

**A mixed methods programme of study on the
determinants and health outcomes of home food
preparation**

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Abstract

Diet-related diseases are the greatest cause of morbidity and mortality worldwide. Food preparation methods are linked to diet and health. The aim of this thesis was to study the determinants and outcomes of home food preparation, using mixed methods.

The first research phase was a systematic review of observational studies on the health and social determinants and outcomes of home cooking. Key determinants included female gender, greater leisure time availability, close personal relationships, and culture and ethnicity. Putative outcomes were mostly at an individual level and focused on potential dietary benefits.

The second phase involved qualitative interviews exploring home food preparation practices, experiences and perceptions amongst adults from the United Kingdom (UK). Key emergent themes concerned the cook (identity), task (process of cooking) and context (situational drivers). Practices changed over the life course and reflected compromises between varied competing demands. Comparison with focus group data from Baltimore, United States, showed that 'home cooking' was distinct from other types of cooking at home. 'Home cooking' was defined as: preparing a meal from scratch; cooking with love and care; and nostalgia, and was not aligned closely with principles of healthy eating.

The third phase comprised analyses of cross-sectional data on participants' meal consumption patterns, sociodemographics, diet and markers of cardio-metabolic health, from a large population-based UK cohort study. Eating home cooked meals more frequently was significantly associated with being female, older, of higher socioeconomic status and not working overtime. Varying patterns of association were observed for consuming takeaways, ready meals and meals out. Eating home cooked meals more frequently was significantly associated with a range of healthier dietary indicators, and lower adiposity.

Overall, preparing and eating meals cooked at home were found have complex and varied determinants, and to offer a range of putative benefits, indicating potential to enhance the public's health.

Dedication

For my parents – in recognition of their unconditional love and support.

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Patient and public involvement

The importance of involving patients and members of the public in research studies has been increasingly recognised over time. Patient and public involvement (PPI) is generally viewed as carrying out research with or by members of the public, in contrast to conducting research on, about, or for them. PPI aims to develop an active partnership between members of the public and researchers. It is an ethical imperative to consult and consider those who have contributed to publically funded research, such as this programme of work, and who experience the conditions and context under study. Research orientated towards the requirements and perspective of patients and members of the public also tends to address relevant clinical and public health needs, tackle them effectively, and share the findings appropriately and usefully.

Lay involvement has been key to this research programme, in terms of the development, undertaking and dissemination of research findings. The initial draft research proposal was submitted to a meeting of the Research Design Service North East Consumer Panel. The panel are drawn from a range of backgrounds, and represent members of the public with carer responsibilities, general interests in health, and specific health concerns. The group provided feedback on my research proposal, and opportunities were discussed for optimal public involvement in the project. The panel favoured the development of a PPI advisory group, to play a key role in oversight of the research programme.

Subsequently, I recruited six members to my PPI group, including participants with diverse socioeconomic backgrounds and experiences of illness and health. The PPI group met biannually during my programme of research, with a total of six meetings over the course of

three years. At each meeting we considered the overall programme, and focused on different aspects of the three research phases, which led to valuable perspectives and feedback. For example, PPI panel members provided insights and advice on the development of participant materials; recruitment for interviews; writing and presenting information in a user-friendly manner; and dissemination of the research findings. By integrating this feedback into the research programme, I was able to optimise the programme's relevance, appropriateness, usefulness and applicability to the real world setting. I was also assisted in establishing links with organisations to which certain members of the group are affiliated, such as the Newcastle Disability Forum, Elders Council of Newcastle, and North East counselling services. This has been beneficial both in terms of conducting the research, for example when recruiting participants, and in considering dissemination of the research findings.

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Statement of contributions

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Chapter one: SM undertook the work for this chapter, and JA, HB, MW and WW provided comments.

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Chapter three: SM, JA and MW devised this study. SR developed and ran the electronic literature database searches. SM led the literature screening, data extraction, quality appraisal, and analysis, supported by JA, HB, JH, DK, MW and WW. SM drafted the chapter and JA, HB, JH, DK, SR, MW and WW provided comments.

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Chapters six and seven: SM, JA, HB, MW and WW devised these studies. SM led the data analyses, supported by JA, HB, MW and WW. SM drafted the chapters and JA, HB, MW and WW provided comments.

Chapter eight: SM undertook the work for this chapter, and JA, HB, MW and WW provided comments.

Chapter nine: SM undertook the work for this chapter, and JA, HB, MW and WW provided comments.

Thesis outputs

I have produced a number of outputs related to the research undertaken for this thesis to date.

Peer-reviewed papers

Mills, S., White, M., Robalino, S., Wrieden, W., Brown, H. and Adams, J. (2015) 'Systematic review of the health and social determinants and outcomes of home cooking: protocol', *Systematic Reviews*, 4(1), p. 35. <https://doi.org/10.1186/s13643-015-0033-3>

This is the protocol for work presented in Chapter three.

Mills, S., White, M., Brown, H., Wrieden, W., Kwasnicka, D., Halligan, J., Robalino, S. and Adams, J. (2017) 'Health and social determinants and outcomes of home cooking: A systematic review of observational studies', *Appetite*, 111, pp. 116-134.

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This summarises work presented in Chapter three.

Mills, S., Brown, H., Wrieden, W., White, M., and Adams, J. (2017) 'Frequency of eating home cooked meals and potential benefits for diet and health: cross-sectional analysis of a population-based cohort study', *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), p. 109. <https://doi.org/10.1186/s12966-017-0567-y>

This summarises work presented in Chapter six.

Mills, S., White, M., Wrieden, W., Brown, H., Stead, M. and Adams, J. 'Home food preparation practices, experiences and perceptions: a qualitative interview study with photo-elicitation', *PLoS One* in press.

This summarises work presented in Chapter four.

Adams, J. and Mills, S. (2017) 'Consuming meals prepared at home more frequently appears to reduce the risk of type 2 diabetes, weight gain and obesity', *Evidence Based Medicine*, 22(1), pp. 38-38. <http://dx.doi.org/10.1136/ebmed-2016-110547>

This is a commentary article.

Papers under review

Mills, S., Brown, H., Wrieden, W., White, M., and Adams, J. 'Sociodemographic characteristics and frequency of consuming home cooked meals and meals from out of home sources: cross-sectional analysis of a population-based cohort study', submitted July 2017 to *Public Health Nutrition*.

This summarises work presented in Chapter seven.

Planned papers

Mills, S., Wolfson, J., Wrieden, W., Brown, H., White, M. and Adams, J. 'Home cooking: good for the soul, bad for the waistline? A qualitative analysis from the United Kingdom and United States', invited resubmission to *BMC Public Health*.

This summarises work presented in Chapter five.

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This summarises work presented in chapters eight and nine.

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This primarily summarised work presented in chapters four and five.

Abbreviations

ANOVA: analysis of variance

BMI: body mass index

CI: confidence interval

D: determinant of home cooking

DASH: Dietary approaches to stop hypertension

EPIC: European Prospective Investigation of Cancer and Nutrition

FFQ: Food frequency questionnaire

HbA_{1c}: haemoglobin A_{1c}

HDL: high density lipoprotein cholesterol

IMD: index of multiple deprivation

kcal: kilocalories

kJ: kilojoules

MDS: Mediterranean diet score

MFP: main food provider

NCDs: non-communicable diseases

NDNS: National Diet and Nutrition Survey

NHANES: National Health and Nutrition Examination Survey

NHS: National Health Service

NS-SEC: National Statistics Socioeconomic Classification

O: outcome of home cooking

OR: odds ratio

PPI: patient and public involvement

SES: socioeconomic status

UK: United Kingdom

US: United States

Chapter 1. Introduction

1.1 Research context

The global burden of disease attributable to non-communicable diseases (NCDs) has been increasing steadily, surpassing that inflicted by communicable diseases in terms of both mortality and cumulative economic impact (1). It is estimated that by 2020, NCDs will contribute 60% of all disability adjusted life years and nearly 75% of deaths worldwide, with the majority of NCDs related to diet (2, 3). Poor diets contribute towards the development of overweight and obesity, defined as body mass index (BMI) over 25 and 30 kg/m² respectively (4), levels of which have been rising in the United Kingdom (UK) and internationally, with lower socioeconomic groups disproportionately affected (5, 6). In the UK, in terms of excess weight and obesity alone, costs borne by the National Health Service (NHS) are estimated to reach £10 billion per year, and wider costs to businesses and society are projected to grow to £49.9 billion per year, by 2050 (7).

In addition to overweight and obesity, unhealthy diets increase the risk of other chronic diseases including type II diabetes (8), cardiovascular disease (9) and certain types of cancer (10). The relationships between diet and health are particularly important at extremes of age, and will exert growing influence as the UK and global population structures continue to grow older. Diet is also an important determinant in recovery post-surgery (11), following illness (12), and in the tertiary prevention of complications from existing illnesses such as type II diabetes (13).

Since poor quality diets are the greatest cause of ill health and death in both the UK and worldwide (2, 14), improving population dietary intake is a high priority for public health action. Dietary risk is posed by aggregate influences from a range of dietary components, including low consumption of fruit, vegetables, whole-grains, nuts and seeds, milk, fibre, calcium, seafood omega-3 fatty acids, and polyunsaturated fatty acids; and high consumption of red meat, processed meat, sugar-sweetened beverages, trans fats, and sodium (14). The UK population overall consumes excess sugar and saturated fat, and insufficient fruit, vegetables and fibre (15).

Dietary quality is socioeconomically patterned, with an estimated quarter of observed inequalities in UK mortality due to inequalities in diet (16). Studies have indicated that highly processed, energy-dense foods, with minimal nutritional value, are more affordable than unprocessed foods (17, 18). Pre-prepared ready meals lower in nutrients have also been found to be cheaper than those with higher nutrient content (19). A comparison of methods for measuring diet cost indicated that home food preparation leads to systematically lower cost estimates (20). Since price is known to be an important determinant of food choices (21), accordingly the consumption of cheap, processed foods has been shown to be higher amongst people from lower socioeconomic groups (18, 22). In contrast, those from socioeconomically disadvantaged backgrounds tend to eat less fruit, vegetables and oily fish, and more processed and red meats (23). It has been estimated that in the UK alone, adherence to dietary recommendations would avoid approximately 33,000 premature deaths every year, with associated savings in healthcare costs (24). This creates both an economic and moral imperative to improve patterns of population dietary intake and hence decrease the burden of dietary-related NCDs.

Patterns of meal consumption and sourcing have changed in the majority of developed countries since the mid-twentieth century, with a decline in cooking at home from basic ingredients (25-27). Adults in the UK still spend approximately three quarters of their weekly food and non-alcoholic drink budget on eating at home (28), although the nature of these meals and degree of involvement in their preparation is not clearly specified. Paradoxically, the decline in time spent preparing food at home has occurred in parallel with growing interest in cooking in popular culture, for example through celebrity chefs, cookbooks, online media and television cookery shows (29).

Changes in meal habits and food spending have been blamed for increases in the prevalence of diet-related NCDs and obesity (30). Accordingly, many governmental and non-governmental dietary interventions in the UK and internationally have assumed positive relationships between cooking, diet and health. It has often been surmised that developing cooking skills and promoting home food preparation will provide an important solution for optimising diet and related health outcomes. For example, in the UK, cookery became a compulsory school curriculum component for children in Key Stages 1-3 in September 2014 (31). Many UK local authorities commission cooking skills programmes for adults (32), and

cooking for children and parents has been advocated in international recommendations for ending childhood obesity (33).

Some research has suggested a correlation between preparing and eating home cooked meals and both higher quality diets (34) and advantages for health and longevity (35, 36). Convenience foods and meals outside the home have been associated with less healthy diets and a higher prevalence of diet-related NCDs (37, 38). However, other studies have contested the potential benefits of home cooked meals for diet and health (39-41), and overall the relationships between home cooking and quality of dietary intake, and morbidity and mortality, remain unclear. Evidently it is important, particularly in the current era of rapidly diminishing public health funding (42), that resources are invested wisely and with opportunity for tangible benefits.

Cooking is a complex behaviour with multiple influencing factors (43), and a potentially long and complex chain of causation exists between gaining cooking skills, and any resultant changes in dietary intake and associated NCDs. To date, food preparation has been inadequately studied, due to both methodological and conceptual challenges (44). Previous initiatives to improve population nutritional intake and health outcomes through home food preparation, such as the UK government's Change4Life Supermeals campaign (45), have been hampered by a limited underpinning theoretical basis, which forms a crucial foundation in developing complex interventions (46). Furthermore, food cultures and traditions vary throughout the world, hence cooking research specific to the UK context is crucial to inform future national public health nutrition policies and interventions. If home cooking enhances dietary quality, and leads to reductions in obesity and the prevalence of associated NCDs, there may be merit in preferentially targeting socioeconomically disadvantaged groups to develop and utilise healthy home cooking. Home cooking could therefore provide an effective tool for ameliorating socioeconomic inequalities in diet and related health outcomes in future.

1.2 Rationale for research

The greatest challenges to health and longevity for current and future generations are likely to be posed by NCDs, including obesity. To date, efforts to reverse the international trends

of a growing diet-related disease burden have failed. Eating is a universal activity, and diet has an important role in the risk and development of chronic diseases (47). Food intake may be influenced by the approach taken to sourcing meals, such as choosing to prepare food at home, buy takeaways and ready-prepared meals, or eat out in restaurants and fast food outlets. Improving our understanding of home food preparation and its associated different types, perceptions, influences and potential impacts, should therefore provide important insights to inform future public health policy, investment and interventions for promoting healthy diets. In turn, this will help to address the global prevalence of poor nutritional intake and associated NCDs.

1.3 Aims and objectives

The aim of this thesis is to develop an improved understanding of home food preparation practices, experiences and perceptions, and the potential implications of home cooking for diet and health. The specific research objectives are to:

- Systematically review current evidence regarding the health and social determinants and outcomes of home cooking
- Provide detailed insights into home cooking behaviours, and how they are perceived and rationalised
- Identify barriers and facilitators for home food preparation
- Identify the relationships between higher frequency of consuming home cooked meals, markers of dietary quality, and indicators of cardio-metabolic health status
- Describe the sociodemographic characteristics of those consuming home cooked meals and main meals from out of home sources

1.4 Outline of the thesis

- Phase one: Systematic literature review
- Phase two: Qualitative interviews and cross-country comparison study
- Phase three: Secondary data analysis

These phases are described further in the chapter synopses below. Due to the mixed methods nature of the research programme, the thesis is structured with a brief introduction, methods, results and concise discussion for each set of findings. The varied nature of the methods used to explore the research objectives, and heterogeneous format of the results, mean that their presentation using a more traditional thesis structure would be less logical and informative in the context of this research.

Chapter one offers an introduction to the thesis.

Chapter two provides a concise background to the research area. This includes a brief history of changes in meal sourcing and food preparation in recent generations. The chapter presents the topic of food choices, and discusses changes in time spent on cooking, and shifts in population meal patterns, such as eating out, takeaways, and pre-prepared meals. The chapter considers issues around the role of cooking skills; links between cooking, diet and health; and defining cooking and food preparation.

Chapter three describes a systematic review of observational studies on the health and social determinants and outcomes of home cooking. The chapter details the process of identifying, appraising, analysing and synthesising the results from peer-reviewed publications meeting the review inclusion criteria. The chapter presents a narrative synthesis of the findings from qualitative and quantitative observational studies, and discusses the implications for research, policy and practice.

Chapter four presents qualitative interviews undertaken to explore home food preparation practices, experiences and perceptions. The chapter describes the recruitment of participants with diverse sociodemographic characteristics, and use of a topic guide and photo-elicitation techniques to understand: how adults prepare food at home; the barriers and facilitators to home cooking; and perceptions of food preparation and meal sourcing. The chapter presents the findings, analysed using the Framework Approach, and discusses their potential implications for public health.

Chapter five describes a collaborative study undertaken comparing my qualitative interview findings with those from focus groups on home food preparation, conducted in Baltimore,

Maryland, United States. The chapter details the perceptions and characteristics of 'home cooking', viewed as distinct from other types of cooking at home, by participants from across the combined sample. The chapter considers the implications of these insights for both future research and our approach to promoting home food preparation.

Chapters six and seven provide details of secondary data analyses using the Fenland cohort study. In Chapter six, the chapter describes the dietary markers and indicators of cardio-metabolic health associated with differing frequencies of consumption of home cooked meals. In Chapter seven, the chapter describes the sociodemographic characteristics associated with different consumption patterns for a range of main meal types, namely home cooked meals, ready meals, takeaways and eating out. The chapters offer reflection on the potential importance of these results for policy and practice.

Chapter eight integrates the research findings from the preceding chapters. The chapter begins with a brief summary of the potential benefits and challenges of using a mixed methods programme of research, and then employs a triangulation approach to integrate the results from the three research phases. The chapter discusses these findings, and considers the main strengths and limitations of using this method.

Chapter nine offers a discussion of the main findings from the research. The chapter starts by summarising the key results with reference to the original aims and objectives. The chapter then considers the main strengths and limitations of the thesis, and identifies overarching implications for research, policy and practice from the empirical findings and the triangulation approach. The chapter finishes with brief closing remarks.

Chapter 2. Background

'Good painting is like good cooking: it can be tasted but not explained' (de Vlaminck, unknown)

'The destiny of nations depends on the manner in which they feed themselves' (Brillat-Savarin & Fisher, 1971)

2.1 Overview of chapter

The above quotations illustrate the complexity and importance of meals and cooking to individuals and society. Food preparation has been a topic of interest in health, social and economic spheres ever since the domestication of fire and development of food practices and traditions. Cooking behaviour has continued to evolve over time, and frequently features highly on public and political agendas. In this chapter I present the key background issues regarding home food preparation. These themes represent the main topics that are thought to have wide impact and/or significant influence, and are most frequently debated in public discourse around cooking and eating home cooked food. Although this background chapter is not intended as a critical examination of the quality and extent of the existing research literature, in describing these issues I set the scene for the subsequent empirical work and discussion in the thesis. In particular, several of these key themes are addressed in greater depth through the systematic review in Chapter three.

Here, I firstly introduce the topic of defining home cooking and related terminology, and highlight challenges in this area, before considering the issue of cooking skills. I briefly review the evidence to date on cooking skills interventions, and then present the concept of the culinary transition, and related themes of time spent on cooking, and the role of women in cooking. I mention financial considerations around preparing food at home and obtaining food from alternative sources, and conclude with a concise summary of the literature describing the relationships between home cooking, diet and health.

2.2 Definitions of home cooking

Despite the ubiquitous nature of food and eating, there remains a distinct lack of clarity regarding related terminology amongst both children (48) and adults (49). Cooking has been described simply as applying heat to food (50). The Oxford English Dictionary defines the verb 'to cook' as 'to prepare or make ready (food); to make fit for eating by due application of heat, as by boiling, baking, roasting, broiling etc' (51, para. 2).

However, different historical, generational and cultural perspectives affect the interpretation of the complex body of knowledge and skills involved in home food preparation, and no widely accepted definitions exist in the literature for 'home food preparation', 'cooking' and the specific concept of 'home cooking'. It has been argued that the existing body of research does not offer sufficient insights for a full understanding of this multifaceted behaviour, and that frequently home food preparation is falsely dichotomised into separate polarised categories of 'skilled' traditional practices and 'unskilled' reliance on pre-prepared foods (52). In reality, most food preparation in the home lies on a continuum between these two extremes, with the label of 'cooking' variably applied (49, 52-55).

Terminology has often failed to reflect the complexity of cooking (56), and obscured the full spectrum of food preparation-related behaviours, ignoring the often opaque distinction between basic and pre-prepared ingredients. For example, dried pasta, tinned tomatoes, and frozen peas are contemporary ingredients that might all be considered to have undergone a degree of processing which could prohibit their classification as 'basic ingredients'. Yet it is unlikely that their inclusion in a dish would automatically result in a general perception that the meal was pre-prepared and not 'cooked'. This also highlights the time- and culture-variant nature of cooking and associated terminology, such that familiarity with ingredients and patterns of food preparation may impact on the manner in which they are perceived. For example, prepared garlic – chopped or pureed and packaged in a jar, ready for use – has become widely available in recent years, and is likely to be viewed contemporaneously as an ingredient for use in cooking a meal. However, it is quite feasible that in a previous era, when such pre-prepared ingredients were not so common, their inclusion might be considered to indicate a transition from an authentic cooked meal, to one taking such culinary short cuts that it would no longer be perceived as 'cooked'.

2.2.1 Cooked meals

The majority of research studies concerning home food preparation and cooking have not provided explicit definitions for the topics under investigation. However, certain definitions have been offered in the peer-reviewed literature. For example, in a study of the relationships between childhood eating habits and subsequent food behaviours as a student, a home cooked meal was defined as ‘a warm meal where at least one or more fresh ingredients were processed into cooked food’ (57, p. 66). This definition was developed to acknowledge that cooking at home frequently involves pre-processed ingredients and not purely fresh elements (54), but solely heating up a pre-prepared meal was not considered to be cooking. Cooked meals have also been described as ‘traditional lunches or dinners, warm or cold, that include a combination of food items, going through some type of food preparation to constitute a more or less traditional meal’ (58, p. 816). However, this definition does not elaborate further on the perception of ‘traditional’, which might be expected to vary in different cultures and contexts. Furthermore, both of the above definitions also concern the concept of a ‘meal’, which may perhaps be conflated with cooking terminology, and contribute towards additional complexity.

2.2.2 Preparing food

In a study of the relationships between confidence to cook, sociodemographic characteristics, and household vegetable purchasing, the authors stated that: ‘for the purposes of this survey, ‘preparing’ food means anything you might do to make the food suitable to eat (for example, make a salad from it)’ (59, p. S53). Similarly, research on the home food practices undertaken by low income, food insecure women defined food preparation activity as ‘the work performed on one or more foods prior to eating’ (60, p. 1507). Notably, the application of heat was absent from these definitions. Taken literally, food preparation as described here could be as limited as putting food onto a plate, or even just opening the food container.

Classifications have been undertaken using details of specific dishes. In a comparison study of the environmental implications of cooking a meal, definitions were developed for three different methods of preparing the same dish (61, p. 416):

- Homemade meal: potatoes are boiled in water, the meatballs are prepared from minced meat and fried in the frying pan, and bread is baked at home. All food is prepared on a stove top and in an oven. Carrots are peeled and eaten raw
- Semi-prepared meal: chilled meatballs are heated in a frying pan, and mashed potato powder is prepared on a stove top and in an oven. Bread is produced in a large industrial bakery. Carrots are peeled and eaten raw
- Ready-to-eat meal: a frozen, ready-to-eat meal consisting of meatballs, boiled potato, and carrots is heated in a microwave oven. Bread is produced in a large industrial bakery

Although these definitions identify different approaches for applying heat to prepare food, with varying degrees of involvement, they are not readily transferable to other contexts where the distinctions between homemade, semi-prepared, and ready-to-eat may be less evident. For example, in the case of a chicken stir-fry with pasta and microwavable vegetables, different elements of the dish might fall into each of these three categories.

A study investigating the cultural meaning of food-related work for older women created four different levels of meal preparation (62, p. 239):

- Homemade meals: meals prepared from fresh ingredients, often cooked plain food
- Partly prepared meals: often with ready-cooked meat (e.g. meatballs or grilled chicken) complemented with home cooked potatoes or rice. Tinned goods, freeze-dried soups, and frozen vegetables are foodstuffs on this level
- Ready-cooked meals: completed dishes, often frozen, bought at the store
- Meals on wheels: completed dishes delivered from Home Help Service once a day

As previously, it is possible that foods served and consumed at the same time could be derived from several of these levels, such as a composite soup dish alongside a salad of raw ingredients, accompanied by fish grilled at home.

The variety of ingredients in a meal has also been viewed as important for food preparation and cooking terminology. For example, in a project to help Nuer refugee women incorporate nutritional concepts and American food preparation techniques into their current repertoire, each dish in the home cooking training was required to contain items from at least three of the American Food Guide groups (63). This emphasis on diversity of ingredients could potentially reflect greater focus on defining a 'meal', rather than cooking specifically.

The role of personal involvement in cooking has also been included in definitions, although this could be challenging to apply in practice: 'Cooking, in the broad sense, refers to food preparation which provides an opportunity for personal involvement in the food system. Cooking requires the selection, measurement and combining of ingredients in an ordered procedure to achieve the desired result' (35, p. 1142). However, interpreted in the most literal sense, this definition could be applied to selecting foods in a supermarket, assessing the amount required, and putting items together on a plate. Overall, in cooking definitions there is clearly a tension between permitting sufficient flexibility in descriptions so that cooked meals might vary, and creating such ambiguity that the definition is too vague to be usefully operationalised.

2.2.3 Cooking from scratch

Preparing food 'from scratch' has also been perceived as a specific concept. Swanson *et al* described cooking from scratch as being able to assemble a meal from basic ingredients (64), whereas McLaughlin *et al* used a definition of combining multiple foods and applying one or more cooking techniques to produce a single dish (60). Cooking from scratch has also been described as 'part of a set of social practices involving greater interest in cooking, broader use of cooking techniques, herbs, spices and sauces, and greater use of meats and legumes' (65, p. 673). This definition alludes to a degree of personal involvement in the task of preparing food, alongside the use of specific ingredients and skills. A study investigating capacity to maintain a healthy diet on lower income post-retirement, defined meals made from scratch as those using raw or fresh ingredients that had no or minimal processing, for example vegetables such as potatoes may have been cleaned (66). However, conversely, healthy diets have also been associated with basic ingredients that have undergone processing, such as butter, oils and sugar (67). This association is likely to be mediated through the use of both processed and unprocessed ingredients in the creation of home cooked meals, which overall remain healthier than ready-prepared alternatives. Therefore definitions of meals made from scratch might usefully include both unprocessed and processed components.

Wide variation in perceptions of preparing food from scratch has been illustrated by studies such as that conducted with women from low income backgrounds, which showed that

mothers considered cooking from scratch to include heating up pre-prepared waffles and pizza in the oven (68). Another study indicated that definitions of homemade used by older people were more likely to stress the importance of cooking from scratch, the use of raw ingredients, and tradition, whereas younger people more commonly emphasised involvement of convenience foods (69). Given the cultural and contextual nature of cooking, it is feasible that individuals' previous experiences of home food preparation may act as a benchmark for perceptions of cooking, and preparing food from scratch, rather than more objective measures.

Cooking from scratch has been described as a desirable attribute in food preparation, and viewed as the optimal mode of cooking (49, 53, 70). Perceptions of a 'proper meal' have also been identified. Amongst Europeans, many consider a proper dinner to involve a homemade hot meal (71, 72). In the United Kingdom (UK), the traditional proper cooked dinner has historically been served on one plate and included meat, potatoes and boiled vegetables (73-75). The meal also involved sitting around a table with other people, particularly family members, and interacting according to prescribed social norms (76). It is therefore possible that if cooking at home is linked with more formalised meals and mealtime practices, some of the observed outcomes of cooking may be associated with these patterns of behaviour, alongside the specific content of the cooked food.

2.2.4 Out of home alternatives

A range of terminology has been used to describe main meal alternatives to those prepared at home. Ready meals have been defined as: 'packaged meals in the format of frozen, chilled, or shelf-stable that are ready to eat or require limited preparation or additional food ingredients' (77, para. 6). In North America, fast food is typically used to describe foods that can be purchased quickly, such as fried chicken, pizza, and burgers, whereas in the UK and Australia, the term takeaway is used more frequently, which incorporates fast food and other meals, such as fish and chips and Indian food to take out (78).

Convenience foods have been defined as 'any fully or partially prepared foods in which significant preparation time, culinary skills or energy inputs have been transferred from the home kitchen to the food processor and distributor' (79, p. 3). These typically include ready meals, takeaways, fast food and meals from restaurants. This definition does not quantify

the nature of 'significant', and it is feasible that perceptions might vary according to an individual's previous experiences of food preparation. Convenience products have been described as including a range of foods such as ready-made sauces and pastas, canned soups, and cooked chickens (66). Evidently, such convenience products might also be used in cooking at home. Their inclusion would not generally necessarily result in reclassification of a contemporary meal as pre-prepared, for example using a canned soup in a casserole dish alongside a range of basic ingredients.

2.2.5 Developing a working definition

Overall, this heterogeneity in terminology, and the frequent absence of specific definitions in the literature for the concepts under study, emphasise the lack of concordance in the research field regarding terminology around cooking and home food preparation, and out of home meal sources. This issue has been highlighted as a problem previously (43, 52, 56, 80, 81), and exacerbated by the varied perceptions and purposes of cooking. For example, someone may prepare a meal out of necessity to eat and feed others; cook for enjoyment; prepare food for special occasions; cook routine everyday meals; prepare a meal using ready-made components; or cook from scratch using basic ingredients (52, 82, 83). Cooking occasions might also meet several of these criteria simultaneously, and there are likely to be spectrums of behaviour, which do not necessarily conform to distinct classifications or categorisations. With regards to definitions, there appears to be particular lack of clarity over any perceived differences between 'cooking' and 'food preparation', and what specific actions need to be involved in an act or task for it to constitute cooking. Challenges around terminology will be revisited throughout this thesis, and particularly explored further in the empirical research in chapters four and five, and the discussion in Chapter nine.

In view of the lack of a well-established, widely accepted definition, for this thesis I have initially defined 'home cooking' as 'the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating a range of ingredients'. I have used this as an overall term to refer to the task of preparing food at home. I produced this classification through a largely pragmatic process, in order to produce a succinct working definition, with reasonable face validity, which was mutually acceptable to me and my PhD supervisors. I drew on various aspects of the research literature in the field to develop this definition, as illustrated in Table 2.1. The final column, 'key theme' indicates the concepts

from the existing definitions which were used to produce the working definition for this thesis.

Author, year	Term defined	Definition	Key theme
Chen et al, 2012	Cooking	Refers to food preparation which provides an opportunity for personal involvement in the food system. Cooking requires the selection, measurement and combining of ingredients in an ordered procedure to achieve the desired result	Range of ingredients, combined. Involves food work.
McGee, 1984	Cooking	Applying heat to food	Often involves heat.
Yannakoulia et al, 2010	Cooked meal	Traditional lunches or dinners, warm or cold, that include a combination of food items, going through some type of food preparation to constitute a more or less traditional meal	Range of ingredients, combined. Involves food work (not necessarily heating).
De Backer, 2013	Home cooked meal	A warm meal where at least one or more fresh ingredients were processed into cooked food	Often involves heat. Involves food work.
Gustafsson et al, 2003	Homemade meal	Meals prepared from fresh ingredients, often cooked plain food	Range of ingredients. Often involves heat.
Sonesson et al, 2005	Homemade meal	Potatoes are boiled in water, the meatballs are prepared from minced meat and fried in the frying pan, and bread is baked at home. All food is prepared on a stove top and in an oven. Carrots are peeled and eaten raw.	Range of ingredients. Involves food work. Often involves heat.
Laverentz et al, 1999	Dish appropriate for home cooking training	Required to contain items from at least three of the American Food Guide groups	Range of ingredients.
McLaughlin et al, 2003	Food preparation	The work performed on one or more foods prior to eating	Involves food work (not necessarily heating).
Winkler & Turrell, 2009	Food preparation	Anything you might do to make the food suitable to eat (for example, make a salad from it)	Involves food work (not necessarily heating).
McLaughlin et al, 2003	Cooking from scratch	Combining multiple foods and applying one or more cooking techniques to produce a single dish	Range of ingredients, combined. Involves food work. Often involves heat.
Swanson et al, 2011	Cooking from scratch	Being able to assemble a meal from basic ingredients	Range of ingredients.
Worsley et al, 2015	Cooking from scratch	Part of a set of social practices involving greater interest in cooking, broader use of cooking techniques, herbs, spices and sauces, and greater use of meats and legumes	Range of ingredients. Involves food work. Often involves heat.
Hunter & Worsley, 2009	Meals prepared from scratch	Those using raw or fresh ingredients that had no or minimal processing, for example vegetables such as potatoes may have been cleaned	Range of ingredients.

Table 2.1 Definitions of cooking and related terms, used in the development of a working definition for the thesis.

The potential relevance of heat in defining cooking has been recognised (50), and this is acknowledged in my working definition, whilst also accepting that a meal cooked at home might not always be heated (such as a main dish salad) (59). Cooking was found to involve food work, also described as processing, preparation, techniques or a procedure, and this was identified in the majority of definitions used to create my working definition (35, 57-61, 65). In this working definition, I also referred to the importance of including a range of ingredients, as previously noted (35, 58, 60-66), and highlighted that components should be combined and/or mixed (35, 58, 60). I elected not to specify whether these ingredients should be 'fresh', 'raw' or 'basic', since dishes often include pre-processed ingredients (54), and constraining the working definition of cooking at home to exclusively non-processed ingredients seemed excessively stringent and unrealistic. In my definition I recognised the role of skills in preparing foods, and also included the term 'practices', in acknowledgement that food preparation is often not necessarily clearly divided into skilled and unskilled methods (52). Overall, I aimed to reflect a degree of personal involvement in the process of cooking, as has been previously noted (35, 65), without being overly rigid to the extent that common practices for preparing food would be excluded by the working definition.

My understanding of the terminology around cooking at home and eating home cooked foods evolved as this programme of research progressed, particularly in light of the qualitative findings addressed in chapters four and five. Given the specific connotations associated with the term 'home cooking' described in Chapter five, and the potential divergence from principles of a healthy diet, I subsequently adopted the term 'cooking at home', defined as above, in place of 'home cooking'. This terminology is used following Chapter five, for the remainder of the thesis. 'Cooking at home' is used in preference to 'home food preparation', which would appear to have less specific implications, according to the existing definitions reviewed. I refer to food preparation, cooking and home cooked food in other research studies using the authors' terminology, as necessary. In the discussion in Chapter nine, Table 2.1 is revisited in the development of further criteria for refining the definition of cooking at home, in light of findings identified through the course of the thesis.

2.3 Cooking skills

Preparing food to eat for oneself is generally considered to be an essential activity for living as independently as possible (84-86). In wider social discourse, there is ongoing debate regarding a perceived loss of home cooking skills in more developed countries. Most hypotheses regarding deskilling are based on Braverman's Labor and Monopoly Capital theory, which posits that workers become deskilled, dissatisfied and degraded as they are gradually segregated from emerging industrial systems and undertake only fragmented, simplified tasks (87). However, this provides little description of the effect of industrialisation on domestic work (88), and it has been argued that superior technology can inspire the development of new, more advanced skills (89).

Although some concern regarding cooking skills relates to the changing role of women as food providers (90), and potential deterioration in self-value and self-identity with the decline of skills themselves (91), most of the alarm is associated with perceived consequences of the loss of skills. For example, it has been suggested that declining cooking skills are associated with reduced control over diet (92) and increasing dominance of food retailers and industries (93, 94). The growing availability of pre-prepared convenience foods is highly lucrative for the food industry, and has received much blame for deskilling domestic cooks and routinising food preparation (93, 95). Proponents of pre-prepared foods have also been accused of robbing children of the opportunity to learn skills in home food preparation from their parents (96). However, a greater prevalence of convenience foods could provide the benefit of increasing dietary variety (97), and offering increased choice over the amount of time spent in food preparation, particularly for women as the main food providers (98). This could enable (primarily) women to adopt greater roles in the non-domestic world, and so potentially improve the economic circumstances, and hence health, of their families. It is therefore plausible that a greater prevalence of women working in paid employment outside the home led to increased demand for convenience foods, whilst such foods also simultaneously facilitated the transition of women into the workforce.

Cooking skills have been described in wider discourse as fundamental to a healthy life: 'the food industry is a business, not a parent; it doesn't care what we eat as long as we're willing

to pay for it... Home cooking these days has far more than sentimental value; it's a survival skill' (99, p. 252-253). This view is somewhat contested by research suggesting that pre-prepared meals and foods, when selected prudently, may offer a comparative nutritional profile to home cooked meals (19, 39). A lack of cooking skills has also been perceived as a barrier to social inclusion: 'poor cooking skills may intensify the sense of social exclusion that may already be felt by the lower-income or de-skilled consumer' (100, para. 6). However, this presupposes that such consumers desire to be part of a cooking community, whereas they may in reality prefer to be liberated from the tasks of food preparation by consuming pre-prepared alternatives, such as takeaways and ready meals.

2.3.1 Learning cooking skills

In the majority of countries, cooking is no longer taught as a formal class in schools (94). In the UK, although food preparation has returned to the teaching curriculum for education Key Stages 1-3, home economics has been discontinued as a GCSE qualification (101). A previous UK survey found that 49% of women and 15% of men considered that cookery teaching at school had provided them with some skills (80). However, the majority of people still report learning to cook from their mother (80, 102), and a perceived waning in the tradition of handing down cooking skills through generations has been noted (103). Whole population groups have reported a lack of confidence in basic cooking skills (83, 104-106) and it is likely that dietary choices will be constrained by limitations in confidence and ability to cook (35, 107, 108). Evidence suggests that those acquiring cooking skills in childhood tend to have greater cooking confidence, skills, and higher dietary quality (102), and the likelihood of preparing food at home as an adult may be decreased amongst those who failed to learn these skills as a child (109).

However, analyses of UK data from a national nutrition survey (110), and time use survey (111), indicated that the majority of people lived in a household in which cooking regularly took place. Although contemporary concerns have been expressed regarding poor standards of cooking skills, this is not a new issue, and anxieties have been voiced for over 200 years (112-114). At the end of World War II, when food rationing and austerity compelled heightened culinary creativity and resourcefulness, the UK Ministry of Food still deemed it necessary to publish advice on cooking (115-117).

Higher standards of cooking skills and confidence in food preparation have been linked with changes in cooking behaviour and dietary benefits (81, 118). These pathways could be mediated through an increased ability to control food intake. For example, a study involving mothers of children of school age showed that the healthiness of meals prepared was positively linked with mothers' confidence in their ability to prepare healthy dishes (119). Amongst Australian households, those that bought a wide variety of vegetables were more likely to have a main cook possessing confidence in preparing vegetables (59). Developing cooking skills may be associated with increased engagement with food and cooking, such that greater awareness and interest leads to healthier food choices (120). The associations between cooking skills, confidence and diet may also be due to decreased dependence on convenience foods. For example, cooking skills were shown to be inversely associated with the consumption of ready meals in German (121) and Spanish (122) populations.

2.3.2 Breadth of cooking skills

The relationships between possessing cooking abilities, and subsequent home cooking practices and behaviour, are evidently more complex than simply learning technical skills. Short conducted a qualitative study of 30 cooks living in England, to develop a clearer understanding of the meaning of 'cooking skills', and provide insights into home food preparation practices (43). The associations between cooking behaviours, knowledge and skills was found to be nuanced, and food preparation was not strictly categorised into a dichotomy of 'cooking from scratch' and 'cooking with pre-prepared foods'. A range of food preparation skills were identified, including mechanical technical skills such as slicing, poaching and grilling; perceptual and conceptual skills, for example identifying the right consistency for a scone; and creative skills such as adapting recipes and designing meals from leftovers. Organisational skills were also demonstrated, for example juggling the timings of meal preparation and other household chores, or using a quicker cooking technique when lacking time. Academic cooking skills included knowledge of combinations of ingredients appropriate for different cuisines. Participants in the study also demonstrated a number of skills less easily classified, such as coping with cooking whilst under pressure or managing childcare.

From this research, Short concluded that the focus on the 'requirements of the cooking task' should be shifted to consider instead a contextual or person-centred approach, which highlights the 'capabilities and practices of the cook'. As Short asserted: 'Rather than our technical skills, it is our approach to cooking that influences what and how we cook, 'approach to cooking' being made up of the attitudes and beliefs about cooking that we share with others, our personal identifications as people who cook and our confidence in cooking and the degree to which we find it an effort, arising in part from our tacit, unseen skills and academic knowledge' (52, p. 93). In addition to these factors, cultural background is an important influence on cooking skills and practices (123), which is likely to interact with other determinants of cooking behaviour and perceptions.

Short's research comprised a small number of participants, who came mostly from the area of Greater London in England. The findings are therefore not necessarily more widely generalisable to other populations, in different geographical areas and with differing food contexts. However, the importance of these wider abilities related to home food preparation, such as food budgeting, meal planning, and shopping for ingredients, has been recognised and collectively referred to as 'food skills' (124). Such skills have been defined as the ability 'to purchase, prepare and cook food materials using available resources, to produce well-balanced and tasty meals, appropriate to the age and needs of the individuals consuming them' (125, p. 2413).

2.3.3 Food literacy and food agency

A similar concept, identifying the significance of the social and environmental context in which an individual uses their skills and abilities to prepare meals, is that of 'food literacy'. Food literacy has been described as 'the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake' (126, p. 54). This is perhaps analogous to the concept of health literacy, which enables individuals and communities to utilise information effectively to optimise their health (127), and is arguably equally complex.

The concept of food literacy has recently been expanded further, to a model of ‘food agency’ which ‘integrates the practical, hands-on, basic components of cooking with cognition while recognizing that the individual’s agency is shaped by both internal personal factors and external structural factors’ (56, p. 1152). This approach is based on psychological, anthropological and sociological theories of agency, which concern ongoing interaction and negotiation with social values and structures (128-130). Whilst this broader conceptualisation of cooking and cooking skills is likely to be useful in encouraging interventions to account for background complexity, much further information is required to guide the development of cooking interventions accordingly. This emphasises the importance of collaborative learning and sharing between different actors and agencies relevant to the field, including academics, policy makers and practitioners.

Overall, these descriptions of cooking skills, food skills, food literacy and food agency illustrate the complexity of home cooking, the varied factors influencing behaviour, and the challenges inherent in defining and quantifying concepts. It is likely that difficulties in measuring and defining these constructs may have contributed to the challenge of establishing a consistent evidence base for potential links with diet and health (125). The issues around cooking-related terminology will be revisited in the empirical research in chapters four and five, and discussed in Chapter nine.

2.3.4 Cooking skills interventions

A large number of interventions delivering cooking skills training have been developed and implemented worldwide, with the aim of leading to improvements in diet and hence diet-related diseases (10, 32, 107, 131-133). Potential benefits of these cooking interventions, in terms of diet; health; and cooking knowledge/skills, confidence and attitudes, have been identified through recent systematic reviews (107, 133). However, overall these reviews found that the evidence base was inconclusive, due to the poor quality of studies considered (107, 133). In particular, limitations included absence of randomisation and/or control group, biases in selection of participants and sample attrition, and poorly designed, implemented and/or evaluated data collection methods, which were unable to provide adequate evidence in support of definitive conclusions for the research outcomes (107, 133).

The systematic review of UK adult home cooking interventions (107) identified a single well-conducted evaluation, which indicated no benefits to cooking knowledge, attitudes or physical health, and minimal dietary improvements only. The participants did however enjoy the cooking intervention, largely attributable to social reasons (134). The second review, including both UK and non-UK adult cooking interventions, found that rigorous evaluation was lacking, and generally only short term outcome measures were studied (133). Other less comprehensive reviews of cooking skills interventions have also been conducted, which have generally drawn similarly inconclusive findings, due to methodological limitations of the included studies. Such reviews have considered for example children only (135); using scoping rather than systematic methods (136); and focusing on specific contexts such as school-based cooking interventions (137), community kitchens (138), and the Jamie Oliver Ministry of Food cooking programme (139).

There has been a call for high quality, comprehensive evaluations of cooking skills interventions, in order to inform decision making regarding future commissioning and resource allocation (32). Recent research suggests that a large-scale, definitive randomised controlled trial of a cooking skills intervention, that is group delivered and community-based, should be feasible to conduct (140). The research presented in this thesis has not sought to address external cooking interventions, since comprehensive consideration would be beyond the scope of this programme of work. Furthermore, it is likely that external interventions may generate different implications for research, policy and practice compared with naturally occurring cooking behaviour, which is the main focus of the work presented here. Nonetheless, further study focused on cooking interventions is likely to be of considerable value, and the findings complementary to those reported in this thesis.

2.4 Culinary transition

The culinary transition has been described as a 'process in which whole cultures experience fundamental shifts in the pattern and kind of skills required to get food onto tables and down throats' (104, p. 2). This has paralleled a wider nutrition transition, whereby economic, demographic and epidemiological shifts have been accompanied by changes in dietary

intake and physical activity, in particular the adoption of diets higher in fat, sugar and animal products (141). In many respects, the modern food landscape in developed countries is unrecognisable, compared with a traditional pattern of daily meals prepared at home from basic ingredients by a housewife and served to the nuclear family. A number of changes at the level of the individual, society and culture have contributed to this transition. These include evolving provision and affordability of food sources, outlets and eating establishments outside the home, such that purchasing and/or eating meals out is commonly no longer reserved for special occasions, but forms part of regular routine (28). In line with this, quick food service as exemplified by the 'drive-thru' has risen dramatically, and eating as a secondary activity by consuming meals on the go has increased over time (142).

A plethora of convenience food options is also available for eating at home with minimal time and resource input. There is debate as to whether such provision arose as a response to changing social patterns, to facilitate the transition of women into the workplace by conserving time and effort in the kitchen, or if convenience was a strategic promotional opportunity, creating a new marketing niche (99). The wide availability of convenience foods are considered to have impacted on food preparation and consumption behaviours worldwide, with shifts away from more traditional cooking using basic ingredients (143, 144). Indeed, it has been suggested that the opportunities afforded by commercial food provision and evolving food technologies may make it challenging for home food preparation behaviours to ever return to their previous state (54).

However, these changes in cooking and eating practices have paradoxically been accompanied by widespread increasing interest in cooking as a leisure 'spectator' activity. For example, the number and range of cooking-related television shows, mobile apps, magazines, and cookery books have grown vastly over the past 20-30 years (145). As noted by food writer Michael Pollan, this signifies a shift from participating in cooking, to watching others cook, and engaging in food preparation vicariously (146). Nonetheless, this perhaps also indicates that the general public maintain or have even grown further interest in cooking, which might be exploited in future to encourage resumption of more regular home cooking practices.

2.5 Time spent on cooking

Recent changes in the food landscape have been accompanied by decreases in time spent on cooking and food preparation-related activities in most developed countries (25, 26, 147). An American study found that time spent by women on food preparation and clean up decreased by 41 minutes per day between 1975 and 2006, from 92 down to 51 minutes, with no compensatory increase in time spent by men (148). A second United States (US) study identified a similar pattern, showing the time spent by women on daily meal preparation decreased by 33 minutes on average from 1965 to 1998, although men did increase their time allocation to food preparation slightly over the same time period (149).

