.3*.

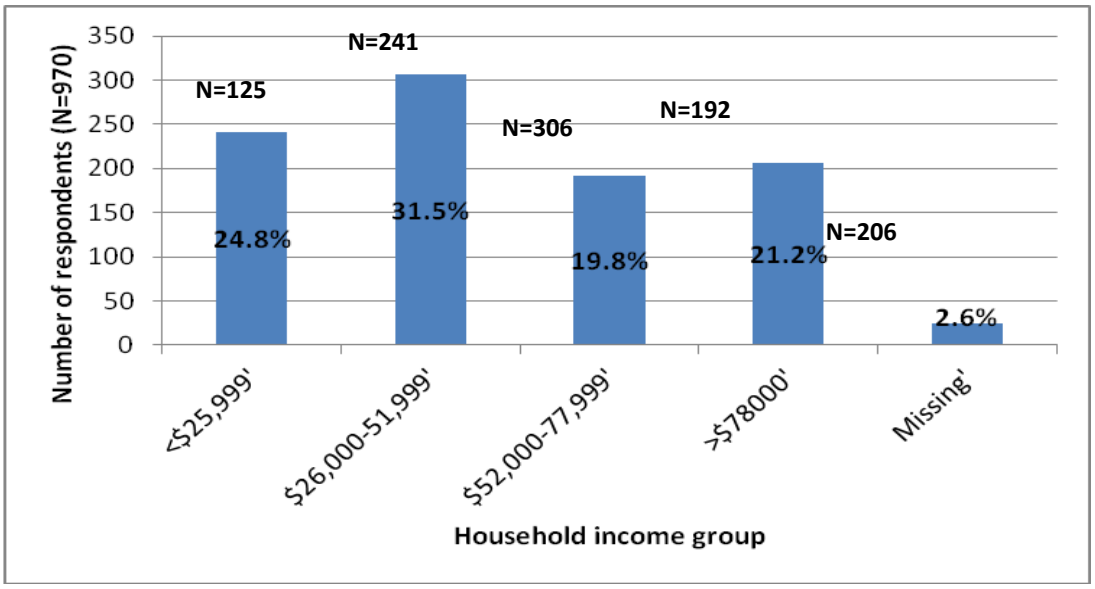


Figure 5.3. The proportion of respondents in each household income group.

Construction of respondent education variable

Respondents were asked whether they had completed any trade certificates or educational qualifications since completing school and the type of additional training undertaken if applicable (Questions 46 and 47 of the BFS included in Appendix D). The 10 categories pertaining to education undertaken post-school were collapsed to three categories: bachelor degree or higher (including postgraduate diploma, masters degree or doctorate); diploma (associate or undergraduate) and vocational (trade or business certificate, or apprenticeship). Those who had not completed any post-school education or provided no

information regarding their education, respectively, comprised two additional categories. This method of constructing the education variable is identical to that reported in previous BFS publications [62, 401]. The distribution of education levels across the BFS sample used in this thesis is presented in *Figure 5.4.*

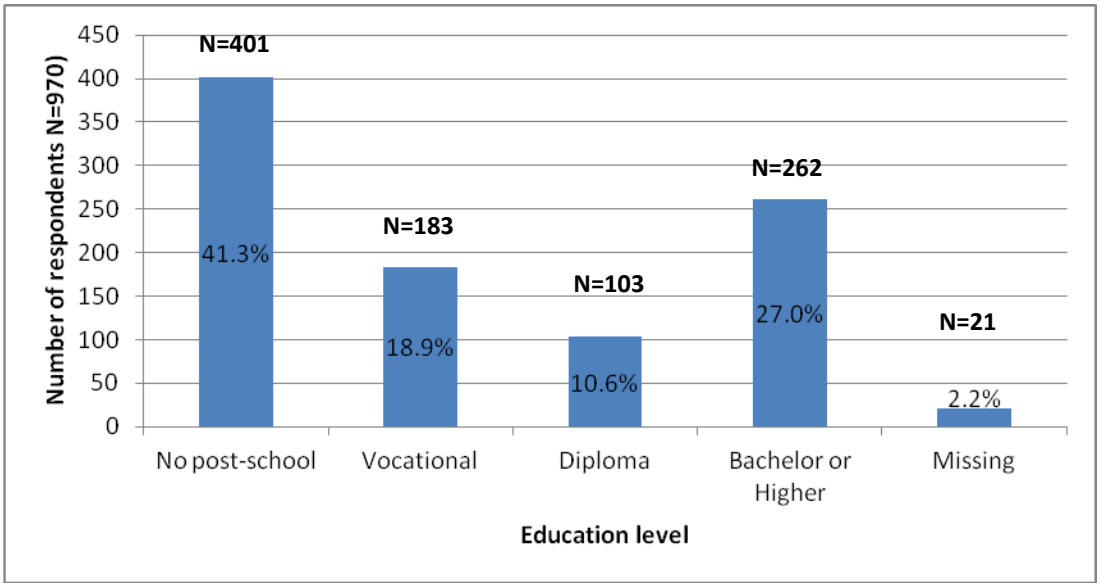


Figure 5.4. The distribution of BFS respondents across each of five educational attainment categories.

Construction of respondent age and gender variables

The interviewer noted respondents' gender and respondents were asked to indicate their age (Question 34, Appendix D). Age was kept in the continuous form in which it was collected due to the normal distribution of this variable. The majority of the sample were female (N=763, 78.7%) and the mean age of respondents was 45.36 (s.d. 16.7).

Construction of household size and composition variables

Household size and composition were also derived from BFS survey question 34 (see Appendix D). A household size variable was calculated by summing the number of household members noted by respondents. A household composition variable was created by assessing the relationship between the respondent and other household members (e.g., respondents nominated relationships such as husband, daughter or lodger and from these household types were identified). The

distributions of household type and size in the sample are shown in *Table 5.8* and *Table 5.9*, respectively.

Table 5.8. Distribution of household types in the BFS sample (N=970)

Household type	Frequency	%
Single-Alone	161	16.6
Group house	81	8.4
Sole parent dependent kids	57	5.9
Couple with dependent kids	316	32.6
Couple no dependent kids	355	36.6

Table 5.9. Distribution of household size in the BFS sample (N=970)

Number of household members	Frequency	%
1	161	16.6
2	315	32.5
3	198	20.4
4	179	18.5
5 or more	117	12.1

5.4 PROTOCOL FOR MISSING DATA.

In some instances in the BFS survey where only one response was required, respondents gave more than one response. When the intended response was not obvious (e.g. one response crossed out), the response was classified as 'missing'. Therefore, in the following explanation of how missing data were treated, the term 'missing data' is used to include actual missing data in addition to duplicate responses and instances where the respondents' intended response was unclear.

5.4.1 Missing data for individual items

For variables constructed from single items (e.g. gender, weight concerns, if the number of respondents with missing data were less than 5% , N=50) they were excluded from the applicable analyses [428]. In such instances the characteristics of individuals with missing data were not compared to those who did respond. When equal to or greater than 5% of respondents had missing data a separate 'missing' response code was created, allowing individuals with missing data to remain in the analyses. Characteristics of those in the 'missing' data group were compared to those with usable data to guide decision making on whether those with missing

data would remain in a separate category or whether they could be combined with other categories. Examples of the characteristics assessed were age, gender, income, education and the food purchasing outcome measures. Decisions on categorisation for specific variables were outlined in the previous section (Section 5.3, variable construction) where applicable.

5.4.2 Missing data for indices

For indices created from several items, respondents were only assigned an index score if they had valid answers for at least one-third of the questions. For indices created via PCA, respondents were only assigned an index score for a given component if they answered all of its composite items. This was due to the fact that the proportion of missing data were very small, therefore, it was considered a preferable approach to retain only original data rather than combining these with imputed data, an approach sometimes undertaken in instances where a considerable amount of data are missing [429].

If for any index constructed, at least 10% of respondents could not be assigned an index score (due to the level of missing data), categorisation of the index was considered to allow this group to be maintained in analyses as a 'missing' category. It was only determined appropriate to categorise an index in this manner on one occasion (regarding the perception that 'regular' food choices cost more than 'regular' choices, as described in section 5.3.2).

5.4.3 Missing data overall

Approximately 3% of the original 1003 respondents (N=33) had missing data for one or more of the variables included in the models. As outlined in Tabachnick and Fidell [428], deleting respondents with missing data when this group totals 5% or less of the sample is often an optimal solution for maintaining data integrity, providing the 5% do not systematically differ from the rest of the sample [428]. A sensitivity analysis showed those 33 respondents with missing data did not differ from the rest of the sample in terms of age, gender, SEP or food purchasing, therefore, these respondents were removed resulting in a final sample of 970 respondents.

5.5 THEORETICAL AND STATISTICAL IDENTIFICATION OF CONFOUNDERS

The literature review identified several potential confounders of the relationships between SEP and food purchasing. These factors were gender, age, household size and household composition. Age [64, 145], gender [64, 145], and household composition [145] have been previously adjusted for in publications using BFS data. Age and gender are commonly adjusted for in this field of research [63, 195], and household composition less commonly [63].

To promote model parsimony and maximise statistical power, it was investigated whether there was statistical evidence that the inclusion of certain potential confounders in the models was warranted or whether they could be excluded. To investigate this it was assessed whether any of the potential confounding variables were associated with both the dependent (food purchasing) and independent (SEP) variables, which is a common criteria of confounding [430]. All factors apart from gender were found to be associated with food purchasing and SEP. However, gender was retained as a covariate in all statistical models due to the frequent association of this factor with food choices [107, 360-362], psychosocial factors [431] and SEP [432, 433].

For the purposes of these analyses no socioeconomic indicators were deemed to confound the relationship between another socioeconomic indicator and food purchasing. That is, education was not deemed to confound the relationship between income and food purchasing and vice versa. Rather each socioeconomic indicator was considered to reflect different aspects of SEP and to possibly be causally related to one another [92] (the standard definition of confounders is that they are not causally related to the relationship they confound [430]). A commentary on the potential problems associated with including dual socioeconomic indicators in the same model (namely over-adjustment) has been presented elsewhere [62, 92, 284]. In short, SEP is represented by multiple elements that may be inextricably related. Therefore, mutual adjustment, for example, adjusting education for income, rather than providing a clearer picture of

the individual contribution of each factor (in this example, education) may actually adjust away some of the inherent socioeconomic differences under investigation.

This conceptualisation of socioeconomic indicators and resulting analytical strategy that examines each indicator without adjustment for other socioeconomic factors, has been used in similar research investigating socioeconomic differences in food purchasing [94, 182]. The construction of separate models using different socioeconomic indicators (without mutual adjustment) meets an objective of this research to explore potentially different pathways between SEP, psychosocial factors and food purchasing according to the socioeconomic indicator considered.

5.6 ASSESSMENT OF STATISTICAL ASSUMPTIONS

Several assumptions were investigated by examining both individual variables, bivariate associations and model residuals. This process was important for determining whether it would be favourable to modify (e.g. transform or categorise) any variables to improve model performance [428]. Further, these results were useful for determining the appropriate bivariate statistical tests and variable summary statistics

The five assumptions examined were:

- *Normality*
- *Homogeneity of variances*
- *Linearity*
- *Independence of observational units*
- *Multicollinearity*

The assessment of these tests is reported in Appendix J.

5.7 SELECTION OF AN APPROACH TO ASSESS MEDIATION

An analytical approach was sought to consider the relationships between food purchasing, psychosocial factors and SEP. The approach selected is based on the explanatory technique of 'elaboration' as described by Rosenberg [434] and later Davis [435]. This method asserts that an association between an independent and dependent variable (here, SEP and food purchasing) is partially explained if the introduction of a third variable(s) (here, psychosocial factors) mediates this

association. There have been considerable developments in mediation analyses from the early conceptual papers published in the 1960s and the widely cited paper by Baron and Kenny published in 1986 [436]. The approach used in this PhD investigation was selected based on contemporary recommendations for mediation analyses [395, 436] and the specific objectives of this PhD research.

5.7.1 Design of the analytical approach based on current recommendations for mediation analyses

The analytical approach was selected based on the following five current recommendations for mediation analyses.

1. The sequential exploration of relevant relationships under study.

Sequential exploration of the inter-relationships between the relevant variables prior to assessing mediation is recommended to provide a more comprehensive understanding of the phenomena under study [395, 428] and aid interpretation of the final mediation results. In this PhD investigation, the relationships between food purchasing and SEP, SEP and psychosocial factors and food purchasing and psychosocial factors were all explored prior to the mediation models, and are reported. Such transparency in the lead up stages to the final models is consistent with current recommendations [395].

2. Enhance model parsimony

The models assessing mediation were kept as simple as possible by ensuring that all variables had a theoretical basis for their inclusion and checking for redundant or collinear variables. Potential collinearity was assessed by calculating the variation inflation factors (VIFs) using SPSS version 19.0. All independent variables had VIFs less than 2. Therefore, it was appropriate to include all independent variables in the same model where required [437, 438].

3. Ensure that assumptions regarding the temporal relationships between variables are reflected in the model specifications.

All models were constructed in a manner that did not make assumptions with regard to the temporal relationships between independent variables, as these were not known. There is a dearth of theory regarding the chronology of relationships

between variables in this emerging area of research. The temporal relationships between psychosocial factors in particular remain unclear. For example, it is not known whether weight concerns precede nutrition knowledge or vice versa, or whether there is no static temporal relationship between these variables.

4. The use of multiple modelling approaches

The use of multiple modelling approaches is recommended to allow a broader understanding of the phenomena under study, particularly when the aim of the analyses is to illuminate potential causal pathways between phenomena, and when the temporal relationships between variables are not established [395]. The modelling approach used consisted of six phases. Collectively, these phases provided estimates of the mediated effect associated with single mediators, and with groups of mediators, in various adjustment scenarios. This process allowed a more complete appraisal of whether such factors are likely to contribute to inequalities in food choices and whether they exert an influence in an individual or collective manner.

Models were generated to specify a number of socioeconomic, psychosocial and food purchasing measures. This allowed insight as to whether psychosocial factors had a unique impact, depending on the food purchasing outcome considered (e.g. fruit, vegetable, or grocery purchasing) or the type of disadvantage considered (e.g. low educational status or low income). This approach also provided an indication of whether particular psychosocial factors were influential across a range of scenarios or only in some contexts.

5. Mediated effects to be presented along with contextual data

When mediation analyses are sufficiently powered it is desirable to report confidence statistics such as confidence intervals or standard errors around the mediated effect [395]. This contextual information is useful to assess the extent to which the observed mediated effects are 'real' as opposed to merely due to chance (reducing the likelihood of a type 1 error). Appendix K provides an example of how confidence intervals may be used to assess the significance of a mediation effect.

The BFS was described by the researchers who devised it as a pioneering and exploratory study [400]. The planning documents for the BFS note that the sample size was not geared for hypothesis testing, even with regard to socioeconomic differences in food purchasing [400]. Mediation analyses typically require much larger samples compared to standard regression analyses [439-441]; clustered data further inflates the sample size required in order to be able to draw conclusions about the data with a high degree of certainty, or in other words with statistical confidence [442].

Therefore, consistent with the way it was devised, the BFS was useful for conducting an exploratory analysis of mediation, however, was not sufficiently powered to allow a meaningful assessment of confidence statistics around the mediated effect. Therefore, confidence statistics around the mediation effects are not presented in the ensuing results section.

5.7.2 Selection of a mediation procedure to meet the research objectives of this PhD

Multiple software packages and procedures available to assess mediation were examined to determine the method most conducive to addressing the research goals of this PhD investigation. The four criteria especially relevant to the selection of a method were as follows:

1. The ability to assess both continuous and categorical mediators, since both types were measured in the BFS and were of interest in this PhD investigation.
2. The ability to assess all (13) potential mediators simultaneously.
3. The capacity to adjust for confounders.
4. The capacity to account for the multi-level nature of the data (to adjust for possible clustering/design effects).

A summary of the methods considered and their ability to meet each criterion is presented in *Table 5.10*.

Only three packages/procedures met most requirements for the PhD investigation: PROCESS, Multilevel Structural Equation Modelling (SEM), and Multi-level General Linear Models (GLM). The inability of most available packages/procedures to assess multiple mediators has been noted as a main limitation in this area by leading authors in the field of mediation analysis [443]. Restrictions regarding the type of mediators are also common, and among the macros and procedures presented in *Table 5.10* most are unable to consider both categorical and continuous mediator variables concurrently.

The newly released (2012) macro PROCESS, has the ability to assess a number of continuous and categorical variables simultaneously. A paper introducing this technique is currently under peer review [444]. However, even once assessed by the academic community, this macro has the capacity to consider 10 mediating variables simultaneously, falling just short of the 13 required for this investigation. In addition, the PROCESS macro can only account for clustered data in a very basic way (i.e. a 'fixed effects approach to clustering'), which is inferior to using a multi-level model for assessing multi-level data such as that collected in the BFS [444].

Structural equation modelling (SEM) meets most of the criteria for this PhD investigation. However, when modelling multiple mediators concurrently this method requires the model specification to reflect proposed relationships between mediator variables (based on theory or hypotheses) [445]. Information on the inter-relationships between psychosocial factors is not yet available in this emerging field of research [92]. Therefore, as expected in this context, the literature review did not identify any studies that used a SEM approach to simultaneously consider multiple psychosocial factors as mediators of socioeconomic differences in food choices.

After detailed consideration of all available procedures, multilevel General Linear Modelling (GLM) was selected as the preferred means of considering mediation for this PhD investigation. As demonstrated in *Table 5.10* this method met all criteria for meeting the objectives of this PhD research. This approach appears to be the most commonly used in the small collection of studies that assess the mediating impact of psychosocial factors on inequalities in food choices [69, 92, 114, 145].

Table 5.10. Procedures available to assess mediation and capacity to meet the goals of this PhD investigation.

Procedure Type	Procedure name	Procedure available in:	Capacity to consider mediators:						Capacity to adjust		Provides CIs/ SEs around the mediated effect [a]
			Individual		Simultaneous						
			CAT	CONT	Multiple	CAT & CONT	+ 10 mediators	PSME	Confounders	Clustered sample	
Macros that can be added to commonly used statistical packages	Sobel Test	SPSS/SAS	√	√	X	X	X	N/A	X	X	√
	INDIRECT	SPSS/SAS	√	√	√	X	X	√	√	X	√
	MEDIATE	SPSS/SAS	√	√	√ [b]	X	X	N/A	√	X	√
	PROCESS	SPSS/SAS	√	√	√ [c]	√	X	√	√	X [d]	√
Procedures available within statistical packages	MBESSs	R	X	X	X	X	X	N/A	X	X	√
	SEM	AMOS/ MPLUS/ LISREL	√ [ef]	√	√	√	√	X [g]	√	X [h]	√
	Multi-level GLM	SPSS complex samples	√	√	√	√	√	√	√	√	√

[a] Only some procedures will provide separate CIs relevant to each mediator, others will only provide a global CI [446]. Most provide bootstrap derived CIs, which are preferred to those derived from the Sobel test due to the stringent assumptions of the later test making it inapplicable to many analyses of mediation [436].
[b] Mediators are assumed to be operating in parallel (i.e. not sequentially linked). It is not known whether the mediators considered in this PhD meet this assumption.
[c] At most 10 mediators can be considered simultaneously (there are 13 variables to be considered in this PhD investigation).
[d] Only provides a 'fixed effects approach to clustering', which is useful in instances with 'small' numbers of clusters [444]' the BFS sample comprised 50 clusters.
[e] Only binary categorical variables can be considered (not all categorical variables considered in this PhD investigation are binary).
[f] For SEM in Mplus categorical variables cannot be nominal (some of the mediators to be considered in this PhD investigation are nominal).
[g] Often standard SEM procedures do not provide estimates of the mediated affect associated with individual mediators, rather only global estimates are provided [445].
[h] Consideration of mediation in multi-level data is not possible in the standard versions of SEM provided in most statistical packages [446].
Abbreviations: Cat,= categorical, Cont = Continuous, CIs= Confidence Intervals, SEs = Standard Errors. GLM = General Linear Modelling, LR = Logistic Regression, PSME = Provides Separate data on the individual Mediating Effect of each variable when multiple mediators are included in a model

5.7.3 PROCEDURE FOR ANALYSIS

The analysis was structured around the four research questions listed below and represented graphically by the four arms of *Figure 5.5*. As shown in *Figure 5.5*, questions 1–3 investigate components of the overall relationship investigated by research question 4.

1. Do socioeconomic groups differ in terms of their food purchasing?
   Do the observed relationships differ according to the socioeconomic measure used?

2. Are psychosocial factors related to food purchasing?

3. Is socioeconomic position related to psychosocial factors?
   Do the observed relationships differ according to the socioeconomic measure used?

4. Do psychosocial factors appear to contribute to socioeconomic inequalities in food purchasing?
   Do the observed relationships differ according to the socioeconomic measure used?

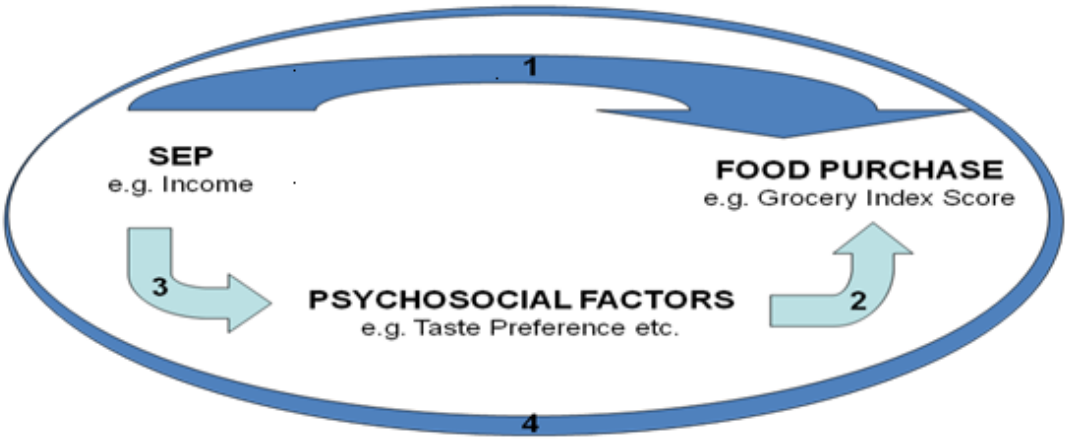


Figure 5.5. Overview of components of the quantitative analyses depicting research questions 1–4.

Data analyses were conducted using SPSS (SPSS Incorporated Version 19.0, 2010) and SPSS Complex Samples Module (SPSS Incorporated Version 19.0, 2010). The type of outcome variable dictated the modelling approach applied to address each research question, as presented in *Figure 5.8*. For continuous outcomes, GLMs

assumed a normal distribution with identity link (i.e. linear regression); for binary outcomes, GLMs assumed a binomial distribution with a logit link (i.e. logistic regression). Multi-category outcomes were modelled using multinomial logistic regression.

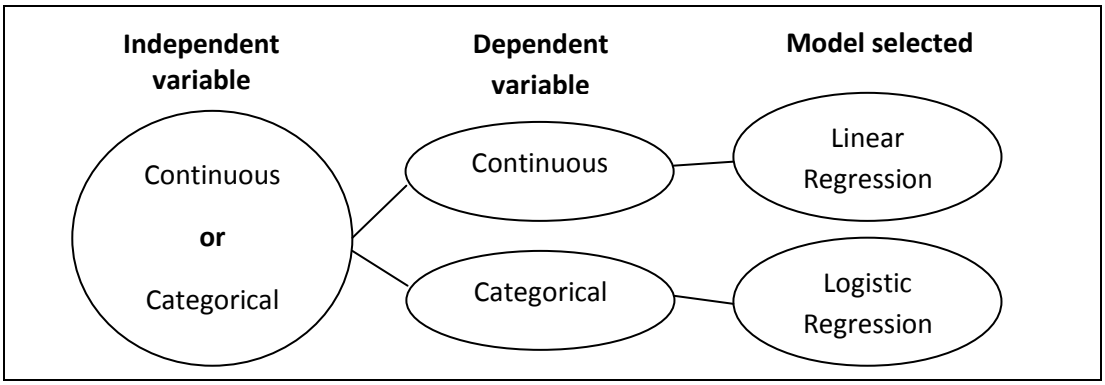
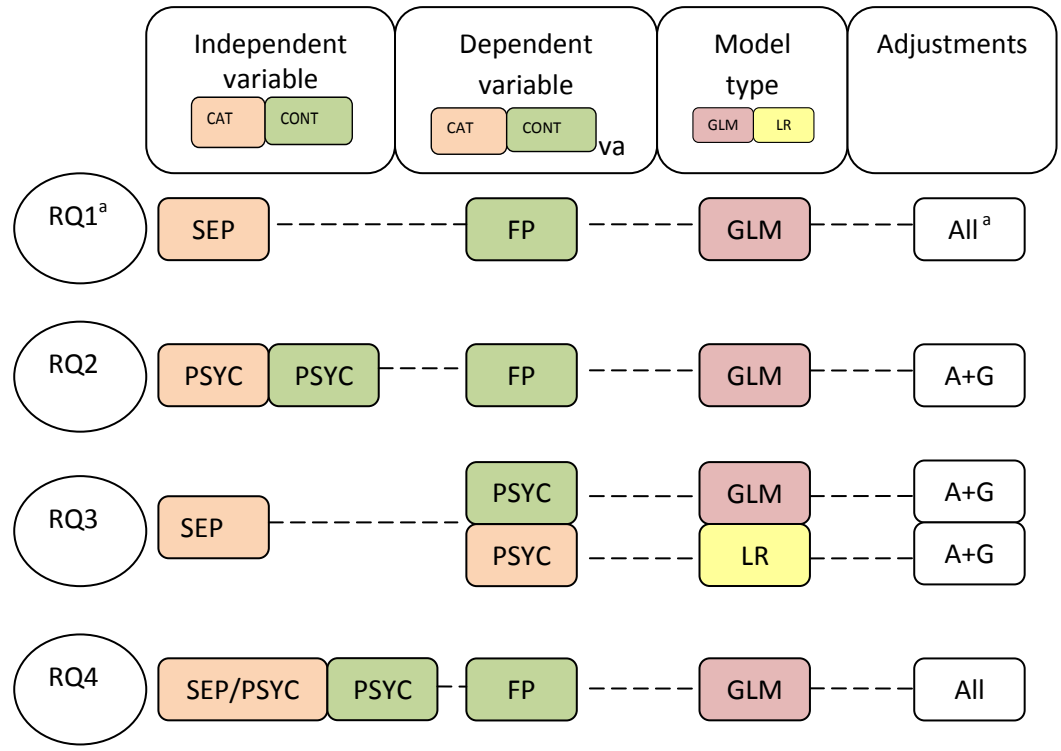


Figure 5.6. Selection of modelling approach based on whether a continuous or categorical outcome (dependent variable) was considered.

Figure 5.7 provides more detail on the variables included in the models constructed to address each research question. As depicted in *Figure 5.7,* linear regression was used to address all research questions apart from one component of research question 3 where logistic regression was used. All models were adjusted for age and gender with the models addressing the final research question (questions 1 and 4) additionally adjusted for household size and household composition.



RQ =Research Question,

CAT =Categorical variable, CONT = continuous variable. PSYC= psychosocial factors, FP = food purchasing.

GLM =General Linear Model, LR = Logistic Regression (both standard and multinominal were used).

All =All identified potential confounding variables (age, gender, household composition and household size).

A+G =Age and gender

[a] These models were adjusted for all confounders, as research question 1 forms the comparison in the analyses that address research question 4, which utilise fully adjusted models..

Figure 5.7. Modelling approach and specifications used to address research questions 1–4.

The results generated from logistic regression are odds ratios, which represent the likelihood of being in one category compared to being in another/or others. Two types of results derived from linear regressions are of interest in this study. When examining a continuous independent variable, regression coefficients represent the change (in points) in the outcome measure for each one point change in the independent variable. These unstandardised regression coefficients (based on variables not adjusted for variable mean and standard deviation) were selected for the presentation of results for two reasons. First, the relationships observed did not

alter according to whether standardised or unstandardised coefficients were generated (as shown in Appendix L). Second, the latter are more easily interpreted due to being in the same scale of measurement as the outcome variables (points on a scale 0–100) rather than in standard deviation units of the outcome measure.

The second type of results considered from linear regressions were mean scores of the outcome/dependent variable across particular groups. All means presented are estimated marginal means (EMM), which are means standardised to account for the comparison groups being potentially different in size. A technical note regarding how SPSS computes EMM is included in Appendix M.

Due to limited research in this area, what constitutes meaningful socioeconomic differences in food purchasing or psychosocial factors has not been established. Therefore, all observed differences were noted in this examination and attention was paid to the patterning of psychosocial factors across categories of socioeconomic variables (e.g. whether graded/linear associations were observed between particular factors and SEP). Statistical significance at the conventional level (≤ 0.05 two tailed) was considered as further evidence of associations between variables in these analyses.

RQ1. DO SOCIOECONOMIC GROUPS DIFFER IN TERMS OF THEIR FOOD PURCHASING?

Do the observed relationships differ according to the socioeconomic indicator used?

This question investigated whether income and education were related to any of the three food purchasing outcome measures, and the magnitude and direction of any observed relationships. Food purchasing across each socioeconomic group was denoted by food-purchasing index scores presented as estimated marginal means.

It was first assessed whether food purchasing index scores differed between the highest and lowest socioeconomic groups. As the socioeconomic categories were ordinal (ranging from highest to lowest), attention was then paid to whether any patterns were present across socioeconomic groups in relation to the three food-purchasing outcome measures. For example, whether index scores for any of the

food purchasing measures showed a linear trend across increasing income or education groups

RQ2. ARE PSYCHOSOCIAL FACTORS RELATED TO FOOD PURCHASING?

Research question 2 considered associations between psychosocial factors and food purchasing. The independent variables were the 13 psychosocial factors and socioeconomic and demographic variables described previously. The outcome measures used were the three food purchasing indices. Regression coefficients were calculated to summarise the relationship between continuous psychosocial factors and food purchasing. These coefficients represented how many points the mean food purchasing outcome indices (range 0–100) changed according to a one-point increase in the relevant psychosocial index score. To compare categorical variables, estimated marginal means were compared across categories of each psychosocial variable (e.g. the mean grocery-purchasing index score was compared between those who agreed labels influenced their food purchasing choices, compared to those who disagreed or did not know).

RQ3. IS SOCIOECONOMIC POSITION RELATED TO PSYCHOSOCIAL FACTORS?

Do the observed relationships differ according to the socioeconomic indicator used?

Research question 3 investigated how socioeconomic groups differed in terms of 13 psychosocial factors. General linear modelling or logistic regression was used depending on whether the psychosocial outcome variable was continuous or categorical. Accordingly, regression coefficients were generated to allow consideration of the relationship between SEP and continuous psychosocial factors and odds ratios to depict the relationship between SEP and categorical psychosocial variables.

RQ4. DO PSYCHOSOCIAL FACTORS APPEAR TO CONTRIBUTE TO SOCIOECONOMIC INEQUALITIES IN FOOD PURCHASING?

Do the observed relationships differ according to the socioeconomic indicator used?

The introduction to this section (Section 5.7: Data Analyses,) described how individual psychosocial factors were considered as candidates for attenuating inequalities in food purchasing when associated with both food purchasing (RQ2) and socioeconomic position (RQ3). These preliminary analyses informed the construction of models used to address this research question (RQ4), specifically by determining the psychosocial factors to be included in the final models.

Almost all psychosocial factors were associated with at least one measure of food purchasing and one socioeconomic indicator in a graded or significant way. The only exceptions were two cost-concern factors; concern regarding the cost of healthy food, and concern that recommend food cost more than 'regular' choices. Although these factors displayed approximately graded relationships with SEP, neither were associated with any food purchasing outcomes, therefore, these factors were not included in the final models assessing mediation. This approach of excluding factors that do not meet the criteria for mediation is commonly used in research in this domain [76].

Therefore, 11 psychosocial factors were explored in the final models. These factors were included in the models both individually and as part of themed groups of factors. Consistent with recommendations to use multiple modelling strategies [395, 428], six regression modelling formats were devised to assess the final quantitative research question assessing mediation. Collectively, these modelling strategies allowed identification of socioeconomic differences in food purchasing and the mediation in food purchasing inequalities associated with:

- Each individual psychosocial factor;
- Each individual psychosocial factor exclusively (i.e. independent of all other psychosocial factors);
- Each group of similarly themed psychosocial factors;
- Each group of similarly themed psychosocial factors independent of all other psychosocial themes; and
- With all 11 psychosocial factors combined.

The six modelling formats will be referred to as Models A, B, C, D, E and F. The 'base' model, Model A allowed a preliminary assessment of socioeconomic differences in food purchasing (expressed via estimated marginal mean index scores) without consideration of psychosocial factors. Model A comprised the covariates age, gender, SEP, household size and household composition with one of the three food purchasing indices as the outcome variable. This model was specified six times to represent all combinations of the two socioeconomic indicators and three food purchasing measures under consideration.

Model B enabled assessment of the total mediation in food purchasing inequalities associated with each individual psychosocial factor. Each psychosocial factor was added separately to the base model, and then removed before the next psychosocial factor was added. In total, 66 models were constructed to assess the relationships between the 11 psychosocial factors, two socioeconomic measures and three food-purchasing outcome measures.

Model C added blocks of similarly themed psychosocial factors to the base model, for example, both variables measuring taste preferences were entered simultaneously into the base model. The mediation in socioeconomic differences between the base model and revised model was then compared. Variables were only added to the models in themed blocks when they influenced food-purchasing inequalities in the same direction, that is, when all factors decreased or increased inequalities in food purchasing. This decision was made because combining factors with countertrends in the same model would likely present a diluted summary of their individual effects. Therefore, to maintain an accurate interpretation of the influence of these variables they were only included in models separately [447].

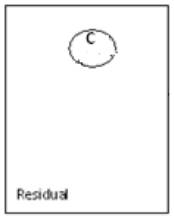
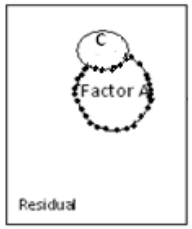
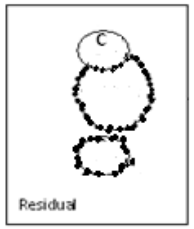
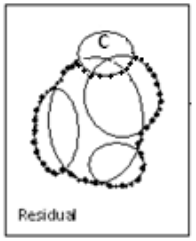
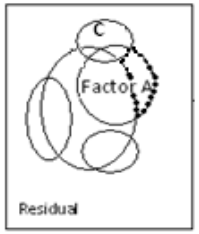
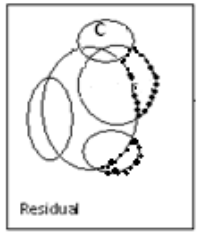
Model D was devised to assess the mediation of socioeconomic variation in food purchasing by all 11 psychosocial factors collectively by adding these factors simultaneously to the base model. This model will be referred to as the 'full' Model and was specified six times to examine all combinations of the two socioeconomic indicators and three food purchasing measures under consideration.

Model E assessed the unique mediation in food purchasing inequalities associated with each individual psychosocial factor. This was achieved by individually removing each psychosocial factor from the full model (then replacing the factor before the next psychosocial factor was removed). In total, Model E was specified 66 times in order to assess the relationships between the 11 psychosocial factors, two socioeconomic measures and three food purchasing measures.

The final model type, Model F assessed the unique mediation in food purchasing inequalities associated with groups of themed psychosocial factors. In this model each group of themed psychosocial factors was separately removed from the full model. The themed group was then replaced before the next themed group was removed. Consistent with the approach used in Model C, themed groups of psychosocial factors were only included in models when they influenced food purchasing inequalities in the same direction.

The six modelling formats are summarised and represented graphically in *Table 5.11*.

Table 5.11. Description of the six modelling formats used to examine the mediating impact of psychosocial factors on socioeconomic differences in food purchasing.

	Model A 'Base' Model	Model B	Model C	Model D 'Full Model'	Model E	Model F
Model description	SEP + C= FP	Base model + a single psychosocial factor = FP	Base model + a themed group of psychosocial factors = FP	Base model + all psychosocial factors. = FP	Full model minus a single psychosocial factor =FP	Full model minus a themed group of psychosocial factors =FP
Model examines mediation[a] of socioeconomic differences in food purchasing associated with :	N/A base model	Each individual psychosocial factor	All psychosocial factors of a particular theme (e.g. all taste preference factors = 2 factors)	All psychosocial factors combined.	Each individual psychosocial factor independent of all other psychosocial factors	Each psychosocial theme independent of all other psychosocial factors
Graphical representation of mediation [a] (Psychosocial factors are depicted by circles, when a single psychosocial factor is being assessed this is labelled 'Factor A', confounding variables are represented by a circle labelled 'c')	 Base socioeconomic variation in food purchasing	 **...**Decrease in socioeconomic variation (%) from the base model (Model A) with the addition of each psychosocial factor.	 **...**Decrease in socioeconomic variation (%) from the base model (Model A) with the addition of a themed group of psychosocial factors.	 **...**Decrease in socioeconomic variation (%) from the base model with the addition of all psychosocial factors.	 **...**Decrease in socioeconomic variation accounted for (%) in the full model (Model B) with the separate removal of each psychosocial factor.	 **...**Decrease in socioeconomic variation accounted for (%) in the full model (Model B) with the removal of a themed group of psychosocial factors.

FP = food purchasing, C = confounders = age, gender, household size, household composition. [a]Mediation was assessed by comparing each model with the base model or full model

Chapter 6: **QUANTITATIVE RESULTS**

6.1 CHAPTER CONTENTS.

This chapter presents the quantitative results from this investigation. Results are presented in order for each of the following four research questions.

RQ1. Do socioeconomic groups differ in terms of their food purchasing?*

RQ2. Are psychosocial factors associated with food purchasing?

RQ3. Is socioeconomic position associated with psychosocial factors?*

RQ4. Do psychosocial factors mediate socioeconomic inequalities in food purchasing?*

**For these research questions, the following sub-question was also asked: Do the observed relationships differ according to the socioeconomic indicator used?*

6.2 RQ1. DO SOCIOECONOMIC GROUPS DIFFER IN TERMS OF THEIR FOOD PURCHASING?

Do the observed relationships differ according to the socioeconomic indicator used?

Food purchasing exhibited approximately linear relationships with SEP with the most affluent and educated respondents reporting food purchasing patterns most consistent with dietary guidelines (Table 6.1). The differences in estimated marginal mean food purchasing scores between the highest and lowest socioeconomic groups form the basis for comparisons in further models. In most instances these differences were significant ($p \leq 0.05$).

The extent of socioeconomic differences in food purchasing varied depending on the socioeconomic and food purchasing measures considered. Grocery purchasing differed to a greater extent according to household income than respondent education. In contrast, vegetable purchasing differed to a greater extent according to education than income. Inequalities in fruit purchasing were of a similar magnitude regardless of the socioeconomic indicator used.

Table 6.1. Socioeconomic differences in food purchasing (N=970)[a].

Socioeconomic Position	Estimated marginal mean (EMM) food purchasing index score [b] (SE)*		
	Grocery	Fruit variety	Vegetable variety
HOUSEHOLD INCOME			
Low (≤ $25 999)	44.6 (1.8)**	59.0 (2.0)*	70.0 (1.6)
Mid-low ($26 000–51 999)	46.1 (1.5)	61.9 (1.5)	73.3 (1.3)
Mid-high ($52 000–77 999)	49.5 (1.7)	63.8 (2.0)	71.5 (1.5)
High (≥$78 000)	55.1 (1.2)	65.5 (1.5)	73.2 (1.1)
Difference (high -low)[c]	10.5	6.0	3.2
P-value for overall income group differences.	<0.001	0.03	0.22
RESPONDENT EDUCATION			
No post-school	45.8 (1.4)**	59.4 (1.5)**	69.1 (1.2)
Vocational	48.1 (1.6)	61.7 (1.7)	71.9 (1.4)
Diploma	46.6 (2.0)	63.3 (2.1)	75.4 (1.7)
Bachelor or higher	51.2 (1.2)	65.9 (1.2)	74.8 (1.0)
Difference (high-low)[c]	5.4	6.5	5.6
P-value for overall education group differences.	0.003	<0.001	<0.001

a Analyses adjusted for age, gender, age, household type and household size. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Range 0–100, SE = Standard error.
c Difference= The EMM food purchasing index score of the highest socioeconomic group minus that of the lowest socioeconomic group.
* Statistical significance compared to the referent (highest) socioeconomic group, * p ≤ 0.05, ** p ≤ 0.001

6.3 RQ2. ARE PSYCHOSOCIAL FACTORS ASSOCIATED WITH FOOD PURCHASING?

The following sections describe the associations between food purchasing and 13 psychosocial factors, grouped according to five psychosocial themes (as listed in *Table 5.7*, page 129).

6.3.1 Nutrition knowledge and food purchasing behaviour

The relationships between food purchasing and the three nutrition knowledge factors considered are presented in *Table 6.2*. The regression coefficients denote the mean increase in food purchasing index scores (range 0–100) for every 1 point increase on the respective nutrition knowledge index (range 0–100). Higher levels of all three nutrition knowledge factors were associated with food purchasing more consistent with dietary guidelines (as evidenced by positive regression coefficients). However, not all associations were significant ($p \geq 0.05$).

Table 6.2. The association between nutrition knowledge and food purchasing (N=970)[a].

Nutrition Knowledge factors[b]	Regression coefficient[b] (SE)[c]*		
	Grocery	Fruit variety	Vegetable variety
Diet-disease	0.16 (0.03)**	0.08 (0.03)*	0.04 (0.02)
Nutrient sources	0.15 (0.03)**	0.05 (0.03)	0.04 (0.03)
Dietary Guidelines	0.31 (0.04)**	0.11 (0.05)*	0.003 (0.04)

a Analyses adjusted for age and gender.
b The regression coefficients represent the number of points increase in the relevant food purchasing index score (range 0–100) for every one-point increase in the relevant nutrition knowledge index (range 0–100).
c SE = Standard Error.
* Statistical significance, * $p \leq 0.05$, ** $p \leq 0.001$.

6.3.2 Nutrition concerns and food purchasing behaviour

Table 6.3 presents the association between nutrition concerns and food purchasing. Those who expressed concern regarding the greatest number of nutrients reported food purchasing patterns more consistent with dietary guidelines compared to those who reported concerns about fewer nutrients ($p \leq 0.05$).

Table 6.3. The association between nutrition concerns and food purchasing (N=970)[a].

Psychosocial factor	Regression coefficient [b] (SE)[c]*		
	Grocery	Fruit variety	Vegetable variety
Concern regarding the nutrient content of food [b]	0.59 (0.03)*	0.24 (0.04)*	0.19 (0.03)*

a Analyses adjusted for age and gender.
b The regression coefficients represent the number of points increase in the relevant food purchasing index score (range 0–100) for every one-point increase in the nutrition concern scale (range 0–100).
c SE = Standard Error.
* Statistical significance, * $p \leq 0.05$, ** $p \leq 0.001$.

Similarly, those who agreed that labels influenced their food choices, exhibited food purchasing patterns more consistent with dietary guidelines compared to those who disagreed or did not know whether labels influenced their food choices (*Table 6.4.*) ($p \leq 0.05$). Both nutrition-related factors were associated with grocery purchasing to a greater extent than fruit or vegetable purchasing.

Table 6.4. The association between use of labels and food purchasing (N=970)[a].

Psychosocial factor	Estimated Marginal Mean Food Purchasing Index Scores [b] (SE)		
	Grocery	Fruit variety	Vegetable variety
Nutrition label use			
Agree	53.8 (0.77)	65.5 (0.88)	73.4 (0.71)
Disagree/don't know	43.6 (0.95)	56.7 (1.10)	67.3 (0.87)
Difference [c]	10.1 (1.11)**	8.8 (1.03)**	6.1 (1.0)**

a Analyses adjusted for age and gender.
b Range 0–100, SE = Standard Error.
c Difference = Estimated marginal mean (EMM) of 'Agree' category minus EMM of disagree/don't know category.
* Statistical significance, * $p \leq 0.05$, ** $p \leq 0.001$.

6.3.3 Cost concerns and food purchasing behaviour

The associations between food purchasing and two cost concern factors (concern regarding the cost of food in general and concern regarding the cost of a healthy diet) are shown in *Table 6.5*. Among the analyses presented, the largest and only

significant result was observed for the association between grocery purchasing and general cost concerns (shown shaded). In this instance for every one point increase on the general food cost concern index (0–100), a 0.14 point decrease was observed in terms of the grocery purchasing index (0–100).

Table 6.5. The association between cost concerns and food purchasing (N=970)[a].

Cost concern factors	Regression coefficient [b] (SE)[c]*		
	Grocery	Fruit variety	Vegetable variety
Concern regarding the cost of food in general [b]	–0.14 (0.03)**	-0.05 (0.04)	0.01 (0.03)
Concern regarding the cost of a 'healthy' diet [b]	0.01 (0.03)	0.04 (0.03)	0.04 (0.03)

a Analyses adjusted for age and gender.
b The regression coefficients represent the number of points increase in the relevant food purchasing index score (range 0–100) for every one-point increase in the relevant cost concern scale (range 0–100).
c SE = Standard Error.
* Statistical significance, * p ≤ 0.05, ** p ≤ 0.001.

The results presented in *Table 6.6* represent the association with the final cost concern factor considered and food purchasing. These results demonstrate that the perception that recommended foods cost more than regular options was not related to food choices in either a graded or statistically significant manner.

Table 6.6. The association between cost concerns and food purchasing (N=970)[ab].

Tertiles for perceive 'recommended' food choices cost more than 'regular' choices [c]	Differences in Estimated Marginal Mean Food Purchasing Index Score[b] (SE)*		
	Grocery	Fruit variety	Vegetable variety
T1 Agree for the least number of foods	–1.5 (1.49)	–1.6 (1.67)	–2.1 (1.33)
T2 Agree for an intermediate number of foods	–2.1 (1.46)	–2.2 (1.63)	–2.1 (1.30)
T3 Agree for the greatest number of foods	Referent	Referent	Referent

a Analyses adjusted for age and gender. Analyses include 106 respondents with missing data, however, these results for this group are not presented.
b The difference in EMM food purchasing score represents the EMM of the referent group (tertile 3) minus the EMM of the relevant comparison group SE = Standard Error.
c Those in tertile 1 (T1) agreed for the least number of foods that the 'recommended' option cost more than the 'regular' option. Those in tertile 3 (T3) agreed for the highest number of foods that the 'recommended' choice cost more than the 'regular' option.Those in tertile 2 (T2) agreed for an intermediate number of foods.
* Statistical significance, * p ≤ 0.05, **p ≤ 0.001.

6.3.4 Taste preferences and food purchasing behaviour

The associations between respondents' taste preferences and food purchasing are presented in *Table 6.7*. Preference for a greater number of 'recommended' foods was associated with grocery, fruit and vegetable purchasing more consistent with dietary guidelines. In addition, preference for a greater number of 'regular' choices was associated with food purchasing less consistent with dietary guidelines. In all instances, taste preferences for 'recommended' foods exhibited a stronger relationship with food purchasing compared to preference for 'regular' foods. All associations were highly significant ($p \leq 0.001$).

Table 6.7. The association between respondents' taste preferences and food purchasing (N=970)[a].

Taste preference	Regression coefficient[b] (SE)[c]*		
	Grocery	Fruit variety	Vegetable variety
'Recommended' choices[b]	0.39 (0.02)**	0.18 (0.03)**	0.12 (0.02)**
'Regular' choices[b]	–0.27 (0.02)**	–0.08 (0.02)**	–0.07 (0.02)**

a Analyses adjusted for age and gender.
b The regression coefficients represent the number of points increase in the relevant food purchasing index (range 0–100) for every one-point increase in the relevant taste preference index (range 0–100).
c SE = Standard error.
* Statistical significance, * $p \leq 0.05$ ** $p \leq 0.001$.

6.3.5 Other psychosocial factors and food purchasing behaviour

The relationships between food purchasing and perceived adequacy of the family diet are presented in *Table 6.8*. Those who most strongly expressed the perception that the diet of their family was adequate reported purchasing a wider range of fruit and vegetables than those who were less satisfied with their family's diet (as indicated by positive regression coefficients)($p \leq 0.05$). This factor was not associated with grocery purchasing.

Table 6.8. The association between perceived adequacy of family diet and food purchasing (N=970)[a]

Psychosocial factor	Regression coefficient[b] (SE)*		
	Grocery	Fruit variety	Vegetable variety
Perceived adequacy of the diet[b]	–0.03 (0.05)	0.13 (0.04)*	0.19 (0.04)**

a Analyses adjusted for age and gender.
b The regression coefficients represent the number of points increase in the relevant food purchasing index score (range 0–100) for every one-point increase in the perceived adequacy of diet scale (range 0–100). SE = Standard Error.
* Statistical significance, * $p \leq 0.05$, ** $p \leq 0.001$.

The associations between health and weight concerns and food purchasing are presented in *Table 6.9*. Those who reported that concern about the health or weight of family members influenced their food choices, on average, made food choices more consistent with dietary guidelines than those who did not report such influences. This was evidenced by those in the 'agree' category having higher (healthier) food purchasing scores compared to those in the 'disagree' category ($p \leq 0.05$).

Table 6.9. The association between 'other' psychosocial factors and food purchasing (N=970)[a]

Psychosocial factors	Estimated Marginal Mean (EMM) food purchasing indices[b] (SE)		
	Grocery	Fruit variety	Vegetable variety
Health concerns			
Agree	52.42 (0.69)*	63.70 (0.81)*	72.57 (0.64)*
Disagree	36.51 (1.51)	53.91 (1.77)	62.99 (1.39)
Difference [c]	15.9 (1.62)	9.79 (1.89)	9.58 (1.49)
Weight concerns			
Agree	55.12 (0.78)**	63.67 (0.93)	72.45 (0.74)
Disagree	43.09 (0.88)	60.25 (1.05)	69.30 (0.84)
Difference [c]	12.03 (1.07)	3.42 (1.28)	3.15 (1.01).

a Analyses adjusted for age and gender.
b Range 0–100, SE = Standard Error.
c Difference = Estimated marginal mean (EMM) of 'Agree' category minus EMM of disagree category.
* Statistical significance of differences between means for the agree compared to disagree groups
* $p \leq 0.05$ **$p \leq 0.001$

6.3.6 Summary of section 6.3

The majority of psychosocial factors considered (66.9%, 10/13) were significantly associated ($p \leq 0.05$) with at least two food purchasing outcomes. Five factors exhibited graded and significant associations with all food purchasing outcomes. These factors belonged to the themes: nutrition concerns (two factors); taste preferences (two factors); and health concerns (one factor).

Overall, the factors positively associated with food purchasing consistent with dietary guidelines were: all nutrition knowledge factors; both nutrition concern factors; weight concerns; health concerns; perceived adequacy of the diet; and taste preference for 'recommended' food choices. Factors that appeared to hinder food purchasing consistent with dietary guidelines were general cost concerns and taste preference for 'regular' food choices. The factors that did not exhibit either a graded or significant relationship with food purchasing were concern regarding the cost of healthy food and concern that 'recommended' cost more than 'regular' choices.

The extent to which psychosocial factors were associated with food purchasing differed according to the food purchasing outcome considered. For example, perceived adequacy of the diet exhibited a stronger association with fruit and vegetable purchasing than with grocery purchasing. In contrast, health, weight and general cost concerns displayed stronger associations with grocery purchasing than with either fruit or vegetable purchasing.

6.4 RQ3. IS SOCIOECONOMIC POSITION ASSOCIATED WITH PSYCHOSOCIAL FACTORS?

Do the observed relationships differ according to the socioeconomic indicator used?

This section presents the associations observed between SEP and 13 psychosocial factors (again arranged according to five psychosocial themes).

6.4.1 Nutrition knowledge

Table 6.10 summarises the findings of the relationships between socioeconomic position and three nutrition knowledge factors. Those with the least income/education displayed significantly ($p \leq 0.05$) lower levels of knowledge across all nutrition knowledge factors compared to those with the highest levels of income/education. In addition, nutrition knowledge levels were generally graded across categories of the socioeconomic measures, that is, with increasing SEP nutrition knowledge scores consistently increased. The knowledge factor that differed least across socioeconomic groups, regardless of the socioeconomic indicator considered, was knowledge of dietary guidelines.

Table 6.10. Socioeconomic differences in nutrition knowledge (N=970) [a].

Nutrition knowledge indices[b]	Socioeconomic position	Estimated marginal mean (EMM) nutrition knowledge index score (95% CI) [b] *	
		Household income[c]	Respondent education[d]
Knowledge of the diet-disease relationship	Low	75.1 (71.7–78.5)**	74.7 (72.1–77.3)**
	Mid-Low	79.5 (76.7–82.3)	78.7 (75.3–82.1)*
	Mid-High	79.5 (76.0–83.2)	81.3 (75.8–86.7)
	High	83.8 (79.9–87.7)	85.3 (82.3–88.4)
	Difference[e]	8.7	10.7
Knowledge of nutrient sources	Low	59.2 (56.3–62.0)**	62.4 (60.2–64.7)**
	Mid-Low	67.0 (64.6–69.4)	65.3 (62.4–68.2)*
	Mid-High	68.9 (65.9–72.0)	67.2 (62.6–71.9)
	High	68.9 (65.6–72.2)	70.4 (67.8–73.0)
	Difference[e]	9.7	8.0
Knowledge of dietary guidelines	Low	73.6 (71.6–75.5)**	77.2 (75.6–78.8)
	Mid-Low	78.5 (76.9–80.2)	77.6 (75.6–79.6)
	Mid-High	79.8 (77.7–81.9)	77.3 (74.0–80.5)
	High	79.1 (76.8–81.4)	78.7 (76.8–80.5)
	Difference[e]	5.5	1.5

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Range 0–100, CI = Confidence interval.
c Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
d Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
e Difference= The EMM psychosocial index score of the highest socioeconomic group minus that of the lowest socioeconomic group.
* Statistical significance of difference compared to referent (highest) socioeconomic group, * $p \leq 0.05$ **$p \leq 0.001$.