Recent research from the UK on time use survey data indicated that during a 24 hour period, 85% of women and 60% of men were engaged in some cooking or washing up, with median time expenditures of 50 minutes and 10 minutes respectively (111). However, research has also suggested that people would ideally prefer to allocate less than 15 minutes per day to preparing meals (150). It is worth noting that the conclusions drawn from surveys of time use are limited by the varied definitions of food-related work, and frequent combining of preparation and clean up activities into the same time use categories. It is therefore possible that some of the apparent decrease in time spent on cooking over recent years may be attributable to more efficient methods of cleaning up, such as more widespread use of dishwashers.

Curtailing time spent on food-related tasks has been linked to the concept of time scarcity, whereby even patterns of daily food intake are strongly influenced by strategies to conserve time (151). In Becker's household production model, the switch in food prepared from scratch to convenience foods is perceived as a time-saving activity, and the factors used to predict behaviour primarily concern the sociodemographic characteristics of the household, and the wife's work responsibilities (152). However, other studies have proposed that an approach to conserving time and effort may involve different 'outsourcing' strategies such as eating out, preparing simpler dishes from scratch, heating up the remains of previous

servings, or simply skipping meals, rather than necessarily swapping to convenience foods (54, 153-155). Research has suggested that there may be no significant difference in total meal preparation time between meals that do and do not include commercial foods (54). However, given a general lack of consensus regarding terminology for convenience and commercial meals and foods (54), this may be at least partially due to variable classifications. The consumption of commercial foods could also present opportunities for time saving beyond hands-on preparation time, for example by simplifying food shopping, and for cost saving, in terms of fuel used for cooking at home.

2.6 Role of women in cooking

Cooking has conventionally been perceived as the responsibility of homemaker women, with their duty to serve the male breadwinner and nurture the family with a proper meal (156). The following quote, fortunately from 1890, embodies this traditional attitude: ‘...there are very many good, nutritious dishes to be made... Unhappily, there are comparatively few who will take enough thought or trouble to prepare them. How many homes would be healthier, brighter, and happier if our women could only be brought to see how much depends on them, and bestir themselves in the matter’ (157, p. 8).

Evidence from the wider research literature indicates that in the majority of households, the female partner continues to assume the bulk of home food preparation tasks, even though outside the home they may also often undertake paid work (98, 100, 111, 158-160). A sense of obligation and duty for women to achieve a harmonious domestic life through the preparation of home cooked food is reinforced by women’s magazines, food advertisers, and cookbooks (156). Providing nutrition for the family may offer a sense of self-esteem and self-confidence for women (90), and enable demonstration of love for others, with symbolic creativity (161, 162). However, it is also possible that women might report such sentiments in reflection of social desirability, and may not consistently feel positive regarding the domestic task of cooking. Indeed, women responsible for preparing meals may feel an obligation to cook daily (54, 163) and find it challenging to juggle both home cooking and employment, with a consequent sense of guilt when relying on convenience foods (69, 164-

166). Hence food decisions and practices may become a forum for gender-related power struggles, and a source of family conflict (167-169).

Research has suggested that when men are involved in home food preparation, they frequently adopt a specific role or task, discrete from the daily routine, such as grilling meat outdoors on a barbeque or cooking the Christmas dinner (170). This activity may be perceived as more akin to leisure than household work. However, such a pattern is not consistently the case, and overall the time spent on food-related activities by men in Britain and America has approximately doubled since the 1960s (171, 172). Research suggests that men may view food preparation as a combination of both work and leisure, particularly through their shaping of the home cooking environment and experience (173). It is also feasible that some men may underreport their home cooking, due to a prevailing self-perception that cooking is not a masculine activity with which to engage. Evidently, wide variation exists in cooking practices in different households, and studies have indicated that after cohabitation, couples often share duties related to food provisioning and preparation (167, 174, 175). Further research into the breakdown of this work, for example according to planning meals, shopping for ingredients, cooking in the kitchen for routine meals and special occasions, and clearing up afterwards, would prove insightful.

2.7 Financial considerations

Factors influencing food choices operate and interact at various levels, including the individual, culture, society and environment (176, 177). As has been previously noted, 'the choice not to cook from basics is not always related to lack of skills but to aspects of food culture' (104, p. 3). This culture can include the relative affordability of different meal sourcing options. Home food preparation may have an important role in balancing the budget for households with constrained finances (178). In 2015, averaged over all UK households, 10.7% of total budget went on food, but for the lowest income households their expenditure was 16.0% (28). This highlights the disproportionate burden of food costs for those experiencing socioeconomic disadvantage, and hence the potential incentive to

economise on food expenditure. Survey questions regarding influences on food purchases have identified the price/value/money available for food as a top priority (179).

In low income households, a necessity to monitor and control food expenditure may limit opportunities for experimenting with home cooking, due to risks of a meal being rejected by the recipients, or preparation not going to plan, resulting in food wastage. More complex home food preparation has been linked to increased household food security (60), although such relationships could be confounded by variation in approaches to and interest in cooking, according to socioeconomic status (SES). Socioeconomic disadvantage has also been associated with less adequate resources for preparing food at home, such as constraints on energy use in cooking, and poor kitchen facilities, which are likely to impact on cooking behaviour (180). Potential mitigation of these factors, associated with educational measures of higher SES, could be due to improved problem-solving skills enabling greater flexibility to facilitate home cooking, despite scant resources.

There is debate over the most appropriate approaches for calculating food-related expenditures needed to meet recommended dietary requirements, and for assessing food insecurity (181, 182). Research has suggested that in the UK, using direct comparisons of healthy and less healthy options, there is minimal difference between regular foods and healthier substitutions (183). Whilst some healthier substitutes are more expensive, such as lean meat, others are cheaper, such as low fat yoghurt. When comparing healthy and less healthy products by edible weight, healthier products such as fruit and vegetables tend to be cheaper than more unhealthy goods, such as crisps and bacon (183). However, evidently these products are not directly interchangeable, and this approach does not account for the need to meet daily energy requirements. Lower energy-density foods (providing less energy per gram) such as fruit and vegetables, are more costly when measuring price per kilocalorie intake, and appear to have increased disproportionately in price over time, compared to more unhealthy, higher energy-density foods (17). This is likely to encourage greater consumption of cheaper, but less nutritious foods (184). In line with this, research has demonstrated the existence of clear socioeconomic dietary inequalities, with more socioeconomically disadvantaged groups generally consuming poorer quality diets, presenting higher risks of causing non-communicable diseases (179).

2.8 Home cooking, diet and health

An accumulating body of research has addressed potential links between home food preparation, dietary intake and associated health outcomes. The key relevant issues are introduced below, and systematically reviewed in Chapter three. In Chapter six, new empirical analyses on home cooking, diet and health are conducted, and the findings discussed.

Research has suggested that food prepared at home may provide an improved nutrient profile compared to that prepared out of home, with for example lower energy intake per meal and less cholesterol, total fat and saturated fat, and more iron, calcium and fibre, per kilocalorie consumed (185). The evidence base regarding potential health benefits from home cooking is limited, however research has for example linked increased frequency of meal planning and leisure cooking with successful weight loss maintenance (186). Home cooking has also been associated with increased longevity, especially for women (35).

In terms of meals prepared outside the home, the consumption of convenience foods as a proportion of total food intake has been linked with a negative impact on dietary quality (187). Prepared food sourced outside the home has also been associated with increased intake of total fat, saturated fat, and salt, reduced fibre intake, and overall poorer dietary quality (188-190). The growing consumption of out of home meals is thought to play an important role in increasing levels of obesity (131), and out of home food intake has been linked to higher levels of overweight and adiposity (189, 191, 192), and weight gain amongst young adults (193). It has been estimated that great reductions in the burden of cardiovascular disease and cancer, and overall healthcare costs, could also be achieved if the food industry adopted the production of healthier foods (194).

However, relationships between consuming home cooked meals and potential diet and health benefits, compared with eating food from out of home sources, remain inconclusive. The evidence base is largely built upon cross-sectional research, which is unable to attribute

direction of causation. Furthermore, certain studies have suggested that home cooked meals may not always be healthy, and many recipes, especially those marketed by celebrity chefs, fail to meet recommended nutritional guidelines; may be less healthy than ready meals; and potentially confer poorer health outcomes (39, 40, 195). Some of the variation in research findings may be attributable to diverse conceptualisation of out of home food between studies. For example, out of home food may include fast food only, fast food and restaurant use, different types of restaurants and/or convenience foods. The potential impact of meal source on diet and health is also likely to be influenced by variation in meal content, food preparation methods used, and portion sizes – which have increased over time (196).

2.9 Summary

In this chapter I have identified and critically assessed the key concepts underpinning contemporary study of home food preparation, and introduced the main areas of potential controversy. I pursue these issues further in chapters three to seven, culminating in the discussion chapters eight and nine.

Through this background chapter I have highlighted the complexity of cooking at home, and identified the diversity and challenges inherent in defining home cooking and out of home alternatives. From the start of this thesis, up to Chapter five, I define ‘home cooking’ as ‘the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating a range of ingredients’. Following Chapter five, in light of learning from this chapter, I use the term ‘cooking at home’ instead of ‘home cooking’ for the remainder of the thesis. I refer to other research studies using the authors’ terminology, as required. Further discussion of terminology for cooking and related practices is offered in Chapter nine.

In this chapter I have also described concerns over perceived loss of cooking skills over time, and noted associated societal changes which may have led to their demise. I have briefly summarised evidence to date on cooking skills interventions, and the implications for future research. I have discussed the potential importance of wider food skills, particularly in the context of a culinary transition less conducive to cooking at home. I have addressed

reductions in time spent on home cooking, and the changing role of women, who nonetheless remain the predominant home cooks. In this background chapter I have included commentary on financial considerations around home cooking, and the potential introduction of socioeconomic inequalities in diet and health through differential pricing of healthy and less healthy foods. Finally, I have identified associations between home cooking and putative benefits to diet and health, and highlighted prevailing controversies and inconsistencies in this evidence base.

Chapter 3. Health and social determinants and outcomes of home cooking: a systematic review of observational studies

A shorter version of this chapter has been published as: Mills, S., White, M., Brown, H., Wrieden, W., Kwasnicka, D., Halligan, J., Robalino, S. and Adams, J. (2017) 'Health and social determinants and outcomes of home cooking: A systematic review of observational studies', *Appetite*, 111, pp. 116-134. <https://doi.org/10.1016/j.appet.2016.12.022>

The review protocol has been published as: Mills, S., White, M., Robalino, S., Wrieden, W., Brown, H. and Adams, J. (2015) 'Systematic review of the health and social determinants and outcomes of home cooking: protocol', *Systematic Reviews*, 4(1), p. 35. <https://doi.org/10.1186/s13643-015-0033-3>

3.1 Abstract

Background

Influences determining home cooking behaviour may be varied, and although many dietary interventions assume a positive impact of home cooking on diet, health and social outcomes, evidence concerning these relationships remains inconsistent. This study aimed to systematically review health and social determinants and outcomes of home cooking.

Methods

Nineteen electronic databases were searched for relevant literature. Peer-reviewed studies published in English were included if they focused mainly on home cooking, and presented post-nineteenth century observational or qualitative data on participants from high or very high human development index countries. Given the absence of a widely accepted, established definition, home cooking was defined as 'the actions required for preparing hot or cold foods at home, including combining, mixing and often heating ingredients'. Interventional study designs, which have previously been reviewed, were excluded. Themes were summarised using narrative synthesis.

Results

From 13,341 unique records, 38 studies – primarily cross-sectional in design – met the inclusion criteria. A conceptual model was developed, mapping determinants of home cooking to layers of influence including non-modifiable, individual, community and cultural factors. Key determinants of cooking included being female, greater leisure time availability, close personal relationships, and culture and ethnic background. Putative outcomes were mostly at an individual level and focused on potential dietary benefits.

Conclusion

These findings suggest that determinants of home cooking are more complex than simply possessing cooking skills, and support potential associations between cooking and positive diet, health and social outcomes, which require further confirmation. Current evidence is hampered by reliance on cross-sectional studies and authors' relatively limited conceptualisation of determinants and outcomes of home cooking.

3.2 Introduction

Many governmental and non-governmental organisations across the world promote home cooking as a key component of strategies to tackle obesity and poor quality diets. Establishing the evidence base for health and social outcomes of home food preparation is crucial for informing the likely relative value of home cooking interventions. To date, this evidence has been inconclusive. Research has suggested that home cooking may offer benefits for diet (197) and health (198); however potential advantages have largely been studied in specific sociodemographic subgroups rather than on a larger population scale, and have generally focused on the shorter term.

Home food preparation incorporates a range of complex behaviours with multiple influences, spanning a broad spectrum of practices (43). Since the mid-twentieth century, people have been cooking less often from basic ingredients in developed countries (25, 26), alongside increasing availability of processed foods and widespread food industry marketing (199). The typical demographic of those cooking has also shifted, such that home food preparation is no longer so dominated by women (171). If home cooking is linked to diet and health benefits, then developing a clearer understanding of who engages in home food

preparation and why, is of importance to inform the rationale for, and targeting and tailoring of, healthy eating and home cooking interventions.

Two recent systematic reviews appraising evidence on home cooking interventions noted that the evidence base was dominated by poor quality studies, and the findings were therefore inconclusive (107, 133). Observational research into home food preparation is likely to offer further insights, both regarding the characteristics of those currently participating in home cooking, and the potential outcomes of home cooking practices. However, to date no synthesis of observational research has been undertaken. In order to fill this gap, I conducted a systematic review with the aim of assessing the health and social determinants and outcomes of home cooking.

The prevalence of systematic reviews has increased greatly since their emergence in medical research and the natural sciences in the 1970s, due to their potential as 'a well-established and rigorous method to map the evidence base in [as] unbiased way as possible, assess the quality of the evidence and synthesize it' (200, para. 5). Systematic reviews are generally distinguished from more traditional literature reviews by the use of a fixed process, built upon rigour, transparency and objectivity.

Conducting a systematic review usually involves six key steps. Firstly the research question is defined and the inclusion criteria identified. Next the existing literature is reviewed, which often involves searching electronic databases for relevant material. Studies are then sifted to identify those meeting the review inclusion criteria, before using objective tools to assess the quality of studies. Included studies are then combined, and finally the findings summarised and interpreted.

Systematic reviews offer a number of advantages, through employing clearly defined methods which help to: minimise bias; enhance the precision, consistency and transferability of results; produce accurate and reliable conclusions; and comprehensively summarise necessary information for researchers, policy makers and healthcare providers, thereby limiting time delays from research to implementation (201). However, systematic reviews may also be subject to a number of limitations, including the identification and selection of

relevant studies; heterogeneity of included research; potentially inappropriate analyses and loss of important details; conflict with new emerging research; publication duplication; and poor quality of review reporting (202). These may limit the wider generalisability of review conclusions, particularly considering publication bias towards positive research findings in the peer-reviewed literature (203).

I chose to conduct a systematic review in preference to a non-systematic, more traditional literature review, in view of the opportunity to develop a thorough, less biased summary of research on determinants and outcomes of home cooking. Given the breadth of existing literature on cooking and food preparation, food consumption patterns, healthy eating, and dietary-related health, I considered that adopting a systematic approach would enable me to objectively distil this body of evidence down to the key relevant data.

3.3 Methods

3.3.1 Protocol and registration

The protocol for this review was registered with PROSPERO International Prospective Register of Systematic Reviews (204) reference CRD42014013984, and deviations from the original research protocol were documented with their rationale in the online PROSPERO record. The protocol was discussed with my PhD Patient and Public Involvement (PPI) panel, and amendments based on their feedback were integrated into the conduct of the study. The protocol has been published in *BMC Systematic Reviews* (205). The review is described here according to recommendations from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (206) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) guidelines (207) (see Appendix A).

3.3.2 Search strategy

The search strategy was built upon pilot work conducted in the development of the protocol for this programme of research. Shannon Robalino, an information scientist specialising in medical and social sciences literature, provided assistance in the development of the electronic search strategy. Initial searches informed the iterative expansion of search strings, created from key words and search terms identified from previous studies of cooking and

food preparation. A sample search strategy for MEDLINE database is shown in Appendix B, which was adapted for use in other databases.

The following electronic databases were searched from inception through to December 2014: MEDLINE; Scopus; Web of Science; PsycInfo; Applied Social Science Index and Abstracts (ASSIA); Business Source Premier; CAB Abstracts; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Cochrane Central Register of Controlled Trials (CENTRAL); Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of Effects (DARE); Embase; Education Resource Information Centre (ERIC); Health Management Information Consortium (HMIC); International Bibliography of the Social Sciences (IBSS); PubMed; Public Affairs Information Service (PAIS) International; Social Services Abstracts; and Sociological Abstracts. Where possible, searches were restricted to human studies. Additionally, internet searches were conducted using the phrases 'home cooking' and 'home food preparation' in the Google search engine, and the top 50 hits for each phrase assessed.

3.3.3 Selection criteria

Population: Studies of children, adolescents, adults and elderly participants were included, to ensure wide generalisability of the review findings. In terms of economic development, only studies involving participants from high or very high human development index countries (208) were incorporated into the review, since issues encountered in areas with lower levels of development, such as smoke inhalation from cooking fires, are not necessarily applicable to more developed nations. Studies focusing on home cooking in relation to specific diseases, physical incapacities, or population groups (for example professional sportspeople) were excluded, to increase the relevance of the findings to the wider population. However, studies concerning type II diabetes were not excluded, given the high prevalence of this disease in the general population and the wide applicability of dietary guidance for disease prevention and control (209). Studies of food safety, and specific dietary requirements such as those related to food allergies or intolerances, were also excluded.

Context: The review was divided into two arms, namely the health and social *determinants* of home cooking (factors potentially influencing behaviour), and the health and social

outcomes of home cooking (possible benefits and disadvantages). Given the absence of a widely accepted, established definition in the literature, I defined 'home cooking' as 'the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating ingredients'. The development of this working definition was described in Chapter two, and involved discussion with my PhD supervisors to establish a mutually acceptable consensus. The working definition for this review differs very slightly from that used for the rest of the thesis, which includes '*a range of ingredients*', since the review definition was developed and applied from the start of the programme of work, before subsequent refinements.

Setting: The definition of 'home' included self-catered domestic arrangements, such as university accommodation and private households. Studies that were not generalisable to the traditional home context, for example those that focused on commercial locations such as restaurants, or analysed specific dishes or food preparation techniques, were excluded. Studies presenting data on cooking practices prior to the twentieth century were also excluded, in view of significant changes in the food environment and associated cooking practices over time (104).

Study design: Observational studies presenting quantitative or qualitative data, with home cooking as a key focus, were included in the review. These studies were required to be peer-reviewed, and published in English. Findings from interventional studies have recently been summarised (107, 133), therefore interventional study designs were excluded. Given that causal relationships could not be established by the included study designs, determinants and outcomes identified were only putative.

3.3.4 Study selection

Searches were managed in EndNote version X7, and duplicate entries removed. In cases where a study was documented in more than one article, preference was given to articles using methods higher in the hierarchy of research study design (210). I screened the titles and abstracts of retrieved articles, and 10% of articles were independently double screened by a second reviewer (one of Jean Adams, Heather Brown, Joel Halligan, Dominika Kwasnicka, Martin White and Wendy Wrieden). We excluded articles that clearly did not

meet the inclusion criteria. Where there was disagreement between reviewers (8.4% of articles), articles were retained. Full texts of all included articles were screened independently by myself and a second reviewer, with disagreements resolved by discussion between the two reviewers, plus a third reviewer where consensus could not easily be reached.

3.3.5 Data abstraction and quality assessment

I developed a tailored data extraction tool to record the characteristics of included studies, using recommended guidance (211, 212) and an example of a previous tool (213) (see Appendix C). The tailored tool included details on: study design, location, aims, setting, focus on determinants and/or outcomes of home cooking, time period, participant recruitment and demographics, and conclusions of the study authors. For quantitative studies, further data on the parameters compared, statistical techniques, and outcomes measured were recorded. For qualitative studies, additional information on the main themes identified and the study perspective was noted. I abstracted the data, and a second reviewer checked and amended the record as required.

The quality of all studies included in the review was appraised independently by two researchers, including myself plus a second reviewer. Quantitative studies were assessed using the Effective Public Health Project tool, which is recommended by the Cochrane Public Health Group (214) (see Appendix D). Reviewers assessed each study in terms of strong, moderate or weak ratings against domains for selection bias, study design, confounders, blinding, data collection, and withdrawals/dropouts. These domain ratings were used to establish a global rating for the study, according to: no weak ratings plus at least four strong ratings equalled a strong global rating; one weak rating plus less than four strong ratings equalled a moderate global rating; two or more weak ratings equalled a weak global rating. Qualitative studies were assessed using a published checklist combining items from a range of previous tools (215) (see Appendix E). Reviewers assessed each study with a yes or no decision for each of ten questions regarding the research question, methodology, recruitment, data collection, data analysis, description of findings, justification of conclusions, limitations, reflexivity and generalisability. Studies with at least 50% yes

assessments were rated of high quality. For both qualitative and quantitative studies, where discrepancies arose between reviewers' ratings, these were resolved through discussion.

3.3.6 Data synthesis

Due to the diverse range of research questions and study methods identified in the review, and the heterogeneity in the included study data and outcomes of interest, statistical meta-analysis was not appropriate. Guidance from the Economic and Social Research Council (216) was instead used to construct a narrative synthesis. This entailed synthesising the results of included literature; investigating relationships and associations within and between studies; noting the involvement of theory in development and analysis of included studies; analysing the robustness of the data synthesis; and constructing a conceptual model of the health and social determinants and outcomes of home cooking.

3.4 Results

3.4.1 Study characteristics

In total, 13,341 articles were screened for inclusion; 853 full text articles were assessed for eligibility; and 38 studies met the inclusion criteria (see Figure 3.1) (206). Since the majority of studies were cross-sectional, it was not possible to draw definitive conclusions regarding direction of effects. However, papers were classified into *determinants* and *outcomes* of home cooking on the basis of the implicit or explicit assumptions of the study authors. The majority of studies in the review (twenty-one, 55%) focused on the determinants of home food preparation only (80, 123, 147, 173-175, 217-232); ten studies (26%) addressed both determinants and outcomes (64, 198, 233-239); and seven studies (18%) explored outcomes only (34, 35, 41, 197, 240-242) (see Table 3.1).

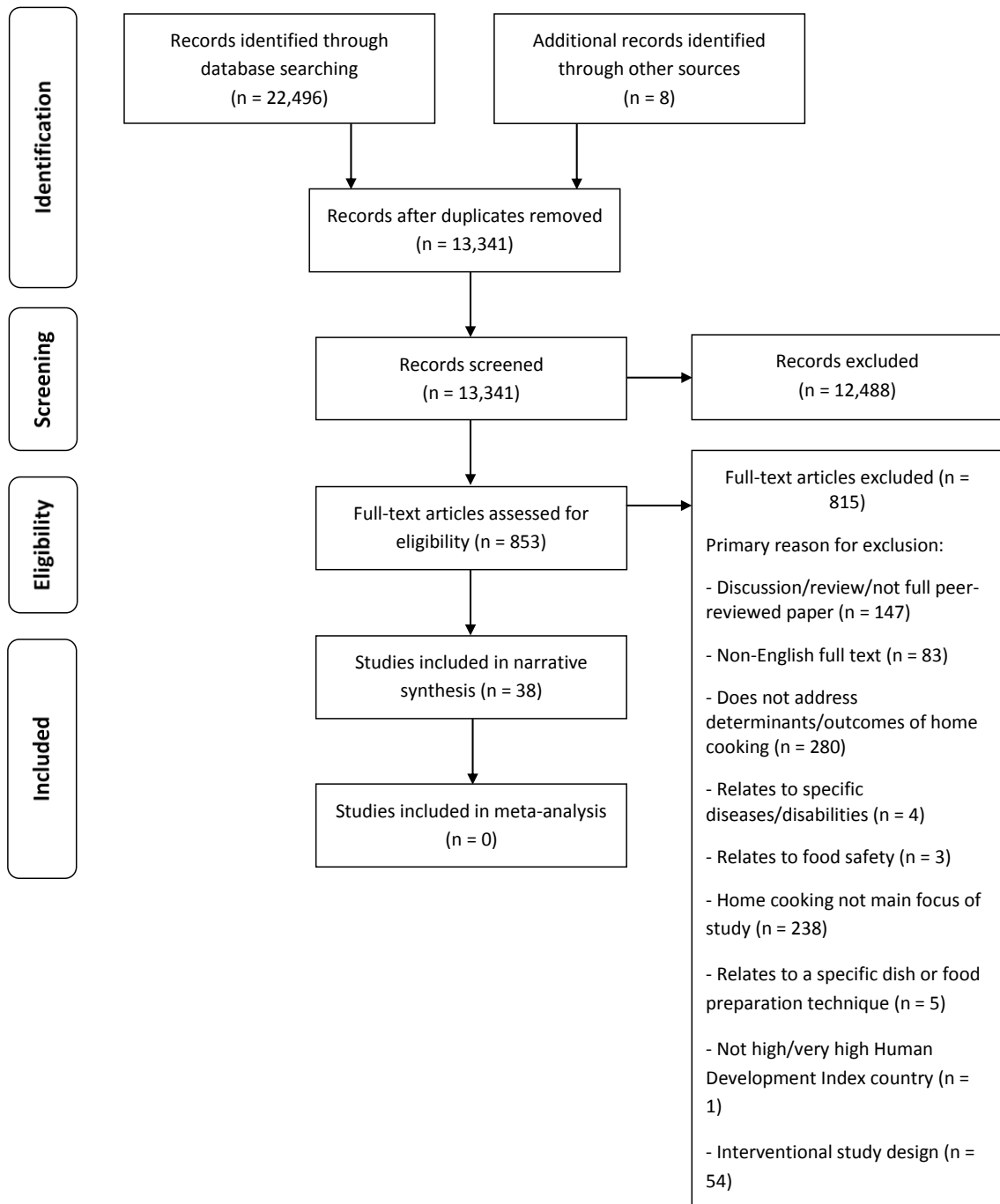


Figure 3.1 Search results, reported according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement (206).

Eighteen studies (47%) were based on data from the United States (US) (34, 41, 123, 198, 217, 220, 222-224, 227-229, 231, 233, 235, 236, 238, 242); seven (18%) from Canada (173, 197, 219, 225, 226, 240, 241); five (13%) from the United Kingdom (UK) (64, 80, 147, 174, 221) (one study included data from both the UK and France (221), and one study included data from the UK and Spain (147)). Three studies (8%) were from Australia (175, 237, 239), and one from each of: the Netherlands (218), Portugal (234), Singapore (232), Sweden (230) and Taiwan (35) (see Table 3.1).

Studies varied greatly in sample size, from national surveys of behaviour, such as the American Time Use Survey (largest sample $n = 118,635$) (228), to smaller scale qualitative studies (smallest sample $n = 6$) (230). In terms of design, four studies (11%) included in the review were exclusively quantitative longitudinal cohort studies (35, 41, 175, 236) and 21 (55%) were exclusively quantitative cross-sectional studies (34, 64, 80, 147, 198, 217, 220, 222, 224, 225, 227-229, 231, 234, 235, 238-242). Two quantitative studies (5%) presented both cross-sectional and longitudinal data (233, 237) (see Table 3.2). Eleven studies in the review (29%) were exclusively qualitative, involving interviews and/or focus groups, six of which were cross-sectional (123, 173, 218, 219, 221, 232) and five longitudinal (174, 197, 223, 226, 230) (see Table 3.3).

Five (13%) studies exclusively involved individuals aged less than 16 years (198, 234, 237, 240, 241); three (8%) involved adults, and children aged 16 years and under (197, 235, 236); and 30 (79%) involved only individuals aged at least 16 years (34, 35, 41, 64, 80, 123, 147, 173-175, 217-233, 238, 239, 242). Certain population age groups, such as middle-age and the very elderly, were less frequently considered by studies included in the review.

Reference, country	Aim of study	Study design	Main focus of study: D and/or O	Recruitment	Characteristics of sample eg age (years), ethnicity, SES, BMI	Sample size (% female)
Arredondo, Elder, Ayala, Slymen, & Campbell, 2006, USA (217)	To examine the influence of meal decision making and preparation on Hispanic women's dietary practices	Cross-sectional survey	D	Random-digit dialing	Mean age approx 40; Hispanic women; 79% married; 49% employed	357 (100%)
Caraher, Dixon, Lang, & Carr-Hill, 1999, UK (80)	To identify how, why and when people use cooking skills; where and from whom people learn these skills	Cross-sectional survey	D	1993 Health & Lifestyle Survey: random address sampling throughout England	Age range 16-74; nationally representative	5,553 (unknown)
Costa, Schoolmeester, Dekker, & Jongen, 2007, Netherlands (218)	To conduct an analysis of the motives behind the choice of meal solutions	Qualitative laddering interviews	D	Adverts in newspapers/ supermarkets/ students' residences	Age range 20-87; mean 52	50 (80%)
Craig & Truswell, 1988, Australia (175)	To study the food habits of young adults and how they change at the time men and women begin living together after marriage	Longitudinal cohort study	D	List of engagements in Sydney Morning Herald newspaper	Age range 20-33, median 23 females; age range 21-37, median 25 males; mostly Australian born; well educated; relatively high SES occupations	120 (50%)
Diaz-Mendez & Garcia-Espejo, 2014, Spain and UK (147)	To analyse time dedicated to eating and cooking in Spain and UK	Cross-sectional survey	D	Multinational Time Use Study (University of Oxford) and Time Use Survey (Instituto Nacional de Estadística)	Age >16	Not stated
Engler-Stringer, 2010, Canada (219)	To understand how social and physical food environments (the foodscape) shape daily food and cooking practices	Qualitative focus groups	D	Posters displayed in key neighbourhoods; personal contacts of research team members	Age range 18-35; urban; French-speaking Quebecoise; low-income women	22 (100%)

Flagg, Sen, Kilgore, & Locher, 2014, USA (220)	To examine the extent to which gendered division of labour persists within households in the US regarding meal planning, preparation and food shopping	Cross-sectional survey	D	US National Health And Nutrition Examination Survey (NHANES)	Age >20; mean approx 50; married or living with partner	3,195 (46%)
Gatley, Caraher, & Lang, 2014, France & UK (221)	To examine and compare current domestic food practices in Britain and France	Qualitative interviews	D	Personal, employer and institutional contacts; snowball sampling	Age range 23-73; mean 45; 50% participants French, 50% British	27 (44%)
Harnack, Story, Martinson, Neumark-Sztainer, & Stang, 1998, USA (222)	To determine the role of men in meal-related tasks in households with both a male and female head; to identify households in which the man is more likely to be involved	Cross-sectional survey	D	US Department of Agriculture 1994 Continuing Survey of Food Intakes of Individuals	Households with both a male and female head	1,204 (unknown)
Jones, Walter, Soliah, & Phifer, 2014, USA (223)	To identify motivators and barriers to preparing foods at home amongst young adults	Qualitative focus groups	D	Not stated	Age range 18-25; students at Abilene Christian University and Baylor University, Texas	239 (unknown)
Kemmer, Anderson, & Marshall, 1998, UK (174)	To examine the changes that take place in couples' eating habits and food related activities when they begin to live together	Qualitative interviews	D	Not stated	Age range 19-33; married or cohabiting couples	44 (50%)
Lo & Tashiro, 2011, USA (224)	To examine how nutritional concerns, luxurious tastes, and value of time affect time allocation decisions for food preparation	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age range 18-65	57,708 (56%)
Mercille, Receveur, & Potvin, 2012, Canada (225)	To examine the determinants of self-efficacy related to food preparation using store-bought food, and whether self-efficacy is associated with household food insecurity	Cross-sectional survey	D	Systematic selection from housing list	Age range 18-64; mean 38; responsible for household food shopping; French-speaking women	107 (100%)

Sealy, 2010, USA (123)	To explore the attitudes and practices of minority parents regarding their food choices for themselves and their children	Qualitative focus groups	D	Flyers posted at large not-for-profit organisations serving minority groups	Age range 26-54; African American, Caribbean and Hispanic parents; children aged 6-12	34 (76.5%)
Slater, Sevenhuysen, Edginton, & O'Neil, 2012, Canada (226)	To examine the aetiology of employed mothers' food choice and food provisioning decisions	Qualitative interviews	D	Posters at libraries and community centres	Middle-income; employed; mothers of elementary school-aged children	11 (100%)
Sliwa, Must, Perea, & Economos, 2015, USA (227)	To estimate the relationship between employment, acculturation, and time spent in food preparation and family dinner	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age range 18-65; at least 1 child <13yrs; Hispanic origin women	3,622 (100%)
Smith, Ng, & Popkin, 2014, USA (26)	To examine the effects of state-level unemployment rates during 2008 recession on patterns of home food preparation and away from home eating among low income and minority populations	Cross-sectional survey	D	American Time Use Survey (ATUS): random selection from households completing last round of Current Population Survey	Age >18 years	118,635 (unknown)
Storfer-Isser & Musher-Eizenman, 2013, USA (229)	To examine the psychometric properties of nine quantitative items that assess time scarcity and fatigue as parent barriers to planning and preparing meals for their children	Cross-sectional survey	D	Email from the National Association of Mothers' Centres; flyers to child care centres; snowball sampling e.g. Facebook and word of mouth	Age range 21-50 years; mean 35; mostly Caucasian; well educated; high SES; children aged 2-6	342 (94%)
Szabo, 2012, Canada (173)	To investigate the relationship between cooking and leisure among Canadian men with significant household cooking responsibilities	Qualitative interviews	D	Not stated	Age range 26-58; men; mostly high SES; 50% white and 50% other ethnicities	30 (0%)

Torp, Berggren, & Erlandsson, 2013, Sweden (230)	To identify Somali women's experiences of cooking and meals after immigration to Sweden	Qualitative focus groups	D	Invitation letter sent to purposefully sampled individuals	Age range 25-36; mothers; immigrated to Sweden	6 (100%)
Virudachalam, Long, Harhay, Polsky, & Feudtner, 2014, USA (231)	To measure the prevalence of cooking dinner at home in the US and test whether home dinner preparation habits are associated with SES, race/ethnicity, country of birth and family structure	Cross-sectional survey	D	US National Health And Nutrition Examination Survey (NHANES)	Age >18	10,149 (55%)
Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014, Singapore (232)	To understand how food-related decisions are made by women of varying educational levels from the major ethnic groups in Singapore	Qualitative focus groups	D	Telephone invitation to participants of the Singapore Consortium of Cohort Studies	Age range 30-55; mean 46; Chinese, Indian, or Malay women; varying educational level	130 (100%)
Appelhans et al., 2015, USA (41)	To determine whether baseline levels and longitudinal changes in meal preparation and clean up time are associated with changes in cardio-metabolic risk factors in midlife women	Longitudinal cohort study	O	Women enrolled in Study of Women's Health Across the Nation (SWAN)	Age baseline 42-52; mean 46; women; range of ethnicities	2,755 (100%)
Chen, Lee, Chang, & Wahlqvist, 2012, Taiwan (35)	To investigate the association between cooking behaviour and long term survival among elderly Taiwanese	Longitudinal cohort study	O	Elderly Nutrition and Health Survey in Taiwan, 1999-2000	Age >65; free-living; nationally representative	1,888 (unknown)
Chu et al., 2012, Canada (240)	To examine the association between frequency of assisting with home meal preparation and fruit and vegetable preference and self-efficacy for making healthier food choices among children in Canada	Cross-sectional survey	O	Stratified random sampling of elementary schools with grade 5 students	Age 10-11; representative across SES spectrum	3,398 (51%)

Chu, Storey, & Veugelers, 2014, Canada (241)	To examine the associations between home meal preparation involvement, and diet quality and food group intake among children in Canada	Cross-sectional survey	O	Stratified random sampling of elementary schools with grade 5 students	Age 10-11; representative across SES spectrum	3,398 (51%)
Larson, Perry, Story, & Neumark-Sztainer, 2006, USA (242)	To describe food-preparation behaviours, cooking skills, resources for preparing food, and associations with diet quality among young adults	Cross-sectional survey	O	Second wave of the longitudinal Project Eating Among Teens (EAT)	Age range 18-23; mean 20	1,710 (55.3%)
Simmons & Chapman, 2012, Canada (197)	To explore parents' and teens' perspectives on the significance of being able to cook	Qualitative interviews	O	Posters; pamphlets; referrals; advert in a local weekly paper; key informant; part of larger multi-site project	Age range teens 13-18 and adults 30-59; diverse range in SES	22 families (unknown)
Wolfson & Bleich, 2015, USA (34)	To examine national patterns in cooking frequency and diet quality among US adults, overall and by weight loss intention	Cross-sectional survey	O	US National Health And Nutrition Examination Survey (NHANES)	Age >20 years	9,569 (51%)
Blake, Wethington, Farrell, Bisogni, & Devine, 2011, USA (233)	To investigate how the food choice coping strategies of employed parents are related to their behavioural contexts and dietary intake	Cross-sectional survey and cohort study	D & O	Random-digit dialing	Age range 23-56; mean approx 37; range of ethnicities; low/moderate income urban; working >2hrs/week; children <17yrs; income <\$60,000	56 (55%)
Da Rocha Leal, De Oliveira, & Pereira, 2011, Portugal (234)	To assess the cooking habits and skills of adolescents and the association with adherence to Mediterranean diet	Cross-sectional survey	D & O	7th, 8th and 9th grade school students in a village school	Age mean 13.5; public school; semi-urban	390 (55.1%)
Kramer et al., 2012, USA (198)	To investigate the relationships between home food preparation/environment and adolescent BMI in African American youth	Cross-sectional survey	D & O	14 recreational centres as part of the Baltimore Healthy Eating Zones study	Age range 10-15; mean 11; African American; low SES; mean BMI percentile 70.4	240 (55.8%)

Larson, Story, Eisenberg, & Neumark-Sztainer, 2006, USA (235)	To describe adolescent involvement in preparing and shopping for food and examine if extent of involvement is related to food quality	Cross-sectional survey	D & O	Longitudinal Project Eating Among Teens (EAT)	Age range 11-18; mean 15; range of ethnicities; 34.3% middle school, 65.7% high school	4,746 (49.8%)
Laska, Larson, Neumark-Sztainer, & Story, 2012, USA (236)	To examine whether involvement in food preparation tracks over time, and 10-year longitudinal associations between home food preparation, dietary quality and meal planning	Longitudinal cohort study	D & O	Three waves of the Project Eating Among Teens (EAT)	Age range 15-28; mean I 16, mean II 20 and mean III 26; range of ethnicities and SES	1,312 (57.6%)
Leech et al., 2014, Australia (237)	To examine cross-sectional and longitudinal associations between family food involvement, family dinner meal frequency and dietary patterns during late childhood	Cross-sectional survey and cohort study	D & O	Health, Eating and Play Study (HEAPS)	Age baseline mean 11, follow-up mean 14; range of SES; mostly English-speaking	Baseline 947; follow-up 188 (unknown)
Monsivais, Aggarwal, & Drewnowski, 2014, USA (238)	To quantitatively assess associations among amount of time habitually spent on food preparation and patterns of self-reported food consumption, food spending, and frequency of restaurant use	Cross-sectional survey	D & O	Seattle Obesity Study: random sample of households	Age mean 54; majority white (81%)	1,319 (67.4%)
Smith et al., 2010, Australia (239)	To describe the involvement of young adults in meal preparation; to determine characteristics of young adults involved in meal preparation; to investigate whether this impacts on diet quality	Cross-sectional survey	D & O	Childhood Determinants of Adult Health study	Age range 26-36; mean 31 males and 32 females	2,814 (55.5%)
Swanson et al., 2011, UK (64)	To investigate which sociocognitive determinants in the TPB predict maternal feeding motivations, and which feeding behaviours relate to children's diet quality	Cross-sectional survey	D & O	10 General Practice lists from the two most deprived deciles in two Scottish NHS Health Board areas	Age range 18-34; mean 25; mothers of children aged 2	300 (100%)

BMI, body mass index; D, determinant of home cooking; NHS, National Health Service; O, outcomes of home cooking; SES, socioeconomic status; TPB, Theory of Planned Behaviour

Studies presented by determinants (D) in author alphabetical order, then outcomes (O), then both determinants and outcomes (D & O)

Table 3.1 Characteristics of the 38 studies included in the review.

Reference	Parameters compared	Statistical techniques	Outcomes measured	Reported results	Precis of authors' conclusions
Appelhans et al., 2015 (41)	Meal preparation/clean up time; odds of meeting criteria for metabolic syndrome and its individual diagnostic components	Mixed-effects logistic and ordered logistic models	Metabolic syndrome status, IFG, abdominal obesity, hypertriglyceridemia, low HDL, hypertension	Adjusted OR: time x change in meal preparation/ clean-up for no. metabolic syndrome diagnostic components = 1.409, for metabolic syndrome status = 1.608	Women who spent more time preparing and cleaning up meals at baseline, or showed greater increases in this activity, had greater increases over time in odds of metabolic syndrome and odds of meeting individual diagnostic components
Arredondo, Elder, Ayala, Slymen, & Campbell, 2006 (217)	Household decision making style (alone 'traditional' vs. family 'shared') and household activity (decides meals, prepares meals, decides snacks)	Multiple logistic regressions	Household decision making style, dietary intake, height, weight, BMI, outcome expectancies for eating a healthful diet, barriers to low fat and high fibre intake, behavioural strategies to reduce fat and increase fibre, types of meals eaten, acculturation	Shared vs. traditional decision making for meal preparation: positive relationships for employment = X^2 7.29, $p < 0.006$, increasing age = t -1.99, $p < 0.04$ and shared vs. traditional decision making for meal decision making: positive relationship for acculturation = t -2.70, $p < 0.007$	Women who were employed, and older, were more likely to be in shared decision making households for meal preparation; women who were more acculturated were more likely to be in shared decision making households for meal decision making; women in shared decision making households faced greater psychosocial barriers to healthful eating and reported less healthy eating
Blake, Wethington, Farrell, Bisogni, & Devine, 2011 (233)	Work and family conditions, sociodemographics, eating behaviour, dietary intake	Chi squared, Fisher's exact tests, ANOVA, hierarchical cluster analysis (Ward's method)	Clusters of food choice coping strategies: Individualised Eating; Missing Meals; Home Cooking	Home Cooking cluster vs. Individualised Eating cluster or Missing Meals cluster: more married $p < 0.05$, fewer with partner working > 20 hrs/week $p < 0.01$, more children at home $p < 0.01$, trend towards higher HEI	Individualised Eating and Missing Meals clusters were characterised by non-standard work hours, a working partner, single parenthood, family meals out of home, quick food rather than a meal, convenience entrees, missing meals and individualised eating. Home Cooking cluster had more married fathers with non-employed spouses and more home cooked family meals

Caraher, Dixon, Lang, & Carr-Hill, 1999 (80)	Gender, SES, income group, level of qualifications	Chi squared	Source of learning to cook, frequency of cooking, application and confidence with cooking techniques, barriers to food choices	76% women and 58% men learned to cook from their mother; 68% women cook every day and 18% men; in single person households 74% cook most/ nearly every day; 94% women and 80% men feel fairly/ very confident to cook from basic ingredients	A widespread lack of confidence existed to cook certain foods and apply techniques. Women were most often the source of learning to cook; they cooked more frequently and with greater confidence; and generally bore the burden of cooking for the household
Chen, Lee, Chang, & Wahlqvist, 2012 (35)	Gender, age, marital status, education, lifestyle factors, frequency of cooking	Chi squared, Cox proportional hazards ratio	Lifespan (survivorship)	Cooking >5 times/week vs. never adjusted HR 0.59; women benefitted more than men with decreased HR 51% vs. 24% when most compared to least cooking	Cooking frequently favourably predicted survivorship; highly frequent cooking may favour women more than men
Chu et al., 2012 (240)	Frequency of home meal preparation, fruit and vegetable preference, healthy eating self-efficacy, sociodemographics	Random effects regression	Frequency of home meal preparation, fruit and vegetable preference, healthy eating self-efficacy	30% children helped with meal preparation at least daily; fruit preference β 0.74 and vegetable preference β 1.02 and self-efficacy β 2.88 for cooking several times per day vs. never cooking	Fruit and vegetable preference and healthy eating self-efficacy increased with increasing frequency of helping to cook at home; teaching children how to prepare simple and healthy meals in health promotion programmes could potentially improve dietary habits
Chu, Storey, & Veugelers, 2014 (241)	Frequency of home meal preparation, energy intake, dietary indicators	Random effects regression	Frequency of home meal preparation, DQI-I, servings of fruit and vegetables, grain products, milk, and meat	Children involved in meal preparation at least daily ate one more serving per day of fruit and vegetables; showed higher intakes of grain/ milk/ meat food groups; and consumed an additional 245 kcal compared with those who never helped	Higher frequency involvement in home meal preparation was associated with healthier diets, with higher DQI-I scores, and greater intake of healthy food groups; encouraging parents to involve their children in meal preparation could be a viable health promotion strategy

Craig & Truswell, 1988 (175)	Frequency of preparing any meal, frequency of preparing meal for both spouses, frequency of preparing meal for self, use of recipes, how learned to cook	Descriptive statistics	Self-report of food purchasing after marriage, food prep after marriage, food consumption, preferred foods, concerns about foods	After 2.5 years of marriage, the number of shared meals was reduced, except for the evening meal which remained the focus meal at which to influence a spouse's eating habits	Wives prepared meals more frequently than their husbands, and the difference increased over time married; wives used recipes more frequently than their husbands; overall wives took the major responsibility for food purchasing and preparation, although husbands also played a significant role
Da Rocha Leal, De Oliveira, & Pereira, 2011 (234)	Sociodemographics, Mediterranean diet adherence (KIDMED score), cooking knowledge, enjoyment, frequency and aspirations	Student's t-test, Mann-Whitney test, Pearson's and Spearman's correlation coefficients, Chi squared	Mediterranean diet index (KIDMED score)	Adolescents who cooked did so 1-4 times/month and learned mainly from family (87.9%) or by themselves (7.9%); girls were more likely to have cooked foods listed in the questionnaire	Adolescents with higher KIDMED scores were younger, knew how to cook better, cooked more often, enjoyed cooking, would like to cook more frequently, and would like to learn how to cook better
Diaz-Mendez & Garcia-Espejo, 2014 (147)	Gender, age, marital status, education, employment, area of residence, age of youngest child, time spent eating at home, in food preparation and eating outside the home	Multiple linear regression; logistic regression	Association between sociodemographic variables and time spent eating at home, in food preparation, and eating outside the home	Spain: decrease in population proportion preparing food, from 66% in 2003 to 61% in 2010, and decrease in time spent cooking from 78 to 49 minutes/day UK: static population involvement at 75% and approximately stable amount of time spent cooking at 61 minutes/day	Changes in eating habits were not linear over time and were affected by moments of intense social transformation e.g. economic recession; this imposed specific eating habit trends and generated new forms of social differentiation; in both countries involvement in home food preparation was associated with being female, older, physically inactive, living with a partner, having children at home, and low level of education

Flagg, Sen, Kilgore, & Locher, 2014 (220)	Sociodemographics, household and family structure	Multinomial logistic regression	Meal planning/ preparing and food shopping	6% men and 40% women, and 7% men and 36% women reported main responsibility for meal planning/ preparing and food shopping respectively; 68% those reporting main meal planning/ preparation status also reported main food shopping status	Women were more likely to take primary responsibility than to share, and less likely to have no responsibility, in meal planning/ preparing and food shopping; the majority of women and men reported sharing in both meal planning/ preparing and food shopping
Harnack, Story, Martinson, Neumark-Sztainer, & Stang, 1998 (222)	Age of male head of household, household income, employment status of female head of household, household size	Frequency distributions; logistic regression analyses	Odds of male head of household being involved in meal planning, shopping or preparation	For men, 23%, 36% and 27% men were involved in meal planning, shopping and preparation respectively; equivalent proportions for women were 93%, 88% and 90%	Men in lower income and smaller households were more likely to be involved in each of the meal activities; younger men and those in households with a female head in full-time work were more likely to be involved in meal planning and preparation; targeting the female head in dual-headed households may be the most effective nutrition education strategy
Kramer et al., 2012 (198)	Psycho-social characteristics, household factors, adolescent and caregiver food preparation behaviours	Multiple linear regression	Adolescent BMI; food preparation behaviour	Adolescent children of caregivers using healthier cooking methods were more likely to use healthy cooking methods themselves, and less likely to be overweight/ obese; more meals prepared by a caregiver was predictive of higher BMI in adolescents	Meals prepared at home in African American households did not necessarily promote healthy BMI in youth; both frequency and healthfulness of meals are important for effective health promotion

Larson, Perry, Story, & Neumark-Sztainer, 2006 (242)	Food preparation, skills/ resources for preparing foods, sociodemographics	Chi squared, mixed regression models	Probability of meeting Healthy People 2010 dietary objectives	Lack of time was most common barrier to food preparation (36%); those reporting frequent food preparation ate less fast food and were more likely to meet guidelines for fat, calcium, fruit, vegetables and whole-grain consumption	Food preparation was not performed by the majority of young adults even weekly; men, African Americans, and those living in campus housing were significantly less likely to prepare food frequently; lower perceived adequacy of skills and resources for food preparation was related to race (African American/ Hispanic) and student status (part-time/ not in education)
Larson, Story, Eisenberg, & Neumark-Sztainer, 2006 (235)	Sociodemographics, weight status	General linear modelling; Spearman correlation	Frequency of involvement in shopping/ preparing food and dietary intake	Many adolescents helped prepare dinner (68.6%) and shopped for groceries (49.8%) at least once during the past week; greater involvement was related to being female, middle school education level, Asian American race, low SES, high family meal frequency and being overweight	Higher frequency of preparing food was related to lower intakes of fat, and higher intakes of fruit and vegetables, fibre, folate and vitamin A; adolescents may benefit from interventions that teach skills for cooking and making healthful purchases
Laska, Larson, Neumark-Sztainer, & Story, 2012 (236)	Food preparation, sociodemographics, dietary quality	Descriptive statistics, linear regression	Food preparation practices, dietary behaviours	Most women (80%) and men (73%) in their mid-late 20s enjoyed cooking, and they were more likely to have prepared food as 'adolescents' and 'emerging adults'	Emerging adult (but not adolescent) food preparation predicted better dietary quality in mid-late 20s with higher intakes of fruit and vegetables, dark green/ orange veg, and less sugar-sweetener beverages and fast-food

Leech et al., 2014 (237)	Family food involvement, frequency of family dinner meals	Factor analysis (PCA), multiple linear regression, paired and independent t-tests, Pearson's chi squared	Dietary patterns	In cross-sectional analyses for boys, family food involvement score ($\beta=0.55$), and eating family dinner meals daily vs. less than daily ($\beta=1.11$), during late childhood were positively associated with a healthful dietary pattern; eating family dinner meals daily vs. less than daily was inversely associated with an energy-dense pattern ($\beta= -0.56$)	No evidence of effects of involvement in family food or eating dinner with the family in cross-sectional analyses for girls, or persisting longitudinally into adolescence for either gender
Lo & Tashiro, 2011 (224)	Education, income, household size, ethnicity	Tobit & Heckman's sample selection models controlling for zero time spent on food preparation	Time spent preparing food at home, time spent obtaining food away from home	High family income and long hours worked increased time allocation to food away from home (luxury and opportunity cost of time outweighed nutritional concerns); high education reduced time spent preparing food at home, yet increased participation in this activity and time spent obtaining food away from home (luxury and opportunity cost of time outweigh nutritional concerns)	Older age, being female and larger household size were positively associated with time spent cooking at home; time allocation decisions varied greatly by race and ethnicity; individuals concerned more with nutrition or price than luxury devoted more time to preparing food cooked at home
Mercille, Receveur, & Potvin, 2012 (225)	Household food insecurity, household composition, food supplies, lifestyle characteristics and sociodemographics	Multiple linear regression	Self-efficacy in healthy, and general, food preparation	Regression models accounted for 31% self-efficacy in healthy food preparation and 15% general food preparation; severe household food insecurity was inversely associated with both self-efficacy scores	Lower self-efficacy in food preparation was linked to food insecurity and obesity, particularly in more severe cases

Monsivais, Aggarwal, & Drewnowski, 2014 (238)	Sociodemographics, food consumption, food spending, restaurant use	Descriptive statistics; multivariable regression, Pearsons chi squared, ANOVA, general linear modelling	Time spent on food preparation, cooking and clearing up	Greater amount of time spent on home food preparation was associated with indicators of higher diet quality including increased intake of fruit and vegetables, salads and fruit juices; spending less than 1hour/day on food preparation was associated with significantly higher spending on food away from home and more regular use of fast food restaurants	People spending the least amount of time on food preparation were usually working adults with high priority on convenience; time may be an essential ingredient in the production of healthier eating habits among adults
Sliwa, Must, Perea, & Economos, 2015 (227)	Time spent in food-related behaviours	Regression models; chi squared; adjusted Wald tests; pairwise t-tests	Food preparation time, family dinner eating time	Working for 8 hours/day was associated with spending 38 fewer minutes in food preparation; this relationship was not modified by acculturation	Length of time spent in food preparation varied by ethnic origin group, and being US-born was associated with spending less time; mothers with longer work days spent less time on food preparation but not less time sharing family dinners
Smith et al., 2010 (239)	Sociodemographics, physical activity, time spent television viewing	ANOVA; Chi squared; log multinomial regression	Involvement in meal preparation; diet quality	65% women had sole responsibility for meal preparation and 23% shared, for males this was 29% and 27%; men with sole responsibility had higher intake of lean meat and alternatives; women with shared responsibility had higher intake of vegetables and dairy	A higher level of involvement in meal preparation was not consistently associated with improved diet quality; differences in dietary quality by meal preparation were only small; strategies to increase involvement in meal preparation may not be sufficient to markedly improve diet

Smith, Ng, & Popkin, 2014 (228)	State-level unemployment, poverty, ethnicity, age, education, household composition, individual employment status, time pre/ post-recession	Multinomial logistic regression; log binomial regression	Time spent cooking, away from home consumption patterns	High state-level unemployment was associated with only trivial increases in cooking patterns and virtually no change in away from home consumption patterns; low income and ethnic minority groups were not disproportionately affected	Recession-related unemployment did not have a strong influence on food preparation and eating practices; even during a major economic downturn, food-related behaviours were resistant to change
Storfer-Isser & Musher-Eizenman, 2013 (229)	No Time to Eat Healthy scale, Fatigue scale, Role Overload scale, Healthy Environment/ Availability subscale, food frequency, BMI	Descriptive statistics; Spearman's correlation	Exploratory factor analysis and principal axis factoring for parent time scarcity and fatigue as barriers	Internal consistency was acceptable for both time and energy for meals ($\alpha=0.82$) and meal planning ($\alpha=0.90$) scales	Time and energy for food-related activities appeared to be a unique and distinct construct from general fatigue and time scarcity; this may be more important than meal planning for child nutrition
Swanson et al., 2011 (64)	Balance of Good Health plate score, TPB items, parental smoking, breastfeeding, television-viewing, playing outside	Descriptive statistics, regression analyses, Pearson's r, Mann-Whitney U	Intended/ actual/ recommended provision of breakfast, cooking from scratch, and providing proper sit down meals	TPB sociocognitive factors (intentions, perceived behavioural control) significantly predicted provision of breakfast, cooking from scratch and providing proper sit down meals	Mothers of children with poorer quality diets were less likely to provide breakfast, cook from scratch and provide proper sit down meals; modifying maternal motivations and attitudes could help to improve feeding behaviours
Virudachalam, Long, Harhay, Polsky, & Feudtner, 2014 (231)	Poverty level, education, gender, age, race/ ethnicity, country of birth, household composition	Bivariable and multivariable regression	Frequency of cooking dinner at home	8% population never, 43% sometimes and 49% always cooked; lower household wealth and educational attainment were associated with a higher likelihood of either always or never cooking; 5 dinners were cooked per week on average	Black households cooked the fewest dinners; foreign-born households cooked more frequently than US-born; households with dependents cooked more frequently than those without

Wolfson & Bleich, 2015 (34)	Cooking frequency, weight loss intention, sociodemographics	Multivariable regression	Total kJ/day, grams of fat, sugar and carbs/day, fast-food meals/week, frozen meals or pizza and ready meals in past 30 days	8% households cooked 0-1 times/week, 44% 2-5 times/week, 48% 6-7 times/week; compared with low cookers (0-1 times/week), more frequent dinner cookers (6-7 times/week) had lower daily energy consumption (9054 vs. 9627 kJ), lower fat (81 vs. 86g) and lower sugar (119 vs. 135g) intake	Cooking dinner frequently at home was associated with consumption of a healthier diet, whether or not trying to lose weight; individuals trying to lose weight consumed fewer kJ than those not seeking weight loss, regardless of household cooking frequency
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ANOVA, analysis of variance; BMI, body mass index; DQI-I, diet quality index-International; HDL, high density lipoprotein; HEI, healthy eating index; HR, hazard ratio; IFG, impaired fasting glucose; kcal, kilocalories; kJ, kilojoules; OR, odds ratio; PCA, principal components analysis; SES, socioeconomic status; TPB, theory of planned behaviour; US, United States

Table 3.2 Summary of the 27 quantitative studies included in the review.

Reference	Main study focus	Precis of authors' reported themes
Costa, Schoolmeester, Dekker, & Jongen, 2007 (218)	Motives behind choice of meal solutions	Made by me; fresh; daily task; low cost; shared; simple – concrete attributes of homemade meals Good health; pleasure; be active; self-esteem; do my duty; achievement; care for others; harmony; belonging; freedom; performance – self-relevant values influencing meal choice
Engler-Stringer, 2010 (219)	Cooking practices and the influence of social and physical food contexts	Gender roles – according to position in the household Planning and organising food preparation – requirements and differences by type of meal Foods, food choice and skill – including traditional foods, experimentation and using different cooking skills Learning – acquiring cooking skills from individuals, and use of media and technology Cooking and health – importance and challenges of nutrition and healthy eating Grocery shopping – priorities including price, quality and availability; patterns of shopping and challenges
Gatley, Caraher, & Lang, 2014 (221)	Comparison of domestic food practices	Remembrance of meals past – childhood food and meals, and differences from current meals Cooking as a significant activity – potential importance of home cooking and other possible meal solutions Cooking skills and confidence – learning to cook and confidence to prepare a meal Contemporary domestic cooking practices – foods cooked regularly Everyday scheduling of modern life – influences on choice of foods to cook at home Cooking and gender – household cook and any sharing of responsibilities Cooking for social occasions – role and involvement in social eating Cooking traditions: change and continuity – usual practices and international cooking styles
Jones, Walter, Soliah, & Phifer, 2014 (223)	Motivators and barriers to preparing foods at home	Desire to save money – conserving finances Positive model in food preparation – parental role model Familiarity with cooking techniques – confidence in food preparation Time to shop, cook and clean up after meals – impact on practices
Kemmer, Anderson, & Marshall, 1998 (174)	Eating habits and food related activities before and after marriage/cohabitation	Continuities and changes – food shopping, cooking and eating patterns Food preparation and purchase: responsibility and control – individual and shared responsibilities Food choice: negotiating and deciding – providing and accounting for preferences Effects of living together – weight, health and alcohol intake
Sealy, 2010 (123)	Attitudes and practices regarding food choices	Ethnicity and culture – childhood eating habits; influence on food, cooking methods and meals Time constraints – impact on food shopping, preparing food, and meals
Simmons & Chapman, 2012 (197)	Perspectives on food in the family and significance of being able to cook	Control and self-reliance – autonomy in food selection and providing in the face of scarce resources Connecting to others – considering family's preferences, learning to cook with family, and socialising Family culinary continuity and departure – maintaining family food habits and breaking with traditions Independence – adolescents gaining autonomy and responsibility for their own food preparation

Slater, Sevenhuysen, Edginton, & O'Neil, 2012 (226)	Food choices and food provisioning	<p>Preparing good, healthy food consistently takes more time than is available – negative impact on ability to cook</p> <p>It is important to accommodate family members' likes and dislikes when planning and preparing food – compromises to feed the family</p> <p>Families should eat together – importance and challenges of shared mealtimes</p> <p>Food choices can have an important effect on personal health – challenges to consuming a healthy diet</p> <p>The good mother – providing food for and promoting the nutritional health of the family</p> <p>Independent self – women coping with time commitments away from family food provisioning</p> <p>Busy, cohesive family – managing time demands of employment and children's extra-curricular activities</p>
Szabo, 2012 (173)	Relationship between cooking and leisure	<p>Creating a gustatory and auditory leisure space – combining cooking with symbols of leisure</p> <p>Combining the domestic and the social – sharing the cooking process with others</p> <p>Taking one's time – benefits of leisurely cooking</p> <p>Childcare and leisurely cooking – challenges of combining food preparation with responsibility for children</p> <p>Gender/class/ethno-racial background and family approach to cooking – intersection of background characteristics and influence on cooking</p>
Torp, Berggren, & Erlandsson, 2013 (230)	Experiences of cooking and meals after immigration	<p>Change in routines and content of daily meals – differences in cooking routines, meal content and regularities</p> <p>Changed experiences related to cooking and shopping for groceries – differences in ingredients, taste and pace of food shopping and cooking</p> <p>Social dimensions in food related occupations – missing interaction with family and neighbours through food</p> <p>Loss of identity and change of roles – reduction in Somali culture and changing gender roles</p>

Wang, Naidoo, Ferzacca, Reddy, & Van Dam, 2014 (232)	Food provision and food choice decision making	<p>Employment presents a barrier to cooking – inverse association between women working and cooking</p> <p>Children's after school activities limit time for meal preparation – activities as a deterrent to cooking</p> <p>Ready availability of cheap, affordable prepared food provides an alternative to cooking – food available at hawker centres and food courts</p> <p>Acknowledgement that eating at home is healthier and more hygienic – preferences for home-prepared food</p> <p>Affordable domestic workers support women with children – domestic workers and responsibility for cooking</p> <p>Ethnic differences in women's attitude towards cooking – expectations particularly of Malay women</p> <p>Children's preferences influence their mother's food decisions – satisfying children's like and dislikes</p> <p>Women try to meet the food preferences of all members of the family – rotating favourite dishes across meals</p> <p>The ready availability of affordable prepared food provides a convenient way for women to meet the diverse food preferences of all family members – an option instead of women cooking</p> <p>Some women recognise the need for providing healthy foods to children – provision of healthy foods as a mother's responsibility</p> <p>Schools, through nutrition education, can potentially influence mothers' food decisions – children as a conduit for nutrition guidance</p> <p>Not wasting food: a value – strategies to minimise food waste</p>
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Table 3.3 Summary of the 11 qualitative studies included in the review.

Beyond the use of standard qualitative analysis techniques such as Grounded Theory (243), four studies explicitly used theory to enhance the development of their research design and/or data analysis plan (64, 198, 218, 232). Means-End Chain Theory was used to enhance the interpretation of potential consumption motives and thereby develop an improved understanding of convenience-related food choices (218). A survey instrument was developed to investigate the relationship between home cooking and adolescent body mass index (BMI), with psychosocial factors grounded in constructs from Social Cognitive Theory, including knowledge, self-efficacy, outcome expectancies, and behavioural intentions relating to food and beverage intake (198). The Theory of Planned Behaviour was used to study sociocognitive determinants of mothers' feeding behaviour, and the association of predictors with children's dietary quality (64). A focus group guide was also developed using the Theory of Triadic Influence, which incorporated intrapersonal, interpersonal, social, and cultural environmental influences on health behaviours, and was used to improve understanding of food-related decisions (232).

Overall, qualitative studies included in the review focused more on the determinants than the outcomes of home cooking, in contrast to quantitative studies. Qualitative studies were also more likely to address social rather than health aspects of home food preparation. However, the main themes identified from both qualitative and quantitative studies were in agreement and drew complementary conclusions.

I developed a conceptual model, demonstrating the tentative relationships indicated by studies included in this review, as shown in Figure 3.2. The model is based upon Dahlgren and Whitehead's Determinants of Health model, showing domains for determinants in terms of: non-modifiable factors; individual factors; social and community networks; and general socioeconomic, cultural and environmental conditions (244). Line arrows between themes indicate relationships supported by evidence from studies in the review; thickened arrows indicate supporting evidence from at least five studies in the review; and dotted arrows show relationships supported by research evidence (as referenced), but not specifically from studies meeting the review inclusion criteria.

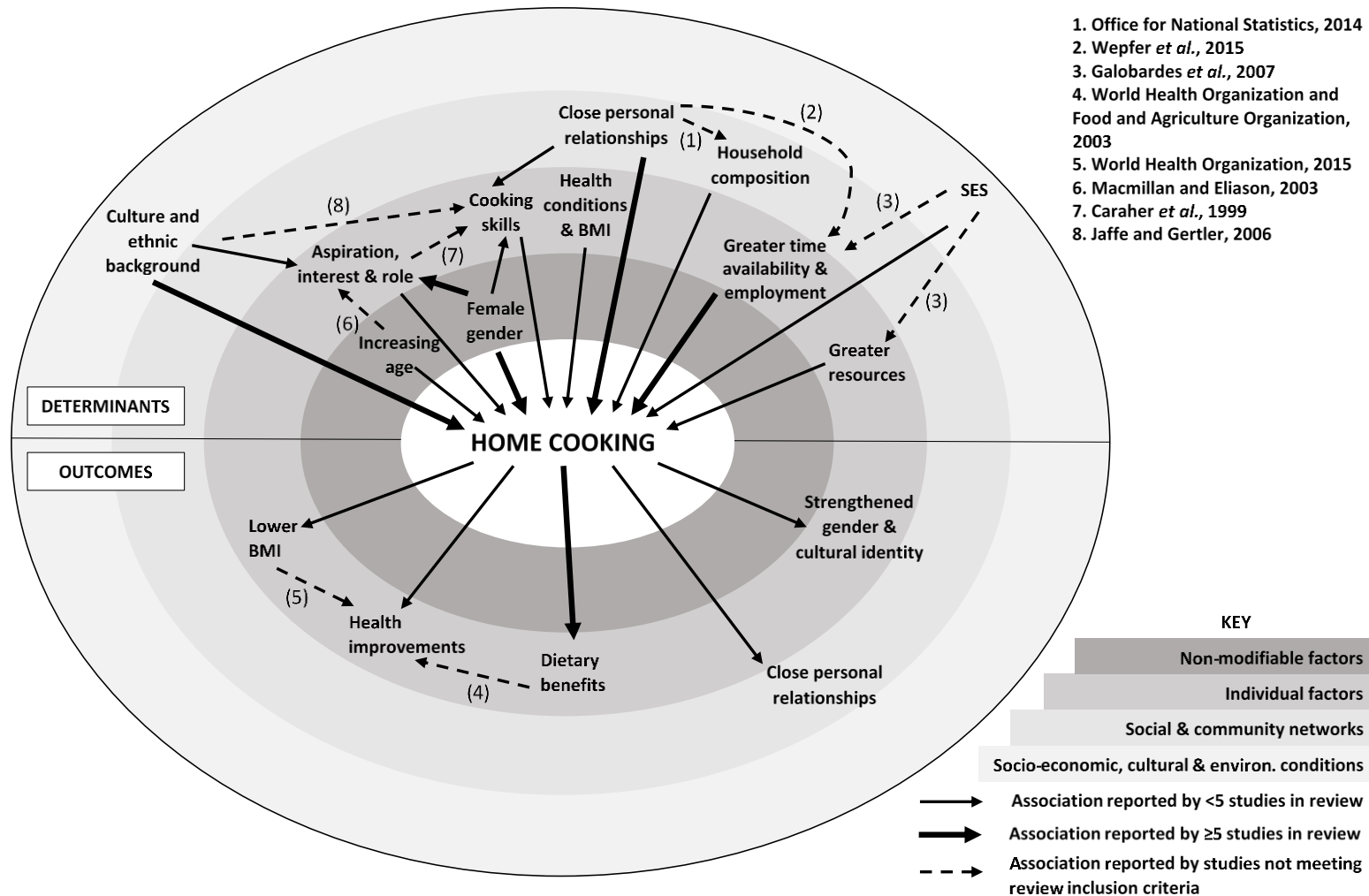


Figure 3.2 Conceptual model of the 38 studies included in the systematic review (4, 80, 245-250).

3.4.2 Quality appraisal

Quality appraisal of qualitative studies resulted in high ratings for all included studies (see Table 3.4). The criterion least frequently satisfied was reflexivity; this considered whether authors reflected on the relationship between research and participants adequately, and whether ethical issues were addressed. Overall, quality ratings for included quantitative studies were uniformly weak (see Table 3.5). Ratings for study design and blinding were generally weak, and for the majority of studies (which were cross-sectional), the withdrawals/dropouts criterion was not applicable.

Reference	1	2	3	4	5	6	7	8	9	10	Overall rating
Costa, Schoolmeester, Dekker et al., 2007	Y	Y	N	Y	Y	N	Y	Y	N	Y	High quality
Craig & Truswell, 1988	Y	Y	N	Y	N	Y	Y	N	N	N	High quality
Engler-Stringer, 2010	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	High quality
Gatley, Caraher, & Lang, 2014	Y	Y	Y	Y	Y	Y	Y	Y	N	N	High quality
Jones, Walter, Soliah et al., 2014	Y	Y	N	Y	N	N	Y	Y	N	Y	High quality
Kemmer, Anderson, & Marshall, 1998	Y	Y	N	Y	Y	Y	Y	N	N	N	High quality
Sealy, 2010	Y	Y	Y	Y	Y	N	Y	Y	N	Y	High quality
Simmons & Chapman, 2012	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	High quality
Slater, Sevenhuysen, Edginton et al., 2012	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	High quality
Szabo, 2012	Y	Y	N	Y	Y	Y	Y	N	N	N	High quality
Torp, Berggren, & Erlandsson, 2013	Y	Y	N	Y	Y	Y	Y	Y	N	Y	High quality
Wang, Naidoo, Ferzacca et al., 2014	Y	Y	Y	Y	Y	Y	Y	N	N	Y	High quality

1 Is there a clear statement of the research question and aims?

2 Was the methodology appropriate for addressing the stated aims of the study?

3 Was the recruitment strategy appropriate and was an adequate sample obtained to support the claims being made?

4 Were the data collected in a way that addressed the research issue?

5 Are the methods of data analysis appropriate to the subject matter?

6 Is the description of the findings provided in enough detail and depth to allow interpretation of the meanings and context of what is being studied? (Are data presented to support interpretations etc?)

7 Are the conclusions/theoretical developments justified by the results?

8 Have the limitations of the study and their impact on the findings been considered?

9 Is the study reflexive? (Do authors consider the relationship between research and participants adequately and are ethical issues considered?)

10 Do researchers discuss whether or how the findings can be transferred to other contexts or consider other ways in which the research may be used?

Table 3.4 Quality appraisal of the 11 qualitative studies included in the review (215).

Reference	Selection bias	Design	Confounders	Blinding	Data collection	Withdrawals	Overall rating
Appelhans et al., 2015	strong	moderate	strong	weak	moderate	weak	weak
Arredondo, Elder, Ayala et al., 2006	weak	weak	strong	weak	moderate	NA	weak
Blake, Wethington, Farrell et al., 2011	moderate	weak	weak	weak	moderate	moderate	weak
Caraher, Dixon, Lang et al., 1999	weak	weak	weak	weak	weak	NA	weak
Chen, Lee, Chang et al., 2012	weak	moderate	strong	weak	moderate	strong	weak
Chu et al., 2012	moderate	weak	moderate	weak	moderate	NA	weak
Chu, Storey, & Veugelers, 2014	moderate	weak	moderate	weak	moderate	NA	weak
Craig & Truswell, 1988	weak	moderate	weak	weak	weak	weak	weak
Da Rocha Leal, De Oliveira, & Pereira, 2011	moderate	weak	weak	weak	weak	NA	weak
Diaz-Mendez & Garcia-Espejo, 2014	weak	weak	strong	weak	weak	NA	weak
Flagg, Sen, Kilgore et al., 2014	weak	weak	strong	weak	weak	NA	weak
Harnack, Story, Martinson et al., 1998	strong	weak	strong	weak	weak	NA	weak
Kramer et al., 2012	weak	weak	moderate	weak	weak	NA	weak
Larson, Perry, Story et al., 2006	weak	weak	strong	weak	moderate	NA	weak
Larson, Story, Eisenberg et al., 2006	moderate	weak	strong	weak	moderate	NA	weak
Laska, Larson, Neumark-Sztainer et al., 2012	weak	moderate	moderate	weak	moderate	weak	weak
Leech, McNaughton, Crawford et al., 2014	weak	moderate	moderate	weak	moderate	weak	weak
Lo & Tashiro, 2011	strong	weak	strong	weak	weak	NA	weak
Mercille, Receveur, & Potvin, 2012	moderate	weak	moderate	weak	moderate	NA	weak
Monsivais, Aggarwal, & Drewnowski, 2014	moderate	weak	moderate	weak	moderate	NA	weak
Sliwa, Must, Perea et al., 2015	strong	weak	strong	weak	weak	NA	weak
Smith, McNaughton, Gall et al., 2010	weak	weak	moderate	weak	moderate	NA	weak
Smith, Ng, & Popkin, 2014	strong	weak	strong	weak	weak	NA	weak
Storfer-Isser & Musher-Eizenman, 2013	weak	weak	weak	weak	moderate	NA	weak
Swanson, Power, Crombie et al., 2011	strong	weak	weak	weak	weak	NA	weak
Virudachalam, Long, Harhay et al., 2014	strong	weak	strong	weak	weak	NA	weak

Wolfson & Bleich, 2015	strong	weak	strong	weak	weak	NA	weak
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Overall rating: Strong: no weak and at least 4 strong ratings; Moderate: less than 4 strong and 1 weak rating; Weak: 2 or more weak ratings.
 NA, not applicable

Table 3.5 Quality appraisal of the 27 quantitative studies included in the review (214).

3.4.3 Determinants

Findings from studies addressing the determinants of home food preparation are presented in detail in Table 3.2 (quantitative data) and Table 3.3 (qualitative data), and illustrated in the upper half of the conceptual model (see Figure 3.2). A large number of inter-related influences on home cooking perceptions and practices were identified, supported by varying levels of research evidence.

In terms of non-modifiable factors, frequency of home cooking did not increase linearly with age (235), although younger age groups were in general likely to cook less frequently (34). A large body of research focused on the relationship between gender and home food preparation behaviour. Women and girls were more likely than men and boys to be involved with cooking (80, 220, 222, 234, 235); to feel confident cooking (80, 234); and to pass on their skills to children (80). A study of men who cooked at home found that food preparation was often perceived as both a chore and a leisure activity (173), although no included studies focused on cooking as a leisure pursuit for women.

With regards to individual factors, self-assessed cooking skills and familiarity with cooking techniques were linked with motivation to cook (219, 223). Being overweight was associated with greater involvement in home food preparation (235). Personal aspirations, interests and roles interlinked with several determinants of home cooking: the roles of wife, girlfriend and mother were associated with a perceived responsibility to provide enjoyable, nutritious meals for the household (219), and could cause conflict with personal growth and satisfaction (226). In contrast, home cooking was also linked with an aspiration to achieve personal goals (218), and interest in both learning cooking skills (234), and nutrition and food prices (224). Previous experience of home food preparation showed an inconsistent relationship with cooking later in life (236, 237).

The role of financial resources, and a desire to save money, in home cooking behaviour was explored in several studies, which indicated the importance of affordability (219, 223, 225). Participants generally did not explicitly describe home cooking as a cost-saving strategy, but reported the price of ingredients and overall cost of cooking as priorities in their approach to

home food preparation. Time was also found to be an important resource; time constraints encouraged shortcuts in food choice decisions, and created a barrier to meal planning and preparation (123, 221, 223, 229). Employment and children's after-school activities also presented potential obstacles to home cooking (227, 232, 239), and personal prioritisation of convenience was associated with less time spent in home food preparation (238).

With regards to social and community networks, personal relationships had a strong impact on home cooking practices. Being married was associated with greater food preparation at home (233), although the relative contributions of wives and husbands varied between studies (174, 175). Single men and women were more likely than those married to have sole responsibility for meal preparation (239). Learning to cook from caregivers or personal role models was an important determinant of behaviour (223, 234), especially for healthy food preparation techniques (198). In terms of household composition, having dependents at home was linked with increased home cooking (231, 233), and a higher frequency of taking part in family meals was associated with greater adolescent participation in food preparation (235).

Regarding general socioeconomic, cultural and environmental conditions, potential relationships between socioeconomic status (SES) and home food preparation behaviour varied between studies, with both lower (231, 235) and higher (239) SES associated with greater involvement in home cooking. Culture and ethnicity were strong influences on food choices (123), and both immigrants (231), and Asian Americans (235), living in the US were more likely to engage in home cooking than other Americans. Social transformation over time, such as economic recession, may also have resulted in a differential impact on meal sourcing decisions according to cultural background. For example, Spain experienced slight decreases in eating outside the home since the economic recession of 2008, in comparison with the UK (147).

3.4.4 Outcomes

The evidence from studies included in the review regarding potential outcomes of home cooking is shown in the lower half of the conceptual model (see Figure 3.2). The majority of findings were at the level of the individual, and most studies focused on putative dietary

benefits of home cooking (34, 64, 233-242). Such benefits included a trend towards higher Healthy Eating Index score (233); greater fruit and vegetable preference and healthy eating self-efficacy (240); higher Diet Quality Index-International score and intake from healthier food groups (241); improved adherence to a Mediterranean diet using the KIDMED index (234); improved adherence to Healthy People 2010 dietary intake objectives (242); enhanced nutrient intake (34, 235); intake from healthier food groups (236, 238, 239); consumption of a healthful dietary pattern (237); and improved adherence to Balance of Good Health (now Eatwell Guide) criteria (64). Potential advantages of home cooking in terms of greater control over the food supply were also noted (197).

However, observed caveats included inconsistent tracking of associations between home cooking and putative dietary benefits later in life (236, 237), and more favourable associations for boys compared with girls (237). Furthermore, potential dietary advantages arising from involvement in home cooking may not have been of sufficient magnitude to generate clinically important benefits to individual health (239). Nonetheless, cooking may have led to advantages at the population health level.

In terms of health outcomes, greater home cooking frequency amongst the Taiwanese was associated with longer lifespan, particularly for women (35). In contrast, amongst women in the US, more time spent on home food preparation and associated clean up at baseline, or increased involvement over time, was linked with an adverse cardio-metabolic profile (41). Since no details were provided on the nature of the food prepared, it is possible that this negative association with health may have been attributable to cooking less healthy foods, such as desserts and home baking, which would potentially involve longer clean up times. In another US study, healthier cooking practices employed by a caregiver were linked with reduced risk of overweight or obese BMI in adolescents (198).

Regarding cultural and gender identities, home cooking was found to confer the possibility of exploring current and new food cultures (197). Gender identity and ethnic and cultural belonging were influenced by cooking and eating patterns, and acculturation potentially led to perceived loss of food-related cultural roles and traditions (230). In terms of personal

relationships, home food preparation may have helped to assist connections with others, and increased independence amongst adolescents (197).

3.5 Discussion

3.5.1 Main findings

To my knowledge, this is the first study to systematically review evidence regarding the putative determinants and outcomes of home food preparation, unrelated to a specific intervention. The proposed conceptual model in Figure 3.2 shows the multiple, interacting relationships involved in home cooking, and the variable strength of supporting evidence. A range of themes that may contribute to determining home food preparation practices were identified, at the level of non-modifiable factors; individual factors; social and community networks; and general SES, cultural and environmental conditions. The evidence base was strongest for potential associations between home food preparation and: gender, time availability and employment, personal relationships, and culture and ethnicity. Women and girls were more likely than men and boys to be involved in home cooking (80, 220, 222, 234, 235); people with time restrictions or working for longer hours cooked less frequently than those with greater leisure time availability (227, 232, 239); and those cohabiting with a partner or children were more likely to prepare food at home (231, 233). Home cooking was linked with cultural background and identity, and evidence supported putative associations between female gender and personal aspirations, interest, and role in home food preparation (174, 219, 226). The range of determinants identified suggest that adopting a life course perspective may be a useful approach to consider important factors in home cooking behaviour, and potential opportunities for intervention.

Overall, studies included in the review indicated that home cooking may be linked with positive outcomes, including the development of personal relationships, establishing stronger cultural or gender identities, and enhanced diet and health indicators. The volume of evidence was greatest at the level of the individual, and in support of potential associations between home food preparation and positive dietary markers. Due to the generally low strength of evidence, the combination of findings from quantitative and

qualitative studies, and exclusion of interventional studies, causal relationships cannot be definitively established.

The identification of limited evidence in terms of the potential outcomes of home cooking is consistent with findings from recent systematic reviews of UK (107) and both UK and non-UK (133) adult home cooking interventions. Although these reviews suggested potential positive impacts on main outcomes for health; diet; and cooking knowledge/skills, confidence and attitudes, rigorous evaluation was lacking, and in common with this review, outcome measures were generally focused on the short term (107, 133).

3.5.2 Strengths and limitations of studies included in the review

The cross-sectional design of the majority of included studies prevented inference of cause and effect, thereby limiting the conclusions drawn regarding determinants and outcomes of home cooking. Most of the outcome measurements used, such as dietary indicators, were undertaken as cross-sectional or short term assessments, whereas longitudinal studies with extended assessments would provide more information on potential associations over time and at different stages in the life course.

As highlighted in the background to this thesis, clear terminology and consensus in definitions were lacking in the literature reviewed on home food preparation. Only five included studies provided an explicit definition of home cooking (35, 64, 147, 221, 234), hence the same behaviours were not necessarily compared between different studies. The putative determinants and outcomes selected for investigation were also disparate, emphasising the importance of clearer theories to inform hypothesis testing for future studies of home food preparation.

The examination of extensive national datasets in a number of included studies (34, 35, 41, 80, 147, 220, 222, 224, 227, 228, 231, 239) provided the opportunity to explore a range of potential determinants and outcomes related to home food preparation. Several other included studies also benefited from large participant sample sizes and hence strong statistical power to identify associations within their data (235, 236, 238, 240-242).

The aim of qualitative research is not necessarily to achieve population representative samples. However, the generally smaller sample sizes used in the qualitative studies included in the review (123, 173, 174, 197, 218, 219, 221, 223, 226, 230, 232) may mean that their findings are not more widely generalisable.

3.5.3 Strengths and limitations of the review

This review has addressed issues of international importance, including the potential relationships between home cooking, and obesity and dietary-related diseases. A comprehensive approach was undertaken, incorporating a broad range of determinants and outcomes relating to home cooking. Interventional study designs were excluded because such studies have recently been reviewed by other authors (107, 133), generating inconclusive results which would be unlikely to modify the conclusions drawn here. Furthermore, the study of naturally occurring home cooking behaviour, as undertaken in this review, and external cooking interventions, may be expected to result in differing implications for research, policy and practice.

As with other systematic reviews, there is no certainty that all relevant literature was identified. Due to resource constraints, and the very large volume of articles retrieved from electronic databases, fully exhaustive literature searches were not undertaken. For example, grey literature sources were excluded, and reference and citation searches were not conducted for the studies included in the review. However, at the later stages of data extraction similar themes were consistently identified from included studies, indicating that a form of thematic saturation had likely been reached.

Recommended and validated methods (211, 212, 251) were employed to conduct this review, utilising a systematic and transparent approach. This was enhanced by integrating feedback on the review protocol from the PPI panel. The validity of the conclusions was strengthened by including only peer-reviewed articles, and the reliability was improved by involving two independent researchers in reviewing articles at each stage in the process of literature screening, data abstraction, and quality appraisal.

A number of different tools were considered to assess the quality of studies included in the review (252-256). However, as previously noted (257), the broad range of observational study designs meant that there was no single suitable quantitative tool for the task. All tools had shortcomings, and the Effective Public Health Project tool was selected because this is recommended by the Cochrane Public Health Group; is applicable across a range of quantitative study types; and has demonstrated validity and good inter-rater reliability (214). Nonetheless, the quality of quantitative studies was uniformly rated as weak. Ratings for study design were generally weak, given that the majority of studies were cross-sectional, and blinding was consistently weak, in view of the study designs and nature of the exposure of interest. Additionally, the withdrawals/dropouts criterion was not applicable to cross-sectional study designs. The quality of qualitative studies was consistently rated as high, which could indicate that the quality appraisal tool was not sufficiently discriminatory to identify differences between included studies.

The findings from quantitative and qualitative studies have been presented here together in the main text, given the potential for this to enhance interpretation (258, 259). Guidance is available on combining quantitative and qualitative research in systematic reviews, which has become accepted practice (260, 261). However, the aims, design and conduct of quantitative and qualitative research frequently differ, and may not always be appropriate to combine. Hence the findings from quantitative studies and qualitative studies have been reported separately in Tables 3.2 and 3.3 respectively, and the quality appraisals presented separately in Tables 3.4 and 3.5.

3.5.4 Implications for research, policy and practice

The evidence summarised in this review suggests that home cooking is likely to be associated with short term, individual dietary benefits, although the longer term implications, and potential impacts on health, remain under-researched. In agreement with two recent systematic reviews of cooking interventions (107, 133), this review has recognised a clear need for further longitudinal studies with capacity to help identify causal relationships, and particularly to establish whether home cooking leads to benefits for individual- and population-level health, compared with meals from out of home sources. Exploration of patterns of home cooking behaviour over the life course is also required. The

predominance of quantitative evidence reviewed here suggests that additional rigorous qualitative studies exploring the rationale for inter- and intra-participant variation in home food preparation behaviours is likely to prove insightful. This is addressed through the qualitative work presented subsequently in chapters four and five. Further development of the evidence base around home cooking is particularly important, given that international policy (33, 262) and academic reviews (263) are currently already advocating for wider adoption of home food preparation.

The conceptual model developed from the review findings in Figure 3.2 illustrates the complex, inter-linked relationships between potential determinants and outcomes of home cooking. More research is needed to understand the relative importance of these themes, and their interconnections. This will help to establish the necessary and sufficient determinants of home food preparation, and the role of mediators and moderators of effects. A realist synthesis approach, exploring potential contexts in which different proposed mechanisms are triggered to lead to home cooking, could provide a valuable perspective. Research across the life course, including less frequently studied age groups such as those in middle age, could also prove insightful, as could addressing other potential social effects, for example the economic impact of home cooking.

The complexity of home cooking as a topic creates challenges in developing conclusions and clear policy recommendations, since there is no universally accepted definition of home cooking (52), and research has largely focused on specific themes, rather than complex interacting domains. The working definition of home cooking used in the inclusion criteria for this review was broad in scope, and a unanimous definition did not emerge from the reviewed literature, which likely contributed to some of the inconsistencies in the review findings. Consensus on a clearer definition or framework of key issues related to home cooking would help inform future research, and this is pursued further in the empirical chapters four and five, and the discussion chapters eight and nine.

If home food preparation is deemed to confer health and/or social advantages, effective strategies to promote this behaviour will be needed. Evidence identified in this review indicating the relevance to home cooking of personal aspirations, interests and roles, and

culture and ethnicity, implies that simplistic provision of information and resources may be insufficient to modify behaviour. More effective avenues could involve widening aspirations for home food preparation to groups such as men; developing behavioural norms around cooking early in life; integrating cooking skills more fully into children's education; and undertaking culturally tailored interventions. Targeted training could build on examples of existing national programmes (264-266), to encourage broader related food skills such as cost-effective food shopping, time- and resource-efficient cooking, and menu planning. The large body of research indicating long-standing associations between women and home food preparation implies both that interventions targeted at women may have greatest impact, and that great potential exists to engage boys and men further in culinary activities. The range of determinants suggesting an important role for the life course, and potential 'teachable moments' at which people may be more receptive to modifying their health behaviours (267), indicate that targeted home cooking interventions may be an effective approach.

This review has shown that cooking skills are not a dominant theme in the published literature that met the review inclusion criteria, regarding observational studies of home cooking. This may be a result of conceptual misunderstanding, in that researchers conflate 'cooking skills' and 'cooking', and hence do not explicitly state and/or measure both concepts because they assume the two to be interchangeable. Furthermore, in this review cooking skills were considered in the context of other key themes, such as female gender, and close personal relationships, which could have partially obscured the prominence of cooking skills. Interventional studies, which were excluded from this review, might also be expected to feature cooking skills more centrally.

The importance of other factors beyond cooking skills in determining behaviour illustrates the complexity of cooking, and the potential to modify cooking behaviour through routes other than skill acquisition. Studies included in this review exploring the role of resources in home food preparation suggested that financial assistance may be beneficial in overcoming economic disadvantage as a barrier to home cooking and purchasing healthy basic ingredients. Such principles underpin the UK Healthy Start voucher scheme, which provides means-tested free weekly vouchers for pregnant women and children under four years of

age, to spend on milk, plain fresh and frozen fruit and vegetables, and infant formula milk (268). The importance of time constraints, both within and outside paid employment, identified in this review also indicates the potential value of support to establish cooking as a priority amongst other competing time demands.

3.6 Conclusion

In a systematic review of the health and social determinants and outcomes of home food preparation, putative determinants were identified at the level of non-modifiable factors, and individual, community and cultural influences. Determinants of home cooking were more complex than simply possessing cooking skills, and key themes affecting behaviour emerged as: gender, personal relationships, time availability and employment, and ethnicity and culture. The majority of potential outcomes of home cooking were measured cross-sectionally at an individual level, and largely focused on dietary benefits. Other possible implications involved generally positive effects on health and BMI, cultural and gender identity, and personal relationships. The current evidence base is limited by reliance primarily on cross-sectional studies; high risk of bias; and authors' conceptualisation of potential determinants and outcomes of home cooking. Synthesising observational research provided the opportunity to investigate people's perceptions and experiences of home cooking, however the research field would benefit from further well designed longitudinal studies, and exploring a life course approach to home cooking behaviour.

3.7 Link to other chapters

- This review identified that further qualitative research into home cooking perceptions and practices was required, and this is advanced through qualitative work in chapters four and five.
- The lack of clarity in terminology around food preparation and definitions of home cooking was highlighted in this chapter, and is addressed throughout the thesis, particularly in the qualitative comparative research in Chapter five and the discussion in chapters eight and nine.

- Uncertainties concerning the sociodemographic characteristics of those who engage in home cooking, and consume meals from other sources, was recognised in this review, as shown in the conceptual model. This topic is explored in Chapter seven, through cross-sectional data analysis.
- The need for more research studying the associations between home cooking and diet and health, particularly in under-studied populations such as those of middle-age, was identified in this review and illustrated by the conceptual model. This is pursued further in the cross-sectional data analyses in Chapter six.
- The life course was noted in this chapter as a potentially useful lens for considering home cooking behaviour and opportunities for intervention. This theme is considered throughout the course of the thesis, with further discussion in Chapter nine.
- The importance of understanding implications for public health policy makers, researchers and practitioners regarding home cooking was noted in this review, and is addressed in the discussion in Chapter nine.

Chapter 4. Home cooking practices, experiences and perceptions: a qualitative interview study with photo-elicitation

A shorter version of this chapter is in press at *PLoS One*: Mills, S., White, M., Wrieden, W., Brown, H., Stead, M. and Adams, J. 'Home food preparation practices, experiences and perceptions: a qualitative interview study with photo-elicitation'.

4.1 Abstract

Background

Food-related choices have an important impact on health. Food preparation methods may be linked to diet and health benefits. However, the factors influencing people's food choices, and how they are shaped by food preparation experiences, are still not fully understood. This study aimed to explore adults' home cooking practices, experiences and perceptions.

Methods

A matrix was used to purposively sample participants with diverse sociodemographic characteristics from the North East of the United Kingdom. Participants developed photographic food diaries that were used as prompts during semi-structured interviews. Data were analysed using the Framework Method.

Results

Interviews were conducted to data saturation with 18 adults (five men and 13 women). Participants' practices varied widely, from reliance on pre-prepared foods, to regularly preparing complex meals entirely from basic ingredients. Key themes emerged regarding the cook (identity), task (process of cooking), and context (situational drivers). Resources, in terms of time, money and facilities, were underpinning influences on food preparation. Participants' practices were determined by both personal motivations to cook, and the influence of others, and generally reflected compromises between varied competing demands and challenges in life. Most people appeared content overall with their home cooking behaviour, though ideally aspired to cook more frequently, using basic ingredients.

Conclusion

Home cooking is complex, with heterogeneous practices, experiences and perceptions both between individuals and within the same individual over time, according to shifting priorities and circumstances. Generalisability of these findings may be limited by the regional participant sample; however the results support and build upon previous research. Focusing interventions on life transition points at which priorities and circumstances change, with careful targeting to stimulate personal motivation and social norms, may prove effective in encouraging home cooking.

4.2 Introduction

Food choices, including meal source and preparation method, have an important impact on dietary intake, and hence health. Preparing food at home has been associated with potential benefits for diet and health (34, 35), and home cooking has been recommended as part of wider strategies to improve health and reduce childhood obesity (33, 269). Internationally, perceived decline in cooking skills has been reported by food and nutrition practitioners, policy makers and scientists (30, 43, 270), although some evidence suggests that skill deficits may be restricted to particular population subgroups (110). The frequency and amount of time spent on home cooking using basic and raw ingredients in the United Kingdom have also been declining, in comparison with other countries such as France (271).