Knowledge of dietary guidelines distinguished income groups to a greater extent than education groups. However, socioeconomic differences in other nutrition knowledge factors were similar regardless of the socioeconomic indicator considered.

6.4.2 Nutrition concerns

Table 6.11 and *Table 6.12* depict the relationships between SEP and nutrition concerns. Graded associations were observed, with increasing income/education associated with greater nutrition concerns and increased likelihood of consulting nutrition labels. All associations between the highest and lowest socioeconomic

groups were significant (p ≤ 0.05). The magnitude of inequalities in these nutrition-related factors was similar regardless of the socioeconomic indicator used.

Table 6.11 Socioeconomic differences in nutrition concerns (N=970)[a]

Psychosocial factor	Socioeconomic position	Estimated marginal mean (EMM) nutrition concern index score[d] (95% CI)	
		Household income[b]	Respondent education[c]
Nutrition concerns[d]	Low	59.2 (56.4–62.0)*	59.5 (57.3–61.6)**
	Mid-Low	61.2 (58.8–63.5)*	61.1 (58.3–64.0)*
	Mid-High	61.9 (58.9–64.9)	61.6 (57.0–66.1)*
	High	65.3 (62.1–68.5)	66.1 (63.6–68.7)
	Difference[e]	6.1	6.6

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
c Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
d Range 0–100
e Difference= The EMM nutrition concerns index score of the highest socioeconomic group minus that of the lowest socioeconomic group.

* Statistical significance compared to the referent (highest) socioeconomic group, * p ≤ 0.05 **p ≤ 0.001.

Table 6.12. Socioeconomic differences in nutrition label use (N=970)[a.]

Psychosocial factor	Socioeconomic position	Household income[b]	Respondent education[c]
		Odds ratio (agree versus not agree) (95% CI)[d]	
Labels influence food choice	Low	0.57 (0.38–0.86)*	0.51 (0.37–0.72)**
	Mid-Low	0.78 (0.54–1.13)	0.75 (0.50–1.13)*
	Mid-High	1.29 (0.94–1.78)	0.72 (0.44–1.18)
	High	1.00	1.00

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
c Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
d Odds of agreeing versus not agreeing that labels influence food choice compared to referent (highest socioeconomic) group. CI = Confidence interval.
* Statistical significance, * p ≤ 0.05 **p ≤ 0.001=significance compared to the referent (highest socioeconomic) group.

6.4.3 Cost concerns

The relationship between SEP and general cost concerns and concern regarding the cost of a healthy diet are presented in *Table 6.13*. Those with the lowest levels of income and education expressed the greatest concerns regarding both the cost of food in general and the cost of a healthy diet. However, only one association was both graded and significant and this was the relationship between income and cost concerns regarding food in general (shown shaded).

Table 6.13. Socioeconomic differences in general cost concerns and concern regarding the cost of a healthy diet (N=970)[a.]

		Estimated marginal mean (EMM) cost concern index score (95% CI) [d]	
Cost concern factors	Socioeconomic position	Household income[b]	Respondent education[c]
Cost concern regarding food in general [d]	Low	47.6 (45.0–50.2)**	42.2 (40.1–44.3)
	Mid-Low	43.4 (41.2–45.5)*	42.6 (39.9–45.4)
	Mid-High	40.7 (37.9–43.4)*	41.2 (36.8–45.6)
	High	33.3 (30.4–36.3)	39.8 (37.3–42.3)
	Difference[e]	–14.2	–2.4
Concern regarding the cost of a 'healthy' diet[d]	Low	50.7 (47.7–53.7)*	49.1 (46.7–51.4)**
	Mid-Low	47.8 (45.3–50.4)	49.9 (46.9–52.9)**
	Mid-High	45.0 (41.8–48.2)	50.7 (45.9–55.6)**
	High	46.3 (42.8–49.8)	43.0 (40.3–45.7)
	Difference[e]	–4.4	–6.1

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Low=<$25 999, Mid-Low=$26 000-51 999, Mid-High=$52 000-77,999, High=>$78 000.
c Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
d Range 0–100. CI = Confidence interval.
e Difference= The mean psychosocial index score of the highest socioeconomic group minus that of the lowest socioeconomic group.
* Statistical significance compared to referent (highest) socioeconomic group, * p ≤ 0.05 **p ≤ 0.001* p ≤ 0.05

Results regarding the final cost concerns factor, concern that recommended foods cost more than regular options, are presented in *Table 6.14*. With increasing income respondents perceived for a smaller number of foods that the 'recommended' choice cost more than the 'regular' option. For education groups this trend was reversed with the most educated group reporting for the greatest number of foods

that they perceived the 'recommended' option to be more expensive than the 'regular' option. However, none of the relationships depicted in *Table 6.14* achieved significance ($p \leq 0.05$).

Table 6.14. Socioeconomic differences in the perceived cost of recommended compared to regular food choices (N=970)[a]

Psychosocial factor	Category of socioeconomic position	Odds ratio (of being in 3rd tertile verus 1st tertile) (95% CI)[b]	
		Household income [c]	Respondent education [d]
Perception that 'recommended' food choices cost more than 'regular' choices.	Low	1.36 (0.79–2.32)	0.87 (0.58–1.32)
	Mid-Low	1.33 (0.82–2.14)	0.82 (0.50–1.36)
	Mid-High	1.16 (0.68–1.98)	0.95 (0.51–1.77)
	High	1.00	1.00

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Response categories were: missing, tertile 1, tertile 2 and tertile 3. Those in tertile 1 agreed for the fewest number of foods that the 'recommended' option cost more than the 'regular' option. Those in tertile 3 agreed for the highest number of foods that the 'recommended' choice cost more than the 'regular'. Therefore, it is the results from multinominal regression comparing the likelihood of being in these two most extreme categories that is presented in this table. CI = Confidence Interval.
c Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
d Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
* Statistical significance compared to the referent (highest socioeconomic) group, * $p \leq 0.05$ ** $p \leq 0.001$.

6.4.4 Taste preferences

The associations between respondent taste preferences (for 'regular' and 'recommended' foods) and SEP are presented in *Table 6.15*. With increasing income/education respondents reported liking a greater number of 'recommended' food choices, and expressed liking fewer 'regular' food choices. All taste preference factors differed more according to income than education.

Table 6.15. Socioeconomic differences in taste preferences [a] (N=970).

Taste preference factors[b]	Socioeconomic Position	Estimated marginal mean (EMM) taste preference index score[b] (95% CI)	
		Household income[c]	Respondent education[d]
Taste preference for 'recommended' choices	Low	58.5 (55.2–61.9)*	61.8 (59.0–64.3)*
	Mid-Low	63.0 (60.2–65.8)	62.2 (58.8–65.5)
	Mid-High	64.3 (60.8–67.9)	63.0 (57.5–68.5)
	High	64.3 (60.5–68.1)	64.7 (61.7–67.8)
	Difference[e]	5.8	3.1
Taste preference for 'regular' choices	Low	55.1 (50.7–59.6)*	54.9 (51.4–58.3)
	Mid-Low	56.3 (52.7–60.0)	54.8 (50.4–59.3)
	Mid-High	53.5 (48.8–58.2)	52.2 (45.0–59.4)
	High	45.8 (40.7–50.9)	49.8 (45.8–54.0)
	Difference[e]	–9.3	–5.1

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Range 0–100. CI = Confidence interval.
c Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
d Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
e Difference= The EMM psychosocial index score of the highest socioeconomic group minus that of the lowest socioeconomic group.
* Statistical significance compared to referent (highest) socioeconomic group, * $p \leq 0.05$ **$p \leq 0.001$.

6.4.5 Other psychosocial factors

This associations between SEP and health and weight concerns are presented in *Table 6.16*. Respondents with the lowest levels of income and education were less likely to report that health or weight concerns influenced their food choices. The relationships observed between SEP and health and weight concerns were approximately graded. However, only the differences between the highest and lowest socioeconomic groups were significant ($p \leq 0.05$)

Table 6.16. Socioeconomic differences in weight and health concerns (N=970)[a].

Psychosocial factor	Category of socioeconomic position	Odds ratios (Agree versus other) [d] (95% CI)	
		Household income[b]	Respondent education[c]
Weight concerns	Low	0.63 (0.42–0.95)*	0.77 (0.56–1.07)
	Mid-Low	0.76 (0.53–1.10)	0.88 (0.60–1.30)
	Mid-High	0.87 (0.58–1.30)	0.78 (0.49–1.24)
	High	1.00	1.00
Health concerns	Low	0.44 (0.24–0.82)*	0.35 (0.20–0.60)**
	Mid-Low	0.82 (0.45–1.49)	0.43 (0.23–0.80)*
	Mid-High	0.67 (0.36–1.26)	1.17 (0.45–3.03)
	High	1.00	1.00

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table
b Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
c Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
d Odds of being in agree factor influences food purchasing verus disagree/don't know group.
* Statistical significance compared to the referent (highest socioeconomic) group. *p ≤ 0.05, **p ≤ 0.001

Socioeconomic differences regarding the perceived adequacy of the family diet are shown in *Table 6.17*. Respondents with the lowest levels of income and education were less likely to perceive their diet to be adequate than those with the highest levels of income and education. However, graded relationships were only observed across income groups.

Table 6.17. Socioeconomic differences in 'other' psychosocial factors (N=970)[a].

		Estimated marginal mean (EMM) psychosocial index score (range 0–100) (95% CI)	
Psychosocial factor	Category of Socioeconomic Position	Household income[b]	Respondent education[c]
Perceived adequacy of the diet	Low	64.9 (63.0– 66.9)*	66.9 (65.4–68.4)
	Mid-Low	67.1 (65.5– 68.7)	65.0 (63.1–66.9)*
	Mid-High	67.4 (65.3– 69.5)	70.1 (67.0–73.2)
	High	69.2 (67.0– 71.5)	68.9 (67.1–70.7)
	Difference[d]	4.3	2.3

a Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table.
b Low=<$25 999, Mid-Low=$26 000–51 999, Mid-High=$52 000–77 999, High=>$78 000.
c Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.
d Difference= The EMM food purchasing index score of the highest socioeconomic group minus that of the lowest socioeconomic group.
* Statistical significance compared to the referent (highest) socioeconomic group, * p ≤ 0.05, **p ≤ 0.001 .

6.4.6 Summary of section 5.3

Socioeconomic differences were noted with regard to all psychosocial themes considered. Socioeconomically-disadvantaged groups differed from their more affluent and educated counterparts in several ways. Those of low SEP exhibited lower levels of nutrition knowledge, nutrition concerns, and liking for 'recommended' foods. These respondents also reported liking a greater number of 'regular' food choices, and more commonly reported that cost concerns influenced their food choices. This population was less likely to indicate that their food choices were influenced by concerns about health or weight and were less satisfied with the adequacy of their family's diet.

Psychosocial themes generally distinguished income and education groups to a similar extent. However, several psychosocial factors exhibited stronger associations with the household-level socioeconomic indicator (household income) compared to the individual level indicator (education). These factors were general cost concerns and both taste preference variables.

6.5 RQ4. DO PSYCHOSOCIAL FACTORS MEDIATE SOCIOECONOMIC INEQUALITIES IN FOOD PURCHASING?

Do the observed relationships differ according to the socioeconomic indicator used?

This section consolidates and extends the previous three sections by assessing the extent to which psychosocial factors mediate socioeconomic differences in food purchasing. The results from models A–F are presented in chronological order and the chapter concludes with an overall summary of findings.

6.5.1 Model A

The results of the base model (presented in Section 6.2 page 151) are reiterated here since these results form the basis for comparison with all subsequent models presented in this section. The results displayed in Table 6.18 represent the estimated marginal mean (EMM) food purchasing scores of the highest socioeconomic (referent) group compared to all other socioeconomic groups. For example, the EMM grocery purchasing scores of the lowest and highest income groups were 44.6 and 55.1, respectively, (data not shown in Table 6.18), hence the difference between these groups is noted in Table 6.18 as '–10.5' (shown shaded). Approximately linear relationships are evident between most food types and SEP, with increasing SEP generally associated with increasing (healthier) food purchasing scores.

Table 6.18. Socioeconomic differences in food choices reported in the base mode (Model A) (N=970).

	Difference in estimated marginal mean food purchasing scores compared to the referent group (range 0–100) (SE)					
	Grocery		Fruit		Vegetables	
	Income	Education	Income	Education	Income	Education
Low	–10.5 (1.8)	–5.4 (1.4)	–6.0 (2.0)	–6.5 (1.5)	–3.2 (1.6)	–5.7 (1.2)
Mid-low	–9.0 (1.5)	–3.1 (1.6)	–3.2 (1,5)	–4.1 (1.7)	0.1 (1.3)	–3.0 (1.4)
Mid-High	–5.6 (1.7)	–4.6 (2.0)	–1.3 (2.0)	–2.4 (2.1)	–1.6 (1.5)	–0.6 (1.7)
High	Referent	Referent	Referent	Referent	Referent	Referent
Overall P value	<0.001	0.07	0.03	0.003	0.22	<0.001

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=21), however, estimates for this group are not displayed in the table.
Abbreviations: SE = Standard Error.

6.5.2 Model B

Model B was constructed by the separate addition of each of 11 psychosocial factors to the base model (Model A). Three goals were prominent when evaluating model B. The first goal was to examine whether the patterned associations between food purchasing and SEP observed in the base model were maintained. The approximately linear relationships observed in the base model were found to persist regardless of which psychosocial factor was individually added to the base model. This is demonstrated for income groups in *Table 6.19* and for education groups in *Table 6.20*.

Table 6.19. Income group differences in food purchasing observed in the base models (Model A) compared to those with psychosocial factors added (Model B)[a].

	Difference in estimated marginal mean food purchasing index score (range 0–100) compared to the referent (highest income) group (SE)											
	Model A	**Model B**										
		Nutrition knowledge			Nutrition concerns		Taste preference		Other			
	(Base Model)	Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concern	Health concerns	Weight concerns	Perceived adequacy of diet
Gross annual household income ($AUS)[b]												
						GROCERY PURCHASING						
≤ $25 999	–10.5 (1.8)	–9.2 (1.8)	–9.4 (1.8)	–9.2 (1.8)	–8.3 (1.5)	–9.7 (1.8)	–8.1 (1.6)	–9.9 (1.7)	–9.5 (1.9)	–9.3 (1.7)	–9.5 (1.7)	–10.7 (1.8)
$26 000–51 999	–9.0 (1.5)	–8.3 (1.5)	–8.6 (1.5)	–8.6 (1.5)	–7.2 (1.6)	–8.7 (1.5)	–7.5 (1.4)	–7.5 (1.4)	–8.3 (1.6)	–8.8 (1.5)	–8.3 (1.5)	–9.1 (1.5)
$52 000–77 999	–5.6 (1.7)	–5.2 (1.7)	–5.4 (1.7)	–5.7 (1.6)	–4.7 (1.3)	–6.0 (1.6)	–5.0 (1.5)	–5.4 (1.5)	–5.1 (1.7)	–4.9 (1.6)	–5.1 (1.6)	–5.7 (1.7)
≥ $78 000	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
						FRUIT PURCHASING						
≤ $25 999	–6.0 (2.0)	–5.3 (2.0)	–5.8 (2.0)	–5.8 (2.0)	–5.3 (2.0)	–5.5 (2.0)	–5.1 (2.1)	–5.9 (2.1)	–5.7 (2.1)	–5.5 (2.0)	–5.8 (2.1)	–5.7 (2.0)
$26 000–51 999	–3.2 (1,5)	–2.9 (1.5))	–3.1 (1.5)	–3.1 (1.5)	–2.6 (1.5)	–3.0 (1.5)	–2.7 (1.6)	–2.8 (1.5)	–3.0 (1.5)	–3.1 (1.5)	–3.0 (1.5)	–3.1 (1.6)
$52 000–77 999	–1.3 (2.0)	–1.1 (1.9)	–1.2 (1.9)	–1.3 (1.9)	–1.0 (1.9)	–1.5 (1.9)	–1.0 (1.9)	–1.2 (1.9)	–1.1 (1.9)	–0.9 (1.9)	–1.2 (2.0)	–1.2 (2.0)
≥ $78 000	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
						VEGETABLE PURCHASING						
≤ $25 999	–3.2 (1.6)	–3.0 (1.6)	–3.0 (1.6)	–3.3 (1.6)	–2.6 (1.6)	–2.9 (1.6)	–2.6 (1.6)	–3.1 (1.6)	–3.5 (1.7)	–2.6 (1.6)	–3.0 (1.6)	–2.6 (1.6)
$26 000–51 999	0.1 (1.3)	0.3 (1.3)	0.2 (1.3)	0.1 (1.3)	0.6 (1.3)	0.3 (1.3)	0.5 (1.3)	0.5 (1.3)	–0.1 (1.3)	0.2 (1.3)	0.3 (1.3)	0.3 (1.3)
$52 000–77 999	–1.6 (1.5)	–1.6 (1.5)	–1.6 (1.5)	–1.6 (1.5)	–1.4 (1.4)	–1.8 (1.4)	–1.5 (1.4)	–1.6 (1.4)	–1.8 (1.5)	–1.3 (1.4)	–1.5 (1.4)	–1.5 (1.4)
≥ $78 000	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25), however, estimates for this group are not displayed in the table.
Abbreviations: SE = Standard Error.

Table 6.20. Education group differences in food purchasing observed in the base models (Model A) compared to those with psychosocial factors added (Model B)[a].

	Difference in estimated marginal mean food purchasing index score (range 0–100) from the referent (most educated) group (SE)											
	Model A (Base Model)	**Model B**										
		Nutrition knowledge			Nutrition concerns		Taste preference		Other			
		Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concern	Health concerns	Weight concerns	Perceived adequacy of diet
Highest attained educational qualification[b]												
						GROCERY PURCHASING						
None post school	–5.4 (1.4)	–3.9 (1.4)	–4.5 (1.4)	–5.1 (1.3)	–2.0 (1.1)	–4.0 (1.3)	–4.4 (1.2)	–4.3 (1.2)	–5.0 (2.4)	–3.8 (1.3)	–4.8 (1.3)	–5.5 (1.4)
Vocational	–3.1 (1.6)	–2.0 (1.6)	–2.4 (1.6)	–3.0 (1.6)	–0.8 (1.3)	–2.6 (1.6)	–2.8 (1.4)	–2.3 (1.5)	–2.6 (1.6)	–1.9 (1.6)	–2.9 (1.5)	–3.2 (1.6)
Diploma	–4.6 (2.0)	–4.0 (1.9)	–4.3 (2.0)	–4.2 (1.9)	–2.5 (1.6)	–4.0 (1.9)	–4.6 (1.7)	–4.0 (1.8)	–4.3 (2.0)	–4.7 (1.9)	–4.0 (1.9)	–4.5 (2.0)
Bachelor or higher	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
						FRUIT PURCHASING						
None post school	–6.5 (1.5)	–6.0 (1.5)	–6.4 (1.5)	–6.4 (1.5)	–5.5 (1.5)	–5.5 (1.5)	–6.1 (1.5)	–6.2 (1.6)	–6.3 (1.5)	–5.8 (1.5)	–6.3 (1.5)	–6.3 (1.6)
Vocational	–4.1 (1.7)	–3.8 (1.8)	–4.1 (1.8)	–4.1 (1.7)	–3.5 (1.7)	–3.8 (1.7)	–3.9 (1.7)	–4.0 (1.7)	–4.0 (1.8)	–3.6 (1.7)	–4.1 (1.7)	–3.8 (1.8)
Diploma	–2.4 (2.1)	–2.3 (2.1)	–2.4 (2.1)	–2.3 (2.1)	–1.8 (2.1)	–2.1 (2.1)	–2.5 (2.1)	–2.3 (2.1)	–2.3 (2.1)	–2.5 (2.1)	–2.3 (2.1)	–2.5 (2.1)
Bachelor or higher	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
						VEGETABLE PURCHASING						
None post school	–5.7 (1.2)	–5.5 (1.2)	–5.6 (1.2)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.4 (1.2)	–5.4 (1.1)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.7 (1.2)
Vocational	–3.0 (1.4)	–2.9 (1.4)	–2.9 (1.4)	–2.9 (1.4)	–2.4 (1.4)	–2.7 (1.4)	–2.8 (1.4)	–2.7 (1.4)	–3.0 (1.4)	–2.4 (1.4)	–2.9 (1.4)	–3.0 (1.4)
Diploma	–0.6 (1.7)	–0.7 (1.7)	0.6 (1.7)	0.6 (1.7)	1.1 (1.6)	0.9 (1.6)	0.6 (1.7)	0.8 (1.6)	0.6 (1.7)	0.6 (1.6)	0.8 (1.7)	0.6 (1.7)
Bachelor or higher	Ref (Referent)	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their education (N= 21), however, estimates for this group are not displayed in the table.
Abbreviations: SE = Standard Error.

Page intentionally blank

Table 6.21. Comparison of socioeconomic differences in food purchasing scores between Models A and B [ab]

		Model A (Base Model)	Model B (Base model + the separate addition of each psychosocial factor)										
			Nutrition knowledge			Nutrition concerns		Taste preference			Other		
			Diet disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concerns	Health concerns	Weight concerns	Perceived adequacy of diet
GROCERY PURCHASING													
Income	Difference EMM FPS	–10.5 (1.8)	–9.2 (1.8)	–9.4 (1.8)	–9.2 (1.8)	–8.3 (1.5)	–9.7 (1.8)	–8.1 (1.6)	–9.9 (1.7)	–9.5 (1.9)	–9.3 (1.7)	–9.5 (1.7)	–10.7 (1.8)
	% Mediation[cd]		**12.4**	**10.5**	**12.4**	**21.0**	7.6	**22.9**	5.7	9.5	**11.4**	9.5	–1.9
Education	Difference EMM	–5.4 (1.4)	–3.9 (1.4)	–4.5 (1.4)	–5.1 (1.3)	–2.0 (1.1)	–4.0 (1.3)	–4.4 (1.2)	–4.3 (1.2)	–5.0 (2.4)	–3.8 (1.3)	–4.8 (1.3)	–5.5 (1.4)
	% Mediation[cd]		**27.8**	**16.7**	5.6	**63.0**	**25.9**	**18.5**	**20.4**	7.4	**29.6**	**11.1**	–1.9
FRUIT PURCHASING													
Income	Difference EMM FPS	–6.0 (2.0)	–5.3 (2.0)	–5.8 (2.0)	–5.8 (2.0)	–5.3 (2.0)	–5.5 (2.0)	–5.1 (2.1)	–5.9 (2.1)	–5.7 (2.1)	–5.9 (2.1)	–5.5 (2.0)	–5.8 (2.1)
	% Mediation[cd]		**11.7**	4.1	4.1	**11.0**	**8.5**	**14.3**	2.4	4.8	2.4	9.1.	3.1
Education	Difference EMM	–6.5 (1.5)	–6.0 (1.5)	–6.4 (1.5)	–6.4 (1.5)	–5.5 (1.5)	–5.5 (1.5)	–6.1 (1.5)	–6.2 (1.6)	–6.3 (1.5)	–6.2 (1.6)	–5.8 (1.5)	–6.3 (1.5)
	% Mediation[cd]		7.7	1.5	1.5	**14.6**	**14.8**	5.7	4.6	3.1	4.6	**10.8**	3.1
VEGETABLE PURCHASING													
Income	Difference EMM FPS	–3.2 (1.6)	–3.0 (1.6)	–3.0 (1.6)	–3.3 (1.6)	–2.6 (1.6)	–2.9 (1.6)	–2.6 (1.6)	–3.1 (1.6)	–3.5 (1.7)	–2.6 (1.6)	–3.0 (1.6)	–2.6 (1.6)
	% Mediation[cd]		6.3	6.3	–3.1	**18.8**	9.4	**18.8**	3.1	–9.4	**18.8**	6.3	**18.8**
Education	Difference EMM	–5.7 (1.2)	–5.5 (1.2)	–5.6 (1.2)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.4 (1.2)	–5.4 (1.1)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.7 (1.2)
	% Mediation[cd]		1.8	1.8	0.0	**14.0**	**12.3**	5.3	5.3	0.0	**14.0**	3.5	5.3

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=21), however, estimates for this group are not displayed in the table.
c % Mediation = (difference in EMM between the highest and lowest income groups in the base model minus difference in EMM between the highest and lowest income groups in the subsequent model)/ difference in EMM between income groups (highest and lowest) in the base model) x 100.
Abbreviations: SE = Standard Error.EMM FPS = Estimated Marginal Mean Food Purchasing Score.
Percentages greater than 10% are shown in bold, the greatest three percentages in each row are shown shaded

The second goal in assessing Model B was to quantify the extent to which the addition of individual psychosocial factors to the base model mediated socioeconomic differences in food purchasing and to examine whether observations differed depending on the socioeconomic or food purchasing measures considered.

Table 6.21 provides the data used to make these assessments. In *Table 6.21*, the psychosocial factors associated with at least a 10% attenuation of socioeconomic differences in food purchasing are shown in bold. The three psychosocial factors associated with the greatest mediation of socioeconomic differences in food purchasing for each food type will be referred to as 'main' attenuators and are shown shaded. These distinctions are made to crudely identify factors consistently important in accounting for inequalities in food choices.

The main findings to be noted from *Table 6.21* are as follows:

- Most psychosocial factors mediated socioeconomic differences in food purchasing. The extent of mediation associated with individual psychosocial factors ranged from no mediation (0.0%) through to 63%.
- A single factor (nutrition concerns) was a main attenuator of socioeconomic differences in food choices irrespective of the measures of SEP or food purchasing considered. The factors 'taste preferences for recommended foods', 'health concerns' and 'knowledge of the relationship between diet and disease' were also main attenuators of inequalities in food choices in several instances.
- Some psychosocial factors mediated socioeconomic differences in particular food purchasing outcomes to a greater extent than others. While each of the nutrition knowledge factors generally reduced inequalities in grocery purchasing by at least 10%, these factors were less influential (relative to other factors) in attenuating socioeconomic differences in fruit and vegetable purchasing. Weight concerns were also observed to have a greater attenuating impact on inequalities in grocery purchasing compared to the purchase of fruit or vegetables.

Perceived adequacy of the diet had a negligible impact on reducing socioeconomic differences in grocery purchasing. However, this factor was associated with socioeconomic variation in both the variety of fruit and vegetables purchased.

- Within psychosocial themes some factors had a greater impact on attenuating inequalities in food choices compared to others. Within the nutrition knowledge theme, knowledge of the diet-disease relationship was always the most, or equally most, influential of the three factors that comprised this theme. Among nutrition concern factors concern regarding the nutrient content of foods almost always had a greater impact than use of labels. Finally preferences for recommended food most often had a greater influence on reducing inequalities in food choices than preferences for regular foods.

Although differences in findings depending on the socioeconomic indicator used can be observed in *Table 6.21*, these differences are more readily observed in *Table 6.22* where the results for Model B are arranged according to socioeconomic indicator. The main observations made regarding the impact of the socioeconomic indicator considered are as follows:

- For differences between income groups, the factors 'taste preferences for recommended food' and 'nutrition concerns', were always associated with the greatest mediation of socioeconomic differences in food choices.

  In contrast, the most important factors in attenuating differences between education groups were 'nutrition concerns' or 'health concerns'. Factors such as 'weight concerns', 'health concerns' and 'general food cost concerns' attenuated differences between income and education groups to a similar extent.

- The fact that the mediation observed in the full model was generally more than the sum of the mediation associated with all individual psychosocial factors is indicative of overlap in the mediation accounted for by each psychosocial factor.

Table 6.22. Comparison of socioeconomic differences in food purchasing scores between Models A and B, arranged by socioeconomic measure [ab]

		Model A	Model B (Base model + the separate addition of each psychosocial factor)										
		(Base Model)	Nutrition knowledge			Nutrition concerns		Taste preference		Other			
			Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concerns	Health concerns	Weight concerns	Perceived adequacy of diet
INCOME													
GROCERY	Difference EMM FPS	–10.5 (1.8)	–9.2 (1.8)	–9.4 (1.8)	–9.2 (1.8)	–8.3 (1.5)	–9.7 (1.8)	–8.1 (1.6)	–9.9 (1.7)	–9.5 (1.9)	–9.3 (1.7)	–9.5 (1.7)	–10.7 (1.8)
	% Mediation[cd]		**12.4**	**10.5**	**12.4**	**21.0**	7.6	**22.9**	5.7	9.5	**11.4**	9.5	–1.9
FRUIT	Difference EMM FPS	–6.0 (2.0)	–5.3 (2.0)	–5.8 (2.0)	–5.8 (2.0)	–5.3 (2.0)	–5.5 (2.0)	–5.1 (2.1)	–5.9 (2.1)	–5.7 (2.1)	–5.9 (2.1)	–5.5 (2.0)	–5.8 (2.1)
	% Mediation[cd]		**11.7**	4.1	4.1	**11.0**	**8.5**	**14.3**	2.4	4.8	2.4	9.1.	3.1
VEGETABLES	Difference EMM FPS	–3.2 (1.6)	–3.0 (1.6)	–3.0 (1.6)	–3.3 (1.6)	–2.6 (1.6)	–2.9 (1.6)	–2.6 (1.6)	–3.1 (1.6)	–3.5 (1.7)	–2.6 (1.6)	–3.0 (1.6)	–2.6 (1.6)
	% Mediation[cd]		6.3	6.3	–3.1	**18.8**	9.4	**18.8**	3.1	–9.4	18.8	6.3	**18.8**
EDUCATION													
GROCERY	Difference EMM FPS	–5.4 (1.4)	–3.9 (1.4)	–4.5 (1.4)	–5.1 (1.3)	–2.0 (1.1)	–4.0 (1.3)	–4.4 (1.2)	–4.3 (1.2)	–5.0 (2.4)	–3.8 (1.3)	–4.8 (1.3)	–5.5 (1.4)
	% Mediation[cd]		**27.8**	**16.7**	5.6	**63.0**	**25.9**	**18.5**	**20.4**	7.4	**29.6**	**11.1**	–1.9
FRUIT	Difference EMM FPS	–6.5 (1.5)	–6.0 (1.5)	–6.4 (1.5)	–6.4 (1.5)	–5.5 (1.5)	–5.5 (1.5)	–6.1 (1.5)	–6.2 (1.6)	–6.3 (1.5)	–6.2 (1.6)	–5.8 (1.5)	–6.3 (1.5)
	% Mediation[cd]		7.7	1.5	1.5	**14.6**	**14.8**	5.7	4.6	3.1	4.6	**10.8**	3.1
VEGETABLES	Difference EMM FPS	–5.7 (1.2)	–5.5 (1.2)	–5.6 (1.2)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.4 (1.2)	–5.4 (1.1)	–5.7 (1.2)	–4.9 (1.1)	–5.0 (1.1)	–5.7 (1.2)
	% Mediation[cd]		1.8	1.8	0.0	**14.0**	**12.3**	5.3	5.3	0.0	**14.0**	3.5	5.3

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=21), however, estimates for this group are not displayed in the table.
c % Mediation = (difference in EMM between the highest and lowest income groups in the base model minus difference in EMM between the highest and lowest income groups in the subsequent model)/ difference in EMM between income groups (highest and lowest) in the base model) × 100.
d Positive values indicate differences between Socioeconomic groups increased with removal of factor from full model. Negative values indicate the reverse.
Abbreviations: EMM FPS = Estimated Marginal Mean Food Purchasing Score, SE = Standard Error
Percentages greater than 10% are shown in bold, the greatest three percentages in each row are shown shaded

Table 6.23. Comparison of mediation of socioeconomic differences in food purchasing scores between Models B, C, and D [ab].

		% Mediation[c] associated with individual factors (Model B) and themed groups of factors (Model C)											Full model (Model D)
			Nutrition knowledge			Nutrition concerns		Taste preference			Other		
		Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concerns	Health concerns	Weight concerns	Perceived adequacy of diet	
GROCERY PURCHASING													
Income	Single factors	12.4	10.5	12.4	21.0	7.6	22.9	5.7	9.5	11.4	9.5	–1.9	45.7
	Themes		**24.2**			**19.9**		**27.3**	9.5	11.4	9.5	–1.9	
Education	Single factors	27.8	16.7	5.6	63.0	25.9	18.5	20.4	7.4	29.6	11.1	–1.9	75.9
	Themes		24.1			**54.2**		**37.2**	7.4	**29.6**	11.1	–1.9	
FRUIT PURCHASING													
Income	Single factors	11.7	4.1	4.1	11.0	8.5	14.3	2.4	4.8	9.1.	3.1	5.2	32.2
	Themes		8.8			**13.0**		**16.7**	4.8	**9.1.**	3.1	5.2	
Education	Single factors	7.7	1.5	1.5	14.6	14.8	5.7	4.6	3.1	10.8	3.1	3.1	21.5
	Themes		5.4			**18.5**		**9.2**	3.1	**10.8**	3.1	3.1	
VEGETABLE PURCHASING													
Income	Single factors	6.3	6.3	–3.1	18.8	9.4	18.8	3.1	–9.4	18.8	6.3	18.8	34.4
	Themes		**N/A[d]**			**19.3**		**22.7**	–9.4	**18.8**	6.3	**18.8**	
Education	Single factors	1.8	1.8	0.0	14.0	12.3	5.3	5.3	0.0	14.0	3.5	5.3	21.1
	Themes		3.6			**16.7**		**9.4**	0.0	**14.0**	3.5	5.3	

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=21), however, estimates for this group are not displayed in the table.
c % Mediation of differences in estimated marginal mean (EMM) food purchasing score (FPS) between the highest and lowest socioeconomic group from the base model
d For clarity factors that exhibited trends in opposite directions (i.e. some reduced while some increased variation between socioeconomic groups) were not combined
Abbreviations: EMM FPS = Estimated Marginal Mean Food Purchasing Score, SE = Standard Error
Percentages greater than 10% are shown in bold, the greatest three percentages in each row are shown shaded

6.5.3 Model C

Model C enabled consideration of the impact of themed groups of psychosocial factors on attenuating socioeconomic differences in food choices. This approach provides insight into whether related psychosocial factors operate in a combined way. In addition, it facilitates comparisons with literature reporting only on psychosocial themes rather than individual psychosocial factors.

The findings from Model C are presented in *Table 6.23*. With regard to 'nutrition knowledge' and 'nutrition concerns' it appeared that there was overlap in the variation associated with each of their constituent factors. This was apparent because the mediation associated with each psychosocial theme was generally less than the summed mediation associated with each constituent psychosocial factor. An example of this can be seen in relation to the differences in grocery purchasing according to income presented in *Table 6.23*. In this case the mediation associated with each of the two constituent nutrition concern factors was 21.0% and 17.6%, respectively. The mediation observed in a model that included both these factors was 19.9%, indicating overlap in the variation accounted for by these two related factors.

In contrast, the taste preference factors tended to have an additive effect, with themed factors combined in a model associated with just as much variation as if the variation associated with the individual constituent factors was summed.

Overall this modelling approach produced results consistent with those of Model B, in that nutrition concerns, taste preferences and health concerns were among the greatest and most consistent attenuators of socioeconomic inequalities in food choices. Also consistent with the former modelling approach, some differences were observed according to the socioeconomic indicator examined. In particular, taste preferences always accounted for differences between income groups to the greatest extent of all factors, while nutrition concerns consistently contributed to differences between education groups to the greatest extent of all factors.

6.5.4 Model D

The results of Model D are also presented in *Table 6.23*. Collectively, psychosocial factors mediated between 21.1% and 75.9% of socioeconomic differences in food purchasing. Socioeconomic differences in grocery purchasing were mediated by psychosocial factors to a greater extent than either fruit or vegetable purchasing.

The fact that the mediation observed in the full model was generally less than the sum of the mediation associated with all individual psychosocial factors or themes indicates overlap in the mediation accounted for by individual psychosocial factors.

6.5.5 Model E

Model B allowed an assessment of the mediation of socioeconomic differences in food choices associated with each individual psychosocial factor. The results from Model E provide further information by indicating the proportion of mediation uniquely associated with each psychosocial factor. Unique contributions to mediation were evaluated by separately removing each psychosocial factor from the full model (Model D) and noting the percentage reduction in mediation in each instance.

In *Table 6.24* the factors associated with the greatest mediation in inequalities in food choices (derived from Model B), are shaded in grey. The factors in each row associated with the greatest reduction of mediation from the full model (Model E) are shaded in yellow.

The main findings evident from *Table 6.24* are as follows:

- None of the factors associated with the greatest mediation of socioeconomic differences in food choices, reduced mediation of socioeconomic differences in food purchasing to a great extent when they were individually removed from the full model. The greatest reduction of mediation uniquely associated with any of these factors was 22.7% (shown outlined in *Table 6.24*). In this instance, this means that the mediation of 75.9% achieved in the full model was reduced by 22.7%, to 58.7% once the factor 'nutrition concerns' was removed from the full model.

- Among the psychosocial factors associated with mediation of socioeconomic differences in food purchasing to a lesser extent (those results from Model B not shaded in grey), some were found to be among those making the greatest unique contribution to attenuating inequalities in food choices. The factors 'general food cost concerns', 'taste preferences for regular foods' 'health concerns' and 'perceived adequacy of the diet' were all found to be among the factors exhibiting the greatest unique contribution to the mediation of food purchasing inequalities in some instances. The highest reduction of mediation uniquely associated with any of these single factors was 27.3% (the influence of general cost concerns in mediating differences in grocery purchasing across education groups, as highlighted in a box in *Table 6.24*).
- There were no obvious trends in terms of which psychosocial factors made a unique contribution to socioeconomic differences in food choices when all six modelling scenarios for Model E were reviewed.

Overall these results indicate that none of the psychosocial factors examined came close to independently accounting for socioeconomic differences in food choices. This is evidenced by their removal from the full model not reducing the mediation of inequalities in food choices by a large extent. Across all factors, the reduction in mediation with the removal of single factors ranged from 0.0% to 27.3%).

These results suggest that psychosocial factors contribute to inequalities in food choices in a combined manner. This finding is consistent with the observation from comparison of Models C and D, that the full model rarely accounted for more variation than the sum of variation associated with each individual psychosocial factor or themed group of factors.

Table 6.24. Comparison of mediation of socioeconomic differences in food purchasing scores between Models D, C, and E [ab].

		Model B = % Mediation associated with the separate addition of individual psychosocial factors to the base model (Model A) Model E = % Reduction in mediation associated with the separate removal of individual psychosocial factors from the full model (Model D).											**Model D**
			Nutrition knowledge			Nutrition concerns		Taste preference			Other				
		Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concerns	Health concerns	Weight concerns	Perceived adequacy of diet	**(Full model)**
GROCERY PURCHASING													
Income	Model B	**12.4**	**10.5**	**12.4**	**21.0**	7.6	**22.9**	5.7	9.5	**11.4**	9.5	–1.9	45.7
	Model E	0.0	3.8	2.6	–4.0	–0.3	–0.12	**12.03**	**22.3**	**16.7**	–2.2	–2.3	
Education	Model B	**27.8**	**16.7**	5.6	**63.0**	**25.9**	**18.5**	**20.4**	7.4	**29.6**	**11.1**	–1.9	75.9
	Model E	–3.0	13.5	–8.8	**22.7**	–2.1	–9.2	**20.0**	**27.3**	–4.3	1.5	0.6	
FRUIT PURCHASING													
Income	Model B	**11.7**	4.1	4.1	**11.0**	8.5	**14.3**	2.4	4.8	9.1.	3.1	5.2	32.2
	Model E	0.0	–3.1	0.0	–0.5	3.27	7.8	0.1	**17.1**	1.4	–3.2	7.0	
Education	Model B	7.7	1.5	1.5	**14.6**	**14.8**	5.7	4.6	3.1	**10.8**	3.1	3.1	21.5
	Model E	0.5	–2.2	–0.4	0.5	4.3	–1.3	1.3	3.7	1.4	0.2	2.1	
VEGETABLE PURCHASING													
Income	Model B	6.3	6.3	–3.1	**18.8**	9.4	**18.8**	3.1	–9.4	**18.8**	6.3	**18.8**	34.4
	Model E	–0.2	4.84	–8.0	–1.1	3.1	8.9	–0.1	–5.0	4.1	0.2	25.1	
Education	Model B	1.8	1.8	0.0	**14.0**	**12.3**	5.3	5.3	0.0	**14.0**	3.5	5.3	21.1
	Model E	6.7	9.2	**11.4**	9.4	**11.0**	7.8	10.2	8.4	**11.7**	8.6	**13.4**	

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=25), however, estimates for this group are not displayed in the table.
c Mediation is referred to in relation to differences in estimated marginal mean (EMM) food purchasing score (FPS) between the highest and lowest socioeconomic group in models compared to the base (Model A) or full (Model D) models.
Abbreviations: EMM FPS = Estimated Marginal Mean Food Purchasing Score, SE = Standard Error
Percentages greater than 10% are shown in bold, the greatest three percentages in each row are shown shaded

6.5.6 Model F .

The final model, Model F, was constructed to investigate the unique contribution of each themed group of psychosocial factors to socioeconomic differences in food choices. This was achieved by removing each themed group of psychosocial factors from the full model (Model D) and observing the percentage reduction in mediation from that achieved in the full model.

Data from Model E informed the appropriateness of the analyses proposed for Model F. When the individual removal of psychosocial factors that comprised a theme had contrary impacts in terms of altering the mediation of socioeconomic variation observed in the full model (as observed in Model E) it was deemed inappropriate to remove all factors of a theme together and report on their combined influence in Model F. To do so would produce a result that reflected a dilution of the individual effect of each factor. It was decided that more meaningful results would be obtained by only removing factors individually from models in such instances (therefore, only performing analyses on these factors in Model E, not F). Consequently, due to counter-trends within themes, data were only generated for a small number of psychosocial themes in relation to Model F. Specifically, as shown shaded in *Table 6.25*, psychosocial themes were unable to be assessed in over half (10/18) of the possible composite factor scenarios explored for Model F.

Only a single instance was observed where all psychosocial themes composed of composite items (nutrition knowledge, nutrition concerns and taste preferences) were modelled. This was the relationship between education and vegetable purchasing. In this instance, those themes associated with relatively higher percentages of mediation of socioeconomic differences in vegetable purchasing were also uniquely associated with this variation to a greater extent than other themes.

Due to so few psychosocial themes being consistently represented in Model F, it is not possible to make generalisations from these data. Rather than examining the unique contribution of psychosocial themes to inequalities in food purchasing, it appears more informative to examine the unique contribution of individual psychosocial factors (Model E).

Table 6.25. Comparison of mediation of socioeconomic differences in food purchasing scores between Models D, C, and E [ab].

		Model C = % Mediation associated with the separate addition of psychosocial themes to the base model (Model A) Model F = % Reduction in mediation associated with the separate removal of psychosocial themes from the full model (Model D).										**Model D**
		Nutrition knowledge			Nutrition concerns		Taste preference		Other[e]			**(Full model)**
		Diet-disease	Nutrient sources	Dietary guidelines	Nutrition concerns	Nutrition label use	'Recommended' choices	'Regular' choices	General food cost concerns	Health concerns	Weight concerns	Perceived adequacy of diet	
GROCERY PURCHASING													
Income	Model C		24.2		19.9		27.3		9.5	11.4	9.5	–1.9	45.7
	Model F		9.4		–2.6		N/A[d]		22.3	16.7	–2.2	–2.3	
Education	Model C		24.1		54.2		37.2		7.4	29.6	11.1	–1.9	75.9
	Model F		N/A[d]		N/A[d]		N/A[d]		27.3	–4.3	1.5	0.6	
FRUIT PURCHASING													
Income	Model C		8.8		13.0		16.7		4.8	9.1.	3.1	5.2	32.2
	Model F		–2.6		N/A[d]		7.4		17.1	1.4	–3.2	7.0	
Education	Model C		5.4		18.5		9.2		3.1	10.8	3.1	3.1	21.5
	Model F		N/A [d]		7.3		N/A [d]		3.7	1.4	0.2	2.1	
VEGETABLE PURCHASING													
Income	Model C		N/A[d]		19.3		22.7		–9.4	18.8	6.3	18.8	34.4
	Model F		N/A[d]		N/A[d]		N/A[d]		–5.0	4.1	0.2	25.1	
Education	Model C		3.6		16.7		9.4		0.0	14.0	3.5	5.3	21.1
	Model F		5.6		13.6		8.4		8.4	11.7	8.6	13.4	

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their income (N= 25) or education (N=25), however, estimates for this group are not displayed in the table.
c Mediation is referred to in relation to differences in estimated marginal mean (EMM) food purchasing score (FPS) between the highest and lowest socioeconomic group in models compared to the base (Model A) or full (Model D) models.
d For clarity, factors that exhibited trends in opposite directions (i.e. some reduced while some increased variation between socioeconomic groups) were not combined.
e A combined mediation percentage for these factors is not appropriate as they are grouped only for organisational purposes, rather than being conceptually related as the psychosocial factors that comprise the other themes are. The factors are interpreted both as individual psychosocial factors and as comprising their own theme in these analyses.

6.6 QUANTITATIVE RESULTS CHAPTER SUMMARY

Graded and significant differences were observed between both socioeconomic indicators and all food purchasing outcomes[17] (RQ1). The results from analyses assessing the relationships between psychosocial factors and food purchasing (RQ2), and psychosocial factors and socioeconomic position (RQ3), supported the investigation of psychosocial factors as potential contributors to socioeconomic differences in food purchasing (RQ4).

On the basis of the preliminary analyses (RQ2 and RQ3), only two factors were deemed exempt from further analyses. These factors were the two cost concern factors ('healthy food cost concerns' and 'perceive recommended food choices cost more than regular choices'). Although exhibiting approximately graded associations with SEP, neither of these factors were associated with any food purchasing outcomes.

Therefore, 11 psychosocial factors were assessed in the final models (RQ 4). When psychosocial factors were added individually to the base model, most factors mediated socioeconomic differences in food purchasing. Psychosocial factors reduced socioeconomic inequalities in grocery purchasing to a greater extent compared to fruit or vegetable purchasing. When assessed in themes, three psychosocial themes were frequently associated with the greatest mediation of socioeconomic differences in food purchasing. These themes were nutrition concerns, taste preferences and health concerns. Nutrition knowledge was also a main attenuator in relation to socioeconomic differences in grocery purchasing. These findings are consistent with the analyses for RQ2 and RQ3 where these factors were associated with food purchasing choices and SEP, respectively.

The combined analyses presented in this chapter provide some indication of the pertinence of socioeconomic indicator selection in this field of research. In particular, choice of indicator appeared to influence the magnitude of

[17] The **only** exception was vegetable purchasing which was only approximately graded with income and differences between income groups in terms of this variable were not statistically significant ($p < 0.05$).

socioeconomic differences in food choices observed (RQ1) and the particular psychosocial factors implicated in inequalities in food choices (RQ3 and RQ4).

These quantitative analyses implicate a number of psychosocial factors as contributing to inequalities in food purchasing. Collectively, the findings across models suggest that psychosocial factors contribute to inequalities in food purchasing in a combined way, rather than any single factors or themes exerting a dominant or exclusive influence.

Chapter 7: **QUALITATIVE METHODS**

7.1 CHAPTER CONTENTS

This chapter first reiterates the main aims of the qualitative component of this investigation. The qualitative data source, The Sixty Families Study (SFS) is then described including the research design, data collection and quality control practices. The remainder of the chapter describes how the SFS data were used in this thesis, specifically, describing the variables constructed from the SFS data and the analytical procedures used.

7.2 THE PURPOSE OF THE QUALITATIVE ANALYSES

The rationale for the mixed-methods approach applied in this investigation is described in detail in chapter 3. Briefly, the qualitative analyses provided an alternative means of assessing the contribution of psychosocial factors to socioeconomic differences in food purchasing. In addition to enabling convergent validation or a 'triangulation' of methods [382], the qualitative investigation extended the quantitative analyses in several ways.

The quantitative methods allowed consideration of a range of psychosocial factors in relation to inequalities in food purchasing using a large sample (N=970). However, the structured format of the quantitative data collection allowed a finite (albeit wide) number of psychosocial factors to be considered. This approach was also restricted in the depth to which socioeconomic differences in psychosocial factors could be explored. This was due to the requirement for participants to respond by selecting among the provided response options (e.g. degree of agreement on a Likert scale). In contrast, the open-ended format of the qualitative interview questions allowed respondents to implicate an infinite number of psychosocial factors as determinants of their food choices. Influential factors were able to be described in detail by respondents, and interviewers were also able to request further descriptive or clarifying information from respondents.

Therefore, the addition of the qualitative analyses to the quantitative analyses is likely to have fostered a more comprehensive understanding of the phenomena under study, than if quantitative methods alone had been used.

7.3 RATIONALE FOR SELECTION OF THE QUALITATIVE DATA SOURCE

The SFS was selected for the qualitative component of this investigation for several reasons. The SFS was designed to investigate the relationships of interest in this enquiry, namely the contribution of psychosocial factors to socioeconomic inequalities in food purchasing. The study also had several design features that made it an optimal choice for this investigation, including a socioeconomically inclusive sampling strategy, inclusion of both male and female respondents, and an in-depth interview mode of data collection.

Many studies, particularly qualitative studies, include only those of low SEP [146, 236, 243, 356, 358, 359, 448, 449], yet there is much to be gained from comparing differences across socioeconomic groups when seeking to understand dietary or health inequalities. Many studies in this field of research also exclusively consider either men [49, 448] or women [61, 450]. Household food purchasing is likely to be influenced by the psychosocial characteristics of all household members and the tendency for studies to not consider familial influences has been criticised [133]. Therefore, for this PhD investigation, it was considered important to assess data from both male and female heads of the household, to allow greater insight into the context of food purchasing decision making. Specifically, this approach allowed both intra- and inter-personal influences on food choices to be explored in a different manner to if only a single household member was interviewed.

The SFS data were collected via in-depth interviews, a mode of data collection that has some advantages compared to other types of qualitative research [383]. For example, respondents may be more likely to disclose sensitive information in interviews compared to in a focus group setting, and more specific issues can be raised and probed in contrast to narrative analysis or unobtrusive methods [386, 451].

7.4 RESEARCH DESIGN AND CHARACTERISTICS OF THE SIXTY FAMILIES STUDY

7.4.1 Study overview

The SFS was conducted in Brisbane during June to October 1998. Eligible participants were married or defacto couples aged over 16 who resided together. Respondents took part in a one hour face-to-face interview regarding their beliefs about health, diet and disease, food purchasing behaviour, and their psychosocial, socioeconomic, and demographic characteristics.

7.4.2 Sample

Sample recruitment

The SFS recruited 60 couples from the Brisbane City Statistical Sub-Division (SSD). A convenience sampling strategy was employed to recruit three socioeconomically distinct groups, which will be referred to as 'welfare', 'low SEP' and 'high SEP'. Within each socioeconomic group (N=20), 10 couples were recruited with children and 10 without.

Respondents of low and high SEP were notified about the study and invited to participate via letters distributed through either workplaces or childcare centres. Workplaces were asked to distribute letters of invitation to the applicable target group. For example, employers were asked to distribute the letter to recruit those of high SEP to "managerial and professional" staff at the workplace. In contrast, to recruit those of low SEP, employers were asked to distribute the letter to those involved in trades, or clerical or administrative based occupations (blue or white collar). Those of high SEP were additionally recruited from childcare centres in affluent neighbourhoods.

Welfare respondents were recruited through The Salvation Army, The Society of St Vincent De Paul and The Smith Family. Recruiting those of low income through charitable organisations is a common research practice [236, 243, 419].

The convenience sampling method used in the SFS may have resulted in respondents being recruited who were more interested in participating in research than other members of the community (the invitation letter noted that the study

was about 'lifestyle choices'). However, if self-selection did influence the type of respondents recruited, presumably this would have occurred across all socioeconomic groups, since all were recruited in this way. Each household was paid a $10 gratuity to cover any costs incurred due to participation in the study. The provision of a gratuity is also a common research practice [61, 419].

7.4.3 Sample characteristics

Table 7.1 presents the demographic profile of the SFS sample. The average age of males and females was similar across socioeconomic groups. Those of high SEP were well educated, earned above-average incomes and were employed in high-status, high-skilled occupations[18]. Those of low SEP were comparatively less educated, with lower household income and were employed in trades-based occupations ('blue collar'), or non-managerial/professional occupations such as clerical/administrative or sales-type occupations ('white collar')[19]. Those in the welfare sample had the lowest levels of education and household income and the majority were not employed (75% males, 100% females).

Across socioeconomic groups, of those families who had children (N=30), most had three or less children (87% = 26/30). In the welfare sample, households with children tended to be larger than households of higher SEP with children, however, no significant differences were observed. The estimated total family income of those in the welfare sample was the lowest of all socioeconomic groups, regardless of whether households with or without children were compared.

[18] The occupational profile of respondents is included in Appendix SFS Occupation.
[19] Although women in these households were sometimes employed in white collar occupations, all males were employed in blue collar occupations therefore, the term 'low' SEP is used to denote this group.

Table 7.1. Sample characteristics according to socioeconomic position.

Socioeconomic and demographic characteristics		Socioeconomic position		
		Welfare	Low	High
AGE				
(Median, range)	Male	35.0 (18–51)	33.0 (23–55)	32.5 (25–52)
	Female	36.0 (16–49)	31.0 (20–54)	31.5 (22–47)
EDUCATION COMPLETED				
(% in each group)				
Year 12	Male	15.0	55.0	90.0
	Female	30.0	65.0	95.0
Some education or a vocational qualification post–year 12	Male	25.0	80.0	90.0
	Female	30.0	40.0	75.0
Completed bachelors degree or higher	Male	10.0	0.0	70.0
	Female	10.0	20.0	65.0
ESTIMATED ANNUAL HOUSEHOLD INCOME				
(Median and range).		$18 199 ($7279–46 799)	$46 799 ($23 399–78 000)	$78 000 ($64 999– 78 000)
UNEMPLOYMENT STATUS				
(%)				
Male		75	0	0
Female		100	30	10
HOUSEHOLD SIZE[a]				
(Median, range)		5.0 (4–7)	4.0 (3–6)	3.5 (3–5)

[a] Household size of households with children (N=30) , since for all household without children, the household size was 2).

7.4.4 Sixty Families Study data collection strategy

The SFS data collection involved face-to-face interviews during which self-completion questionnaires were administered and discussed. The interview was audio recorded for later transcription (respondents' consent was sought to allow this). Both the interview schedule and questionnaires are included in Appendix N. The interview was conducted in two parts with self-completion surveys issued after each segment of interviewing. The chronology of the procedure was as follows:

Part 1: Face-to-face interview

Part 2 (a): Self-completion food purchasing questionnaire;

(b): Self-completion meal preparation and cooking questionnaire;

(c): Self-completion eating patterns questionnaire.

Part 3: Face-to-face interview

Part 4: Self-completion "food influences" questionnaire followed by a face-to-face interview

Part 5: Self-completion questionnaire about socioeconomic and demographic background and family size and structure

The interview commenced with unstructured questions on health in general, then progressed to more detailed, structured questions on the relationship between diet and health and concluded by investigating purchasing decisions for specific foods. This unstructured-to-structured approach, or broad-to-narrow focus, is commonly used and is a recommended approach for in-depth interviews [452]. Over the course of the interview data were collected pertaining to respondents' food purchasing, preparation and consumption, in addition to demographic, socioeconomic and psychosocial characteristics. The specific details regarding how this information was collected are included in the sub-sections below.

Collection of data on demographic variables

As the interviewer alternated asking questions of the male and female respondent, the gender of the person responding was noted alongside their comments during data collection. This was also noted later during the audio transcription process. Age was determined by asking each respondent their age in years on the self completion questionnaire.

Collection of data on socioeconomic position

The recruitment procedure selected couples based on occupation to represent one of three socioeconomic groups. In the SFS survey both partners were asked to nominate their employment status as unemployed, part time or full time. If they held a job in the previous week they were asked to describe the title of that occupation (the occupations reported by each socioeconomic group are provided in Appendix O). Household income was ascertained by asking respondents which of 14 categories best reflected their total annual income, including wages, pensions, allowances, and investment profits. Both partners were asked to report the highest level of schooling and to describe any training that they had completed since leaving school. The actual question pertaining to occupation, income and education are shown in the full SFS survey presented in Appendix N.

Collection of data on food purchasing

The SFS was conducted by the same research team as the BFS and the same rationale was applied for the selection of foods to be examined (as described in the quantitative methods, Chapter 4). The SFS collected data on the purchase of the following 10 grocery foods: milk, yoghurt, cheese, bread, rice, pasta, breakfast cereal, fruit juice, minced beef, and cooking oil. Data were obtained in an identical format to that applied in the BFS. That is, respondents were asked to indicate whether they purchased each grocery food, and if so, the type that was regularly purchased. The question pertaining to pasta is provided below as an example (*Figure 7.1*).

When shopping what type of pasta do you USUALLY buy ?

I do not buy pasta	☐ 1
Wholemeal pasta	☐ 2
Regular pasta	☐ 3
Either type	☐ 4

Figure 7.1. Sixty Families Study survey question pertaining to pasta purchasing.

Data were then collected on the purchase of 18 fruits and 24 vegetables (listed in *Table 7.2*)[20].

Table 7.2. Fruit and vegetables included in the SFS survey

Fruit (18 types)		Vegetables (24 types)	
Kiwi Fruit	Honey Dew-Melon	Broccoli	Cauliflower
Paw-Paw	Apricot	Capsicum	Green Beans
Orange	Nectarine	Brussels Sprouts	Tomatoes
Mandarin	Pear	Sweet Potato	Cucumber
Rockmelon	Peach	Silverbeet/spinach	Potatoes
Grapefruit	Grapes or Berries	Peas	Lettuce
Mango	Water Melon	Chinese Greens	Celery
Banana	Apple	Cabbage	Onions
Pineapple	Plum	Pumpkin	Eggplant
		Zucchini/Squash	Mushrooms
		Carrots	Corn
		Legumes (lentils/ baked beans)	Sprouts

Respondents were asked to indicate how frequently each type of fruit or vegetable was purchased using a five-point scaling ranging from always to never. The survey instructed participants to assume all produce were in season when providing their response and to consider frozen, canned or dried produce, but to exclude fruit juice. Respondents were later asked, in reference to their completed fruit/vegetable purchasing inventory, whether they felt they purchased a 'wide-range' of fruit/vegetables. The actual question asking respondents to assess whether a variety of produce was purchased was as follows:

Would you say that you usually purchase a wide variety of (fruit/vegetables)?

Collection of data on psychosocial factors

The open-ended format of the SFS interview allowed respondents to note an infinite number of psychosocial factors as either influencing their food purchasing

[20] The fruits and vegetables included in the SFS survey differed slightly from those included in the BFS. The only type of fruit excluded from the SFS data collection that was included in the BFS was strawberries. In the SFS respondents were additionally asked to note if they purchased any dried or canned fruit. An extra three vegetables were included in the SFS compared to the BFS these were legumes, sprouts and corn.

specifically or in relation to their views on diet and health. Respondents were also questioned about some psychosocial factors explicitly, for example, concerns regarding health, cost, and weight concerns. To avoid repetition, the full list of these items is presented in Section 7.5 (to follow) along with the description of the analyses undertaken for each item.

7.4.5 Pre-testing the interview schedule and accompanying questionnaire

Many of the questions included in the SFS interview schedule and questionnaire had been used in previous research investigating diet and health conducted by the SFS research team [360]. A pilot study was also undertaken, which involved testing of questionnaire content and administration with 20 men and women of varying levels of SEP. This process resulted in changes to questionnaire wording and structure and the determination that a combination of in-depth interview and self-administered questionnaires would be the optimal strategy for data collection.

7.4.6 Sixty Families Study quality control

The SFS design included several features devised to optimise data quality and research rigour. The specific inclusion of a welfare group allowed representation of some of the most underprivileged citizens, whom are often under-represented or exempt from studies that recruit in conventional ways [397, 453, 454]. For example, those who are homeless often cannot be contacted by a mail or telephone survey, and may not appear on the electoral roll (from which study participants are often extracted). Studies that use socioeconomically truncated samples are likely to produce findings that underestimate the actual socioeconomic inequalities in the community. The SFS aimed specifically to include those with the least resources (in terms of income, education and social resources) in order to capture, as much as possible, the spectrum of socioeconomic differences in food purchasing and associated determinants in the community.

Interviewers were trained in interviewing technique and instructed to be consistent in their presentation of the interview questions, and to probe for additional

information using a non-directive approach[21]. The fact that couples were interviewed simultaneously provided additional verification of information about the household's food purchasing. Couples were often found to correct or provide additional information to a partner's response when they felt it was lacking. Interviewers were instructed to alternate which member of the couple was asked each question first, and started half of the interviews with the female and the other half with the male. This approach was employed to control for possible gender biases. Females are generally found to place more importance on the consumption of a healthy diet than males [455, 456] and males have been found to dominate food consumption in low income households [135]. Therefore, the interviewing technique promoted representation of both males and females throughout the interview and across socioeconomic groups. The aspects of qualitative research rigour applicable to the data analyses are described in Section 7.10.

7.5 THE USE OF THE SIXTY FAMILIES STUDY TO ADDRESS THE RESEARCH AIMS OF THIS ENQUIRY

The following sections describe how the SFS data were used to address the research objectives of this investigation.

7.5.1 Data preparation and variable construction

Interview transcripts were received in Microsoft word and were transferred by the candidate into NVivo (version 8). A number of variables were constructed to classify respondents according to their SEP, gender and food purchasing choices.

Construction of socioeconomic and demographic variables

The recruitment process generated three groups of respondents primarily differentiated by occupation. These groups represented three distinct socioeconomic groups (as demonstrated by the descriptive information provided in Table 7.1). It is the distribution of respondents into these three groups, (welfare, low, or high SEP) that formed the basis of the socioeconomic comparisons made in

[21] The non-directive approach is outlined by Flick (2006) who note one advantage of this method is that it reduces the extent to which the interviewer imposes their frame of reference regarding the topic on respondents.

the analyses. All couples interviewed comprised one male and one female. The gender of the respondent was noted in the interview transcripts and considered in these PhD analyses.

Construction of food purchasing variables

Construction of grocery purchasing variables

Of the 10 grocery foods explored in the SFS, three were investigated in detail in this PhD investigation. Bread, milk and fruit juice were selected as commonly purchased foods [400]. These foods each differ in fibre, fat or sugar content, which are nutrients referred to in current dietary guidelines [2]. They have each been considered individually in previous quantitative studies examining socioeconomic differences in food choices [112, 114, 355].

The classification of grocery choices into 'regular' or 'recommended' categories according to dietary guidelines is shown in *Table 7.3*. Depending on their purchasing pattern, respondents were classified as belonging to one of four categories for each grocery type including, 'do not buy this grocery food', purchase 'exclusive regular', purchase 'exclusive recommended' or purchase a mixture of 'regular' and 'recommended' options.

Table 7.3. Classification of three grocery foods into 'recommended' and 'regular' categories.

Food-type [a]	Recommended [b]	Regular
Milk	Reduced fat (Trim), low fat (Skim), high calcium (Physical, Shape), high calcium skim (Physical), high iron (Life), high protein (Lite White), reduced lactose (Lactaid), no cholesterol (Dairy Wise), soy or soy & linseed (Skim)	Extra Creamy, full cream, soy or soy & linseed (full cream)
Bread	Wholemeal, multigrain, white high in fibre, rye, soy and linseed	White
Fruit juice	No added sugar (unsweetened)	Added sugar, fruit drink (5–35% fruit juice)

[a] Food types were selected based on those included in the five core food-groups of the Australian Guide to Healthy Eating [407] and findings from the National Nutrition Survey, 1995 [457], which indicated that the foods were readily available and consumed by a large proportion of the population.

[b] Food options endorsed in dietary guideline publications and considered consistent with minimal risk for the development of disease. Regular foods refer to the alternative choice to 'recommended' for each food type.

The quantitative analyses of the BFS indicated that in some instances the relationship between socioeconomic position, psychosocial factors and food choices

differed according to the food purchasing outcome considered. Therefore, in the qualitative analyses individual grocery foods were considered, rather than combining foods to from a grocery purchasing index. The approach of considering individual foods has been used in previous research considering the influence of psychosocial factors on inequalities in food choices [112, 114, 115, 189, 355, 458].

Particular foods are known to be consumed in different contexts, for example, vegetables are known to most commonly be included in the main meal of the day, often a hot meal served at night in many households [137]. This main meal of the day has been found to be the main contributor to individuals' energy and micronutrient intake [137]. Fruit, in contrast does not normally constitute part of main meals and instead is included in the diet in a different way to vegetables [137]. The consideration of individual foods allows greater insight into the context of various food choice decisions; hence, more detailed information can be obtained to inform health promotion strategies or health policies.

Construction of variables representing respondents' perception of whether a variety of fruit and vegetables was purchased

Two variables were constructed that dichotomously categorised respondents according to whether they believed that they did or did not purchase a wide range of fruit and a wide range of vegetables. Respondents self-classified themselves as either buying or not buying a wide variety of fruit and vegetables based on their purchasing pattern of 18 types of fruit and 24 vegetables. Since the question used to collect the data was open-ended (*Would you say that you usually purchase a wide variety of (fruit/vegetables?)* some coding was required. Three response types were identified which were 'do not buy fruit/vegetables', 'believe that a wide variety is purchased' and 'do not believe that a wide variety is purchased'.

'Yes' and 'No' responses were simple to code and were placed in the categories 'believe that a wide variety is purchased' and 'do not believe that a wide variety is purchased', respectively. Responses such as "I suppose so" or "I think so" were categorised as belief that a wide variety of fruit/vegetables was purchased, while

responses such as “probably not” or “I don’t think so” were categorised as belief that a variety of fruit/vegetables was not purchased.

Consideration of psychosocial factors

The consideration of psychosocial factors was the focus of this qualitative investigation. Therefore, a rationale for the selection of psychosocial data from the SFS will be presented, prior to description of the actual items selected for analyses. Several findings from the literature review and the quantitative phase of this PhD informed which data on psychosocial factors were selected from the SFS. In particular research findings on socioeconomic differences in psychosocial factors appeared to vary according to:

- Whether psychosocial factors were referred to in a broad or specific sense (e.g. whether the importance of weight concerns was assessed or whether the qualitative nature of weight concerns was assessed).
- Whether the food outcomes examined were referred to in a broad or general sense (e.g. if respondents were asked about the impact of a psychosocial factor on ‘daily food choices’ or with regard to selection of a specific food type, e.g. low fat milk).

From these observations the qualitative analyses were devised to explore socioeconomic differences in psychosocial factors contributing to food choices in multiple ways. Content from the SFS was selected to enable assessment of socioeconomic differences in psychosocial factors at three tiers of observation (as presented in *Figure 7.2*).

Level 1	Broad perceptions of health
Level 2	Perceived influence of health and nutrition concerns on food purchasing
Level 3	Psychosocial factors associated with the purchase of three specific grocery foods, and fruit and vegetables

Figure 7.2. Three levels of observation of socioeconomic differences in psychosocial factors relevant to food purchasing.

The first (and broadest) level allowed examination of socioeconomic differences in psychosocial factors in a general sense (not specifically in relation to food choices). The data included in the SFS at this level particularly pertained to respondents' perceptions of the determinants of health, including the individual's perceived control over their own health and perceived contribution of diet to health.

This approach of investigating respondents' broad perspectives in order to gain insight into their experience of their place in the world, and health orientation has been commonly used by researchers seeking to understand behaviours relevant to health [459], including food choices [419, 460]. Health concerns were associated with SEP in the majority of studies that considered this factor in the literature review and were found to be an important attenuator of socioeconomic differences in food purchasing in the quantitative phase of this investigation. The information obtained regarding respondents' broad perceptions of health and the role of diet in health, provides an important context for interpreting socioeconomic differences in psychosocial factors examined in the subsequent two narrower levels of enquiry that focus specifically on food purchasing.

The second level of analyses involved socioeconomic comparisons of psychosocial factors discussed in relation to food purchasing in a general sense (rather than with regard to specific food choices). Specifically, data were selected from the SFS at this level to examine the influence of health and nutrition concerns on food choices.

Health concerns were selected for consideration due to being implicated as important determinants of inequalities in food choices in both the literature review and quantitative analyses. While the contribution of nutrition concerns to inequalities in food choice could not be established in the available literature, this factor was selected for further analyses at this level due to being implicated as among the most influential factors from the quantitative analyses.

The final and most specific phase of the qualitative analyses enabled investigation of socioeconomic differences in psychosocial factors mentioned in relation to the purchase of five specific food types (milk, bread, fruit juice, fruit and vegetables). Therefore, as displayed in *Figure 7.2*, the selection of data from the SFS allowed consideration of an infinite number of psychosocial factors in relation to specific foods (level three), and some additional exploration of psychosocial factors identified as important contributors to socioeconomic differences in food choices from previous research (levels one and two).

In contrast to the quantitative analyses wherein the thesis research questions were addressed consecutively, sometimes several research questions were addressed simultaneously in the qualitative analyses. This is a common feature of the constant comparative analytical approach used [461, 462]. An overview of the components of the SFS used to address all research questions applicable to the qualitative analyses are shown in *Table 7.4*.

Table 7.4. Selection of SFS data to respond to each qualitative research question.

RQ 1 Do socioeconomic groups differ in terms of their food purchasing?
This question was addressed with data derived from the food purchasing inventories described in Section 7.4.4 (page 189)
RQ 4 Do psychosocial factors appear to contribute to socioeconomic inequalities in food purchasing? ***RQ 6*** How do socioeconomic groups differ with regard to psychosocial factors implicated in food purchasing inequalities?
These questions were addressed with data derived from the following three levels of information available in the SFS.
Level 1. Broad perspectives on health
Do you think you lead a healthy life? (why do you say that?). *If you were asked to give advice to someone about the best way of staying healthy, what would you tell them?* *What do you think are the main reasons for someone to become ill? Do you think that people sometimes have themselves to blame for becoming ill?"* *Do you think someone's chance of getting heart disease is related to their behaviours, or is it simply a matter of luck?* *Do you think the foods we eat play a role in our health? In what ways?* *Can you name any diseases or illnesses which you think are related to our diets or the foods we eat?*
Level 2. Influence of specific health and nutrition concerns on food purchasing choices.
To what extent are your food purchasing choices influenced by: *the amount of fat in the food, the amount of salt in the food, the amount of sugar in the food, the amount of fibre in the food, the type of fat in the food (e.g. saturated or unsaturated), concerns about your health, concerns about heart disease, concerns about cancer, concerns about your weight.*
Level 3. Influence of psychosocial factors on choice of three grocery foods, fruit & vegetables
GROCERY FOODS (respondents were asked one of the following four questions according to their reported grocery purchasing pattern). *1. Are there any particular reasons why you DON'T buy (name of food)?* *2. You have indicated that you usually ONLY purchase (name of recommended product). Why do you usually buy this type of food and not (name of regular product).* *3. You have indicated that you usually ONLY purchase (name of regular product). Why do you usually buy this type of food and not (name of recommended product).* *4. You have indicated that you usually purchase both (name of recommended product) AND (name of regular product). Why do you usually purchase both types?* *FRUIT AND VEGETABLES* *1. Would you say that you usually purchase a wide variety of fruit/vegetables* • *If no: What things stop you purchasing a wider variety?* 2. *You have indicated that you always, or nearly always, purchase (name of fruits/vegetables) and rarely or never purchase (names of fruits/vegetables). Can you please tell me why you make these particular choices.*

RQ= Research Question

7.6 PREPARATION FOR ANALYSES

Prior to conducting the analyses respondents were assigned an interview number at random (ranging 0=60). This data set was then saved and a new copy was created with the variable denoting socioeconomic position removed. This allowed all data analyses to be conducted blind and for the socioeconomic data to then be re-introduced later to allow socioeconomic comparisons to be made.

7.7 PROCESS OF DATA ANALYSES FOR EACH RESEARCH QUESTION

7.7.1 Research Question 1.

Do socioeconomic groups differ in terms of their food purchasing?

This research question sought to determine whether there were socioeconomic differences in food purchasing among this sample, to warrant investigation of psychosocial factors as potential contributors to such differences. Due to the nature of the data on this outcome, this research question was addressed using a quasi-quantitative approach wherein analyses were solely based on counts of the number of respondents in each food purchasing category.

With regard to the three grocery foods considered, the proportion of respondents in each of the purchasing categories 'do not purchase', purchase 'exclusively regular', purchase 'exclusively recommended' and 'mixed' purchase were compared across socioeconomic groups. With regard to fruit and vegetable purchasing the proportion of respondents in each of the purchasing categories 'do not purchase vegetables/fruit', 'purchased a wide variety of vegetables/fruit', 'do not purchase a wide range of vegetables/fruit' was compared across socioeconomic groups. Due to the small sample size no statistical tests were performed to assess whether differences between groups were statistically significant.

7.7.2 Research Questions, 4 and 6.

Do socioeconomic differences in psychosocial factors appear to contribute to inequalities in food purchasing?

How do socioeconomic groups differ with regard to psychosocial factors implicated in food purchasing inequalities?

In contrast to the quantitative analyses, research questions were not strictly addressed in a consecutive order in the qualitative analyses. Rather the analyses involved an iterative process where research questions were revisited several times and in relation to entire transcripts or specific components of them. Therefore, the analyses used to address the research questions (and the corresponding results) are described together, rather than separately, in contrast to the presentation of the quantitative methods.

7.8 DEFINITION OF TERMS AND DESCRIPTION OF, AND RATIONALE FOR, THE ANALYTICAL APPROACH USED

Some technical language pertaining to qualitative analyses will be defined before describing the analytical approach used. Terms used are based on those described by Braun and Clarke [463]. The term 'data excerpt' is used to refer to sections of a transcript reflecting the comments of an individual respondent. The term 'code' is used to describe a concept represented in the data excerpt. The term 'theme' is used to describe several codes that are grouped together to represent a common pattern or sentiment.

The qualitative analytical methods applied in this PhD research involved identifying and describing general patterns (or 'themes') in the data. This technique is commonly known as a 'bottom-up', 'thematic' or 'inductive' approach [464]. Rather than constituting a separate method such as grounded theory or ethnography, thematic analyses represents a process used by researchers (who may or may not be using one of the aforementioned approaches), to gain insight regarding a given research area [465]. As noted by Quinn Patton (2001), through the process of thematic analyses,

"categories or dimensions of analysis emerge from open-ended observations as the inquirer comes to understand patterns that exist in the phenomenon being investigated"[464] (p56).

Thematic approaches to data analyses have been used previously in studies investigating the dietary behaviour of those of low SEP [236, 243] or socioeconomic differences in diet-related behaviour [61]. A thematic analysis was deemed the most suitable approach to address the research questions of this thesis and in particular, to generate

information in a format able to be readily interpreted and applied in a public health context. The thematic analyses specifically allowed psychosocial themes influencing food purchasing to be identified, described and compared across socioeconomic groups.

The coding approach used in this thesis is known as 'open coding', distinct from other kinds of coding in that it is determined primarily by the data, rather than findings from previous data analyses or being theory driven [465]. The coding process searched for both explicit and implicit meaning and feeling provided in responses. Therefore, the analyses could be seen in some regards as akin to both 'content' and 'ethnographic' analyses, a combination found to be useful in previous studies investigating the contribution of psychosocial factors to food choices [193]. As described by Wilkinson [466].

"Content analysis produces a relatively systematic and comprehensive summary or overview of the data set as a whole, sometimes incorporating a qualitative element, whereas ethnographic analysis is more selective typically addressing the issues of 'what's going on' between the participants in some segment (or segments) of the data, in greater analytical depth or detail" (p182-183).

Both of these qualities of the analyses were important in assessing whether and how psychosocial factors were related to socioeconomic differences in food choices in this PhD investigation.

The themes generated from the analyses represented both explicit and implicit meaning derived from the text by the candidate. In addition to developing codes to represent psychosocial themes, additional codes were created to reflect the nature of language used by respondents (e.g. the use of lay language or technical-medical or nutrition-related terms). Other distinctions between responses that arose from reviewing the transcripts led to additional themes and codes being created, for example, whether comprehensive responses were given compared to single word responses. As noted previously, socioeconomic data were removed at the outset of analyses. Therefore, all themes identified were generated blind to the socioeconomic position of respondents, with comparison across socioeconomic groups being the final step in the analyses.

A feature of thematic analyses useful for assessing socioeconomic differences in psychosocial factors was the capacity to conduct counts of themes. In addition to qualitative differences in the messages expressed across socioeconomic groups, counts enabled an assessment of whether particular themes or sub-themes were more commonly raised within some socioeconomic groups compared to others. These types of analyses highlighted apparent differences in the salience of certain themes across socioeconomic groups. Counts have been previously used in studies investigating the determinants of food choices [467] and have been noted as providing useful supporting evidence for a researcher's conclusions [468]. As one author notes, when included in the results

"counts help the reader to see how widespread phenomena are, guarding against excessive emphasis on rare things that happen to suit the researcher's preferred arguments"[469] " (p256).

The constant comparative approach was used both in the creation of codes, development of themes, comparison of socioeconomic groups, and ultimately in drawing final conclusions from the data. The constant comparison approach is often considered fundamental in qualitative research as meaning is derived from making comparisons, be these between all data attributed to an individual, within groups of individuals, between groups of individuals or between data sets [470]. As described by Wolfe et al. (2003) the constant comparative approach enables interpretation of meaning, examination of emergent themes and generation of conclusions.

In this PhD research, the constant comparison technique was used to repeatedly compare within and between groups of individuals belonging to each of the three socioeconomic groups considered. Comparisons were also made with regard to the purchase of several different types of food to see if the relationships observed between SEP, psychosocial factors, and food purchasing were consistent, or whether they varied according to the type of food considered. At the broadest level, in this PhD research the constant comparisons approach was used to critically examine and contrast the quantitative and qualitative findings of this investigation.

7.9 PROCEDURE FOR THE QUALITATIVE ANALYSES

Data analysis was conducted using NVivo (version 8, 2010) software. After research question one was addressed using a quasi-quantitative approach, the remaining research questions were assessed using the following systematic approach. Relevant portions of the interviews were read and re-read by the researcher, prior to codes being generated. Codes were often revised numerous times as the data analyses progressed.

Use of the NVivo 8 (2008) data organisation package made it simple to note the components of each transcript that comprised each code, to generate sub-codes where applicable and to group codes into themes. It was endeavoured to retain respondents' own language in making codes and themes as much as possible This practice is recommended to decrease the likelihood of distorting meaning and to ensure the authenticity of the conclusions drawn from the data [452, 471]. The files constructed in NVivo 8 (2008) formed an electronic 'code-book' for this study. Some examples of how codes were derived from data excerpts and themes constructed from codes, are provided in Appendix P.

Once all responses were examined, coded, and (where applicable) grouped into themes, socioeconomic data were re-introduced to the data set. This allowed socioeconomic profiling of the respondents who reported each theme. Assessments of socioeconomic differences in psychosocial factors relevant to food purchasing were made through an iterative process of considering the frequency with which particular themes and sub-themes were mentioned across socioeconomic groups. In addition, qualitative differences in the characteristics of responses were considered across socioeconomic groups. All analyses and conclusions were continuously reviewed and revised in light of the information that arose from further analyses.

7.10 RIGOUR OF THE SFS ANALYSES

When assessing qualitative research, terms such as validity and reliability are often avoided due to the positivist connotations associated with these terms due to their use in quantitative research [472, 473]. Instead the term 'rigour' is generally used. The four types of rigour commonly evaluated in qualitative research are, theoretical rigour,

methodological (or procedural) rigour, interpretative rigour and triangulation [383]. In addition, reflexivity is also noted as an important consideration when evaluating the quality of an investigation [474].

Theoretical rigour is established by considering whether the study aims and research questions are effectively met by the research technique/s applied. In this PhD research, the qualitative analyses allowed evaluation of whether socioeconomic groups differed both in terms of their food purchasing and in terms of the psychosocial factors relevant to this behaviour. These analyses also elicited detailed information about the nature of socioeconomic differences in psychosocial factors; descriptive information which could not be obtained using quantitative methods.

Methodological rigour is apparent in the detailed documentation of research methods and analyses. This includes descriptions of the analytic process, including the questions that the data considered were derived from, and the process undertaken to assess the data including counts and thematic analyses.

Interpretative rigour was pursued by engaging a research assistant to undertake analyses of a proportion of the data considered in this investigation. The themes generated by the research assistant were consistent with those produced by the PhD candidate; however, one theme produced by the candidate was represented as two themes by the second coder. This distinction was also originally made by the candidate. However, after consideration of all responses, it was deemed (by the candidate) that the two responses had the same meaning in the context of the research; therefore, they were considered to represent a single code.

Interpretative rigour was also demonstrated by the provision of actual data excerpts to illustrate themes and conclusions generated from the data. The quotes presented in the qualitative results are provided in their original context. In instances where only part of the quote was directly relevant to the point being made, the relevant part is shown underlined. Respondent identification numbers accompany the quotes to allow assessment of whether a single respondent provided many comments or whether the provided quotes were provided by multiple respondents. The gender of the respondent

is also noted along with the quotes for transparency, as this characteristic was considered in the analyses.

The process of undertaking counts addressed a concern common to qualitative analyses, which is that quotes supporting the researcher's arguments may have been selectively chosen or that too much emphasis has been placed on sentiments that were not commonly expressed [475]. The qualitative findings were similar in some regards to those reported in the literature and in the quantitative component of this thesis. Concurrence with previous research is often noted as providing additional evidence of the rigour of the analyses performed [390, 476].

Triangulation is commonly used to demonstrate confirmability and completeness in a research enquiry [382, 473, 477]. Triangulation, was implemented through the use of both qualitative and quantitative methods in this thesis as will be demonstrated in Chapter 9 where the findings from both research components are compared and discussed.

Reflexivity pertains to the researcher's acknowledgement of their role in the research process and the necessarily subjective nature of their analyses [474]. In this study, counts were used to identify the most dominant themes expressed by respondents rather than exclusively placing credence on what the researcher deemed to be important themes. Coding was also undertaken blind to respondents' SEP in an attempt to reduce the likelihood that the researcher's knowledge of a respondent's SEP would influence the way that their response was coded. The characteristics of the researcher have an inextricable influence on the analytical process [478]. Therefore, the fact that the analyses (and double coding) were undertaken by white, middle-class females is acknowledged as potentially influencing the results obtained and conclusions drawn. The comparison of the findings of this PhD investigation with previous research in the discussion chapter provides a means of assessing the influence of this, and other potential sources of bias, unique to this investigation.

7.11 CHAPTER SUMMARY

This chapter has described the objectives of the qualitative research and the data source and analytical techniques used to achieve these aims. The following chapter presents the qualitative findings of this investigation.

Chapter 8: **Qualitative results**

8.1 CHAPTER CONTENTS

All respondents who participated in the SFS were living with a partner and were interviewed as 'couples'. Therefore, both the terms 'respondent' and 'couples' will be used throughout this chapter. This chapter commences by examining socioeconomic inequalities in food purchasing. Socioeconomic differences in psychosocial factors relevant to food choices are then described at three levels of observation. These levels pertain to respondents' broad health beliefs, the influence of health and nutrition concerns on food purchasing (in general) and the influence of psychosocial factors on the purchase of five specific foods. The chapter concludes with a summary of the results presented.

8.2 RESEARCH QUESTION 1.

Do socioeconomic groups differ in terms of their food purchasing?

8.2.1 Assessing socioeconomic differences in grocery purchasing.

In the same manner as the BFS analyses, grocery foods were classified as either 'regular' or 'recommended' according to dietary guidelines. *Table 8.1* presents the proportion of respondents across socioeconomic groups exhibiting each of the three identified purchasing patterns: exclusively regular, exclusively recommended, or mixed purchasing in relation to the purchase of bread, milk and fruit juice. A higher proportion of those in the welfare group purchased exclusively regular options across all three grocery foods compared to those of low or high SEP. Conversely, a higher proportion of those of high SEP exclusively purchased the recommended versions of all three grocery foods relative to the other socioeconomic groups. The propensity to purchase a mixture of regular and recommended food was not clearly related to SEP, but appeared to vary according to

food type, with respondents across all socioeconomic groups being more likely to purchase a mixture of bread types compared to other foods.

Table 8.1. Socioeconomic distribution of exclusively regular, exclusively recommended, and mixed purchasing patterns for each of three grocery foods.

Food Type	Socioeconomic Group	Food category % (N)		
		Exclusively Recommended	Mixed	Exclusively Regular
Bread	High (N=20)	45 (9)	40 (8)	15 (3)
	Low (N=20)	25 (5)	60 (12)	15 (3)
	Welfare (N=20)	15 (3)	55 (11)	30 (6)
Milk	High (N=20)	45 (9)	25 (5)	30 (6)
	Low (N=20)	20 (4)	40 (8)	40 (8)
	Welfare (N=20)	20 (4)	10 (2)	70 (14)
Fruit Juice[a]	High (N=20)	65 (13)	5 (1)	10 (2)
	Low (N=20)	50 (10)	5 (1)	20 (4)
	Welfare (N=20)	25 (5)	15 (3)	35 (7)

[a] Approximately 25% (n~5) of respondents in each socioeconomic group did not purchase any fruit juice (all purchased bread and milk).

8.2.2 Assessing socioeconomic differences in fruit and vegetable purchasing.

Table 8.2 shows the distribution of respondents who agreed that they purchased a wide range of fruits and vegetables. Most households reported purchasing a wide-range of vegetables (77%, N=46/60), whereas approximately half (48%, N=29/60) indicated that they purchased a wide-variety of fruit. A greater proportion of respondents of high SEP reported purchasing a wide-variety of fruit (65%) compared to those of low SEP (40%) or in the welfare sample (40%). Those of low and high SEP were more likely to report purchasing a range of fruit (~80%) compared to those in the welfare sample (65%).

Table 8.2. Self assessed variety of fruit and vegetables purchased by socioeconomic position.

	Household socioeconomic groups % (n/N)*			
	Welfare	Low	High	Whole sample
Agree wide variety of fruit purchased	40 (8/20)	40 (8/20)	65 (13/20)	48 (29/60)
Agree wide variety of vegetables purchased	65 (13/20)	80 (16/20)	85 (17/20)	77 (46/60)

*n Numerator equals number of respondents engaging in a given fruit/vegetables purchasing pattern within a particular socioeconomic group (or the whole sample in the final column).

N Denominator equals the number of respondents in the relevant socioeconomic group or the whole sample.

8.3 RESEARCH QUESTIONS 4 AND 6

Do psychosocial factors appear to contribute to socioeconomic inequalities in food purchasing?

How do socioeconomic groups differ with regard to psychosocial factors implicated in food purchasing inequalities?

8.3.1 LEVEL 1: SOCIOECONOMIC DIFFERENCES IN BROAD PERSPECTIVES ON HEALTH

Factors perceived to influence health and specifically the extent to which diet is considered in relation to health.

At the beginning of the interview, respondents were asked whether they led a healthy life and to describe the advice they would give someone about the best ways to stay healthy. *Figure 8.1* presents an overview of the themes identified in relation to these questions.

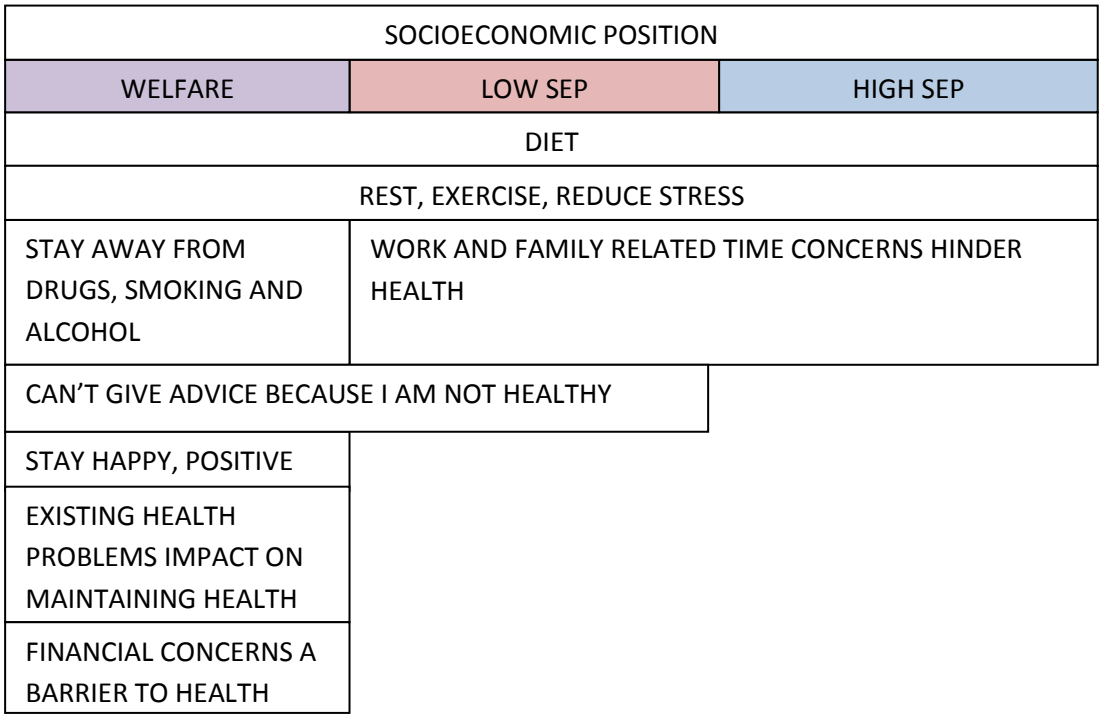


Figure 8.1. Overview of psychosocial factors noted when evaluating one's own health or in relation to the advice that would be given to others regarding the maintenance of good health.

Diet was mentioned in relation to health by a high proportion of respondents across socioeconomic groups. Most respondents when commenting on the importance of diet in relation to health mentioned consumption of fruit and vegetables specifically.

In general, socioeconomic differences were observed in instances where one or two factors dominated respondents' definitions of health. Among those of high and low SEP if a single influence was noted as dominating responses it was usually time concerns. Time concerns were expressed in relation to work and family commitments. A lack of time was reported to influence respondents' ability to manage their diet, exercise, sleep, socialisation and mental wellbeing. In contrast, time concerns were rarely raised by those in the welfare sample. Work-related time concerns were expected to be raised less frequently by those in the welfare sample since the majority of this group (all women, and 75% of men) did not work.

A number of respondents in both the welfare sample and of low SEP commented on not feeling capable of giving advice to others regarding how to stay healthy. These respondents explained they did not feel qualified to give advice because they did not feel that they were leading a healthy life themselves, especially due to being a smoker or being overweight. Several respondents in the welfare group focused on avoidance of drugs, alcohol and cigarettes in their advice on how to maintain good health. Stress was often mentioned on its own as a trigger for ill health, and also through contributing to substance abuse. Many respondents in the welfare group spoke about the need to stay happy or to stay positive in order to maintain good health.

**INTERVIEWER*
If you were asked to give advice to someone about the best ways of staying healthy, what would you tell them?

**11 WELFARE RESPONDENT*
(Male) Just keep being happy.
(Female) Just relax and enjoy yourself.
(Male) That's a good point. That's a really good point.

A number of respondents in the welfare sample expressed that particular medical issues had a major impact on their health, for example, being very overweight, diabetic, recovering from alcoholism, or being on a number of medications.

**60 WELFARE GROUP RESPONDENT*
(Male) Yes. At the moment we do (lead a healthy life). I was an alcoholic but I am recovering and it has been nine months so yes with the program I live a lot healthier.

**29 WELFARE GROUP RESPONDENT*
(Male) Reasonably healthy, yes. I could do better but I could do a lot worse, but being that I'm paralyzed and I'm taking a bit of medication, but I lead a reasonably healthy life yes.

Only respondents in the welfare sample noted financial pressure as a barrier to health in these initial questions regarding health in general. In particular finances were noted as limiting the consumption of a healthy diet.

** INTERVIEWER*
Do you think you lead a healthy lifestyle?

**38 WELFARE RESPONDENT*
(Female) Not really no. We don't go out much and we don't exercise and we are not eating right but when we are working it all goes up for a little while so it is just depending on what type, whether we are working or not so. It depends on what phase we are going through and how we live.

**42 LOW-SEP RESPONDENT*
(Male) Not really. I can't really afford to buy healthy food for the household and I smoke cigarettes.

Overall, it appeared that respondents in the welfare sample perceived a greater number of barriers to maintaining good health compared to those of higher SEP. Diet was noted as important across socioeconomic groups. However, for those in the welfare sample chronic health conditions and financial concerns appeared to hinder the extent to which these individuals could focus on obtaining a diet that they felt was conducive to good health. In addition, the admission by some respondents of low SEP and in the welfare sample that they were uncertain about how to maintain good health would presumably be a barrier to achieving this outcome.

<u>Belief in a behavioural basis for illness.</u>

Most respondents acknowledged the contribution of lifestyle factors to health, and disapproved of the assumption that health outcomes were predominantly due to bad luck or fate. The few respondents that did express largely fatalistic views towards health were either of low SEP or in the welfare group. Such views were generally made in relation to conditions with a hereditary component, with respondents presenting their belief that such conditions were unavoidable.

**INTERVIEWER:*
What do you think are the main reasons for someone to become ill? Do you think that people sometimes have themselves to blame for becoming ill?

**16 WELFARE RESPONDENT:*
(Female) It depends on what's wrong with them, <u>if it is some illness like cancer, they can't be sort of helped that's in your genes any way,</u> but if it sudden like as you said babies for instance getting chicken pox and measles or anything like that they can cause death it is the parents responsibility

A small number of respondents across socioeconomic groups focused on external influences on health such as exposure to pollution or chemicals. In addition, among some respondents in the welfare group there was a general belief in an uncaring government and corporate world that conspired against them in terms of maintaining good health.

**INTERVIEWER*
Do you think people sometimes have themselves to blame if they become ill?

**58 WELFARE RESPONDENT*
(Female) It depends a lot on the circumstances. I mean, I'm quite sure that each time a packet of cigarettes go up, that they put more nicotine in them. We all know what the government's like. Ah, it just depends on the circumstances, you know, some people – it's – you can't help it, it's society, the way everything is in life at the moment, you know?

Arguments about society being the cause of disease and other externally focused arguments were less frequently voiced by those of high SEP. One high SEP respondent articulated the reverse argument, criticising those who largely attributed their health to external circumstances and indicating that individuals should take more personal responsibility for their wellbeing.

**INTERVIEWER:*
Do you think people sometimes have themselves to blame if they become ill?

**28 HIGH SEP RESPONDENT:*
(Male) I would say in many cases yes. If you overeat, if you drink, you don't drive carefully, you do drugs, or you don't have safe sex I think they should blame themselves. But everybody in the country are blaming other people, I think everybody should take some responsibility for their behaviour.

<u>Socioeconomic differences in the ability to name diet-related conditions</u>

When respondents were asked if they felt foods played a role in their health, it was respondents in the welfare group who often interpreted this question in the most literal sense, stating that if you did not eat then you would die.

**INTERVIEWER*
Do you think the foods we eat play a role in our health?

**26 WELFARE RESPONDENT*
(Female) I'd say it plays the – it would play the biggest role in your health because if you don't eat you won't live, and if you don't live you'll die, because if you starve yourself your body is going to deteriorate so in other words, you have to have a proper diet and if you don't have a proper diet, therefore, your body is going to suffer – in some way your body suffers inside. Like your internal organs will suffer because of the lack of a diet, so therefore, I would say yes, it would have to be yes to the question.

**42WELFARE RESPONDENT*
(Male) You wouldn't be healthy if you didn't eat; you've got to eat to keep healthy. It is very important in our lifestyle. Yes it does.

Respondents were asked to name any diet-related diseases or illnesses that they were aware of. Socioeconomic groups differed in terms of the number of conditions raised, the language used to refer to conditions, and general beliefs concerning the relationship between diet and health. With regard to the number of conditions raised, while most couples together were able to name at least four diet-related conditions, some couples named less than this and these responses were classified as 'simple responses'. Approximately one third of those in the welfare sample provided simple responses when naming diet related conditions compared to less than 10% of respondents in each of the high or low socioeconomic groups.

** INTERVIEWER*
Can you name any diseases or illnesses that you think are related to the foods we eat or our diet?

**47.WELFARE RESPONDENT:*
(Female) Sugar diabetes, blood pressure has got a lot to do with food, they are the only two I think I can think of. Cholesterol.

(Interviewer) Brian can you name any disease or illness that you think is directly related to the foods we eat?

(Male) No she said them all.

Very few respondents used technical terms to refer to diet-related conditions (e.g. myocardial infarction, hypertension or glycemia) with most respondents across socioeconomic groups using lay terms. While some respondents across socioeconomic groups tended to name body parts rather than naming health conditions, twice as many of those in the welfare sample provided this type of response compared to other socioeconomic groups.

**INTERVIEWER*
Can you name any diseases or illnesses which you think are related to our diet, the foods we eat?

**01 WELFARE RESPONDENT*
(Male) Yes, definitely lungs, they're a real main one. Gall stones, naturally the heart...

When naming diet-related health conditions, those of low SEP and in the welfare sample were more likely to concentrate on conditions such as anorexia, bulimia or obesity

compared to those of high SEP. The way respondents described these conditions provided further evidence of distinct socioeconomic perspectives regarding diet and health. In particular, respondents in the lower socioeconomic groups appeared to focus on health conditions that they considered to be the consequence of having too much or too little food. In contrast, those of high SEP named a greater range of diet-related health conditions and were more likely to comment on the influence of dietary quality on health, rather than the mere presence or absence of food.

8.3.2 Level 2: Socioeconomic differences in the extent to which concern regarding particular nutrients and health concerns influenced food purchasing

Respondents were asked whether concerns about particular nutrients (salt, sugar, fat and fibre) or specific health conditions (cancer and heart disease) influenced their food purchasing. It was of interest whether respondents perceived particular barriers to taking these considerations into account when food shopping. The barriers reported across socioeconomic groups are summarised in *Figure 8.2*.

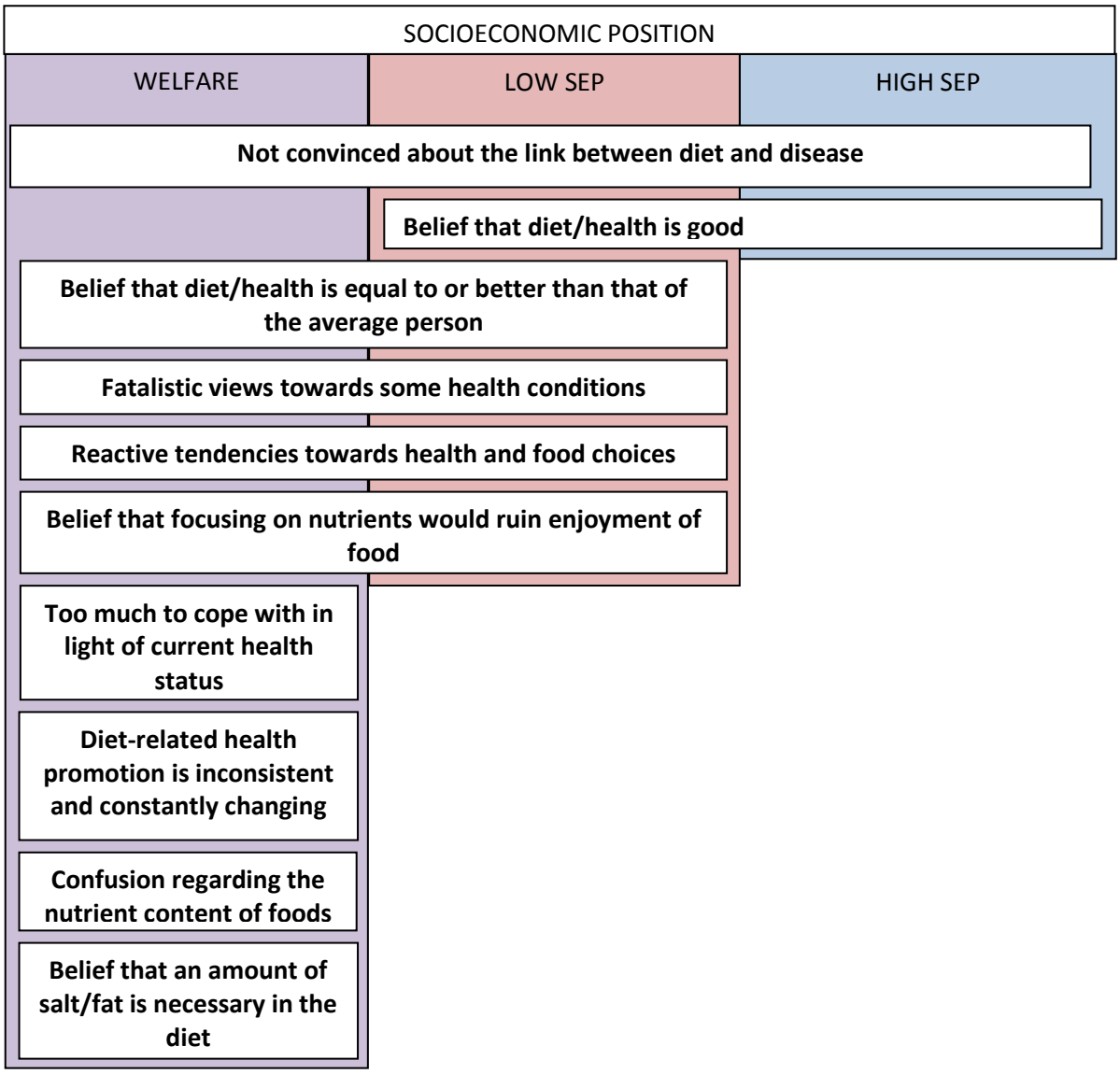


Figure 8.2. Reasons why concern regarding the nutrient content of foods or concern regarding specific health conditions did not influence food choices

Not convinced about the link between diet and disease.

To ascertain the influence of concerns regarding diet and disease, respondents were asked whether concerns about cancer or heart disease specifically influenced their food purchasing. Entire transcripts were searched for additional references to these conditions in relation to food purchasing. There was widespread confusion about the nature of the relationship between diet and cancer, so much so that this feature distinguished this disease compared to any other diet-related conditions discussed by respondents. Respondents across socioeconomic groups expressed that concerns regarding cancer did not influence their food choices because they felt specific foods had not been implicated in relation to cancer. Some indicated that when specific foods were nominated then this would alter their food purchasing.

**INTERVIEWER*
And you say you're not influenced by concerns about cancer when you're purchasing food – are there any reasons for that?

**01 WELFARE RESPONDENT*
(Female) Well, until they can actually scientifically prove there that any particular food is directly linked with cancer, no, I'm not influenced at all.
(Male) Once they've proven it we just don't buy it.

**24 HIGH SEP RESPONDENT*
(Male) I'm not aware of any food that does give you cancer.
(Female) Every food does, it depends on your degree of paranoia I believe.

Belief that diet/health is good or equal to or better than the average person

A number of those of high SEP commented that they did not think about particular nutrients or diet-related conditions when food shopping because they felt that they always adhered to a healthy diet, or were generally in good health. Those in the welfare sample expressed a variation on this theme indicating that they did not consider particular nutrients or health concerns while food shopping because they felt that their health, diet or nutrition knowledge was equal or superior to the average person. These respondents appeared to take comfort in the belief that the average person knew little about the relationship between diet and disease and this outlook was expressed as a response as to why concern regarding particular health conditions or nutrients did not influence their food choices.

**INTERVIEWER*
What about yourself, do you think the foods we eat play a role in our health?

**04 WELFARE RESPONDENT*
(Male) it's got to, isn't it. I mean, what you put in your body is a lot of… a lot of toxins stay there, stay in your body plus the lack of information because a lot of people say oh yes… polyunsaturated margarine, mono-unsaturated, you probably find 50-60-70% of people haven't got a clue what poly-unsaturated or mono-unsaturated is.

This theme provides an example of how among those of low SEP, some respondents made comments that resembled those expressed by those of high SEP while others expressed sentiments more aligned with those in the welfare group. The tendency of those of low SEP to be intermediate between the two extreme socioeconomic groups was evident throughout the transcripts in relation to most food purchasing outcomes and psychosocial factors.

Fatalistic views about conditions with a genetic component

A number of respondents in the welfare sample displayed fatalistic views about cancer expressing that they felt their only risk of cancer was through genetics. Correspondingly, these respondents indicated that concerns regarding cancer did not bother them when they were food shopping because there was no history of cancer in their family.

**INTERVIEWER*
And concerns about cancer you say you don't think about that either when purchasing food, any reason for that?

**46 WELFARE RESPONDENT*
(Female) No. Cancer doesn't run in my family so I am not worried about it.

**60 WELFARE RESPONDENT*
(Female) No. There's no one in our family…. Well my grandmother has cancer but no there's no one really suffering from cancer which is found in any food or anything like that, so generally we are healthy, and no we don't think about that.

A number of respondents in the welfare sample admitted not ever thinking about the potential link between food and disease in addition to presenting fatalistic views regarding cancer.

**04 WELFARE RESPONDENT*
(Male) No we don't think about it. If you're going to get cancer, well get it and die quick….
(Interviewer) You don't think it (cancer) is related to diet?
(Male) I've never thought about it as diet, I mean… fibre

**49 WELFARE RESPONDENT*
(Male) No, not as a rule. It doesn't enter my mind. Like, if you are going to get cancer you are going to get it. You've got to lean that way. I don't know…

(Female) They reckon there's cancer in everybody it just got to turn on itself

(Male) You get it triggered but I don't know what would cause cancer from food unless it was preservatives or something like that, but I've never ever thought of cancer, it never ever entered our heads and it's down now thanks a lot.

** 42WELFARE RESPONDENT*
(Female) I didn't know you can get cancer from foods.
(Male) No I didn't know either.

Too much to cope with in light of current health status

Several respondents in the welfare sample commented that their purchasing was strongly influenced by having a particular health condition. For example, a welfare respondent indicated that their food purchasing centred around managing diabetes, and that they did not think about other conditions that they could potentially develop (such as heart disease or cancer) when food shopping.