Given the potential rich insights offered through qualitative research methods (272), it is feasible that adopting a qualitative approach to home cooking may be particularly useful for exploring the nuances of this highly contextualised and predominantly individualised behaviour. The systematic review described in Chapter three identified only eleven qualitative studies with a main focus on determinants and/or outcomes of home cooking (273). In general, studies sought information solely through traditional interview or focus group methods, which can have limited capacity to generate perceptive data regarding everyday practices that are often undertaken with minimal reflection (274). The investigation of routine realities, such as home cooking, may therefore benefit from employing more novel methods, with the ability to highlight both taken-for-granted

elements, and background context such as culture and identity (275). Visual methods (276), particularly participant-generated photographs (274, 277), have been shown previously to help elicit detail on nuanced personal experiences.

The studies included in the systematic review in Chapter three generally considered only one aspect of cooking behaviour and did not describe in detail the rationale for and experiences of decisions relating to different approaches to cooking. Most studies focused on a specific demographic group, such as the experiences of working mothers (226), or a particular social context, for example acculturation following immigration (230).

Similar data from participants with wide-ranging sociodemographic characteristics would enhance understanding of the broad range of factors influencing behaviour, and potentially help to inform development of public health interventions to encourage home cooking. Further research to explore the nature and perceptions of home cooking practices has been advocated (49), and contemporary studies are particularly important in view of the rapid evolution of influential social and economic determinants. These include increasing female participation in the workforce (278), growing domination of large supermarkets in the grocery market (279), and increasing availability of pre-prepared meal options (280). Therefore, this study aimed to build upon the findings of the systematic review, using interviews with self-taken photographs through the novel process of photo-elicitation. The study sought to explore practices, experiences and perceptions of home food preparation, and identify the key themes of public health importance, traversing diverse sociodemographic characteristics and social circumstances.

4.3 Methods

4.3.1 Participants and recruitment

The reporting of this study adhered to the consolidated criteria for reporting qualitative research (COREQ criteria) (281). Semi-structured interviews with photo-elicitation were conducted to explore home food preparation behaviour. The majority of interviews were one-to-one; however for three interviews, two of the other research participants were also present, in accordance with the participants' requests. These participants were all known to

each other, had consented to take part in the research, and contributed to the interview dialogue.

The participant materials for the study, namely the recruitment poster, interview screening questions, participant consent form, participant information sheet, interview topic guide, and participant debriefing sheet (see Appendices F to K) were developed with input from the PhD Patient and Public Involvement (PPI) panel. The PPI members discussed and reviewed the draft materials and provided comments, particularly concerning coverage of key issues and accessibility for a lay readership. This feedback was incorporated into the final versions of the participant materials.

Adult participants from the North East of the United Kingdom (UK) were purposively recruited between June and October 2015, through social media advertisements, voluntary organisations, academic recruitment networks, and health, employment and community groups. The links established with organisations to which certain members of the PPI group were affiliated, such as the Elders Council of Newcastle, Newcastle Disability Forum, and North East counselling services, were used to facilitate recruitment.

A sampling matrix was used to ensure diverse participant representation according to gender, age, ethnicity, marital status, household composition, socioeconomic disadvantage, self-reported weight status, and self-reported interest and skills in cooking. Area based socioeconomic disadvantage was measured using the 2015 index of multiple deprivation (IMD), assigned to unit postcodes and allocated to fifths of the distribution (282). The aim was not to recruit a sample that met all possible combinations in the matrix, but rather to interview participants with diverse characteristics, in order to identify key issues of public health importance. Individuals aged at least 16 years, who were the main or shared main household food provider, as defined previously (15), were included, since they were anticipated to have greater insights to contribute towards the research questions.

Depending on the recruitment method, either the potential participant saw advertising material and contacted me to express their interest, or the participant responded to me in person directly, following a promotional presentation to a group. I met participants on two

occasions, and they were made aware of my status as a doctoral researcher, qualified as a medical doctor, with a background in public health. Prior to the interviews, I also received in-depth training in qualitative research methods and analysis.

At the first meeting, the participant information sheet was reviewed, and the participant was provided with the opportunity to ask any outstanding questions, before completing the written consent form. Participants were asked to take photographs, which they would then present and discuss at interview (283, 284). I explained this process, and asked the participant to submit at least one digital photograph via email each day, over the period of one week. Participants were encouraged to photograph all aspects of food and eating at home, such as food shopping, cooking and eating facilities, and mealtimes. For participants who did not own a smartphone with capacity to take and send photographs, a digital camera was provided, and photographs were uploaded and sent by computer. In order to maintain anonymity, participants were advised to avoid taking identifiable images of people. A daily text message reminder service was offered.

4.3.2 Data collection

Interviews were conducted one week after the initial meeting, at the participant's home, Newcastle University, or a public venue such as a local community centre. I had no relationship with any of the participants before the study started, and participants were aware that the focus of the study was to explore their home food preparation behaviour, and not to provide a critique of their diet, nor to offer medical advice.

Interviews followed a semi-structured interview topic guide with largely open-ended questions (see version 1 topic guide in Appendix J). This was informed by the systematic review described in Chapter three (273) and piloted. In the main interviews some questions were expanded and iteratively developed as the study progressed, according to previous participants' responses, as undertaken previously (285).

The process of photo-elicitation was used to generate additional participant data and provide a form of visual diary to prompt in-depth interview responses. Interviews commenced by asking each participant to present and discuss their photographs of food and

eating. Two participants did not take any photographs and therefore this stage was omitted. Participants were encouraged to 'tell their story' of home cooking, and questions from the topic guide were used to probe emerging themes and concepts further (see Appendix J). Interviewing and concurrent data analysis continued to data saturation, whereby existing themes were consistently repeated, and no new themes emerged from the data (286). All interviews were audio recorded, transcribed verbatim, and anonymised; basic field notes were made at the time of the interview. Transcripts were not returned to participants for comment; however all participants were invited to receive a copy of the final research findings at the end of the study, if they so wished.

4.3.3 Analysis

Interviews were analysed using the Framework Approach (287), which entails coding data according to the salience of emerging themes and concepts, rather than their frequency of occurrence (288). This process focused particularly on emergent key public health issues.

NVivo 10 software (QRS International Pty Ltd.) was used to manage the data, using Framework Analysis in a stepped process (287). In step one, initial transcripts were reviewed, and key ideas and recurrent themes regarding home food preparation were recorded. In step two, a provisional thematic framework was constructed, incorporating themes highlighted from previous research (44, 273) and key themes from step one, and directed by the research aims. Subsequently, in step three the thematic framework was applied to successive interviews, thereby facilitating simultaneous data collection and analysis. The framework was modified and iteratively expanded to incorporate new emerging themes and ideas, including those arising from photo-elicitation. In step four, data were charted according to themes using Microsoft Excel software, to enable comparisons within and between participants. Finally, step five involved exploring further relationships, patterns and associations within the data, including emerging overarching concepts and principles.

I led the development and review of data analysis, supported by my PhD supervisors. Advice on this process was also received from Ms Martine Stead, a collaborator who has extensive experience and expertise in conducting and analysing qualitative research. Initially, I coded

the dataset independently and iteratively to develop a set of key themes. A subset of transcripts (n = 3) were discussed in a data clinic with my PhD supervisors early in the analysis phase, to review the interpretation of emergent perspectives and themes. A further subset (one transcript each, for three of the supervisors) was coded independently using the final coding frame, to check the reliability of the coding process. I also attended a departmental qualitative data sharing group to improve my understanding and experience of interpreting themes, at which I presented and received feedback on interpretation of the interview data.

4.3.4 Ethics

This research was approved by the Newcastle University Faculty of Medical Sciences Research Ethics Committee, application number 008585 2015. All participants submitted written, informed consent prior to taking part in the study. After the interviews were completed, participants received a debriefing sheet, and details of data management, confidentiality, and use of data in research and publications were reiterated. Participants were able to ask any outstanding questions, and received a £20 shopping voucher in reimbursement for their time, as advertised. The participant materials are provided in Appendices F to K.

4.4 Results

A total of 19 adult participants were recruited to the study; one participant withdrew after the first meeting, leaving 18 participants' data for analysis. Characteristics of those taking part are shown in Table 4.1.

Participant	IMD fifth ⁱ	Gender	Ethnicity	Age (years)	Marital status	Living with	Weight ⁱⁱ	Interest in cooking ⁱⁱⁱ	Standard of cooking ^{iv}
1	3rd	Female	White British	≤30	Single, cohabiting	Partner	Overweight	High	High
2	3rd	Female	White British	31-45	Single, cohabiting	Partner	Overweight	High	Medium
3	1st	Male	White British	56-65	Married	Partner	Normal	Low	Low
4	5th	Male	White British	31-45	Single	5 unrelated people	Normal	Medium	Medium
5	2nd	Male	White British	≥66	Divorced	Alone	Normal	High	Medium
6	1st	Female	White British	31-45	Married	Partner and 2 children	Overweight	High	High
7	5th	Female	Pakistani	31-45	Married	Partner and 2 children	Normal	Medium-high	High
8	2nd	Male	White British	≥66	Widower	Alone	Overweight	Low	Low
9	3rd	Male	White British	≥66	Divorced	Part-time living-in partner	Normal	Low	Low
10	5th	Female	White British	31-45	Single, cohabiting	Partner and 2 children	Overweight	High	Medium-high
11	5th	Female	White British	31-45	Single, cohabiting	Partner and 2 children	Overweight	Medium	Medium
12	5th	Female	White British	31-45	Single	3 children	Normal	High	Medium
13	5th	Female	Black African	31-45	Single, cohabiting	Partner and 1 child	Overweight	High	High
14 ^v	5th	Female	White British	≤30	Single (engaged)	Mother (acts as full time living-in carer)	Overweight	High	Medium
15 ^v	4th	Female	White British	31-45	Single	Alone (partner lives in flat above)	Overweight	Low	Low
16 ^v	5th	Female	Bangladeshi	31-45	Married	Partner and 2 children	Normal	High	High
17	5th	Female	White British	31-45	Married	Partner and 2 children	Overweight	Low-medium	Medium
18	5th	Female	White British	≤30	Single	1 child	Normal	Low	Low
19 (withdrew)	3rd	Female	White British	≤30	Single, cohabiting	Partner and 1 child	Overweight	Medium	Low

Table 4.1 Characteristics of interview participants involved in the study.

ⁱ Index of Multiple Deprivation (scale 1 to 5: 1 = least deprived fifth, 5 = most deprived fifth of distribution)

ⁱⁱ Self-reported: underweight/normal/overweight

ⁱⁱⁱ Self-reported: low/medium/high

^{iv} Self-reported: low/medium/high

^v Participants in the same shared interview

Interviews lasted between 36 minutes and 1 hour 18 minutes. Key underpinning principles identified from the research are presented below, followed by description of the main emergent themes, using supporting quotations and referring to illustrative participant photographs where applicable. The number of photographs that participants submitted (range one to 97) and their choice of material varied greatly. Some participants systematically photographed all meals and eating occasions daily, whereas others selected images to illustrate habits or deviation from usual practices. This variation complemented the range of perspectives and experiences of home cooking that participants described during interviews. Longer interviews generally corresponded to larger collections of participant photographs submitted, suggesting the photo-elicitation approach generated useful material for discussion.

With regards to the interview findings, overall participants viewed cooking as a balance between varied competing influences and demands in life. Most people appeared to have the essential resource requirements, such as time and money, necessary to reach a level of compromise in cooking with which they were generally content. Many participants described strategies they had adopted to juggle an aspiration to regularly cook healthy meals on the one hand, with the challenge of fitting food preparation conveniently into busy lives on the other. Often people seemed to conclude that under perfect conditions they would aim to cook more often, and use basic ingredients more extensively. But given other competing demands, they were comfortable to make compromises. For those participants who aspired to change, this was apparently often driven by social desirability to prepare more complex, healthy meals for themselves and others, and the fulfilment of an ideal or self-identity as a competent cook.

I would like it to be different in the sense that I would like to feel that I could give myself the time to do it [cooking] and enjoy it. But that feeling isn't strong enough to make it happen, because there is always something that I would rather be doing.

Participant 9, male. See Figure 4.1.



Figure 4.1 Aspirations and reality.

Participant 9 typically cooked the same meal every night, comprising filled pasta shapes, a ready-made sauce, and boiled fresh vegetables, with slight variations. He described enjoying food, but not being interested enough in cooking to dedicate much of his time to preparing meals.

The main emergent interview themes are depicted in Figure 4.2. Three key themes were identified regarding home cooking in terms of the cook (identity); task (process of cooking); and context (situational drivers). These were each shaped by both personal motivation, and the influence (or absence) of others. These associations were fluid, with overlap and inter-relationships between categories. A fourth theme of resources, with consideration for time, money, and facilities, straddled these concepts. The relationships between these themes are explored further below.

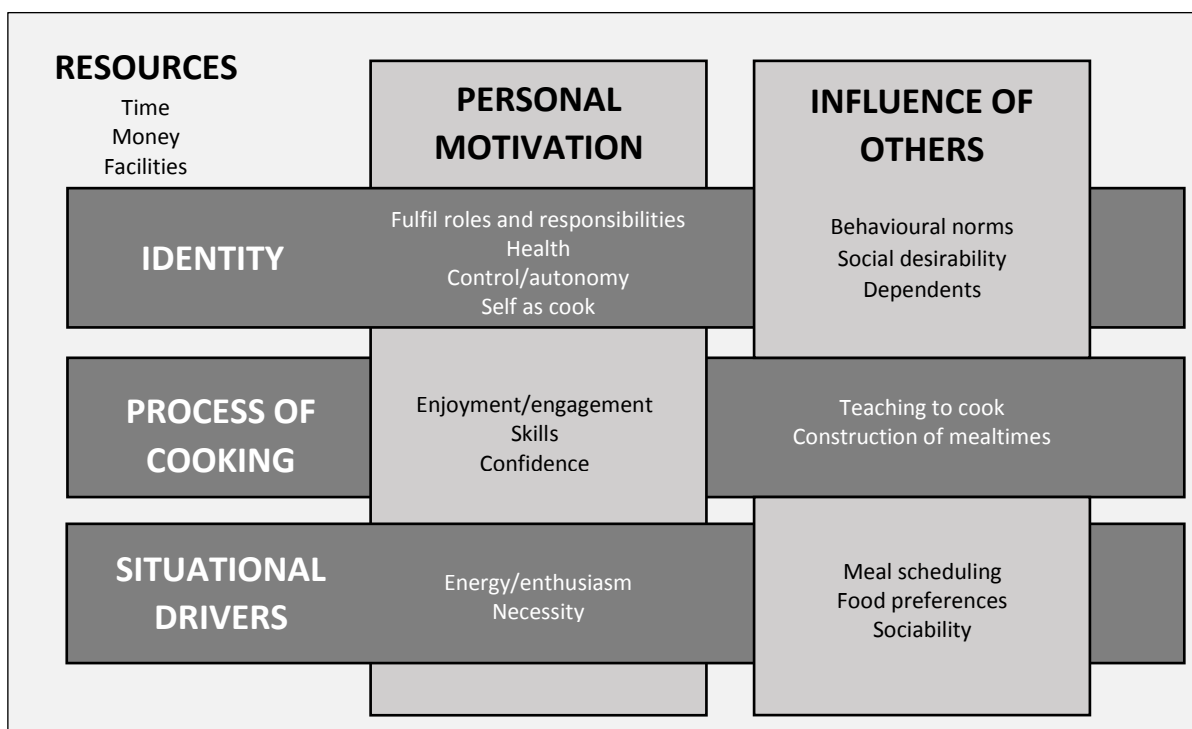


Figure 4.2 Matrix of main interview themes.

Terms in smaller type indicate concepts that determined participants' home cooking behaviour, categorised by one of three themes, and one of two sources of motivation. For example 'fulfil roles and responsibilities' provided a personal motivation to cook, and was recognised as part of the participant's identity. Underpinning all themes was a consideration for resources, namely time, money and facilities.

4.4.1 Identity

For many participants, the roles and responsibilities they had currently adopted in life provided a key personal motivation to cook. For example, several women perceived that part of their duty as a mother and homemaker was to provide meals, particularly those that were healthy and nutritious, for the household. Similarly, some participants described motivation to cook in their role as spouse/partner or carer, irrespective of gender. This sense of responsibility was often persistent, shifting only at different life transition points as participants' living context and roles changed with time, and could override more transient levels of energy and enthusiasm.

Well when my wife was at home, which she was for some time after she took ill, I did make an effort and cooked things which I thought she would eat, because she wasn't eating very well... And there was the incentive to do it then because I was doing it for her. Participant 8, male.

Many participants also recognised that they were influenced by others, through behavioural norms and social desirability around providing home cooked meals for dependents. In particular, participants often seemed embarrassed about serving meals straight out of a packet, without any personal contribution, and so sought compromises to avoid this.

I am at home so for me this has been my setting. This is a role that I've taken on, so I'm the main homebody in this home, so for me cooking and having the cleaning and everything done, that in a sense is a mother's role, but that's how I feel it is.

Participant 7, female. See Figure 4.3.



Figure 4.3 Roles and responsibilities.

Participant 7 was a full-time housewife and prepared traditional Indian meals from basic ingredients several days of the week. She described her role in life as providing and caring for her family.

I might buy something like these lamb kebabs which if you buy all the component ingredients that are pre-prepared it's not like – I like to think it's like the next step up from a ready-meal, if you like... So it's not like a meal out of a pot ready, all-in-one.

It's a meal that you've put together but it's really convenient... Participant 2, female.

See Figure 4.4.



Figure 4.4 Shortcuts in food preparation.

Participant 2 often purchased meal ingredients which were ready to assemble with minimal personal involvement. She described this as preferable to buying a composite ready-meal.

For many participants, their own health and that of dependents influenced their home cooking behaviour. Most people were aware of healthier foods and cooking methods, and tried to choose these when possible, particularly in view of existing health conditions. The majority of participants stated that preparing food at home was a healthier choice than alternatives such as ready-prepared foods and takeaways.

Well they're unhealthy [takeaways], and when I went to this seminar for my gastric band they showed you how, like they'd done a national survey and they showed you how many calories and stuff there was in them and I was, like, 'and how much sugar?' There was ninety grams of sugar in a Korma and I was, like, 'What?'

Participant 14, female.

Some participants described growing in confidence with cooking over the life course, which enabled them to develop their own self-identity as a cook, and exercise autonomy. For example, one participant commented that whilst in the past she was always trying to imitate others, over time she established her own signature dishes. Another participant noted that he became more organised in his food purchasing and preparation over time, ensuring that the necessary ingredients for cooking were available to hand.

Because to me it's part of being independent, you make your own food, you clear up after yourself, that kind of thing. Participant 4, male. See Figure 4.5.



Figure 4.5 Planning and organisation. Participant 4 described taking a methodical approach to meal planning, food shopping and cooking, which had evolved over time as he became more independent and self-sufficient.

4.4.2 Process of cooking

Many participants recognised that they were inherently interested in food and cooking and enjoyed the activity, or to varying degrees were disinterested and disliked it. Frequently, personal interest in food and cooking appeared to last lifelong. However, some individuals reported changing levels of enthusiasm and engagement at different stages in life, as new roles or influences became important.

But the longer we were together the more interest I took in making meals. And when we had the children we couldn't go out for ages because they were quite close together, and so I used to watch a lot of cookery programmes when I was off on maternity leave, and try things out. And like I say having family over you feel the need to make an effort. So I really came to love doing it, and liked to read recipes and, you know, it's nice... So I have grown into it definitely. Participant 6, female.

Well, I don't like cooking... And, in fact, I don't do it... So if I eat in, it is inevitably a frozen meal... Microwaves are very handy... And that's it. Participant 8, male. See Figure 4.6.



Figure 4.6 Alternatives to cooking.

Participant 8 stated that he had no interest in cooking, and when eating at home consumed ready meals, pre-prepared foods such as tinned soup, and sandwiches.

A few participants reported drawing inspiration for their cooking from television programmes; however, some also mentioned that in their household those who prepared food the least frequently were also the most likely to enjoy watching cookery shows. Cooking courses delivered as part of public health initiatives, such as Change4Life, were noted by some participants as an important learning resource. Participants also often described learning how to cook from other people, frequently relatives. Cooking was sometimes used to facilitate bonding between families or friends.

Well my mam and dad always done cooking with me, like when I was younger. My mam and dad, my dad cooks all the time. Even down to where they showed me how to do rabbit stews. Participant 10, female.

*I love baking my cakes... More so if I've got...if I've just got my girls in, weekend...
Because it involves them, you see.* Participant 12, female.

The reported cooking skills varied widely between participants, from no practical ability, to the capacity to prepare complex meals entirely from scratch. Participants who were interested in cooking often sought out opportunities to improve their skills, and were prepared to accept culinary failures along the way, whereas those who were less engaged viewed their lack of ability as a significant barrier. Greater confidence with cooking was often associated with higher levels of skill. However, confidence was also influenced by the expectations associated with sharing meals, and there was variation in the perceived differing standards required for preparing food for oneself, partner or family, guests, and formal occasions.

When I'm cooking for other people I worry about it more. It was actually quite a stressful aspect in the last relationship I was in because I felt under pressure to produce a good meal pretty much every night for my girlfriend, as well as for myself.
Participant 4, male.

For most participants, the process of cooking was strongly linked to their perception and experience of mealtimes. These included usual meal patterns and deviations; planning ahead for meals; and treats and rewards.

I have a cooked breakfast when I go away somewhere, just as a little treat... But I don't have a cooked breakfast at home. Never, never. Participant 5, male.

Many people seemed to operate a mealtime routine or 'norm', for example home cooked dishes shared with their family, which was modified according to competing demands, such as the time constraints imposed by others' schedules.

...and my partner also works shifts... He's on early on a Thursday morning so I know if I'm getting in late on a Wednesday I know I need to have something made quickly.
Participant 2, female. See Figure 4.7.



Figure 4.7 Mealtime routines.

Participant 2 described preparing quick meals during the working week, such as omelettes, particularly when time was tight in order to fit in with her partner's schedule.

4.4.3 Situational drivers

Participants frequently described how their home cooking behaviour was influenced by their mood and levels of energy and enthusiasm at a specific point in time. For example, the preparation of complex meals requiring extensive thought and planning was generally more common at weekends than during the working week, since participants often felt pressured and tired after a day at work. Prompted by her own photograph, one participant described how:

I make these [meals] up and put these in the freezer, in silver dishes. I take [them] out each day. Participant 10, female. See Figure 4.8.



Figure 4.8 Preparing ahead.

Participant 10 reported batch cooking at the weekends and then portioning up meals, ready for the busy week ahead when her enthusiasm for cooking was reduced.

Levels of motivation in specific meal situations could also vary greatly within the same participant in the short term from day-to-day.

So we all quite like eating and making food, but it's usually just because when you get in you're tired and you can't really be bothered sometimes, but on weekends it's different. Participant 2, female.

It's just spur of the moment. If I'm in the mood for cooking then I'll just do batches of cooking... If I'm not in the mood then I don't do it. Participant 11, female.

Strategies used by participants to manage low enthusiasm for cooking involved short cuts to simplify food preparation and minimise the cognitive input required, for example using pre-chopped vegetables.

When I get home I'm tired so I don't really want to cook for as long or prepare as long, so it's usually quite fast dinners that I make. Participant 1, female. See Figure 4.9.



Figure 4.9 Managing levels of motivation.

Participant 1 described how her enthusiasm and energy for cooking during the working week was often low, so she tended to prepare dishes described as 'simple', such as those with pasta.

Sharing meals and preparing them for others was a strong situational driver, and attitudes to compromise varied between participants. With regards to scheduling, some participants prepared meals more quickly, or to fit in with others' timetables, for example using pre-

prepared ingredients rather than cooking from scratch. In contrast, others chose to eat separately. In terms of balancing food preferences, some participants perceived these as fixed parameters, and prepared different dishes or meal variations according to the likes and dislikes of the household. Others viewed the situation flexibly, for example considering that children should be encouraged to diversify their tastes and eat the food served. These decisions often appeared to be based on personal principles, such as perceived importance of shared mealtimes.

I like to eat it together, we try our best to eat together. Participant 7, female.

Yeah, so I usually eat it [dinner] with my boyfriend, but he... I am very fussy and he is very fussy, so we tend to have different foods. Participant 1, female.

I know with my friend whose a vegetarian, if she's coming obviously I need to do vegetarian food... So to make it easier I will make something for all of us, rather than doing two separate meals. I just don't tell them. Participant 10, female.

The sociability of preparing food for others provided an incentive to cook. Some participants described maintaining a supply of home cooked foods available, in case guests should visit. Entertaining people for a meal also often influenced behaviour, both in terms of preparing more elaborate dishes, and eating in a more formal context. One participant, prompted by their photograph, noted:

Oh, this is dinner at the table, which is Sunday, because we had someone around, and everything we served from dishes rather than serving straight onto the plate, which is what would normally happen. I would normally just serve onto the plate and then we would eat in the lounge, usually, on a lap tray or something like that. Participant 2, female. See Figure 4.10.



Figure 4.10 Sociability of meals.

Participant 2 explained that the meal photographed was unusual in that it was consumed at a table, using serving dishes, whereas usually the meal would be served directly onto plates and eaten off a lap tray. The difference was due to a guest visiting to share the meal.

Participants living alone sometimes noted that preparing a meal for only themselves reduced their sense of engagement with cooking and seemed purposeless and time inefficient, which discouraged extensive food preparation.

I think it would be if I lived with someone, or in a family, or in a group of people, even a commune or something like that, where there was a focus on it [cooking] which I could join in with. That would encourage me to do a lot more, actually. Participant 9, male.

In contrast, some participants stated that living alone drove them to cook out of necessity.

So when I got married my wife was a very good cook, and she did all the cooking, and it's a bit sexist, really, I just let her do that, and she was happy to do it... She enjoyed cooking. And then when we separated I had to learn to cook. Participant 5, male. See Figure 4.11.



Figure 4.11 Obligation to cook.

Participant 5 reported learning to cook out of necessity, initially using cook books, when he separated from his wife.

4.4.4 Resources

Resource availability over the life course, in terms of time, money and facilities, emerged as an underpinning influence on home cooking behaviour. In this context, skills have been presented as part of the process of cooking, rather than a resource, since skills may be viewed more subjectively and are potentially less easily quantified, compared with the other resources discussed here. However, as noted previously, clear overlap and interaction between different influences on home cooking behaviour were identified.

Time

Some participants reported time as a limiting factor in their home cooking. This was due to pressures both from themselves, such as their employment schedule, and other people, such as children's extra-curricular activities. However, responses to this constraint varied widely. Some people avoided cooking by for example consuming ready meals, eating out and ordering takeaways; others greatly restricted their time allocation to cooking by using pre-prepared ingredients. Some participants maintained food preparation as a priority, by for example cooking at weekends and freezing meals for later in the week; planning ahead extensively; and purchasing time-conserving cooking equipment. These strategies could therefore be helpful in terms of managing shortages of both time and motivation to cook.

Like on a Tuesday me and my partner both work late and the kids are at clubs so we all don't get in until about seven o'clock, half past seven... So we would have a late tea then. Normally that's something I would have in the slow cooker, or it would be one of the meals I've already had cooked so I can just make that. Participant 10, female.

Participants' perceptions of time spent cooking also varied. Some viewed cooking as another potentially stressful chore to be completed as quickly as possible, whereas others considered it an enjoyable use of time, for example marking the transition from work to home life, or demonstrating love and care in their role as nurturer and provider. Accordingly, participants who took pleasure in cooking were much less likely to perceive and cite time as a practical barrier, and tended to spend longer cooking.

Sundays, I always spend Sunday batch-cooking... Sunday afternoon, I quite enjoy it. Participant 10, female. See Figure 4.12.



Figure 4.12 Managing time availability.

Participant 10 described how she tackled a shortage of time for cooking during the working week by preparing large quantities of food at the weekend, and then freezing it in batches. She found cooking enjoyable, and by taking this approach, lack of time ceased to be a barrier to eating home cooked meals daily.

Money

Most participants considered the cost of food in their decision making around cooking, though the context differed according to their financial situation. For example, some participants budgeted on food to ensure there was enough to feed them until the end of the week, whereas others deliberated whether the extra expense of premium products, such as organic goods, was justified.

I work part-time, so my income's not enormous, so I do think quite a lot about where I can get the cheapest food. Participant 4. See Figure 4.13.



Figure 4.13 Food shopping on a budget.

Participant 4 explained how he regularly visited a range of supermarkets to search for cut-price items, in order to reduce his food shopping bill.

Participants seemed divided on whether home cooking was more or less expensive than alternatives such as pre-prepared foods and takeaways, though were in general agreement that eating out was an expensive luxury.

Well, I did think that it is cheaper to get a takeaway instead of making a big massive thing of something, but I think well, if I do a big massive thing like you say, you could freeze it for next week, so that's what I've started doing. Participant 14, female.

We [self and current partner] don't make a choice and say let's go and eat out tonight, I don't tend to do that, unless it's a special occasion... I always think I can cook better value when I'm eating out... What you pay these days, actually, it's ridiculous. Participant 5, male.

Facilities

For some participants, facilities had a strong bearing on their approach to cooking at home, with limited resources acting as a deterrent to cook.

But some days I just walk in [to the kitchen] and think 'Agh', and I'm like, 'right pass the phone and we'll order the Chinese'. But I think once it's decorated I think I'll be using it a lot more than what I am at the moment. Participant 11, female.

Yeah, that can make things really difficult when you don't have the equipment and the kitchen that you need. Participant 15, female.

In contrast, participants also reported that cooking equipment could enable them to optimise their time and help fit cooking into a busy schedule.

My slow cooker, I couldn't live without my slow cooker now because I just put it on. I chop all my veg on a night time. Put it in in the morning. I have everything ready, stock and everything ready, put it all in and I know when we come in at five, six o'clock it's ready. Participant 10, female.

4.5 Discussion

4.5.1 Main findings

Qualitative interviews were conducted with adults from varied sociodemographic backgrounds to provide insights into their practices, experiences and perceptions of home cooking. In this participant sample, lack of basic conditions necessary to cook was not generally noted as a particular barrier, and most people developed a personally satisfactory day-to-day coping approach. Nonetheless, home cooking was a compromise between diverse motivations and demands on resources. Driven largely by social desirability and a wish to identify themselves as a proficient cook, many participants aspired to change their patterns, particularly to increase their cooking from scratch, and to prepare healthier meals.

Demonstrable changes in food preparation were often found to coincide with transition points in life, such as beginning or ending cohabitation, or starting a family.

This research highlighted home cooking as a practical process and skill, with short term situational drivers, and influenced by longer term facets of identity (see Figure 4.2). These three main themes were also considered in terms of two categories, namely personal motivation, for example enjoyment and engagement with cooking; and the influence of others, such as their food preferences. These factors interacted with each other, according to their salience and modifiability. For example, enjoyment of cooking helped participants to overcome potential barriers, such as complicated family food preferences. Participants also noted the significance of resources for home cooking, in terms of time, money, and facilities.

4.5.2 Strengths and limitations

In contrast to previous research exploring home food preparation (173, 219, 230, 232), this study involved participants from wide-ranging sociodemographic backgrounds and varied stages in the life course, rather than focusing on a particular subgroup. This highlighted the cross-cutting nature of the key emergent themes traversing the sociodemographic spectrum, namely identity, the process of cooking, situational drivers, and resources. The data analysis approach undertaken involved using Framework Analysis, which provides the benefit of a systematic approach to comparing inter- and intra- participant viewpoints (288).

All participants were recruited from the North East of the UK, hence their views may not necessarily be more widely generalisable. However, participants were not all originally from the North East, and the results reported here reflect previous research emphasising the importance of factors such as time (221), skills (223) and shifts in behaviour at key transition points in life (174). The findings also support the main issues emerging from the systematic review of home cooking described in Chapter three (273). This suggests that the key themes identified here are likely to be transferable to other population groups.

The interview topic guide (see Appendix J) was informed by the main themes and questions arising from the systematic review in Chapter three (273). The draft guide was reviewed by the PhD PPI panel, and subsequently amended to optimise readability and coverage of key

issues. It is therefore likely that this guide prompted consideration of relevant wide-ranging themes regarding home cooking, and the use of open-ended questions also ensured the generation of rich, detailed data. Interviews were conducted to reach thematic saturation, which suggested that all the main themes on the topic were identified. There were no overall differences in the main themes raised in single interviews and those where other participants were also present. For example, consistency was observed in references to the underpinning influence of resource availability on home cooking behaviour.

In these interviews, photo-elicitation (289, 290) was used successfully to generate prompts to in-depth discussion. Participants maintained control over their research involvement, thereby avoiding bias against individuals with busy lifestyles, or limited cooking facilities, and promoting participant recruitment and retention. Multiple photographs on different aspects of food preparation, such as food shopping and cooking facilities, provided data on a wider range of scenarios than a single observed cooking session, and may therefore more accurately reflect usual behaviour. The range of photographs presented included examples of fast food, unhealthy desserts, and home baking. This suggests that at least to a certain extent, potential social desirability bias towards sharing photographs of only healthy home cooked meals was overcome. The great majority of participants engaged effectively with photo-elicitation, and the variation in their photograph submissions reflected different styles of telling their personal story of home cooking.

An alternative method considered for data collection was the go-along interview, during which the interviewer accompanies the research participant in their home and for excursions in their locality (291). This approach offers direct experience of food behaviours, and the environments in which the participant lives and eats (292). Similarly, using an ethnographic approach might have involved observing the research participant preparing a meal at home, and undertaking a think aloud interview to explore their behaviour (293, 294). However, both go-along interviews and ethnography are resource and time-intensive techniques, and would have provided experiential data on the period of accompaniment only. Although these methods involve observing the research participant directly, this remains a potentially contrived research environment, in which the potential for social desirability bias may persist. For example, the participant might choose to spend more time

in food preparation; cook or purchase healthier foods; and/or prepare more complex meals than usual whilst under scrutiny, thereby providing biased data.

The professional and personal characteristics of an interviewer may impact on qualitative data collection, and its subsequent interpretation (295). In order to reduce this likelihood, and the possibility that participants would provide socially desirable responses, a reflexive interviewing approach was used. This involved considering my own perspective on the interpretation of the findings; providing adequate time for participants to consider their responses; reminding them that honesty was more valuable than any perceived 'right' answer; and promoting full comprehension of all questions by rephrasing as necessary. In order to reduce potential bias in the analytical process, independent coding of interview transcripts was conducted by both myself and my PhD supervisors, and I met regularly with my supervisors to cross-check the interpretation of key themes.

4.5.3 Relationship to previous research

This study identified the importance of considering multiple dimensions of home cooking, in terms of the cook (identity); task (process of cooking); context (situational drivers) and resources, and the role of both personal motivation and the influence of others (see Figure 4.2). Previous qualitative research has largely focused on single aspects of cooking (273), such as the influence of culture (221), or impact of marriage and cohabitation (174). The results presented here support findings from the United States (49) and island of Ireland (53) regarding the individuality, complexity and social importance of cooking. This study additionally highlighted changing patterns in food preparation behaviour according to varying demands and priorities over the life course, and generated personalised insights into cooking attitudes and practices through the process of photo-elicitation.

Research into home cooking has often concentrated on barriers, such as limited resources, and sought to explore constraints without explicitly considering that participants may be content with their current practices (223, 226). In this study, individuals often stated that additional resources would be beneficial, however participants engaged in varying types and degrees of involvement in home cooking, throughout the spectrum of resource availability. This suggests that resources may have been used as a perceived socially acceptable

response, and/or obtaining further resources was not necessarily a priority, whereas personal motivation and the influence of others generally determined the extent to which participants cooked. Hence interventions targeting resources alone, including those focused on cooking skills, may not result in comprehensive changes to home cooking behaviour. Furthermore, the impact of cooking interventions more broadly may be limited if people consider that their own cooking is acceptable, and that they would not benefit themselves from an intervention.

Much previous research has described the impact of busy lifestyles on time available for food preparation at home (155, 226, 296, 297). This study indicated that there was no clear linear connection between time availability and willingness or ability to cook. Instead, the perception of time as a barrier to cooking was related to participants' underlying opinion of themselves as a cook (identity); enjoyment and engagement with preparing food (process of cooking); and levels of energy and enthusiasm (situational drivers) (see Figure 4.2). Participants tended to learn to manage their cooking within the time available, and to devote more time if they experienced cooking as pleasurable and a priority, rather than a domestic chore. A potential risk of excessive health promotion, advocating for putative health benefits of home cooking, could be that cooking comes to be perceived as an onerous task, rather than an enjoyable activity, which could act as a deterrent to cooking.

Perceptions of time appeared to vary in the short term, according for example to mood and the availability of alternative activities. These findings build on a qualitative cross-cultural study comparing home food preparation practices in the UK and France, which found that overall, French participants valued cooking more highly, and were more willing to prioritise time for cooking, than the British (221). This may reflect traditionally stronger cultural connections to food and cooking in France than in the UK (271).

The results presented here identified concurrent significance of both personal motivation, and the influence of others, in determining home cooking practices. This extends previous research investigating the impact of being alone on cooking and eating habits. For example older women (298), older men (299), and younger men (300) living alone all tended to experience personal and practical challenges to preparing and eating wholesome meals.

Similarly, this study found that preparing a one-person meal often provided little incentive to cook. However, in contrast, single people frequently noted the necessity to cook in order to fend for themselves in the absence of others.

4.5.4 Implications

These findings suggest that the most effective opportunities for intervention in home cooking practices are likely to occur at transition points in life when incentives and circumstances for cooking change, such as leaving the parental home; commencing or ending cohabitation; adopting caring responsibilities; or retirement. Evidence from other domains, such as smoking cessation in pregnancy (301), dietary changes following a cancer diagnosis (302), and sustained weight loss after a personal crisis (303), support the notion of ‘teachable moments’ (267) or significant life stages for potential adoption of new health behaviours. Cooking interventions delivered at such transition points may therefore prove fruitful for changing food preparation habits and developing closer engagement with food and cooking. Coordination between key agencies is also likely to be important in evaluating this approach, for example closer collaboration between researchers, practitioners delivering cooking interventions, and health and social care organisations supporting individuals through life transitions, such as community children’s centres.

Given that the interview participants often described making changes to their cooking behaviour, this research indicates that individuals’ home cooking practices are generally likely to be modifiable. This presents potential opportunities to create more conducive environments for preparing food at home, hence increasing motivation to cook. For example, policies could support vouchers for healthy food for young children and pregnant women (268); subsidising cooking equipment; or ensuring that adequate kitchen facilities form part of mandatory criteria for new properties and public or social housing.

However, evidence that many people adapt their home cooking practices to establish a personally acceptable compromise with other competing demands, indicates that there may be a natural limit to the impact of cooking interventions. Approaches may therefore need to appeal to people’s reported aspirations to change. Tailored marketing could focus on adjusting social norms and personal priorities to promote a positive view of time spent in

food preparation, in contrast to existing marketing campaigns against cooking, such as Just Eat (304). Such a strategy could include emphasising the accessibility of cooking, in contrast to complex, often seemingly unachievable culinary creations frequently portrayed in popular media. This could build upon recent everyday cooking campaigns delivered by supermarkets such as Tesco and Sainsbury's (305, 306), and cooking with an accessible, practical focus, for example Jamie Oliver's 15 minute meals (307). Approaches could also highlight the potential health significance of cooking for disease prevention and management, and the importance, as a responsible provider, of cooking for dependents.

4.5.5 Future research

The findings presented here suggest that life transition points are important in determining home cooking behaviour. Hence future research should involve longitudinal studies with duration encompassing key life changes, such as starting or ending cohabitation, taking on significant caring responsibilities, and retirement. Detailed questions on home cooking could be incorporated into existing large-scale longitudinal surveys, which would facilitate exploration of key determinants and outcomes of home cooking, and relationships with significant transition points in life.

The successful use of photo-elicitation to generate key insights into nuanced, individualised behaviours in the interviews described here indicates this may be a promising strategy for use in future qualitative studies. Continued advancements in digital technology are also likely to offer additional options in future, such as SenseCam body-worn video cameras for personalised filming (308).

4.6 Conclusion

This research explored home cooking practices, experiences and perceptions, and identified the importance of both personal motivation and the influence of others. Key themes emerged regarding identity; the process of cooking; situational drivers; and resources. Home cooking behaviour was often a balance between varied competing influences and demands in life. Overall, people were largely content with their cooking compromises; however, many

participants did express an aspiration under ideal conditions to cook at home more frequently using basic ingredients. Approaches to cooking varied greatly between individuals, and often evolved in the short and longer term within the same individual, according to changing priorities and circumstances. These life transition points may prove effective junctures at which to offer support and interventions to encourage home cooking. Interventions should be targeted at encouraging personal motivation and a shift in social norms, in order to prevent ambivalence regarding changes in behaviour.

4.7 Link to other chapters

- This work addressed the need for further qualitative research into home cooking perceptions and practices, identified through the systematic review in Chapter three.
- Varied perceptions of home food preparation and cooking were identified in this qualitative research. This is explored further in the cross-country comparison work in Chapter five.
- The importance of resources, particularly time, in influencing home cooking behaviour was noted in this chapter. The impact of time availability is considered further in Chapter seven, through cross-sectional data analysis.
- The potential for further research investigating the sociodemographic characteristics of those who engage in home cooking, and consume meals from other sources, emerged through this qualitative work. This theme is addressed in the cross-sectional data analysis in Chapter seven.
- This chapter considered qualitative evidence indicating the potential value of a life course approach to home cooking, which was also identified in the systematic review in Chapter three, and is revisited in Chapter nine.
- The influence of public health policy, such as provision of cookery courses and affordability of ingredients for cooking, emerged in this chapter. The implications identified from this research for public health policy makers, researchers and practitioners are addressed in the discussion in Chapter nine.

Chapter 5. Home cooking: good for the soul, bad for the waistline? A qualitative analysis from the United Kingdom and United States

Resubmission of a modified version of this chapter has been invited to *BMC Public Health*: Mills, S., Wolfson, J., Wrieden, W., Brown, H., White, M. and Adams, J. 'Home cooking: good for the soul, bad for the waistline? A qualitative analysis from the United Kingdom and United States'.

5.1 Abstract

Background

In both the United Kingdom (UK) and United States (US), cooking at home plays an important role in everyday life. Cooking may be associated with benefits to diet and health. However, the nuanced perceptions and practices linked to different types of cooking at home are not yet fully appreciated. This research aimed to examine the specific concept of 'home cooking', using qualitative research from the UK and US.

Methods

Participants were recruited from the North East of the UK to take part in interviews, and from Baltimore, Maryland, US to take part in focus groups. Data from these two studies exploring cooking at home were combined and analysed using the Framework Method.

Results

A total of 71 adults participated (18 UK and 53 US), with diverse sociodemographic characteristics and experiences of cooking. In both countries, participants distinguished 'home cooking' as a distinct subtype of cooking at home. 'Home cooking' was defined in terms of: preparing a meal from scratch, cooking with love and care, and nostalgia. These descriptions were not aligned closely with principles of healthy eating.

Conclusion

These findings suggest that cooking at home has a range of dimensions, with different implications for health. Interpretations of the specific concept of 'home cooking' are not necessarily associated with healthy eating. Given the pervasive role in societal eating patterns of cooking at home more generally, and potential for diet, health and social

benefits, public health initiatives promoting cooking at home are likely to be of value. However, communications should be crafted to avoid conflation with the less healthful connotations of 'home cooking'. Further research is required investigating the perceptions, experiences and definitions linked to different potential subtypes of cooking at home.

5.2 Introduction

The vast and growing international burden of ill health contributed by diet-related non-communicable diseases (NCDs) such as obesity, type II diabetes, and several types of cancer (1) has been paralleled by a decrease in time spent cooking at home in the majority of high income countries (25, 26). As described in the systematic review in Chapter three, home cooking may provide benefits for diet and health (273), and meals from out of home sources have been identified as a risk factor for higher energy and fat consumption, and lower micronutrient intake (309). Nonetheless, to date the evidence base remains inconclusive.

These observations have led some experts to conclude that promoting cooking at home, particularly traditional cooking 'from scratch' using basic ingredients, and encouraging the development of cooking skills, could offer one solution for addressing the prevalence of diet-related NCDs (30). However, currently there is no consensus around the meanings and implications of cooking at home, and among the general public, interpretations span a wide range of ingredients, products and approaches to food preparation (49, 52, 53, 55). Lack of clarity over cooking terminology persists (52, 56, 81). Given the complexity and individuality of cooking, as demonstrated through the systematic review described in Chapter three and the qualitative interviews presented in Chapter four, a shared understanding of the meaning of terms around cooking at home is important for researchers, policy makers and practitioners. Similarly important is establishing realistic expectations regarding potential relationships between cooking at home, healthy eating and subsequent health outcomes.

In recent work, the phrase and concept of 'home cooking' has started to emerge as a specific subtype within cooking food at home more generally (49), although differences have not yet been characterised or described in detail. There is therefore a need for further research to

address this ambiguity. The work presented here aimed to explore the meanings and values embedded in 'home cooking', as distinct from other types of cooking at home, using data from two qualitative studies that investigated cooking perceptions and behaviour within diverse populations in the UK and US. This research also sought to consider the implications of how people understand and regard 'home cooking', for the relationships between cooking at home and healthy diets, health outcomes, and ultimately public health policy. The findings from the UK interviews in terms of cooking practices, experiences and perceptions were summarised in Chapter four, and those from the US focus groups have been published previously (49) (see Appendix L). This chapter presents new cross-country results from the combined subset of data that addressed 'home cooking' specifically.

5.3 Methods

This study is reported recognising the principles of the consolidated criteria for reporting qualitative research (COREQ criteria) (281). The methods for the UK qualitative interviews are described in detail in Chapter four, and methods for the US focus groups have been previously published (49) (see Appendix L). In brief, the US study aimed to explore perceptions of concepts related to cooking amongst American adults. Specifically, the research sought to examine individuals' perceptions of what it means 'to cook', and to investigate important factors in how cooking is viewed and practiced. The study was undertaken in Baltimore, Maryland, where 53 participants were recruited from two urban neighbourhoods with contrasting sociodemographic populations and levels of neighbourhood socioeconomic disadvantage (based on median income and food access). Participants volunteered to be part of the study by responding to fliers posted at neighbourhood food outlets, libraries, churches and apartment buildings, and participated in one of seven focus groups. Inclusion criteria included being aged 18 years or over, and living within the recruitment neighbourhood (based on self-report). Participants were accepted on a first come, first served basis. Group sessions lasted for approximately 90 minutes and were facilitated using an iteratively developed discussion guide, covering a wide range of topics related to perceptions of cooking and cooking behaviour (see Appendix M).

In both the UK and US studies, basic field notes were taken and audio recordings of the sessions were transcribed verbatim by a professional service. The UK data collection was approved by Newcastle University Faculty of Medical Sciences Research Ethics Committee, application number 008585 2015. The US data collection was approved by Johns Hopkins University Institutional Review Board, application number 6027. All participants provided informed consent prior to taking part.

The secondary analysis of the datasets from the UK and US studies presented here provided an opportunity to explore in-depth the meanings and understandings of the specific concept of 'home cooking'. This analysis was broadened by involving two distinct cultural settings, with differing national influences and sociodemographic characteristics. Both primary data collection studies used a qualitative approach, and focused on the perceptions and practices involved in preparing food at home.

The data addressing 'home cooking' from the two studies were merged and Framework Analysis (287) was used to identify key themes concerning the meanings, values and importance of 'home cooking', with consideration for any influence of cultural context. Framework Analysis involves coding data with regard to the importance of emergent ideas and themes, in preference to the frequency with which they occur (288). I led the Framework Approach through an iterative process, assisted by the author of the US study, Dr Julia Wolfson. The original participant interview and focus group transcripts were revisited, and the main overarching themes regarding 'home cooking' were identified. Thematic codes were allocated and tabulated, and developed over time, following re-reading of transcripts and discussion between myself and Dr Julia Wolfson. The tabulated themes were presented as a draft framework to my PhD supervisors, and then discussed and refined further on the basis of mutual consensus. The qualitative data analysis software NVivo 10 (QRS International Pty Ltd.) was used to facilitate data coding, management and analysis.

5.4 Results

The findings were drawn from a cross-country sample of 71 participants (18 UK and 53 US), with wide-ranging sociodemographic characteristics (see Table 5.1). In both countries, the majority of participants were female. The US sample was more ethnically diverse than the UK sample, and participants in the UK were generally drawn from younger age groups than in the US. A greater proportion of US participants described their marital status as single, compared with the UK. In terms of self-reported weight status, the majority of UK participants were overweight, whereas most US participants were of normal/healthy weight.

Overall, in both countries participants highlighted the individuality of cooking at home, and perceived 'home cooking' as a distinct subtype of cooking food at home more generally. Three main themes concerning the meanings and values attached to 'home cooking' emerged from the data, namely cooking 'from scratch' using basic ingredients, demonstration of love and care, and nostalgia. These themes are described in further detail below, illustrated by participant quotations. The participants' interpretations highlight the complexity of relationships between cooking and health, and indicate that 'home cooking', as currently widely perceived, is not necessarily closely associated with principles of healthy eating.

Participant characteristics	United Kingdom (UK) n (%)	United States (US) n (%)
Total number	18	53
Age (years)		
<30	3 (17)	8 (15)
31-45	11 (61)	7 (13)
46-55	0 (0)	16 (30)
56-65	1 (5)	14 (27)
≥66	3 (17)	8 (15)
Gender		
Male	5 (28)	14 (26)
Female	13 (72)	39 (74)
Race/Ethnicityⁱ		
White	15 (83)	16 (30)
Black	1 (6)	35 (66)
Asian	0 (0)	2 (4)
Pakistani or Bangladeshi	2 (11)	Not asked
Hispanic	0 (0)	0 (0)
Marital Status		
Single	4 (22)	26 (49)
Married	5 (28)	8 (15)
Living with partner	6 (33)	10 (19)
Divorced/separated/widowed	3 (17)	9 (17)
Weight statusⁱⁱ		
Underweight	0 (0)	4 (8)
Normal/healthy weight	8 (44)	32 (60)
Overweight	10 (56)	9 (17)
Overweight by >20 pounds	Not asked	7 (13)

ⁱ Self-reported. In the UK sample, participants described their race/ethnicity via an open ended question. In the US sample, response categories were White, Black, Hispanic, or Asian.

ⁱⁱ Self-reported. In the UK sample, response options were underweight, normal, or overweight. In the US sample, response options were underweight, healthy weight, overweight, or overweight by >20 pounds. One US participant declined to respond.

Table 5.1 Characteristics of interview and focus group participants involved in the study.

5.4.1 Cooking at home

Perceptions of cooking at home varied between individual participants in both the UK and US, though these distinctions did not appear to be systematically associated with sociodemographic characteristics and were largely consistent between countries. In the US however, greater emphasis was placed on the role of heat in the concept of cooking:

It's just that for me, cooking does mean something was heated. US Participant 35, female.

Many participants recognised that cooking was a very personal activity, and others' definitions could differ from their own. As one participant noted:

I think that cooking and home cooking means something different to everyone. US Participant 46, male.

For some participants, the term cooking at home encompassed all food preparation undertaken in the home, regardless of the extent of incorporating raw or basic ingredients. Viewed from this perspective, cooking at home included for example, heating a pre-prepared pizza in the oven, or adding hot water to a pot of instant noodles. Other participants considered that cooking should encompass some degree of personal effort and involvement in the meal, such as chopping, combining and heating ingredients to produce a sauce.

I might buy something like these lamb kebabs which if you buy all the component ingredients that are pre-prepared it's not like – I like to think it's like the next step up from a ready-meal, if you like... So it's not like a meal out of a pot ready, all-in-one. It's a meal that you've put together but it's really convenient... UK Participant 2, female.

5.4.2 Meanings and values of 'home cooking'

Throughout the cross-country sample, participants differentiated 'home cooking' as a distinct subtype of cooking at home, with unique properties. Three key overlapping themes emerged, which were consistent between participants from both the UK and US: cooking from scratch, demonstration of love and care, and nostalgia. These are presented in turn below, supported by participant quotations.

Cooking 'from scratch'

Many participants described 'home cooking' as cooking 'from scratch' using basic ingredients that were raw or otherwise not processed. This definition of 'home cooking' excluded many convenience foods and ready-made products, though appeared to include widely used time-saving ingredients, such as dried pasta and tinned tomatoes. By focusing on the concept of cooking from scratch as the key principle of 'home cooking', emphasis was placed on the knowledge and technical skills required, and the creativity involved in producing composite meals from basic components. Many participants considered that other types of cooking at home also often included raw ingredients, but that these other types could incorporate convenience foods too. Thus 'home cooking' was a special subcategory, undertaken from scratch using basic ingredients only.

To me home cooking means making something from scratch rather than from a pre-prepared item. For example I don't think that if I buy a Pillsbury crust [frozen pastry] that I bring home and thaw and roll out, to me that's not home cooking because I could have made the crust [pastry] from scratch. US Participant 46, male.

Make it from scratch and start on it from fresh fruit and vegetables or whatever you're doing and you make it yourself. Rather than buying it and warming it up you make it yourself... UK Participant 12, female.

Preparing from scratch. So not convenience food, and not ready made chicken cooked from frozen, it's like buying fresh stuff, cooking it from scratch. UK Participant 11, female.

Demonstration of love and care

Participants also highlighted the meaning of 'home cooking' as a demonstration of love and care. In this context, producing a home cooked meal was often an opportunity to fulfil a duty or desire to care for dependents or loved ones, and involved enacting the role of a provider. This description linked with the concept of preparing a meal from scratch, by identifying the personal effort inherently involved in 'home cooking', and hence the potential to

demonstrate love and appreciation for others through the preparation of a home cooked meal.

Home cooking? It's almost one of those warming kind of expressions, isn't it?... You think of mum, you think of a farmer's wife... It kind of engenders that kind of feeling about it... And, of course, you see that kind of thing outside pubs, don't you?... It kind of pulls you in, home cooked. It's not saying it was made in a factory or processes. There's love gone into it... So, to me that's what that suggests... But yeah, yeah, it's all that kind of warm, loving, tender, thoughtful preparation of food. UK Participant 3, male.

And also the other ingredient about home cooking is the love because it's something about knowing that somebody took two hours to make this from scratch, winter soup with fresh garlic and you have to do the eggplant [aubergine] first and then you cook it with the other ingredients and it takes so long. One time I made a homemade soup for my pastor. And my pastor's wife's comment was, "Oh my goodness, Sister, you can taste the love in it". US Participant 1, female.

You got to put your heart into it. Because when you [are] cooking a home cooked meal, you put love into it. You've seen people roll biscuits [baked goods, similar to scones] and how they shape them and how they want them to all look the same. They are like when you do a meatloaf you got to toss that thing and pat it. You got to put your heart into it. US Participant 40, male.

...I know she put love and time and energy into that so I guess I still feel like that's home made even if it has a different – it clearly has a different nutritional value. It clearly has a very different cooking style but I think it's the love and the effort that went into it. US Participant 33, female.

Nostalgia

A third theme that emerged from participants' responses associated 'home cooking' with nostalgia. Here, participants' previous personal experiences shaped their understanding of

the nature of 'home cooking'. Meals cooked at home in childhood or earlier in life were often recalled with fondness. Favourite meals or those frequently provided by a caregiver were often cited as typical examples of home cooked meals. 'Home cooking' associated with nostalgia also often appeared to determine the type of cooking practices and meals that participants ideally desired to emulate themselves.

Yeah. I think it would probably be an image of what my mum would do... When I was growing up... And that was always a meal from scratch... We very rarely had anything like oven chips or pizza unless it was like a weekend treat. So it would normally be things like – it would always be like your typical kind of meat and two veg... UK Participant 2, female.

Like mince and dumplings and things... It makes me think of what your Nana [grandmother] would cook. UK Participant 10, female.

Now nobody whip up pancakes no more like they used to – put them on the frying pan, flip them up... Everything now comes quick. That's not home cooked. It might be cooked at home but it's not home cooked. US Participant 25, male.

Across all these three themes of: cooking from scratch, demonstration of love and care, and nostalgia, 'home cooking' was perceived as more time and energy intensive, and sometimes more difficult, than other types of cooking at home, and not necessarily always achievable on a daily basis. 'Home cooking' was also highly valued and seen as socially desirable. For participants from both the UK and US, 'home cooking' was closely tied to cultural identity and traditions, and relationships with family and friends.

It's like a culture, like my own culture, home cooking my own food from back home where I come from... UK Participant 13, female.

That's home cooking to me, doing it with your friends and family. UK Participant 14, female.

Whilst it was important for some participants that their definition of 'home cooking' included preparing meals from scratch or using basic ingredients, the strong emotional, social and cultural values of 'home cooking' were qualities that also differentiated it from other types of cooking at home.

5.4.3 'Home cooking' and health

In both the UK and US, perceptions of 'home cooking' usually had little association with eating healthily and promoting health. Although cooking at home more generally may be used as a strategy to control one's diet and attempt to eat more healthfully (34), participants did not here make a similar connection with the specific concept of 'home cooking'. Rather, participants tended to define 'home cooking' in terms of the involvement of basic ingredients, level of personal effort, and reminiscence of meals with emotional and cultural significance in times gone by.

The dishes that participants described creating through 'home cooking' were often hearty, traditional meals, such as mince and dumplings, a roast chicken dinner, and rice pudding in the UK, or macaroni and cheese, fried chicken and potato salad in the US. These meal types and associated cooking practices were culturally influenced by Northern European heritage, whereas current recommendations for healthy eating tend to be based on Southern European traditions, such as the Mediterranean diet (310). Contemporary developments in the food system have greatly increased the breadth of dietary options available internationally (311). However, a diet based on dishes described as home cooked would be unlikely to satisfy dietary recommendations for the avoidance of NCDs (312). Such meals would be more akin to the notion of tasty, filling, 'comfort' foods.

Many participants described pleasure in cooking a meal for others, and a sense of satisfaction in creating a dish from basic ingredients. They felt that 'home cooking' was important for fostering strong and loving personal connections. Participants stated:

So in the house, as long as I've cooked the main meal, you feel comfortable because you can have anybody sit and have a meal with you. UK Participant 7, female.

I love home cooked food. I came from a family that [were] from the south, North Carolina, South Carolina, Virginia. I ate the gamut of foods, rice, potatoes, whatever. And I like for my food to taste like it was cooked with just a little bit of love going in that gravy, going over them potatoes. It has a certain taste. US Participant 9, female.

The main potential benefits associated with 'home cooking' were generally based on social, cultural, and emotional gains, and occasionally with dietary advantages derived from using raw foods or traditional cooking techniques that were not reliant on highly processed ingredients. Participants' accounts of 'home cooking' were often associated with positive memories, happiness and with overall wellbeing.

I love baking my cakes... More so if I've got...if I've just got my girls in, weekend... Because it involves them, you see. UK Participant 12, female.

There were few perceptions of 'home cooking' directly related to more clinical concepts of dietary quality and health, such as this participant's view:

To me, what defines home cooking is that you put all of the ingredients in it and the main thing is it's not pre-packaged, pre-prepared or preserved because the stuff that they're adding to food now to increase the shelf life, the high fructose corn syrup... and like she said, even what makes the frozen foods last so long is they add a lot of sodium to it. You don't have that extra stuff going into your diet. You know what you have in it. It's fresh.... And I think that helps even your health because everything affects your health, your mood, the way you feel. I think home cooking is an important necessary ingredient for healthy living. US Participant 1, female.

5.5 Discussion

5.5.1 Main findings

Qualitative data from combined UK interviews and US focus groups investigating cooking at home showed that perceptions of cooking varied between individual participants, though did not appear to differ systematically by country or sociodemographic group. Participants

expressed different views on the acceptability of including processed ingredients or convenience products in cooking at home. In both the UK and US, 'home cooking' was identified as a distinct subtype within the category of cooking at home more generally. Three key themes concerning the meanings and values inherent in 'home cooking' were identified, namely cooking from scratch, demonstration of love and care, and nostalgia. These provided additional insights for exploring potential relationships between cooking, diet and health. The concept of 'home cooking' did not closely align with general principles of healthy eating, and a diet based on traditional meals of Northern European heritage created through 'home cooking' would be unlikely to meet dietary recommendations for the avoidance of NCDs (312).

5.5.2 Strengths and limitations

This study benefits from a number of strengths. This was a novel study design, using qualitative cross-country data to focus specifically on 'home cooking' as a subcategory of cooking at home. The few previous international comparative studies of cooking have largely been quantitative, and addressed for example time spent on cooking (147), attitudes to food and the role of food (313), domestic cooking habits in general (221), and overall meal patterns and cooking practices (271). The UK and US data analysed here were collected using topic guides with open-ended questions, which were updated and revised as the research progressed, and through further probing of emerging ideas and concepts. The process is therefore likely to have been comprehensive, producing in-depth data on cooking at home. The Framework Approach (287) was used to systematically compare and contrast participants' perspectives, and to iteratively analyse the overarching themes from the merged UK and US datasets, thereby enabling detailed exploration of key findings.

However, the research is also subject to limitations. The combined qualitative data sample was drawn from two separate populations, using different data collection methods. Interviews and focus groups tend to have distinct aims with regards to participant interaction and reaching consensus (272), which could have affected the subsequent integration of data from these two sources. The range of opinions expressed regarding 'home cooking' may have been partly attributable to the diversity of participants involved. This study did not specifically seek to identify differences in perceptions of 'home cooking'

according to participant demographics; however the descriptions of the interviews provided in Chapter four, and the focus groups as published previously (49) (see Appendix L), indicated that systematic differences were not observed in terms of perceptions of cooking more generally. Data analysis in this study required data merging, which created an extra analysis step, with associated additional potential for introduction of researcher bias. Nonetheless, at all stages of the research, I endeavoured to ensure reflexivity and confront any prior biases and assumptions brought to the study, by checking my interpretation of themes with Dr Julia Wolfson and my PhD supervisors, and considering the emergent findings in the context of existing related literature.

In common with the majority of qualitative research studies, the findings presented here were generated from a relatively small number of participants and may not necessarily be more widely generalisable. In particular, the nature of cooking at home, and meanings and values attached to associated terminology, are likely to differ from those in less developed countries with more traditional cooking cultures. Nevertheless, the concordance in themes between participants in both the UK and US, and support for findings from previous studies, suggest that the key concepts identified here are likely to be transferable to other similar population groups, especially those of Northern European heritage.

5.5.3 Interpretation and implications

The overall evidence to date indicates that cooking at home more generally may be associated with diet, health and social benefits (273). However, cooking behaviour is complex and varied (52, 82, 163), exhibiting a spectrum from heating up food in a microwave, to producing elaborate meals from raw ingredients (49). These practices are likely to span a range of healthfulness, determined for example by the ingredients involved and food preparation methods used. The findings from this study suggest that the specific concept of 'home cooking' may fall towards the less healthy end of this cooking continuum.

The emergence of 'home cooking' as a discrete concept within the overarching category of cooking at home indicates that there may be a range of cooking subcategories, with varying implications for diet and health. It is therefore important that researchers, policy makers and practitioners employ cooking terminology judiciously, and in particular avoid

interchangeable use of the terms 'home cooking', and 'cooking at home' more generally. For this reason, I refer to 'cooking at home', rather than 'home cooking' for the remaining chapters six to nine of this thesis.

The results presented here suggest that promoting the specific concept of 'home cooking' as part of public health initiatives may not be advisable from a solely dietary perspective, given widespread perceptions of the term, and divergence from principles of healthy eating. Findings from the qualitative work described in Chapter four indicated that both investment of time and effort, and enjoyment of cooking at home, were not ubiquitous, and therefore advocating for 'home cooking' as commonly perceived might not resonate with everybody.

However, potential social advantages of 'home cooking' were also described by research participants, which support those noted in Chapter four. Participants in this study described demonstrating love and care for others through 'home cooking', and reflected on pleasurable home cooked meals shared with family and friends in the past. 'Home cooking' could therefore offer benefits in terms of mental health and wellbeing, consistent with prior work underscoring the potential social and emotional merits of sharing a meal with others, particularly in the family setting (314-316). Additionally, putative gains for diet and health derived from cooking at home in general have been identified, as presented in the systematic review in Chapter three (273).

Despite the caveats identified around potential diet and health implications of 'home cooking', the broader concept of cooking at home remains integral to most people's dietary patterns. Cooking from basic ingredients has to a certain extent been declining in high income countries in recent years (25, 26), but nonetheless surveys indicate that the majority of the population in the UK (110) and US (231) still regularly eat meals cooked at home. Cooking therefore cannot be ignored in relation to public health, and campaigns frequently refer to the specific concept of 'home cooking' (317). Overall, the findings presented here suggest that public health initiatives to tackle diet-related NCDs may involve the promotion of cooking at home as a strategy offering potential diet, health and social benefits. However, such messages should advocate clearly and carefully, to avoid conflation with the less healthful specific connotations of 'home cooking'. Training is also likely to be required to

develop associated food literacy, described as ‘the tools needed for a healthy lifelong relationship with food’ (126, p. 54).

As noted in the background to this thesis, and throughout subsequent chapters, further clarity is needed in definitions and terminology around cooking at home and meals from out of home sources. This study adds weight to the hypothesis that the mixed evidence base regarding associations between cooking at home and potential diet, health and social advantages may be at least partially attributable to poor conceptualisation and ambiguous terminology. If ‘home cooking’ as a distinct concept confers less healthful implications than cooking at home more generally, failure to discriminate between the two may lead to dilution of any potential benefits from cooking at home more broadly.

5.5.4 Further research

To my knowledge, this is the first study to directly elicit and describe differences between the specific meanings and values inherent in ‘home cooking’, and those associated with cooking at home more generally. Although this research used evidence from two high income countries to identify strong similarities between concepts of ‘home cooking’ in different cultural contexts, and between participants with varied sociodemographic backgrounds, clarifying whether these concepts differ systematically according to different participant characteristics offers an important area for further exploration.

This study builds upon previous evidence indicating that cooking food at home is not one single process or entity, but rather spans several continua of perceptions, behaviours, and consequent implications for health (49, 56, 273). Therefore cooking research is not likely to be addressed satisfactorily through simple quantitative ‘tick-box’ style data collection. Lack of clarity in research studies, without adequate explanation of key terms and/or capacity to capture varied perceptions and practices, is liable to lead to varied and potentially invalid findings. More detailed quantitative studies are required, alongside further qualitative research, particularly to establish which aspects of cooking at home are perceived as, and indeed actually are, associated with healthy eating, in order that these can be advocated through public health promotion initiatives.

This research did not specifically seek to investigate whether any other subtypes of cooking exist within cooking at home more generally. Further insight into the presence or absence of such subtypes, and their associated terminology, characteristics, and implications for health, is likely to prove valuable.

Findings from this study highlighting 'home cooking' as a means of showing love and care to other people, particular family and friends, suggest that preparing and sharing home cooked meals may foster improved mental health and wellbeing. In line with this, participants were nostalgic for home cooked meals eaten at an earlier stage in life, particularly childhood, and frequently remembered these with pleasure. This supports findings identified in Chapter four, indicating that cooking helped to facilitate bonding between families and friends. Previous studies have associated frequent shared meals with healthful dietary intake patterns and decreased risk of a range of practices such as unhealthy weight control, substance use and suicidal involvement (318-321). Therefore, there is a need for further research exploring whether preparing and consuming home cooked meals may also lead to benefits for mental health and wellbeing, and the relative balance with any potential negative impact on diet and physical health.

5.6 Conclusion

This cross-country study combined qualitative data from the UK and US, highlighting 'home cooking' as a concept distinct from cooking at home more generally. Three key emergent themes regarding the meanings and values associated with 'home cooking' were identified: cooking 'from scratch' using basic ingredients, demonstration of love and care, and nostalgia. These suggest that interpretations of 'home cooking' are not necessarily aligned with principles of healthy eating. Given that cooking at home more generally plays a fundamental role in societal eating patterns, and may offer diet, health and social benefits, public health initiatives will continue to promote cooking at home. However, this should be undertaken judiciously, avoiding conflation with less healthful connotations of the specific concept of 'home cooking'. Further research exploring definitions, perceptions and experiences associated with different potential subtypes of cooking at home is required.

5.7 Link to other chapters

- This work met the need identified in chapters three and four, for additional in-depth qualitative research exploring perceptions of cooking at home.
- This chapter addressed the lack of consensus around definitions and terminology for cooking at home, raised in chapters three and four. This is pursued further in the discussion in Chapter nine.
- Chapter four noted that the small sample of UK interview participants, recruited from a single geographical area, could potentially limit wider generalisability of the findings. This chapter combined participant samples from the UK and US to replicate the individuality and multifaceted nature of cooking recognised in Chapter four.
- The complexity of relationships between cooking, diet and health was apparent in this chapter. These relationships are explored further through the quantitative cross-sectional data analysis in Chapter six.
- This chapter identified the importance of careful framing of public health promotion messages regarding cooking at home. This is considered further in the discussion presented in Chapter nine, in the context of implications for public health policy makers, researchers and practitioners.

Chapter 6. Frequency of eating meals cooked at home and potential benefits for diet and health: cross-sectional analysis of a population-based cohort study

A shorter version of this chapter has been published as: Mills, S., Brown, H., Wrieden, W., White, M., and Adams, J. (2017) 'Frequency of eating home cooked meals and potential benefits for diet and health: cross-sectional analysis of a population-based cohort study', *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), p. 109.

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6.1 Abstract

Introduction

Studies investigating potential associations between preparing and eating food cooked at home, and both diet and health, have produced mixed results. Most previous research has focused on preparing, rather than eating, food cooked at home; used small, non-population based samples; and studied markers of nutrient intake, rather than overall diet quality or health. This study aimed to assess whether the frequency of consuming meals cooked at home is cross-sectionally associated with diet quality and cardio-metabolic health.

Methods

Baseline data from a United Kingdom population-based cohort study of adults aged 29 to 64 years (n=11,396) were used for analyses. Participants self-reported their frequency of consuming main meals cooked at home. Diet quality was assessed using plasma vitamin C, and the Mediterranean Diet Score, Dietary Approaches to Stop Hypertension (DASH) score, and fruit and vegetable intakes, all calculated from a 130-item food frequency questionnaire. Markers of cardio-metabolic health were researcher-measured body mass index (BMI), percentage body fat, haemoglobin A_{1c} (HbA_{1c}), serum cholesterol and hypertension. Differences across the three exposure categories of frequency of consuming main meals cooked at home were assessed using linear regression (diet variables) and logistic regression (health variables).

Results

Eating meals cooked at home more frequently was significantly associated with greater adherence to DASH and Mediterranean diets, greater fruit and vegetable intakes and higher plasma vitamin C, in adjusted models. For example, those eating meals cooked at home more than five times, compared with less than three times, per week consumed 62.3 grams more fruit (99% CI 43.2 to 81.5) and 97.8 grams more vegetables (99% CI 84.4 to 111.2) daily. More frequent consumption of meals cooked at home was significantly associated with greater likelihood of having normal range BMI and normal percentage body fat. Those consuming meals cooked at home more than five times, compared with less than three times, per week were 28% less likely to have an overweight BMI (99% CI 8 to 43%), and 24% less likely to have excess percentage body fat (99% CI 5 to 40%). Associations with HbA_{1c}, cholesterol ratio and hypertension were not significant in adjusted models.

Conclusion

In a large population-based cohort study, eating meals cooked at home more frequently was associated with better dietary quality and lower adiposity. Further prospective research is required to identify whether consumption of meals cooked at home has causal effects on diet and health, and how to support this at individual and population levels.

6.2 Introduction

Studies exploring the potential benefits of preparing and eating meals cooked at home, primarily cross-sectional in design, have identified associations with consuming a healthier diet (34, 239, 242) and gains for health and longevity (35, 36, 198). However, to date the evidence base has been somewhat mixed and shown methodological limitations (273). Many studies have been small in size, with associated limited scope to identify significant associations (197, 233), and research outcomes have often been focused on specific dietary indicators, rather than overall diet quality or health (238, 239). Studies have also frequently been limited to a specific geographical area (64, 238) and/or restricted to population subgroups, by for example age (35) or ethnicity (198).

In addition, the majority of studies in the field have investigated cooking and food preparation practices as an exposure, rather than the consumption itself of food cooked at

home. Since eating food is more proximal to potential diet and health outcomes, focusing on behaviour upstream may be more likely to introduce confounding, for example regarding gender – given that more women than men engage in food preparation (26), and women tend to have healthier diets (322). Of key primary interest, therefore, is establishing whether consuming meals cooked at home is associated with benefits to diet and health, and subsequently investigating who eats meals cooked at home, who prepares these meals, and why.

Despite the fact that the evidence base regarding relationships between cooking and both diet and diet-related NCDs remains somewhat varied and uncertain, the promotion of cooking at home features in public health strategies to improve diets and reduce obesity and diet-related NCDs, in the UK and internationally (33, 269). Further research is therefore needed to investigate the associations between consumption of meals cooked at home and potential diet and health outcomes. This study aimed to assess whether the frequency of eating meals cooked at home is cross-sectionally associated with indicators of diet quality and cardio-metabolic status.

6.3 Methods

6.3.1 Data source

The Fenland Study is a population-based cohort study conducted by the Medical Research Council Epidemiology Unit at the University of Cambridge, investigating interactions between genetic and lifestyle factors in determining obesity and diabetes. The study recruited adults born between 1950 and 1975 from general practice lists in Cambridgeshire, United Kingdom (UK), between 2005 and 2015, with approximate response rate of 27% (323). Participants were invited to attend one of three clinical sites in Cambridgeshire to take part in a detailed assessment. These sites were: the Princess of Wales Hospital, Ely; the North Cambridgeshire Hospital, Wisbech; and the Institute of Metabolic Science, Cambridge. A total of 12,434 participants undertook baseline assessment, which involved a range of clinical, biological and anthropometric measurements, and completion of questionnaires. The data collection tools are available online (324).

Study exclusion criteria included previously diagnosed diabetes, psychosis, terminal illness, pregnancy, and inability to walk unaided. The Fenland study was approved by the Health Research Authority National Research Ethics Service Committee – East of England Cambridge Central, reference 04/Q0108/19 – and performed in accordance with the Declaration of Helsinki. All participants provided written informed consent to participate in the study.

Data from the Fenland study were used to conduct the analyses described in chapters six and seven. I developed a data analysis plan with my PhD supervisors, which was presented to the PhD Patient and Public Involvement (PPI) panel, and feedback received on the basis of discussions was integrated into the final research strategy. I obtained the Fenland data by submitting a data request to the MRC Epidemiology Unit, which was subsequently approved. The analyses undertaken are reported here according to the STROBE-nut guidelines (325) (see Appendix N).

6.3.2 Frequency of consuming meals cooked at home

Exposure was derived from an item in the participant questionnaire: ‘When eating your main meal at home, how often do you usually eat home cooked meals?’ Response categories were: never or rarely; one to two times per week; three to five times per week; or more than five times per week. The first two response categories were collapsed to yield appropriate numbers for statistical analysis, as undertaken previously (326), giving a three category variable: less than three times per week, three to five times per week, and more than five times per week.

6.3.3 Indicators of diet quality

A range of dietary outcome variables were assessed, namely Mediterranean Diet Score (MDS) (327), Dietary Approaches to Stop Hypertension (DASH) score (328), plasma vitamin C, and fruit and vegetable intakes. These variables were part of the dataset that I received from the MRC Epidemiology Unit, and I did not derive the composite dietary scores myself.

Participants completed a 130-item, semi-quantitative food frequency questionnaire (FFQ) for their food intake over the previous year, by recording frequency of foods and beverages consumed, in order to assess habitual consumption (329). The FFQ prompted participants to

state their frequency of consumption using a nine-point scale from 'never/once a month' to 'more than six times a day', of a 'medium serving'. Participants also answered additional questions on breakfast cereal, milk and fat used for frying and baking. This method has been shown to yield valid and reproducible food intake assessments, and has been validated previously in the European Prospective Investigation of Cancer and Nutrition (EPIC) studies (330).

The FFQ EPIC Tool for Analysis was used to convert food intake frequency to energy, nutrient and food intakes (331). Total daily intake was provided in grams for carbohydrate, fibre, fat, saturated fat, sugar, protein, fruit, vegetables and alcohol. Total daily sodium intake was measured in milligrams, and total daily energy intake in kilojoules. Data on dietary supplements were not collected.

Approaches to address the distribution of dietary intake values and their deviation from normality were considered. The values could have been split into quintiles (or smaller groupings) for analyses undertaken (332); however, this approach obscures data variation within the quintiles, and limits the statistical methods appropriate for subsequent analyses. Extreme values at the top or bottom of the distributions might also have been excluded, on the basis that they were implausible and therefore probably erroneous; however, assessing plausibility is often subjective and may not necessarily accurately identify outliers (333). Furthermore, in order to ensure a systematic process this approach would need to be applied to all the variables, which could lead to over-correction. Therefore dietary intake values were Winsorized at 1st and 99th percentiles, by replacing the smallest and largest 1% of values in the distribution with the observations closest to them (334). This was undertaken to account for their positively skewed distribution, and the limitations of the FFQ as a tool to collect precise data on dietary intake (335-337).

The consumption of a more DASH accordant diet is associated with health gains, particularly in terms of cardio-metabolic risk (338-340). For example, more DASH accordant dietary patterns have demonstrated health benefits through randomised trials, in terms of lowering blood pressure in hypertensive and pre-hypertensive participants (341, 342), and through observational studies, in terms of reduced risk of type II diabetes (338) and colorectal

cancer (343), decreased weight gain (339), reduced incidence of stroke (328), heart failure (344), and fatal cardiovascular disease in general (340).

The DASH diet assumes that beneficial impact is derived from the overall diet, rather than individual foods or nutrients playing important roles (345). A DASH score was computed from each participant's dietary intake using the method developed by Fung et al (328). This index includes eight components (one nutrient and seven food groups) based on eating guidance from the United States (US) National Heart, Lung and Blood Institute (346). Scoring is established through quintile rankings, on the basis of relative comparisons with the rest of the sample, with men and women classified separately. Participants are allocated a score from one (lowest quintile) to five (highest quintile) for energy-adjusted intake of: low-fat dairy products; whole grains; nuts, seeds and legumes; fruit (includes fruit juice); and vegetables (excludes potatoes). In contrast, for intakes of red and processed meat; sodium; and sugar-sweetened beverages, participants are allocated a score from one (highest quintile) to five (lowest quintile). Scores are then combined to give a total DASH score, ranging from a minimum of eight to a maximum of 40 points. In this study, DASH scores were standardised using the z-score, to yield a semi-continuous measure of participants' relative standing.

The Mediterranean diet refers to the traditional diet consumed in Mediterranean regions including Crete, other areas in Greece, and the south of Italy (310, 347, 348). This dietary pattern is generally considered to be low in consumption of red meats, moderate in consumption of fish, poultry, fermented dairy products and wine, and high in consumption of fruits, legumes, cereals and olive oil (310, 349). Concordance with the Mediterranean diet has been linked with positive health outcomes, including lowered overall mortality (350) and reductions in both the incidence of, and mortality from, chronic diseases such as cancer, cardiovascular disease and neurodegenerative diseases (351-355). Evidence from randomised controlled trials has also supported a health promoting role for the Mediterranean diet (356, 357).

A Mediterranean diet score (MDS) was calculated from each participant's dietary intake using sex-specific tertiles, according to relative comparisons with the rest of the sample.

Scores of zero, one or two were allocated for each of nine dietary components, including legumes; fruit and nuts; vegetables; ratio of monounsaturated and polyunsaturated fatty acids to saturated fatty acids; fish; meat products; dairy products; cereals; and alcohol (327). In order to appraise diet quality independently of quantity, dietary intakes were adjusted to a 2,000 kilocalorie/day (8.37 megajoule/day) diet using the residual method (336). This also aimed to help reduce measurement errors, since energy intake is partially associated with over-reporting and under-reporting of dietary intake (358). MDS scores were then standardised using the z-score.

Fruit and vegetable intake is promoted in recommended dietary guidelines (248, 317). Plasma vitamin C ($\mu\text{mol/l}$) provides an objective biomarker of fruit and vegetable consumption (359). Fasting venous blood samples drawn into heparin-containing tubes and stabilised using metaphosphoric acid (10%) were measured for plasma vitamin C levels by fluorometric assay within two months, as undertaken previously (360).

6.3.4 Markers of cardio-metabolic health

Body mass index (BMI), percentage body fat, haemoglobin A_{1c} (HbA_{1c}), serum cholesterol and hypertension were used as indicators of cardio-metabolic health.

Elevated total serum cholesterol and low levels of high density lipoprotein cholesterol (HDL) are associated with increased risk of cardiovascular disease (361), and the derived ratio of total serum cholesterol to HDL is used in the QRISK2 model to estimate risk of cardiovascular disease over the next ten years (362). HDL and total serum cholesterol were measured in mmol/l in fasting venous blood samples, and the ratio of total serum cholesterol to HDL calculated for analysis. In line with UK guidance, a ratio of 4.0 or greater was used to indicate higher risks to cardio-metabolic health (363).

Excess body fat and raised BMI have been associated with increased risk of various NCDs (364). Height and weight were measured at the clinical sites by trained observers, with participants wearing light clothing and barefoot. Height was measured to the nearest 0.1 cm using a wall-mounted calibrated stadiometer (SECA 240, Birmingham, UK). Weight was measured to the nearest 0.1 kg with a calibrated electronic scale (TANITA, BC-418MA, Tokyo,

Japan). BMI was derived as weight (kg) divided by height (m²). Dual-energy X-ray absorptiometry (DEXA; Lunar Prodigy Advance fan beam scanner (GE Healthcare)) was used to assess body composition, and has been described in detail elsewhere (323). A three-compartment model (fat mass, fat-free mass and bone mineral mass) was used to estimate percentage total body fat. In line with international guidance, overweight was defined as BMI 25 kg/m² and above (365), and excess percentage body fat as 25% and over for males and 38% and over for females (366).

Haemoglobin A_{1c} (HbA_{1c}) has previously been used to assess risk of developing type II diabetes (367). Participants' HbA_{1c} was measured on entry to the study from fasting venous blood samples, in either mmol/mol or as a percentage. A conversion algorithm was used to convert all measurements to mmol/mol, and in accordance with international guidance (367), a level of 42.00 mmol/mol (6.0%) or higher was used to indicate increased risk of type II diabetes.

Hypertension is associated with an elevated risk of developing cardiovascular disease (368). Using an upper arm cuff and automated oscillometric device, three sets of diastolic and systolic blood pressure measurements were performed on each participant. The first readings were discarded and the lowest systolic and lowest diastolic readings from the last two readings were used for assessment. In adherence to UK guidance (369), readings of at least 90 mmHg diastolic and 140 mmHg systolic were considered indicative of hypertension. Participants currently taking hypotensive medication, or self-reporting a diagnosis of hypertension from a clinician, were also classified as hypertensive.

6.3.5 Covariates

In view of the current evidence base regarding factors influencing dietary intake (370), demographic and behavioural variables including sex, age, smoking status (current/ex-smoker or never smoker), and first degree family history of relevant diseases such as type II diabetes were obtained from a self-administered questionnaire. Participants were asked whether or not they had been employed in the past four weeks, and those answering yes were identified as currently working. Participants working more than 48 hours in any one of the previous four weeks were identified as working overtime, in accordance with parameters

from the European working time directive (371). Socioeconomic status was assessed using age at leaving full-time education, as undertaken previously (372), which was divided into three categories: education up to age 16 years (compulsory education); over 16 and up to 18 years (post-compulsory school education); and over 18 years (higher education).

Physical activity was measured objectively using an integrated movement and heart rate sensor (Actiheart; CamNtech, Cambridge, UK) attached to the chest via two standard ECG electrodes and worn during free-living over six days (373). A ramped treadmill protocol test was used to individually calibrate heart rate, as undertaken previously (374). Monitoring data were cleaned for measurement issues and sensor wear time was specified as at least 48 hours, although data were not necessarily spread over a full 24 hour period. Periods of non-wear were inferred from the combination of non-physiological heart rate and prolonged periods of inactivity, which were taken into account to minimise diurnal information bias when summarising the intensity time-series. Data were processed (375) and a branched equation framework (376) used for modelling to estimate intensity time series. These were collated over time to yield daily physical activity energy expenditure in kJ/kg/day.

6.3.6 Analytical approach

All analyses were on a complete case basis. Thus, participants with missing data on any of the variables described were excluded. Differences in the characteristics of participants included and excluded from the analytic sample were tested using the Mann-Whitney test for continuous variables and Pearson Chi squared test for categorical variables.

The skewness and kurtosis test was used to assess normality for continuous variables. No variables were normally distributed, so population characteristics by frequency of consuming meals cooked at home were presented as medians (interquartile ranges) for continuous variables, and as numbers (percentages) for categorical variables.

Differences in covariates and markers of diet and cardio-metabolic health across the three frequency categories of consuming meals cooked at home were assessed using descriptive statistics (Kruskal-Wallis test and Pearson Chi squared test). Separate analyses were then run for each outcome variable, using linear regression for continuous diet variables and logistic

regression for binary health variables. Analyses were adjusted for covariates: sex, age, alcohol intake, smoking status, age at leaving full-time education, physical activity, working status, and overtime working, with supplementary adjustment for family history of diabetes for the outcome of HbA_{1c}. The analyses for markers of cardio-metabolic status were conducted with additional adjustment for dietary variables (MDS, DASH score, plasma vitamin C, fruit and vegetable intakes), added to the model sequentially and then together, to assess the potential health benefits of consuming meals cooked at home independent of dietary improvements. Models were run with and without additional adjustment for BMI in testing the association between frequency of consuming meals cooked at home and hypertension. A sensitivity analysis was also conducted, with the inclusion and the exclusion of participants diagnosed with hypertension by a doctor and/or receiving hypotensive medication, given the potential unreliability of participant self-reporting.

All analyses were conducted using Stata (version 14; Stata Corp.) and in view of the large number of comparisons, 99% confidence intervals (CI) were used and $p < 0.01$ used to indicate statistical significance.

6.4 Results

Participant characteristics are summarised in Table 6.1. Of 12,434 baseline participants in the Fenland study, full data were available for 11,396 (91.7% total cohort), who were included in analyses. The outcome variable with the greatest missingness was vitamin C (missing for 350 participants) and the covariate with the greatest missingness was physical activity (missing for 227 participants).

A slight majority of the included sample was female (53.3%), with median age 48.9 years. Most participants were non-smoking (88.2%), with no family history of diabetes (76.1%), median alcohol intake of 5.47g/day and physical activity energy expenditure of 51.0 kJ/kg/day. Most participants had left full-time education by 18 years of age (62.2%), were currently in work (82.8%), and did not work overtime (88.8%). There were significant differences between the included and excluded participants in terms of sex, age, smoking

status, physical activity energy expenditure, working status, and frequency of consuming meals cooked at home.

Variable ⁱ	Level	Included, n (%)	Excluded, n (%)	Statistical tests ⁱⁱ
All	N (%)	11,396 (91.65)	1,038 (8.35)	--
Sex	Male	5,321 (46.69)	422 (40.66)	$\chi^2(1) = 13.95$, $p < 0.0001$
	Female	6,075 (53.31)	616 (59.34)	
Age (years)	Median (IQR)	48.9 (42.7, 54.8)	48.0 (42.2, 53.5)	$z = -3.69$, $p = 0.0002$
Alcohol (grams/day)	Median (IQR)	5.47 (1.27, 10.72)	5.14 (0.79, 10.88)	$z = -0.94$, $p = 0.35$
Age at leaving full-time education (years)	≤16	4,570 (40.10)	362 (38.39)	$\chi^2(2) = 1.85$, $p = 0.40$
	>16 to ≤18	2,521 (22.12)	204 (21.63)	
	>18	4,305 (37.78)	377 (39.98)	
Smoker	No	10,045 (88.14)	742 (83.75)	$\chi^2(1) = 14.87$, $p < 0.0001$
	Yes	1,351 (11.86)	144 (16.25)	
Family history of diabetes ⁱⁱⁱ	No	8,677 (76.14)	798 (76.88)	$\chi^2(1) = 0.29$, $p = 0.59$
	Yes	2,719 (23.86)	240 (23.12)	
Physical activity (kJ ^{iv} /kg ^v /day)	Median (IQR)	51.00 (37.84, 66.75)	48.25 (34.45, 64.61)	$z = -3.70$, $p = 0.0002$
Working in past 4 weeks	No	1,959 (17.19)	217 (20.91)	$\chi^2(1) = 9.10$, $p = 0.003$
	Yes	9,437 (82.81)	821 (79.09)	
Overtime work (>48 hours/week)	No	10,116 (88.77)	896 (89.60)	$\chi^2(1) = 0.64$, $p = 0.42$
	Yes	1,280 (11.23)	104 (10.40)	
Home cooked meal consumption	<3x/week	704 (6.18)	79 (7.79)	$\chi^2(2) = 10.10$, $p = 0.006$
	3-5x/week	3,688 (32.36)	360 (35.50)	
	>5x/week	7,004 (61.46)	575 (56.71)	

Table 6.1 Characteristics of Fenland study participants included and excluded from analyses.

ⁱ Results shown as number (column percentage). Median (inter-quartile range) shown for: age, alcohol, physical activity

ⁱⁱ Testing for significant differences between included and excluded populations using Mann-Whitney test with z-scores for continuous variables, and Pearson Chi squared test (degrees of freedom) with p values for categorical variables. Significance at 1% level

ⁱⁱⁱ History of diabetes in first degree relative

^{iv} kj = kilojoules

^v kg = kilograms

Table 6.2 shows that 6.2% of included participants consumed meals cooked at home as their main meal less than three times per week, 32.4% consumed these three to five times per week, and 61.5% consumed these more than five times per week. Participants who ate meals cooked at home more frequently tended to be female, older, non-smokers, not currently in work, working fewer hours and not working overtime, older at leaving full-time education, with greater daily alcohol intake. These associations were all statistically significant at $p < 0.01$. Participants who consumed meals cooked at home more frequently generally had higher plasma vitamin C, higher fruit and vegetable intakes, and higher MDS and DASH scores. They were also less likely to have an overweight BMI, excess percentage body fat, high risk cholesterol ratio, or to be at risk of developing diabetes according to HbA_{1c} level.

Covariate ⁱ		Consumption of home cooked main meals			
		Total n = 11,396 (100.00%)	<3x/week n = 704 (6.18%)	3-5x/week n = 3,688 (32.36%)	>5x/week n = 7,004 (61.46%)
Sex	Male	5,321	389 (7.31)	1,914 (35.97)	3,018 (56.72)
	Female	6,075	315 (5.19)	1,774 (29.20)	3,986 (65.61)
Age (years)	Median (IQR)	48.9 (42.7, 54.8)	47.1 (41.7, 53.3)	48.3 (42.2, 53.9)	49.5 (43.1, 55.3)
Alcohol (grams/day)	Median (IQR)	5.47 (1.27, 10.72)	3.90 (0.76, 9.56)	5.47 (1.30, 10.56)	5.47 (1.27, 10.88)
Age at leaving full-time education (years)	≤16	4,570	351 (7.68)	1,709 (37.40)	2,510 (54.92)
	>16 to ≤18	2,521	148 (5.87)	839 (33.28)	1,534 (60.85)
	>18	4,305	205 (4.76)	1,140 (26.48)	2,960 (68.76)
Smoker	No	10,045	569 (5.66)	3,133 (31.19)	6,343 (63.15)
	Yes	1,351	135 (9.99)	555 (41.08)	661 (48.93)
Family History of diabetes ⁱⁱ	No	8,677	535 (6.17)	2,796 (32.22)	5,346 (61.61)
	Yes	2,719	169 (6.22)	892 (32.81)	1,658 (60.98)
Physical activity (kJ ⁱⁱⁱ /kg ^{iv} /day)	Median (IQR)	51.00 (37.84, 66.75)	49.64 (35.82, 65.82)	51.57 (38.22, 67.64)	50.89 (37.88, 66.27)
Working in past 4 weeks	No	1,959	118 (6.02)	563 (28.74)	1,278 (65.24)
	Yes	9,437	586 (6.21)	3,125 (33.11)	5,726 (60.68)
Average working hours	Median (IQR)	33.0 (14.0, 40.0)	37.0 (20.0, 43.7)	35.0 (17.5, 41.0)	30.0 (12.0, 40.0)
Overtime work (>48 hours/week)	No	10,116	592 (5.85)	3,243 (32.06)	6,281 (62.09)
	Yes	1,280	112 (8.75)	445 (34.77)	723 (56.48)
Outcome ⁱ					

ⁱ Results shown as number (row percentage). Median (inter-quartile range) shown for: age, alcohol, physical activity, average working hours, vitamin C, fruit intake, vegetable intake, DASH score, MDS

ⁱⁱ History of diabetes in first degree relative

ⁱⁱⁱ kj = kilojoules

^{iv} kg = kilograms

Vitamin C (umol/l)^v	Median (IQR)	69.40 (56.00, 82.00)	63.15 (44.73, 77.38)	66.80 (52.70, 80.10)	71.1 (58.5, 83.4)
Fruit intake (grams/day)	Median (IQR)	207.10 (111.61, 329.50)	142.53 (60.08, 264.19)	180.53 (93.10, 293.10)	226.83 (131.16, 353.04)
Vegetable intake (grams/day)	Median (IQR)	258.95 (188.89, 348.56)	174.41 (111.92, 257.26)	234.59 (172.55, 310.33)	280.56 (209.53, 375.83)
DASH score^{vi}	Median (IQR)	24 (21, 27)	22 (19, 25)	23 (20, 26)	25 (22, 28)
MDS^{vii}	Median (IQR)	9 (7,11)	7 (6, 10)	8 (6, 10)	10 (7, 11)
Excess body fat (≥25% men; ≥38% women)	No	4,831	246 (5.09)	1,399 (28.96)	3,186 (65.95)
	Yes	6,565	458 (6.98)	2,289 (34.87)	3,818 (58.16)
Overweight BMI^{viii} (≥25.0)	No	4,384	211 (4.81)	1,290 (29.43)	2,883 (65.76)
	Yes	7,012	493 (7.03)	2,398 (34.20)	4,121 (58.77)
High cholesterol ratio (≥4.0)	No	7,234	400 (5.53)	2,209 (30.54)	4,625 (63.93)
	Yes	4,162	304 (7.30)	1,479 (35.54)	2,379 (57.16)
High HbA_{1c}^{ix} (≥42.00)	No	10,207	608 (5.96)	3,265 (31.99)	6,334 (62.06)
	Yes	1,189	96 (8.07)	423 (35.58)	670 (56.35)
Hypertension	No	8,561	516 (6.03)	2,761 (32.25)	5,283 (61.72)
	Yes	2,836	188 (6.63)	927 (32.69)	1,721 (60.68)

Table 6.2 Characteristics of participants overall and by frequency of consuming meals cooked at home.