**INTERVIEWER*
And concerns about heart disease how does that actually work when you are shopping for food?

**04 WELFARE RESPONDENT*
(Male) No, I don't really think of … my biggest thing is diabetes that rules my life, I know diabetes is killing me so if I have a heart attack in the meantime, that's tough luck, my chip is up.

Commonly when those in the welfare sample were afflicted with a condition, it appeared that they felt they had to focus all available attention on this condition in order to manage. Under these circumstances, respondents in the welfare group did not indicate that their food purchasing was influenced by concerns regarding other conditions that they may potentially develop or be diagnosed with in the future. Some respondents in the welfare sample commented on various ailments limiting their ability to manage their diet overall, especially in instances where they were acutely unwell.

Reactive tendencies towards health and food choices

Some respondents of low SEP or in the welfare sample expressed more reactive views towards their health and dietary choices compared to those of high SEP. For example, when asked whether they considered the sugar content of foods, many respondents of low SEP or in the welfare sample noted that they would only consider this nutrient when food shopping if they were diabetic or overweight.

**INTERVIEWER*
And the amount of sugar in the food, to what extent does that influence your food choices?

**58 WELFARE RESPONDENT*
(Female) I'm a sweet tooth... I love sugar. If I had sugar diabetes I might, or if my kids had sugar diabetes I think that would influence me a lot. Something like that would have to be, you know, go horribly wrong like that for me to cut out the sugar totally'.

In contrast those of high SEP spoke about monitoring their intake of particular nutrients in terms of the routine maintainance of their health.

Focussing on nutrients would compromise my enjoyment of food

Some respondents indicated that they found it to be a burden to consider health or particular nutrients when they were food shopping. Respondents of low SEP or in the welfare group in particular commented that thinking about nutrients would ruin their enjoyment of food. This also sometimes appeared to be related to perceptions that their diet or nutrition knowledge was superior to others, or was entwined with fatalistic or reactive views towards health.

**INTERVIEWER*
And you say you don't think about cancer when you're purchasing foods, different types of foods?

**48WELFARE RESPONDENT*
(Female) You know, they don't know what causes it so if you're going to get it, you're going to get it. Why should you stop eating food for fear that you're going to get it when you could possibly get it anyway and be enjoying your food so –

**59 LOW SEP RESPONDENT*
(Male) I never thought there was a link between the two. Maybe down the track, but again I mean… because we have a very perception that our diet is healthy I mean I am not concerned about that, I think there'll be a lot of people worse than we are so… You can't spend your life worrying about these things but again I guess it is not a concern that we deal with at the moment.

Diet-related health promotion is inconsistent and constantly changing

Some respondents, particularly those in the welfare sample, expressed annoyance that diet-related health promotion appeared to be constantly changing. This sentiment generally led to respondents making purchases without consideration of health promotion messages because they found these messages to be too confusing.

**01WELFARE RESPONDENT*
(Female) Yes, you know, you get so many conflicting thingos there, oh, such and such is linked to heart disease and that, and then somebody comes along and says, no that's not linked to heart disease and cancer but that is, and that sort of jazz, so who the hell do you believe? So it doesn't worry me, I just buy it.

Confusion regarding the nutrient content of foods

Respondents were asked whether the type of fat in food, that is, saturated or unsaturated concerned them when they were shopping for food. Respondents were then asked why this was the case and whether they knew the difference between different types of fat. When entire transcripts were reviewed, 60% (N=12) of those of high SEP mentioned saturated fat independent of this question compared to only a single respondent in the welfare group (5%, N=1). In addition, while most (80%, N=16) of those of high SEP demonstrated at least a basic understanding of the differences between fat types, this was only the case for 20% (N=4) of those in the welfare sample. The comments below are examples of the detailed responses provided by some respondents of high SEP, with regard to the different types of fat contained in food, in contrast with the limited and uncertain responses of those in the welfare sample.

**31 HIGH SEP RESPONDENT*
(Female) Yes the Heart Foundation tick. The oil is a more interesting one because the saturated fats they recommend you keep well away from but some of the poly, or mono saturated fat like your olive oil, sunflower are actually good for you and fish oil actually helps combat cholesterol.

**INTERVIEWER*
And the type of fat in food, you say you don't think about that?

**58WELFARE RESPONDENT*
(Female) No. Sometimes I might say, Oh, you know, that might be a bit too greasy for the children or something – like we buy chips or something for tea, we might splurge out and get two dollars worth of chips for the kids and if there's a little bit – you know, if they're really oily, we might sort of say, well, those are a bit oily, but that's about it.

(Interviewer) Do you think you understand what the difference between saturated and unsaturated fat is?

(Female) Not really, no.

Belief that an amount of salt/fat is necessary in the diet

Respondents across socioeconomic groups expressed the need for recommended nutrients such as 'good' fats in the diet. However, some respondents in the welfare sample expressed their belief in the importance of including nutrients restricted in dietary guidelines (including saturated fat and salt) in the diet. Often these respondents expressed the sentiment that your body would inform you of what nutrients or foods were required for good health through cravings for these foods.

**INTERVIEWER*
And the type of fat in the food you say you are influenced a lot whether it is saturated or unsaturated?

**49 WELFARE RESPONDENT*
(Male). (regarding cutting fat from meat) Sometimes you need a bit of fat your body will tell you when it needs a bit of fat in the system to grease the machine so to speak.

**48 WELFARE FEMALE RESPONDENT*
(Female) I try. I don't drink, I don't smoke. I don't have sugar. I need a little bit more salt, I will admit that.

8.3.3 Level 3: socioeconomic differences in psychosocial factors influencing the purchase of five specific foods.

This section describes the psychosocial factors that influenced purchase decisions regarding five specific types of food, including three grocery foods (milk, bread and fruit juice), fruit, and vegetables. Grocery purchasing analyses were undertaken to investigate the psychosocial factors contributing to four purchasing patterns (i.e. exclusively recommended, exclusively regular, mixed purchasing or non-purchasing). Fruit purchasing analyses were undertaken to consider the purchasing patterns 'purchase a wide-variety of fruit' and 'do not purchase a wide-variety of fruit'. The vegetable purchasing patterns assessed were identical to those considered for fruit.

The results presented in this section form a summary of the psychosocial factors found relevant to any or all of the five food types considered. When a particular psychosocial factor was relevant only to specific food types, purchasing patterns, household types or household members this is noted.

Overview of the relationship between psychosocial factors and particular food types

In total 14 factors were found to influence the purchase of the five food types examined, these factors were as follows:

- Access/availability
- Habit
- Tradition
- Taste
- Influence of family members
- Cost concerns
- Waste concerns
- Weight concerns
- Convenience
- Desire for variety
- Health concerns
- Value whole form
- Versatility
- Cooking confidence

Some psychosocial factors were relevant to the purchase of all food types considered, whereas others were only associated with the purchase of particular foods. *Figure 8.3* provides some examples of psychosocial factors relevant to the purchase of one or more food types. As shown in *Figure 8.3*, the factors taste, health and cost were associated with all food choices investigated, whereas factors such as tradition and wastage concerns were only associated with particular food types.

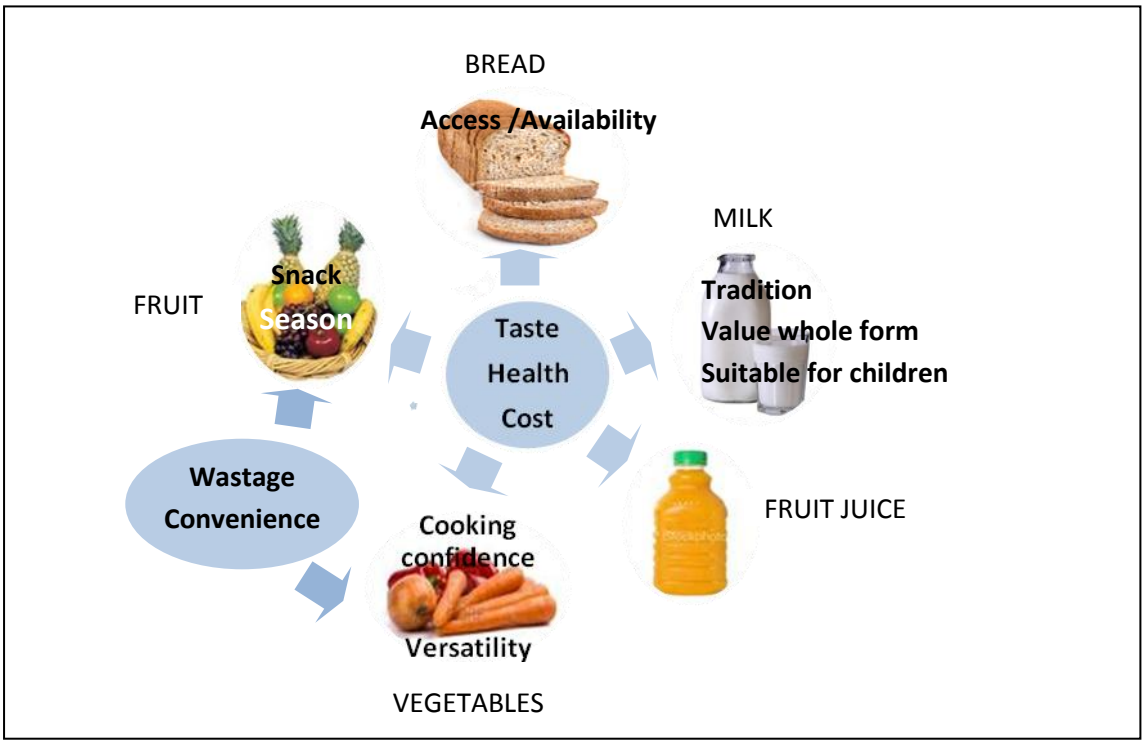


Figure 8.3. Psychosocial factors reported to influence bread, milk, fruit juice, fruit and vegetable purchasing.

Socioeconomic differences were evident in terms of the range of psychosocial factors influencing food choices, the way psychosocial factors were described and the prioritisation of psychosocial factors in food choices. The following sections describe the findings regarding each individual psychosocial factor. However, as food choices were rarely based on single factors some discussion of the interaction with other factors is provided where applicable. A summary is then provided including descriptions of how psychosocial factors appeared to operate in concert to influence food choices. Trends identified in terms of different constellations of influential factors and prioritisation of factors across socioeconomic groups are also described.

Descriptions of socioeconomic differences in psychosocial factors relevant to the selection of three specific grocery choices and selection of fruit and vegetables

Access/Availability

Access and availability were only noted as influencing grocery purchasing choices and were only reported by respondents of low SEP or in the welfare sample. In general these concerns appeared to hinder compliance with dietary guidelines. In particular respondents noted only purchasing low fat milk if this option was available at the local corner store, and selecting bread type based on what was available from charity or what was on sale due to being less fresh.

Habit

As noted previously, in the context of this research 'habit' is defined as automatic, day-to-day routine, whereas tradition is used in relation to what people consumed in childhood or in reference to traditional cultural practices. A number of respondents indicated that they were disappointed that the range of vegetables they purchased was restrained by habit. Similar proportions of respondents of high SEP (24%) and low SEP (19%) gave this response, compared to a single respondent (8%) in the welfare sample. While some respondents gave no reason for why their habit continued; those who did explain provided reasons to do with convenience or time concerns. This finding of greater concern about convenience and time among those of high and low SEP (compared to those in the welfare sample) is consistent with the former analyses

assessing broad health beliefs (Section 8.3) wherein available time was noted as having a major influence on health by many respondents of high and low SEP.

Tradition

Across the sample, traditional preferences were only observed to influence food purchasing in relation to full-cream milk and the selection of particular vegetables. Although the nature of responses was similar across socioeconomic groups, traditional preferences were mentioned by a higher proportion of those in the welfare sample. Traditional preferences raised in relation to the purchase of full-cream milk were: being from a rural background, growing up on full-cream milk and simply purchasing the kind of milk that they had always purchased.

**#11 WELFARE RESPONDENT*
(Male) I come from a farm and so does (wife's name) and we both like full-cream milk, it's great.

**58 WELFARE RESPONDENT*
(Female) I feel, you know, I sort of - we just stick to the milk that we always buy.

Previous studies have found socioeconomic differences in the influence of tradition on food choices to be demonstrated in the selection of certain vegetables [61, 93]. Specifically, compared to those of high SEP, those of low SEP were more likely to report frequently consuming vegetables used in traditional English meals (e.g. carrots, peas, pumpkin and potatoes) and were less likely to report consuming more 'novel' varieties (e.g. capsicum and eggplant) [61, 93]. Current dietary guidelines recommend consumption of a wide-range of nutritious foods without promoting any particular types of fruit or vegetables more than others [479]. However, the selection of traditional versus novel foods may be indicative of underlying food ideologies that influence the willingness to try new foods or to undertake dietary changes [480]. It is also known that particular vegetables lend themselves to particular preparation and cooking practices which may be more or less conducive to adhering to other aspects of dietary guideline recommendations (e.g. potatoes tend to be used in high fat dishes more than other vegetables [51]), therefore, a preference for these type of vegetables/dishes may hinder

adherence to some dietary guideline recommendation (e.g. to 'eat a diet low in fat') [479].

Therefore, among the 24 vegetables selected by respondents, it was examined whether there were socioeconomic differences in the purchase of, and preference for, 'traditional' types of vegetables compared to 'ethnic' or 'novel' varieties [61]. Across socioeconomic groups respondents were equally likely to indicate that they purchased traditional vegetables. Among those who purchased a limited variety of vegetables, those in the welfare sample were the least likely to indicate this was due to only liking the taste of particular traditional vegetables. Hence, traditional taste preferences did not appear to account for the limited range of vegetables purchased more commonly by those in the welfare sample. However, among those who purchased a wide-variety of vegetables, only those of low and high SEP remarked on specifically rejecting purchasing only a traditional range of vegetables. The fact that higher socioeconomic groups voiced this distinction between traditional and more novel types of vegetables may reveal greater general cognisance about food choices among these socioeconomic groups.

Socioeconomic groups were also distinguished in their traditional or progressive outlook to meal choices overall. Unlike the other food types considered (bread, milk, fruit juice and fruit), vegetables appeared to represent a core part of main meals in many households. The few respondents who articulated their philosophies on consuming traditional type meals, perhaps revealed beliefs commonly held by their respective socioeconomic groups.

** WELFARE RESPONDENT*
(Male) It has probably a lot to do with your upbringing and conditioning because it looks right to you, it looks like what mum used to cook, I must be on the right track.

** HIGH SEP RESPONDENT*
(Male) We like eating well and we have sort of travelled the world and tried different cuisines in different countries and it told us about a lot of different ways to prepare food which is interesting and healthy as well. So we try and eat in reasonably healthy ways, and we enjoy eating healthy.

Taste preferences

Respondents across socioeconomic groups expressed similar sentiments when they described their taste preferences for particular food choices. For example, those who enjoyed the taste of full-cream milk described this choice as having more flavour, while

reduced-fat milk choices were described as tasting 'like water'. Overall, approximately equal proportions of respondents across socioeconomic groups indicated that taste preferences influenced their food choices. Taste preferences were the dominant reason given for the purchase of regular grocery choices among those of high SEP.

Respondents of both low and high SEP were distinguished from those in the welfare sample by indicating that they included particular regular grocery choices in their diet as treat foods, or for particular purposes (e.g. full-cream milk for use in coffee). These respondents usually stressed that regular options were consumed infrequently or in small amounts.

> **15 HIGH SEP RESPONDENT*
> *(Female) We buy white on the weekends when we go to the bakery they've got lots of nicer breads in white bread and multi grain because I think it is good to have multi-grain during the week and we buy the loaves that you can freeze and use as required.*

In contrast, some respondents of low SEP or in the welfare sample indicated that regular products were purchased for the day-to-day use of at least one household member. Among these respondents taste was just as commonly raised as other considerations prompting regular grocery choices, such as cost concerns and the preference for tradition. Taste preferences were noted as important in the selection of fruit and vegetables for the majority of respondents who purchased a wide-variety of produce. Among those who purchased a limited-variety of fruit and vegetables, those in the welfare sample were the least likely to note taste as a barrier to purchasing a wider variety, while those of high SEP were the most likely to give this response.

In summary, while those of high SEP were the most likely to purchase recommended grocery options and to purchase a wide range of vegetables, when members of this group did not exhibit these purchasing patterns it was largely due to taste preferences. In contrast, for those of low SEP or in the welfare group, taste preferences represented only one factor among several factors that contributed equally to the lower levels of compliance with dietary guidelines exhibited by these groups.

Of particular note, while taste preferences and cost concerns were among the most commonly noted motivators of food choices by those in the welfare sample, these responses were not observed to be reported together. This indicates that less

advantaged respondents may make compromises with regard to taste in order to save money. The notion of compromising on taste to reduce costs was articulated by the following respondent from the welfare sample:

**INTERVIEWER*
Okay, and with fruit juice you say you normally buy the regular?

**11 WELFARE RESPONDENT*
(Female) Cheap. Yeah, I mainly price wise, that's why I don't buy – I like good juice but price-wise it's too dear, we usually just buy the Sunrise one, it's a big four litre one, it's only about $3 so that's mainly why – I do, I don't mind fruit juice with no added sugar but it's usually too dear.

A unique feature of those of low SEP was that this group were the most likely to report 'getting used to' the taste of recommended products and subsequently enjoying the taste. This transition was much less frequently noted among those of high SEP or in the welfare sample.

**05 LOW SEP RESPONDENT*
(Female) I can no longer drink full-cream milk, it just tastes like drinking a bucket of cream to me.

Influence of family members

The preferences of the male head of the household and children were predominantly noted as influencing the purchase of regular grocery choices. The response that regular options were selected for the male head of the household was least likely to be given by those of low SEP or in the welfare group, thus did not account for the overall greater purchase of regular options among these groups.

Among respondents with children, those of low SEP or in the welfare sample were more likely to purchase particular regular grocery choices compared to those of high SEP. In addition, those in the welfare group or of low SEP were more likely to note children's taste preferences as motivating the selection of regular grocery choices. When asked about the possibility of purchasing both regular and recommended grocery types (e.g. white and high fibre bread), these respondents generally commented that this would be too inconvenient or costly. Allowing children to have the food that they preferred appeared to be a stress-reduction strategy for some respondents in these socioeconomic groups (low SEP or welfare). It was explained that allowing children to

have what they wanted eased tension, and sometimes parents were simply glad that children were consuming foods such as bread and milk at all.

**45 LOW SEP RESPONDENT*
(Female) I figure (child's name) doesn't need the wholemeal all the time, she gets at least white sometimes, it encourages her to have her bread.

The value placed on tradition by those of low SEP was reinforced with regard to their purchase of regular food types on account of their children. A number of respondents emphasised that they wanted their children to be brought up on what they themselves had consumed as children or continued to consume.

**56 LOW SEP RESPONDENT:*
(Female) The taste, full milk tastes nice, I don't like trim or any of those. Plus I think why should the children have the low skim milk I was brought up on full-cream milk I don't think they need to be dieting.

Women were acknowledged as the 'gatekeepers' of food in many households. The selection of regular grocery options was commonly attributed to the preferences of children and males, while women were noted as motivating the choice of recommended grocery options. In general, a greater proportion of respondents of high SEP gave this response compared to those of low SEP or in the welfare group. Few respondents articulated why recommended options were purchased for the female head of the household. When reasons were given, respondents across socioeconomic groups generally noted health or weight concerns.

Cost concerns

Cost concerns were predominantly expressed by those in the welfare group or of low SEP. When those of high SEP made comments about the cost of food, it was generally to convey feelings of unfairness in relation to the cost of recommended foods. In this vein, several respondents of high SEP commented on full-cream milk and sugar-added juice being comparatively better value for money than the recommended alternatives. These respondents of high SEP generally described reaching these conclusions by performing calculations to assess the amount of desired product obtained for the respective cost of regular and recommended options. An example of this rationale was the argument presented that the quantity of fruit juice obtained in the 35% juice (regular) product was purchased at a cheaper rate than if one was to purchase the 100% juice (recommended)

product. It appeared that these respondents of high SEP did not purchase recommended products due to these options being perceived as inferior value-for-money as opposed to not having the financial resources to purchase them.

In contrast, a proportion of those of low SEP and in the welfare sample reported not being able to afford certain recommended foods, including grocery items, fruit, and vegetables. Some of these respondents made value-for-money comparisons, but they were of a much different nature to those expressed by those of high SEP. For example, those in the lower socioeconomic groups expressed the preference to allocate money to main meal foods, ahead of foods perceived to be more discretionary such as fruit.

**38 WELFARE RESPONDENT*
(Female) With the mango and the paw paw they tend to, like $3 or $4 each sometimes and I don't believe in spending that much on a fruit, I might as well buy a kilo of meat and have a few meals out of it.

Cost concerns appeared to be particularly important to those in the welfare sample in relation to fruit and vegetable purchasing, with this factor often being noted as the main reason for purchasing a limited variety by these respondents.

**INTERVIEWER*
Again what sorts of things stop you from purchasing a wider variety?

**12WELFARE RESPONDENT*
(Female) It takes too much money.

**35 WELFARE RESPONDENT*
(Male) Financial, a lot of them are too expensive. We basically get the same and when we can afford to buy them we get something like potatoes and onions.

(Interviewer) So the ones you never get or rarely get is that because of expense again?

(Male) If it wasn't for the expense we would purchase them yes because there's a fair few things that we would enjoy. We enjoy mushrooms immensely but it is so expensive.

A cost-related theme that also appeared to hinder purchase of fruit and vegetables by those in the welfare group was a lack of cold storage or cooking equipment.

** INTERVIEWER*
Vegetables would you say you normally purchase a wide variety of vegetables?

**42WELFARE RESPONDENT*
(Female) Not really, it is still the same thing, because of the fridge situation.

(Interviewer) If you had one do you think you would purchase a wider variety?

(Male) When we get the fridge we will yes.

(Interviewer) So why is it you always purchase carrots, baked beans and potatoes?

(Female) Potatoes you don't need a fridge. And baked beans are just in a can it is more for the taste.

Some respondents of low SEP and in the welfare sample expressed concern that they could not afford to buy organic fruit and vegetables. They felt that this limited the extent to which they could maintain a healthy diet.

While cost concerns did not appear to influence all respondents of low SEP or in the welfare sample, when cost concerns were present they appeared to have a large impact on food choices. The importance of cost concerns for some members of the welfare sample was emphasised by this concern being stated repeatedly and in relation to a number of foods. Some respondents in the welfare sample reported not purchasing some types of food at all due to financial restraints. These food types were fruit and fruit juice.

**INTERVIEWER*
And you've indicated here that you never buy fruit. Why

**49 WELFARE RESPONDENT*
(Male) No we can't afford it, occasionally I'll buy (wife's name) an avocado.

Respondents in the welfare group and of low SEP reported employing numerous and varied cost-saving strategies in relation to the purchase of many of the food types examined. Specifically, those strategies that influenced the purchase of food consistent with dietary guidelines were:

- Buying regular or recommended grocery products depending on what was on special or at a reduced price due to being less fresh (e.g. day-old bread).
- Obtaining regular or recommended grocery products depending on what was available through charitable organisations.

- When the household could only afford one grocery food option, purchasing the regular choice to cater for children's taste preferences (or perceived need in relation to milk) while forgoing adult preferences for the recommended choice.
- Purchasing food in bulk. In particular, it was noted that only full-cream milk was available in a four litre option.
- Purchasing milk in powdered form so that it was able to be stored without refrigeration and so that it was lighter and easier to transport. While a number of respondents noted purchasing full-cream powdered milk, only one respondent provided a rationale for this decision. The respondent indicated that full-cream milk powder was easier to blend than the reduced-fat option. This sentiment may have been shared by other respondents in the welfare sample or of low SEP who purchased powdered milk.

Across socioeconomic groups respondents noted purchasing fruit in season in order to save costs. This response was given slightly more often by those of low SEP and in the welfare group, and the focus of buying in season was emphasised as saving expense, whereas among those of high SEP buying in season was also noted as a strategy to obtain better quality produce.

A number of additional cost saving strategies, not particularly relevant to compliance with dietary guidelines were also noted by those of low SEP or in the welfare sample. The strategies reported were: stocking up on products while on special, choosing un-branded products, shopping at discount grocery stores, buying tinned or frozen vegetables, and receiving fruit and vegetables from family or neighbours. While not obviously relevant to dietary guidelines, these additional cost saving strategies further highlight the stressful contexts in which those of lower SEP make their food purchasing decisions.

Wastage concerns

The main wastage concern expressed by respondents was that food would become inedible before they were able to consume it. A small number of respondents across

socioeconomic groups indicated that their decision to not buy both regular and recommended types of bread and milk was based on this concern.

Wastage concerns were mentioned much more commonly in relation to the purchase of fruit and vegetables than with regard to grocery items. Those of high SEP were the most likely to indicate that wastage concerns limited their purchase of fruit and vegetables. With regard to fruit purchasing this factor was mentioned by the majority of respondents of high SEP who purchased a limited range of fruit, indicating that this concern had a detrimental impact on compliance with dietary guidelines in this group. This factor was also noted among approximately one third of respondents of low SEP who purchased a limited range of fruit, but was rarely noted by those in the welfare sample.

In contrast, wastage concerns regarding vegetables were only expressed by those respondents of low and high SEP who did report purchasing a wide range of vegetables. Comments regarding wastage were in relation to specific vegetables, for example, mushrooms and sprouts, with this factor noted as the main reason why these vegetables were not frequently purchased.

Weight concerns

Weight concerns were discussed most in the context of milk purchasing. Since options of this food type predominantly differ in terms of fat content, this food is obviously relevant to weight control [481]. Respondents did not always articulate their weight concerns. However reduced-fat milk was often noted as being selected for the female head of the household, and across socioeconomic groups when a specific reason was given, this was usually weight concerns.

Some respondents of low SEP and in the welfare group suggested that alternatives to full-cream milk were only appropriate for those who were trying to lose weight and indicated that they did not choose these options because they were not trying to lose weight.

**INTERVIEWER*
You've indicated that you usually purchase full-cream milk. Can you indicate please why you purchase that particular type only and why don't you buy other types or a mixture, what is behind that choice?

**21 LOW SEP RESPONDENT*
(Male) We don't really have to watch our weight if anything I'm just border line for my height and (wife's name) is about the same so, we are not conscious… I'm conscious about getting fat but it won't happen, because I'm smoking anyway.

**52 LOW SEP RESPONDENT*
(Male)I basically drink full-cream milk for the taste and also because I'm fairly thin so I never really considered myself to have to worry about having a weight problem.

Convenience

Convenience was generally only noted in relation to fruit purchasing. Convenience concerns were reported to determine the type of fruit purchased (among wide-variety purchasers) and as limiting the amount of fruit purchased (among low-variety purchasers). In all instances, convenience was noted as important by a greater proportion of those of high SEP compared to those of low SEP. Those in the welfare sample were the least likely to express concerns about convenience. The nature of convenience concerns also differed according to SEP. Those of low and high SEP explained that they did not purchase certain fruits as they were perceived to be messy or difficult to prepare or consume. Those in the welfare sample commented on certain varieties of fruit being less convenient to store. For example, respondents commented on apples and bananas being easy to store, whereas fruits like watermelon, in addition to requiring refrigeration, took up a lot of fridge space.

** INTERVIEWER*
In this group here you say you never purchase things like peach, mandarins, grapefruits, stone fruit, and the melons, why do you never buy those?

**42 WELFARE RESPONDENT*
(Female) The melons we have no fridge again.

The final convenience issue raised by respondents was related to the convenience of fruit as a snack or specifically to take it to work or pack in school lunches. Respondents across socioeconomic groups did not differ in comments regarding the suitability of certain fruits for children. However, it was mostly those of low and high SEP who spoke about certain fruits being selected due to their suitability for taking to work or for use as a convenient snack for adults. It is understandable that those in the welfare sample did

not talk about fruit as being taken to work, since the majority were not employed (all females and 75% of males), however, fruit was generally not mentioned as being used as a snack in any context by respondents in this group.

Desire for variety

A desire for variety was noted as a motivator for the selection of a wide-variety of both fruit and vegetables by about a third of respondents who purported to purchase a wide selection of produce. This response was given by equal proportions of respondents across socioeconomic groups and responses were of a similar nature.

Health concerns

Health concerns were noted as a major motivator for the purchase of recommended grocery foods by all respondents who purchased them. The fact that lower proportions of those of low SEP and in the welfare group purchased recommended grocery options is suggestive of health concerns being less influential in the food choice decisions of these respondents.

The type of health concerns expressed regarding recommended grocery choices differed across socioeconomic groups. Among those in the welfare sample who purchased recommended fruit juice, specific health concerns were almost always noted as motivating this food choice (e.g. to manage diabetes or hyperactivity). In some instances, purchasing appeared to be reactive, for example, only purchasing 100% juice sugar-free juice when the management of diabetes was not going so well. These types of responses differed substantially to those provided by those of low and high SEP who appeared to purchase recommended products more consistently and for maintaining health in general rather than intermittently or in response to a specific health concern.

**INTERVIEWER*
And the type of fruit juice you either get the regular or the no added sugar variety, why would that be?

**03 WELFARE RESPONDENT*
(Female) Yes sometimes, it depends if I'm… like my sugar levels have been normal for a while I'll have sugar in it, but if it's been playing up I'll just get the no added sugar, it depends on my diabetes.

Of those who purchased regular grocery choices, only respondents of high SEP commented on these options not being the most healthy choice. This may be a reflection of higher levels of nutrition knowledge, or the greater salience of health in food choices, among this socioeconomic group.

Value whole form

This motivator for purchase was only given in relation to regular (full-cream) milk. A number of respondents commented that they purchased full-cream milk because of its perceived superior nutrient content compared to reduced fat milk (in general, rather than in reference to children's needs) and/or because they valued 'whole' milk. These types of responses were only given by those who exclusively purchased full-cream milk and who were of low SEP or in the welfare group.

**INTERVIEWER*
You indicated here that you normally purchase full-cream milk, what would be your reason for that rather than buying some of the other types of milk?

**#21 LOW SEP RESPONDENT*
(Female) I don't drink milk unless it is real milk.

**44 LOW SEP RESPONDENT*
(Female) Because I don't think the others have got the same nutrition in them, I think full-cream milk is proper milk, is closest you can get to milk.

The following themes were relevant to main meal choices. Vegetables were the only food type considered that were commonly discussed in relation to main meals, therefore they form the focus of this section. Vegetable purchasing was influenced by a broader range of psychosocial factors than other foods considered, likely due to the role of vegetables in main meals and the involvement of all family members, and potentially non-household members in such meals.

Versatility

Among those who noted purchasing a limited variety of vegetables, only those in the welfare sample commented on the versatility of the vegetables that they purchased as a reason for their selection. For example, respondents indicated that potatoes could be mashed, roasted or made into fried chips. This indicates that those respondents in the welfare sample may rely on some vegetables more than others. This may have

implications for health as the main vegetable that appeared to be relied upon was potatoes, a vegetable that is known to be nutritionally inferior to other types and which is often excluded in surveys of vegetable intake [482, 483].

Cooking confidence

Some vegetables listed in the questionnaire were not purchased by a large proportion of the sample; these were eggplant and Chinese greens. A number of respondents of low and high SEP commented that they did not purchase these vegetables due to not knowing how to cook them. This admission might suggest higher cooking confidence among these groups (compared to those in the welfare sample), since it implies that they felt comfortable cooking the other 19 vegetables listed.

8.4 QUALITATIVE RESULTS SUMMARY

8.4.1 Overall findings

Socioeconomic differences were observed in the selection of grocery foods and in the range of fruit and vegetables regularly purchased. In all instances, those in the highest socioeconomic group were the most compliant, while those in the welfare sample were the least compliant, with current dietary guidelines.

During the general discussion regarding the determinants of health, unique perceived barriers to health became apparent across socioeconomic groups, including time constraints for those of high and low SEP, and illness, stress and cost concerns for those in the welfare sample. Respondents detailed throughout their interviews how these factors impacted on their diet and subsequent health.

Although a high proportion of respondents across socioeconomic groups nominated diet as an essential component of good health, those in the welfare sample generally demonstrated lower levels of knowledge regarding the relationship between diet and health, compared to those of higher SEP. Those in the welfare sample and of low SEP tended to identify fewer diet-related conditions and to provide less articulate responses compared to those of high SEP. Those in the welfare sample in particular expressed confusion or surprise that particular health conditions were related to diet and felt that

they had little control over health conditions with a hereditary component. These respondents also displayed a reduced capacity to follow dietary guidelines. For example, a lower proportion of those in the welfare sample and of low SEP knew the difference between fat types (e.g. saturated versus unsaturated fats), compared to those of high SEP.

In general it appeared that those of low SEP and in the welfare sample took a more reactive view towards their diet, only paying attention to it or altering it if they experienced a health problem or felt they were at high risk of developing one. For example, many respondents in the lower socioeconomic groups explained that they were not concerned about the fat content of foods because they were 'thin' or were not 'dieting' while other respondents in this group explained that they were very concerned because they were very overweight or managing diabetes. In contrast, respondents of high SEP implied that they managed their fat intake as part of a regular strategy to maintain their health.

While some respondents across socioeconomic groups felt external causes such as air pollution or chemicals in the environment impacted on their health, only those in the welfare sample expressed the notion that society and the government were among the main contributors to ill health. Additional factors likely to contribute to the less healthy food purchasing choices of those of low SEP or in the welfare group include: the belief that their diet, health or nutrition knowledge was superior to the average person, a lack of concern regarding weight or health concerns, and confusion and subsequent disregard for diet-related health promotion.

The analyses of individual foods yielded further information regarding the contribution of psychosocial factors to inequalities in food purchasing. The psychosocial factors relevant to food purchasing inequalities differed to some extent depending on the individual food considered. A constellation of psychosocial factors was generally involved in food choices and often the factors of influence and the purchasing outcome (e.g. exclusively regular, mixed, exclusively recommended, or not purchased) differed according to SEP. The following sections describe the trends associated with regular and recommended grocery choices and fruit and vegetables choices according to

socioeconomic position. Particular attention is paid to differences in the prioritization of psychosocial factors across socioeconomic groups.

8.4.2 Prioritisation of psychosocial factors across socioeconomic groups.

Summary and prioritisation of psychosocial factors relevant to REGULAR grocery choices

The choice of regular grocery options among those of high SEP was almost always driven by taste. However, these respondents were more likely to be mixed purchasers – purchasing a recommended option in addition to a regular choice. Such respondents often described regular choices as 'treat' foods, which they consumed infrequently or in small amounts. Those of low SEP were also more likely than those in the welfare sample to be mixed purchasers and to report purchasing regular products as 'treat' foods or only for particular purposes (e.g. white bread for toast).

In contrast, those in the welfare sample were the most likely to choose regular foods exclusively or to indicate that regular choices were used for the bulk of their consumption. While taste preferences were nominated as an influential factor by a proportion of respondents in this group, generally other factors such as cost concerns or tradition were raised just as frequently in relation to the selection of regular grocery choices.

Other factors that contributed to the selection of regular food choices by some respondents of low SEP or in the welfare sample were: limited cooking appliances/storage, a perception of regular products as only being suitable for those trying to lose weight, and due to the taste preferences of children.

Summary and prioritisation of psychosocial factors relevant to RECOMMENDED grocery choices

The purchase of recommended choices was generally less complex compared to choices of regular foods. The most common motivator reported for the purchase of recommended grocery options was health concerns. Taste preferences were also noted as prompting the selection of some recommended food choices (e.g. wholemeal bread), although by fewer respondents than health concerns. The final factor of influence on recommended grocery choices was the preference of the female head of household.

While this constellation of factors was noted across socioeconomic groups by purchasers of recommended grocery options, those of high SEP were always more likely to note health concerns suggesting the greater salience of health concerns among this group compared to those of lower SEP.

Summary and prioritisation of psychosocial factors relevant to selecting a range of fruit and vegetables

Almost all respondents indicated that taste preferences promoted their purchase of fruit and vegetables. Among respondents of high SEP who purchased a limited range of vegetables, taste preferences were noted as the main barrier to expanding the range purchased. Additional barriers reported among this group included food wastage and convenience concerns. In comparison, among the welfare sample, cost concerns were commonly mentioned as the greatest barrier to selecting a wide range of fruit and vegetables. Storage concerns were also sometimes reported as limiting the purchase of fruit and vegetables by respondents in this group.

8.5 CHAPTER CONCLUSIONS

These analyses demonstrate the complexity of the relationships between psychosocial factors and socioeconomic differences in food purchasing. However, several psychosocial factors were identified as main contributors to socioeconomic differences in food purchasing, some of which may be highly amenable to change using health promotion. Broadly, the main factors that appear to contribute to the less favourable diet of those of lower SEP include, taste preferences, health concerns and orientation, nutrition knowledge and cost concerns.

Once these most influential factors have been addressed, issues that currently restrict the purchase of a healthy diet among those of high SEP including food wastage and convenience concerns, may then come to the fore for those in the lower socioeconomic groups. These factors will then require attention if the food purchasing habits of these groups are to be improved.

Chapter 9: **Discussion**

9.1 INTRODUCTION

This thesis commenced by acknowledging the broad range of health conditions associated with socioeconomic position, including cardiovascular disease, type 2 diabetes and some cancers. Diet is implicated in the aetiology of many of these conditions and hence a vast body of research has sought to establish socioeconomic differences in food and nutrient intake. In developed countries, those of low SEP are consistently found to consume diets that are the least consistent with recommendations made by public health and nutrition authorities.

The reasons for such differences in diet are under-researched and remain unclear. It was posited that investigation of the behaviours that precede food and nutrient intake (specifically food purchasing) may improve our understanding of how socioeconomic differences in food and nutrient intake and ultimately health, arise and are perpetuated.

A range of environmental influences (e.g. the proximity of food stores) have been explored as contributors to inequalities in food choices. However, research to date has mainly shown that these factors do not account for a large proportion of socioeconomic differences in food choices. This consistent finding has prompted many authors to urge consideration of other potentially relevant factors, including psychosocial factors, to better understand inequalities in food choices [11, 13, 64, 73, 75, 81-85]. Among the general population a number of psychosocial factors have been found to be important determinants of food choices [118, 189] and, therefore, would also conceivably be relevant to inequalities in food choices.

It is against this backdrop, that this PhD investigation sought to explore whether and how psychosocial factors contribute to inequalities in food purchasing with a view to better understand socioeconomic inequalities in food and nutrient intake and subsequent health inequalities.

This discussion chapter commences with a synthesis of the mixed-methods results of this PhD research and a comparison of these findings with those of previous studies. An interpretation of the main research findings will be provided, followed by an assessment of the study strengths and limitations. The chapter will conclude by presenting recommendations for future public health promotion, policy and research.

9.2 SYNTHESIS OF THE MIXED METHODS RESULTS

The key findings from this study were:

- Those of low SEP were found to make food-purchasing choices less consistent with dietary guidelines compared to those of high SEP.

- Multiple psychosocial factors differed according to SEP and appeared to contribute to socioeconomic differences in food purchasing choices.

- Associations between SEP and food choice, SEP and psychosocial factors and the mediating roles of the psychosocial factors examined differed by the socioeconomic indicator used (i.e. education or income).

9.2.1 Those of low SEP were found to make food-purchasing choices less consistent with dietary guidelines compared to those of high SEP.

Examination of both the BFS and SFS found those of low SEP to engage in food purchasing behaviour less consistent with dietary guidelines compared to those of high SEP. Specifically, a higher proportion of those of low SEP reported choosing foods higher in fat, salt and sugar and lower in fibre and selecting a more narrow range of fruit and vegetables compared to their more advantaged counterparts. These findings are consistent with the large body of research examining inequalities in food choices [13, 50, 51, 53, 54, 56, 63, 92, 95, 96, 98, 99, 101, 102, 104, 106, 110, 112, 115, 117-123]. In this PhD research, the greatest socioeconomic variation in food purchasing observed was a difference of approximately 10 points on a 100-point scale. Therefore, the magnitude of socioeconomic differences in food purchasing was also consistent with previous investigations, with researchers frequently classifying the socioeconomic differences in food choices that they observed as ‘small’, or at best ‘moderate’ [104, 122, 484-487].

No clinically meaningful socioeconomic differences in food purchasing choices have been established. However, even small differences in health promoting behaviours over time may make an important contribution to the marked socioeconomic differences in chronic health conditions that are consistently found [3, 7, 10-18, 21-24, 26-48, 488].

9.2.2 Multiple psychosocial factors differed according to socioeconomic position, and appear to contribute to socioeconomic differences in food purchasing choices.

This PhD research identified associations between multiple psychosocial factors and SEP. The qualitative and quantitative components of this enquiry generally agreed in terms of which psychosocial factors were related to SEP.

As described in the literature review, few psychosocial factors have been explored in relation to SEP in a rigorous manner across a number of studies. Nevertheless, the following tables compare the findings of previous research in this field with the mixed-methods results of this PhD investigation. *Table 9.1* presents the psychosocial factors associated with SEP in the majority of previous studies and indicates whether these factors were also associated with SEP in this PhD research.

Table 9.1 Psychosocial factors found socioeconomically graded in the literature and comparison with the findings of this PhD research.

Psychosocial factor	Associated with SEP in the majority of previous studies	Associated with SEP in the BFS	Associated with SEP in the SFS
Cost concerns	√	√	√
Health beliefs	√	NS	√
Health concerns	√	√	√
Nutrition knowledge	√	√	√

BFS The Brisbane Food Study (the quantitative data source used in this PhD investigation).
SFS The Sixty Families Study (the qualitative data source used in this PhD investigation).
NS Not studied.
√/X Associated/Not associated

The results of previous research and of this PhD research will now be discussed in relation to each psychosocial factor listed in *Table 9.1*. Explanations specific to particular psychosocial factors are noted when each factor is discussed. A summary of the explanations applicable to multiple psychosocial factors is provided in the section to follow (Section 9.3).

Cost concerns

Cost concerns were identified from the literature review as the most commonly examined psychosocial factor in relation to inequalities in food choices. All studies reviewed found those of low SEP more likely to express concerns about the cost of food compared to those of high SEP. Both the quantitative and qualitative phases of this PhD investigation concurred with these findings. This PhD research extends previous research regarding socioeconomic differences in cost concerns in six important ways.

1. The majority of previous research has assessed general food cost concerns [62, 78, 189, 194, 195, 241, 244]. This PhD research additionally considered concerns regarding the cost of healthy food and the perception that recommended food choices cost more than regular options. Those of low SEP, on average, expressed higher levels of concern regarding all three cost concern factors, compared to those of higher SEP. The only exception was the relationship between the perceived higher cost of recommended food and education.
2. All cost concern factors exhibited a greater magnitude of inequality across income groups, than across education groups. These findings emphasise how the selection of socioeconomic indicator may influence research findings. Almost half of the existing literature on cost concerns uses a socioeconomic indicator other than income [58, 77, 106, 194, 195, 244, 245], suggesting the socioeconomic differences in cost concerns may be minimised in these studies compared to those that consider income as a socioeconomic indicator.
3. The single cost concern factor associated with SEP and a food choice outcome (general cost concerns) was considered in mediation analyses and found to attenuate inequalities in food choices. Few studies have considered both cost concerns and a food choice outcome, and fewer still have employed mediation analyses. Therefore, this study provides more relevant evidence regarding the contribution of cost concerns to socioeconomic differences than what has generally been available from previous studies.
4. This study evaluated the impact of general food cost concerns on socioeconomic differences in three food choices outcomes, namely grocery, fruit and vegetable

purchasing. While this factor attenuated socioeconomic differences in all food purchasing outcome measures, differences in grocery purchasing were mediated to a greater extent than differences in either fruit or vegetable purchasing.

5. Few studies have considered whether socioeconomic groups differ in the types of cost concerns that they experience. This PhD research found qualitatively different descriptions of cost concerns to be exhibited across socioeconomic groups. For example, among those respondents who indicated that cost concerns influenced their food choices, respondents of high SEP commonly reported only purchasing particular vegetables (e.g. asparagus) while in season. In contrast, some respondents in the welfare sample, reported instances of not being able to purchase vegetables at all due to cost concerns.

   Therefore, in addition to a higher proportion of disadvantaged respondents reporting cost concerns as influencing their food choices (compared to those of high SEP), the type of cost concerns expressed by this group appeared more likely to hinder compliance with dietary guidelines in some circumstances. These findings emphasise the more complete understanding of phenomena available from the application of mixed research methods.
6. The consideration of multiple psychosocial factors in this investigation provided an indication of the relative influence of each psychosocial factor. Compared to other psychosocial factors, cost concerns were not a main attenuator of socioeconomic differences in food choices. However for some respondents in the welfare sample cost concerns dominated all food choices made.

Although cost concerns were not found to be a main contributor to socioeconomic differences in food choices in this PhD investigation, addressing this issue is still likely to alleviate socioeconomic differences in food purchasing and may be particularly important for improving food choices among some very disadvantaged respondents for which cost concerns had a profound influence on food choices.

The concept of promoting healthy foods as affordable is not new [61, 107, 189]. Research from both the US and Australia has found that even those on low incomes should be able to afford the foods promulgated in dietary guidelines [489, 490]. It has

been argued that those of low SEP could afford recommended foods if they did not spend so much of their food budget on less nutritious foods [489, 490]. For example, supermarket data suggests that those of low SEP purchased significantly more confectionery; sugar sweetened, carbonated beverages and cordials, sweet biscuits and cakes, crisps and popcorn compared to those of higher SEP [491]. It may be difficult to encourage consumers of low SEP to 'trade-in' some of their less healthy food choices for healthier options. Nevertheless it might be worthwhile to make consumers aware that healthy food may be financially obtainable if such negotiations were made [489, 490].

The concept of trading less healthy foods for more healthy options is the main premise of the current 'Swap it don't stop it' initiative launched by the Australian Government (Department of Health and Ageing) in March 2011 [492]. According to current data on food choices, those of low SEP have the greatest potential to improve their diet by 'swapping' due to this population being consistently found to be less compliant with dietary guidelines compared to their more affluent counterparts [106, 108, 110]. In a similar vein to proposing food 'trade-offs', a recent publication explored how typical dietary guidelines may be relaxed to an extent to promote culturally acceptable, nutritious and affordable food options [490]. The authors explain that some foods that are not heavily marketed in health promotion may be nutritious and affordable options, particularly for those of low income [490]. Some suggestions put forth include promoting canned or frozen fruits and vegetables, potatoes, whole eggs and certain processed foods [490].

The authors also suggest reducing concerns about obtaining sustainable, organic, foods with low glycemic indexes among those of low SEP. This is proposed to assist this population to obtain nutritionally adequate foods within their budget [490], since this population may not be able to afford to shop according to such middle-class ideals [490]. The findings of this PhD investigation support this suggestion. Several respondents of low SEP or in the welfare sample of the SFS expressed concern that they could not afford to buy organic fruit and vegetables, and that they felt this had negative implications for their health. Reassurance that non-organic produce may be equally as nutritious as organic produce [493] and that frozen or canned goods are nutritious, may be useful to

help those with low incomes to manage the quality of their diet on a restricted budget. Another possibility for health promotion may be to advise consumers that less well known and cheaper brands may be equal in terms of nutrient and calorie content when compared to more expensive, well-known brands [194].

Apart from these recommendations pertaining to reducing cost concerns, attending to structural inequalities, such as access to education, employment and income, is likely to reduce socioeconomic differences in cost concerns and their subsequent influence on inequalities in food choices [92, 245].

Health beliefs and concerns

Consistent with previous research, this PhD investigation found those of low SEP less likely to report that health concerns influenced their food choices compared to those of high SEP. In contrast to previous research, this investigation included health concerns separately in models assessing mediation, rather than including this factor in a block with other (possibly un-related) variables. The separate consideration of health concerns in this PhD research allowed a more definitive assessment of the influence of this factor on inequalities in food choices.

The results of the SFS provide some useful explanations as to why health concerns may have a less influential role in food choice decisions among those of lower SEP compared to those with higher levels of income and education. Many of these explanations relate to other psychosocial factors. For example, those of low SEP or in the welfare sample indicated that they were not influenced by health concerns when purchasing food because they perceived their diet to be adequate or because they were uncertain about the relationships between diet and health (displaying limited nutrition knowledge).

This investigation also concurred with previous research that found socioeconomic differences in health beliefs and orientation [254]. Those of low SEP, or in the welfare sample, were more likely to believe that health conditions with a hereditary component were beyond their control. These respondents were also more likely to comment on external causes of illness (e.g. the government or large corporations) compared to those of high SEP. The finding that those of low SEP perceive less personal control over their

diet and health is consistent with previous literature [95, 254-257]. It has been posited that this trend could partly due to the relative lack of autonomy that those of low SEP may experience in the workplace and in society in general; leading to a reduced sense of control with regard to many facets of their lives compared to those of higher SEP [235, 494, 495].

Nutrition knowledge

While the relationship between nutrition knowledge and food choice is contentious [49, 50, 118, 362, 496], increasing nutrition knowledge has been a focus of health promotion internationally [50, 497, 498]. The reduced compliance with dietary guidelines by those of low SEP has, in part, been attributed to lower levels of nutrition knowledge among this group [50, 57, 62, 98, 289-291]. Most studies assessing socioeconomic differences in nutrition knowledge use a composite variable reflecting all three commonly acknowledged elements of this construct (knowledge of the relationship between diet and disease, of the nutrient content of foods and of dietary guidelines). Such studies find those of lower SEP to exhibit lower levels of nutrition knowledge compared to those of higher SEP [50, 62, 76, 290]. This PhD investigation considered the impact of three components of nutrition knowledge both separately and combined.

The extent to which each nutrition knowledge component was associated with SEP was not predictive of the extent to which each element mediated socioeconomic differences in food purchasing. 'Knowledge of dietary guidelines' was the nutrition knowledge component that differed least across socioeconomic groups. 'Knowledge of nutrient sources' and 'knowledge of the diet-disease relationship' differed to a similar extent across socioeconomic groups. However, the latter factor was always the most, or equally most, influential factor in terms of reduced socioeconomic differences in food choices. Therefore, of the three nutrition knowledge components, intervening to reduce inequalities in 'knowledge of the relationship between diet and disease' may have the greatest impact on reducing inequalities in food choices.

In the qualitative analyses, those of low SEP displayed lower levels of knowledge regarding both the relationship between diet and disease and with regard to the

nutrient content of foods. For example, those of low SEP exhibited a reduced capacity to identify diet-related heath conditions and expressed greater confusion about the nutrient content of foods. These findings are consistent with previous qualitative research [293, 499].

This concludes the discussion of factors associated with SEP in the majority of studies in which they were examined. The following table (*Table 9.2*) presents factors that were not related to SEP in the majority of studies in which they were considered.

Table 9.2 Psychosocial factors not socioeconomically graded in the majority of previous studies and comparison with the findings of this PhD investigation.

Psychosocial factor	Associated with SEP in the majority of previous studies	Associated with SEP in the BFS	Associated with SEP in the SFS
Availability/Access concerns (regarding food)	X	NS	√
Convenience/Time	X	NS	√
Taste preferences	X	√	√
Nutrition concerns	X	√	√
Weight concerns	X	√	√

BFS The Brisbane Food Study (the quantitative data source used in this PhD investigation).
SFS The Sixty Families Study (the qualitative data source used in this PhD investigation).
NS Not studied.
√/X Associated/Not associated

Availability/Access concerns (regarding food)

The findings of previous studies were inconsistent in terms of whether availability or access concerns were associated with SEP. The incongruent findings appear to be due to differences in the measurement of this factor. When respondents were asked in a general sense whether access or availability concerns influenced their food choices, no socioeconomic differences were observed [61, 107, 195]. However, when respondents were asked about specific access concerns (e.g. transport or child-minding concerns) socioeconomic differences were found [58, 114, 134, 188].

Availability and access concerns were assessed in the qualitative phase of this investigation. Among the SFS sample, the only respondents to express availability or access concerns were those of low SEP or in the welfare sample. These respondents indicated that availability of grocery types at charities, corner stores or at discounted

prices determined their choice of regular or recommended grocery options. However, access or availability concerns were not raised as influencing food choices for the majority of respondents in these lower socioeconomic groups. This suggests that this factor is unlikely to be a main determinant of the observed socioeconomic differences in food purchasing choices.

Convenience or time concerns

Previous research findings have varied as to whether convenience or time concerns were found to be more influential in the food choices of those of high SEP [188, 195, 229, 233] or low SEP [189, 194], or whether no socioeconomic differences were observed [61, 78, 134]. Qualitative research provides some possible explanations for these incongruent findings, in particular such studies highlight variation in the type of convenience or time concerns experienced across socioeconomic groups [61]. This indicates that the conceptualisation and measurement of convenience or time concerns across studies is likely to influence research findings.

This PhD investigation assessed convenience or time concerns in a qualitative manner. Consistent with some previous research, those of high SEP were more likely to express that convenience or time concerns influenced their food choice decisions compared to those of lower SEP [188, 195, 229, 233]. Therefore, this factor did not appear to account for the less healthy purchasing patterns among those of lower SEP observed in this investigation.

However, in general the foods assessed in both the BFS and the SFS may not have been the most relevant to convenience/time concerns. For example, whether regular or recommended bread or milk was selected presumably would not have been influenced by time or convenience concerns. Although convenience is sometimes discussed in relation to snack foods [500], it appears to be more commonly noted in relation to main meal choices [61, 228], which were not a specific focus of this investigation. Therefore, this factor should not be dismissed with regard to socioeconomic differences in food choices based only on the findings of this PhD investigation.