^v umol/l = micromole/litre

^{vi} DASH = Dietary Approaches to Stop Hypertension

^{vii} MDS = Mediterranean Diet Score

^{viii} BMI = body mass index

^{ix} HbA_{1c} = Haemoglobin A_{1c}

Multivariate associations between frequency of consuming meals cooked at home and indicators of diet quality and cardio-metabolic status are shown in Table 6.3. In all cases, consuming meals cooked at home more frequently was significantly associated with indicators of a healthier diet, as measured by higher MDS, DASH score, plasma vitamin C, and fruit and vegetable intakes. These associations were present for both consuming meals cooked at home three to five times per week, and more than five times per week, compared with the reference of less than three times per week, and remained robust to adjustment for sociodemographic and behavioural covariates. In particular, those who consumed meals cooked at home more than five times per week consumed 62.3 grams more fruit (99% CI 43.2 to 81.5) and 97.8 grams more vegetables (99% CI 84.4 to 111.2) daily than those who consumed meals cooked at home less than three times per week. This equates to more than three-quarters of a portion of fruit, and almost one and a quarter portions of vegetables, or approximately two extra portions of fruit and vegetables per day.

Outcomes	Home cooked meals ⁱ	Unadjusted value (99% CI ⁱⁱ)	Adjusted value, model 1 ⁱⁱⁱ (99% CI ⁱⁱ)	Adjusted value, model 2 ^{iv} (99% CI ⁱⁱ)
DASH score ^v	3-5x/week	0.23 (0.13, 0.34)	0.18 (0.08, 0.28)	NA
	>5x/week	0.61 (0.51, 0.71)	0.44 (0.35, 0.54)	NA
MDS ^{vi}	3-5x/week	0.27 (0.17, 0.38)	0.23 (0.13, 0.33)	NA
	>5x/week	0.64 (0.54, 0.74)	0.52 (0.42, 0.61)	NA
Vitamin C (µmol/l ^{vii})	3-5x/week	4.50 (2.28, 6.73)	3.29 (1.18, 5.39)	NA
	>5x/week	8.95 (6.81, 11.09)	5.35 (3.31, 7.39)	NA
Fruit intake (grams/day)	3-5x/week	32.29 (12.14, 52.44)	27.17 (7.43, 46.92)	NA
	>5x/week	79.06 (59.69, 98.43)	62.33 (43.19, 81.46)	NA
Vegetable intake (grams/day)	3-5x/week	54.22 (40.06, 68.39)	50.54 (36.61, 64.29)	NA
	>5x/week	107.43 (93.81, 121.05)	97.83 (84.42, 111.24)	NA
Odds ratios for markers of cardio-metabolic status				
Cholesterol binary (high vs low risk)	3-5x/week	0.88 (0.71, 1.09)	0.96 (0.76, 1.21)	0.99 (0.78, 1.25)
	>5x/week	0.68 (0.55, 0.83)	0.87 (0.70, 1.09)	0.93 (0.74, 1.17)
BMI ^{viii} binary (over- vs normal weight)	3-5x/week	0.80 (0.63, 1.00)	0.81 (0.64, 1.02)	0.82 (0.65, 1.05)
	>5x/week	0.61 (0.49, 0.76)	0.70 (0.55, 0.88)	0.72 (0.57, 0.92)
Body fat binary (excess vs normal)	3-5x/week	0.88 (0.70, 1.10)	0.89 (0.71, 1.13)	0.92 (0.73, 1.17)
	>5x/week	0.64 (0.52, 0.80)	0.71 (0.57, 0.89)	0.76 (0.60, 0.95)
HbA _{1c} ^{ix} binary (high vs low risk)	3-5x/week	0.82 (0.60, 1.12)	0.83 (0.60, 1.15)	0.86 (0.62, 1.19)
	>5x/week	0.67 (0.50, 0.91)	0.68 (0.49, 0.93)	0.73 (0.53, 1.01)
Hypertension binary (yes vs no)	3-5x/week	0.92 (0.72, 1.17)	0.88 (0.69, 1.13)	0.89 (0.69, 1.14)
	>5x/week	0.89 (0.71, 1.13)	0.84 (0.67, 1.07)	0.86 (0.67, 1.09)

Table 6.3 Associations between frequency of consuming meals cooked at home and markers of diet and cardio-metabolic status, with reference group of low consumption frequency at less than three times per week.

ⁱ Consumption of home cooked meals as main meal at home: comparisons with low consumption (<3x/week, reference) for medium consumption (3-5x/week) and high consumption (>5x/week)

ⁱⁱ CI = 99% confidence interval

ⁱⁱⁱ Adjusted for age, sex, alcohol intake, smoking, physical activity, working status, working overtime, years of full time education (+ family history diabetes for HbA_{1c} outcome)

^{iv} Adjusted for age, sex, alcohol intake, smoking, physical activity, working status, working overtime, years of full time education, DASH score, MDS, vitamin C, fruit intake, vegetable intake (+ family history diabetes for HbA_{1c} outcome)

^v DASH = Dietary Approaches to Stop Hypertension

^{vi} MDS = Mediterranean Diet Score

^{vii} µmol/l = micromole/litre

^{viii} BMI = Body Mass Index

^{ix} HbA_{1c} = Haemoglobin A_{1c}

In terms of cardio-metabolic status, consuming meals cooked at home more than five times per week compared with the reference of less than three times per week was significantly associated with all markers except hypertension in the unadjusted models. After adjustment for sociodemographic and behavioural covariates (model 1), the association between consuming meals cooked at home more than five times per week and high risk cholesterol ratio was no longer significant. After further adjustment for dietary variables (model 2), only the associations with having a normal range BMI and lower percentage body fat remained significant. The version of model 2 including adjustment for all the dietary variables represented the best overall fit, and hence this model was used in the analyses. Such associations indicated that consuming meals cooked at home more than five times per week compared with the reference was associated with lower adiposity, independent of effects due to the aspects of diet accounted for. Those consuming meals cooked at home more than five times per week were 28% less likely to have a BMI in the overweight range (99% CI 8 to 43%), and 24% less likely to have excess percentage body fat (99% CI 5 to 40%), compared with those who consumed meals cooked at home less than three times per week. The association between frequency of consuming meals cooked at home and hypertension was not significant, with or without additional adjustment for BMI in the model, and therefore to ensure a parsimonious model the simpler version was used in analyses.

Overall, a higher frequency of consuming meals cooked at home was associated with markers of improved cardio-metabolic health, including lower risk cholesterol ratio, normal range BMI, lower percentage body fat, and lower risk of diabetes according to HbA_{1c} level.

6.5 Discussion

6.5.1 Main findings

In this study of a large population-based cohort, a higher frequency of consuming main meals cooked at home was significantly associated with indicators of a healthier diet, namely DASH score, MDS, plasma vitamin C, fruit intake and vegetable intake. Similarly, eating meals cooked at home more frequently was significantly associated with several markers of cardio-metabolic health, in particular a lower likelihood of being overweight, and lower likelihood of having excess percentage body fat. Associations between frequency of consuming meals

cooked at home and markers of cardio-metabolic health were strongest at the highest consumption frequency of eating meals more than five times per week. To my knowledge, this is the first large-scale, population-based study to address associations between the frequency of consuming meals cooked at home and indicators of both diet quality and cardio-metabolic status, and builds on the findings identified through the systematic review in Chapter three (273).

6.5.2 Strengths and limitations

The strengths and limitations associated with the Fenland study overall, and the specific analyses presented in Chapter six, are reported here. Strengths and limitations associated with the analyses presented in Chapter seven are reported in the corresponding next chapter.

The Fenland study is a large cohort, with detailed sociodemographic data, objective physical measurements and samples, and comprehensive dietary measures. Participants in this study were from the county of Cambridgeshire, which is representative of the wider population in England in terms of adult obesity and several behavioural variables, such as smoking and levels of physical activity (377).

Overall diet quality was assessed using two composite diet scores, DASH and MDS. Using two composite scores helped to reduce the impact of shortcomings associated with measurement of individual dietary components, and provided more robust evidence for the relationships between frequency of consuming meals cooked at home and diet quality. These results were supported by similar associations between frequency of eating meals cooked at home and higher fruit and vegetable intakes, as measured by both FFQ, and plasma vitamin C as an objective biomarker.

In contrast to much previous research exploring cooking at home (273), this study investigated consumption, rather than preparation, of meals cooked at home. This exposure is likely to be closer on the putative causal pathway to diet and health outcomes. Furthermore, the use of objective measurements for determining cholesterol ratio, BMI, percentage body fat, HbA_{1c} level and hypertension is likely to increase the validity of these

markers of cardio-metabolic status, and the confidence in conclusions drawn from resultant analyses. This contrasts with the use of self-reported measures in many surveys, such as for BMI, which is known to lead to more biased results (378, 379).

This research is also subject to certain limitations. The Fenland study was selected for secondary data analysis following thorough consideration of available options for investigating relationships between consumption and/or preparation of meals cooked at home and potential diet and health outcomes. Ideally, this analysis would have involved using a longitudinal dataset with increased capacity to deduce causal relationships. However, a review of survey data sources with diet and health data accessible and amenable to analysis showed that the inclusion of questions on meal preparation and consumption of food cooked at home was a key limitation. Data sources from the UK were considered for analysis: EPIC-Norfolk study (329), National Diet and Nutrition Survey (15), Low Income Diet and Nutrition Survey (179), Living Costs and Food Survey (380), Health Survey for England (381), Scottish Health Survey (382), Growing up in Scotland study (383), Newcastle Thousand Families Study (384) and the Gateshead Millennium Study (385). A number of non-UK data sources were also reviewed: National Institutes of Health (NIH) American Association of Retired Persons (AARP) Diet and Health Study (386), Iowa Women's Health Study (387), and the National Health and Nutrition Examination Survey (388).

The majority of surveys assessing dietary intake did not specifically collect data on the origin of the food consumed. For example, they might collect dietary data on individual food types using an FFQ, 24 hour recall or three day food diary, but few studies addressed where participants' meals were sourced from. Given that the Fenland study usefully includes data on consumption of main meals cooked at home, this study was chosen for analysis. The cross-sectional nature of the dataset means that direction of cause and effect cannot be established; however wave two follow-up data collection in the Fenland study is currently underway, which will enable longitudinal analyses within the next five years.

Participants were recruited to the Fenland study between the ages of 29 and 64 years, and are therefore not representative of the full UK population age range. Since food preparation practices vary with age (102), the results presented here may not necessarily be

generalisable to younger or older populations. Participants with missing data on any of the analytic variables were excluded from analyses, and these participants were systematically different from the rest of the cohort in terms of certain characteristics, as shown in Table 6.1. However, less than 10% of the original cohort sample was excluded.

With regards to dietary information, the participant data on fruit and vegetable intakes and DASH and MDS dietary scores were derived from an FFQ, which although validated, may be subject to error and biases (335-337). The composite MDS and DASH scores assessed diet quality relative to other participants, rather than establishing absolute values, and ranking groups (quintiles or tertiles) may therefore constitute a broad range of actual intake values. The exposure variable for consumption of 'home cooked meals' was derived from a questionnaire item, and given the absence of consensus on cooking terminology, discussed throughout this thesis, participants may have interpreted this question in different ways. Data were collected specifically on meals cooked and eaten at home and not those eaten elsewhere, such as packed lunches taken to work or place of study.

This study lacked details on household composition and marital status, which were identified in the systematic review in Chapter three as important influences on diet-related behaviour (273). Certain sociodemographic and behavioural variables included in these analyses, such as smoking, may have been correlated with each other, leading to risk of type II statistical errors. Although the analyses presented here were adjusted for a number of relevant potential confounding factors, residual confounding remains possible. In particular, if people who consumed meals cooked at home more frequently were also more likely to engage in other health promoting behaviours, such as adherence to prescribed medication, this could have artificially strengthened associations between increased consumption of meals cooked at home and markers of cardio-metabolic health.

6.5.3 Interpretation of findings

The findings from this study reflect those of others that have found associations between preparing and eating meals cooked at home, and higher quality diets. The systematic review described in Chapter three (273) identified that potential benefits included intake from healthier food groups (236, 238, 239); greater fruit and vegetable preference and healthy

eating self-efficacy (240); enhanced nutrient intake (34, 235); higher Diet Quality Index-International score and intake from healthier food groups (241); trend towards higher Healthy Eating Index 2005 score (233); consumption of a healthful dietary pattern (237); and improved adherence to: Healthy People 2010 dietary intake objectives (242), Balance of Good Health (now Eatwell Guide) criteria (64), and a Mediterranean diet using the KIDMED index (234). A greater frequency of cooking at home has also been associated with higher Healthy Eating Index 2005 and 2010 scores (326). However, the majority of previous studies employed self-reported measures, which are vulnerable to bias (389), and used cooking practices as an exposure, rather than the consumption itself of food cooked at home.

The results presented here also support previous studies that have identified associations between preparing and eating meals cooked at home and potential advantages to health. Greater frequency of cooking at home has been linked with longer lifespan (35) and more frequent consumption of meals prepared at home has been associated with reduced risk of developing type II diabetes (36). Amongst adolescents, healthier cooking at home by a caregiver has been linked with lowered risk of having an overweight or obese BMI (198). However, the findings from this study do conflict with US research that reported more time spent on home food preparation and associated clean up at baseline, or increased involvement over time, was linked with an adverse cardio-metabolic profile (41). Possible reasons for this discrepancy could be that the US study used time spent preparing meals, rather than meal consumption, as their exposure, and this exposure also included clean up time, which may have a differential impact on cardio-metabolic health. It is feasible that the adverse association between time spent on food preparation and health may have been due to cooking or baking less healthy foods, such as cakes and desserts, which could involve longer preparation and clean up times. Since food preparation activities are strongly patterned by gender (110, 273), this may also confound observed associations with health.

6.5.4 Possible mechanisms and implications for clinicians and policymakers

The findings presented here indicate that an increased frequency of consuming meals cooked at home is associated cross-sectionally with markers of a healthier diet, and indicators of improved cardio-metabolic health, particularly in terms of adiposity. Links between more frequent consumption of meals cooked at home and dietary benefits could

be attributable to healthier food preparation methods, increased dietary variety and/or consumption of healthier food groups. Such links may also be due to decreased intake of convenience foods, which tend to prioritise ingredients such as fat, sugar and salt to increase palatability and preservation, over those for optimising health (190).

The association between eating meals cooked at home more frequently and potential benefits for health in terms of hypertension was not significant in the unadjusted model, and in terms of cholesterol ratio was no longer significant after adjustment for sociodemographic and behavioural variables. This may be because the hypertension variable was poorly ascertained, since in addition to blood pressure measurement, participants were required to self-report on any previous diagnoses of hypertension, and receipt of hypotensive medication. Such reporting may not have been comprehensive. However, a sensitivity analysis with the inclusion and exclusion of participants diagnosed with hypertension by a doctor and/or receiving hypotensive medication, showed that regardless of whether or not these participants were excluded, the relationship between frequency of consuming meals cooked at home and hypertension was not significant. For cholesterol, strong genetic determinants have been identified (390), and the impact of consuming meals cooked at home may therefore not have been sufficient to result in statistically significant changes. The relationship between frequency of eating meals cooked at home and participant cholesterol levels may also have been obscured by the use of cholesterol-lowering statin medications.

The cross-sectional association between higher frequency of consuming meals cooked at home and lower adiposity was robust to adjustment for sociodemographic, behavioural and dietary covariates. The association between eating meals cooked at home more frequently and lower likelihood of being classified as at risk of diabetes according to HbA_{1c} level was borderline significant after such adjustments. Although the direction of causation cannot be established, these relationships indicate that cooking at home potentially confers benefits to health, beyond those mediated through dietary changes. Such benefits from eating meals cooked at home might be attributable to consumption of smaller portion sizes (391); moderated snacking behaviour (392); more structured mealtimes and/or the time of day at which meals are consumed (393). Increased social cohesion has been linked with potential health benefits (394), and it is plausible that higher social capital may be associated with

more sociable eating patterns. Given the potential time and effort involved in cooking at home, it may be that meals cooked at home are more often shared together with other people than meals from other sources, and a range of benefits to diet, health and wellbeing derived from shared mealtimes have been identified (395, 396).

The results from this study support previous research indicating putative benefits from meals cooked at home, suggesting that public health promotional messages may be used to advocate for cooking at home as an opportunity to potentially improve diet and health. Strategies could also be developed to support people to learn to cook healthy meals, and to use their skills often, for example using digital technology and social media to provide shopping list generators, food preparation teaching videos, and nutritional information (397-400). Regularity is particularly important, given that these findings indicated the greatest potential advantages from consuming meals cooked at home were experienced at the highest frequency of consumption. Cooking at home may therefore offer most benefit as part of the daily routine. This is in accordance with previous research suggesting that routinised cooking behaviour, and other routinised health behaviours such as medication adherence, are more likely to be maintained and prioritised over time (221, 401).

6.5.5 Unanswered questions and future research

The evidence base for associations between preparing and eating meals cooked at home, dietary indicators, and cardio-metabolic health, requires further longitudinal studies to contribute towards establishing causal relationships. This could be facilitated by incorporating questions on cooking and meal consumption into current large-scale national longitudinal surveys, particularly those with more detailed existing dietary components. Wave two data collection in the Fenland study will also enable longitudinal follow-up analyses within the next five years. Additional analyses, for example using structural equation modelling, could be employed to explore causal pathways more fully in future. Further insights regarding who eats meals cooked at home are also needed, and this issue is investigated further through the analyses in Chapter seven. Other questions include exploring further the potential benefits of meals cooked at home beyond those mediated through diet, and determining the most effective approaches to encourage cooking at home, which may require a combination of tailored interventions.

6.6 Conclusion

In a cross-sectional population-based study, consuming main meals cooked at home more frequently was associated with a range of indicators of a healthier diet, and several markers of cardio-metabolic health including adiposity, cholesterol ratio and diabetes risk. Strongest associations were observed at the highest frequency of consuming meals cooked at home, more than five times per week. These findings suggest that regularly eating meals cooked at home may confer benefits to diet and health, and that cooking promotion and skill development may form a valuable component of future public health initiatives. Further research regarding causal relationships between preparing and eating meals cooked at home, diet and health; the wider social aspects of home food preparation; and evaluation of interventions to promote the preparation and consumption of meals cooked at home, is required.

6.7 Link to other chapters

- Data from the Fenland study were used in the analyses for both chapters six and seven. Chapter seven studies the relationships between sociodemographic characteristics and frequency of consuming meals cooked at home and meals from out of home sources.
- The cross-sectional data analysis in this chapter addressed the need for more research studying the potential impact of preparing and/or eating meals cooked at home on diet and health, as highlighted in chapters two, three and five.
- The implications identified here for policy makers and practitioners, in terms of the potential benefits derived from consuming meals cooked at home, are discussed further in Chapter nine.

Chapter 7. Sociodemographic characteristics and frequency of consuming meals cooked at home and meals from out of home sources: cross-sectional analysis of a population-based cohort study

A modified version of this chapter has been submitted to *Public Health Nutrition*: Mills, S., Brown, H., Wrieden, W., White, M., and Adams, J. 'Sociodemographic characteristics and frequency of consuming home cooked meals and meals from out of home sources: cross-sectional analysis of a population-based cohort study'.

7.1 Abstract

Introduction

Eating meals cooked at home has been associated with potential benefits to diet and health, in comparison with meals from out of home sources. However, there remains lack of clarity regarding who eats meals from different sources. This study aimed to identify detailed sociodemographic characteristics associated with frequency of consuming meals cooked at home and meals from out of home sources.

Methods

Baseline data from a United Kingdom population-based cohort study (n=11,326) were used in analyses. Frequency of consuming meals cooked at home, ready meals, takeaways and meals eaten out were derived from a participant questionnaire. Sociodemographic characteristics regarding sex, age, ethnicity, working overtime, and socioeconomic status (SES) (as measured by household income, educational attainment, occupational status and employment status) were self-reported. Sociodemographic differences in higher versus lower meal consumption frequency were explored using logistic regression.

Results

Eating meals cooked at home more frequently was associated with being female, older, not working overtime and higher SES (measured by educational attainment and household income). A higher frequency of consuming takeaways was associated with being male, non-white ethnicity and lower SES (in terms of household income and educational attainment). Eating ready meals more frequently was associated with being male and lower SES

(measured by household income only). A higher frequency of eating meals out was associated with being male, working overtime and higher SES (in terms of household income and educational attainment).

Conclusion

Sociodemographic characteristics associated with eating meals from out of home sources varied according to meal source, and were not necessarily the reciprocal of those associated with eating meals cooked at home. In general, eating meals from different out of home sources more frequently was associated with being male and lower SES (measured by educational attainment and household income). These findings may be used to target public health policies and interventions for promoting healthier diets and dietary-related health, towards specific groups such as men and those experiencing socioeconomic disadvantage. Further research is required to determine both causal relationships between sociodemographic characteristics and consumption of different meal types, and the most effective approaches to modify consumption behaviour towards healthier patterns.

7.2 Introduction

Convenience foods, including ready meals, takeaways, fast food and meals from restaurants, have been linked with obesity and diet-related non-communicable diseases (NCDs) (38, 151), whereas cooking and eating meals prepared at home have been associated with benefits to diet (34, 239, 242) and health (35, 36, 198). However, other research has suggested that ready meals may be healthier than meals cooked at home (40), and that meals prepared at home may be of poor nutritional quality (195), and potentially associated with increased body mass index (402) and elevated cardio-metabolic risks (41). Some of this complexity may be attributable to inadequately defined terminology around both meals cooked at home and main meal alternatives. 'Eating out of home' may be used varyingly to describe food consumed at home but prepared away from home, food prepared at home but consumed away from home, and food both prepared and eaten away from home (309). However, despite such inconsistencies in the evidence base, meal source appears to be an important determinant of both diet and health.

In an effort to improve population diets and prevent diet-related NCDs, public health interventions have been developed to preferentially encourage different patterns of meal sourcing, such as through improving cooking skills (107, 133). Initiatives have also focused, for example, on improving the healthiness of takeaway foods (403), and calorie menu labelling in restaurants (404). However, few studies to date have specifically identified who currently engages in different meal sourcing patterns. In terms of cooking at home, positive associations have been identified with being female, married, older, having dependents at home, and greater time availability (273). However, the relationship between socioeconomic status (SES) and cooking behaviour has varied (111, 273). There is little evidence for a gradient in adult fast food intake with regards to wealth (405). Working patterns may be associated with approaches to meal sourcing, given that those with longer working hours or erratic schedules may be more likely to opt for alternatives to meals cooked at home, due to time pressures (406).

The majority of research on sourcing meals has focused on specific population subgroups, such as working parents (406), and explored individual perspectives qualitatively (219). Further clarity is required regarding the sociodemographic factors associated with consumption of different meal types, in order to inform targeting and tailoring of public health interventions encouraging healthier eating practices. This study aimed to identify detailed sociodemographic characteristics associated with frequency of consuming meals cooked at home and meals from different out of home sources, namely takeaways, pre-prepared ready meals and eating out, in a population-based cross-sectional cohort.

7.3 Methods

7.3.1 Data source

This study analysed baseline data from the Fenland study, which was described in Chapter six (see Methods section). My PhD Patient and Public Involvement (PPI) panel reviewed the analysis plan for this research, and amendments informed by their input were made to the final research strategy. This study is reported here in adherence to the STROBE-nut guidelines (325) (see Appendix O).

7.3.2 Frequency of consuming main meals from different sources

Participants were dichotomised on the basis of their consumption of the main meal of the day from four different sources, according to their questionnaire responses. Items in the participant questionnaire were: 'When eating your main meal at home, how often do you usually eat home cooked meals?'; 'When eating your main meal at home, how often do you usually eat home delivery or take-away meals?' and 'When eating your main meal at home, how often do you usually eat ready-made meals/prepared foods?' Response options for each question were: never or rarely; one to two times per week; three to five times per week; or more than five times per week. These options were collapsed into two times per week or less; and more than two times per week, to yield appropriate numbers for statistical analysis.

Frequency of eating out was established through a separate item in the participant questionnaire: 'On average, how often do you eat a meal outside of the home (restaurants, pubs, fast-food outlets etc)?' Response options were: less than once a week; once a week; two to four times a week; five to six times a week; once a day; or more than once a day. These options were collapsed into less than once per week; and once or more per week, to provide suitable numbers for statistical analysis.

7.3.3 Sociodemographic characteristics

In view of current evidence regarding factors influencing dietary intake (370), patterns of meal consumption were explored according to the following sociodemographic variables: sex, age, ethnicity, working overtime, and SES in terms of household income, educational attainment, occupational status and employment status. Ethnicity was collapsed from the 17 categories of the 2001 UK Census class (407) into white and non-white groups, given the very low prevalence of ethnic minorities. Participants were asked whether they had been employed in the past four weeks, and those responding positively were classified as currently working. Participants working more than 48 hours in any one of the last four weeks were classified as working overtime, in line with parameters from the European working time directive (371). Current or most recent occupation was categorised into three hierarchical strata according to the National Statistics Socioeconomic classification (NS-SEC) (408). Household income was divided into three categories by authors of the Fenland

questionnaire: less than £20,000; £20,000-40,000; and more than £40,000 per year.

Information on household composition was not available in order to equalise household income. Educational qualifications attained were stratified into: no or compulsory school-level qualifications (basic); university entry qualifications and vocational equivalents (further); and degree level qualifications (degree).

7.3.4 Analytical approach

Participants with missing data on any of the variables described were excluded from the study, and a complete case analysis performed. Unadjusted differences in the frequency of consuming meals cooked at home, takeaways, ready meals and meals eaten out were compared for each sociodemographic characteristic using binary logistic regression. Models were then mutually adjusted for all sociodemographic variables included, as appropriate. All analyses were conducted using Stata (version 14; Stata Corp.). In view of the large number of comparisons, 99% confidence intervals (CI) were used and $p < 0.01$ used to indicate statistical significance.

7.4 Results

Of 12,434 baseline participants in the Fenland study, full data were available for 11,326 (91.1%), who were included in analyses. The variables with the greatest missingness were occupational status (missing for 686 participants) and ethnicity (missing for 609 participants). A comparison of participant characteristics for those included and excluded from the analytic sample is shown in Table 7.1. Just over half of participants included were female (53.3%), most were of white ethnicity (97.3%) and median age was 48.9 years. The majority of included participants were working (87.7%) and did not work overtime (88.1%). Most of the included sample lived in a household with annual income of at least £20,000 (86.5%). The majority of participants had educational qualifications below degree level (65.1%), and were in the higher occupational status group (54.2%).

With regards to main meal consumption, most participants ate meals cooked at home as their main meal at home more than twice per week (93.9%). In contrast, the majority of

participants ate ready meals (94.4%) and takeaways (93.7%) only twice per week or less.
Most included participants ate out less than once per week (67.9%).

Variable ⁱ	Level	Included, n (%)	Excluded, n (%)	Statistical tests ⁱⁱ
All	N (%)	11,326 (91.09)	1108 (8.91)	--
Sex	Male	5,291 (46.72)	452 (40.79)	$\chi^2(1) = 14.24, p < 0.001$
	Female	6,035 (53.28)	656 (59.21)	
Age (years)	Median (IQR)	48.9 (42.9, 54.8)	47.1 (40.2, 53.4)	$z = -8.17, p < 0.001$
Ethnicity	Non-white	305 (2.69)	34 (6.81)	$\chi^2(1) = 29.14, p < 0.001$
	White	11,021 (97.31)	465 (93.19)	
Annual household income (£)	<20,000	1,529 (13.50)	139 (18.34)	$\chi^2(2) = 30.18, p < 0.001$
	20,000-40,000	3,971 (35.06)	303 (39.97)	
	>40,000	5,826 (51.44)	316 (41.69)	
Educational qualifications	Basic	2,149 (18.97)	310 (30.21)	$\chi^2(2) = 104.18, p < 0.001$
	Further	5,222 (46.11)	487 (47.47)	
	Degree level	3,955 (34.92)	229 (22.32)	
Working in past 4 weeks	No	1,398 (12.34)	778 (70.22)	$\chi^2(1) = 2.3 \times 10^3, p < 0.001$
	Yes	9,928 (87.66)	330 (29.78)	
Overtime work (>48 hours/week)	No	9,975 (88.07)	1,037 (96.92)	$\chi^2(1) = 77.10, p < 0.001$
	Yes	1,351 (11.93)	33 (3.08)	
Occupational status	Routine	1,814 (16.02)	158 (37.44)	$\chi^2(2) = 168.32, p < 0.001$
	Middle	3,372 (29.77)	147 (34.83)	
	Higher	6,140 (54.21)	117 (27.73)	
Home cooked meals	$\leq 2x/week$	692 (6.11)	91 (8.39)	$\chi^2(1) = 8.74, p = 0.003$
	$> 2x/week$	10,634 (93.89)	993 (91.61)	
Ready meals	$\leq 2x/week$	10,692 (94.40)	981 (92.46)	$\chi^2(1) = 6.74, p = 0.009$
	$> 2x/week$	634 (5.60)	80 (7.54)	
Takeaways	$\leq 2x/week$	10,609 (93.67)	982 (92.38)	$\chi^2(1) = 2.68, p = 0.102$
	$> 2x/week$	717 (6.33)	81 (7.62)	
Eating out	$< 1x/week$	7,695 (67.94)	764 (70.54)	$\chi^2(1) = 3.09, p = 0.079$
	$\geq 1x/week$	3,631 (32.06)	319 (29.46)	

Table 7.1 Characteristics of Fenland study participants included and excluded from analyses.

ⁱ Results shown as number (column percentage). Median (inter-quartile range) shown for age

ⁱⁱ Testing for significant differences between included and excluded populations using Mann-Whitney test with z-scores for continuous variables, and Pearson Chi squared test (degrees of freedom) with p values for categorical variables. Significance at 1% level

Table 7.2 shows descriptive statistics for participant sociodemographic characteristics against frequency of consuming meals cooked at home, ready meals, takeaways, and meals out. Unadjusted associations are summarised in Table 7.3, and mutually adjusted associations are presented in Figure 7.1.

In adjusted analyses, higher odds (odds ratio (OR), 99% CI) of eating meals cooked at home more than twice per week was associated with being female (OR 1.39, 99% CI 1.12 to 1.73), whereas being female was associated with lower odds of consuming all out of home main meal types more frequently. There was a small association between older age and eating meals cooked at home more frequently (OR 1.03, 99% CI 1.01 to 1.04), although older people did not eat meals from specific out of home sources less frequently than younger people.

Relationships between SES and meal consumption were not consistent across all measures of SES assessed. Higher odds of eating meals cooked at home more than twice per week was associated with higher educational attainment (OR 1.52, 99% CI 1.08 to 2.14) and greater household income (OR 2.31, 99% CI 1.69 to 3.15). Higher odds of eating out once or more per week was associated with having degree level, compared with basic, educational qualifications (OR 1.21, 99% CI 1.01 to 1.45), and household income of over £40,000, compared with less than £20,000 (OR 1.74, 99% CI 1.44 to 2.10). Lower odds of eating ready meals more than twice per week was associated with household income of over £40,000, compared with less than £20,000 (OR 0.57, 99% CI 0.41 to 0.80). Lower odds of eating takeaways more than twice per week was associated with having degree level, compared with basic, educational qualifications (OR 0.51, 99% CI 0.36 to 0.72), and household income of over £40,000, compared with less than £20,000 (OR 0.71, 99% CI 0.52 to 0.97).

White ethnicity was associated with lower odds of eating takeaways more than twice per week (OR 0.30, 99% CI 0.19, 0.46), although there were no other associations between ethnicity and meal consumption frequency. Working overtime was associated with lower odds of eating meals cooked at home more than twice per week (OR 0.69, 99% CI 0.52 to 0.92), and higher odds of eating out once or more per week (OR 1.30, 99% CI 1.11 to 1.53).

Variable	Level	Total (n=11,326)	Home cooked meals ⁱ		Ready meals ⁱ		Takeaways ⁱ		Eating out ⁱ	
			≤2x/week	>2x/week	≤2x/week	>2x/week	≤2x/week	>2x/week	<1x/week	≥1x/week
Sex	Male	5,291	377 (7.13)	4,914 (92.87)	4,923 (93.04)	368 (6.96)	4,903 (92.67)	388 (7.33)	3,291 (62.20)	2,000 (37.80)
	Female	6,035	315 (5.22)	5,720 (94.78)	5,769 (95.59)	266 (4.41)	5,706 (94.55)	329 (5.45)	4,404 (72.97)	1,631 (27.03)
Age (years)	Median (IQR)	48.9 (42.9, 54.8)	47.2 (41.9, 53.3)	49.1 (43.0, 54.9)	49.0 (43.0, 54.9)	48.2 (42.0, 54.0)	48.9 (42.9, 54.8)	49.8 (43.5, 55.6)	49.2 (43.1, 55.0)	48.5 (42.3, 54.6)
Ethnicity	Non-white	305	12 (3.93)	293 (96.07)	280 (91.80)	25 (8.20)	261 (85.57)	44 (14.43)	212 (69.51)	93 (30.49)
	White	11,021	680 (6.17)	10,341 (93.83)	10,412 (94.47)	609 (5.53)	10,348 (93.89)	673 (6.11)	7,483 (67.90)	3,538 (32.10)
Annual household income (£)	<20,000	1,529	151 (9.88)	1,378 (90.12)	1,423 (93.07)	106 (6.93)	1,396 (91.30)	133 (8.70)	1,189 (77.76)	340 (22.24)
	20,000-40,000	3,971	258 (6.50)	3,713 (93.50)	3,742 (94.23)	229 (5.77)	3,673 (92.50)	298 (7.50)	2,936 (73.94)	1,035 (26.06)
	>40,000	5,826	283 (4.86)	5,543 (95.14)	5,527 (94.87)	299 (5.13)	5,540 (95.09)	286 (4.91)	3,570 (61.28)	2,256 (38.72)
Qualifications	Basic	2,149	170 (7.91)	1,979 (92.09)	2,039 (94.88)	110 (5.12)	1,959 (91.16)	190 (8.84)	1,569 (73.01)	580 (26.99)
	Further	5,222	342 (6.55)	4,880 (93.45)	4,928 (94.37)	294 (5.63)	4,851 (92.90)	371 (7.10)	3,714 (71.12)	1,508 (28.88)
	Degree level	3,955	180 (4.55)	3,775 (95.45)	3,725 (94.18)	230 (5.82)	3,799 (96.06)	156 (3.94)	2,412 (60.99)	1,543 (39.01)
Occupation status	Routine	1,814	152 (8.38)	1,662 (91.62)	1,709 (94.21)	105 (5.79)	1,650 (90.96)	164 (9.04)	1,343 (74.04)	471 (25.96)
	Middle	3,372	214 (6.35)	3,158 (93.65)	3,195 (94.75)	177 (5.25)	3,120 (92.53)	252 (7.47)	2,470 (73.25)	902 (26.75)
	Higher	6,140	326 (5.31)	5,814 (94.69)	5,788 (94.27)	352 (5.73)	5,839 (95.10)	301 (4.90)	3,882 (63.22)	2,258 (36.78)
Working in past 4 weeks	No	1,398	68 (4.86)	1,330 (95.14)	1,334 (95.42)	64 (4.58)	1,298 (92.85)	100 (7.15)	1,016 (72.68)	382 (27.32)
	Yes	9,928	624 (6.29)	9,304 (93.71)	9,358 (94.26)	570 (5.74)	9,311 (93.79)	617 (6.21)	6,679 (67.27)	3,249 (32.73)
Overtime working (>48 hours/ week)	No	9,975	574 (5.75)	9,401 (94.25)	9,422 (94.46)	553 (5.54)	9,345 (93.68)	630 (6.32)	6,904 (69.21)	3,071 (30.79)
	Yes	1,351	118 (8.73)	1,233 (91.27)	1,270 (94.00)	81 (6.00)	1,264 (93.56)	87 (6.44)	791 (58.55)	560 (41.45)

Table 7.2 Characteristics of participants overall and by frequency of consuming different main meal types.

ⁱ Number (row percentage for meal type). Median (inter-quartile range) shown for age.

Variable	Unadjusted odds ratio of consuming main meal type more vs less frequently (99% confidence interval)			
	Home cooked (>2x/week vs ≤2x/week)	Ready meals (>2x/week vs ≤2x/week)	Takeaways (>2x/week vs ≤2x/week)	Eating out (≥1x/week vs <1x/week)
Sex (female vs male)	1.39 (1.14, 1.71)	0.62 (0.50, 0.76)	0.73 (0.60, 0.89)	0.61 (0.55, 0.68)
Age (years)	1.02 (1.01, 1.04)	0.99 (0.97, 1.00)	1.02 (1.00, 1.03)	0.99 (0.98, 1.00)
Ethnicity (white vs non-white)	0.62 (0.29, 1.34)	0.66 (0.38, 1.13)	0.39 (0.25, 0.59)	1.08 (0.78, 1.49)
Qualifications (further vs basic)	1.23 (0.95, 1.58)	1.11 (0.82, 1.49)	0.79 (0.62, 1.00)	1.10 (0.95, 1.27)
Qualifications (degree vs basic)	1.80 (1.36, 2.39)	1.14 (0.84, 1.56)	0.42 (0.32, 0.56)	1.73 (1.49, 2.01)
Occupation (intermediate vs routine)	1.35 (1.02, 1.79)	0.90 (0.65, 1.25)	0.81 (0.62, 1.06)	1.04 (0.88, 1.23)
Occupation (higher vs routine)	1.63 (1.25, 2.12)	0.99 (0.74, 1.33)	0.52 (0.40, 0.67)	1.66 (1.42, 1.93)
Income (£20,000-40,000 vs <£20,000)	1.58 (1.20, 2.08)	0.82 (0.60, 1.12)	0.85 (0.64, 1.13)	1.23 (1.03, 1.48)
Income (>£40,000 vs <£20,000)	2.15 (1.64, 2.81)	0.73 (0.54, 0.98)	0.54 (0.41, 0.72)	2.21 (1.86, 2.63)
Working (in work vs not)	0.76 (0.54, 1.07)	1.27 (0.90, 1.80)	0.86 (0.64, 1.15)	1.29 (1.10, 1.52)
Overtime (work >48hrs/week vs not)	0.64 (0.49, 0.84)	1.09 (0.79, 1.49)	1.02 (0.75, 1.38)	1.59 (1.37, 1.85)

Table 7.3 Unadjusted logistic regressions of associations between frequency of consuming main meals and sociodemographic characteristics.

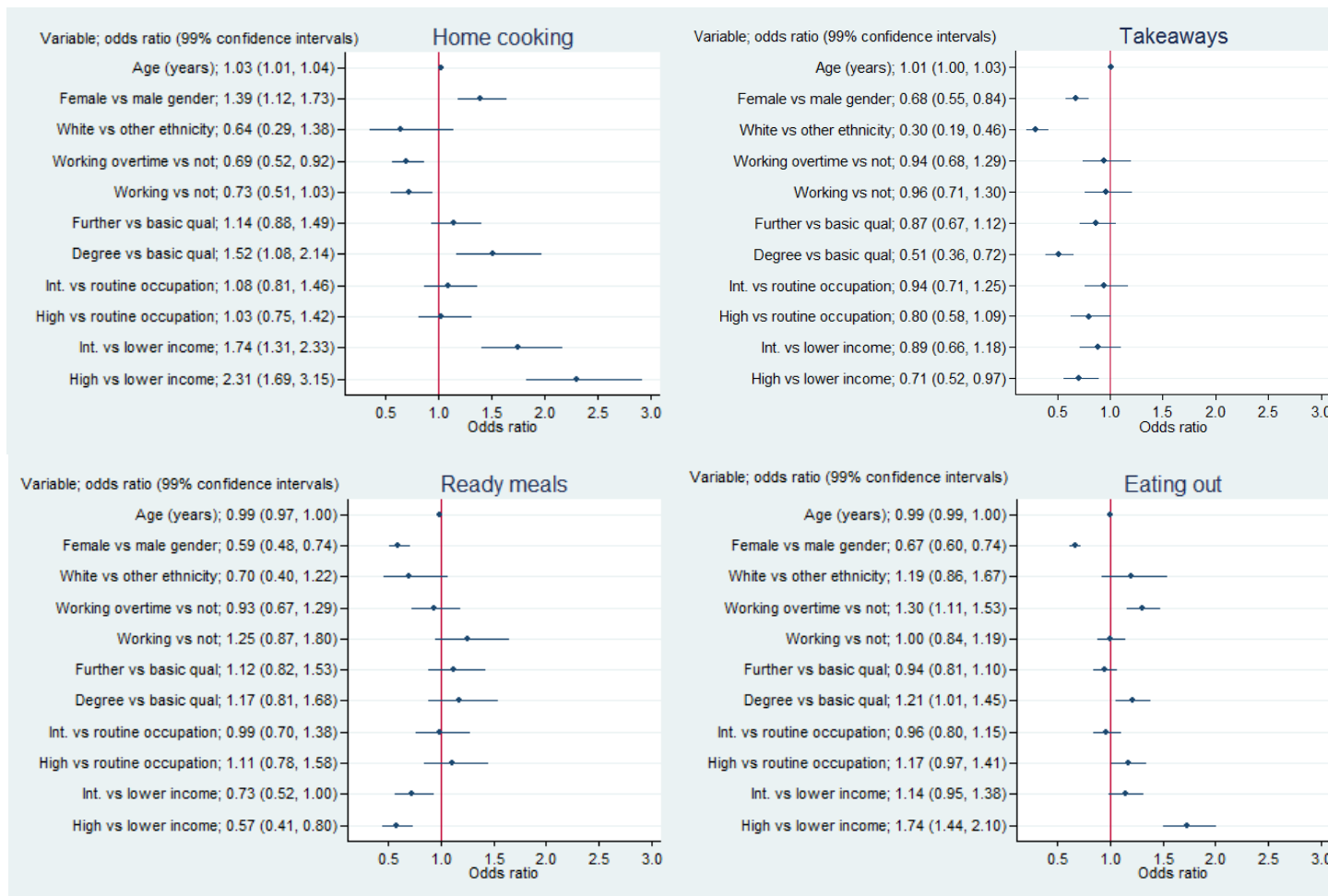


Figure 7.1 Adjusted logistic regressions for sociodemographic characteristics, with odds ratios for frequency of consuming different main meal types. Logistic regressions mutually adjusted as appropriate for: sex, age, ethnicity, educational attainment, household income, occupational status, employment status and working overtime. Int, intermediate; qual, qualifications.

7.5 Discussion

7.5.1 Main findings

To my knowledge, this is the first large-scale, population-based study to describe and compare the sociodemographic characteristics of people consuming main meals cooked at home and meals from different out of home sources. These findings should be important in guiding the targeting of public health policies to promote healthier eating patterns, and tailoring of associated interventions.

The majority of participants (93.9%) ate meals cooked at home as their main meal at home more than twice per week, whereas few ate ready meals (5.6%) or takeaways (6.3%) more than twice per week. Most participants ate out less than once per week (67.9%). In fully adjusted analyses, consuming meals cooked at home more frequently was associated with being female, older, not working overtime and higher SES, as measured by greater educational attainment and household income. Eating ready meals more frequently was associated with lower SES in terms of household income. Eating takeaways more frequently was associated with non-white ethnicity, and lower SES in terms of both household income and educational attainment. A higher frequency of eating meals out was associated with working overtime, and higher SES in terms of greater household income and educational attainment. Being female was associated with a lower frequency of consuming all main meal types, apart from meals cooked at home.

7.5.2 Strengths and limitations

A number of strengths and limitations relevant to the overall use of data from the Fenland study have already been discussed in Chapter six; to avoid duplication these are not repeated again in this section. The strengths and limitations reported here pertain to the specific analyses conducted in this chapter.

A range of measures of SES were used in this study, which facilitated exploration of potential relationships between different aspects of socioeconomic disadvantage and consumption of main meals from different sources. Dietary intake data were derived from a comprehensive FFQ, which is likely to have enabled participants to report the great majority of foods and

beverages they consumed. Data were also collected on consumption of meals cooked at home and meals from three different out of home sources, which enabled a broad understanding of the construction of their diets.

Many dietary studies to date have been limited to information on specific nutritional components, or have studied food preparation or purchasing practices (273, 309).

Individuals may prepare or purchase food without eating it themselves, and may consume foods they have not themselves prepared or purchased, and such foods may be prepared inside or outside the home. Therefore focusing on meal consumption as here is likely to offer a more accurate measure of exposure to different food types and dietary patterns. Previous work has often concentrated solely on binary in home versus out of home food intake.

However, given the ambiguity of terminology around meals cooked at home and obtained from alternative sources, there is often no clear distinction regarding location of preparation or consumption (309, 372).