Taste preferences

Of all the psychosocial factors considered in this PhD investigation, taste preferences represented the factor most consistently related to socioeconomic differences in food purchasing. However, fewer than half (3/8) of the previous studies investigating taste preferences in relation to SEP concurred with this finding. The reason why the majority of previous study findings (both quantitative and qualitative) were contrary to those of the current study is likely due to differences in the measurement of taste preferences.

All of the studies that found taste preferences to be unrelated to SEP focused on the importance of taste preferences on food choices rather than investigating reported taste preferences for specific foods. In these previous studies, respondents were asked whether or not taste influenced their food choices [61], or to rate the influence of taste on food choices [107, 189, 194, 195, 229]. In all instances respondents were asked to consider food choices in general, rather than in reference to specific foods. Even in qualitative studies, socioeconomic differences in taste preferences were not observed when this factor was referred to in a general sense [61]. By investigating the importance of taste in relation to food choices, these prior studies essentially only confirm what is already known from studies of the general population. That is, that across the community overall, taste is a major determinant of food choices [55, 78, 133, 157, 189, 193, 229, 231].

A single previous study was located that, like this PhD investigation, assessed socioeconomic differences in taste preferences by asking respondents about their liking for particular foods, rather than asking about the importance of taste in general [16]. This previous study assessed taste preferences for recommended foods (e.g. high fibre bread, reduced-fat milk) across income groups [16]. The findings of this previous study and this PhD investigation concurred in finding a greater proportion of those of high SEP to report that they liked the taste of recommended grocery food choices compared to those of low SEP [16].

The previous study considered income as an indicator of SEP and measured recommended taste preferences. This PhD investigation expanded on this research by considering dual socioeconomic indicators (income and education) and by examining

both regular and recommended taste preferences. The qualitative component of this study also extended knowledge regarding how socioeconomic differences in taste preferences might contribute to inequalities in food purchasing choices. The main findings of this PhD investigation regarding taste preferences can be summarised as follows:

- Increasing levels of income and education were associated with liking of a greater number of recommended food choices and liking fewer regular food choices.
- The observed socioeconomic differences in taste preferences mediated socioeconomic differences in food purchasing choices regardless of the socioeconomic indicator, taste preference measure (regular or recommended), or food purchasing outcome considered.
- In the qualitative analyses, taste was reported as a main contributor to food purchasing choices by a high proportion of respondents across socioeconomic groups. Therefore, the greater purchasing of recommended grocery foods by those of high SEP appeared in part to be attributable to taste preference for these options being more common among this group. Conversely, the greater purchasing of regular products among those of low SEP and in the welfare sample appeared at least in part due to greater taste preferences for these options among these socioeconomic groups.

  Also noteworthy from the qualitative analyses, was the sentiment expressed commonly by those in the welfare group that your body would 'tell you what it needs'. This was usually mentioned in relation to the consumption of nutrients recommended to be limited in dietary guidelines, such as salt or fat. This indicates that disadvantaged respondents may be unaware of the role of exposure in developing taste preferences and may instead interpret cravings for particular foods as part of a lay ideology concerning health.
- There were socioeconomic differences in the prioritisation of taste in food choices relative to other factors of influence that became apparent in the qualitative analyses. Namely, the food choices of those of high SEP were often

dominated by health or nutrition concerns, in the absence of these concerns, taste preferences dominated food choices for those of lower SEP. Some participants in the welfare group commented that they did not concern themselves with health or nutrition when food shopping as they felt this would ruin their enjoyment of food. Therefore, taste preferences appeared to override health concerns at least for some of the most disadvantaged respondents. The perception that allowing health concerns to influence purchasing decisions would compromise enjoyment of food has been previously reported in relation to those of low SEP [201].

There may be several explanations for these findings. The greater liking of recommended choices among those of high SEP may be due to the greater uptake of health promotion by this group. Since repeated exposure is known to promote liking [323, 324], those of high SEP may have been compelled by health promotion both to try, and to persevere with, recommended foods. The trajectory of trying food due to health concerns then becoming accustomed to or enjoying the taste was depicted in the comments given by many respondents of low SEP regarding 'getting used to' the taste of recommended options. This sentiment indicates that some respondents of low SEP may have adopted consumption of recommended foods relatively recently. In comparison this comment was made by very few respondents of high SEP or in the welfare sample. The omission of this comment by those of high SEP could imply that respondents in this group may have been eating recommended grocery choices for a very long time, perhaps even having grown up on them, therefore, a taste 'transition' had either not occurred or had occurred long enough ago that it was not prominent in their mind.

It follows that a 'recommended taste transition' was mentioned by very few respondents in the welfare group, since this group were the least likely to report purchasing any recommended options. These findings are consistent with research that indicates that those of high SEP tend to be the earliest adopters of new innovations before they diffuse to the rest of the population [501].

Another factor that may have influenced taste preferences through exposure is the preference among those of low SEP for traditional rather than novel food choices [61,

93]. Such preferences may have resulted in those in the welfare sample being less likely to try certain recommended foods, which may have been deemed as non-traditional by this group, such as low fat dairy products.

Nutrition concerns

In studies where respondents were asked about the importance of nutrition concerns in their food choices, generally no socioeconomic differences were observed [189, 194, 198, 283]. A single previous study was identified that, like this PhD research, considered socioeconomic differences in concern regarding specific nutrients including fat, sugar and salt [282]. The findings of the previous study and this PhD research concurred in observing those of high SEP to have greater concerns about particular nutrients when making food choices, compared to those of lower SEP.

The qualitative analyses of the SFS provided detailed information regarding how socioeconomic groups differed in terms of whether nutrition concerns were taken into account in food choices. Multiple factors were identified as barriers to considering the nutrient content of food among those of lower SEP. These barriers were largely the same as those discussed previously in relation to health concerns and comprised: a lack of nutrition knowledge, perceived adequacy of the diet and concern about compromising the enjoyment gained from consuming food by considering nutrition.

Weight concerns

Despite the acknowledged higher incidence of obesity among those of low SEP [31-41], few studies have examined socioeconomic differences in weight concerns among adults. Similar to some of the other factors presented (e.g. taste preferences and nutrition concerns), the findings on socioeconomic differences in weight concerns appeared to vary depending on how this factor was measured. Studies that asked respondents to rank the importance of weight concerns relative to other factors influencing food choices, found no socioeconomic differences in the relative importance assigned to this factor [194, 195, 197]. In contrast, studies that assessed particular aspects of weight concerns (e.g. the amount of weight gain required to notice [197]) did observe socioeconomic differences in relation to this factor [197, 351, 352].

The quantitative component of this PhD research examined the degree of concern regarding weight using a scale of importance (1–5) specifically for this factor rather than ranking its importance in relation to other factors relevant to food choices. In this context, socioeconomic differences in weight concerns were found, with those of lower income and/or with lower levels of education expressing less concern regarding their weight than their more advantaged counterparts.

Weight concerns were also considered in the qualitative data. Those of low SEP expressed more reactive tendencies with regard to controlling their weight, rather than engaging in preventative activities. These findings are consistent with previous research that finds those of low SEP to take a reactive approach towards their health in general, attending to things when and if they become a problem, rather than engaging in proactive, preventative behaviours [243]. These differences in orientation have been noted in relation to multiple behaviours relevant to health, including smoking behaviour, alcohol consumption, physical activity and diet [282].

The more reactive management of health among those of low SEP may in part be the result of living in financially precarious circumstances. Those who are under extreme financial pressure often report planning their budget for food and other essential items on a day-to-day basis [502]. It may be that this short-term outlook, often considered as necessary for survival, is then applied to many facets of life, including health maintenance.

The final table presented in this section, *Table 9.3*, lists the psychosocial factors identified in the literature review that have been considered in three or less previous studies.

Table 9.3 Psychosocial factors considered in relation to socioeconomic position in three or less studies compared with the findings of this PhD investigation.

Psychosocial factor	Associated with SEP in existing studies (Number of studies)	Associated with SEP in the BFS	Associated with SEP in the SFS
Nutrition label use	√(1), X(0)	√	√
Perceived adequacy of the diet	√ (0), X(0)	√	√
Preferences of other household members	√(2), X(1)	NS	√
Habit/Tradition	√(3), X(0)	NS	√
Food wastage concerns	√ (1), X(1)	NS	√
Access to cooking and storage facilities	√ (2), X(0)	NS	√
Social support	√ (3), X(0)	NS	X
Cooking confidence	√(2), X(0)	NS	X
Quality and freshness concerns	√ (1), X(1)	NS	X
Ethical concerns	√ (1), X(2)	NS	X
Mood	√ (3), X(0)	NS	X
Motivation	√ (2), X(0)	NS	X
'Natural' content of food	√ (1), X(1)	NS	X
Lack of control over food choices	√(1), X(0)	NS	X

BFS The Brisbane Food Study (the quantitative data source used in this PhD investigation).
SFS The Sixty Families Study (the qualitative data source used in this PhD investigation).
NS Not studied.
√/X Associated/Not associated

The BFS was designed to focus on the psychosocial factors most likely to contribute to inequalities in food choices (based on a literature review), therefore, 'nutrition label use' and 'perceived adequacy of the diet' were the only factors listed in *Table 9.3* that were examined in the BFS.

Nutrition label use

In the BFS sample, those of low SEP were approximately half as likely as those in the highest socioeconomic group to indicate that their food choices were influenced by what they read on 'food labels'. This finding is consistent with previous research reporting lower levels of label use to be associated with decreased levels of education [298, 299] or income [299]. In the present study nutrition label use was found to be a mediator of socioeconomic differences in food choices, although to a lesser extent than most other psychosocial factors considered.

The qualitative results provide insight as to why those of low SEP may be less likely to use nutrition labels. Respondents of low SEP expressed concern that health promotion

was confusing and constantly changing. These respondents also reported that focussing on the nutrient content of foods would compromise their enjoyment of food, a pleasure that was highly valued. Both of these findings are in accordance with previous research among those of low SEP [503, 504].

Perceived adequacy of the diet

Perceiving the diet to be inadequate has been noted as a fundamental prompt for dietary change [83]. While displaying dietary behaviour contrary to dietary guidelines, a high proportion of both those in the general population [505] and of low SEP specifically [83], do not identify their diets as being inadequate. The quantitative phase of this investigation found perceived adequacy of the diet to increase across increasing income groups. That is, with increasing income, respondents on average agreed to a greater extent that their 'family's diet is ok and does not need to be changed' and that 'overall my family's diet consists mainly of healthy and nutritious foods'. This factor was only associated with socioeconomic differences in fruit and vegetable purchasing and was found to attenuate socioeconomic differences with regard to each of these outcomes.

These findings suggest that across socioeconomic groups, BFS participants may have largely based their assessment of the adequacy of their diet on the range of fruit and vegetables that they purchased. It was observed that those of high SEP expressed the greatest satisfaction with their diet and purchased the greatest range of fruit and vegetables, and that those of lowest SEP expressed the least satisfaction with their diet and purchased the most narrow range of fruit and vegetables. Therefore, it appears that all socioeconomic groups were aware that fruit and vegetables form an important part of a healthy diet. Support for this assertion was also provided in the qualitative analyses with a high proportion of respondents across all socioeconomic groups noting fruit and vegetable consumption as an important contributor to good health.

While SFS respondents were not asked directly whether they were satisfied with their diet, differences were apparent in how dietary adequacy was assessed across socioeconomic groups. Those of low SEP and in the welfare sample commonly reported being content that they deemed their diet to be of equal, or superior quality to that of

the average person. The perception that one runs a lesser risk of misfortune or illness compared to their peers is known as 'optimistic bias' [506, 507]. Although previous research has found no socioeconomic differences in optimistic bias [508, 509], this PhD research suggests that those of lower SEP may have been subject to this bias to a greater extent than those of high SEP.

In addition to comparison with others, those of lower SEP also appeared to gauge the adequacy of their family's diet according to the extent to which it was similar to what they consumed as children, a diet that was commonly deemed to be optimal by this group.

Preferences of other household members

The male head of the household has been found to exert a dominant influence on food choices in households of low SEP [135]. In contrast, in this PhD investigation, males across all socioeconomic groups appeared to have a similar level of influence on household food choices. The previous research that found males to assert a dominant influence on food choices was conducted in 1988, approximately a decade earlier than the research presented in this thesis (the BFS and SFS). It may be that at the time of the earlier study household food-choice decisions had become more egalitarian between men and women in households of high SEP, while in households of low SEP male domination of food choices was still more common. In accordance with the theory of diffusion of innovation, those of high SEP are often the first to embark on new trends, which may be technological or social [510]. By the time of the BFS and SFS the tendency for both male and female heads of the household to have a more equal influence on food choices may have become common across all socioeconomic groups.

With regard to children's preferences, this PhD investigation concurred with previous research in finding children's preferences were more likely to be taken into account in households of lower SEP [77, 499]. Often this was described by respondents as a stress reduction strategy. It is commonly noted that those of low SEP may experience higher levels of emotional problems [511] and stress [60, 512, 513] and have less coping skills and resources available to deal with these issues [512]. Studies of the general population

frequently find stress to be associated with behaviour less conducive to good health, such as smoking [514, 515] consumption of alcohol [514], and food choices that are less conducive to good health [516]. It may then follow that those of low SEP are more likely to engage in risky health behaviours as a means of coping with their higher levels of both long term and daily stress. Studies conducted among those of low SEP support this notion [517, 518].

Women are often considered as the 'gatekeepers' of food entering a household [133-135, 188, 225], however, it may be that women are not always aware of their influence in this role. Particularly in households of low SEP that are found to be more permissive of children's preferences, it may be worthwhile reinforcing to women that they may be able to manage and improve the diet of their household to a greater extent than they realise.

Dietary inequalities are observed at all points of the life course and are known to correspond with age-specific socioeconomic inequalities in health (e.g. among school-aged children the poor diet of those of low SEP is associated with higher rates of dental caries, compared to those of high SEP [7]). This context reinforces the value of directing health promotion (regarding psychosocial factors relevant to diet) towards multiple household members who may collectively occupy multiple different stages of the life course [133, 519-521].

Habit and tradition

Consistent with previous studies, analyses of the SFS found habit and tradition to influence the food choices of those of lower SEP to a greater extent than those of high SEP [78, 194, 195]. The greater value placed on consuming what they have always consumed is likely a barrier to those of low SEP altering their diet to include more healthy options. Many SFS respondents of low SEP and in the welfare sample expressed the sentiment that the diet they were raised on was the most conducive to good health and were therefore, motivated to emulate this diet for themselves and their children.

'Other' infrequently studied psychosocial factors

Wastage concerns were expressed most commonly in relation to fruit and vegetable purchasing. Consistent with previous research, this factor was predominantly expressed as a barrier to additional fruit and vegetable purchasing by those of high SEP [188]. Therefore, this factor did not appear to account for the more limited range of fruit and vegetables that was purchased by those of lower SEP. The paradox of those of low SEP not having enough food for their needs and those of high SEP having so much food that it causes wastage concerns has been noted by other authors [188].

Access to cooking and storage facilities were noted only among those in the welfare sample, and were attributed to a lack of financial resources by these respondents. The inclusion of a very disadvantaged group (the welfare sample) in the SFS may explain why socioeconomic differences with regard to this factor were observed in this investigation, yet were not identified in qualitative studies that appeared to consider more socioeconomically truncated samples [61]. These concerns and general cost concerns appeared to have a dominant influence on the food choices of some of the most disadvantaged respondents included in the SFS, therefore, such factors need to be addressed.

The remaining 'other' infrequently studied factors were: social support, cooking confidence, quality and freshness concerns ethical concerns, mood, motivation, 'natural' content of food, and a lack of control over food choices. None of these factors were found to distinguish socioeconomic groups in the SFS. Researchers studying 'social support' generally refer to the influence of peers, work colleagues, extended family members, friends or household members [522]. In this thesis, the preferences of other household members are discussed separately; therefore, social support is used in reference to the influence of others outside the home. It may be that because the SFS focused on household food purchasing, that outside social influences had less bearing on these choices. It has also been noted that individuals may not be cognitively aware of social influences on their food choices [523], which could also explain why this factor was not raised among SFS respondents.

The qualitative component of this study assessed a food type used in main meals, namely, vegetables. Therefore, respondents did make some references to cooking main meals. However, no socioeconomic differences in cooking confidence were apparent. Previous studies that have found socioeconomic differences in cooking confidence have asked about this factor explicitly [145, 196], which may explain why differences were observed in these studies but not in this PhD investigation. This explanation may also be relevant to why this PhD investigation did not find socioeconomic differences in freshness/quality concerns, ethical concerns, mood, motivation, 'natural' content of food, or a lack of control over food choices. Socioeconomic differences in these factors appear to have only been observed in studies where respondents were asked specifically about these factors [78, 107, 118, 194, 195].

This section (Section 9.2.2) has described how this research has extended what is currently known about the contribution of psychosocial factors to inequalities in food choices. The next section describes how the consideration of different socioeconomic indicators provides further information about the relationships pertinent to this field of research.

9.2.3 Associations between SEP and food choice, SEP and psychosocial factors and the mediating roles of the psychosocial factors examined differed by the socioeconomic indicator used (i.e. education or income).

A large body of research has investigated how the use of different socioeconomic indicators may influence the inequalities in diet and health that are observed. While income is frequently found to be the indicator most predictive of diet and health [213, 399], it is widely acknowledged that various socioeconomic indicators provide unique information relevant to our understanding of health inequalities [104, 416]. The influence of socioeconomic indicator on the observed relationships between SEP, psychosocial factors and food choices was investigated in the quantitative component of this investigation.

<u>The influence of socioeconomic indicator on observed inequalities in food purchasing choices.</u>

Grocery purchasing differed more according to household income than respondent education. This finding may be due to differences in the level of measurement of these

socioeconomic indicators. It may be expected, since food purchasing was measured at the household level, that this behaviour would be more strongly associated with the socioeconomic indicator also measured at the household level (income). It may also be that household income represents a measure that is temporally more closely related to current household food purchasing, as respondents may have acquired their highest level of education many years prior to survey participation.

The influence of socioeconomic indicator on the attenuating impact of psychosocial factors on inequalities in food purchasing choices.

In this investigation the observed socioeconomic differences in psychosocial factors differed according to the socioeconomic indicator considered. For example, general food cost concerns and taste preferences distinguished income groups to a greater extent than education groups. In the analyses of mediation, most psychosocial factors attenuated socioeconomic differences in food purchasing choices irrespective of the socioeconomic indicator considered. However, the relative mediating impact of psychosocial factors was found to differ according to the socioeconomic indicator used. The factor 'taste preferences' was a main mediator of *income* group differences across all food purchasing measures. In contrast, differences between *education groups* in addition to being party due to differences in taste preferences were equally attributable to differences in health and nutrition concerns. These findings that health and nutrition concerns had a greater impact on attenuating differences between education than between income groups is likely due to the different type of resources associated with each socioeconomic indicator. While income is more reflective of the availability of material resources [91, 399], education is more likely a reflection of the skills that would be required to be able to read, interpret, retain and apply health and nutritional information [62, 91, 399]. These results emphasise the need for health inequalities researchers to consider the multidimensional nature of SEP in order to select indicators most relevant to the constructs under study.

9.3 OVERVIEW OF EXPLANATIONS FOR THE OBSERVED RESEARCH FINDINGS

The preceding sections have outlined the key findings from this investigation regarding socioeconomic differences in food purchasing, the psychosocial factors relevant to the

observed differences and the influence of considering different socioeconomic indicators. Some explanations proposed to account for the observed findings will now be presented. These are: inequality and stress; culture, values and norms; exposure; differential uptake of health promotion; reporting bias; and optimistic bias. In the absence of research, these explanations are speculative; however, they may be useful for considering approaches to reduce inequalities in food choices.

Inequality and stress

According to the stress process (or stress paradigm), disadvantaged individuals are more likely to be exposed to stressful life circumstances and the effect of such adverse situations are compounded by having less resources to enable them to cope with this adversity compared to those of high SEP [512, 524-526]. Indulging in less healthy behaviours such as smoking, inactivity, and consumption of high fat or sugar foods may provide pleasure and relaxation among those of low SEP [60, 527]. As such, these behaviours can be seen as types of 'self medication' to allow disadvantaged individuals to regulate their mood [528, 529]. The stress process and the role of less healthy behaviours in coping may make it very difficult for those of low SEP to revise their current behaviours in exchange for healthier, often more challenging, behaviours [529]. This explanation could in part explain why in this PhD research those of lower SEP were more likely to indicate that taste preferences were paramount in the food choice decisions, compared to those of higher SEP. In further support of this notion, in contrast to those of high SEP, those of lower SEP frequently noted that their food choices were in part a reaction to managing stress, and they also commented on the role of stress in influencing their health overall.

Culture, values and social norms

Theorists such as Bourdieu posit that group membership may contribute to the values that individuals hold, the ideals that they aspire to and image that they would like to portray to others [530, 531]. Among the general population culture is often noted as an important determinant of food choices [487, 532, 533]. In the context of this PhD research, cultural differences may contribute to the observed socioeconomic differences

in several psychosocial factors including weight and health concerns, taste preferences and preferences for tradition in food choices.

Those of low SEP have been found to be less likely to delay gratification preferring immediate rewards [534, 535]. This notion is consistent with the findings of this research, in which some members of the lower socioeconomic groups indicated that they did not consider health or nutrition while food shopping as they felt this would compromise their enjoyment of food.

In addition to valuing immediate gratification, those of low SEP have been found to hold other values and beliefs that facilitate their choice of foods and nutrients recommended to be restricted in dietary guidelines [205, 487]. In the current study, examples of this were the belief held by those of low SEP that their body would 'tell' them what they needed to eat and that their children would be disadvantaged if they were not able to consume the same foods that their parents had consumed growing up. Both of these beliefs functioned to rationalise regular grocery food choices among those of low SEP.

Social norms refer to the behaviours that are sanctioned and considered common within a particular social group [536]. Socioeconomic groups are found to have different norms regarding factors important to health, for example, what is considered to be an acceptable body weight [197]. Social groups are also found to differ in their ideals regarding health, for example ideals regarding preventative health care including immunisations or dental health checks [537]. It is likely that the unique psychosocial profiles observed across socioeconomic groups in this PhD research were in part, a reflection of socioeconomically distinct norms regarding nutrition and health.

Exposure

Exposure may contribute to socioeconomic differences in a number of psychosocial factors. In relation to taste preferences, several exposures to a given food are often required in order for a preference for that food to develop [323, 538]. Trying different foods, for example, recommended versions of grocery foods or previously un-tried fruit or vegetables may be especially risky for those of low SEP who are experiencing financial hardship, since this could potentially result in food wastage [141, 539]. Those of low SEP

may also have less exposure to recommended foods by virtue of their work environment, for example, healthy food choices may be less readily available to those employed in blue collar occupations compared to those in managerial or professional roles [16].

The reduced levels of nutrition knowledge, health and weight concerns among those of low SEP may be in part due to the media preferences of this group. Such preferences may reduce exposure to information concerning nutrition and health and increase exposure to marketing for foods with less healthy nutrient profiles. A review of magazines commonly read across socioeconomic groups found that content differences were likely to contribute to the perpetuation of inequalities in food choices [540]. In particular, magazines commonly read by those of high SEP included advertising for foods that were more in accordance with dietary guidelines compared to those promoted in magazines with a readership comprising those of low SEP [540].

Across age-groups, those of low SEP are found to be higher consumers of television, compared to those of high SEP [541-543]. Although television marketing is generally found to promote less healthy food choices [544-546], this media source has been noted as an attractive and potentially cost effective means of health promotion in the general population [547, 548]. This medium has also been noted as a popular source of health and nutrition information specifically among those of low SEP [291, 549, 550], therefore, television may be an effective medium to increase exposure to accurate and adequate nutrition and health information among this population.

The internet is currently an important source of health information for those of middle and high SEP; however, usage among those of low SEP is comparatively lower [398, 551]. The disparity in internet use is likely to further exacerbate socioeconomic differences in exposure to health and nutrition information. In addition, it has been documented that quite high literacy and critical thinking skills are required in order to locate and interpret legitimate health information available on the internet [552]. Therefore, in addition to physical access to a computer and the internet, low levels of literacy and of other relevant skills may also represent barriers to those of low SEP obtaining information regarding health and nutrition from the internet.

In summary, some of the media sources that are preferred or are the most accessible to those of low SEP appear to hinder exposure to nutrition and health information among this population. While under-studied, knowledge of the channels through which those of low SEP prefer to receive information is likely to be useful to direct future strategies intended to reduce health inequalities [550]. For example, several authors have advocated the pursuit of gaining unpaid television air-time for health promotion [547, 548, 553]. This would overcome problems associated with the cost of using this medium and allow delivery of health and nutrition information in a mode that is accessible and preferred by those of low SEP.

Apart from popular media, those of low SEP are also found to prefer to obtain health and nutrition information from friends or family members as opposed to gaining information from official sources (e.g. medical doctors) [549, 554, 555]. This preference for information sources suggests that peer-based health promotion may be especially effective in increasing exposure to health information among those of low SEP.

Differential uptake of health promotion

Some of the observed socioeconomic differences in psychosocial factors may be due to the differential uptake of health promotion across socioeconomic groups. This may conceivably influence factors such as nutrition knowledge, health and weight concerns and health beliefs.

Current population-based health promotion may be delivered in a manner that is not conducive to being understood or adopted by those of low SEP. For example, if the messages delivered do not appear to come from a credible or persuasive source (for this population) or are not comprehensible to those of low SEP they are unlikely to be internalised or acted on. With regard to the first point, the credibility or persuasiveness of the message, it has been postulated that individuals are more receptive to health messages delivered by a source considered to be a peer [556]. Although peer-based health promotion strategies have been criticised for not having a theoretical basis [557] some authors have used social diffusion theory (developed by Rogers (1983) [510]) to support the use of such strategies and note that they do appear to work in practice [556,

558]. It is plausible that those of middle or upper SEP may be more likely to perceive health promotion as coming from their peers, compared to those of low SEP. Therefore, in part the delivery of health promotion, for example, the language used or the characteristics of the speaker used, may contribute to inequalities in the uptake of health promotion and subsequent socioeconomic differences observed in a number of psychosocial factors.

An investigation of the literacy required to comprehend dietary guidelines conducted in the US found that the dietary guidelines considered were written to a literacy level beyond that of many-low income individuals [424]. It has also been noted that general literacy may not equate to 'health literacy', meaning that even those with a sufficient level of general literacy may not be able to adequately interpret information specific to health and nutrition topics [549, 559]. Therefore, the lower levels of both general literacy [404, 405] and health literacy [560, 561] among those of low SEP is likely to hinder their uptake of health promotion relative to more advantaged groups.

Beyond being able to adequately comprehend health promotion messages, it is suggested that the recall and application of health promotion may also be influenced by the formal education that an individual has received [62]. Overall, difference in media usage and subsequent variation in exposure to health and nutrition information is likely to contribute to socioeconomic differences in the uptake of health promotion.

Reporting bias

The seminal work "La Distinction" by Bourdieu argues that individuals within social groups are motivated to engage in behaviours devised to distinguish themselves from social groups that they do not wish to belong to and to signify membership in their desired social group/s [530]. This concept has since been discussed in many recent publications [562-564]. The greater uptake of health promotion by those of high SEP may have led to normative pressure among this group to report particular preferences and behaviours that are in accordance with health and nutrition recommendations [16, 102]. For example, those of high SEP may feel more compelled to express a liking for recommended grocery products, or to express that they are concerned about their

weight, or the salt content of food, since these food choice considerations have all been emphasised in health promotion. Conversely, those of low SEP may have been compelled to indicate that they were not concerned about factors such as their weight or the nutrient content of foods in order to distinguish themselves according to the unique cultural values of their social group.

In this PhD investigation, even if those of high SEP did only report particular preferences and concerns due to perceived social pressure, in both phases of this study this population was found to purchase food more consistent with dietary guidelines. Therefore, irrespective of the extent to which responses were influenced by social desirability bias, or motivations for social distinction, it appears that exposure to and uptake of health promotion messages may contribute to healthier food purchasing habits.

Optimistic bias

As noted in relation to the perceived adequacy of the diet, those of low SEP may have perceived themselves as less prone to adverse nutrition or health outcomes compared to their peers. This perception could also explain why disadvantaged respondents were less likely to express health, nutrition and weight concerns. In addition, this outlook may have resulted in those of low SEP being less motivated to seek nutrition knowledge and therefore, may partially explain the lower levels of nutrition knowledge exhibited by those of low SEP.

This section has presented a number of possible explanations for the distinct psychosocial profiles observed across socioeconomic groups in this PhD research. In addition to these considerations it is evident that governments must strive to reduce structural inequalities that perpetuate disadvantage through differential access to income and education [92, 565-567]. The following sections summarise the limitations and strengths of this PhD investigation.

9.4 ASSESSMENT OF STUDY LIMITATIONS

9.4.1 Factors specific to the data examined

The questionnaire used to obtain the quantitative data examined in this PhD research, namely, the Brisbane Food Study Survey, has not been subject to formal validity testing. However, the measures do appear to have face validity and a selection of questions were found to be valid in the two validity checks conducted with portions of the BFS pilot sample and the actual BFS sample (described on page 110). The findings of this study using the BFS measures concurred with existing research on a number of well established phenomena, for example, those of low SEP were found to make less healthy food purchasing choices and to have lower levels of nutrition knowledge (compared to those of high SEP). These consistent findings provide some additional support regarding the validity of the measures used, however formal validity checks of the BFS measures would be an appropriate goal for future research.

Causal relationships cannot be established from this research due to the observational nature of the data assessed. The SFS and BFS were conducted in 1998 and 2000, respectively. The direction of socioeconomic differences in food choices appears to be stable over time. This is apparent due to the findings of this PhD research being consistent with both historic and the most current research investigating socioeconomic differences in food and nutrient intake [50, 51, 54, 102, 104, 120, 121] and food purchasing choices [13, 63, 99, 114, 355, 421].

In addition, it appears that the direction of associations between (at least the most commonly studied) psychosocial factors and SEP remain fairly stable over time. For example, for decades those of low SEP have been found to experience greater cost concerns in relation to food and lower levels of nutrition knowledge, compared to those of high SEP [135, 568]. Therefore, the psychosocial factors identified as contributing to inequalities in food choices in this investigation are unlikely to be unique to the specific time period when the BFS and SFS were conducted and hence, hold relevance for current health promotion and policy development.

9.4.2 Factors specific to the research focus

Inequalities in health are likely to arise due to many causes including differential participation in: smoking, physical activity and routine health screening in addition to food choices [7]. As such, this PhD investigation only contributes to one aspect of a large constellation of factors that contribute to health inequalities.

The BFS only considered the psychosocial factors most likely to contribute to inequalities in food choices as identified from a literature review. Therefore, the range of psychosocial factors considered in a quantitative manner was limited to 13 factors. However, this is a much larger range than what has been considered in most quantitative studies in this field. In addition, the qualitative analyses of the SFS allowed an infinite number of psychosocial factors to be assessed.

9.4.3 Factors specific to the sample

Both psychosocial factors and food choices have been found to differ according to ethnicity, cultural factors and geographic region [14, 195, 270, 569, 570]. For example, regional variation has been observed with regard to nutrition knowledge [270] and attitudes regarding diet and health [14].

Therefore, many studies of food choice behaviour have focused on specific ethnic or geographic groups such as, African Americans [125, 126], Hispanic populations [125, 571, 572] or those who live in rural areas [253, 573]. The ethnicity of respondents in the BFS and SFS was not collected, however the participants included in both studies were conducted within the Brisbane city region. Therefore, the findings of this thesis are most appropriately generalised to city dwellers. Further research that focuses specifically on population sub-groups such as Indigenous Australians or immigrant families would be useful since these groups are often found to be among the most disadvantaged in the community [574-576].

9.5 STUDY STRENGTHS

This PhD investigation has advanced knowledge regarding the contribution of psychosocial factors to socioeconomic differences in food choices in multiple ways.

9.5.1 The consideration of samples examining a range of socioeconomic groups.

As discussed previously, conventional recruitment and survey administration techniques tend to under-represent those of low SEP [397, 401]. Both the BFS and SFS employed recruitment strategies that were likely to have enhanced participation by those of low SEP. In particular, a welfare group was recruited for consideration in the SFS, and the BFS respondents were recruited through the selection of dwellings, rather than using telephone or electoral roll sampling strategies, which may exclude those of low SEP [397, 401, 453, 454].

The use of interviewer administered surveys in both studies is also likely to have facilitated the inclusion of those of low SEP, for whom literacy may have otherwise represented a barrier to participation. Therefore, both the sampling approach and the data collection methods employed in the SFS and BFS are likely to have enhanced the extent to which the most disadvantaged members of the community were represented in this research.

9.5.2 Investigation of a wide range of psychosocial factors

This investigation considered a range of psychosocial factors in relation to inequalities in food choices. This broad scope allowed a more realistic portrayal of the complexity of food choice decision that has often not been represented in previous research, particularly in studies using quantitative methods [532].

This study provided information on a number of psychosocial factors that have been infrequently explored in relation to inequalities in food choices; such factors include nutrition label use, perceived adequacy of the diet, and the preferences of other household members.

9.5.3 Alternative measurement of psychosocial factors

Many psychosocial factors examined as part of this project were measured in a more rigorous way than they have been in prior research. For example, nutrition knowledge in the quantitative data source was based on 20 questions capturing three elements of the construct, rather than the more simplistic measures used in other studies (e.g. those

that use fewer questions or differentiate respondents dichotomously with regard to this factor [76]).

The findings of this investigation also brought to the fore the importance of how psychosocial factors are measured in the context of investigating inequalities in diet and health. It became apparent from both the literature review, and the findings from this project, that often the reported importance of psychosocial factors in food choices did not differ markedly across socioeconomic groups. For example, taste was an important determinant of food choices for all respondents; however, it was the nature of taste preferences that distinguished socioeconomic groups. Therefore, this investigation provided insight into how the measurement of psychosocial factors influenced whether socioeconomic differences in these factors were detected or not. Measuring both the importance of, and the nature of, psychosocial factors in the current study provided further understanding of the conflicting findings reported in previous research. In addition, meaningful, yet previously undetected socioeconomic distinctions were able to be observed using this approach.

9.5.4 The consideration of dual socioeconomic indicators

In the quantitative analyses dual socioeconomic indicators were employed in acknowledgement that psychosocial factors may influence socioeconomic differences in food purchasing through unique, indicator specific pathways. For example, in previous analyses of the BFS conducted by Turrell et al. 2006 [62] cost concerns were found to attenuate food purchasing differences between income groups, while nutrition knowledge was found to attenuate differences between education groups. This identification of unique pathways between SEP, psychosocial factors and food choices has been recognised as important by the academic community with 75 authors citing the reference by Turrell et al. since this work was published in 2006 [577]. However it appears that no subsequent research has been conducted to further investigate this phenomenon.

This PhD investigation explored whether unique pathways were present between each of 13 psychosocial factors, two socioeconomic indicators (education and income) and

three food purchasing outcome measures (grocery, fruit and vegetable purchasing). Knowledge of the specific socioeconomic-psychosocial pathways influencing food choices, can better inform health policy and health promotion. Many authors have discussed the need for both practical and theoretical considerations to guide the selection of socioeconomic indicators [87, 89, 91, 416]. The findings of this PhD investigation provide additional support for the thoughtful selection of socioeconomic indicators to be used in health research.

9.5.5 Investigation of food purchasing choices in addition to psychosocial factors

The bulk of previous literature in this field examined whether socioeconomic groups differed in terms of psychosocial factors without also assessing food choices. Studies that did measure a food choice outcome tended to focus on a single food category, for example, fruit and vegetables [51], grocery items [355] or takeaway food [85]. This PhD investigation allowed a more comprehensive study of the contribution of psychosocial factors to inequalities in food choices by assessing several food choice outcome measures, namely, grocery, fruit and vegetable purchasing.

9.5.6 The use of modelling to consider not only the relationship between SEP and psychosocial factors, but whether this relationship attenuates food purchasing inequalities

While numerous studies have investigated the relationship between SEP and a psychosocial factor, or SEP and food choices, few have used modelling to assess the mediating impact of psychosocial factors on inequalities in food choices.

Those studies that have assessed mediation frequently had study designs or used modelling strategies that were not conducive to assessing the impact of individual psychosocial factors on inequalities in food choices. The modelling technique used in this PhD research allowed the degree of mediation associated with each psychosocial factor to be assessed, along with the extent to which the observed mediation was uniquely associated with each psychosocial factor. Models were also generated including all psychosocial factors simultaneously to ascertain their combined influence in mediating socioeconomic inequalities in food purchasing choices.

9.5.7 Consideration of potential confounding variables

Many studies of socioeconomic differences in either food choices or psychosocial factors do not take relevant demographic factors into account such as age, household size or household composition [62, 145]. The analytical methods applied to both the BFS and the SFS were devised with an awareness of demographic features that may influence the observed socioeconomic differences in food purchasing. In the quantitative analyses, results were either adjusted or stratified for particular demographic features of the respondents (including age, gender, household size and composition). In the qualitative analyses, data were assessed based on whether children were present in the household and according to respondent gender. The analyses were then reported separately when differences based on demographic features were observed.

The fact that the analyses undertaken in this thesis were subject to consideration of a range of demographic factors, is likely to have made the socioeconomic differences observed to be more accurate compared to the findings of research that did not take such factors into account.

9.5.8 The selection of data that enhanced the qualitative analyses

The qualitative data selected for secondary analysis had several advantages compared to that used in previous research. The use of in-depth interviews conducted in respondents' homes was likely to elicit more candid responses than focus groups, particularly due to the sometimes sensitive nature of dietary choices and the factors that influence them. Using both male and female heads of the household provided a verification of sorts as to why particular foods were selected. This approach also provided information regarding how food choices occurred in the context of a household.

9.5.9 The use of mixed methods for a more comprehensive examination of this topic

The mixed methods approach used in this investigation provided a triangulation in the identification of psychosocial factors that contribute to inequalities in food choices. In addition to both studies being useful for identifying factors of importance, each allowed assessment of the relative importance of factors in terms of their apparent contribution

to food choice inequalities. The qualitative investigation provided rich descriptions of the factors influential in the selection of specific types of food. This information was useful for understanding the socioeconomically distinct purchasing patterns identified in both the qualitative and quantitative analyses.

9.6 RECOMMENDATIONS FOR HEALTH PROMOTION AND POLICY

This PhD investigation concurred with previous research in finding those of low SEP to make food choices less consistent with dietary guidelines across a range of staple foods [102, 122]. The poorer diet of those of low SEP is likely to substantially contribute to health inequalities [7, 101]. Therefore, the findings of this PhD research emphasise the importance of continuing efforts to reduce inequalities in food choices.

This investigation found multiple psychosocial factors to be important determinants of food choices across socioeconomic groups. Therefore, it is suggested that these factors be taken into account in dietary health-promotion directed at the general population. Furthermore, numerous psychosocial factors were identified as contributing to socioeconomic differences in food choices. Consideration of these factors is likely to enhance the efficacy of health promotion and policy aimed to reduce diet-related health inequalities. On the basis of these findings, the following recommendations are made for health promotion directed at reducing inequalities in food choices:

9.6.1 The provision of information to raise awareness of important determinants of health and to address some values and beliefs of those of low SEP which appear to hinder food choices consistent with dietary guidelines.

This research highlighted distinct psychosocial profiles across socioeconomic groups. As discussed, these profiles are likely to be indicative of different underlying values and beliefs in relation to health and food choices across socioeconomic groups. It may be useful for health promotion to challenge some beliefs and misconceptions held by those of low SEP that do not appear conducive to meeting dietary guidelines, such as the beliefs that:

- A healthy diet is not affordable.
- A traditional diet or what you were raised with is the most conducive to good health.
- The female head of household has little control over the food consumed by other household members (particularly in relation to children).
- If a health condition has a genetic component, that lifestyle factors controlled by the individual will not alter health outcomes.
- Your body will 'tell' you what it needs.
- It is conducive to good health to have a diet that is equivalent to or better than that of the average person.
- There is no need to be concerned about your diet, weight or health unless a problem arises.

The final point is currently being addressed in the Australian government's 'Measure up campaign' [578]; this PhD research suggests that it may be especially important to convey the importance of weight management to those of low SEP. In addition to modifying beliefs, it may be useful to educate those of low SEP about how psychosocial factors are developed and about the capacity for these factors to be changed. For example, to explain that exposure to foods is important for the development of taste preferences [158, 317], or of the role of parental modelling in the development of children's food choice behaviours [579-582].

Health promotion is likely to be most effective when it is aligned with the values and belief systems of the population to which it is directed [431, 583-585]. The differential uptake of health promotion in the community has in part been attributed to discordance between the values and assumptions of health promotion makers and those of particular social and cultural groups [503]. Knowledge of the values and beliefs of particular cultural groups can be useful for couching health messages in ways that are relevant to, and motivating for, these groups [555]. For example, for cultural groups with more collectivist values, it could be emphasised that the maintenance of one's own

health will facilitate being able to care for other members of the family and the community [586]. Recent publications provide many more examples of culturally targeted health promotion, including those that are specifically relevant to those of low SEP [583, 586].

As emphasised by the use of dual socioeconomic indicators in this research, those of low SEP do not represent a homogenous group. Authors discussing the cultural adaptation of health promotion make the distinction between cultural 'targeting' as opposed to cultural 'tailoring' [586]. The former term is used in reference to strategies that address the overlying cultural characteristics of a group, whereas cultural tailoring involves customising health promotion to a much greater extent – even to individuals within a cultural group [586]. Examples of specific socioeconomic subgroups investigated in relation to culturally tailored health promotion include: pregnant adolescents [587] and the elderly [588] . While culturally tailored health promotion may be very effective, it is likely to be costly [586]. Therefore, culturally targeted health promotion may represent a cost-effective middle ground between mass public health campaigns and culturally tailored strategies [586].

The findings of this thesis may be useful for guiding culturally targeted health promotion directed towards those of low SEP. For example, in health promotion targeting those of low SEP, it may be useful to acknowledge the value placed on a traditional diet when promoting food choices consistent with dietary guidelines.

9.6.2 Improve nutrition knowledge

Nutrition knowledge across socioeconomic groups in Australia has been noted as 'high' when respondents were able to correctly answer 70% and upwards of the nutrition knowledge questions being assessed [292]. This PhD research also found respondents across all socioeconomic groups to generally be able to answer at least 70% of nutrition knowledge questions correctly. These findings imply that there is still room for improvement in terms of the nutrition knowledge of all Australians. Importantly, this PhD research concurs with two previous Australian studies in finding nutrition knowledge to mediate socioeconomic differences in food choices [76, 292]. Therefore, it

seems an important goal to improve the nutrition knowledge of all Australians, and particularly of those of low SEP if we are to reduce inequalities in food choices.

In addition to promoting the three main components of nutrition knowledge (knowledge of the relationship between diet and disease, of the nutrient content of foods and of dietary guidelines), other messages may also be particularly relevant to those of low SEP. For example, that frozen, canned and dried foods be useful in terms of achieving a nutritionally adequate diet as these can sometimes be obtained at cheaper prices than fresh produce and have some advantages in terms of storage and perishability. The acceptability of frozen and canned foods is currently promoted in the Australian Government's 'Swap it Don't Stop it' promotion, which is part of the 'Measure Up' health promotion initiative [578].

Since those of low SEP were found to be overwhelmed by current recommendations for healthy eating and to find reading nutrition labels difficult and time consuming, it could be investigated how these messages can be simplified for a disadvantaged audience.

9.6.3 Improve access to healthy food

Despite increases in the cost of food, a healthy diet is generally found to be affordable for Australians [589, 590]. However, the cost of a healthy diet may differ depending on geographic region [63, 589-591]; and obtaining a recommended diet may be especially challenging financially for those of low SEP [589, 592], or living in rural or remote areas [593, 594].

In this PhD research, across income groups, greater inequalities were observed with regard to grocery purchasing, compared to either fruit or vegetable purchasing. In Australia, over the past decade, the price of fruit and vegetables has increased proportionately more than other food types [590]. Therefore, it will be particularly important to continue to monitor and respond to inequalities in the purchase and consumption of fruit and vegetables, since these foods represent such important components of the diet [149, 595].

It has been noted that those of low SEP face relatively greater financial risk when trying new foods compared to those of high SEP, due to the possibility of food wastage [141,

539]. Therefore, government programs to increase access to recommended foods may be useful to both encourage the trial, and promote the continued selection, of recommended food options by those of low SEP. Such initiatives could include ensuring that those of low income have enough money to buy healthy food [51], lowering the cost of recommended foods [596, 597], providing vouchers to those of low SEP specifically for the purchase recommended foods [51, 598, 599] and promoting inexpensive ways to incorporate recommended foods into the diet [51]. The latter strategy is currently an inclusion of Australian Government's 'Swap it Don't Stop it' campaign [578].

9.6.4 Conclusions regarding public health recommendations.

Poor compliance with dietary guidelines is commonly observed in studies of the general population [301, 302]. In many ways it may be especially difficult for those of low SEP to meet dietary guideline recommendations compared to other population sub-groups. Many of these specific barriers have been described in this thesis. Therefore, while addressing the poor diet of those of low SEP is very important, achieving change among this population is likely to be particularly challenging [92]. Nevertheless, psychosocial factors have been found to be amenable to change in the general population and in a number of interventions directed specifically towards those of low SEP. Therefore, the modification of psychosocial factors among those of low SEP represents a promising opportunity to reduce inequalities in food choices.

Health promotion aimed to modify the psychosocial characteristics of those of low SEP should be provided in a mode and format most applicable to this population. In particular, the language used should be of an appropriate literacy or comprehension level for those of low SEP and messages should be delivered through channels suitable for this population. For example, a computer based education program may not be appropriate if the target group is not literate or does not have access to a computer. Many types of existing health promotion require literacy and numeracy; these skills are also vital for the interpretation of nutrition labels. Therefore, improving the numeracy and literacy of the population overall is likely to enhance the effectiveness of strategies aimed to improve diet quality.

9.7 RECOMMENDATIONS FOR FURTHER RESEARCH

This PhD investigation has raised some important considerations for those wishing to conduct further research in this area:

9.7.1 Employ strategies to recruit and collect data from a socioeconomically diverse sample if socioeconomic differences are of interest

Conventional sampling techniques tend to under-represent those who may not be listed on the electoral roll or do not have a telephone [397, 401, 453, 454]. Therefore, if an objective of proposed research is to make socioeconomic comparisons, care should be taken to recruit a socioeconomically diverse sample and to employ methods that will promote participation across socioeconomic groups.

9.7.2 Consider demographic factors when researching diet/health inequalities

It is important for future research and analytical methods to be designed to take into account possible demographic confounding factors. This could mean making qualitative samples more homogenous with regard to sample characteristics, for example, by only recruiting households with children, or by stratifying results according to certain characteristics. In a quantitative setting it could mean collecting data on factors such as household composition or size, and assessing whether these factor are related to both food choices and SEP. Factors meeting the criteria of confounders should be addressed appropriately in statistical analyses, that is, by being included as model covariates or by performing stratified analyses.

9.7.3 Ask respondents about psychosocial factors explicitly, and where possible anchor questions to specific foods or food types (for example, 'to what extent do you like the taste of wholemeal bread?', rather than 'To what extent does taste influence your food choices?')

Studies that ask respondents how important particular factors are in their food choices in a non-specific manner frequently do not observe socioeconomic differences in relation to these factors. However, studies that have asked about psychosocial factors in more anchored and specific terms (this PhD investigation included), do tend to observe socioeconomic differences. Therefore, researchers should be mindful of how the

conceptualisation and measurement of psychosocial factors may influence study findings.

9.7.4 Circumspect selection of socioeconomic indicator/s

This investigation, in addition to previous research in this field [62, 104], has emphasised how research findings may differ according to the socioeconomic indicator considered. The geographic region where research is undertaken often has an influence on the socioeconomic indicator selected, in part due to what is collected by government agencies and what is available from public records. For example, data on occupation is more frequently used as a socioeconomic indicator in studies conducted in the UK, while income is more commonly used in the US [104, 399, 600].

Different socioeconomic indicators have been found to be relevant at different stages of the life course (e.g. different indicators are recommended when considering adolescents [601] compared to those that are recommended when considering the elderly [602]) [90, 91]. In addition, health status is likely the result of an individual's SEP throughout their life, with factors such as maternal and paternal education, childhood living conditions and adult income and education all contributing to health outcomes over the life course, and often thought to have a cumulative effect [89-92].

Ideally, the selection of socioeconomic indicators for use in health inequalities research should be based on both pragmatic and theoretical or conceptual considerations [87, 89, 91]. The implications of the use of particular socioeconomic indicator/s should be noted in relation to the research findings [89].

9.7.5 Ensure that sample size is sufficient for the analyses undertaken

As indicated in Chapter 4, the BFS sample size was not devised to have sufficient power for hypothesis testing. The candidate performed a prospective sample-size calculation to guide the development of future studies that have the goal of assessing mediation. In order to achieve 80% power to detect mediation effects in the magnitude observed in this investigation, in the order of 8200 participants would be required. This is to use one of the most basic mediating procedures available (the Sobel test [439, 440, 443]) with a single mediator, and without adjustment for any relevant confounders or possible

design effects (clustering). Therefore future research should be planned with mindfulness of the quite large sample size that is desirable for an analysis of mediation, if this is to be undertaken.

9.7.6 Longitudinal research

Longitudinal research would be useful to improve our knowledge of how psychosocial factors develop and change and whether these processes differ according to SEP. Further information on the temporal relationships between SEP, psychosocial factors and food choices would facilitate more complex modelling scenarios in addition to generally improving our understanding of how psychosocial factors contribute to inequalities in food choices [92, 134, 213].

9.7.7 Investigate specific sub-groups among those of low SEP

Health promotion is often devised to target particular sub-groups in the community, for example, the aged [603, 604], or immigrant groups [605, 606]. Specific disadvantaged sub-groups have also been targeted in health promotion, for example, pregnant women [607], mothers of young children [608, 609] or those with a chronic illness [610, 611]. This PhD research identified some qualitative differences in food purchasing determinants between those classified as 'low SEP' compared to those respondents who were the most disadvantaged, comprising the welfare sample. Further research on the specific needs and characteristics of different disadvantaged sub-populations may be useful to target specific groups when addressing inequalities in food choices.

9.8 CONCLUSION

Reducing health inequalities is a main objective of governments and health authorities internationally [449, 612-614]. This PhD investigation affirms the persistence of socioeconomic differences in food choices, and in doing so, highlights the continued need to identify and understand the determinants of these inequalities.

An extensive literature review identified cost concerns as the most commonly studied psychosocial factor in relation to food choice inequalities. However, this investigation found cost concerns to contribute to inequalities in food choices to a relatively minor

extent compared to factors such as nutrient concerns, health concerns and beliefs, nutrition knowledge and taste preferences. The identification of taste preferences as highly relevant to socioeconomic differences in food choice is a noteworthy finding, since this factor has been largely overlooked in research investigating food choice inequalities.

Many psychosocial characteristics relevant to food choices appear to develop early in life [92, 158, 317], yet are susceptible to change over the life course [615-617]. The mechanisms through which psychosocial factors develop, change and exert an influence on food choices, remain contentious in general population studies [49, 50, 118, 362, 496], and even less is known about these issues in relation to those of low SEP specifically. This type of information would be useful in devising health promotion strategies to modify psychosocial factors both in the general population and specifically among those of low SEP. Therefore, while this PhD investigation highlights psychosocial factors that may be useful to target in health promotion directed at those of low SEP, further research is needed to establish the most effective way to do this.

As a starting point, interventions that occur early in life, involve multiple household members, and are delivered in a suitable format for those of low SEP would appear to be the most promising in terms of modifying psychosocial factors and consequently reducing inequalities in household food choices. Even in the absence of specific information regarding how psychosocial factors are generated and operate to influence food choices, a number of interventions have been devised with the goal of modifying the psychosocial characteristics of those of low SEP to promote healthy food choices [113, 599, 618-622]. Many of these programs appear to be effective, at least in the short term [599, 618, 619, 621]. These strategies tend to focus on improving the health and nutrition knowledge of those of low SEP; pursuits which this PhD research suggests are well founded. The findings of this PhD investigation also indicate that an expansion of the psychosocial factors targeted in health promotion would be appropriate. In particular, it may be useful for health promotion to address effective influences on food choices such as taste preferences, along with a variety of beliefs and values held by those of low SEP that do not appear to be conducive to healthy food choices.

Without doubt, the determinants of socioeconomic differences in food choices are multi-factorial and include environmental and broader societal factors. However, even if the barriers related to these external influences were resolved, individuals are unlikely to make healthy food choices in the absence of adequate knowledge regarding health and nutrition. In addition, knowledge alone is probably not sufficient to promote healthy food choices, unless such choices accord with an individual's core motivations, beliefs and values. Thus, psychosocial factors appear to be an integral determinant of healthy food choices. This thesis has demonstrated that a constellation of psychosocial factors are likely to be responsible for inequalities in food choices and the recognition of this complexity is likely to improve the efficacy of future health promotion efforts.