This research is also subject to certain limitations. The study lacked details of household composition and marital status, which were shown in the systematic review in Chapter three to influence diet-related behaviour (273). The measure of household income used here was therefore not equivalised for household composition, and it was not possible to investigate the influence of personal relationships and other household members on meal sourcing.

The research participants self-reported sociodemographic characteristics and meal consumption patterns. In common with similar studies on frequency of consuming different meal types (273, 309), the specific questionnaire items were not validated, and may therefore have been variably interpreted. Given the general lack of clarity in definitions for meal sourcing, this highlights the need for improved terminology, and more advanced conceptualisation and operationalisation of this issue in dietary studies. Participants may have under-reported their consumption of ready meals and takeaways if they perceived these to be unhealthy, and therefore less socially desirable. If this bias differed by socioeconomic group, it could obscure or artificially enhance true associations between SES and meal consumption patterns.

7.5.3 Interpretation of findings

Overall, the patterning of meal sourcing behaviour according to sociodemographic factors identified in this study suggests that embedded cultural norms may exist. Some of these are likely to be generational and influenced by the prevailing cultural context, and hence may be expected to change over time with secular trends. Evidence, including that from the systematic review in Chapter three (273) and reinforced by Chapter six (409), has indicated that preparing and eating meals cooked at home are likely to provide benefits to diet and health, over obtaining and consuming meals from other sources (273, 309). Therefore, public health strategies to improve diet and health may focus on increasing consumption of meals cooked at home; decreasing consumption of alternative meal types; and/or improving the healthiness of meals from out of home sources. This research provides important insights regarding towards whom interventions to shift patterns of meal consumption should be targeted.

This study identified an association between being female and eating meals cooked at home more frequently. This concurs with results (34) from the United States (US) National Health and Nutrition Examination Survey (NHANES) (410). In contrast, analysis of data from the UK National Diet and Nutrition Survey (NDNS) (15) found that similar proportions of men and women lived in households where the main food provider (MFP) prepared a main meal on most days of the week (110). However, women were more likely than men to prepare meals themselves on at least five days of the week, and the NDNS analysis focused on food preparation rather than consumption, hence interpretation is reliant on assumptions that meal availability is associated with subsequent intake. Furthermore, participation in the NDNS and NHANES may be biased by the substantial commitment involved in taking part, which could affect resultant findings (15). The research presented here also showed that being male was associated with a higher frequency of consumption for all out of home main meal types. Similarly, previous research has shown that men purchased more out of home meals than women (411), and men were more likely to report eating fast food, takeaways, and ready meals (122, 412, 413).

This study found an association between older age and more frequent consumption of meals cooked at home. The association was small, however the OR was measured per year

increase in age, and it is therefore likely that using a larger age bracket would have increased the magnitude of this relationship. This association between age and consumption of meals cooked at home is in agreement with previous research involving US health professionals, which identified that those consuming a higher frequency of meals cooked at home were likely to be older (36). Similarly in the NDNS, older participants (aged 50-64 years) were more likely than younger participants (aged 19-34 years) to live in a household where the MFP prepared a main meal on most days of the week, although the relationship with age was non-linear (110). Given the associations between frequency of consuming meals cooked at home, age, and gender, there may be a generational effect in meal sourcing, such that older women are likely to eat meals cooked at home more frequently due to historical societal expectations and priorities.

More frequent consumption of meals cooked at home was associated with not working overtime, whereas a higher frequency of eating meals out was associated with overtime working. This indicates that in accordance with previous research (226, 227, 232), lack of time, including time constraints due to employment, may be a potential barrier to eating food cooked at home. Policy makers may therefore focus on promoting time-efficient cooking approaches, and development of time-saving skills such as batch cooking, through classes to develop wider food skills beyond those directly related to technical cooking tasks. Policies addressing working patterns, in order to reduce overtime working, could also offer benefits.

In this study, higher SES in terms of educational attainment and household income was associated with a higher frequency of eating meals cooked at home and meals out, and a lower frequency of consuming takeaways. This suggests that health promotion messages regarding the potential negative implications of takeaways for diet and health may have been differentially adopted according to SES, and/or that the acceptability and accessibility of takeaways may vary by SES. This could lead to widening of diet-related health inequalities.

However, relationships between SES and meal consumption were not consistent across all measures of SES assessed. This creates a mixed picture, and makes it more challenging to draw clear conclusions from the findings. There were no significant associations between

meal consumption frequency and SES, when measured by occupational status, and employment status. In general, associations between SES and frequency of eating different meal types were observed only for the highest compared with the lowest category variables, and not for intermediate compared with lowest category variables. The observed relationships between educational attainment and meal consumption may indicate that education itself, rather than its use as a measure of SES, is important in determining meal sourcing behaviour. For example, education might help develop problem-solving skills, enabling people to overcome barriers in order to prepare and eat meals cooked at home. Higher educational attainment could also indicate greater potential exposure to nutrition and cooking skills training in an educational setting. The relationship between SES and consumption of different meal types was least consistent for ready meals, where the only significant association with consumption frequency was for the highest compared with the lowest income category. Here higher income was associated with less frequent ready meal consumption. This may indicate that in lower SES strata, with potentially fewer resources, ready meals may be perceived as a less cost-effective or attractive alternative to cooking at home and eating out than takeaways.

Data from the NDNS previously showed that adults of higher SES, as measured by occupational status and age at completion of full-time education, were more likely to eat out at least once per week, although there was no observed association between SES and takeaway consumption (372). In a systematic review, higher SES was overall associated with higher dietary energy derived from eating out of home, although eating out of home was defined as including both place of consumption and place of preparation of food (309). It is likely that at least some of these discrepancies between different studies may be attributable to varying terminology regarding main meal alternatives to meals cooked at home, and nuances between different measures of SES.

The association between lower SES and lower frequency of eating meals cooked at home observed in our research may indicate links between socioeconomic disadvantage and fewer resources, kitchen facilities and/or skills for cooking meals at home (219, 225). It is also possible that meals cooked at home may be more highly valued culturally amongst higher SES groups, or that cooking at home is equally valued across the socioeconomic spectrum,

but those of higher SES have greater resources and financial opportunity to engage in cooking. The relationship between frequency of consuming meals cooked at home and SES may be influenced by food price, given that cooking involves the use of basic ingredients such as fruit and vegetables, and the association between dietary costs and fruit and vegetable intake is stronger for lower income and less educated groups (414). Public health interventions to promote cooking at home may therefore need to be more targeted at lower SES groups, and supported by measures to increase the affordability of basic ingredients, and ensure adequate resources and facilities for food preparation at home.

7.5.4 Unanswered questions and future research

In order to investigate further the potential causal associations between sociodemographic characteristics and patterns of consuming main meals cooked at home and meals from out of home sources, longitudinal studies are required. Phase two follow-up data collection is currently underway in the Fenland study, which will also enable longitudinal analyses within the next five years. Regular surveys are additionally needed, to identify emerging secular trends in meal sourcing and consumption, such that public health initiatives may be tailored to prevailing and prospective patterns of behaviour. More novel approaches might include utilising existing data sources, such as exploring associations between sociodemographic characteristics and retail data in supermarket loyalty programmes.

In future research it will be important to address nuances around different measures of SES and potential associations with main meal patterns, for example investigating further whether relationships differ according to education or wealth. Development of more objective measures of leisure time availability and employment patterns, and their relationship with meal sourcing, would also prove insightful. This study did not comprise an ethnically diverse sample, and investigation of meal patterns amongst people from different ethnic and cultural backgrounds would help to develop understanding of these relationships. Identifying the relative contributions of meals cooked at home and different out of home meal types to individuals' overall diets, using both quantitative and qualitative data, would provide additional information to help guide public health policies and interventions encouraging healthier dietary patterns. Finally, clear, consistent terminology around meals cooked at home, convenience foods, eating out, and food from other sources needs to be

developed, to enable informed comparisons and conclusions in research, and more effective public health promotion.

7.6 Conclusion

In a population-based cross-sectional study, the sociodemographic characteristics associated with frequency of eating meals from different out of home sources varied according to meal source. These sociodemographic characteristics were not always the converse of those associated with consuming meals cooked at home. Eating meals from different out of home sources more frequently was generally associated with being male, and lower SES (assessed by household income and educational attainment). Such findings may help the targeting of public health policies and interventions designed to promote healthier diets and dietary-related health, towards particular population groups such men, and those of lower SES. Further research is required to establish causal relationships between sociodemographic characteristics and meal sourcing, and to determine how to most effectively change patterns of consumption behaviour.

7.7 Link to other chapters

- Data from the Fenland study were used in the analyses for both chapters six and seven. Chapter six studied the relationships between frequency of eating meals cooked at home and potential benefits for diet and health.
- This chapter addressed uncertainty regarding the sociodemographic characteristics of those who eat meals cooked at home and meals from other sources, as identified in the systematic review in Chapter three and qualitative work in Chapter four.
- The qualitative work in Chapter four noted the importance of resources, including time, in influencing cooking and eating behaviour. The impact of time availability on meal consumption patterns was considered further in this chapter.
- The implications for policy makers and practitioners presented here, regarding the sociodemographic characteristics of those who consume meals cooked at home and meals from out of home sources, are addressed in greater depth in Chapter nine.

Chapter 8. Systematic integration of empirical findings from a mixed methods programme of study on preparing and eating meals cooked at home, using Triangulation Protocol

8.1 Overview of chapter

In this chapter I describe the use of a triangulation approach to systematically synthesise findings generated by the mixed research methods employed during this doctoral work. I begin with a brief summary of the potential benefits and challenges of using a mixed methods programme of research, and then apply Triangulation Protocol to integrate the results from the three research phases. I discuss these findings and potential areas of contradiction, and consider the main strengths and limitations of adopting a triangulation approach. The implications of these findings are then addressed alongside those from the empirical chapters in the 'Implications for policy and practice' section of Chapter nine, in order to avoid duplication.

8.2 Introduction

8.2.1 Mixed methods research

Mixed methods research has been defined as the use of two or more methods that draw on different meta-theoretical assumptions, implying that it involves different research paradigms, which may include qualitative (interpretive) and quantitative (positivistic) perspectives, although this distinction is frequently more complex than a simple dichotomy (415). The justification for combining methods is originally based on an assumption of 'increased validity', with the premise that if different research methods reach the same conclusions regarding an issue, the deductions are accurate, whereas dissonant findings indicate biased research measures (416). This approach is similar to that taken when using multiple measurements to produce accurate geographical mapping, and assumes that the inherent inaccuracies in each research method are counteracted by employing several different measurement techniques (417). However, this stance is problematic in that it ignores the potential for biases shared jointly between different research methods to obscure errors (418). Furthermore, it has been argued that differences in paradigm between

largely positivist quantitative methods and primarily interpretivist qualitative methods would negate any claims regarding validity resulting from perceived concordance between methods (419, 420). Or in other words, the viewpoints and questions answered by qualitative and quantitative methods are likely to be too different to try and identify agreement over the same issue.

However, advocates of mixed methods research have suggested that the complex nature of the world necessitates an enriched understanding through a combination of different paradigmatic approaches, to shed light on different facets of the issue under study, and contribute evidence towards strength of causal inference. Although research validity in the strictest sense may not be increased, additional knowledge and a greater sense of coherence may be developed regarding a phenomenon by viewing the issue through different lenses (421). Furthermore, it has been highlighted that in applied research, such as the study of food preparation and consumption behaviour, focus is shifted away from paradigmatic differences towards flexibility, and particular perspectives do not have ownership over different methods (422, 423). Mixed methods research may therefore offer the potential to: produce new knowledge by synthesising findings derived from varied approaches (424); reveal the intricacies and complexities of an issue (425-427); and consider different perspectives on a topic (428).

There has been widespread use of mixed methods in health and health services research (424, 429). In this thesis, the overall aim – to develop an improved understanding of home food preparation practices, experiences and perceptions, and the potential implications of home cooking for diet and health – was framed such as to necessitate a mixed methods approach. Furthermore, the five different research objectives outlined at the outset required a combination of quantitative and qualitative methods for full exploration.

Research may be combined at various different stages in the research cycle, for instance at the outset, during analysis, or at the stage of interpretation of the findings (415). This thesis was designed and undertaken as a mixed methods programme of research, rather than a discrete mixed methods study. The different methods in each of research phases one to three are interlinked and their interrelationships developed iteratively as the programme of

work progressed. For example, key themes from the systematic review in phase one were used to inform questions in the topic guide for the qualitative interviews in phase two. Outstanding uncertainty regarding the potential impact of cooking at home on diet and health, which was raised in phases one and two, was used to drive the hypotheses tested in the Fenland study data analyses in phase three.

In terms of satisfying criteria for integration, it has been proposed that research methods or data types should be equally weighted, and orientated towards a common research aim (415). Hence this thesis may be considered a fully interdependent programme of linked research, with integration focused at this final stage of interpretation and explanation. This enables the findings developed from the different research methods to be used to generate overarching explanations and an overall narrative from the research programme.

8.2.2 Triangulation

Studies of mixed methods research in health have highlighted a dearth of integration between the constituent parts (430). Challenges to integration have been described, such as a lack of clear methods (415) and deficiency of formal training in mixed methods research (431, 432). In the absence of integration, an opportunity to generate new summative knowledge is missed, and findings are restricted to those equivalent to individual qualitative and quantitative components (429).

There are relatively few recommended approaches in the literature for integrating studies using different methods, particularly at the stages of analysis and interpretation (415). Moran-Ellis *et al* developed a method termed 'following a thread', which involves selecting a theme or analytic question in one of several datasets investigating a phenomenon, and then following this into the others, to produce a 'thread' illustrating a range of findings (433). This inductive method may be used to produce a varied depiction of the issue under study, and a similar approach has been applied in healthcare services research, to explore the impact of patient views on help seeking and appropriate service use (434). However, the 'following a thread' technique provides little by way of explicit justification for identifying threads, and could potentially inappropriately infer direction of causation for the relationships described.

A mixed methods matrix may be employed to integrate qualitative and quantitative data derived from the same cases, and has been used previously in the context of exploring relationships between team working styles, and level of integration in mixed methods research in the health services domain (435). The approach involves constructing a matrix with each row representing a case for which there is both quantitative and qualitative data, and each of the columns showing different data sources (436). The matrix method provides the opportunity to explore unexpected findings and paradoxes between data sources for single cases, and to pursue these across other cases, and search for patterns. However, the approach is not feasible in a research programme such as this, where both quantitative and qualitative data are not available for specific individual cases.

In a step beyond integration, it has been argued that 'triangulation is an epistemological claim concerning what more can be known about a phenomenon when the findings from data generated by two or more methods are brought together' (415, p. 47). There has been a great deal of interest in the concept of triangulation within the public health and health promotion community (437-439). Approaches to triangulation have been classified into four groupings: data triangulation, whereby data are collected from more than one group of respondents or source of data; methodological triangulation, whereby more than one method is used for data collection; theoretical triangulation, whereby more than one theoretical perspective or interpretative framework is incorporated; and investigator triangulation, whereby at least two researchers are involved in integrating and analysing the data (440).

With regards to existing integrated mixed methods research on preparing and/or eating food cooked at home, the systematic review presented in Chapter three did not identify any relevant integrated studies published in the peer-reviewed literature and meeting the review inclusion criteria. It is possible that there may be examples in the grey literature of integrated quantitative and qualitative research focused on preparing and eating home cooked meals, such as academic dissertations. However, to my knowledge this is the first mixed methods programme of research to use a formal, structured integration approach to consider findings on the topic.

The aim of this chapter is to integrate the findings from the three phases of the research programme, using 'Triangulation Protocol', as developed by Farmer *et al* (441). This is the triangulation approach most thoroughly described in the research literature, and draws on a similar concept to the mixed methods matrix (436). Triangulation Protocol was originally developed for integrating multiple qualitative studies, using the Canadian Heart Health Dissemination Project (441). However, the approach is also relevant to mixed methods research, and has been used in this context as applied to the acceptability of incentives for preschool vaccinations (442). In Triangulation Protocol, key themes are identified in the results derived from each data source or method of data collection, and the themes are collapsed into overarching meta-themes, adopting a systematic approach akin to Framework Analysis (287). This process aims to highlight similarities and disparities within the research data, and then identify relationships between different data sections, in order to develop explanatory conclusions focused around themes (288). Themes are then coded in terms of agreement, dissonance, and silence (category not mentioned) between the different methods and data sources. Farmer *et al* described these sequential stages as: sorting, convergence coding, convergence assessment, and completeness assessment, followed by researcher comparison, and feedback (441).

The use of Triangulation Protocol in this chapter aims to provide insights regarding the programme of research as a whole, rather than considering the individual components separately. As such, this will help the identification of key overarching themes regarding the preparation and consumption of meals cooked at home, and any areas of potential contradiction within the data. It should also enable recognition of the main implications for future research, policy and practice.

8.3 Methods

All four approaches to triangulation previously described (440) were used in this discussion. Firstly, data triangulation was facilitated by analysing data from different groups of participants and different data sources in the three research phases. Methodological triangulation was enabled by the integration of different research methods, including

quantitative (quantitative literature in the systematic review, cross-sectional data analysis) and qualitative (qualitative literature and narrative synthesis integration in the systematic review, participant interviews and focus groups). Theoretical triangulation was possible by incorporating data based on different research perspectives, including positivist (systematic review, cross-sectional data analysis) and interpretivist (narrative synthesis in the systematic review, participant interviews and focus groups) paradigms. Investigator triangulation was facilitated by involving my PhD supervisors in checking, discussing, and where relevant suggesting amendments to the findings developed from Triangulation Protocol described below.

I integrated data from the primary studies in the three phases of my programme of research exploring the preparation and consumption of food cooked at home. These studies were: phase one systematic review (n=38 studies included); phase two qualitative interviews (n=18 participants included) and focus groups (n=53 participants included); and phase three cross-sectional cohort data analysis (n=11,396 (Chapter six) and n=11,326 (Chapter seven) participants included). The phase one systematic review is defined here as a primary study, since this the first time the included studies have been systematically summarised and interpreted; however this phase of the research did not involve new data collection.

I followed Triangulation Protocol approach as described previously (441, 442), by considering the main findings from each phase of the research and their implications, as presented in the empirical chapters three to seven. I collapsed these themes into overall meta-themes, and then coded the themes as agreement, silence and dissonance for each of the three research phases. I presented the process and outcomes from this approach to my PhD supervisors, and revised the findings on the basis of discussion and mutual agreement.

8.4 Results and interpretation

I have focused here on the key issues emergent from considering the data from the three research phases integrated together, rather than repeating the specific findings from the primary studies, which are described in the respective empirical chapters of the thesis.

The themes, and overarching meta-themes (bold type headings), derived from the data are shown in the triangulation matrix (Table 8.1). Overall, several areas of agreement (indicating that the themes were identified) and areas of silence (indicating that the themes were not identified), were noted between the research phases and the themes. There was only one area of explicit dissonance, representing disagreement between the first research phase and the theme of an association between higher socioeconomic status (SES) and greater preparation and/or consumption of meals cooked at home. Nonetheless, some of the other themes could also be viewed as potentially contradictory, and these are presented below. The meta-themes identified from the data in this programme of research were behaviour, determinants, outcomes, and research approach. These are described briefly, and the implications considered in further depth in the 'Implications for policy and practice' section of the next chapter. The final summary Chapter nine provides overall conclusions for the programme of work as a whole, by considering the empirical chapters and Triangulation Protocol findings together.

Themes and meta-themes	SR	Qualitative	Cohort analysis
Behaviour			
CE is complex, beyond simply possessing technical skills	A	A	S
Key life course influences on CE are similar between different cultures	A	A	S
Encouraging and teaching children in CE may be important for the future	A	A	S
CE can change over time, particularly at transition points in the life course	A	A	S
Determinants			
More advanced cooking skills and broader food skills are associated with greater CE	A	A	S
Higher levels of interest in food and cooking are associated with greater CE	A	A	S
Culture and ethnicity play a role in determining CE	A	A	A
Female gender is associated with greater CE	A	A	A
Older age is associated with greater CE	A	S	A
Higher socioeconomic status is associated with greater CE	D	A	A
Personal relationships and household composition play a role in determining CE	A	A	S
More leisure time is associated with greater CE	A	A	A
CE is a compromise between competing demands and motivations	A	A	S
Outcomes			
CE is associated with potential benefits for diet quality	A	A	A
CE is associated with potential benefits for physical health	A	S	A
CE is associated with potential social benefits	A	A	S
Main benefits of CE are derived from frequent patterns of behaviour	S	S	A
Research approach			
Research on CE has been primarily cross-sectional	A	S	S
Research on outcomes of CE has primarily focused on diet	A	S	S
There is heterogeneity in measurement of CE and use of alternative out of home sources	A	S	S
There is lack of clarity and consistency in terminology for CE and alternative meal sources	A	A	A
Key: A = Agreement, CE = cooking/eating food cooked at home, D = dissonance, S = silence, SR = systematic review			
One Agreement	Two Agreements	Three Agreements	

Table 8.1 Triangulation matrix showing themes and meta-themes derived from the three research phases.

8.4.1 Meta-themes

Behaviour

In terms of behaviour, the cohort analysis was silent regarding the main emergent themes. This was largely because the cross-sectional quantitative cohort data analysis did not measure broader general issues regarding preparing and eating food cooked at home, and changes in behaviour over time. The systematic review and qualitative work both highlighted that cooking and eating food cooked at home is more complex than the simple acquisition and use of technical cooking skills. These research phases also identified that cooking at home and consumption of food cooked at home can evolve over time, particularly at transition points in the life course, such as leaving the parental home, starting and ending cohabitation, and adopting and relinquishing caring responsibilities. The systematic review and qualitative work suggested that despite complexity, important life course influences on behaviour were similar between different cultures, and highlighted that encouraging and teaching children in cooking may be important to ensure continuation in future generations.

Determinants

The systematic review and qualitative work identified a range of factors influencing cooking behaviour and consumption of food cooked at home, several of which were also supported by the cohort analysis. All three data sources highlighted culture and ethnicity as playing a role in determining behaviour, and also identified female gender and more leisure time as associated with greater preparation and consumption of food cooked at home. In particular, it has previously been suggested that the issue of time is more associated with perceived timing difficulties and prioritisation, rather than shortage of time as an actual barrier to cooking and eating food cooked at home (221). However, the total time commitment for cooking at home involves several stages in addition to actual food preparation, such as meal planning, food shopping, and cleaning up afterwards, all of which contribute to the overall time burden. The importance of time was illustrated by the cohort analysis, which showed that those with objectively less time available, as measured by working overtime, were less likely to eat meals cooked at home frequently.

Data from the systematic review and qualitative work supported a role for personal relationships and household composition in determining cooking behaviour and consumption of food cooked at home. These research phases also identified more advanced cooking skills and broader food skills, and higher levels of interest in food and cooking, as associated with greater preparation and consumption of food cooked at home. The cohort analysis was silent on these factors, since these variables were not examined in sufficient detail to draw conclusions. The systematic review and cohort analysis highlighted an association between older age and greater preparation and consumption of food cooked at home, although this was not specifically demonstrated by the qualitative research. The role of SES in determining behaviour is discussed below, under areas of potential contradiction. Overall, the qualitative work and systematic review also highlighted that cooking at home and eating food cooked at home is often a compromise between competing demands and motivations in life. The cohort analysis was not designed to address prioritisation and perceptions around different putative determinants of behaviour, and thus was silent on this theme.

Outcomes

There was consistency between the three data sources in terms of agreement on the potential for dietary benefits from preparing and consuming food cooked at home. However, the qualitative work highlighted that 'home cooking' as a specific subtype of cooking at home may not be aligned with principles of a healthy diet, and therefore caution is required regarding the use of terminology. The systematic review and cohort analysis additionally identified the potential for physical health benefits, and the systematic review and qualitative work identified the potential for social benefits, from cooking and eating food cooked at home. Taken together, these findings suggest that preparing and eating food cooked at home may have wide-ranging, positive impacts, provided that the specific connotations of 'home cooking' are avoided. The cohort analysis additionally highlighted that the main potential benefits from eating food cooked at home were associated with the most frequent patterns of consumption.

Research approach

The majority of emergent themes regarding research approaches to cooking at home and the consumption of food cooked at home were identified through the systematic review, given that this data source provided capacity to compare, contrast and collate different research studies on home food preparation and meal consumption. Data from the systematic review showed that research on preparing and eating food cooked at home has primarily been cross-sectional in design, and studies addressing potential outcomes have largely focused on diet. The systematic review also identified heterogeneity in the methods used to measure cooking practices, consumption of food cooked at home, and use of alternative meal sources such as takeaways, ready meals, and eating out. This makes it more difficult to compare research findings across studies, and to draw meaningful conclusions. All three research phases provided evidence concerning a lack of clarity and consistency in terminology around cooking at home, and consumption of meals cooked at home and derived from out of home sources. This limitation has the potential to hinder data collection, analysis and interpretation, regardless of the research method employed. Suggestions are provided in Chapter nine to develop further understanding and consensus regarding terminology in this field.

8.4.2 Areas of potential contradiction

One area of explicit dissonance, and several themes which could be viewed as potentially contradictory, emerged from the data. These are discussed below.

Socioeconomic status

Higher SES was identified in the qualitative work and cohort analysis as being associated with greater preparation and consumption of food cooked at home. This relationship was more explicit in the cohort analysis, which assessed the association between frequency of consuming meals cooked at home and SES using a range of indicators. However, the association was not consistent across all the indicators of SES studied, and only household income and educational attainment were found to be statistically significant. In the qualitative work, participants generally reflected on factors known to be strongly influenced by socioeconomic disadvantage, such as money and cooking facilities, and cultural aspects of SES, rather than specifically stating that SES played an important role in their behaviour. This

is perhaps to be expected, given that the interview and focus group participants were encouraged to reflect on their own personal perceptions and experiences, rather than generalising to wider issues such as their relative standing in society.

In contrast, the systematic review highlighted a mixed picture, with evidence for associations between both lower and higher SES and greater preparation and consumption of food cooked at home. Overall, it would appear that SES has a role in determining cooking at home and consumption of food cooked at home, but this is a complex relationship which is likely to vary between different contexts. It is possible that limited resources associated with socioeconomic disadvantage might provide a barrier or disincentive to preparing and eating food cooked at home, but this may be overcome by other factors – such as interest in food and cooking – should they be sufficiently strong. Furthermore, considering SES as an umbrella concept may be an overgeneralisation. This is highlighted by the inconsistent findings from the cohort analysis using different measures of SES. Further exploration is therefore needed, to investigate the relationships between preparing and eating food cooked at home, varying contexts, and different facets of SES.

Cooking skills

Cooking at home and the consumption of meals cooked at home were noted to be complex behaviours, with a range of determining factors beyond cooking skills. Nonetheless, another key theme highlighted the importance of cooking skills and broader food skills in influencing behaviour. In line with this, teaching and encouraging children in cooking, to ensure continuation of practices in the next generation, also emerged as a main finding from the data. Although intervention studies were excluded from the systematic review, and overall conclusions to date regarding the effectiveness of teaching cooking to children have not been definitive (135), the theme of promoting cooking amongst children was mentioned in the included research in a variety of ways. For example, studies discussed the concept and perception of teaching in schools, community events, and sharing skills with family members. Even those who had no direct contact with children often expressed perceived importance of maintaining cooking at home and consumption of food cooked at home in the future.

These contrasts in the relative importance of achieving and teaching cooking skills may reflect that technical skills are necessary and important, but not sufficient for cooking. So a recipient may gain the choice of whether or not to cook and eat meals cooked at home when they learn these skills. However, they may still choose not to use them in practice, if for example they experience other barriers, such as low motivation.

It is possible that cooking skills interventions are commonly perceived by the general public as involving wider skills and/or determinants, such as developing motivation and interest in food and cooking, and hence such programmes are widely advocated. This is reflected in interventions such as the Jamie Oliver Ministry of Food cooking skills course, which alongside the principle aim of teaching people how to cook, includes other objectives such as: 'Get excited and curious about food, where it comes from and how it's grown' and 'Try new foods and flavours, and discover new favourites' (140, p. 43). The popular focus on cooking skills may also reflect lack of ingenuity in developing cooking interventions, and highlight that by default, onus is often placed on the individual to change their behaviour in response to education. Non-skills based interventions, targeting for example the wider food environment through availability and affordability of basic ingredients for cooking, are likely to be more complex to develop and implement, and potentially require greater political agreement.

Culture

The findings from Triangulation Protocol identified that key life course influences on preparing and eating food cooked at home, such as personal relationships, and roles and responsibilities, were similar between different cultures. These varied cultures included people from different sociodemographic backgrounds in the United Kingdom (UK) interviews and United States (US) focus groups; participants from both the UK and US in the cross-country qualitative comparison work; and research studies from different countries in the systematic review. Despite this finding, culture and ethnicity were also identified as playing important roles in determining the preparation and consumption of food cooked at home. Furthermore, cooking and eating practices were found to change over time, particularly at transition points in the life course.

These observed contrasts between consistency and change could be due to several reasons. Although culture and ethnicity were found to be important influences on cooking and eating food cooked at home, they formed only one part of a range of influential factors, many of which are probably consistent between different cultures. For example, the notion of pressure on time and resources is unlikely to be unique to specific cultural contexts, although the impact might vary according to prevailing cultural importance and motivation for cooking. Studies identified in this programme of research, illustrating the influence of culture and ethnicity on cooking and eating practices, tended to focus on migration and immigration. The key points in the life course at which patterns of preparing and eating meals cooked at home often changed were generally associated with transitions in personal circumstances, such as cohabitation and child rearing, rather than large-scale cultural changes. The majority of these life milestones would be expected to be shared between different cultures. However, the influences on cooking and eating behaviour investigated in this programme of work were studied only in more developed countries, and such relationships may not necessarily be more widely generalisable to a developing world cultural context.

Gender

Changes in behaviour over time regarding the preparation and consumption of meals cooked at home were identified as an important theme in this programme of work. However, gender was also highlighted as an important determinant, and it is very rare for an individual to change their gender over the course of their lifespan. This potential contradiction in themes may be due to the fact that whilst biological sex may remain constant, gender-related roles can alter over time, according to context. For example, a woman may feel pressurised to adopt traditional stereotyped responsibilities as a nurturer and meal provider, if they care for dependents. However, the same role may not be adopted if they do not bear these responsibilities, or may be relinquished when the responsibilities cease, for example when children leave the parental home, or they are too old to physically continue to cook.

Range of potential benefits

Triangulation Protocol identified as an emergent theme that cooking and eating meals cooked at home may be associated with a range of benefits, including potential advantages for physical health, and social life. In contrast, diet was highlighted as the primary focus of studies to date addressing the preparation and consumption of meals cooked at home. These differences between themes illustrate that research up to the present time has principally targeted potential dietary benefits of cooking and eating meals cooked at home, possibly because this is perceived as the most straightforward or achievable research focus. Nonetheless, the research that has been conducted exploring potential impacts on social life and physical health has been sufficient to deduce that there are likely to be advantages drawn from preparing and consuming meals cooked at home. This is supported by broader literature indicating potential benefits to diet, health and wellbeing from shared mealtimes, particularly in the family setting (395, 396), although this literature has not specifically studied meals cooked at home.

8.5 Discussion

8.5.1 Main findings

This chapter has described the use of Triangulation Protocol to integrate findings from the three research phases of this mixed methods programme of work. Key meta-themes emerging from the findings regarding cooking and eating meals cooked at home were behaviour, determinants, outcomes and research approach. One specific area of disagreement was noted between the research phases and the themes, namely higher SES and greater preparation and consumption of meals cooked at home. Several potentially contradictory themes were also explored. These concerned the comparative importance of cooking skills in influencing cooking and eating practices, the potential contrast between cultural concordance and diversity in behaviour, and changes over the life course. The disparity between continuity of gender, and transitions in approaches taken to cooking and eating meals cooked at home over time was identified. Potential divergence in the relative emphasis placed on research to date regarding putative diet, health and social benefits from preparing and eating meals cooked at home was also highlighted. The implications of these

findings from Triangulation Protocol are considered alongside those from the empirical chapters in the 'Implications for policy and practice' section of the following Chapter nine.

8.5.2 Strengths and limitations of triangulation

There were some limitations in using Triangulation Protocol to consider the findings from three different phases of research. The data sources differed, for example in terms of purpose, level of detail, focus and research paradigm. Hence many of the disparities between data sources, particularly in instances of silence on a research theme, may have been attributable to the nature of the source. In this triangulation exercise, comparisons of themes in the three research phases indicated areas of agreement and silence, but only one area of explicit disagreement. This could have been because differences between the research phases made it difficult to accurately identify clear areas of dissonance in the findings, or there may indeed have been minimal dissonance within the data.

The themes and meta-themes identified in Triangulation Protocol were reliant on the key findings that emerged from the different phases of the research, rather than returning directly to the raw data collected and analysed in each phase. Whilst this was necessary for the triangulation task to be feasible, some details from the research may have been missed, which could potentially have contributed toward more nuanced conclusions. Triangulation Protocol does not provide a third dimension to count the number of times that a theme is mentioned, or consider primacy and privilege of data sources. It is therefore possible that some of the research findings should have been weighted more heavily or prioritised over others, which could have altered the overall emphasis and conclusions.

However overall, Triangulation Protocol provided a useful approach to systematically integrate findings from different phases in a diverse programme of research. Using this method facilitated the identification of meta-themes emerging from the combined findings drawn from the systematic review, qualitative work, and cohort analysis, and searching for areas of agreement, dissonance and silence. The validity of the conclusions developed was increased by cross-checking the triangulation process and findings with my PhD supervisors. Triangulation Protocol enhanced the reliability and confidence in the overall conclusions drawn from this programme of research, since the deductions are unlikely to be dependent

on a specific researcher, theoretical perspective, data source or research method. The triangulation process also provided a useful tool to help consider the three research phases as a coherent whole programme of work, and to draw out key generalisable implications for policy and practice, as discussed in the next chapter.

8.6 Conclusion

Triangulation Protocol provided an effective approach for integrating diverse findings in this mixed methods programme of research. The key meta-themes emerging from this programme of work on cooking and eating meals cooked at home were identified as behaviour, determinants, outcomes and research approach. The relationship between higher SES and greater preparation and consumption of meals cooked at home was noted as a specific area of disagreement between the research phases and the themes. Several potentially contradictory themes were also highlighted, concerning the importance of cooking skills; influence of culture; change in gender-related roles; and relative emphasis on different putative benefits of cooking and eating meals cooked at home. Such potential contrasts between emergent research themes may be interpreted and understood by considering the multifaceted and evolving nature of food preparation and consumption.

Chapter 9. Discussion

9.1 Overview of chapter

In this chapter I provide a concluding discussion of the key findings from the thesis. I start by offering a summary of the main results with reference to the aims and objectives, and consider the principal strengths and limitations of the approach used to build the body of research presented in this thesis. I then suggest overarching implications for policy and practice, identified from the empirical findings, and Triangulation Protocol described in Chapter eight. Finally, I note the unanswered questions and opportunities for future research, and finish with brief closing remarks.

9.2 Summary of findings

The main stated aim of this thesis was to develop an improved understanding of home food preparation practices, experiences and perceptions, and the potential implications of home cooking for diet and health. This aim was met by addressing five specific research objectives:

9.2.1 Objective one

Systematically review current evidence regarding the health and social determinants and outcomes of home cooking.

In Chapter three, I described a systematic review of observational studies on participants from high or very high human development index countries. This review of the peer-reviewed literature identified 38 studies meeting the inclusion criteria, which were summarised using narrative synthesis. The findings showed that key determinants of cooking at home included being female, and having greater leisure time availability and less restrictive employment hours. Close personal relationships, such as caring responsibilities and cohabiting with others, and cultural and ethnic background, were also important influences on cooking behaviour. Overall, the determinants of cooking at home were far more diverse than cooking skills alone.

The majority of studies included in the review were cross-sectional, hence it was not possible to definitively deduce direction of cause and effect. Putative outcomes from cooking at home were largely focused on dietary benefits measured cross-sectionally or in the short term, and were assessed predominantly at an individual, rather than group or community level. The conceptual model developed from the review findings (Figure 3.2, page 61) highlighted the complexity of cooking at home, and areas for further development of the evidence base. These areas included more detailed exploration of the nuances around cooking behaviour, and potential relationships between cooking and health.

9.2.2 Objective two

Provide detailed insights into home cooking behaviours, and how they are perceived and rationalised.

9.2.3 Objective three

Identify barriers and facilitators for home food preparation.

In Chapter four, I addressed key issues arising from the systematic review by undertaking qualitative interviews with 18 adults in the North East of the United Kingdom (UK), to explore their home food preparation practices, experiences and perceptions. I identified wide inter-participant variation in cooking behaviour, from heavy dependence on meals requiring minimal preparation, such as pre-prepared ready meals, takeaways and eating out, to routinely cooking complex meals entirely from basic ingredients. The main barriers and facilitators for cooking at home were categorised into factors concerning the cook (identity), the task (process of cooking), and the context (situational drivers). Time, money and facilities were key resources influencing cooking practices. Patterns of behaviour were also determined by personal motivations to cook, and the influence (or absence) of others.

Overall, cooking at home reflected a compromise between diverse competing demands and challenges in life. Intra-participant variation in cooking behaviour was evident across the life course. This was particularly significant at life transition points such as starting and ending cohabitation, adopting and ceasing caring responsibilities, and changes in employment, such

as retirement. Most people viewed their own food preparation practices as personally acceptable, and were able to rationalise any perceived shortcomings, attributing them for example to time pressures. However, many participants described an aspiration, under ideal circumstances, to cook more frequently and to make greater use of basic ingredients. Often this seemed to be driven by social desirability, in order to provide more complex, healthy meals for themselves and others, and to fulfil an ideal or self-identity as a competent cook.

In Chapter five, I described a cross-country qualitative study comparing findings from the UK interviews, and those from focus groups on cooking undertaken in Baltimore, United States (US). This research highlighted that despite differences in the food environment and food preparation culture, participants in both countries perceived 'home cooking' as a specific subtype of cooking at home, distinct from other cooking practices. Definitions of 'home cooking' were generally categorised into: preparing a meal from scratch, cooking with love and care, and nostalgia. The lack of alignment between these descriptions of 'home cooking' and principles of a healthy diet were consistent in both the UK and US. In light of these findings, I opted to primarily use the term 'cooking at home' in place of 'home cooking' for the remainder of the thesis.

9.2.4 Objective four

Identify the relationships between higher frequency of consuming home cooked meals, markers of dietary quality, and indicators of cardio-metabolic health status.

9.2.5 Objective five

Describe the sociodemographic characteristics of those consuming home cooked meals and main meals from out of home sources.

In chapters six and seven, I analysed cross-sectional data from the UK Fenland study on consumption of meals cooked at home, ready meals, takeaways and eating out, and participants' sociodemographic characteristics, diet quality, and cardio-metabolic health. In Chapter six, multivariate analyses showed that more frequent consumption of meals cooked at home was associated with better diet quality, in terms of greater adherence to the Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets, greater fruit and

vegetable intakes and higher plasma vitamin C. Eating meals cooked at home more frequently was also associated with lower adiposity, as measured by greater likelihood of having normal range BMI and normal percentage body fat. The relationships between frequency of eating meals cooked at home and markers of adiposity were strongest at the highest consumption frequency of more than five times per week, indicating that the greatest potential benefits were derived from eating meals cooked at home most often. The associations between frequency of consuming meals cooked at home and HbA_{1c} (measure of diabetes risk), cholesterol and hypertension were not significant after adjusting for potential sociodemographic, behavioural and dietary confounders.

In Chapter seven, logistic regressions showed that eating meals cooked at home more frequently was associated with being female, older, not working overtime and higher socioeconomic status (SES) (as measured by educational attainment and household income). Sociodemographic characteristics associated with eating meals from out of home sources varied according to meal source, and were not necessarily the reciprocal of those associated with eating meals cooked at home. A higher frequency of consuming takeaways was associated with being male, non-white ethnicity and lower SES (in terms of household income and educational attainment). Eating ready meals more frequently was associated with being male and lower SES (as measured by household income only). A higher frequency of eating meals out was associated with being male, working overtime and higher SES (in terms of household income and educational attainment).

9.2.6 Overall findings

Overall, the three phases of this mixed methods programme of research have helped to develop a clearer picture regarding the practices, perceptions and experiences linked with cooking at home, and the potential impact of cooking and eating meals cooked at home on diet, health and social life. I systematically integrated the findings from these three research phases using Triangulation Protocol in Chapter eight, and identified key meta-themes concerning behaviour, determinants, outcomes and research approach. An instance of disagreement arose between the research phases and the themes, in terms of higher SES and greater preparation and consumption of meals cooked at home. Potential contradictions between themes were also noted with regards to the importance of cooking skills; influence

of culture; change in gender-related roles; and relative emphasis on different putative benefits from cooking and eating meals cooked at home. Triangulation Protocol helped to generate insights regarding the three research phases as a coherent whole programme of work, and to identify implications for policy and practice, as discussed later in this chapter.

9.3 Strengths of the programme of research

This mixed methods programme of research benefits from a number of strengths. The particular strengths associated with each research phase have been noted previously in the respective empirical chapters. Overall, the research is focused on tackling issues of international importance. In almost every part of the world, health problems attributable to diet-related non-communicable diseases (NCDs) now outweigh the burden due to undernutrition (2, 443-445). Given the modifiable nature of diet, and strong relationships between diet and health, addressing key aspects of diet – such as food preparation – provides an important opportunity to enhance our understanding of these issues, and work towards initiatives to improve diet and related NCDs.

The advantages of using a mixed methods approach to explore a multifaceted issue such as cooking at home were noted in Chapter eight. This programme of research was also undertaken from a broad public health standpoint, incorporating flexibility and a range of perspectives, rather than imposing specific restrictions, such as the use of a particular economic or psychological theory. Further insights were developed by using Triangulation Protocol (441) to integrate findings from the diverse research methods, as described in Chapter eight. The three phases of work were conducted according to rigorous research standards, such as guidance from the Economic and Social Research Council (216), Framework Analysis (287), and registering the systematic review protocol with the PROSPERO International Prospective Register of Systematic Reviews (204). The research was also reported in adherence to recommended guidance, namely the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines and Meta-analysis Of Observational Studies in Epidemiology (MOOSE) guidelines (phase one) (206), COnsolidated criteria for REporting Qualitative research (COREQ) guidelines (phase two) (281), and

STrengthening the Reporting of OBservational studies in Epidemiology for nutrition (STROBE-nut) guidelines (phase three) (325) (see Appendices A, N-O).

This programme of work benefited from patient and public involvement (PPI) at every stage of the research, from developing the study designs, to disseminating the findings (see Acknowledgements). Overall, the thesis is composed of work deemed to be of publishable quality, as demonstrated by peer-reviewed publications, published conference poster abstracts, and invited presentation of the research material (see Thesis outputs).

9.4 Limitations of the programme of research

This body of research is also subject to certain limitations. The specific shortcomings of each research phase have been discussed in the respective empirical chapters. Notably, it was not possible to conclusively deduce direction of cause and effect due to the cross-sectional nature of: the majority of studies included in the systematic review in phase one; the qualitative research described in phase two; and the Fenland study data analysed in phase three. Participants included in the Fenland study analysis sample and those involved in the qualitative research were all adults, and were not nationally representative in terms of certain sociodemographic characteristics. Since recruitment of the interview participants involved direction from PPI group members towards organisations with which they are affiliated, it is possible that some interview participants may have been more community orientated than the general population. Hence the findings may not all necessarily be generalisable to wider populations, in particular children and adolescents. However, over the three research phases a broad range of participants were considered, including diverse studies of adults, adolescents and children in the systematic review; purposively sampled participants with wide-ranging sociodemographic characteristics in the qualitative work; and a large population-based participant sample in the Fenland study analyses. It is therefore likely that the main conclusions drawn from this body of research are transferable to other population groups.

This research has been conducted from the perspective of the developed world, and orientated towards those populations with a predominantly Western diet and food environment (446), particularly in terms of Northern European heritage. Given the international diversity of food consumption patterns (199), these empirical research findings, and the associated implications, may not necessarily be more widely generalisable to less developed countries with more traditional food environments and cooking practices. Nevertheless, the rapid expansion of the nutrition transition (141) suggests that principles relevant to the developed world are likely to become applicable to many less developed countries within the near future.

As noted previously (43, 125) and throughout this thesis, cooking at home and the consumption of food cooked at home is a complex topic with multiple, diverse influences. It has therefore not been feasible to address all relevant facets of cooking and meal sourcing behaviour through new empirical research. However, the key remaining issues have been indicated in the background section in Chapter two, and through the discussion portions of chapters three to eight. The work supporting this thesis has been led by a single researcher, and is therefore vulnerable to subjectivity. In order to minimise the potential impact of biases, the empirical research and wider discussion have been reviewed by my PhD supervisors and the PhD advisory group, the PPI panel, and both journal and conference peer-reviewers.

9.5 Implications for policy and practice

Overall, this programme of research has reviewed, and generated new evidence, indicating that preparing and consuming meals cooked at home may offer a range of diet, health and social benefits over meals from out of home sources. Since this research is largely cross-sectional, it is not possible to definitively state direction of causation of effects. However, temporality is only one of nine 'aspects of association' originally outlined by Bradford Hill to help deduce whether or not epidemiologic associations are causally related (447). These aspects of association were described in 1965 – when the scientific field was remarkably different to today – and were not intended to be used as a rigid checklist for assessing

causation. Nonetheless, these criteria offer a useful framework for considering whether there is currently enough evidence overall to indicate causal relationships between preparing and eating meals cooked at home, and diet, health and social benefits.

9.5.1 Bradford Hill criteria

Bradford Hill's first criterion, strength of association, indicates that the greater the association between exposure and outcome, the more likely the relationship is to be causal. In a modern context, statistical significance is often used to assess quantitative measures. In phase three, this programme of work identified statistically significant relationships between higher frequency of consuming meals cooked at home, and indicators of a healthier diet and lower adiposity. Similarly, other studies included in the systematic review in phase one found statistically significant associations between preparing and consuming meals cooked at home and diet and health benefits. However, the majority of studies focused on dietary advantages, and potential social merits were assessed using qualitative methods only.

The second criterion of consistency, whereby several different studies, with differing populations and contexts, identify similar relationships between the exposure and outcome, is also supported overall by this programme of research. In Chapter eight, Triangulation Protocol approach showed agreement between the three research phases in terms of associations between preparing and consuming meals cooked at home, and potential diet, health and social benefits. However, the qualitative work was silent regarding advantages for physical health, and the cohort analysis was silent regarding social merits. The majority of studies included in the systematic review in phase one that investigated outcomes indicated potential benefits arising from cooking and eating meals cooked at home.