Reference List

1. *The Oxford English Dictionary. OED online,2nd edition. Oxford University Press. 2010 [cited 2011 15 June 2011]; Available from: http://dictionary.oed.com.*
2. *National Health and Medical Research Council, Dietary guidelines for Australian adults. 2003, Australian Government Publishing Service: Canberra.*
3. *Davey Smith G and E. Brunner, Socioeconomic differentials in health: The role of nutrition. Proceedings of the Nutrition Society, 1997. **56**: p. 75-90.*
4. *Oakes, J.M. and P.H. Rossi, The measurement of SES in health research: Current practice and steps toward a new approach. Social Science & Medicine, 2003. **56**(4): p. 769-784.*
5. *Lynch, J.W. and G.A. Kaplan, Socioeconomic factors, in Social epidemiology, L. Berkman and I. Kawachi, Editors. 2000, Oxford University Press: New York. p. 13-35.*
6. *Bartley, M., Health inequality: An introduction to theories, concepts, and methods. 2004, Cambridge: Polity Press.*
7. *James, W., Philip T, et al., Socioeconomic determinants of health: The contribution of nutrition to inequalities in health. British Medical Journal, 1997. **314**(7093): p. 1545-1549.*
8. *Lallukka, T., et al., Multiple socio-economic circumstances and healthy food habits. European Journal of Clinical Nutrition, 2006. **61**(6): p. 701-710.*
9. *Anderson, N.B. and C.A. Armstead, Toward understanding the association of socioeconomic status and health: A new challenge for the biopsychosocial approach. Psychosomatic Medicine, 1995. **57**(3): p. 213-225.*
10. *Australian Institute of Health and Welfare, Australia's health 2010, in Australia's health series no. 12. Cat. no. AUS 122. 2010, AIHW: Canberra.*
11. *Adler, N.E. and J.M. Ostrove, Socioeconomic status and health: What we know and what we don't. Annals of the New York Academy of Sciences, 1999. **896**(1): p. 3-15.*
12. *Taylor, R., Mediation of the effects of social and economic status on health and mortality: The roles of behaviour and constitution, in The social origins of health and wellbeing, Eckersley R, Dixon J, and D. B, Editors. 2002, Cambridge University Press: Cambridge.*
13. *Turrell, G., Structural, material and economic influences on the food-purchasing choices of socioeconomic groups. Australian and New Zealand Journal of Public Health, 1996. **20**(6): p. 611-17.*
14. *Pettinger, C., M. Holdsworth, and M. Gerber, Psycho-social influences on food choice in Southern France and Central England. Appetite, 2004. **42**(3): p. 307-316.*
15. *Turrell, G., et al., Health inequalities in Australia: Morbidity, health behaviours, risk factors and health service use, in Health Inequalities Monitoring Series. No 2 AIHW Cat . No. PHE 72. 2006, Queensland University of Technology and the Australian Institute of Health and Welfare: Canberra.*

16. *Turrell, G., Socioeconomic differences in food preference and their influence on healthy food purchasing choices. Journal of Human Nutrition and Dietetics, 1998.* ***11****(2): p. 135-149.*
17. *Smith GD, Bartley M, and B. D., The black report on socioeconomic inequalities in health 10 years on. British Medical Journal, 1990.* ***301****: p. 373-77.*
18. *Marmot, M.G., et al., Health inequalities among British civil-servants - the Whitehall-II study. Lancet, 1991.* ***337****(8754): p. 1387-1393.*
19. *Whitehead, M. and G. Dahlgren, Levelling up (part 1). A discussion paper on concepts and principles for tackling social inequities in health. 2006.*
20. *Mackenbach, J.P., et al., Socioeconomic inequalities in health in 22 European countries. New England Journal of Medicine, 2008.* ***358****(23): p. 2468-2481.*
21. *Robbins, J., et al., Socioeconomic status and diagnosed diabetes incidence. Diabetes research and clinical practice, 2005.* ***68****(3): p. 230-6.*
22. *Hu, F.B., et al., Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. New England Journal of Medicine, 2001.* ***345****(11): p. 790-797.*
23. *Mozaffarian, D., et al., Lifestyle risk factors and new-onset diabetes mellitus in older adults: The cardiovascular health study. Archives of Internal Medicine, 2009.* ***169****(8): p. 798-807.*
24. *Roberts, C.K. and R.J. Barnard, Effects of exercise and diet on chronic disease. Journal of Applied Physiology, 2005.* ***98****(1): p. 3-30.*
25. *Sims, M., et al., The socioeconomic gradient of diabetes prevalence, awareness, treatment, and control among African Americans in the jackson heart study. Annals of Epidemiology.* ***21****(12): p. 892-898.*
26. *Bennett, S., Socioeconomic inequalities in coronary heart disease and stroke mortality among Australian men, 1979 -1993. International Journal of Epidemiology, 1996.* ***25****(2): p. 266-275.*
27. *Chaturvedi, N., et al., Socioeconomic gradient in morbidity and mortality in people with diabetes: Cohort study findings from the Whitehall study and the who multinational study of vascular disease in diabetes. British Medical Journal, 1998.* ***316****(7125): p. 100-105.*
28. *Diez Roux, A., et al., Neighborhood of residence and incidence of coronary heart disease. The New England Journal of Medicine, 2001.* ***345****(2): p. 99-106.*
29. *Matthews, K.A., et al., Socioeconomic trajectories and incident hypertension in a biracial cohort of young adults. Hypertension, 2002.* ***39****(3): p. 772-776.*
30. *Erkkila, A.T., et al., Diet in relation to socioeconomic status in patients with coronary heart disease. European Journal of Clinical Nutrition, 1999.* ***53****(8).*
31. *Wardle, J., et al., Development of adiposity in adolescence: Five year longitudinal study of an ethnically and socioeconomically diverse sample of young people in Britain. British Medical Journal, 2006.* ***332****(7550): p. 1130-1135.*
32. *Healton, C.G., et al., Smoking, obesity, and their co-occurrence in the United States: Cross sectional analysis. British Medical Journal, 2006.* ***333****(7557): p. 25-26.*
33. *Kuczmarski, R.J., Prevalence of overweight and weight gain in the United States. American Journal of Clinical Nutrition, 1992.* ***55****(2): p. 495S-502.*
34. *Sobal, J. and S. J, Socioeconomic status and obesity: A review of the literature. Psychological Bulletin, 1989.* ***105****(2): p. 260-275.*

35. *Vernay, M., et al., Association of socioeconomic status with overall overweight and central obesity in men and women: The French nutrition and health survey 2006. BMC Public Health, 2009.*
36. *Giskes, K. and J. Siu, Do Australians perceive their weight status differentially and accurately? Implications for health promotion. Australian and New Zealand Journal of Public Health, 2008.* ***32****(2): p. 183-4.*
37. *Hall, K., et al., Diet, obesity and education in three age groups of Saskatchewan women. Canadian Journal of Dietetic Practice and Research, 2003.* ***64****(4): p. 181.*
38. *Ball, K., G.D. Mishra, and D. Crawford, Social factors and obesity: An investigation of the role of health behaviours. International Journal of Obesity, 2003.* ***27****(3): p. 394-403.*
39. *Dykes, J., et al., Socioeconomic gradient in body size and obesity among women: The role of dietary restraint, disinhibition and hunger in the Whitehall II study. International Journal of Obesity, 2003.* ***28****(2): p. 262-268.*
40. *Zhang Q and W. Y., Socioeconomic inequality of obesity in the United States: Do gender, age, and ethnicity matter? Social Science and Medicine, 2004.* ***58****(6): p. 1171-80.*
41. *McLaren, L., Socioeconomic status and obesity. Epidemiologic Reviews, 2007.* ***29****(1): p. 29-48.*
42. *Stamler, J., et al., Higher blood pressure in middle-aged American adults with less education - role of multiple dietary factors: The intermap study. Journal of Human Hypertension, 2003.* ***17****(9): p. 655-775.*
43. *Colhoun, H.M., H. Hemingway, and N.R. Poulter, Socio-economic status and blood pressure: An overview analysis. Journal of Human Hypertension, 1998.* ***12****(2): p. 91-110.*
44. *Wang, M.-C. and L.B. Dixon, Socioeconomic influences on bone health in postmenopausal women: Findings from NHANES III, 1988-1994. Osteoporosis International, 2006.* ***V17****(1): p. 91-98.*
45. *Avendano, M. and M.M. Glymour, Stroke disparities in older Americans: Is wealth a more powerful indicator of risk than income and education? Stroke, 2008.* ***39****(5): p. 1533-1540.*
46. *Kee, F., et al., Socioeconomic circumstances and the risk of bowel cancer in Northern Ireland. Journal of Epidemiology and Community Health, 1996.* ***50****(6): p. 640-644.*
47. *Kumar, J.R., et al., An objective assessment of demography of gallbladder cancer. Journal of Surgical Oncology, 2006.* ***93****(8): p. 610-614.*
48. *Buiatti, E., et al., A case-control study of gastric cancer and diet in Italy. International Journal of Cancer, 1989.* ***44****(4): p. 611-616.*
49. *McPherson, K.E. and J.D. Turnbull, An exploration of nutritional knowledge in a sample of Scottish men of low socio-economic status. Nutrition Bulletin, 2000.* ***25****(4): p. 323-327.*
50. *Wardle, J., K. Parmenter, and J. Waller, Nutrition knowledge and food intake. Appetite, 2000.* ***34****(3): p. 269-275.*
51. *Giskes, K., et al., Socioeconomic differences among Australian adults in consumption of fruit and vegetables and intakes of vitamins A, C and folate. Journal of Human Nutrition and Dietetics, 2002 B.* ***15****(5): p. 375-385.*

52. *Ricciuto, L.E. and V.S. Tarasuk, An examination of income-related disparities in the nutritional quality of food selections among Canadian households from 1986-2001. Social Science & Medicine, 2007.* ***64****(1): p. 186-198.*
53. *Evans, A., H. Booth, and K. Cashel, Socio-demographic determinants of energy, fat and dietary fibre intake in Australian adults. Public Health Nutrition, 2000.* ***3****(1): p. 67-75.*
54. *Hupkens, C.L.H., R.A. Knibbe, and M.J. Drop, Social class differences in women's fat and fibre consumption: A cross-national study. Appetite, 1997.* ***28****(2): p. 131-149.*
55. *Pollard, J., S.F.L. Kirk, and J.E. Cade, Factors affecting food choice in relation to fruit and vegetable intake: A review. Nutrition Research Reviews, 2002.* ***15****(02): p. 373-387.*
56. *Darmon, N. and A. Drewnowski, Does social class predict diet quality? The American Journal of Clinical Nutrition, 2008.* ***87****(5): p. 1107-1117.*
57. *Health Education Authority, Hea health and lifestyle survey: A report on the secondary analysis of a national dataset of health-related knowledge, attitudes and behaviour. 1998, UK: Health Education Authority: London.*
58. *Giskes, K., et al., Household and food shopping environments: Do they play a role in socioeconomic inequalities in fruit and vegetable consumption? A multilevel study among Dutch adults. Journal of Epidemiology and Community Health, 2009.* ***63****(2): p. 113-120.*
59. *Shahar, D., et al., Diet and eating habits in high and low socioeconomic groups. Nutrition, 2005.* ***21****: p. 559-566.*
60. *Baum, A., J.P. Garofalo, and A.M. Yali, Socioeconomic status and chronic stress: Does stress account for SES effects on health? Annals of the New York Academy of Sciences, 1999.* ***896****: p. 131-144.*
61. *Inglis, V., K. Ball, and D. Crawford, Why do women of low socioeconomic status have poorer dietary behaviours than women of higher socioeconomic status? A qualitative exploration. Appetite, 2005: p. 1-10.*
62. *Turrell, G. and A. Kavanagh, Socio-economic pathways to diet: Modelling the association between socio-economic position and food purchasing behaviour. Public Health Nutrition, 2006.* ***9****(3): p. 375-383.*
63. *Turrell, G., et al., A multilevel study of area socio-economic status and food purchasing behaviour. Public Health Nutrition, 2009(-1): p. 1-10.*
64. *Turrell, G., et al., A multilevel analysis of socioeconomic (small area) differences in household food purchasing behaviour. Journal of Epidemiology and Community Health., 2004.* ***58****(3): p. 208-215.*
65. *Ball, K., A. Timperio, and D. Crawford, Neighbourhood socioeconomic inequalities in food access and affordability. Health & Place, 2009.* ***15****(2): p. 578-585.*
66. *O'Dwyer, L. and J. Coveney, Scoping supermarket availability and accessibility by socio-economic status in adelaide. Health Promotion Journal of Australia, 2006.* ***17****: p. 240-6.*
67. *Jetter, K.M. and D.L. Cassady, The availability and cost of healthier food alternatives. American Journal of Preventive Medicine, 2006.* ***30****(1): p. 38-44.*
68. *Shohaimi, S., et al., Residential area deprivation predicts fruit and vegetable consumption independently of individual educational level and occupational social class: A cross sectional population study in the Norfolk cohort of the*

European prospective investigation into cancer (epic-Norfolk). Journal of Epidemiology and Community Health, 2004. ***58****: p. 686-691.*

69. *Giskes, K., et al., A multilevel study of socio-economic inequalities in food choice behaviour and dietary intake among the Dutch population: The globe study. Public Health Nutrition, 2006.* ***9****(1): p. 75-83.*
70. *Pearce, J., et al., The contextual effects of neighbourhood access to supermarkets and convenience stores on individual fruit and vegetable consumption. Journal of Epidemiology and Community Health, 2008.* ***62****(3): p. 198-201.*
71. *Tsang, A., et al., Adelaide healthy food basket: A survey on food cost, availability and affordability in five local government areas in metropolitan adelaide, south Australia. Nutrition & Dietetics, 2007.* ***64****(4): p. 241-247.*
72. *Foley, R., Pollard C, and D. McGuiness, Food cent$- achieving a balanced diet on a limited food budget. Australian Journal of Nutrition and Dietetics, 1997.* ***54****(4): p. 167-72.*
73. *Pearson, T., et al., Do 'food deserts' influence fruit and vegetable consumption? A cross-sectional study. Appetite, 2005.* ***45****(2): p. 195-197.*
74. *Cummins, S. and S. Macintyre, A systematic study of an urban foodscape: The price and availability of food in greater glasgow. Urban Studies, 2002.* ***39****(11): p. 2115-2130.*
75. *Apparicio, P., M.-S. Cloutier, and R. Shearmur, The case of montreal's missing food deserts: Evaluation of accessibility to food supermarkets. International Journal of Health Geographics, 2007.* ***6****(1): p. 4.*
76. *Ball, K., D. Crawford, and G. Mishra, 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).*
77. *Hupkens, C.L.H., R.A. Knibbe, and M.J. Drop, Social class differences in food consumption: The explanatory value of permissiveness and health and cost considerations. European journal of public health, 2000.* ***10****(2): p. 108-113.*
78. *Steptoe, A., T. Pollard, and J. Wardle, Development of a measure of the motives underlying the selection of food: The food choice questionnaire. Appetite, 1995.* ***25****(3): p. 267-284.*
79. *Wadolowska, L., E. Babicz-Zielinska, and J. Czarnocinska, Food choice models and their relation with food preferences and eating frequency in the polish population: POFPRES study. Food Policy, 2008.* ***33****(2): p. 122-134.*
80. *Furst, T., et al., Food choice: A conceptual model of the process Appetite, 1996* ***26****(3): p. 247-266.*
81. *Akbay, C. and E. Jones, Food consumption behavior of socioeconomic groups for private labels and national brands. Food Quality and Preference, 2005.* ***16****(7): p. 621-631.*
82. *Leibtag, E., S, and P. Kaufman, Exploring food purchase behavior of low-income households how do they economize?, in Current Issues in Economics of Food Markets. 2003, Economic Research Service , United States Department of Agriculture: Agriculture Information Bulletin.*
83. *Dibsdall, L., et al., Low-income consumers' attitudes and behaviour towards access, availability and motivation to eat fruit and vegetables. Public Health Nutrition, 2003.* ***6****(2): p. 159-169.*

84. *Marmot, M.G., M. Kogevinas, and M.A. Elston, Social/economic status and disease. Annual Review of Public Health, 1987.* ***8****(1): p. 111-135.*
85. *Turrell, G. and K. Giskes, Socioeconomic disadvantage and the purchase of takeaway food: A multilevel analysis. Appetite, 2008.* ***51****(1): p. 69-81.*
86. *Galobardes, B., J. Lynch, and G.D. Smith, Measuring socioeconomic position in health research. British Medical Bulletin, 2007.* ***81-82****(1): p. 21-37.*
87. *Braveman, P.A., et al., Socioeconomic status in health research. One size does not fit all JAMA: The Journal of the American Medical Association, 2005.* ***294****(22): p. 2879-2888.*
88. *Liberatos, P., B.G. Link, and J.L. Kelsey, The measurement of social class in epidemiology. Epidemiologic Reviews, 1988.* ***10****(1): p. 87-121.*
89. *Abramson, J.H., et al., Indicators of social class: A comparative appraisal of measures for use in epidemiological studies. Social Science and Medicine, 1982.* ***16****(20): p. 1739-1746.*
90. *Shavers, V., Measurement of socioeconomic status in health disparities research. Journal of the National Medical Association, 2007.* ***99****(9): p. 1013-1023.*
91. *Galobardes, B., et al., Indicators of socioeconomic position (part 1). Journal of Epidemiology and Community Health, 2006A.* ***60****(1): p. 7-12.*
92. *Lynch, J.W., G.A. Kaplan, and J.T. Salonen, Why do poor people behave poorly? Variation in adult health behaviours and psychosocial characteristics by stages of the socioeconomic lifecourse. Social Science & Medicine, 1997.* ***44****(6): p. 809-819.*
93. *Mishra, G., et al., Dietary patterns of Australian adults and their association with socio-economic status: Results from the 1995 national nutrition survey European Journal of Clinical Nutrition, 2002.* ***56****(7).*
94. *Turrell, G., et al., Socioeconomic differences in food purchasing behaviour and suggested implications for diet-related health promotion. Journal of Human Nutrition and Dietetics, 2002.* ***15****(5): p. 355-364.*
95. *Wardle, J. and A. Steptoe, Socioeconomic differences in attitudes and beliefs about healthy lifestyles. Journal of Epidemiology and Community Health, 2003.* ***57****(6): p. 440-443.*
96. *Shohaimi, S., et al., Occupational social class, educational level and area deprivation independently predict plasma ascorbic acid concentration: A cross-sectional population based study in the Norfolk cohort of the European prospective investigation into cancer (epic-Norfolk). European Journal of Clinical Nutrition, 2004.* ***58****(10): p. 1432-1435.*
97. *Stallone, D.D., et al., Dietary assessment in Whitehall II: The influence of reporting bias on apparent socioeconomic variation in nutrient intakes. European Journal of Clinical Nutrition, 1997.* ***51****(12): p. 815-825.*
98. *Purdy, J., G. Armstrong, and H. McIlveen, The influence of socio-economic status on salt consumption in Northern Ireland. International Journal of Consumer Studies, 2002.* ***26****(1): p. 71-80.*
99. *Blisard, Stewart, and Jolliffe, Low-income households' expenditure on fruits and vegetables, in Agriculture Information Bulletin. 2004, United States Department of Agriculture Economic Research Service.*
100. *Gerber, A., et al., Socioeconomic status and electrolyte intake in black adults: The pitt county study. American Journal of Public Heallth, 1991* ***81****(12).*

101. *Kant, A. and B. Graubard, Secular trends in the association of socio-economic position with self-reported dietary attributes and biomarkers in the US population: National Health and Nutrition Examination Survey (NHANES) 1971-1975 to NHANES 1999-2002 Public Health Nutrition, 2007.* ***10****(2): p. 158-167.*
102. *De Irala-Estevaz, J., et al., A systematic review of socioeconomic differences in food habits in Europe: Consumption of fruit and vegetables. European Journal of Clinical Nutrition, 2000.* ***54****: p. 706-14.*
103. *Hulshof, K., et al., Socio-economic status, dietary intake and 10 y trends: The Dutch national food consumption survey. European Journal of Clinical Nutrition, 2003.* ***57****(1): p. 128-37.*
104. *Galobardes, B., A. Morabia, and M. Bernstein, Diet and socioeconomic position: Does the use of different indicators matter? International Journal of Epidemiology, 2001.* ***30****: p. 334-340.*
105. *Roos, E., et al., Modern and healthy?: Socioeconomic differences in the quality of diet. European Journal of Clinical Nutrition, 1996.* ***50****: p. 753 - 760.*
106. *Inglis, V., K. Ball, and D. Crawford, Socioeconomic variations in women's diets: What is the role of perceptions of the local food environment? Journal of Epidemiology and Community Health, 2008.* ***62****(3): p. 191-197.*
107. *Giskes, K., et al., Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults. Public Health Nutrition, 2002A.* ***5****: p. 663–669.*
108. *Baghurst, K., P. Baghurst, and S. Record, Demographic and dietary profiles of high and low fat consumers in Australia. Journal of Epidemiology and Community Health, 1994.* ***48****: p. 26-32.*
109. *Turrell, G., Determinants of healthy food choice in a population-based sample. American Journal of Health Behavior, 1998.* ***22****(5): p. 342-357.*
110. *Smith, A. and K. Baghurst, Public health implications of dietary differences between social status and occupational category groups. Journal of Epidemiology and Community Health, 1992.* ***46****: p. 409-416.*
111. *Laaksonen, M., et al., Income and health behaviours. Evidence from monitoring surveys among Finnish adults. Journal of Epidemiology and Community Health, 2003.* ***57****(9): p. 711-717.*
112. *Lindstrom, M., et al., Socioeconomic differences in the consumption of vegetables, fruit and fruit juices. The influence of psychosocial factors. European journal of public health, 2001.* ***11****(1): p. 51-9.*
113. *Steptoe, A., et al., Behavioural counselling to increase consumption of fruit and vegetables in low income adults: Randomised trial. British Medical Journal, 2003.* ***326****(7394): p. 855-858.*
114. *Giskes, K., et al., Socioeconomic inequalities in food purchasing: The contribution of respondent-perceived and actual (objectively measured) price and availability of foods. Preventive Medicine, 2007.* ***45****(1): p. 41-48.*
115. *Roos, E., et al., Gender, socioeconomic status and family status as determinants of food behaviour. Social Science & Medicine, 1998.* ***46****(12): p. 1519-1529.*
116. *Stamler, R., et al., Higher blood pressure in adults with less education. Some explanations from intersalt. Hypertension, 1992.* ***19****(3): p. 237-241.*

117. *Kamphuis, C., et al., Environmental determinants of fruit and vegetable consumption among adults: A systematic review. British Journal of Nutrition, 2006.* ***96****(4): p. 620-35.*
118. *Steptoe, A. and J. Wardle, Motivational factors as mediators of socioeconomic variations in dietary intake patterns. Psychology & Health, 1999.* ***14*** *(3).*
119. *Thompson, F.E., et al., Interrelationships of added sugars intake, socioeconomic status, and race/ethnicity in adults in the United States: National health interview survey, 2005. Journal of the American Dietetic Association, 2009.* ***109****(8): p. 1376-1383.*
120. *Moreira, P. and P. Padrao, Education, economic and dietary determinants of obesity in Portugese adults: A cross sectional study. Eating Behaviors, 2005.*
121. *Dowler, E., Inequalities in diet and physical activity in Europe. Public Health Nutrition, 2001.* ***4****(2b): p. 701-709.*
122. *Giskes, K., et al., A systematic review of studies on socioeconomic inequalities in dietary intakes associated with weight gain and overweight/obesity conducted among European adults. Obesity Reviews, 2010.* ***11****(6): p. 413-429.*
123. *Miura, K., K. Giskes, and G. Turrell, Contribution of take-out food consumption to socioeconomic differences in fruit and vegetable intake: A mediation analysis. Journal of the American Dietetic Association.* ***111****(10): p. 1556-1562.*
124. *Quan, T., et al., Behaviors of low-income mothers related to fruit and vegetable consumption. Journal of the American Dietetic Association, 2000.* ***100****(5): p. 567-569.*
125. *Beto, J.A., G. Sheth, and P. Rewers, Assessing food purchase behavior among low-income black and hispanic clients using a self-reported shelf inventory. Journal of the American Dietetic Association, 1997.* ***97****(1): p. 69-70.*
126. *Eyler, A., et al., Correlates of fat intake among urban, low income African Americans. American Journal of Health Behavior, 2004.* ***28*** *(5): p. 410-417.*
127. *Albala C, et al., Obese women of high and low socioeconomic status diet composition and serum levels of lipoproteins. Revista Médica de Chile, 1989.* ***117****(1): p. 3-9.*
128. *Drewnowski A, et al., Taste and food preferences as predictors of dietary practices in young women. Public Health Nutrition, 1999: p. 513–519.*
129. *Lytle, L.A., et al., Predicting adolescents' intake of fruits and vegetables. Journal of Nutrition Education and Behavior, 2003.* ***35****(4): p. 170-178.*
130. *Laitinen, S., et al., Diet of Finnish children in relation to the family's socio-economic status. Scandinavian Journal of Public Health, 1995.* ***23****(2): p. 88-94.*
131. *Yngve, A., et al., Fruit and vegetable intake in a sample of 11-year-old children in 9 European countries: The pro children cross-sectional survey. Ann Nutr Metab, 2005.* ***49****: p. 236-245.*
132. *Djuric, Z., et al., Relationships of psychosocial factors to dietary intakes of preadolescent girls from diverse backgrounds. Maternal and Child Nutrition, 2006.* ***2****(2): p. 79-90.*
133. *Stratton, P. and K. Bromley, Families' accounts of the causal processes in food choice. Appetite, 1999.* ***33****(1): p. 89-108.*

134. *Kamphuis, C.B.M., et al., Perceived environmental determinants of physical activity and fruit and vegetable consumption among high and low socioeconomic groups in the Netherlands. Health & Place, 2007.* ***13****(2).*
135. *Charles, N. and M. Kerr, Women, food and families. 1988, Manchester: Manchester University Press.*
136. *Nesbitt, A., et al., Food consumption patterns in the Waterloo region, Ontario, Canada: A cross-sectional telephone survey. BMC Public Health, 2008.* ***8****(1): p. 370.*
137. *Kearney, J.M., K.F. Hulshof, and M.J. Gibney, Eating patterns - temporal distribution, converging and diverging foods, meals eaten inside and outside of the home - implications for developing FBDG. Public Health Nutrition, 2001.* ***4****: p. 693 - 698.*
138. *Burgess-Champoux, T., et al., Are family meal patterns associated with overall diet quality during the transition from early to middle adolescence? Journal of Nutrition Education and Behavior, 2009.* ***41****(2): p. 79-86.*
139. *Australian Bureau of Statistics, Household expenditure survey:1993-94, in Cat. No. 6535.0. 1996.*
140. *Wrigley, N., 'food deserts' in British cities: Policy context and research priorities. Urban Studies, 2002.* ***39****(11): p. 2029-2040.*
141. *Beardsworth, A. and T. Keil, Sociology on the menu: An invitation to the study of food and society. 1997: Routledge.*
142. *Buscher, L.A., K.A. Martin, and S. Crocker, Point-of-purchase messages framed in terms of cost, convenience, taste, and energy improve healthful snack selection in a college foodservice setting. Journal of the American Dietetic Association, 2001.* ***101****(8): p. 909-913.*
143. *Buttriss, J., et al., Successful ways to modify food choice: Lessons from the literature. Nutrition Bulletin, 2004.* ***29****(4): p. 333-343.*
144. *McKernan Boulanger, P., et al., Determinants of nutrition knowledge among low-income, latino caretakers in Hartford, conn. Journal of the American Dietetic Association, 2002.* ***102****(7): p. 978-981.*
145. *Winkler, E. and G. Turrell, Confidence to cook vegetables and the buying habits of Australian households. American Dietetic Association, 2009.* ***109*** *(10): p. 1759-1768.*
146. *Signal, L., et al., Perceptions of New Zealand nutrition labels by Maori, pacific and low-income shoppers. Public Health Nutrition, 2008.* ***11****(7): p. 706-13.*
147. *Turrell, G., Socioeconomic status, gender and health-related food behaviour, in PhD thesis: Department of Anthropology and Sociology. 1996, University of Queensland: Brisbane.*
148. *Dixon H, R. Borland, and C. Segan, Public reaction to Victoria's '2 Fruit 'n' 5 Veg every day' campaign and reported consumption of fruit and vegetables. Prev Med, 1998.* ***27****: p. 572-582.*
149. *Krebs-Smith SM and L. Scott Kantor, Choose a variety of fruit and vegetables daily: Understanding the complexities. The Journal of Nutrition, 2001.* ***131 Suppl****: p. 487S-501S.*
150. *Strategic Inter-Governmental Nutrition Alliance, Eat well Australia: An agenda for action for public health nutrition 2001-2010. . 2001: Canberra: National Public*

Health Partnership; available at http://www.health.vic.gov.au/nhpa/resources/nu_eatwell.htm.

151. *Nayga, R., D. Lipinski, and Savur; N, Consumers' use of nutritional labels while food shopping and at home. Journal of Consumer Affairs, 1998.* ***32****.*
152. *Grunert, K. and J. Wills, A review of European research on consumer response to nutrition information on food labels. Journal of Public Health, 2007(15): p. 385-399.*
153. *Martikainen, P., M. Bartley, and E. Lahelma, Psychosocial determinants of health in social epidemiology. International Journal of Epidemiology, 2002.* ***31****(6): p. 1091-1093.*
154. *Hemingway, h. and M. Marmot, Evidence based cardiology psychosocial factors in the aetiology and prognosis of coronary heart disease: Systematic review of prospective cohort studies. British Medical Journal, 1999.* ***318****.*
155. *Drewnowski, A., S. Henderson, and A. Shore, Genetic sensitivity to 6-n-propylthiouracil (prop) and hedonic responses to bitter and sweet tastes. Chemical Senses, 1997.* ***22****: p. 27.*
156. *Dinehart, M.E., et al., Bitter taste markers explain variability in vegetable sweetness, bitterness, and intake. Physiology & Behavior, 2006.* ***87****(2): p. 304-313.*
157. *Palojoki, P. and T. Tuomi-Grohn, The complexity of food choices in an everyday context. International Journal of Consumer Studies, 2001.* ***25****(1): p. 15-23.*
158. *Forestell, C.A. and J.A. Mennella, Early determinants of fruit and vegetable acceptance. Pediatrics, 2007.* ***120****(6): p. 1247-1254.*
159. *Mintz, S.W., Sweetness and power : The place of sugar in modern history. 1985, New York: Viking.*
160. *Chung, C. and S.L. Myers, Do the poor pay more for food? An analysis of grocery store availability and food price disparities. Journal of Consumer Affairs, 1999.* ***33****(2): p. 276-296.*
161. *Cummins, S. and S. Macintyre, "food deserts"-evidence and assumption in health policy making. British Medical Journal, 2002.* ***325****(7361): p. 436-438.*
162. *Shaw, H.J., Food deserts: Towards the development of a classification. Geografiska Annaler, Series B: Human Geography, 2006.* ***88****(2): p. 231-247.*
163. *Lee, G. and H. Lim, A spatial statistical approach to identifying areas with poor access to grocery foods in the city of Buffalo, New York. Urban Studies, 2009.* ***46****(7): p. 1299-1315.*
164. *Winkler, E., G. Turrell, and C. Patterson, Does living in a disadvantaged area mean fewer opportunities to purchase fresh fruit and vegetables in the area? Findings from the Brisbane Food Study. Health and Place, 2006 A.* ***12****(3): p. 306-19.*
165. *Winkler, E., G. Turrell, and C. Patterson, Does living in a disadvantaged area entail limited opportunities to purchase fresh fruit and vegetables in terms of price, availability, and variety? Findings from the Brisbane Food Study. Health & Place, 2006 B.* ***12****(4): p. 741-748.*
166. *Nutbeam, D. and E. Harris, Theory in a nutshell a practical guide to health promotion theories. 2004, Sydney: McGraw-Hill Australia.*

167. *Shepherd, R., M. Raats, and M. Meiselman, Attitudes and beliefs in food habits, in Food choice, acceptance and consumption, H.L. Meiselman and H.J.H. MacFie, Editors. 1996. p. 346-364*
168. *Tuorila, H. and R.M. Pangborn, Prediction of reported consumption of selected fat-containing foods. Appetite, 1988.* ***11****(2): p. 81-95.*
169. *Rosenstock, I.M., V.J. Strecher, and M.H. Becker, Social learning theory and the health belief model. Health Education & Behavior, 1988.* ***15****(2): p. 175-183.*
170. *Ball, K., et al., Can social cognitive theory constructs explain socio-economic variations in adolescent eating behaviours? A mediation analysis. Health Education Research, 2009.* ***24****(3): p. 496-506.*
171. *Contento, I., Nutrition education: Linking research, theory, and practice. 2007, London: Jones and Bartlett Publishers*
172. *Schafer, R., P. Keith, and E. Schafer, Predicting fat in diets of marital partners using the health belief model. Journal of Behavioral Medicine, 1995.* ***18****: p. 419.*
173. *Vassallo, M., et al., Willingness to use functional breads. Applying the health belief model across four European countries. Appetite, 2009.* ***52****(2): p. 452-460.*
174. *Brug, J., K. Glanz, and G. Kok, The relationship between self-efficacy, attitudes, intake compared to others, consumption, and stages of change related to fruit and vegetables. American Journal of Health Promotion, 1997.* ***12****(1): p. 25.*
175. *Di Noia, J. and J. Prochaska, Dietary stages of change and decisional balance: A meta-analytic review. American Journal of Health Behavior, 2010.* ***34****(5): p. 618-632*
176. *Van Duyn, M., et al., Association of awareness, intrapersonal and interpersonal factors, and stage of dietary change with fruit and vegetable consumption: A national survey. American Journal of Health Promotion, 2001.* ***16****: p. 69-78.*
177. *Kloek, G.C., et al., Stages of change for fruit and vegetable consumption in deprived neighborhoods. Health Education & Behavior, 2004.* ***31****(2): p. 223-241.*
178. *Steptoe, A., et al., Psychological and social predictors of changes in fruit and vegetable consumption over 12 months following behavioral and nutrition education counseling. Health Psychology: Official Journal Of The Division Of Health Psychology, American Psychological Association, 2004.* ***23****(6): p. 574-581.*
179. *Bissonnette, M.M. and I.R. Contento, Adolescents' perspectives and food choice behaviors in terms of the environmental impacts of food production practices: Application of a psychosocial model. Journal of Nutrition Education and Behavior, 2001.* ***33****(2): p. 72-82.*
180. *West, R., Time for a change: Putting the transtheoretical (stages of change) model to rest. Addiction, 2005.* ***100****(8): p. 1036-1039.*
181. *Attree, P., Low-income mothers, nutrition and health: A systematic review of qualitative evidence. Maternal & Child Nutrition, 2005.* ***1****(4): p. 227-240.*
182. *Winkler, E.A., Food accessibility, affordability, cooking skills and socioeconomic differences in fruit and vegetable purchasing in Brisbane, Australia in School of Public Health. 2008, Queensland University of Technology: Brisbane.*
183. *Caplan, P., A. Keane, and A. Willets, Studying food choice in its social and cultural contexts: Approaches from a social anthropological perspective, in The nation's diet. The social science of food choice, A. Murcott, Editor. 1998, Longman: London. p. 168-182.*

184. *Jaeger, S.R., et al., The food choice kaleidoscope. A framework for structured description of product, place and person as sources of variation in food choices. Appetite, 2011.* ***56****(2): p. 412-423.*
185. *Robinson, T., Applying the socio-ecological model to improving fruit and vegetable intake among low-income African Americans. Journal of Community Health, 2008.*
186. *Klein, K.J., H. Tosi, and A.A. Cannella, Multilevel theory building: Benefits, barriers, and new developments. Academy of Management Review, 1999.* ***24,****: p. 243-248.*
187. *Stokols, D., Translating social ecological theory into guidelines for community health promotion. Am J Health Promot, 1996.* ***10****(4): p. 282-98.*
188. *Caraher, M., et al., Access to healthy foods: Part i barriers to accessing healthy foods: Differentials by gender, social class, income, and mode of transport. Health Education Journal, 1998.* ***57****: p. 191–201.*
189. *Glanz, K., et al., Why Americans eat what they do: Taste, nutrition, cost, convenience, and weight control concerns as influences on food consumption. Journal of the American Dietetic Association, 1998.* ***98****(10): p. 1118-1126.*
190. *Kristal, A.R., et al., Nutrition knowledge, attitudes and perceived norms as correlates of selecting low-fat diets. Health Education Research, 1990.* ***5****(4): p. 467-477.*
191. *Harnack, L., G. Block, and S. Lane, Influence of selected environmental and personal factors on dietary behavior for chronic disease prevention: A review of the literature. Journal of Nutrition Education, 1997.* ***29****(6): p. 306-312.*
192. *White, M., et al., Do 'food deserts' exist? A multi-level, geographical analysis of the relationship between retail food access, socioeconomic position and dietary intake. 2004, Food Standards Agency.*
193. *Chan, C., C. Patch, and P. Williams, Australian consumers are sceptical about but influenced by claims about fat on food labels. European Journal of Clinical Nutrition, 2005.* ***59****(1): p. 148-151.*
194. *Crossley, M.L. and S.N. Khan, Motives underlying food choice: Dentists, porters and dietary health promotion. British Dental Journal, 2001.* ***191****(4): p. 198-202.*
195. *Kearney. M, et al., Sociodemographic determinants of perceived influences on food choice in a nationally representative sample of Irish adults. Public Health Nutrition, 2000.* ***3****(2): p. 219-226.*
196. *Caraher, M., et al., The state of cooking in England: The relationship of cooking skills to food choice. British Food Journal, 1999.* ***101****(8): p. 590-609.*
197. *Jeffery, R.W. and S.A. French, Socioeconomic status and weight control practices among 20- to 45-year-old women. American Journal of Public Heallth, 1996.* ***86****(7): p. 1005-1010.*
198. *Bowman, S., Food shoppers' nutrition attitudes and relationship to dietary and lifestyle practices. Nutrition Research, 2005.* ***25****(3): p. 281-293.*
199. *Bhargava, A., Socio-economic and behavioural factors are predictors of food use in the national food stamp program survey. British Journal of Nutrition, 2004.* ***92****(03): p. 497-506.*
200. *Patrick, H. and T.A. Nicklas, A review of family and social determinants of children's eating patterns and diet quality. J Am Coll Nutr, 2005.* ***24****(2): p. 83-92.*

201. *Giskes K, et al., Health and nutrition beliefs and perceptions of Brisbane adolescents. Nutrition and Dietetics, 2005.* ***62****: p. 69-75.*
202. *Neumark-Sztainer, D., et al., Correlates of inadequate fruit and vegetable consumption among adolescents. Preventive Medicine, 1996.* ***25****(5): p. 497-505.*
203. *Ogden, J. and D. Thomas, The role of familial values in understanding the impact of social class on weight concern. International Journal of Eating Disorders, 1999.* ***25****(3): p. 273-279.*
204. *Vijayapushpam, T., et al., A qualitative assessment of nutrition knowledge levels and dietary intake of schoolchildren in hyderabad. Public Health Nutrition, 2003.* ***6****(07): p. 683-688.*
205. *Smith, S.L., et al., Aging and eating in the rural, southern United States: Beliefs about salt and its effect on health. Social Science & Medicine, 2006.* ***62****(1): p. 189-198.*
206. *Edwards, J., et al., The diet of prisoners in England. British Food Journal, 2007.* ***109****(3): p. 216 - 232.*
207. *Nelson, K.M., G. Reiber, and E.J. Boyko, Diet and exercise among adults with type 2 diabetes. Diabetes Care, 2002.* ***25****(10): p. 1722-1728.*
208. *Hu, F.B., Globalization of food patterns and cardiovascular disease risk. Circulation, 2008.* ***118****(19): p. 1913-1914.*
209. *Porter, P., Westernizing women's risks? Breast cancer in lower-income countries. New England Journal of Medicine, 2008.* ***358****(3): p. 213-216.*
210. *Smith, L.H. and L. Holm, Social class and body management. A qualitative exploration of differences in perceptions and practices related to health and personal body weight. Appetite, 2010.* ***55****(2): p. 311-318.*
211. *Cade, J. and B. Margetts, Relationship between diet and smoking--is the diet of smokers different? Journal of Epidemiology and Community Health, 1991.* ***45****(4): p. 270-272.*
212. *MacKinnon, D., Introduction to statistical mediation analysis. 2008, New York: Routledge Academic.*
213. *Beydoun, M.A. and Y. Wang, How do socio-economic status, perceived economic barriers and nutritional benefits affect quality of dietary intake among US adults? European Journal of Clinical Nutrition, 2007.* ***62****(3): p. 303-313.*
214. *Guy, C.M. and G. David, Measuring physical access to 'healthy foods' in areas of social deprivation: A case study in cardiff. International Journal of Consumer Studies, 2004.* ***28****(3): p. 222-234.*
215. *Rose, D. and R. Richards, Food store access and household fruit and vegetable use among participants in the US food stamp program. Public Health Nutrition, 2004.* ***7****(08): p. 1081-1088.*
216. *Caldwell, E., et al., Perceived access to fruits and vegetables associated with increased consumption. Public Health Nutrition, 2009.* ***12****(10): p. 1743-50.*
217. *Barratt, J., The cost and availability of healthy food choices in Southern Derbyshire. Journal of Human Nutrition and Dietetics, 1997.* ***10****(1): p. 63-69.*
218. *Hendrickson, D., C. Smith, and N. Eikenberry, Fruit and vegetable access in four low-income food deserts communities in Minnesota. Agriculture and Human Values, 2006.* ***23****: p. 371-383.*

219. *Hemphill, E., et al., Exploring obesogenic food environments in Edmonton, Canada: The association between socioeconomic factors and fast food outlet access. American Journal of Health Promotion, 2008.* ***22****(6): p. 426-432.*
220. *Latham, J. and T. Moffat, Determinants of variation in food cost and availability in two socioeconomically contrasting neighbourhoods of Hamilton, Ontario, Canada. Health & Place, 2007.* ***13****(1).*
221. *Gustafson, A.A., et al., Perceived and objective measures of the food store environment and the association with weight and diet among low-income women in North Carolina. Public Health Nutrition, 2011.* ***FirstView****: p. 1-7.*
222. *Brug J, Lechner L, and H. De Vries, Psychosocial determinants of fruit and vegetable consumption. Appetite, 1995.* ***25****: p. 285-296.*
223. *Eikenberry, N. and C. Smith, Healthful eating: Perceptions, motivations, barriers, and promoters in low-income minnesota communities. Journal of the American Dietetic Association, 2004.* ***104****(7): p. 1158-1161.*
224. *.*
225. *Havelock, R.G. and S. Zlotolow, The change agent's guide. 1995: Educational Technology Publications.*
226. *Wylie, C., J. Copeman, and S.F.L. Kirk, Health and social factors affecting the food choice and nutritional intake of elderly people with restricted mobility. Journal of Human Nutrition and Dietetics, 1999.* ***12****(5): p. 375-380.*
227. *Dubowitz, T., et al., Lifecourse, immigrant status and acculturation in food purchasing and preparation among low-income mothers Public Health Nutrition, 2007.* ***10****(4): p. 96-404*
228. *Jabs, J. and C.M. Devine, Time scarcity and food choices: An overview. Appetite, 2006.* ***47****(2): p. 196-204.*
229. *Kearney, J. and S. McElhone, Perceived barriers in trying to eat healthier - results of a pan-eu consumer attitudinal survey. British Journal of Nutrition,, 1999.* ***81****: p. S133-S137.*
230. *Askegaard, S. and T.K. Madsen, The local and the global: Exploring traits of homogeneity and heterogeneity in European food cultures. International Business Review, 1998.* ***7****(6): p. 549-568.*
231. *Auld, G.W., et al., Reported adoption of dietary fat and finer recommendations among consumers. Journal of the American Dietetic Association, 2000.* ***100****(1): p. 52-58.*
232. *Kim, C., Working wives' time-saving tendencies: Durable ownership, convenience food consumption, and meal purchases. Journal of Economic Psychology, 1989.* ***10****(3): p. 391-409.*
233. *Giskes, K., Socioeconomic position, dietary intakes, perceptions of health and diet among Australian adolescents and adults, in School of Public Health. 2002, Queensland University of Technology: Brisbane.*
234. *Wrieden, W.L., et al., The impact of a community-based food skills intervention on cooking confidence, food preparation methods and dietary choices ? An exploratory trial. Public Health Nutrition, 2007.* ***10****(02): p. 203-211.*
235. *Devine, C.M., et al., 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): p. 617-630.*

236. *Devine, C.M., et al., "A lot of sacrifices:" Work-family spillover and the food choice coping strategies of low-wage employed parents. Social Science & Medicine, 2006.* ***63****(10): p. 2591-2603.*
237. *SIGNAL. National action plan to increase consumption of vegetables and fruit. 2000 16/09/03 [cited 2003 17/12/03]; Available from: http://www.nphp.gov.au/publications/signal/fvact.pdf.*
238. *Queensland Public Health Forum, Eat well queensland: 2002-2012. 2002.*
239. *Strategic Intergovernmental Nutrition Alliance, Eat well Australia: An agenda for action for public health nutrition. 2001, National Public Health Partnership. p. 126.*
240. *Gittelsohn, J., et al., Psychosocial determinants of food purchasing and preparation in American Indian households. Journal of Nutrition Education and Behavior, 2006.* ***38****(3): p. 163-168.*
241. *Shepherd, R., et al., Constraints on dietary choice: The role of income. Nutrition & Food Science, 1996.* ***96****(5): p. 19-21.*
242. *National Children's Home, Going hungry: The struggle to eat healthily on a low income. 2004: London.*
243. *Wiig Dammann, K. and C. Smith, Factors affecting low-income women's food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight. Journal of Nutrition Education and Behavior, 2009.* ***41****(4): p. 242-253.*
244. *Lennernas, M., et al., Influences on food choice perceived to be important by nationally-representative samples of adults in the European union. European Journal of Clinical Nutrition, 1997.* ***51****(Suppl. 2, S8-S15.).*
245. *Mulder, B., et al., Stressors and resources mediate the association of socioeconomic position with health behaviours. BMC Public Health, 2011.* ***11****(1): p. 798.*
246. *Kolodinsky, J., et al., Household food and beverage purchasing, in Qualitative Research in Psychology. 2009: Journal of the American Dietetic Association.*
247. *Australian Bureau of Statistics, Household expenditure survey, Australia: Summary of results, 2009-10 in Cat. No. 6530.0 2011.*
248. *Lindeman, M. and M. Väänänen, Measurement of ethical food choice motives. Appetite, 2000.* ***34****(1): p. 55-59.*
249. *Ward, P., J. Coveney, and J. Henderson, Editorial: A sociology of food and eating. Journal of Sociology, 2010.* ***46****(4): p. 347-351.*
250. *Maddux, J.E., Habit health and happiness. Journal of Sport & Exercise Psychology, 1997.* ***19****(4): p. 331-346.*
251. *Conner, M.T., Individualized measurement of attitudes towards foods. Appetite, 1993.* ***20****(3): p. 235-238.*
252. *Kimura, A., et al., Eating habits in childhood relate to preference for traditional diets among young Japanese. Food Quality and Preference*
2010. ***21****(7): p. 843-848.*
253. *Flight, I., P. Leppard, and D.N. Cox, Food neophobia and associations with cultural diversity and socio-economic status amongst rural and urban Australian adolescents. Appetite, 2003.* ***41****(1): p. 51-59.*

254. *Smith, B., et al., Lay beliefs about the preventability of major health conditions. Health Education Research, 1999.* ***14****(3): p. 315-325.*
255. *Wooldridge, K.L., et al., The relationship between health beliefs, adherence, and metabolic control of diabetes. The Diabetes Educator, 1992.* ***18****(6): p. 495-500.*
256. *Shaikh, A.R., et al., Psychosocial predictors of fruit and vegetable consumption in adults: A review of the literature. American Journal of Preventive Medicine, 2008.* ***34****(6): p. 535-543.e11.*
257. *Pajak, B., Intake of selected nutrients by perceived control over life, over health and general control in men and women aged 45-64, residents of Kraków. Przegl Lek, 2005.* ***62****(12): p. 1367-71.*
258. *French, S. and R. Jeffery, Weight concerns and smoking: A literature review. Annals of Behavioral Medicine, 1995.* ***17****(3): p. 234-244.*
259. *Hayes, D. and C.E. Ross, Concern with appearance, health beliefs, and eating habits. Journal of Health and Social Behavior, 1987.* ***28****(2): p. 120-130.*
260. *Lau, R., K. Hartman, and J.E. Ware, Health as a value: Methodological and theoretical considerations. Health Psychology, 1986.* ***5****(1): p. 25-43.*
261. *Smith SC, Taylor JG, and S. AM., Use of food labels and beliefs about diet-disease relationships among university students. Public Health Nutrition, 2000* ***3****(2): p. 175-82.*
262. *Steptoe, A. and J. Wardle, Locus of control and health behaviour revisited: A multivariate analysis of young adults from 18 countries. British Journal of Psychology, 2001.* ***92****(4): p. 659-672.*
263. *Furnee, C.A., W. Groot, and G.A. Pfann, Health and income: A meta-analysis to explore cross-country, gender and age differences. The European Journal of Public Health, 2010.*
264. *Grembowski, D., et al., Self-efficacy and health behavior among older adults. Journal of Health and Social Behavior, 1993.* ***34****(2): p. 89-104.*
265. *Adler, N., et al., Relationship of subjective and objective social status with psychological and physiological functioning: Preliminary data in healthy white women. Health Psychol, 2000.* ***19****(6): p. 586-92.*
266. *Bosma, H., H. Van de Mheen, and J. Mackenbach. Childhood socioeconomic conditions and adult health: The contribution of psychological attributes. in International Congress of Behavioral Medicine. 1998. Copenhagen, Denmark.*
267. *Jain, A., et al., Why don't low-income mothers worry about their preschoolers being overweight? Pediatrics, 2001.* ***107****(5): p. 1138-1146.*
268. *Stewart-Knox, B., et al., Dietary strategies and uptake of reduced fat foods. Journal of Human Nutrition and Dietetics, 2005.* ***18****(2): p. 121-128.*
269. *Deeks, A., et al., The effects of gender and age on health related behaviors. BMC Public Health, 2009.* ***9****(1): p. 213.*
270. *Girois, S.B., et al., A comparison of knowledge and attitudes about diet and health among 35- to 75-year-old adults in the United States and Geneva, Switzerland. American Journal of Public Heallth, 2001.* ***91****(3): p. 418-424.*
271. *Bobbitt-Zeher, D., The gender income gap and the role of education. Sociology of Education, 2007.* ***80****(1): p. 1-22.*

272. *Barnard, H. and S.A. Eat Well, Food, nutrition, low income and health in Australia : What does the literature say? / eat well sa. 1999, Adelaide (S. Aust.) :: Eat Well SA.*
273. *Gochman, D., Handbook of health behavior research 1 personal and social determinants, ed. D. Gochman. 1997, New York: Plenum Press.*
274. *Monneuse, M.O., F. Bellisle, and G. Koppert, Eating habits, food and health related attitudes and beliefs reported by French students. European Journal of Clinical Nutrition, 1997. **51**: p. 46-53.*
275. *Nielsen, N.A., E. Sørensen, and K.G. Grunert, Consumer motives for buying fresh or frozen plaice: A means end chain approach, in Seafood from producer to consumer: Integrated approach to quality, , B. Luten, Børresen T, and J. Oehlenschläger, Editors. 1997, Elsevier: Amsterdam. p. 31-43.*
276. *White, K., A. Humke, and M. Kiviniemi, Current mood and food choices: The relation between positive affect and dietary behavior. Annals of Behavioral Medicine, 2005(S167).*
277. *Rose, N., S. Koperski, and B.A. Golomb, Mood food: Chocolate and depressive symptoms in a cross-sectional analysis. Archives of Internal Medicine, 2010. **170**(8): p. 699-703.*
278. *Michaelidou, N. and L.M. Hassan, The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. International Journal of Consumer Studies, 2008. **32**(2): p. 163-170.*
279. *Strolla, L.O., K.M. Gans, and P.M. Risica, Using qualitative and quantitative formative research to develop tailored nutrition intervention materials for a diverse low-income audience. Health Education Research, 2006. **21**(4): p. 465-476.*
280. *Worsley, A., A. Worsley, and S. McConnon, Kiwis, food and cholesterol: New Zealand consumers' food concerns and awareness of nutritional guidelines. Australian Journal of Public Health, 1991. **15**(4): p. 296-300.*
281. *McLean-Meyinsse, P.E., Assessing concerns about the fat content of meats among primary grocery shoppers in Louisiana and Southeast Texas Journal of Food Distribution Research, 1998. **29**(1).*
282. *Rimal, A.P., S.M. Fletcher, and K.H. McWatters, Nutrition considerations in food selection. The International Food and Agribusiness Management Review, 2000. **3**(1): p. 55-70.*
283. *Nayga, R.M.J., Impact of sociodemographic factors on perceived importance of nutrition in food shopping. Journal of Consumer Affairs, 1997. **31**(1): p. 1-9.*
284. *Beydoun, M.A. and Y. Wang, Do nutrition knowledge and beliefs modify the association of socio-economic factors and diet quality among US adults? Preventive Medicine, 2008. **46**(2): p. 145-153.*
285. *Sims, L., Further thoughts on research perspectives in nutrition education. Journal of Nutrition Education, 1981. **13**: p. S70-75 1.*
286. *Parmenter, K. and J. Wardle, Development of a general nutrition knowledge questionnaire for adults. 1999. **53**(4): p. 298-308.*
287. *Shimamoto, I., et al., Changes in 24-hour urinary excretion of sodium and potassium in a community-based health education program on salt reduction. Japanese Journal Of Public Health, 1999. **46**(10): p. 894-903.*

288. *Cathi, L., et al., Use of home study to improve nutrition knowledge in two rural counties of california. Journal of Nutrition Education, 1999.* ***31****(2): p. 94-98.*
289. *De Vriendt, T., et al., Determinants of nutrition knowledge in young and middle-aged Belgian women and the association with their dietary behaviour. Appetite, 2009.* ***52****(3): p. 788-792.*
290. *Hendrie, G., J. Coveney, and D. Cox, Published online by Cambridge University, Exploring nutrition knowledge and the demographic variation in knowledge levels in an Australian community sample. Public Health Nutrition, 2008.* ***1****.*
291. *Buttriss, J.L., Food and nutrition: Attitudes, beliefs, and knowledge in the United Kingdom. The American Journal of Clinical Nutrition, 1997.* ***65****(6): p. 1985S-1995S.*
292. *McLeod, E.R., K.J. Campbell, and K.D. Hesketh, Nutrition knowledge: A mediator between socioeconomic position and diet quality in Australian first-time mothers. Journal of the American Dietetic Association, 2011.* ***111****(5): p. 696-704.*
293. *Coveney, J., A qualitative study exploring socio-economic differences in parental lay knowledge of food and health: Implications for public health nutrition. Public Health Nutrition, 2005.* ***8****(03): p. 290-297.*
294. *Variyam, J.N. and J. Cawley. Nutrition labels and obesity. in SSRN eLibrary. 2006: SSRN.*
295. *Kim, S.-Y., R.M. Nayga, and O. Capps, Food label use, self-selectivity, and diet quality. Journal of Consumer Affairs, 2001.* ***35****(2): p. 346-363.*
296. *Byrd-Bredbenner, C., L. Alfieri, and L. Kiefer, The nutrition label knowledge and usage behaviours of women in the US. Nutrition Bulletin, 2000.* ***25****(4): p. 315-322.*
297. *Trudeau, E., et al., Demographic and psychosocial predictors of fruit and vegetable intakes differ: Implications for dietary interventions. Journal of the American Dietetic Association, 1998.* ***98****(12): p. 1412-1417.*
298. *Guthrie, J., et al., Who uses nutrition labeling and what effects does label use have on diet quality? Journal of Nutrition Education, 1995.* ***27****: p. 153-172.*
299. *Nayga, R.M., Determinants of consumers' use of nutritional information on food packages. Southern Agricultural Economics Association, Journal of Agricultural and Applied Economics, 1996.* ***28****(2).*
300. *Perez-Escamilla, R. and L. Haldeman, Food label use modifies association of income with dietary quality. The Journal of Nutrition, 2002.* ***132****(4): p. 768-772.*
301. *Ball, K., et al., How well do Australian women comply with dietary guidelines? Public Health Nutrition, 2004.* ***7****(03): p. 443-452.*
302. *Nettleton JA, Striving to increase compliance with dietary guidelines for fatty acid intake: A call for a multifaceted dietary approach. Journal of the American Dietetic Association, 2007.* ***107****(10): p. 1723-5.*
303. *Santich, B.J., It's a chore! Women's attitudes to cooking. Australian Journal of Nutrition and Dietetics, 1995.* ***52****: p. 11-13.*
304. *De Bourdeaudhuij, I., Perceived family members' influence on introducing healthy food into the family. Health Education Research, 1997.* ***12****(1): p. 77-90.*
305. *Westenhoefer, J., Age and gender dependent profile of food choice, in Diet diversification and health promotion. 2005. p. 44-51.*
306. *Mayall, B., Keeping children healthy: The role of mothers and professionals. 1987, London: Allen & Unwin.*

307. *Wandel, M. and A. Bugge, Environmental concern in consumer evaluation of food quality. Food Quality and Preference, 1997.* ***8****(1): p. 19-26.*
308. *Baranowski, T., et al., Social support is a primary influence on home fruit, 100% juice, and vegetable availability. Journal of the American Dietetic Association, 2008.* ***108****(7): p. 1231-1235.*
309. *Krause, N. and E. Borawski-Clark, Social class differences in social support among older adults. Gerontologist, 1995.* ***35****: p. 498 - 508.*
310. *Weyers, S., et al., Low socio-economic position is associated with poor social networks and social support: Results from the Heinz Nixdorf Recall Study. International Journal for Equity in Health, 2008.* ***7****(1): p. 13.*
311. *Langenberg, P., et al., Psychosocial factors and intervention-associated changes in those factors as correlates of change in fruit and vegetable consumption in the Maryland WIC 5 a day promotion program. Annals of Behavioral Medicine, 2000.* ***22****(4): p. 307-15.*
312. *Charlton, K., The nutrient intake of elderly men living alone and their attitudes towards nutrition education. Journal of Human Nutrition and Dietetics, 1997.* ***10****(6): p. 343-352.*
313. *Wardle, J., Food choices and health evaluation. Psychology and Health, 1993.* ***8****: p. 65-75.*
314. *Ikeda, M., et al., Changes in appetite, food preference, and eating habits in frontotemporal dementia and alzheimer's disease. Journal of Neurology, Neurosurgery & Psychiatry, 2002.* ***73****(4): p. 371-376.*
315. *Rozin, P. and T. Vollmecke, Food likes and dislikes. Annual Review of Nutrition, 1986.* ***6****: p. 433-56.*
316. *Nestle, M. and C. Woteki, Trends in American dietary patterns: Research issues and policy implications in Nutrition and health: Topics and controversies F. Bronner, Editor. 1995 CRC Press*
317. *Daniels, L., et al., The nourish randomised control trial: Positive feeding practices and food preferences in early childhood - a primary prevention program for childhood obesity. BMC Public Health, 2009.* ***9****(1): p. 387.*
318. *Drewnowski, A., Taste preferences and food intake. Annual Review of Nutrition, 1997.* ***17****(1): p. 237-253.*
319. *Clark, J., Taste and flavour: Their importance in food choice and acceptance. Proceedings of the Nutrition Society, 1998.* ***57****: p. 639-643.*
320. *Salbe, A.D., et al., Taste preferences and body weight changes in an obesity-prone population. American Journal of Clinical Nutrition, 2004.* ***79****(3): p. 372-378.*
321. *Wright, L., C. Nancarrow, and P. Kwok, Food taste preferences and cultural influences on consumption. British Food Journal, 2001.* ***103****(5): p. 348-357.*
322. *Axelson, M. and D. Brinberg, Social-psychological perspective on food-related behavior. 1989, New York: Springer-Verlag.*
323. *Mennella, J.A., et al., Early milk feeding influences taste acceptance and liking during infancy. American Journal of Clinical Nutrition, 2009.* ***90****(3): p. 780S-788.*
324. *Wardle, J., et al., Modifying children's food preferences: The effects of exposure and reward on acceptance of an unfamiliar vegetable. European Journal of Clinical Nutrition, 2003.* ***57****(2): p. 341-348.*

325. *Hursti, U.-K.K. and P.-O. SjÖDÉN, Food and general neophobia and their relationship with self-reported food choice: Familial resemblance in Swedish families with children of ages 7-17 years. Appetite, 1997.* ***29****(1): p. 89-103.*
326. *Mustonen, S. and H. Tuorila, Sensory education decreases food neophobia score and encourages trying unfamiliar foods in 8-12-year-old children. Food Quality and Preference.* ***In Press, Corrected Proof****.*
327. *Cooke, L.J., C.M.A. Haworth, and J. Wardle, Genetic and environmental influences on children's food neophobia. American Journal of Clinical Nutrition, 2007.* ***86****(2): p. 428-433.*
328. *Dovey, T.M., et al., Food neophobia and 'picky/fussy' eating in children: A review. Appetite.* ***50****(2-3): p. 181-193.*
329. *Pliner, P. and S. Salvy, Food neophobia in humans. The psychology of food choice, ed. R. Shepherd and M. Raats. 2006, Wallingford, UK: CABI.*
330. *Walker, J., et al., Consumer acceptance and purchase intent of a novel low-fat sugar-free sherbet containing soy protein. Journal of Food Quality: p. no-no.*
331. *Tuorila, H., et al., Effect of product formula, information and consumer characteristics on the acceptance of a new snack food. Food Quality and Preference, 1998.* ***9****(5): p. 313-320.*
332. *Mintz, S.W. and C.M. Du Bois, The anthropology of food and eating. Annual Review of Anthropology, 2002.* ***31****(1): p. 99-119.*
333. *Clarke, J., Taste and flavour: Their importance in food choice and acceptance. Proceedings of the Nutrition Society, 1998(57): p. 639-643.*
334. *Robinson, T.N., et al., Effects of fast food branding on young children's taste preferences. Archives of Pediatrics & Adolescent Medicine, 2007.* ***161****(8): p. 792-797.*
335. *Aaker, D.A., The value of brand equity. Journal of Business Strategy, 1992.* ***13****(4).*
336. *Hover, W. and S. Broun, Effects of brand awareness on choice for a common, repeat-purchase product. Journal of Consumer Research, 1990: p. 141-159.*
337. *Allen, M., R. Gupta, and A. Monnier, The interactive effect of cultural symbols and human values on taste evaluation. Journal of Consumer Research, 2008.* ***35****(2): p. 294-308.*
338. *Wansink, B., M.M. Cheney, and N. Chan, Exploring comfort food preferences across age and gender. Physiology & Behavior, 2003.* ***79****(4-5): p. 739-747.*
339. *Chauhan J, et al., Age-related olfactory and taste changes and interrelationships between taste and nutrition. Journal of the American Dietetic Association, 1987.* ***87****(11): p. 1543-50.*
340. *Logue AW, et al., Food preferences in families. Appetite, 1988* ***10****(3): p. 169-80.*
341. *Drewnowski A and Shultz J, Impact of aging on eating behaviors, food choices, nutrition, and health status. The Journal of Nutrition Health and Aging, 2001.* ***5****(2): p. 75-9.*
342. *Killen, J., et al., Pursuit of thinness and onset of eating disorder symptoms in a community sample of adolescent girls: A three-year prospective analysis. International Journal of Eating Disorders, 1994.* ***16****(3): p. 227-238.*
343. *Taylor, C.B., et al., Factors associated with weight concerns in adolescent girls. International Journal of Eating Disorders, 1998.* ***24****(1): p. 31-42.*

344. *Killen, J.D., et al., Weight concerns influence the development of eating disorders: A 4-year prospective study. Journal of Consulting and Clinical Psychology, 1996.* ***64****(5): p. 936-940.*
345. *Ventura, A.K., et al., Understanding reporting bias in the dietary recall data of 11-year-old girls. Obesity, 2006.* ***14****(6): p. 1073-1084.*
346. *Flynn, K. and M. Fitzgibbon, Body image ideals of low-income African American mothers and their preadolescent daughters. Journal of Youth and Adolescence, 1996.* ***25****(5): p. 615-630.*
347. *Wardle, J. and L. Marsland, Adolescent concerns about weight and eating; a social-developmental perspective. Journal of Psychosomatic Research, 1990.* ***34****(4): p. 377-391.*
348. *O'Dea, J.A. and P. Caputi, Association between socioeconomic status, weight, age and gender, and the body image and weight control practices of 6- to 19-year-old children and adolescents. Health Education Research, 2001.* ***16****(5): p. 521-532.*
349. *Wang, Z., et al., Influences of ethnicity and socioeconomic status on the body dissatisfaction and eating behaviour of Australian children and adolescents. Eating Behaviors, 2005.* ***6****(1): p. 23-33.*
350. *Lin, B.H., C.L. Huang, and S.A. French, Factors associated with women's and children's body mass indices by income status. International Journal of Obesity and Related Metabolic Disorders, 2004.* ***28****(4): p. 536-542.*
351. *Siu, J., K. Giskes, and G. Turrell, Socio-economic differences in weight-control behaviours and barriers to weight control. Public Health Nutrition, 2011.* ***14****(10): p. 1768-1778.*
352. *Wardle, J. and J. Griffith, Socioeconomic status and weight control practices in British adults. Journal of Epidemiology and Community Health, 2001.* ***55****(3): p. 185-190.*
353. *Neumark-Sztainer, D., et al., Weight-control behaviors among adults and adolescents: Associations with dietary intake. Preventive Medicine, 2000.* ***30****(5): p. 381-391.*
354. *Davis, E., et al., Racial and socioeconomic differences in the weight-loss experiences of obese women. American Journal of Public Heallth, 2005.* ***95****(9): p. 1539-1543.*
355. *Binkley, J. and A. Golub, Household food choice in four food categories:Healthy or unhealthy? Working Papers 10-2, Purdue University, College of Agriculture, Department of Agricultural Economics, 2010.*
356. *Reicks, M., et al., Use of the think aloud method to examine fruit and vegetable purchasing behaviors among low-income African American women. Journal of Nutrition Education and Behaviour, 2003.* ***35****(3): p. 154-160.*
357. *Sanders-phillips, K., Correlates of healthy eating habits in low-income black women and latinas. Preventive Medicine, 1994.* ***23****(6): p. 781-787.*
358. *Reicks, M., J. Randall, and B. Haynes, Factors affecting consumption of fruits and vegetables by low-income families. Journal of the American Dietetic Association, 1994.* ***94****: p. 1309.*
359. *Hoisington, A., J.A. Shultz, and S. Butkus, Coping strategies and nutrition education needs among food pantry users. Journal of Nutrition Education and Behavior, 2002.* ***34****(6): p. 326-333.*

360. *Turrell, G., Determinants of gender differences in dietary behaviour. Nutrition Research, 1997.* ***17****(7): p. 1105-1120.*
361. *Fagerli, R. and M. Wandel, Gender differences in opinions and practices with regard to a "Healthy diet". Appetite, 1999.* ***32****(2): p. 171-190.*
362. *Nayga, R., Nutrition knowledge, gender, and food label use. Journal of Consumer Affairs, 2000.* ***34****(1): p. 97-112.*
363. *Rozin, P., R. Bauer, and D. Catanese, Food and life, pleasure and worry, among American college students: Gender differences and regional similarities. Journal of Personality and Social Psychology, 2003.* ***85****(1): p. 132-141.*
364. *Bove, C.F., J. Sobal, and B.S. Rauschenbach, Food choices among newly married couples: Convergence, conflict, individualism, and projects. Appetite, 2003.* ***40****(1): p. 25-41.*
365. *Ricciuto, L., V. Tarasuk, and A. Yatchew, Socio-demographic influences on food purchasing among Canadian households. European Journal of Clinical Nutrition, 2006.* ***60****(6): p. 778-790.*
366. *Tiggemann, M. and C. Stevens, Weight concern across the life-span: Relationship to self-esteem and feminist identity. International Journal of Eating Disorders, 1999.* ***26****(1): p. 103-106.*
367. *Brown, R. and S. Prus, Income inequality over the later-life course: A comparative analysis of seven OECD countries, in Social and Economic Dimensions of an Aging Population Research Papers. 2006, McMaster University.*
368. *Kemmer, D., Food preparation and the division of domestic labour among newly married and cohabiting couples. British Food Journal, 1999.* ***101****(8): p. 57-57.*
369. *Wandel, M., Dietary intake of fruits and vegetables in norway: Influence of life phase and socio-economic factors. International Journal of Food Sciences and Nutrition, 1995.* ***46****: p. 291 - 301.*
370. *Urala, N. and L. Lähteenmäki, Reasons behind consumers' functional food choices. Nutrition & Food Science, 2003.* ***33****(4): p. 148 - 158.*
371. *Connors, M., et al., Managing values in personal food systems. Appetite, 2001.* ***36****(3): p. 189-200.*
372. *Furey, S., et al., Cooking skills: A diminishing art? . Nutrition & Food Science, 2000.* ***30****(5).*
373. *Yanchar, S.C. and D.D. Williams, Reconsidering the compatibility thesis and eclecticism: Five proposed guidelines for method use. Educational Researcher, 2006.* ***35****(9): p. 3-12.*
374. *Bazeley, P., Issues in mixing qualitative and quantitative approaches to research in Applying qualitative methods to marketing management research, J.G. R. Buber, & L. Richards, Editor. 2004, Palgrave Macmillan: Melbourne. p. 141-156.*
375. *Howe, K.R., Against the quantitative-qualitative incompatibility thesis or dogmas die hard. Educational Researcher, 1988.* ***17****(8): p. 10-16.*
376. *Bahari, S.F., Qualitative versus quantitative research strategies: Contrasting epistemological and ontological assumptions. Journal of Technology, 2010.* ***52****: p. 17-28*
377. *Johnson, R.B. and A.J. Onwuegbuzie, Mixed methods research: A research paradigm whose time has come. Educational Researcher, 2004.* ***33****(7): p. 14-26.*

378. *Tashakkori, A., Teddlie, C Mixed methodology: Combining qualitative and quantitative approaches. Thousand oaks. 1998, California: Sage.*
379. *Greene, J.C., Is mixed methods social inquiry a distinctive methodology? Journal of Mixed Methods Research, 2008.* ***2****(1): p. 7-22.*
380. *Tashakkori, A. and C. Teddlie, Handbook of mixed methods in social & behavioral research. 2003, Thousand Oaks, California: Sage.*
381. *Abowitz, D. and T. Toole, Mixed method research: Fundamental issues of design, validity, and reliability in construction research. Journal of Construction Engineering and Management, 2010.* ***136, No. 1, January*** *(1): p. 108-116.*
382. *Jick, T., Mixing qualitative and quantitative methods: Triangulation in action. Administrative Science Quarterly, 1979.* ***24****.*
383. *Liamputtong, P. and D. Ezzy, Qualitative research methods, Second Edition. 2005, Melbourne: Oxford University Press.*
384. *Besculides, M., R. Farris, and J. Will, Identifying best practices for WISEWOMAN programs using a mixed-methods evaluation. Preventing Chronic Disease, 2006.* ***3****(1).*
385. *Greene, J.C., V.J. Caracelli, and W.F. Graham, Toward a conceptual framework for mixed-method evaluation designs. Educational Evaluation and Policy Analysis, 1989.* ***11****(3): p. 255-274.*
386. *Grbich, C., Qualitative research in health: An introduction. 1999, London: Sage.*
387. *Gilbert, T., Mixed methods and mixed methodologies. Journal of Research in Nursing, 2006.* ***11****(3): p. 205-217.*
388. *Onwuegbuzie, A. and N. Leech, Enhancing the interpretation of "significant" findings:The role of mixed methods research. The Qualitative Report, 2004.* ***9****(4): p. 770-792.*
389. *Popay, J., et al., Theorising inequalities in health: The place of lay knowledge, in Medical sociology: Social structures and health G. Scambler, Editor. 2005, Routledge: New York.*
390. *Miles, M. and M. Huberman, Qualitative data analysis. 1994, London: Sage.*
391. *Meyer-Krahmer, F., Quantitative approaches - strengths and weaknesses. Scientometrics, 1999.* ***45*** *(3): p. 413-415.*
392. *Hudelson, P., Qualitative research for health programmes. 1996, World Health Organisation, Division of Mental Health and Prevention of Substance Abuse.: Geneva.*
393. *McCaffery, K., et al., Attitudes towards HPV testing: A qualitative study of beliefs among Indian, Pakistani, African-caribbean and white British women in the UK. British Journal of Cancer, 2003.* ***88****(1): p. 42-46.*
394. *Martha, D., V.D. Sousa, and I.A.l.C. Mendes, An overview of research designs relevant to nursing: Part 3: Mixed and multiple methods. Revista Latino-Americana de Enfermagem, 2007.* ***15****: p. 1046-1049.*
395. *Gelfand, L., J. Mensinger, and Y. Tenhave, Mediation analysis: A retrospective snapshot of practice and more recent directions. The Journal of General Psychology, 2009.* ***136****(2).*
396. *Cleland, V. and K. Ball, Recruiting hard-to-reach populations: Lessons from a study of women living in socioeconomically disadvantaged areas of Victoria, Australia. Health Promotion Journal of Australia, 2010.* ***21****(3): p. 243.*

397. *Turrell, G. and J. Najman, Collecting food-related data from low socioeconomic groups; how adequate are our current research designs? Australian Journal of Public Health, 1995.* ***19****(4): p. 410-416.*
398. *Brodie, M., et al., Health information, the internet, and the digital divide. Health Affairs, 2000.* ***19****(6): p. 255-265.*
399. *Lahelma, E., et al., Pathways between socioeconomic determinants of health. Journal of Epidemiology and Community Health, 2004.* ***58****(4): p. 327-332.*
400. *Hewitt, B., et al., The Brisbane food study: A multi-level and spatial investigation of socioeconomic differences in food purchasing behaviour. 2003, Queensland University of Technology: Brisbane.*
401. *Turrell, G., et al., The socio-economic patterning of survey participation and non-response error in a multilevel study of food purchasing behaviour: Area- and individual-level characteristics. Public Health Nutrition, 2003.* ***6****(2): p. 181-189.*
402. *Hyndman, J.C.G., et al., Misclassification of social disadvantage based on geographical areas: Comparison of postcode and collector's district analyses. International Journal of Epidemiology, 1995.* ***24****(1): p. 165-176.*
403. *Australian Bureau of Statistics, Statistical Geography, volume 1, Australian standard geographical classification (asgc) cat no. 1216.0. 1996, Australian Government Publishing Service: Canberra.*
404. *Weiss, B.D., R.L. Reed, and E.W. Kligman, Literacy skills and communication methods of low-income older persons. Patient Education and Counseling, 1995.* ***25****(2): p. 109-119.*
405. *Fredrickson, D.D., et al., Optimal design features for surveying low-income populations. Journal of Health Care for the Poor and Underserved, 2005.* ***16****(4).*
406. *National Health and Medical Research Council, Dietary guidelines for Australians. 1992, Australian Government Publishing Service: Canberra.*
407. *Commonwealth Department of Health and Family Services, Australian guide to healthy eating. 1998, Australian Government Publishing Service: Canberra.*
408. *Australian Bureau of Statistics, National Nutrition Survey: Foods eaten Australia, Cat. No. 4804.0, Editor. 1995, Australian government publishing service: Canberra.*
409. *National Health and Medical Research Council, Dietary guidelines for children and adolescents. 2003, Australian Government Publishing Service: Canberra.*
410. *Australian Bureau of Statistics, 1996-1997 apparent consumption of foodstuffs, in Cat. No. 4306.0. 1998.*
411. *National Health and Medical Research Council, Dietary guidelines for older Australians. 1999, Australian Government Publishing Service: Canberra.*
412. *National Health and Medical Research Council, Dietary guidelines for Australians: Draft for public consultation 2011, Australian Government Publishing Service: Canberra.*
413. *Pelletier, C.A. and H.T. Lawless, Measuring taste acceptance in neurologically impaired adults. Food Quality and Preference, 2003.* ***14****(7): p. 595-602.*
414. *Hekmat, S. and G. Reid, Sensory properties of probiotic yogurt is comparable to standard yogurt. Nutrition Research, 2006.* ***26****(4): p. 163-166.*

415. *Rothman, S., Young people from low-SES families and participation in higher education: Evidence from five Australian cohorts in National Higher Education Student Equity Forum. 2003: Canberra.*
416. *Turrell, G., et al., Measuring socio-economic position in dietary research: Is choice of socio-economic indicator important? Public Health Nutrition., 2003. **2**: p. 191-200.*
417. *Lee, S., et al., Education, other socioeconomic indicators, and cognitive function. American Journal of Epidemiology, 2003. **157**(8): p. 712-720.*
418. *Fein, O., The influence of social class on health status. Journal of General Internal Medicine, 1995. **10**(10): p. 577-586.*
419. *Wolfe, W.S., E.A. Frongillo, and P. Valois, Understanding the experience of food insecurity by elders suggests ways to improve its measurement. The Journal of Nutrition, 2003. **133**(9): p. 2762-2769.*
420. *Turrell, G., Compliance with the Australian dietary guidelines in the early 1990's: Have population-based health promotion programs been effective? Nutrition and Health, 1997. **11**: p. 271-288.*
421. *Brennan, D.S. and K.A. Singh, Grocery purchasing among older adults by chewing ability, dietary knowledge and socio-economic status. Public Health Nutrition, 2011. **14**(7): p. 1279-1284.*
422. *Statsoft. Prinicpal components and factor analysis. Electronic statistics textbook 2010 [cited 2010; Available from: http://www.statsoft.com/textbook/principal-components-factor-analysis/.*
423. *Kolodinsky, J., et al., Knowledge of current dietary guidelines and food choice by college students: Better eaters have higher knowledge of dietary guidance. Journal of the American Dietetic Association, 2007. **107**(8): p. 1409-1413.*
424. *Busselman, K. and C. Holcomb, Reading skill and comprehension of the dietary guidelines by WIC participants. Journal of the American Dietetic Association, 1994. **94**(6): p. 622-625.*
425. *Trent, L.K., Nutrition knowledge of active-duty navy personnel. Journal of the American Dietetic Association, 1992. **v92**(n6): p. p724(5).*
426. *Babbie, E., The basics of social research. 2008, Belmont: Thomson Learning.*
427. *Birch, L.L., et al., What kind of exposure reduces children's food neophobia?: Looking vs. Tasting. Appetite, 1987. **9**(3): p. 171-178.*
428. *Tabachnick, B. and L. Fidell, Using multivariate statistics. 2007, Boston: Pearson.*
429. *Stanimirova, I., M. Daszykowski, and B. Walczak, Dealing with missing values and outliers in principal component analysis. Talanta, 2007. **72**(1): p. 172-178.*
430. *Szklo, M. and J. Nieto, Epidemiology: Beyond the basics 2007, Massachusetts: Jones & Bartlett Publishers.*
431. *Arcury, T.A., et al., Diabetes beliefs among low-income, white residents of a rural North Carolina community. The Journal of Rural Health, 2005. **21**(4): p. 337-345.*
432. *Weichselbaumer, D. and R. Winter-Ebmer, A meta-analysis of the international gender wage gap, in Meta-regression analysis: Issues of publication bias in economics C. Roberts and T. Stanley, Editors. 2005, Blackwell publishing: Oxford.*
433. *Xu, W.U. and A.N.N. Leffler, Gender and race effects on occupational prestige, segregation and earnings. Gender & Society, 1992. **6**(3): p. 376-392.*
434. *Rosenberg, M., The logic of survey analysis. 1968, New York: Basic Books.*

435. *Davis, J.A., The logic of causal order. 1985, Beverly Hills: Sage.*
436. *Hayes, A.F., Beyond baron and kenny: Statistical mediation analysis in the new millennium. Communication Monographs, 2009.* ***76****(4): p. 408 - 420.*
437. *Kutner, M., et al., Applied linear regression models, 4th edition. 2004: McGraw-Hill Irwin,.*
438. *O'Brien, R., A caution regarding rules of thumb for variance inflation factors. Quality & Quantity, 2007.* ***41****: p. 673-690.*
439. *Thoemmes, F., D.P. MacKinnon, and M.R. Reiser, Power analysis for complex mediational designs using monte carlo methods. Structural Equation Modeling: A Multidisciplinary Journal, 2010.* ***17****(3): p. 510-534.*
440. *Fritz, M.S. and D.P. MacKinnon, Required sample size to detect the mediated effect. Psychological Science, 2007.* ***18****(3): p. 233-239.*
441. *Fairchild, A. and D. MacKinnon, A general model for testing mediation and moderation effects. Prevention science : the official journal of the Society for Prevention Research, 2009.* ***10****(2): p. 87-99.*
442. *Zyzanski, S.J., S.A. Flocke, and L.M. Dickinson, On the nature and analysis of clustered data. The Annals of Family Medicine, 2004.* ***2****(3): p. 199-200.*
443. *Preacher, K. and A. Hayes, Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods, 2008.* ***40****(3): p. 879-891.*
444. *Hayes, A. Process: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. 2012 [cited; Available from: http://www.afhayes.com/public/process2012.pdf.*
445. *Brown, R.L., Assessing specific mediational effects in complex theoretical models. Structural Equation Modeling, 1997.* ***4****(142-156).*
446. *Kenny, D.A. Mediation. 2012 [cited 2012 13 February]; Available from: http://davidakenny.net/cm/mediate.htm.*
447. *Preacher, K., Personal communication. 2011.*
448. *Daborn, C., L. Dibsall, and N. Lambert, Understanding the food related experiences and beliefs of a specific group of low-income men in the UK. Journal:Health Education*

2005. ***105****(2): p. 109 - 125.*

449. *Treiman, K., et al., Attitudes and behaviors related to fruits and vegetables among low-income women in the WIC program. Journal of Nutrition Education, 1996.* ***28****(3): p. 149-156.*
450. *Kristen Wiig, D. and S. Chery, Factors affecting low-income women's food choices and the perceived impact of dietary intake and socioeconomic status on their health and weight. Journal of Nutrition Education and Behavior, 2009.* ***41****(4): p. 242-253.*
451. *Yong, V., Interviewing men on sensitive issues. Contemporary nurse, 2001.* ***11****: p. 18-27.*
452. *Flick, U., An introduction to qualitative research 2006, London: sage.*
453. *Tjonneland, A., et al., Study design, exposure variables, and socioeconomic determinants of participation in diet, cancer and health: A population-based prospective cohort study of 57,053 men and women in denmark. Scandinavian Journal of Public Health, 2007.* ***35****(4): p. 432-441.*

454. *Cox, D., et al., UK consumer attitudes, beliefs and barriers to increasing fruit and vegetable consumption. Public Health Nutrition, 1998. **1**: p. 61.*
455. *Wardle, J., et al., Gender differences in food choice: The contribution of health beliefs and dieting. Annals of Behavioral Medicine, 2004. **27**(2): p. 107-116.*
456. *Fagerli, R.A. and M. Wandel, Gender differences in opinions and practices with regard to a "Healthy diet". Appetite, 1999. **32**(2): p. 171-190.*
457. *National Health and Medical Research Council, The role of polyunsaturated fats in the Australian diet. 1992, Australian Government Publishing Service: Canberra.*
458. *Cronin, F.J., et al., Characterizing food usage by demographic variables. Journal of the American Dietetic Association, 1982. **81**: p. 661 - 673.*
459. *Edward A. Suchman, Health orientation and medical care. American Journal of Public Heallth, 1966. **56**(1).*
460. *Elliott, S.J. and J. Gillie, Moving experiences: A qualitative analysis of health and migration. Health & Place, 1998. **4**(4): p. 327-339.*
461. *Mertler, C.A., Action research: Teachers as researchers in the classroom. 2008, London: Sage.*
462. *Coast, J., et al., Using qualitative methods for attribute development for discrete choice experiments: Issues and recommendations. Health Economics, 2011. **Published online ahead of print**.*
463. *Braun, V. and V. Clarke, Using thematic analysis in psychology. Qualitative Research in Psychology, 2006. **3**(2): p. 77 - 101.*
464. *Quinn-Patton, M., Qualitative research & evaluation methods. 2001, London: Sage Publications.*
465. *Boyatzis, R.E., Transforming qualitative information: Thematic analysis and code development. 1998, Thousand Oaks: Sage.*
466. *Wilkinson, S., Focus group research, in Qualitative research: Theory, method and practice. 2004, Sage Publications: London.*
467. *Dibsdall, L., N. Lambert, and L. Frewer, Using interpretative phenomenology to understand the experiences of a low income group of UK women towards aspects of food choice and health. Journal of Nutrition Education, 2002. **34**: p. 298–309.*
468. *Anderson, C., Presenting and evaluating qualitative research. Am J Pharm Educ, 2010 **74**(8).*
469. *Silverman, D., Doing qualitative research. 2010, London: Sage.*
470. *Boeije, H., A purposeful approach to the constant comparative method in the analysis of qualitative interviews. Quality and Quantity, 2002. **36**(4): p. 391-409.*
471. *Chiovitti R, F. and N. Piran, Methodological issues in nursing research: Rigour and grounded theory research. Journal of Advanced Nursing, 2003. **44**(4): p. 427-435.*
472. *Thomas, E. and J.K. Magilvy, Qualitative rigor or research validity in qualitative research. Journal for Specialists in Pediatric Nursing, 2011. **16**(2): p. 151-155.*
473. *Tobin, G. and C. Begley, Methodological rigour within a qualitative framework. Journal of Advanced Nursing, 2004. **48**(4): p. 388-396.*
474. *Denzin, N. and Y. Lincoln, The discipline and practice of qualitative research. Handbook of qualitiative research second edition, ed. N.D.Y. Lincoln. 2000, California: Sage Publications.*
475. *Seale, C., D. Silverman, and D. Thelle, Ensuring rigour in qualitative research. European journal of public health, 1997. **7**: p. 379-384.*

476. *Kirk, J. and M. Miller, Reliability and validity in qualitative research 1986, London: Sage Publications.*
477. *Thurmond, V.A., The point of triangulation. Journal of Nursing Scholarship, 2001.* ***33****(3): p. 253-258.*
478. *Finlay, L., Outing the researcher: The provenance, process, and practice of reflexivity. Qualitative Health Research, 2002.* ***12****(4): p. 531-545.*
479. *National Health and Medical Research Council, Dietary guidelines for Australian adults. 1999, Canberra.*
480. *Schickenberg, B., et al., Are the Dutch acquainted with and willing to try healthful food products? The role of food neophobia. Public Health Nutrition, 2008.* ***11****(5): p. 493-500.*
481. *Astrup, A., L. Ryan, and M.S. Gary K. Grunwald, Wim Saris, Ed Melanson and James O. Hill The role of dietary fat in body fatness: Evidence from a preliminary meta-analysis of ad libitum low-fat dietary intervention studies. British Journal of Nutrition, 2000.* ***83****: p. S25-S32*
482. *Van't Veer P, et al., Fruits and vegetables in the prevention of cancer and cardiovascular disease. Public Health Nutrition, 2000.* ***3****: p. 103-7.*
483. *Ireland J, et al., Selection of a food classification system and a food composition database for future food consumption surveys. European Journal of Clinical Nutrition, 2002* ***56*** *(Suppl 2:S33-45).*
484. *Huang, C.L. and S.K. Misra, Assessing nutritional adequacy of Americans based on individual food intake patterns. Journal of Consumer Studies & Home Economics, 1991.* ***15****(2): p. 147-159.*
485. *Senauer, B., Economics and nutrition. What is america eating?, ed. F.a.N.B.N.R. Council. 1986, Washington, D.C.: National Academy Press.*
486. *Windham CT, et al., Nutrient density of diets in the USDA nationwide food consumption survey, 1977–1978: I. Impact of socioeconomic status on dietary density. Journal of the American Dietetic Association, 1983.* ***82****(28-34).*
487. *Raffensperger, S., et al., Effect of race and predictors of socioeconomic status on diet quality in the HANDLS study sample. Journal of the National Medical Association, 2010.* ***102****(10): p. 923-30.*
488. *Stringhini S, et al., Association of socioeconomic position with health behaviors and mortality. The Journal of the American Medical Association, 2010.* ***24****(303 (12)): p. 1159-66.*
489. *Stewart, H., et al., Can low-income americans afford to satisfy mypyramid fruit and vegetable guidelines? Journal of Nutrition Education and Behavior, 2009.* ***43****(3): p. 173-179.*
490. *Drewnowski, A. and P. Eichelsdoerfer, Can low-income Americans afford a healthy diet? Nutrition Today, 2009.* ***44****(6): p. 246-249 10.1097/NT.0b013e3181c29f79.*
491. *Vinkeles Melchers, N., M. Gomez, and R. Colagiuri, Do socio-economic factors influence supermarket content and shoppers' purchases? Health Promotion Journal of Australia, 2009.* ***20****(3): p. 241-246.*
492. *Department of Health and Ageing. Swap it don't stop it. Commonwealth Government of Australia 2011 [cited 18 Feb 2012]; Available from: http://swapit.gov.au/.*

493. *Magkos, F., F. Arvaniti, and A. Zampelas, Organic food: Nutritious food or food for thought? A review of the evidence. International Journal of Food Sciences and Nutrition, 2003.* ***54****(5): p. 357-371.*
494. *D' Houtaud, A. and M. Field, The image of health: Variations in perception by social class in a French population. Sociology of Health & Illness, 1984.* ***6****(1): p. 30-60.*
495. *Ulijaszek, S., Socio-economic status, forms of capital and obesity. Journal of Gastrointestinal Cancer, 2012.* ***43****(1): p. 3-7.*
496. *Worsley, A., Nutrition knowledge and food consumption: Can nutrition knowledge change food behaviour? Asia Pacific Journal of Clinical Nutrition, 2002.* ***11****(s3): p. S579-S585.*
497. *Lakshman, R., et al., A novel school-based intervention to improve nutrition knowledge in children: Cluster randomised controlled trial. BMC Public Health, 2010.* ***10****(1): p. 123.*
498. *Shariff, Z., et al., Nutrition education intervention improves nutrition knowledge, attitude and practices of primary school children: A pilot study. International Electronic Journal of Health Education, 2008.* ***11****: p. 119-132.*
499. *Hart, K.H., et al., Promoting healthy diet and exercise patterns amongst primary school children: A qualitative investigation of parental perspectives. Journal of Human Nutrition and Dietetics, 2003.* ***16****(2): p. 89-96.*
500. *Jack, F.R., et al., Perception of fruit as a snack: A comparison with manufactured snack foods. Food Quality and Preference, 1997.* ***8****(3): p. 175-182.*
501. *Valente, T.W. and R. Fosados, Diffusion of innovations and network segmentation: The part played by people in promoting health. Sexually Transmitted Diseases, 2006.* ***33****(7): p. S23-S31*
502. *Lister, R., Poverty, material insecurity and income vulnerability: The role of savings, in The saving gateway: From principles to practice, S. Sodha and R. Lister, Editors. 2006, Institute for Public Policy Research: London.*
503. *Garcia, A., Is health promotion relevant across cultures and the socioeconomic spectrum? Family & Community Health, 2006.* ***29****(1): p. 20S - 27S*
504. *Ward, P.R., et al., How do south Australian consumers negotiate and respond to information in the media about food and nutrition?: The importance of risk, trust and uncertainty. Journal of Sociology, 2012.* ***48****(1): p. 23-41.*
505. *Variyam, J.N., Y. Shim, and J. Blaylock, Consumer misperceptions of diet quality. Journal of Nutrition Education, 2001.* ***33****(6): p. 314-321.*
506. *Weinstein, N.D., Unrealistic optimism about future life events. Journal of Personality and Social Psychology, 1980.* ***39*** *p. 806-820.*
507. *Klein, C.T.F. and M. Helweg-Larsen, Perceived control and the optimistic bias: A meta-analytic review. Psychology & Health, 2002.* ***17****(4): p. 437-446.*
508. *Weinstein, N.D., Unrealistic optimism about susceptibility to health problems: Conclusions from a community-wide sample. Journal of Behavioral Medicine, 1987.* ***10****(5): p. 481-500.*
509. *Chock, T.M., The influence of body mass index, sex, and race on college students optimistic bias for lifestyle healthfulness. Journal of Nutrition Education and Behavior.* ***43****(5): p. 331-338.*
510. *Rogers, E., Diffusion of innovations 3rd ed. 1983, New York: Free Press.*

511. *Van Oort, F., et al., Cross-national comparison of the link between socioeconomic status and emotional and behavioral problems in youths. Social Psychiatry and Psychiatric Epidemiology, 2011.* ***46****(2): p. 167-172.*
512. *Grzywacz, J., et al., Socioeconomic status and health: A micro-level analysis of exposure and vulnerability to daily stressors. Journal of Health and Social Behavior, 2004.* ***45****(1).*
513. *Adler, N.E. and A. Conner Snibbe, The role of psychosocial processes in explaining the gradient between socioeconomic status and health. Current Directions in Psychological Science, 2003.* ***12****(4): p. 119-123.*
514. *Vlahov, D., et al., Increased use of cigarettes, alcohol, and marijuana among Manhattan, New York, residents after the september 11th terrorist attacks. American Journal of Epidemiology, 2002.* ***155****(11): p. 988-996.*
515. *Beckham, J.C., et al., Prevalence and correlates of heavy smoking in vietnam veterans with chronic posttraumatic stress disorder. Addictive Behaviors, 1997.* ***22****(5): p. 637-647.*
516. *Zellner, D.A., et al., Food selection changes under stress. Physiology & Behavior, 2006.* ***87****(4): p. 789-793.*
517. *Cancer Council and C.o.S.S.o.N.S. Wales. The reciprocal relationship between social disadvantage, financial stress and smoking: What does the research tell us? What can community service organisations do? in Smoking and Disadvantage Seminar 2008. NSW.*
518. *Gilman, S.E., et al., Education and race-ethnicity differences in the lifetime risk of alcohol dependence. Journal of Epidemiology and Community Health, 2008.* ***62****(3): p. 224-230.*
519. *Hopper, C.A., et al., Effect of including parents in a school-based exercise and nutrition program for children. Research Quarterly for Exercise and Sport, 1992.* ***63****(3): p. 315-21*
520. *Crockett, S.J., et al., Parent education in youth-directed nutrition interventions. Preventive Medicine, 1989.* ***18****(4): p. 475-491.*
521. *White E, et al., Dietary changes among husbands of participants in a low-fat dietary intervention. American Journal of Preventive Medicine, 1991.* ***7****(5): p. 319-25.*
522. *Langenberg, P., et al., Psychosocial factors and intervention-associated changes in those factors as correlates of change in fruit and vegetable consumption in the Maryland WIC 5 a day promotion program. Annals of Behavioral Medicine, 2000.* ***22****(4): p. 307-315.*
523. *Feunekes, G.I.J., et al., Food choice and fat intake of adolescents and adults: Associations of intakes within social networks. Preventive Medicine, 1998.* ***27****(5): p. 645-656.*
524. *Pearlin, L.I., The sociological study of stress. Journal of Health and Social Behavior, 1989.* ***30****(3): p. 241-256.*
525. *Weng, C.-Y., SES gradient in psychological distress revisited a dynamic perspective on the mediating effect of financial strain and mastery, in Department of Sociology. 2008, Iowa State University: Ames.*

526. *Gallo, L.C. and K.A. Matthews, Understanding the association between socioeconomic status and physical health: Do negative emotions play a role? Psychological Bulletin, 2003.* ***129****(1): p. 10-51.*
527. *Graham, H., Women's smoking and family health. Social Science and Medicine, 1987.* ***25****: p. 47-56.*
528. *Pampel, F.C., P.M. Krueger, and J.T. Denney, Socioeconomic disparities in health behaviors. Annual Review of Sociology,, 2010.* ***36****: p. 349-370.*
529. *Layte, R. and C.T. Whelan, Explaining social class inequalities in smoking: The role of education, self-efficacy, and deprivation. European Sociological Review, 2009.* ***25****(4): p. 399-410.*
530. *Bourdieu, P., Distinction: A social critique of the judgement of taste. 1984, London: Routledge.*
531. *Douglas, M. and J. Gross, Food and culture: Measuring the intricacy of rule systems. Social Science Information, 1981.* ***20****(1): p. 1-35.*
532. *Köster, E.P., Diversity in the determinants of food choice: A psychological perspective. Food Quality and Preference, 2009.* ***20****(2): p. 70-82.*
533. *Shepherd, R., Social determinants of food choice. Proceedings of the Nutrition Society, 1999.* ***58****(4): p. 807-812.*
534. *Schneider, L. and S. Lysgaard, The deferred gratification pattern: A preliminary study. American Sociological Review, 1953.* ***18,*** *: p. 142-49.*
535. *Hirschi T and Gottfredson MR, The generality of deviance. 1994, New Brunswick, : Transaction.*
536. *Sunstein, C.R., Social norms and social roles. Columbia Law Review, 1996.* ***96****(4): p. 903-968.*
537. *Green, L.W., Manual for scoring socioeconomic status for research on health behavior. Public Health Reports, 1970.* ***85****(9): p. 815-827.*
538. *Pliner, P., The effects of mere exposure on liking for edible substances. Appetite, 1982.* ***3****: p. 283 290.*
539. *DeVault, M.L., Feeding the family: The social organization of caring as gendered work. 1994: University of Chicago Press.*
540. *Adams, J. and M. White, Socio-economic and gender differences in nutritional content of foods advertised in popular UK weekly magazines. The European Journal of Public Health, 2009.* ***19****(2): p. 144-149.*
541. *Bernard-Bonnin AC, et al., Television and the 3- to 10-year-old child. Pediatrics, 1991.* ***88****(48-54).*
542. *Kumanyika, S. and S. Grier, Targeting interventions for ethnic minority and low-income populations. The Future of Children, 2006.* ***16****(1): p. 187-207.*
543. *Stamatakis, E., et al., Television viewing and other screen-based entertainment in relation to multiple socioeconomic status indicators and area deprivation: The Scottish health survey 2003. Journal of Epidemiology and Community Health, 2009.* ***63****(9): p. 734-740.*
544. *Halford, J.C.G., et al., Beyond-brand effect of television (tv) food advertisements/commercials on caloric intake and food choice of 5 to7 year-old children. Appetite, 2007.* ***49****(1): p. 263-267.*
545. *Powell, L.M., et al., Nutritional content of television food advertisements seen by children and adolescents. Pediatrics, 2007.* ***120****(576-583).*

546. *Owen, B. and J. Carter, The weighty issue of Australian television food advertising and childhood obesity. Health Promotion Journal of Australia, 2006.* ***17*** *(1).*
547. *WARNER, K.E., Television and health education: Stay tuned. American Journal of Public Health, 1987.* ***77****(2).*
548. *Reid, D., A. Killoran, and A. McNeill, Choosing the most effective health promotion options for reducing a nation's smoking prevalence. Tobacco Control, 1992.* ***1****: p. 185-97.*
549. *Davis, T.C., et al., Health literacy and cancer communication. CA: A Cancer Journal for Clinicians, 2002.* ***52****(3): p. 134-149.*
550. *McKay, D.L., et al., Nutrition information sources vary with education level in a population of older adults. Journal of the American Dietetic Association, 2006.* ***106****(7): p. 1108-1111.*
551. *National Telecommunications and Information Administration, Falling through the net: Toward digital inclusion 2000.*
552. *Birru, M.S., et al., Internet usage by low-literacy adults seeking health information: An observational analysis. Journal of Medical Internet Research, 2004.* ***6****(3): p. e25.*
553. *Mindell, J., An assessment of the feasibility of health authorities generating unpaid mass media publicity in the long term. Health Education Journal, 1997.* ***56****(2): p. 125-133.*
554. *Kontos, E.Z., et al., Determinants and beliefs of health information mavens among a lower-socioeconomic position and minority population. Social Science and Medicine.* ***73****(1): p. 22-32.*
555. *McConaghy, J., Adults' beliefs about the determinants of successful dietary change. Community Health Studies, 1989.* ***13****(4): p. 492-502.*
556. *Woodcock, A., K. Stenner, and R. Ingham, "All these contraceptives, videos and that ...": Young people talking about school sex education. Health Education Research, 1992.* ***7****(4): p. 517-531.*
557. *Turner, G. and J. Shepherd, A method in search of a theory: Peer education and health promotion. Health Education Research, 1999.* ***14****(2): p. 235-247.*
558. *Solomon, L.J. and B.S. Flynn, Telephone support for pregnant smokers who want to stop smoking. Health Promotion Practice, 2005.* ***6****(1): p. 105-108.*
559. *Kickbusch, I.S., Health literacy: Addressing the health and education divide. Health Promotion International, 2001.* ***16****(3): p. 289-297.*
560. *Howard, D.H., T. Sentell, and J.A. Gazmararian, Impact of health literacy on socioeconomic and racial differences in health in an elderly population. Journal of General Internal Medicine, 2006.* ***21****(8): p. 857-861.*
561. *Lindau, S.T., et al., Improving rates of cervical cancer screening and pap smear follow-up for low-income women with limited health literacy. Cancer Investigation, 2001.* ***19****(3): p. 316-323.*
562. *Pampel, F.C., Socioeconomic distinction, cultural tastes, and cigarette smoking. Social Science Quarterly, 2006.* ***87****(1): p. 19-35.*
563. *Cockerham, W., Health lifestyle theory and the convergence of agency and structure. Journal of Health and Social Behavior, 2005.* ***46****: p. 51-67.*
564. *Crompton, R., Class and stratification.2nd edition 1998, Oxford, United Kingdom: Polity Press.*

565. *DOWLER, E. and B. DOBSON. Nutrition and poverty in Europe: An overview. in Proceedings of the Nutrition Society. 1997. Coleraine*
566. *Kaplan, G. and J. Lynch, Is economic policy health policy? American Journal of Public Heallth, 2001* ***91****(3): p. 351-353.*
567. *Kaplan, G., Economic policy is healthy policy: Findings from the study of income, socioeconomic status, and health. Income, socioeconomic status and health: Exploring the relationships, ed. Auerbach JA and Krimgold BK. 2001, Washington, DC: National Policy Association. 137-49.*
568. *Young, C., K. Berresford, and B. Greer Waldner, Nutritional knowledge and practices. Public Health Reports, 1956* ***71*** *(5): p. 487-492.*
569. *Rozin, P., et al., Attitudes to food and the role of food in life in the U.S.A., Japan, Flemish belgium and France: Possible implications for the diet-health debate. Appetite, 1999.* ***33****(2): p. 163-180.*
570. *Stern, M.P., et al., Sex difference in the effects of sociocultural status on diabetes and cardiovascular risk factors in Mexican Americans: The San Antonio heart study. American Journal of Epidemiology, 1984.* ***120****(6): p. 834-851.*
571. *Woodruff, S., et al., Effects of gender and acculturation on nutrition-related factors among limited-English proficient hispanic adults. Ethnicity and Disease, 1997.* ***7****: p. 121.*
572. *Taylor, T., et al., Knowledge, skills, and behavior improvements on peer educators and low-income hispanic participants after a stage of change-based bilingual nutrition education program. Journal of Community Health, 2000.* ***25****(3): p. 241-262.*
573. *Lupton, D., The heart of the meal: Food preferences and habits among rural Australian couples. Sociology of Health and Illness, 2000.* ***22****(1): p. 94-109.*
574. *Steering Committee for the Review of Government Service Provision, Overcoming indigenous disadvantage:Key indicators 2011. 2011, Productivity Commission: Canberra.*
575. *Miller, P. and L.M. Neo, Labour market flexibility and immigrant adjustment. Economic Record, 2003.* ***79****(246): p. 336-356.*
576. *Southcombe, F., Feeding the family in an unfamiliar environment: Food insecurity among recently resettled refugees, N.R.H. Service, Editor. 2006.*
577. *Google. Google scholar citation search. 2012 [cited 2012 16/03/2012]; Available from: http://scholar.google.com.au.*
578. *Department of Health and Ageing. Measure up. Commonwealth Government of Australia 2011 [cited 18 Feb 2012]; Available from: http://www.measureup.gov.au.*
579. *Sutherland, L.A., et al., Like parent, like child: Child food and beverage choices during role playing. Archives of Pediatrics and Adolescent Medicine, 2008.* ***162****(11): p. 1063-1069.*
580. *Pearson, N., et al., Family circumstance and adolescent dietary behaviours. Appetite, 2009.* ***52****(3): p. 668-674.*
581. *Grimm, G.C., L. Harnack, and M. Story, Factors associated with soft drink consumption in school-aged children. Journal of the American Dietetic Association, 2004.* ***104****(8): p. 1244-1249.*

582. *Rasmussen, M., et al., Determinants of fruit and vegetable consumption among children and adolescents: A review of the literature. Part i: Quantitative studies. International Journal of Behavioral Nutrition and Physical Activity, 2006.* ***3****(1): p. 22.*
583. *Sanders Thompson, V.L., et al., Evidential preferences: Cultural appropriateness strategies in health communications. Health Education Research, 2008.* ***23****(3): p. 549-559.*
584. *Garcia, A., Is health promotion relevant across cultures and the socioeconomic spectrum? Family & Community Health, Promoting Health in Persons With Chronic and Disabling Conditions.* ***29****(1): p. 20S - 27S*
585. *Rogers, A. and J. Popay, Inequalities in health & health promotion: Insights from the qualitative research literature. . 1997, Health Education Authority, : London.*
586. *Kreuter, M.W., et al., Achieving cultural appropriateness in health promotion programs: Targeted and tailored approaches. Health Education & Behavior, 2003.* ***30****(2): p. 133-146.*
587. *Byerly, J., et al., Nutrition knowledge, attitudes and food intake of low-socio-economic status pregnant adolescents. Journal of the American Dietetic Association, 1999.* ***99****(9): p. A34.*
588. *Guthrie, J.F. and B.-H. Lin, Overview of the diets of lower- and higher-income elderly and their food assistance options. Journal of Nutrition Education and Behavior, 2002.* ***34, Supplement 1****: p. S31-S41.*
589. *Harrison, M., et al., The increasing cost of the basic foods required to promote health in queensland. Medical Journal of Australia., 2007.* ***186****(1): p. 9-14.*
590. *Williams, P., A. Hull, and M. Kontos, Trends in affordability of the illawarra healthy food basket 2000–2007. Nutrition & Dietetics, 2009.* ***66****(1): p. 27-32.*
591. *Burns CM, G.P., Boak R, Baudinette S, Dunbar JA. , Food cost and availability in a rural setting in Australia. Rural and Remote Health, 2004.* ***4****(311).*
592. *Kettings, C., A.J. Sinclair, and M. Voevodin, A healthy diet consistent with Australian health recommendations is too expensive for welfare-dependent families. Australian and New Zealand Journal of Public Health, 2009.* ***33****(6): p. 566-572.*
593. *Ward, P., et al., Cost and affordability of healthy food in rural south Australia. Rural and Remote Health, 2012.* ***12****: p. 1938.*
594. *Burns, C., et al., Food cost and availability in a rural setting in Australia. Rural and Remote Health, 2004.* ***4****(311).*
595. *Ness AR and P. JW., Fruit and vegetables, and cardiovascular disease: A review. International Journal of Epidemiology, 1997.* ***26****(1): p. 1-13.*
596. *French, S.A., Pricing effects on food choices. The Journal of Nutrition, 2003.* ***133****(3): p. 841S-843S.*
597. *Dong, D. and B.-H. Lin, Fruit and vegetable consumption by low-income Americans: Would a price reduction make a difference?, in Economic Research Report. 2009, United States Department of Agriculture, Economic Research Service.*
598. *Department of Health. Disadvantaged families get healthy boost. 2011 [cited 06/09/2011]; Available from: http://www.dh.gov.uk/en/MediaCentre/Pressreleases/DH_125858.*

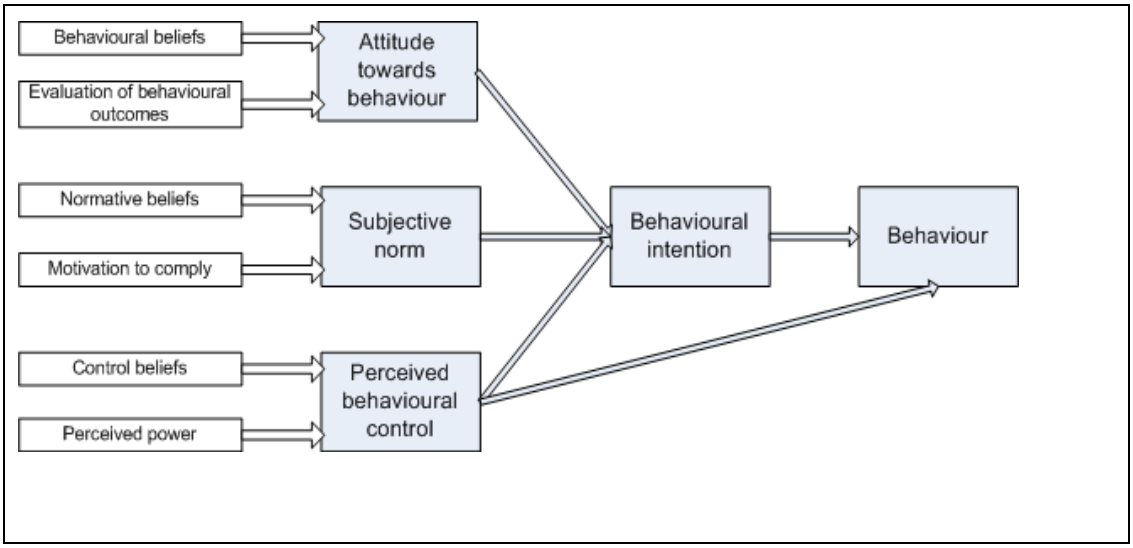
599. *Anderson, J.V., et al., 5 a day fruit and vegetable intervention improves consumption in a low income population. Journal of the American Dietetic Association, 2001.* ***101****(2): p. 195-202.*
600. *Forsyth, A., S. Macintyre, and A. Anderson, Diets for disease? Intraurban variation in reported food consumption in glasgow. Appetite, 1994.* ***22****(3): p. 259-274.*
601. *Currie, C.E., et al., Indicators of socioeconomic status for adolescents: The who health behaviour in school-aged children survey. Health Education Research, 1997.* ***12****(3): p. 385-397.*
602. *Martelin, T., Mortality by indicators of socioeconomic status among the finnish elderly. Social Science & Medicine, 1994.* ***38****(9): p. 1257-78.*
603. *Walter, U. and F.W. Schwartz, Development of a health promotion program for the target group "Elderly people". Abteilung Epidemiologie und Sozialmedizin, 1995.* ***89*** *(8): p. 839-46.*
604. *Clark, F., et al., Effectiveness of a lifestyle intervention in promoting the well-being of independently living older people: Results of the well elderly 2 randomised controlled trial. Journal of Epidemiology and Community Health.*
605. *Gonz´alez Castro, F., et al., Substance abuse prevention intervention research with hispanic populations. Drug and Alcohol Dependence, 2006.* ***84S****(S29-S42).*
606. *Rimmer, J., et al., Feasibility of a health promotion intervention for a group of predominantly African American women with type 2 diabetes. The Diabetes Educator, 2002.* ***28****(4): p. 571-80.*
607. *Zlotnick, C., N. Capezza, and D. Parker, An interpersonally based intervention for low-income pregnant women with intimate partner violence: A pilot study. Archives of Women's Mental Health.* ***14****(1): p. 55-65.*
608. *Klohe-Lehman, D.M., et al., Low-income, overweight and obese mothers as agents of change to improve food choices, fat habits, and physical activity in their 1-to-3-year-old children. Journal of the American College of Nutrition, 2007.* ***26****(3): p. 196-208.*
609. *Anderson, A.K., et al., A randomized trial assessing the efficacy of peer counseling on exclusive breastfeeding in a predominantly latina low-income community. Archives of Pediatrics and Adolescent Medicine, 2005.* ***159****(9): p. 836-841.*
610. *Rosal, M.C., et al., Randomized trial of a literacy-sensitive, culturally tailored diabetes self-management intervention for low-income latinos. Diabetes Care, 2011.* ***34****(4): p. 838-844.*
611. *Maliski SL, Clerkin B, and L. MS., Describing a nurse case manager intervention to empower low-income men with prostate cancer. Oncology Nursing Forum, 2004* ***31****(1): p. 57-64.*
612. *Brunner, E., D. Stallone, and M.a.B. Juneja, S and Marmot, M (2001), Dietary assessment in Whitehall II: Comparison of 7d diet diary and food-frequency questionnaire and validity against biomarkers. British Journal of Nutrition, 2001.* ***86*** *p. 405 - 414.*
613. *Queensland Health, Queensland strategy for chronic disease 2005-2015, Health information centre, Editor. 2005, Queensland Health: Brisbane.*
614. *Nestle, M. and C. Cowell, Health promotion for low-income minority groups: The challenge for nutrition education. Health Education Research, 1990.* ***5****(4): p. 527-533.*

615. *Zallen EM, Hooks LB, and O.B. K., Salt taste preferences and perceptions of elderly and young adults. Journal of the American Dietetic Association, 1990* ***90****(7): p. 947-50.*
616. *Jari-Erik, N., Age differences in adult life goals, concerns, and their temporal extension: A life course approach to future-oriented motivation. International Journal of Behavioral Development, 1992.* ***15****(4): p. 487-508.*
617. *Eertmans, A., F. Baeyens, and O. Van den Bergh, Food likes and their relative importance in human eating behavior: Review and preliminary suggestions for health promotion. Health Education Research, 2001.* ***16****(4): p. 443-456.*
618. *Campbell, M.K., et al., A tailored multimedia nutrition education pilot program for low-income women receiving food assistance. Health Education Research, 1999.* ***14****(2): p. 257-267.*
619. *Samuel-Hodge, C.D., et al., Randomized trial of a behavioral weight loss intervention for low-income women: The weight wise program. Obesity, 2009.* ***17****(10): p. 1891-1899.*
620. *Klohe-Lehman, D.M., et al., Nutrition knowledge is associated with greater weight loss in obese and overweight low-income mothers. Journal of the American Dietetic Association, 2006.* ***106****(1): p. 65-75.*
621. *Olson, C.M., M.S. Strawderman, and R.G. Reed, Efficacy of an intervention to prevent excessive gestational weight gain. American Journal of Obstetrics and Gynecology, 2004.* ***191****(2): p. 530-536.*
622. *Peterson, K.E., et al., Design of an intervention addressing multiple levels of influence on dietary and activity patterns of low-income, postpartum women. Health Education Research, 2002.* ***17****(5): p. 531-540.*
623. *Munro, S., et al., A review of health behaviour theories: How useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS? BMC Public Health, 2007.* ***7****(1): p. 104.*
624. *Cancer Prevention Research Centre. Transtheoretical model. 2011 [cited 2011 5 June 2011]; Available from: http://www.uri.edu/research/cprc/TTM/StagesOfChange.htm.*
625. *Box, G., Non-normality and tests on variances. Biometrika, 1953.* ***40****: p. 318-335.*
626. *Cummings, P. and T.D. Koepsell, Statistical and design issues in studies of groups. Injury Prevention, 2002.* ***8****(1).*
627. *Woods, J.A. and C.J. McCurley, Design effects in complex sampling designs, in The annual meeting of the The Midwest Political Science Association. 2004: Palmer House Hilton, Chicago, Illinois*
628. *Smeeth, L. and E.S.-W. Ng, Intraclass correlation coefficients for cluster randomized trials in primary care: Data from the mrc trial of the assessment and management of older people in the community. Controlled Clinical Trials, 2002.* ***23****(4): p. 409-421.*
629. *Kerry, S.M. and J.M. Bland, Statistics notes: The intracluster correlation coefficient in cluster randomisation. British Medical Journal, 1998.* ***316****(7142): p. 1455-1460.*
630. *Muthen, B.O. and A. Satorra, Complex sample data in structural equation modeling. Sociological Methodology, 1995.* ***25****: p. 267-316.*

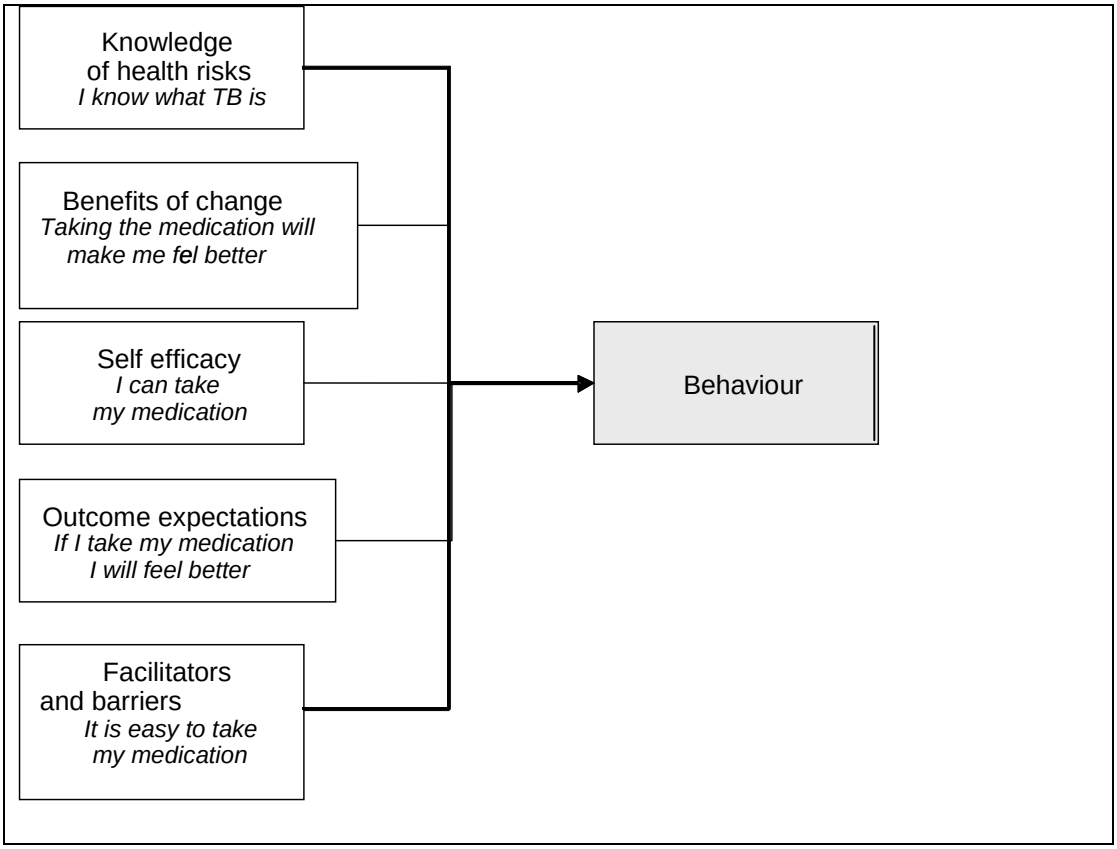
631. *Katz, J., et al., Estimation of design effects and diarrhea clustering within households and villages. American Journal of Epidemiology, 1993.* ***138****(11): p. 994-1006.*
632. *Perera, R. and P. Glasziou, A simple method to correct for the design effect in systematic reviews of trials using paired dichotomous data. Journal of Clinical Epidemiology, 2007.* ***60****(9): p. 975-978.*
633. *Skinner, C.J., Design effects of two-stage sampling. Journal of the Royal Statistical Society. Series B (Methodological), 1986.* ***48****(1): p. 89-99.*
634. *Hurst, C., Discussion regarding how to assess whether a mediated effect is significant using confidence intervals. 2012: Brisbane.*

Appendices

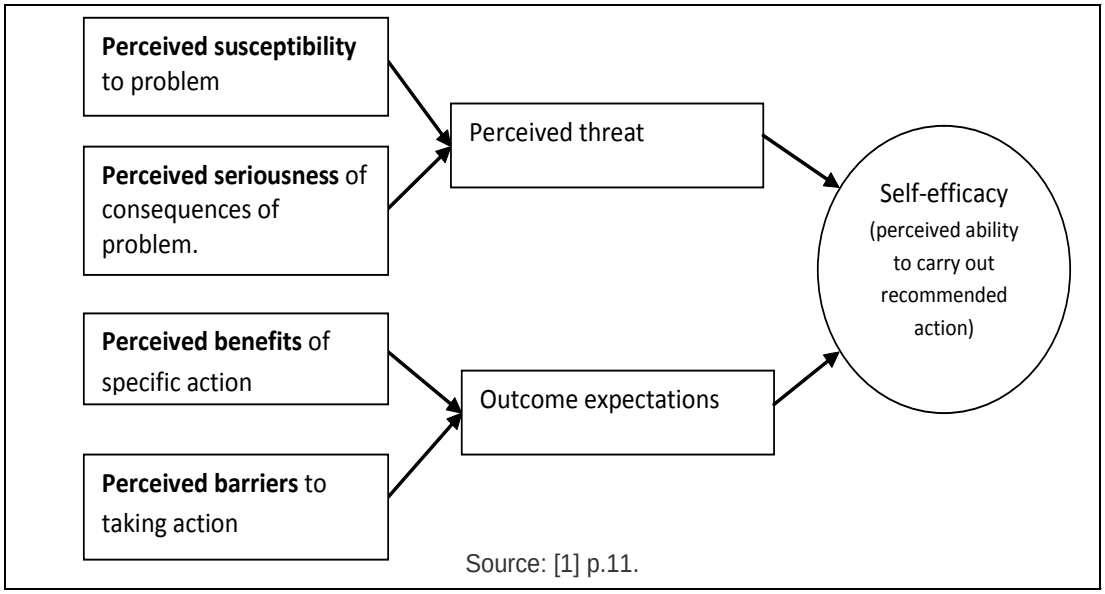
Appendix A. Psychological models of health behaviour



Appendix Figure 1 The Theory of Planned Behaviour. Source[166] p. 14.



Appendix Figure 2 An overview of Social Cognitive Theory (with examples relating to tuberculosis). Source: [623]



Appendix Figure 3. The Health Belief Model

Precontemplation *is the stage at which there is no intention to change behavior in the foreseeable future. Many individuals in this stage are unaware or underaware of their problems.*

Contemplation *is the stage in which people are aware that a problem exists and are seriously thinking about overcoming it but have not yet made a commitment to take action.*

Preparation *is a stage that combines intention and behavioral criteria. Individuals in this stage are intending to take action in the next month and have unsuccessfully taken action in the past year.*

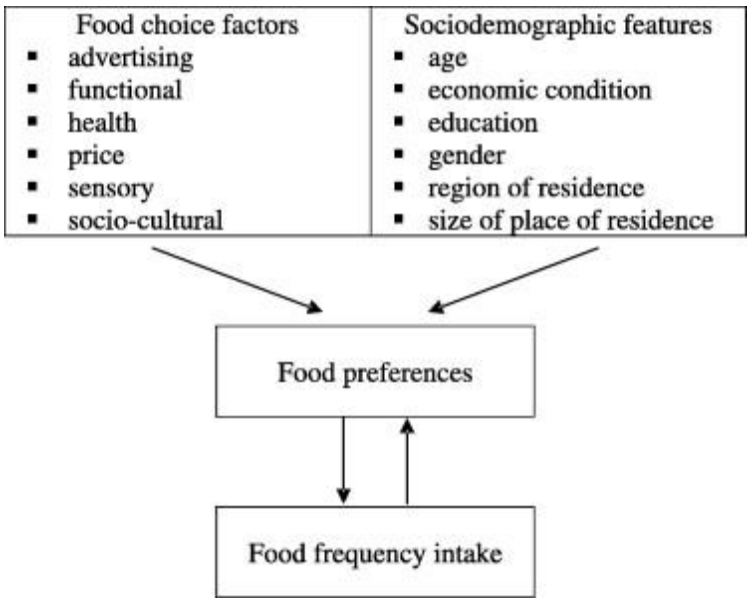
Action *is the stage in which individuals modify their behavior, experiences, or environment in order to overcome their problems. Action involves the most overt behavioral changes and requires considerable commitment of time and energy.*

Maintenance *is the stage in which people work to prevent relapse and consolidate the gains attained during action. For addictive behaviors this stage extends from six months to an indeterminate period past the initial action.*

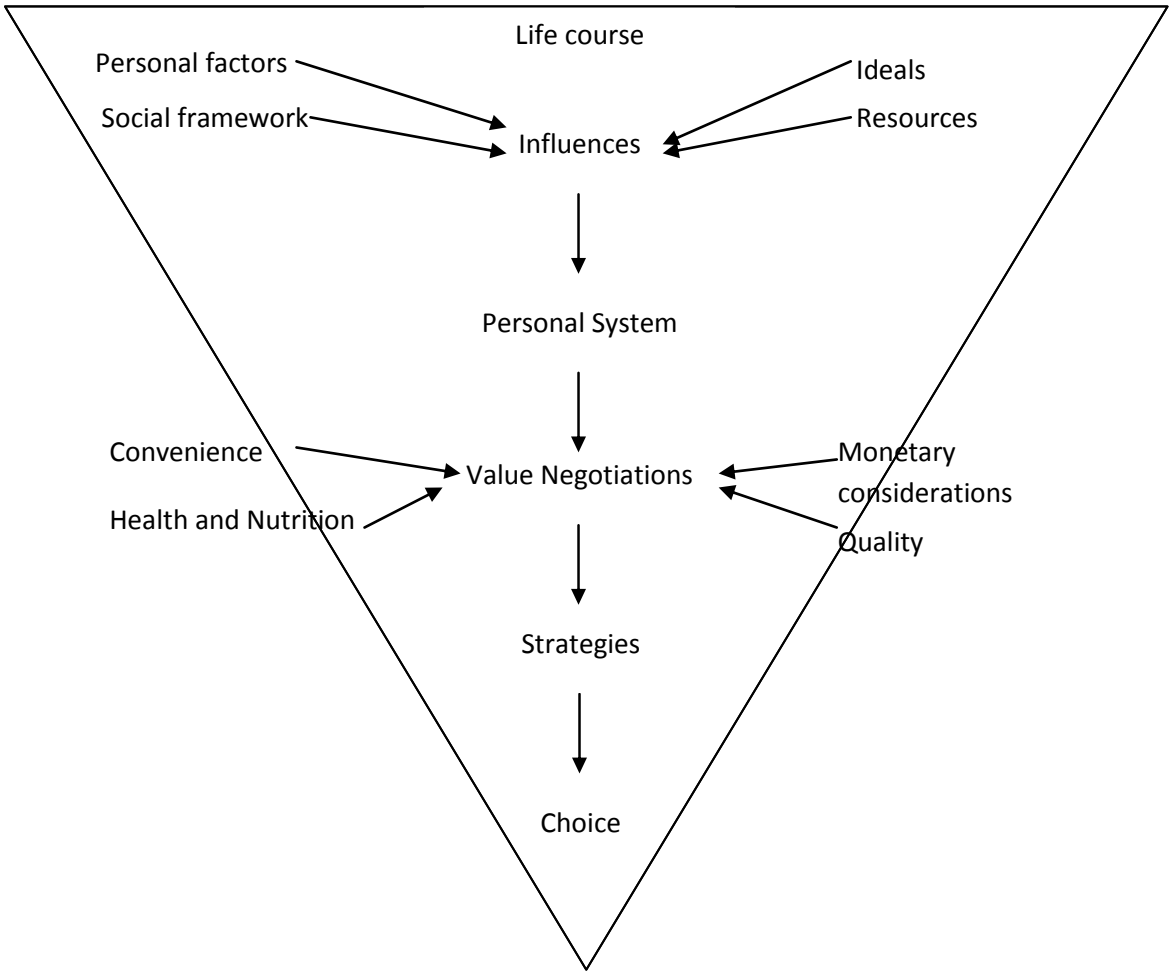
Appendix Figure 4. Transtheoretical Model (stages of change) Source: [624]

Appendix B. Food choices models.

This appendix provides examples of models constructed to describe food choice behaviours in the general population. Of particular note, in models constructed to represent food choices in the general population, psychosocial and socioeconomic factors are often arranged in a manner that implies they have a discrete influence on health. This structure is demonstrated below in *Appendix Figure 5,* with the psychosocial factors health and price listed separately (on the left) to economic condition and education (on the right). In contrast, in this PhD investigation psychosocial factors are conceptualised as forming part of the pathway between socioeconomic factors and food choices.



Appendix Figure 5. "The relationships between food choice factors, food preferences, food frequency intake and subjects' socio-demographic features" reproduced with permission from Wadolowska [79].



Appendix Figure 6 Schematic reproduction of conceptual model of food choice. Source [80].

Appendix C. Literature review table.

The following table depict the range of psychosocial factors considered in the quantitative studies reviewed.

Appendix Table 1. Breadth of factors considered simultaneously in quantitative papers reporting on inequalities in diet/ diet-related behaviour.(Arranged by region then by date, 41 publications in total based on 35 studies)

Study Number	Region	Publication Year	Author	Psychosocial factors																			
				Availability/ Accessibility	Cooking confidence	Cost concerns	Ethical concern	Taste	Preferences other household members	Health	Convenience/Time	Weight concerns	Nutrition Knowledge	Nutrition concerns	Habit/ Tradition	Nutrition label use	Quality /Freshness	Motivation	Mood	Social support	Other	Number of types considered in each publication	Number of types considered# in each study
1	US	2008	Beydoun	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	A	2	2
2	US	2005	Bowman	.		.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	1	1
3	US	2002	Perez_Escamilla	.	.	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	1	1
4	US	2000	Rimal	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	1	1
5	US	2000	Byrd-Bredbenner	.	.	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	1	1
6	US	1998	Glanz & Basil et al.	.	.	√	.	√	.	.	√	√	.	√	.	.	.	.	.	.	.	5	5
7	US	1997	Nayga	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	1	1
8	US	1996	Jeffrey & French	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	√	.	2	2
9	US	1995	Guthrie et al	.	.	.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	1	1
10	UK	2003	Wardle	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	.	.	.	1	1

(continued) Appendix Table 1. Breadth of factors considered simultaneously in quantitative papers reporting on inequalities in diet/ diet-related behaviour.(Arranged by region then by date, 41 publications in total based on 35 studies)

Study Number	Region	Publication Year	Author	Psychosocial factors																				
				Availability/ Accessibility	Cooking confidence	Cost concerns	Ethical concern	Taste	Preferences other household members	Health	Convenience/Time	Weight concerns	Nutrition Knowledge	Nutrition concerns	Habit/ Tradition	Nutrition label use	Quality and freshness	Motivation	Mood	Social support	Other	Number of types considered in each publication	Number of factors considered in each study
11	UK	2002	Purdy & Armstrong	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
12	UK	2001	Crossley	.	.	√	√	√	.	√	√	√	.	.√	√	.	.	.	√	.	.	9	9
13	UK	2001	Wardle	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	.	1	1
14	UK	2000	Wardle	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
	UK	2000	Parmenter	.	.	.	.	.	.	.	.	.		.	.	.	.	.	.	.	.	1	
15	UK	1999	Steptoe et al	.	.	√	.√	√	.	√	√	√	.	.	√	.	.	.	√	.	B	9	9
16	UK	1999	Caraher	.	. √		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	7
	UK	1998	Caraher	√		.	.	.	.	√	.	.	.	.	.	.	.	.	.	.	H, I, J	7	
	UK	1998	HEA[ab]	.		.	.	.	.		.	.	. √	.	.	.	.	.	.	.	.	3	
17	UK	1997	Buttriss et al	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
18	UK	1996	Shepherd et al	.	.	√	.	.	.	.	.	.	√	.	.	.	.	√	.	.	C, F, K	6	6
19	UK	1995	Steptoe et al	.	.	√	√	√	.	.√	√	√	.	.	√	.	.	.	√	.	B	9	9
20	EUR	2011	Mulder et al	.	.	√	.	.	.	√	.	.	.	.	.	.	.	.	.	√	E	4	4

(continued) Appendix Table 1. Breadth of factors considered simultaneously in quantitative papers reporting on inequalities in diet/ diet-related behaviour.(Arranged by region then by date, 41 publications in total based on 35 studies)

Study Number	Region	Publication Year	Author	Psychosocial factors																				
				Availability/ Accessibility	Cooking confidence	Cost concerns	Ethical concern	Taste	Preferences other household members	Health	Convenience/ Time	Weight concerns	Nutrition Knowledge	Nutrition concerns	Habit/ Tradition	Nutrition Label use	Quality and freshness	Motivation	Mood	Social support	Other	Number of factors considered in each publications	Number of factors considered in each study
21	EUR	2009	Giskes et al	√	.	√	.	.	.	.	.	.	.	.	.	.	√	.	.	.	D	4	4
22	EUR	2009	De Vriendt	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
23	EUR	2000	Hupkens et al.	.	.	√	.		√	√	.	.	.	.	.	.	.	.	.	.	.	3	3
24	EUR	1997	Lennernas et al	.	.	√	.	√	√	√	.	.	.	.	.	.	√	.	.	.	.	5	10
	UK	2000	Kearney	√	.		.				√	.	.	.	√	.		√	.	.	D	10	
	EUR	1999	Kearney	.	.	.	.	.	.	.		.	.	.	.	.	.		.	.	.	2	
25	EUR	1997	Lynch	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	E	4	4
26	SCA	2001	Lindström et al.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	√	.	1	1
27	AUS	2011	Siu et al	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	.	1	1
28	AUS	2011	McLeod et al.	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
29	AUS	2009	Winkler & Turrell	.	√	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
30	AUS	2008	Inglis	√	.	√	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2

(continued) Appendix Table 1. Breadth of factors considered simultaneously in quantitative papers reporting on inequalities in diet/ diet-related behaviour.(Arranged by region then by date, 41 publications in total based on 35 studies)

Study Number	Region	Publication Year	Author	Psychosocial factors																			
				Availability/ Accessibility	Cooking confidence	Cost concerns	Ethical concern	Taste	Preferences other household members	Health	Convenience/ Time	Weight concerns	Nutrition Knowledge	Nutrition concerns	Habit/ Tradition	Nutrition Label use	Quality and freshness	Motivation	Mood	Social support	Other	Number of factors considered in each publications	Number of factors considered in each study
31	AUS	2008	Hendrie	.	.	.	.	.	.	.	.	.	√	.	.	.	.	.	.	.	.	1	1
32	AUS	2006	Ball et al	.	.	.	.	.	.	√	.	.	√	.	.	.	.	.	.	√	.	3	3
33	AUS	2007	Giskes	√	.	√[d]	.	.	.	.	.	.	.	.	.	.	.	.	.	.		2	2
	AUS	2006	Turrell &Kavanagh	.	.	√[d]	.	.	.	.	.	.	. √	.	.	.	.	.	.	.	.	2	
34	AUS	2002A	Giskes et al.	√	.	√	.	√	.	.	√	.	.	.	.	.	√	√	.	.	H,G	8	8
35	AUS	1998	Turrell	.	.	.	.	√	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
Total number of studies considering each psychosocial factor				6	2	13	3	7	2	9	6	7	10	6	4	3	3	3	3	3	11	33	33

[a]Three studies share the same data set [57, 188, 196] so psychosocial factors only counted once if explored in any of the three studies. [b]HEA Health Education Authority. [c]While this study shares a data set with other publications in this table [229, 244] it is listed separately since the sample drawn was very different to that used in the other publications. This study considered the 1000 Irish participants of a European study that considered 14 331 respondents in total [229, 244].
[d]Cost concerns are noted as being investigated in both publications using the same data set as different cost factors were considered in each publication.
INDEX OF 'OTHER' FACTORS (A–K).

A) Perceived barrier of food prices (PBFP) = perceived importance of price relative to the importance of nutrition B) natural content, C) belief eating a healthy diet beneficial, D) lack of control over food choices E) psychological-based factors (hopelessness, depression, cynical hostility, sense of coherence, psychological stress F) Social pressure to change diet. G) Open ended any response coded, H) lack of storage, I) lack of facilities or equipment to cook, J) Concern about food wastage. K) belief eating a healthy diet enjoyable

√ Socioeconomic differences in this factor were considered in this study/publication.

. Socioeconomic differences in this factor were not considered in this study/publication.

Appendix D. Brisbane Food Study Survey.

Appendix E. The Dietary Guidelines for Australians and older adults (1999)

Dietary guidelines for Australians

1. Enjoy a wide variety of nutritious foods.
2. Eat plenty of breads and cereals (preferable wholegrain), vegetables (including legumes) and fruits.
3. Eat a diet low in fat and in particular, low in saturated fat.
4. Maintain a healthy body weight by balancing physical activity and food intake.
5. If you drink alcohol, limit your intake.
6. Eat only a moderate amount of sugars and foods containing added sugars.
7. Choose low salt foods and use salt sparingly.
8. Encourage and support breastfeeding.

Guidelines on specific nutrients include:

· Eat foods containing calcium. This is particularly important for girls and women.

· Eat foods containing iron. This applies particularly to girls, women, vegetarians and athletes.

Dietary guidelines for older Australians

1. Enjoy a wide variety of nutritious foods.
2. Keep active to maintain muscle strength and a healthy body weight.
3. Eat at least three meals every day.
4. Care for your food: prepare and store it correctly.
5. Eat plenty of vegetables (including legumes) and fruit.
6. Eat plenty of cereals, breads and pastas.
7. Eat a diet low in saturated fat.
8. Drink adequate amounts of water and/or other fluids.
9. If you drink alcohol, limit your intake.
10. Choose foods low in salt and use salt sparingly.
11. Include foods high in calcium.
12. Use added sugars in moderation.

Appendix F. Introductory letter.

Dear Householder

I would like to invite you to take part in a project about families and food. We ask for about 45 minutes of your time to complete a survey about the things that influence your family's food purchasing choices.

Different families buy different types of food and we would like to find out why. By taking part you will make an important contribution to your community. The information you provide will be used to develop ways of making sure that all families have equal access to the food they need.

You will be offered $10.00 for helping us with the survey

To do this project, we have specially selected 2000 households at random in Brisbane. Your household is one of these. We would greatly appreciate your help, for it is vital that we get an accurate picture of Brisbane's population, and this depends on your participation and of all other people selected.

In the next few days an interviewer will visit your home to see if you would like to help us with this project. For your convenience, the survey will be done in your home at a time that best suits you (weekdays, evenings, weekends). **The survey needs to be completed by the person in your family who does most of the food shopping.**

Your interviewer's name is _____. If you'd like to make an appointment with her before she visits your home, she can be contacted at Ph: _____.

We would like to assure you that any information you provide will be kept strictly confidential and no individual person will be identified in any reports. For more information about this project or the survey, please call me on 3864 3880.

Thank you in anticipation of your help.

Yours sincerely,

Dr Gavin Turrell, Centre for Public Health Research

Appendix G. Consent form.

Queensland University of Technology (QUT)

Centre for Public Health Research

INFORMATION FOR RESPONDENTS

PROJECT TITLE

Food shopping and your family

PURPOSE OF THE STUDY

This project aims to identify the things that influence the food purchasing choices of families. At present, we know very little about why different families buy different types of food.

YOUR INVOLVEMENT

As a participant, you will be asked to complete a survey with an interviewer. Questions will relate to food shopping, with a few details about you and your family. Interviews will be in your house and will take about 45 minutes to complete.

The interviewer may seek your permission to check whether you have certain food items in your cupboard or refrigerator. We would be grateful if you could assist us with this, as it is important that we collect accurate information.

It is possible that a supervisor may come with the interviewer. The supervisor will observe the interview to see if the interviewer asks the questions correctly. In the week after your interview, you may be contacted on the phone by your interviewer's supervisor. The supervisor will ask if the survey was completed to your satisfaction.

POTENTIAL BENEFITS

To make up for any inconvenience that may result from participating in this study, you will be offered $10.

Your participation will make an important contribution to our knowledge of the factors that influence families' food shopping choices. The information collected by this project will be used to develop ways of making sure that all families have equal access to the food they need.

POTENTIAL RISKS

There are no risks participating in this study.

CONFIDENTIALITY

Only the research team members will know the names of the respondents. To ensure your privacy, all information will be recorded so that you will remain anonymous. All details about you will be kept in a secure location and will not be connected to your answers. The information you provide will not be used for any other purpose.

FREEDOM OF CONSENT

Participation in this project is entirely voluntary. You are free to withdraw consent before or during the interview without comment or penalty. If you withdraw consent during the interview, you will still be offered $10 to compensate for your time. Your participation or withdrawal will not influence your present or future association with Queensland University of Technology (QUT).

INQUIRIES

Questions related to this project are welcome at any time. Please direct them to Dr Gavin Turrell on 3864 3880. If at any time you are not satisfied with his response, you may direct your requests to the Head of the School of Public Health, Professor Brian Oldenburg on 3864 3926. If you have any concerns in relation to the ethical conduct of this project you may contact the Queensland University of Technology's Registrar, on 3864 1056.

ACKNOWLEDGMENT

Thank you for considering being involved in this project. We hope you find the survey interesting.

The research team of the "Food Shopping and your family" survey

Appendix H. Proportion of respondents in each of four grocery food purchasing categories.

Appendix Table 2. Percentage of respondents purchasing each choice of grocery food based on 'recommended' and 'regular' classifications of food items (N=1003).

Food-Type	Regular Exclusively %	Mixed %	Recommended Exclusively %	Non-purchasers %
Bread	24	31	41	4
Rice	78	10	7	5
Pasta	84	4	3	9
Fruit Juice	18	9	50	19
Tinned Fruit	12	9	53	26
Milk	33	32	35	0
Cheese	46	23	29	2
Yoghurt	27	10	42	21
Mince	18	6	65	11
Chicken	15	38	38	9
Vegetable Oil	4	9	81	6
Margarine	26	5	41	28
Butter	38	4	21	38
Solid Cooking Fat	3	1	13	83
Tinned Fish	39	17	26	18
Baked Beans	58	2	19	21

Appendix I. Description of Principal Components Analyses (PCA).

Principal components analysis was used to assist decision making on the appropriate grouping of sets of items included in the BFS survey. This Appendix details how this procedure was applied to the 16 items included in question 40 of the BFS (Question 40 is included in its entirety in Appendix D). Question 40 included a broad range of questions including concerns regarding weight, health, particular nutrients and food costs. Each of the items 16 in question 40 had the five response options; strongly agree (1), agree (2), not sure (3), disagree (4) and strongly disagree (5). All scores were reversed (i.e 5=1, 4=2, 3=3, 2=4, 5=1) from the original response categories so that higher scores indicated higher levels of agreement with each item, not sure remained as '3'.

A correlation matrix was developed to represent the degree of correlation between responses to all 16 items. It is normally advised to remove any variables that are not correlated with any other variables (SPSS Version 18, Results Coach). Inspection of the correlation matrix indicated this was not an issue for any of the 16 items so all remained candidates for exploration with PCA.

Rotation was performed in SPSS using the Varimax option, and these results, represented in a scree plot, indicated there were four factors with eigenvalues greater than one. Each of the four statistically identified components also made sense conceptually and thereby had face validity. These factors can be classified as concern regarding the nutrient content of food, concern that healthy food is expensive, and concern regarding the cost of food in general and the perceived adequacy of the family diet. Cronbach's Alpha coefficients were generated to show how highly correlated the items were that make up each factor. Cronbach's Alpha coefficients of 0.7 and upwards are considered highly correlated [286]. The outcomes can be seen below. These four components were then placed into multivariable models so that their impact on socioeconomic differences in food purchasing could be assessed.

Appendix Table 3. Factor scores generated from principal components analyses.

Factors	Cronbach's Alpha	Number of iten
Concern over nutrient content of food	0.809	4
Concern food cost in general	0.665	3
Concern healthy food is expensive	0.706	2
My family has a satisfactory diet	0.620	2

Respondents with missing data for any of the 16 items that comprised Question 40, did not receive factor scores derived from the PCA and were excluded from subsequent analyses. This applied to a very small proportion (less than 3.0%) of respondents). All factor scores were re-scaled to range 0–100.

Appendix J. Assumption testing of the distribution of individual variables and model residuals.

This appendix describes assumption tests undertaken in relation to both individual variables and model residuals. The rationale for performing assumption tests at each level is described in the relevant sections below.

ASSUMPTION TESTS OF INDIVIDUAL VARIABLES.

At the outset of the analyses, prior to multivariate modelling, three assumptions (normality, homogeneity of variance and linearity) were assessed with regard to the distribution of the individual variables proposed to be included in the statistical models. The testing of normality in particular, informed the correct summary statistics to present for each variable. The criteria for checking each assumption in relation to individual variables are described below.

Normality

The distribution of a variable was considered normal when, the review of frequency distributions and histograms indicated that each of the following criteria were met.

1. $\bar{X}$ within + 10% of median.

2. $\bar{X}$ + 3 SD approx min and max.

3. Skewness within + or – 3.

4. Kurtosis within + or – 3.

5. Bell-shaped curve.

6. If a continuous variable, scaled positively from zero, SD less than half the $\bar{X}$.

Means and standard deviations were presented for normally distributed variables, while the median and range were presented for non-normally distributed variables.

Homoscedascity of variances

The homogeneity of variance assumption was reviewed and deemed to be met using Levene's test. As this is known to be a very conservative test [625], meeting

this assessment was accepted as good evidence that the variances observed were of an acceptable level for the general linear model to perform as designed.

Linearity

Linearity of the relationships between each continuous independent variable and each food purchasing outcome variable was initially investigated using scatterplots. As linearity was difficult to accurately assess by this method it was decided to use a second approach, wherein continuous variables were divided into quartiles and graphed against the outcome measures. All independent variables were found to be linearly related to all outcome measures. Therefore, no categorisation of continuous variables was required since the assumptions of homogeneity of variances and linearity both being met.

BIVARIATE AND MULTIVARIATE ASSUMPTION TESTING.

Five assumptions were investigated to ensure that the multivariate models used were performing adequately [428]. These assumptions were as follows:

- *-Normality**
- *-Homogeneity of variances*
- *-Linearity*
- *-Independence of observational units*
- *–Multicollinearity*

Normality, homogeneity of variances and linearity

General linear modelling (GLM) assumes multivariate normality, that is, that each variable and all linear combinations of variables, display a normal distribution. Homogeneity of variances and linearity are also assumed with this technique. The examination of model residuals is a common and appropriate way to test these assumptions [428]. However, assessing individual variables is a more conservative way of testing these assumptions [625] and resulting decisions to change variable form (e.g. transforming or categorising continuous variables) can enhance model performance [428].

Assumption testing of residuals involved examination of scatterplots depicting the distribution of the residuals generated from final, fully-adjusted models (modelling

each of the three food purchasing outcomes) by respondent ID number. Regardless of whether individual variables or model residuals were examined, all variables met the assumption of homogeneity of variance and linearity. Although some independent variables (psychosocial factors) were not normally distributed according to all criteria, their distribution was still viable for inclusion in models. It was determined that since the models could perform adequately with these variables included in their original form, that this was preferable to transformation or categorisation, which may have influenced the integrity of the data, reduced the original variation present in the data, or made the findings using these variables more difficult to interpret [428]. Therefore, on the basis of the testing of assumptions it was not deemed necessary to categorise or transform any continuous variables in order for the applied models to perform optimally.

Independence of observational units

The two-stage cluster sampling design of the BFS meant that unlike in a random sampling scenario, the independence of the observational units (households) could not be assumed [626]. Therefore, it could be the case that households within clusters (CCDs) could be more similar than between clusters resulting in what is known as a 'design effect' [627]. While the presence of a design effect would not influence the point estimates generated in models, it may result in underestimation of the standard errors surrounding these values. Therefore, an analytical approach was devised to take account of this situation so that the necessary statistical adjustments could be made [628].

The first step in assessing the degree to which clustering was an issue was to assess the homogeneity between individuals in clusters by calculating the intraclass correlation coefficient (ICC). ICCs were generated to assess the degree of homogeneity in each of the three food purchasing outcome measures across the sample clusters (i.e. CCDs). Conventionally ICC scores of equal to or less than 0.02 are considered small, between 0.03 and 0.04 moderate and 0.05 to 0.10 high [628, 629]. While there was very low evidence of cluster homogeneity for grocery and

vegetable scores (ICC = 0.009 and 0.023, respectively) there was greater homogeneity with regard to the fruit index score (ICC= 0.04).

However, it is the size of the clusters that determines the extent to which clustering will influence results and hence the need for adjustment, potentially using multi-level modelling [630, 631]. Calculation of the design effect takes into account both the homogeneity and size of the clusters, and in doing so, indicates the extent to which standard errors may be underestimated if the clustered nature of the sample was not taken into account [628]. The design effect for sample clusters relating to the grocery, fruit and vegetable indices were respectively 1.00, 1.76 and 1.45. It has been found that adjusting for clustering has a negligible influence on standard errors/confidence intervals when the design effect is less than 2 [630]. Nevertheless, since such adjustments are common practice [632, 633], and in the interest of rigour, all final models presented in this thesis were adjusted for any design effect using the Statistical Package for Social Sciences (SPSS), Complex Samples, version 19.0.

Multicollinearity

Potential collinearity between variables was examined to optimise modelling fit and parsimony. This was achieved by assessing the degree to which two independent variables suspected to measure a similar concept were correlated with each other using Pearson's correlation coefficients (r). Collinearity was deemed to be evident when $r \geq 0.90$ and was significant ($p \leq 0.05$) [428]. Examples of variables investigated for collinearity are household size and composition. As no variables were found to be more than 90% correlated no variables were excluded from the analyses on this basis.

Appendix K. Assessing the significance of a mediation effect.

The data presented in *Appendix Table 4* will be used to show how the significance of a mediation effect can be determined through an assessment of confidence intervals. As can be seen in *Appendix Table 4* three nutrition knowledge factors when assessed in separate mediation models, reduce socioeconomic differences in grocery purchasing (initially 5.4 points on a 100 point scale) by 27.8%, 16.7% and 5.6% respectively.

The process of evaluating significance of the mediation effect is very simple; it must be determined whether the difference in food purchasing observed in the base model (5.4 points) fit within the confidence interval of the models adjusted for each potential mediator, i.e. in this example knowledge of, diet and disease, nutrient sources and dietary guidelines.

If the base estimate fits within the confidence interval of an adjusted model, no significant mediation is deemed to have occurred [634]. It is apparent that the base estimate of 5.4 fits within the confidence intervals of all of the models of mediation presented in *Appendix Table 4*, therefore, no variables produced a significant mediation effect.

Appendix Table 4 Comparison of education group differences in food purchasing scores between Models A and B [ab]

	Model A	**Model B (Base model + the separate addition of each psychosocial factor)**		
			Nutrition knowledge	
	(Base Model)	Diet-disease	Nutrient sources	Dietary guidelines
Difference EMM FPS	–5.4 (–8.5 to –2.4)	–3.9 (–7.0 to –0.9)	–4.5 (–7.6 to –1.3)	–5.1 (–8.0 to –2.2)
% Mediation[cd]		**27.8**	**16.7**	5.6

a All analyses adjusted for gender, age, household type and household size.
b Analyses included respondents who did not report their education (N=21), however, estimates for this group are not displayed in the table.
c % Mediation = (difference in EMM between the highest and lowest income groups in the base model minus difference in EMM between the highest and lowest income groups in the subsequent model)/ difference in EMM between income groups (highest and lowest) in the base model) x 100.
EMM FPS = Estimated Marginal Mean Food Purchasing Score.

Studies that are not powered to assess significant mediation effects still provide a useful indication of whether psychosocial factors are likely to contribute to inequalities in food choices. In these situations, it is informative if the same factor appears to have a mediating impact across a range of different scenarios (e.g. in relation to a variety of food choices outcomes) and to consider whether a mediating relationship would be plausible based on the bivariate relationships observed between relevant variables.

Appendix L. Socioeconomic differences in cost concerns with continuous psychosocial variables represented as z scores rather than means.

Appendix Table 6, presents socioeconomic differences in two continuous psychosocial factors using z scores rather than unstandardised means. Z scores are derived from the original variables by subtracting the variable mean and dividing by the variable standard deviation, resulting in standardised variables. In the results section, unstandardised means are presented since the results were the same, and these are more intuitive to interpret being in the same scale of measurement as the outcome measures (points on a 100 point scale) rather than in standard deviation units. An example is provided below in *Appendix Table 6* to allow confirmation that the associations observed are the same regardless of the format of the means. *Appendix Table E* includes results presented in z-scores (standardised values) along with unstandardised values extracted from Table 6.13 (page 162). Comparing these results, the approximate graded relationships across socioeconomic groups persisted and were in the same direction regardless of the units of measurement used to present the results. The relative strength of relationships was also consistent, with the strongest relationship being observed for differences in general cost concerns across household income groups and the weakest for general cost concerns across education groups. We would not have expected standardisation of variables to alter the findings in this instance since the means and standard deviations of the compared unstandardised variables were very similar (Cost concern regarding food in general (Mean =42.14 (SD 18.84) and regarding the cost of a healthy diet (Mean 47.14 (SD 17.13)).

Appendix Table 6. Socioeconomic differences in cost concerns (N=970)[a].

Psychosocial factors	SEP	Household income[c]	Respondent education[d]
		Standardised mean psychosocial index score[b] (95% CI)	
Cost concern regarding food in general	Low	0.32 (0.17–0.47)**	0.01 (–0.12–0.13)
	Mid-Low	0.07 (–0.05–0.20)**	0.03 (–0.13– 0.19)
	Mid-High	–0.09 (–0.25–0.08)**	–0.06 (–0.31–0.20)
	High	–0.51 (–0.69 – –0.34)	–0.14 (–0.28–0.01)
	Difference[e]	–0.83**	–0.14
Concern regarding the cost of a 'healthy' diet	Low	0.19 (0.03–0.35)	0.10 (–0.02 –0.23)***
	Mid-Low	0.04 (–0.10–0.17)	0.15 (–0.12–0.31)***
	Mid-High	–0.12 (–0.29–0.06)	0.19 (–0.66– 0.45)***
	High	–0.04 (–0.23–0.14)	–0.22 (–0.37–0.08)
	Difference[d]	–0.23	–0.32**
		Unstandardised mean psychosocial index score (range 0–100)(95% CI)	
Cost concern regarding food in general	Low	47.6 (45.0 – 50.2)*	42.2 (40.1 – 44.3)
	Mid-Low	43.4 (41.2 – 45.5)*	42.6 (39.9 – 45.4)
	Mid-High	40.7 (37.9 – 43.4)*	41.2 (36.8 – 45.6)
	High	33.3 (30.4 – 36.3)	39.8 (37.3 – 42.3)
	Difference[f]	–14.2**	–2.4
Concern regarding the cost of a 'healthy' diet[d]	Low	50.7 (47.7 – 53.7)*	49.1 (46.7 – 51.4)**
	Mid-Low	47.8 (45.3 – 50.4)	49.9 (46.9 – 52.9)**
	Mid-High	45.0 (41.8 – 48.2)	50.7 (45.9 – 55.6)**
	High	46.3 (42.8 – 49.8)	43.0 (40.3 – 45.7)
	Difference[f]	–4.4	–6.1**

[a] Analyses adjusted for age and gender. Respondents who did not report their income (N= 25) or education (N=21) were included, however, estimates for this group are not displayed in this table .

[b] Standardised scores are have mean '0' and standard deviation of '1'.

[c] Low=<$25,999, Mid-Low=$26,000-51,999, Mid-High=$52,000-77,999, High=>$78000.

[d] Low= No post school, Mid-Low= Vocational Qualification, Mid-High= Diploma, High= Bachelor or higher.

[e] Difference= The standardised mean food purchasing index score of the highest socioeconomic group minus that of the lowest socioeconomic group.

[f] Difference= The standardised mean food purchasing index score of the highest socioeconomic group minus that of the lowest socioeconomic group.

* ***p ≤ 0.001 **p ≤ 0.05 =significance compared to the referent (highest socioeconomic) group.

Appendix M. Technical note regarding Estimated Marginal Means generated in SPSS version 19.0.

The EMMEANS procedure in SPSS version 19.0 allocates each group as having equal proportions of participants in each category of the categorical variables considered, e.g., 50% per category for binary variables or 25% per category for 4-category variables. Consequently, adjusted means are estimated based on prevalences that can be quite different from the prevalences within the sample. As a result, the adjusted means in each category can diverge markedly from the overall mean. This is a current limitation of SPSS, which has not released an alternative procedure that is equivalent to SAS's "observed marginal" option for LSMEANS or STATA's "at means" option for margins. However, the estimated marginal means produced by SPSS are suitable for comparing subgroups, which is the task that they were used for in this thesis.

Appendix N. Sixty Families Study interview schedule and survey

Appendix O. Occupations reported by respondents in the Sixty Families Study.

Appendix Table 7: Type of occupation by socioeconomic group (males and females)

MALES		
High (N=20)	Medium (N=20)	Welfare (N=20)
Accountant	Buildings officer	Beverage Technician
Civil engineer	Butcher	Fitter and Turner
Company director	Carpenter	Foreman
Computer programmer	Cleaner	Mig welder
Construction manager	Electrical fitter	Self-employed
Economist	Electrical technician	Not employed
Electrical engineer	Electrician	
Industrial Relations officer	Fire fighter	
Internal auditor	Green keeper	
Lending officer	Grounds Administrator	
Management accountant	Labourer	
Operations Manager	Machine operator	
Professor	Plumber	
Project manager	Refrigeration mechanic	
Resource officer	Telecommunications officer	
Sales manager	Tree surgeon	
Software consultant		
University tutor		
Veterinary surgeon		

FEMALES		
High (N=20)	Medium (N=20)	Welfare (N=20)
Administration Officer	Clerk	Not employed
Business manager	Administrative assistant	
Business officer	Human resources consultant	
Chemist	Lab technician	
Courier driver	Library assistant	
Doctor	Mail sorter	
Employee consultant	Optometrist	
Financial analyst	Research officer	
Flight attendant	Sales person	
Legal secretary	Secretary	
Planning officer	Not employed	
Primary/secondary teacher		
Project officer		
Quality controller		
Receptionist		
Social worker		

Appendix P. Coding Examples.

The excerpt below in *Appendix Table 8* provides an example of the coding of a response to the question "Do you think you lead a healthy life".

Appendix Table 8. Example of coding from interview transcripts.

Interview Question	Response	Codes (and sub-codes) from the data	Themes from the data
Do you think you lead a healthy life? *What makes you say that?*	*Yes, we eat healthy food, try to do a bit of exercise, outside activities, like fishing that's pretty healthy you know… apart from that…*	*-Eat healthy food* *-Do a bit of exercise* *-Outside activities* *-fishing*	1. Eat healthy food 2. Exercise 3. Participate in outdoor activities.

Using the constant comparison approach, by continually developing and revising codes and themes throughout the consideration of all transcripts, several themes emerged and were articulated based on the data from all respondents. For example, while the respondent in *Appendix Table 8* nominated '*fishing*' specifically as an outdoor activity conducive to good health, most respondents made more general comments for example, *'spend time outdoors'* or *'get outside'* therefore, the theme *'participate in outdoor activities'* was created with the *'fishing'* response included as one code that comprised this theme. The comments made by the participant shown above in *Appendix Table 8*, were classified as belonging to three themes, including: eat healthy food, exercise and participate in outdoor activities. An example of a theme derived from codes collected across several interview excerpts is shown in *Appendix Table 9*. The theme was derived from the question 'Do you think you lead a healthy life' and is titled "limiting my alcohol consumption is something I do that improves my health"

Appendix Table 9. Example responses within the theme, "Limiting my alcohol consumption is something that I do that improves my health"^.

	Example Responses
#23 FEMALE RESPONDENT	*We don't smoke and we don't drink alcohol.*
#26 FEMALE RESPONDENT	*Normally yes. I don't smoke and ah, I consume small amounts of alcohol so – and smoking, I haven't smoked since I was eighteen year old so –*
#34 MALE RESPONDENT	*Oh, I don't smoke, I don't drink excessively.*

^Smoking was often but not always mentioned along with alcohol consumption, therefore, comments regarding smoking and alcohol were coded separately.