The third criterion of specificity considers that if the exposure leads to only one outcome, the association is more likely to be causal. Modern science has enabled advancements in understanding of interactions between different risk factors for disease, such that this criterion is now generally considered a weak or irrelevant indication of causal relationships (448). The fourth criterion of temporality, with the exposure required to precede the outcome in order for an association to be causal, has been noted previously as not generally addressed by the study designs included in this programme of work. However, other studies

of longitudinal design have generally identified advantages from consuming meals cooked at home, such as dietary benefits (36), and from cooking at home, such as longer lifespan (35).

The fifth criterion of biological gradient indicates that if a dose-response relationship is observed between the exposure and the outcome, the association is more likely to be causal. This is reflected in the phase three data analyses, which showed that associations between frequency of eating meals cooked at home and potential benefits for diet and health were greatest at the highest frequency of consumption. Similarly, the relationship between frequency of consuming meals prepared at home and lower risk of developing type II diabetes has previously been found to be strongest at the highest frequency of meal intake (36).

The sixth criterion of plausibility requires that the proposed causal association between exposure and outcome is consistent with current widely accepted scientific theory. Similarly, the seventh criterion of coherence considers that the cause-and-effect relationship should be logical, in view of all the available relevant scientific knowledge. The proposed associations between preparing and eating meals cooked at home and diet, health and social benefits would appear in line with existing evidence in the field. For example, out of home food alternatives have been linked with higher levels of overweight and adiposity (189, 191, 192), and weight gain amongst young adults (193).

The eighth criterion of experiment suggests that a causal association is more probable, if an experimental intervention affecting the exposure leads to an altered risk of the outcome occurring. As previously noted, evidence to date regarding the impact of cooking interventions has largely been inconclusive (107, 133), and this programme of research did not contribute further empirical evidence regarding cooking interventions.

The ninth criterion of analogy considers that if one causal exposure has already been identified, the standard of evidence required to ascertain causal relationships for a second, similar exposure, are reduced (449). This criterion has been criticised as subjectively dependent on the extent of the researcher's creativity in suggesting analogies (450), and is therefore probably a less useful benchmark for assessing potential causal associations.

9.5.2 Public health action

Since eating is ubiquitous and essential for life, it is not feasible for researchers, practitioners and policy makers to ignore this issue. In the context of public health, evidence from studies highest in the hierarchy of research design is not always available to inform decision making in policy and practice (210, 451). However, current available evidence, as discussed above using the Bradford Hill criteria, suggests that preparing and eating meals cooked at home is preferable to sourcing and consuming meals from out of home sources. This is in line with calls for cooking at home to be widely adopted, as stated in both academic literature and government policies, and supported by the media (103, 452-454).

The vast international burden of diet-related NCDs (2) and growing evidence in favour of potential benefits from cooking at home and eating meals prepared at home, suggest justification for public health action. This may be at the level of guiding choice through incentives and disincentives, according to the tiered Nuffield public health intervention ladder (455). Given current and projected future widespread reductions in public health funding in countries such as the UK (42), it will be important for research to assess the relative potential benefits of focusing on cooking, in comparison with other determinants of diet and health, such as reformulation of processed foods (456) and taxes on sugar-sweetened beverages (457).

In order to address the implications for policy, practice and research from this programme of work, the model developed in phase one demonstrating the determinants and outcomes of cooking at home (see Figure 3.2, page 61) has been updated here, by adding the findings from phases two and three (see Figure 9.1). The contribution of evidence from each of phases one, two and three are colour coded in the model. There was no evidence specifically derived from phase one only, phase three only, or phases two and three jointly, therefore these are not colour coded. The model illustrates the multifaceted and interrelated nature of determinants and outcomes of cooking at home and eating meals prepared at home, and I have used this as a framework to consider the related implications, as described below.

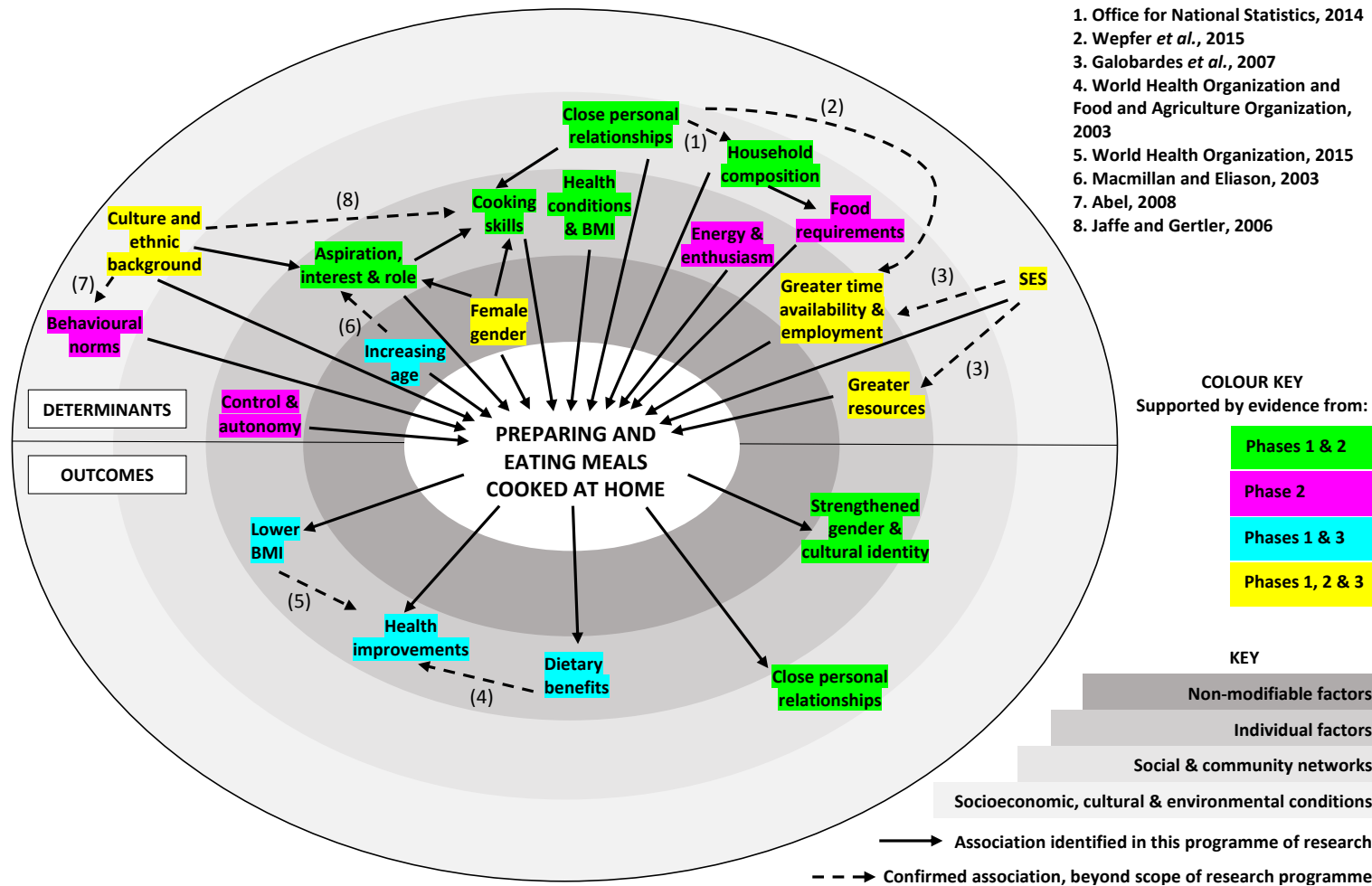


Figure 9.1 Overall conceptual model of the determinants and outcomes of preparing and eating meals cooked at home, with the findings from each research phase colour coded (4, 245-250, 458).

9.5.3 Addressing determinants of preparing and eating food cooked at home

The research findings identified through this programme of work, as shown in Figure 9.1, suggest a number of implications regarding the determinants of preparing and consuming food cooked at home. Firstly, modifying practices is unlikely to be straightforward and simple to achieve. This is emphasised by the varying relative importance of different determinants in different contexts, and the overall inconclusive findings from reviews of cooking interventions to date (107, 133, 136). Secondly, given that a wide range of determinants of cooking and eating meals cooked at home have been identified, it is likely that in order to be most effective, cooking interventions should incorporate components targeted towards several domains of influence. For example, intervention targets may include policy, education, technology and/or resources. Addressing discrete areas in isolation, such as specific individual factors, may be less likely to lead to comprehensive changes in behaviour.

Thirdly, evidence from phase three indicated that different sociodemographic characteristics are associated with different patterns of meal consumption behaviour. Therefore cooking interventions should be tailored to their audience, rather than adopting a one size fits all approach, and/or multiple population-wide schemes should be employed, covering many different determinants of preparing and eating meals cooked at home. This is likely to necessitate close collaboration between those designing and evaluating interventions, public health policy makers, and practitioners working with target recipients. Fourthly, the consistency in life course influences between different cultures, as identified in this programme of work, suggests that learning from exploratory research and interventional studies may be transferable between different international contexts, at least in the more developed world.

Specific determinants of preparing and eating food cooked at home that have been identified as important in this research provide pointers toward potentially impactful intervention strategies. These are described below and illustrated by examples in Table 9.1.

Proposed intervention/approach	Related examples	Supporting evidence from programme of work
Cooking training for men and boys	Real Men Cook: charity initiative promoting male involvement, education, outreach and advocacy on food resources, healthy eating and cooking (459)	Phase 1: women and girls cook more frequently, and have greater cooking skills and confidence, than men and boys Phase 3: women eat meals cooked at home more frequently than men
Targeting males in initiatives to promote a more gender-neutral culinary culture	Football Fans in Training: a gender-sensitised weight loss and healthy living programme for overweight and obese men, delivered by Scottish Premier League football clubs (460)	
Training in schools to cook simple, healthy meals	Home economics in the Irish school curriculum, delivered by trained teachers (461)	Phases 1-3: teaching children to cook is important; preparing simple meals cooked at home may be easier to maintain; specific connotations of the cooking subtype 'home cooking' may be less healthy
Training for the general public in broader food skills/food literacy/food agency	University of Vermont food lab course in food and food culture (462)	Phases 1-2: wider skills, in addition to mechanical cooking skills, influence cooking and eating practices
Training in quick and flexible cooking for those with time constraints	Jamie Oliver's 15 minute meals recipes and demonstration videos (307, 398)	Phases 1-3: barriers to cooking include lack of time, motivation, and different food preferences within households
Training in nutrition and food preparation for health and social care professionals	Tulane University School of Medicine curriculum for medical students, teaching integrated cooking and nutrition science (463)	Phases 1-2: cooking is influenced by motivational levels, which may be modified during periods of illness and by advice from professionals
Cooking training targeted at specific stages in the life course	Cooking matters: initiative to develop skills amongst young families for healthy and affordable cooking, food shopping, and food literacy (264)	Phases 1-2: changes in motivations and demands at transitions in the life course offer opportunities for intervention
Cooking education delivered at 'teachable moments'	Culinary Health Education for Families: cooking and nutrition training delivered to families referred on by a clinician for poor dietary-related health (464)	
Developing greater accessibility and affordability of healthy, basic ingredients for cooking	UK Healthy Start voucher scheme: provides means-tested free weekly vouchers for pregnant women and children under four years of age, to spend on milk, plain fresh and frozen fruit and vegetables, and infant formula milk (268)	Phases 1-3: resources are an important determinant of cooking and eating behaviour

Promotional campaigns on potential benefits of cooking, to encourage higher societal value and appeal	Supermarket retailers Tesco and Sainsbury's marketing campaigns for cooking at home (305, 306)	Phases 1-2: cooking is a compromise between different competing influences, and perceptions of potential barriers influence behaviour
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Table 9.1 Potential interventions for preparing and eating food cooked at home, with related examples, and supporting evidence from this programme of work.

Gender

The pervasive predominance of women and girls in both cooking at home and consuming meals cooked at home indicates there is scope for further involvement of men and boys. Greater engagement of males in cooking at home may help to reduce some of the pressures associated with lack of time for cooking, by increasing the pool of household members involved. This could also facilitate greater equity between males and females in terms of eating meals cooked at home, and associated potential dietary, health and social benefits. However, this strategy would need to be broached carefully, in order that women and girls do not feel disenfranchised from any perceived cultural or gender role as primary food provider in the home.

Creating a more equal gender balance in the preparation and consumption of meals cooked at home may require appropriate provision of training, for example cooking classes led by and specifically tailored to males, such as Real Men Cook (459). Steps towards a culinary culture in which men and boys are encouraged to value cooking at home more highly may also be needed. This might start in childhood, by for example providing more gender-neutral toys associated with food preparation and consumption. In older age groups, cooking equipment, cookbooks and marketing material in supermarkets could all be more orientated towards males. The concept of cooking at home might also be promoted in traditionally male dominated settings such as live sports, and endorsed by male celebrities. This may be particularly influential, given the evidence from research phases one and two indicating that role models and aspirations are important in determining cooking behaviour, and the success of previous healthy living initiatives targeted towards men, such as Football Fans in Training (460).

Prioritisation and motivation

In this programme of work, approaches to cooking at home were found to strike a compromise between different competing demands and motivations in life. The prevalence of cooking and eating meals cooked at home for individuals and their families was often apparently determined by its degree of prioritisation. This was particularly relevant in the context of time: although time was consistently identified in the three research phases as an important determinant of behaviour, wide-ranging engagement in cooking and consuming meals cooked at home was observed across the spectrum of leisure time availability. This

finding was less evident in the third research phase, which did identify a higher likelihood of frequently eating meals cooked at home amongst people not working overtime. Overall however, it seems that those who prioritise cooking may perceive this as a positive time investment, regardless of the opportunity costs, whereas when cooking is less of a priority, lack of time is more likely to be seen as a challenging barrier.

In terms of modifying behaviour and increasing enthusiasm and motivation, strategies may therefore need to appeal to perceptions of cooking and consuming food cooked at home as a priority. For example, existing and new marketing campaigns highlighting a range of potential benefits might be supported. Meals cooked at home have been promoted through UK national health initiatives such as One You (269). Supermarket retailers including Tesco (305) and Sainsbury's (306) have also begun to advertise the potential merits of preparing and eating meals cooked at home. Similarly, food brands such as Uncle Ben's have emphasised the potential social values inherent in cooking at home, with adverts stating: 'You have a big influence on your kids, so teach them the life lesson of cooking' (465, 0:20). This contrasts starkly with marketing from out of home food vendors, such as Just Eat – which promotes takeaways as liberation from the constraints and drudgery of the kitchen (466).

Food skills and food literacy

This doctoral work has reviewed previous research in phase one, and developed qualitative evidence in phase two, suggesting that promoting an interest and appreciation for food and cooking at an early stage in the life course may be important to encourage a more cooking-positive culture. This programme of work has also summarised evidence indicating that developing a range of diverse skills could be beneficial in encouraging cooking behaviour and navigating the food environment. Skills can influence food choices, and ultimately health, by determining which foods people purchase (for example frozen pizza rather than raw chicken and fresh vegetables) and how they prepare these ingredients (for example frying rather than grilling chicken) (221). Important skills to develop would therefore include technical cooking skills such as roasting and poaching, and wider food skills such as meal planning and budgeting, and flexibility and creativity in producing meals.

This principle is in line with recent calls for a broader conceptualisation and approach to cooking, with greater consideration for the food context, and an individual's interaction with and navigation of their food environment. Such concepts of food literacy and food agency recognise that in contrast to the design of many cooking interventions to date, individuals do not operate autonomously and dispassionately, with a clearly defined set of discrete actions (56, 126). Comprehensive approaches to developing and implementing cooking interventions seek to change food preparation and consumption practices more effectively, in comparison with task-orientated strategies. At the University of Vermont, US, a food lab has been created to provide combined learning in food, food culture and how to cook (462). Future public health initiatives could support the modification of current cooking classes in UK schools, to encourage greater focus on food literacy, negotiating the food environment, and learning to produce simple, healthy meals. This approach would be more akin to the discipline of home economics, as delivered for example in Irish educational settings (461). By teaching universally in schools, this strategy could also help to avoid the potential introduction of inequalities, as mediated through opt-in community programmes.

Food environment

Whilst potentially more challenging to achieve in practice, modifications to the food environment could make it easier for individuals to navigate, and to make healthier choices. The availability of different foods, in terms of physical access, affordability, and social acceptability, can impact on choice of meals prepared and cooking methods used (219). The price of basic ingredients and overall cost of cooking meals were noted in phases one and two of this research as important determinants of behaviour, and evidence suggests that in comparison with more unhealthy, higher energy-density foods, lower energy-density foods such as fruit and vegetables have become disproportionately less affordable over time (17). This is a great disincentive for socioeconomically disadvantaged groups to eat healthfully (184), and likely contributes to known socioeconomic inequalities in diet and diet-related health (179, 467, 468). Public health initiatives to promote the availability, affordability and appeal of healthier foods used for cooking at home, such as vouchers for fruit and vegetables (268), and/or disincentives for less healthy processed items, such as taxes on sugar-sweetened beverages (457), could therefore lead to great benefits for diet and health. A combined individually-focused and food environment approach also acknowledges that strong public health emphasis on cooking, and teaching cooking skills, shifts onus and

responsibility onto individuals to improve their own diet and health. However, accountability should also lie with those determining the food environment in which choices are made, such as governments, public health policy makers and the food industry. Hence an integrated range of interventions is likely to be needed, including a whole system approach (469), with upstream targeting of health policy, impacting on the food supply, food chain, and food choices (470).

9.5.4 Addressing potential outcomes of preparing and eating food cooked at home

Public health nutrition interventions may be advanced by promoting the diverse potential advantages derived from cooking at home and eating meals cooked at home. Findings from this programme of work indicated that benefits may exist in terms of diet (including a range of indicators), physical health (particularly adiposity), family and friends (such as demonstrating love and care for others) and community networks (for example social cohesion and cultural identity). Qualitative evidence also suggested that cooking at home may offer benefits for mental health and wellbeing, with regards to developing new skills, creativity, and fostering a sense of achievement. However, interventions based solely on education and provision of information are not always successful in changing behaviour (471, 472). A more interactive approach, incorporating for example cooking demonstrations and food tasting, could be more effective (473). Interventions may additionally need to address actual and perceived barriers to behaviour change. For example, potential barriers noted in this body of research included conflicting food demands and preferences in the household, lack of time, and periods of low motivation for cooking. These might be addressed through interventions designed to develop skills and confidence in flexible meal planning and adaptation of recipes, such as ingredient swaps; quick-cook recipes; and batch cooking, to provide meals for occasions when time and energy are in shorter supply. For optimal impact, interventions should also be part of a broad spectrum approach, tackling both individual behaviour and the wider food environment.

This research supports previous studies which showed that the greatest potential benefits from cooking and eating meals cooked at home were derived from frequent practices, in the order of at least five times per week (34, 36, 326). These findings suggest that public health initiatives should support people to prepare and eat meals cooked at home as part of their daily routine, by for example planning each meal in advance and specifically scheduling time

for preparation. Although the concept was not specifically addressed through this programme of work, it is also likely that encouraging simple, healthy cooking at home may be the most effective strategy for maintaining regular habits. The preparation of more complex dishes, such as those created in television cookery programmes or cooking magazines, is likely to be more intimidating, time consuming and expensive, thereby creating potential challenges in sustaining cooking routines over time. Furthermore, evidence considered in this programme of work has indicated that more ambitious recipes, of the style inspired by celebrity chefs, may confer a poor nutritional profile (40, 195). These findings concur with conclusions drawn from the cross-country qualitative comparison study in phase two, which identified that there are likely to be a range of different subtypes of cooking, with varied consequences for diet and health.

Given the variation in cooking practices demonstrated through this research, it is important that messages promoting cooking at home are carefully framed. In particular, it would appear preferable to refer to the act of 'cooking at home' rather than 'home cooking', in view of the potential negative implications of the specific term 'home cooking' for diet and diet-related health. Public health initiatives should also acknowledge that some meals cooked at home are healthier than others, and discretion is still required, regarding choice of ingredients and cooking methods. Interventions should promote cooking from scratch and the preparation of meals from basic ingredients, rather than the predominant inclusion of less healthy processed foods (474).

However, given current uncertainty regarding the precise implications of different types of cooking at home, it is plausible that any cooking at home – including that involving pre-prepared convenience products – might be preferable to complete reliance on out of home alternatives. This might be, for example, because meals cooked at home may be more likely to include fruit and vegetables than those from out of home sources (309). The pressure, particularly experienced by women, to produce elaborate meals prepared at home (475), is frequently perpetuated by celebrity chef culture and the popular media (476, 477).

However, emulating a perceived socially desirable ideal of cooking meals at home daily, to be shared together with others around a table at leisure, may be unrealistic. Hence public health messages should not necessarily emphasise a straightforward dichotomy between cooking and not cooking, but instead use terminology carefully to encourage those aspects

of preparing food at home associated with better nutrition, such as healthier cooking methods for both basic ingredients and convenience foods. Advice on appropriate portion sizes, such as that provided in Public Health England's healthy eating guidance (478), should also be promoted.

9.5.5 Principles for guiding interventions

Life course perspective

This research has highlighted that transition points in the life course may provide key stages at which to deliver interventions to encourage cooking at home. For example, changes in context and motivations when leaving the parental home; beginning and ceasing employment; starting and ending cohabitation; and adopting and relinquishing caring responsibilities, could offer opportunities for engagement. Adopting a life course perspective has been identified as a useful framework for revealing insights regarding how food choices evolve in changing historical, temporal and social circumstances (479, 480). The life course viewpoint takes account of the dynamic nature of food choices, rather than considering an isolated snapshot in time – which may exclude important context. A life course perspective typically includes trajectories, which refer to patterns or states of health, or social factors impacting on health, that persist over long periods of time; transitions, such as changing responsibilities or social roles; and turning points, which represent significant changes after which life takes on a new direction. Also viewed as important are culture and contextual influences, the timing of life events, interactions with significant others with whom we are interdependent, and adaptive strategies, in terms of social norms and individual conscious decisions to change (480).

In the context of food choices, the life course perspective has been used to explore, for example, fruit and vegetable consumption (481), food insecurity (482) and cooking experiences of older adults (483). Consideration for the life course, and interrelationships with cooking practices and consumption of food cooked at home, may prove instructive in the development and implementation of cooking interventions. Certain transitions, such as ending cohabitation and relinquishing caring responsibilities, are less likely than others to involve contact with organisations and agencies, and are therefore potentially more challenging to support. Such transitions might be addressed by developing targeted marketing campaigns, emphasising for example the opportunity to use greater available

leisure time in cooking at home, and the sociability of preparing meals to share with other non-household members.

The life course approach is based on a number of linked psychological theories, including the moments of change hypothesis (484), and the habit discontinuity hypothesis, which states that when individuals' habits are disrupted by a context change, a new opportunity opens up in which the deliberate consideration of behaviour is more likely (485). Evidence from previous studies in food related (486, 487) and non-food related (488-490) domains has suggested that the context changes associated with life transitions may be fruitful opportunities for intervention. Similarly, the term 'teachable moment' has been used to refer to life transitions or health events which motivate recipients to modify their health behaviour to a state of lowered disease risk (267). This theory is built upon the perceived significance of cues in incentivising motivation to behaviour change (491). An advantage of this concept is that by strategically timing interventions to coincide with naturally occurring events, such interventions might be increased in effectiveness, despite often remaining self-directed and low in intensity and cost. The opportunities afforded by teachable moments have been noted in a variety of health contexts, including prostate cancer screening (492), non-cardiac chest pain (493), sexual health consultations (494) and medical triggers to weight loss (495).

In terms of cooking interventions, support could be offered to existing programmes targeting stages in the life course, such as those involving young families on low incomes (264), and existing initiatives directed towards teachable moments, such as pregnancy and the periconceptional period (496). New interventions might also be developed, aimed at reaching for example young men leaving the parental home or commencing employment, given that younger males were found to cook and eat meals cooked at home less frequently in this programme of research. Cooking initiatives targeting teachable moments could, for example, be delivered as brief educational interventions for patients visiting their general practitioner due to a dietary-related health scare, following the model of alcohol brief interventions (497). Some clinicians have already started to 'prescribe' cooking to their patients consulting for diet-related NCDs, by creating teaching kitchens as part of their practices, such as the nutrition-focused US paediatrics practice, Yum Pediatrics (498). Patients with diet-related NCDs, and their families, may also be referred to cooking

education programmes, such as the Culinary Health Education for Families (CHEF) initiative (464).

Training for health and social care professionals

Despite the great importance of nutrition in disease prevention and management, and the key role of health and social care professionals in communicating advice to patients, concern has been raised regarding professionals' apparent low levels of nutritional knowledge (499, 500). In response, recent initiatives have been developed to promote nutrition teaching in the UK medical student undergraduate curriculum (501, 502). In the US, one medical school has taken a step further by collaborating with a local college of culinary arts to develop a new culinary medicine centre (503). The main aim of the Goldring Center for Culinary Medicine is to train medical students and doctors in healthy food preparation, using for example recipes adherent to DASH (Dietary Approaches to Stop Hypertension) dietary guidelines, in order that physicians might be equipped to integrate knowledge and experience of healthy cooking into their future clinical practice (463). Given the potential receptiveness of patients to clinicians' advice at teachable moments, and the putative benefits of cooking at home and eating meals cooked at home identified through this programme of work, training for health and social care professionals could prove an effective strategy for wider roll-out in future.

It has previously been noted that overall, in view of the varied potential opportunities to promote cooking at home, cooking initiatives and their advocates should be coordinated, to avoid direct competition for attention and resources (504). Placing emphasis on campaigns for integrated cooking policy, and overarching principles to optimise cooking, may be more effective than pursuing multiple small initiatives. A degree of prioritisation is likely to be required, for example focusing on the next, rather than current, generations. It has also been highlighted that maintaining novelty and joy in cooking is important to sustain motivation, and reasonable expectations in terms of outcomes should be held – given that cooking will not solve complex 'wicked' problems such as the international obesity crisis, in isolation (504). However, it is ethically of paramount importance to ensure that policies and interventions do not cause harm, by for example widening health inequalities (455). Hence evaluation should form a fundamental component of implementing related public health policies and interventions.

9.5.6 Definitions and terminology

A key issue throughout the course of this PhD research has concerned the present lack of clarity and consistency in terminology and definitions for both cooking at home, and out of home alternatives. Extending recent work (48, 49) to develop consensus in this area would facilitate the collection of more valid data in research, for example through surveys and interviews, and enable more accurate comparisons between different studies. In the context of public health policy and practice, clearer terminology would help to facilitate the promotion of principles and initiatives to optimise diet-related health.

In the background section provided in Chapter two, I offered a working definition for cooking, built upon existing definitions and concepts around cooking, cooking from scratch, and meals cooked at home (see Table 2.1, page 15). On the basis of the findings from this programme of research, I suggest the following developments, and principles for guiding future terminology in the area:

- The terms ‘cooking at home’ and ‘meals cooked at home’ should in general be used in place of ‘home cooking’ and ‘home cooked meals’, due to apparent poor alignment between ‘home cooking’ and principles of healthy eating, as explored in Chapter five
- The working definition for cooking outlined in Chapter two: ‘the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating a range of ingredients’ is fit for this task, when incorporating certain supplementary criteria for cooking
- These criteria draw upon further consideration of the existing definitions shown in Table 2.1, and additional learning developed through my PhD research, in particular the qualitative work described in phase two. Themes emerging from this research indicated that cooking was generally considered to involve a range of ingredients, often those that were basic or unprocessed, and the work of cooking frequently encompassed heating. Cooking was perceived as multi-stage task, requiring personal engagement and effort
- Therefore, cooking:
 - Involves the combination of at least three different food ingredients. One or more of these should be a ‘basic’ ingredient

- Basic ingredients are derived from groups one and two of Monteiro *et al's* processing classification (505). These include unprocessed and minimally processed foods (such as cleaned vegetables, frozen meat and pasteurised milk) and processed culinary or food industry ingredients (such as oils, salt and sugar). Ingredients do not necessarily need to be 'fresh' or raw, but should require a degree of further input prior to consumption, for example dried pasta needs heating in boiling water
- Does not necessarily need to involve heating, although often will
- Involves active participation in the task, by for example mixing ingredients, or preparing them for consumption, by for instance peeling or chopping
- Involves evaluative processing, for example using a stovetop and monitoring heating, and adjusting the degree of heat and timing as appropriate
- Involves developing an idealised concept of the intended completed dish, which is not necessarily evident to others from the outset
- The ordering of the procedure is important to achieve the desired result, although there may be a degree of flexibility
- Criteria for 'cooking from scratch' are the same as those above for cooking more generally. However, additionally this should involve a majority of basic ingredients.

9.6 Unanswered questions and future research

This programme of research has identified a number of areas requiring further study and exploration, within the field of preparing and eating meals cooked at home, and potential diet, health and social implications. This is a complex domain, and how a person cooks, including all the determinants that influence their approach; how they perceive cooking; the values they associate with cooking; and their level of knowledge and skills, may all be important for their interaction with the food environment; the food choices that they make; and how they prepare these foods.

9.6.1 Research approaches

Further clarity is required regarding the definitions and terminology used to describe cooking and meals prepared at home. In view of the challenges identified through this research regarding the measurement of cooking, further studies on assessment are also

likely to be beneficial. These might involve the development of existing methods, for example including items on cooking in online dietary assessment tools such as INTAKE 24 (506), and/or creating an adjunct to food frequency questionnaires, such as that used in the European Prospective Investigation of Cancer and Nutrition (EPIC) studies (329). Questions on cooking could be included in large-scale dietary surveys such as the National Diet and Nutrition Survey (15) and Living Costs and Food Survey (380). Other approaches might involve measuring cooking skills, in terms of technical ability and stratification of complexity; quantifying time spent cooking, meal planning and food shopping, as a total and a proportion of available leisure time; studying approaches to food preparation, such as meal planning and batch cooking; and assessing the content of meals cooked at home, regarding for example their healthiness and dietary variety.

In order to explore the mechanism of potential benefits derived from cooking at home, mediated independently of impact on diet, research approaches could include assessment of meal portion sizes; studying mealtimes, including sharing of meals; and exploring meal patterns and snacking behaviour. There may be merit in comparison studies involving communities or cultural contexts in which traditional patterns of frequent cooking at home have been maintained to greater or lesser degrees, and further investigation of cooking practices and associated outcomes following migration. All such studies would need to adequately account for the potential clustering of diet with other health-related behaviours such as physical activity, alcohol intake, and smoking status (507), plus other possible confounders of diet, such as SES, personal relationships and household composition.

Potential exists to exploit data sources further in pursuit of answering some of the more pervasive research questions around cooking at home and eating meals cooked at home. For example, data from the Living Costs and Food Survey (380) and/or retail data such as those derived from supermarket loyalty cards, could be used to identify relationships between sociodemographics, neighbourhood characteristics, and purchasing patterns for basic ingredients used in cooking. Retail data could also be studied to assess the impact of marketing campaigns advocating for cooking at home, such as the Tesco Real Food campaign, promoting cooking as a facilitator of relationships with family and friends (305). Commercial and media discourse on cooking, including social media sources, could provide a rich seam of data for analysis. Research on cooking and eating patterns should be extended

to less frequently studied population groups, such as the elderly and very old, to ensure that those 'seldom heard' in research are not excluded from strategies to optimise potential benefits from cooking at home.

Given the importance of considering cooking in a wider food context, greater operationalisation of emerging concepts such as the eleven components of food literacy, under domains of: planning and management, selection, preparation, and eating (126), have potential to be instructive. Similarly, evaluations employing principles of food agency, whereby individuals are trained to overcome diverse barriers to fulfil their nutrition and provisioning aims (56), may be useful to explore. The role of preparing and eating meals cooked at home in the broader context of policy on nutrition and diet-related NCDs, such as the calorie reduction programme (508) in the UK's childhood obesity strategy (509), should also be considered.

9.6.2 Dietary patterns

Developing a clearer understanding of how relative contributions from meals cooked at home and those derived from out of home sources impact upon diet, health and social factors will prove insightful. For example, analysis of survey data addressing frequency of consuming meals cooked at home in greater detail, and relationships with diet, health and social indicators, could help to determine more precisely how often meals cooked at home need to be eaten, in order to derive key benefits. Data on which meals are cooked at home (breakfast, lunch and/or dinner) would also permit further exploration of previous suggestions that relationships between meals cooked at home and health benefits may be stronger for the consumption of evening, compared with midday meals (36).

The cross-country comparison study described in phase two identified that 'home cooking' may be perceived as a distinct category within cooking at home more generally, and hence other subtypes of cooking may also exist. Further research to explore these potential subtypes, and their associated characteristics, terminology, and relationships with diet, health and social factors, is likely to provide useful insights.

9.6.3 Outcomes of preparing and eating meals cooked at home

This body of work has highlighted the predominance of cross-sectional studies to date, and therefore the importance of conducting future longitudinal research exploring the impact of preparing and eating meals cooked at home on diet, health and social outcomes, in order to help establish causal relationships. This process might be achieved most efficiently by incorporating items on cooking and meal consumption into existing large-scale longitudinal surveys, particularly at a national level. Potential surveys could include the National Child Development Study (510), Million Women Study (511), British Cohort Study (512), Millennium Cohort Study (513) or UK Household Longitudinal Study (Understanding Society) (514). Longitudinal studies might be employed to explore further the relationships between cooking and the life course, such as the points at which cooking capability develops and declines, and triggers for different cooking trajectories. Regular surveys could also be used to highlight emerging secular trends in meal preparation and consumption, in order that public health initiatives may be developed according to prevailing and projected patterns of behaviour.

Given that most studies on putative outcomes of cooking at home and eating meals cooked at home have primarily focused on diet, further research concerning the broader potential consequences of cooking is needed. For example, implications could involve food costs and household budgeting; effects on the environment and sustainability; and impact on sociability and communities. Evidence for the downstream economic effects of cooking at home, such as influence on demand for health services, may prove particularly significant. This could offer important leverage in support of cooking at home, if it is demonstrated that preparing and eating meals cooked at home leads to health benefits that reduce healthcare costs. However, the promotion of cooking has often been resisted by the powerful food industry lobby, in order to further commercial interests in processed foods (99). A broader social movement, led for example by celebrity chefs such as Jamie Oliver in the UK (454), Stephanie Alexander in Australia (515), and Alice Waters in the US (516), may be required, in addition to persuasive scientific arguments.

9.6.4 Cooking interventions

This programme of research has not sought to specifically consider the impact of cooking interventions. However, if cooking at home is to be encouraged through public health

initiatives, evaluation should be built into all food preparation programmes. The impact of cooking interventions in schools and other communities should be assessed, and the effect of providing training in both technical cooking skills, and broader skills such as meal planning, food budgeting, and food literacy. It will also be important to learn from contexts and interventions in which cooking is a secondary or opportunistic area of interest, such as identifying the potential benefits of cooking with offenders as part of an approach to resettlement (517).

Business initiatives that encourage cooking at home provide a novel opportunity to assess potential strategies to incentivise cooking. For example, Hello Fresh (518) and Gousto (519) in the UK, and Blue Apron (520) and Purple Carrot (521) in the US, provide recipes and ready-prepared (for example chopped) basic ingredients by post. These enable the recipient to prepare their own meals at home, without having to plan and shop for the necessary constituents. Assessing the effective components of such schemes, and the sociodemographic groups for whom they prove successful, could provide important insights regarding how to overcome barriers to cooking at home.

9.6.5 Role of theory

A full consideration of the theoretical underpinnings of changing patterns of behaviour for cooking and eating meals cooked at home was beyond the scope of this thesis. Existing research has suggested for example, that according to Self-Determination Theory, intrinsic motivation (enjoyment experienced through performing an activity) provides a driver of behaviour change (522), and enjoyment has been associated with successful behaviour change maintenance (523). Perceived difficulty and confidence have also been identified as influencing behaviour implementation, using Self-Efficacy Theory (524). Theories used to date in cooking interventions and development of cooking skills have included Applied Behavioural Analysis, Blooms Taxonomy, Experiential Learning Theory, Social Cognitive Theory, Social Ecological Theory, Social Learning Theory, Social Marketing Theory and Systematic Instruction and Information Processing Theory (84, 525-533). However, in spite of increasing recognition for the potential importance of cooking skills interventions in modifying cooking behaviour at home, a theoretical underpinning has been absent from many cooking programmes up to the present time (125). Further work is therefore required to identify factors and techniques that play an important role in learning cooking skills and

encouraging sustained positive changes in cooking behaviour and consumption of meals cooked at home. The 40-item taxonomy of behaviour change techniques and updated 93-item version developed by Michie *et al* (534) have been highlighted as useful frameworks for this purpose (140), and may be applied to different interventions in order to facilitate comparisons, and the identification and replication of successful components (535).

9.7 Concluding remarks

This programme of research has explored the determinants and outcomes of cooking and eating meals cooked at home using mixed methods, including a systematic review, qualitative work and cohort study data analysis. The findings have been integrated using Triangulation Protocol (441), and the implications discussed. This research has highlighted a number of key findings:

- Cooking at home and consuming food cooked at home are complex behaviours, which may change over time according to varied determining factors, to establish a personally acceptable compromise
- These changes in behaviour, and the modifiable nature of most determinants, indicate there is potential for public health interventions to alter cooking and eating patterns, potentially towards healthier activities
- A broad range of potential diet, health and social benefits may be offered by preparing and eating food cooked at home, in comparison with out of home sources, particularly with frequent engagement
- Cooking and eating food cooked at home, and associated meal planning, food shopping, and clearing up, are part of the wider food environment. This broader context should be taken into consideration in the development, implementation and evaluation of cooking interventions
- The terminology and methods of assessment around preparing and consuming food cooked at home need further development, in order to promote clarity and international consensus
- Future research should incorporate a wider range of determinants and potential outcomes of cooking at home and eating food cooked at home, and include studies with capacity to establish patterns of causation.

These findings serve to: further our understanding of preparing and eating food cooked at home, and the associated potential benefits and caveats; inform the development and evaluation of public health initiatives to encourage healthier cooking and eating practices at home; and prioritise areas of related research for the future.

Appendix A. MOOSE Checklist for Chapter 3

Meta-analysis of Observational Studies in Epidemiology (MOOSE) (207).

This checklist was used to draft the manuscript for *Appetite*, based on the research described in Chapter 3.

Criteria		Brief description of how the criteria were addressed
Reporting of background should include		
√	Problem definition	Many dietary interventions assume positive influences of home cooking on diet, health and social outcomes, but evidence remains inconsistent. It is also unclear exactly who engages in home cooking, and why. A systematic review of the health and social determinants and outcomes of home cooking is therefore required to clarify these issues (pages 1-2)
√	Hypothesis statement	Home food preparation is associated with a range of potential dietary- and obesity-related benefits (page 1)
√	Description of study outcome(s)	All potential health and social outcomes of home cooking, such as reduced risk of obesity and consumption of a healthful dietary pattern (pages 1-2)
√	Type of exposure or intervention used	Home cooking: the practices and skills for preparing hot or cold foods at home, including combining, mixing and often heating ingredients (page 2)
√	Type of study designs used	All observational and qualitative study designs (page 2)
√	Study population	Non-clinical populations (including type II diabetics) from high/very high human development index countries (page 2)
Reporting of search strategy should include		
√	Qualifications of searchers	The search strategy was developed by an experienced information scientist specialising in medical and social sciences literature, with input from the lead reviewer, who also has experience of prior involvement in devising and undertaking systematic reviews (page 3)
√	Search strategy, including time period	We searched databases from inception through to December 2014. Initial searches informed the iterative expansion of

	included in the synthesis and keywords	search strings created from key words and search terms (pages 2-3). A sample search strategy, which was adapted for use in other databases, is available in the Supporting Information online.
√	Effort to include all available studies, including contact with authors	We supplemented database searches by internet searches using Google search engine. Study authors were not contacted directly (page 3)
√	Databases and registries searched	MEDLINE; Scopus; Web of Science; PsycInfo; Applied Social Science Index and Abstracts (ASSIA); Business Source Premier; CAB Abstracts; Cumulative Index to Nursing and Allied Health Literature (CINAHL); Cochrane Central Register of Controlled Trials (CENTRAL); Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of Effects (DARE); Embase; Education Resource Information Centre (ERIC); Health Management Information Consortium (HMIC); International Bibliography of the Social Sciences (IBSS); PubMed; Public Affairs Information Service (PAIS) International; Social Services Abstracts; and Sociological Abstracts (pages 2-3)
√	Search software used, name and version, including special features used	We did not use search software. EndNote version X7 was used to file searches and remove duplicate citations (page 3)
√	Use of hand searching	We hand searched peer-reviewed journal special editions focussing on food preparation (page 3)
√	List of citations located and those excluded, including justification	The literature search process is outlined in Figure 1 (page 5). The extensive citation list of over 13,000 studies is available upon request.
√	Method of addressing articles published in languages other than English	We excluded studies without a full text published in English, due to resource constraints (page 2)
√	Method of handling abstracts and unpublished studies	We excluded studies without a full text published in a peer-reviewed journal (page 2)
√	Description of any contact with authors	There were no instances where it was necessary to contact the authors directly for further information on their research (page 4)

Reporting of methods should include		
√	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	Inclusion criteria for the review are described in detail in the Methods section and Table 1 (page 2)
√	Rationale for the selection and coding of data	We abstracted data from included studies with relevance to: study design, location, aims, setting, focus on determinants and/or outcomes of home cooking, time period, participant recruitment and demographics, and conclusions of the study authors. For quantitative studies, we recorded further data on the parameters compared, statistical techniques, and outcomes measured. For qualitative studies, we noted additional information on the study perspective, and the main themes identified (page 4)
√	Documentation of how data were classified and coded	We developed a bespoke data abstraction tool to record details from included studies. The classification and coding of data was checked independently and amended as required by a second reviewer (page 4)
√	Assessment of confounding	Confounding was assessed in the quality appraisal of included studies in Table 6 (page 7)
√	Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results	Study quality was appraised in Tables 5 and 6. We used a checklist combining items from a range of previous tools, developed by Smith et al, for qualitative studies, and used the Effective Public Health Project tool which is recommended by the Cochrane Public Health Group, for quantitative studies. Quality appraisal was undertaken independently by two unblinded reviewers (page 7)
√	Assessment of heterogeneity	Due to high heterogeneity in the included study data, a meta-analysis was not undertaken and therefore heterogeneity was not statistically assessed (pages 4-5)
√	Description of statistical methods in sufficient detail to be replicated	Due to high heterogeneity in the included study data, a meta-analysis was not undertaken and statistical methods were not employed in analysis (pages 4-5)
√	Provision of appropriate tables and graphics	We included 1 table of PICOS criteria, 1 PRISMA flow chart figure, 1 summary table of study characteristics, 2 tables recording data from quantitative and qualitative studies respectively, 2 tables recording study quality appraisal, 1 figure illustrating a conceptual model of the review findings, and supplementary information detailing the search strategy

		(pages 2-7)
Reporting of results should include		
√	Graphic summarising individual study estimates and overall estimate	Figure 2 shows a conceptual model of the review findings (page 6)
√	Table giving descriptive information for each study included	Table 2 provides a summary of the characteristics of included studies, and Tables 3 and 4 record data from quantitative and qualitative studies respectively (pages 5-6)
√	Results of sensitivity testing	Due to high heterogeneity in the included study data, a meta-analysis was not undertaken and statistical methods were not employed in analysis (pages 4-5)
√	Indication of statistical uncertainty of findings	Due to high heterogeneity in the included study data, a meta-analysis was not undertaken and statistical methods were not employed in analysis (pages 4-5)
Reporting of discussion should include		
√	Quantitative assessment of bias	Study quality was appraised in Tables 5 and 6. We used a checklist combining items from a range of previous tools, developed by Smith et al, for qualitative studies, and used the Effective Public Health Project tool which is recommended by the Cochrane Public Health Group, for quantitative studies. Quality appraisal was undertaken independently by two unblinded reviewers (page 7) Due to high heterogeneity in the included study data, we did not do a meta-analysis and statistical quantitative assessment of bias was also not undertaken.
√	Justification for exclusion	Studies were excluded that did not provide data to help tackle the issues addressed by the review. Certain exclusions, such as the restriction to English language studies, were also made on the basis of resource constraints (page 12)
√	Assessment of quality of included studies	We discussed the strengths and limitations of studies included in the review (pages 12-13)
Reporting of conclusions should include		
√	Consideration of alternative explanations	We addressed the limitation of observational research, particularly cross-sectional studies, in establishing cause and effect relationships. We also considered the conclusions of

	for observed results	recent reviews of interventional study designs (pages 12- 15)
√	Generalisation of the conclusions	We addressed the extent to which the review findings on home cooking can be generalised, and provided practical suggestions for promoting home cooking behaviour (pages 13-15)
√	Guidelines for future research	We advised that current evidence is limited by reliance primarily on cross-sectional studies; high risk of bias; and authors' relatively limited conceptualisation of potential determinants and outcomes of home cooking. The research field would benefit from further well designed longitudinal studies (pages 15-16)
√	Disclosure of funding source	Funding from the National Institute for Health Research (NIHR) and Centre for Diet and Activity Research (CEDAR) is disclosed (page 16)

Appendix B. Medline search strategy for Chapter 3

Sample search strategy for Ovid MEDLINE - In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present

Searched December 2014

1. (dinner* or lunch* or breakfast* or meal* or food* or supper*).ti,ab.
2. ((home? or domestic*) adj2 (made or based or cook* or prepare or prepared or preparation)).ti,ab.
3. 1 and 2
4. (famil* adj3 (dinner* or lunch* or breakfast* or meal* or cook*)).ti,ab.
5. ((at-home or scratch or from-scratch or "put together") adj3 (dinner* or lunch* or breakfast* or meal* or food* or supper* or cook*)).ti,ab.
6. *cooking/ or exp meals/ or *food habits/
7. ((prepare or preparing or prepared or preparation or "make ready" or "make fit" or "put together") adj2 (dinner* or lunch* or breakfast* or meal* or food* or supper*)).ti,ab.
8. ((intake or consume\$ or consumption) adj2 (fruit? or vegetable?)).ti,ab.
9. ((cook or cookery or cooked or cooking) adj5 (dinner* or lunch* or breakfast* or meal* or food* or supper* or fruit? or vegetable?)).ti,ab.
10. ((menu or food) adj2 (plan* or management)).ti,ab.
11. or/3-10
12. (attitude? or barrier* or behavior? or belief? or believ* or confiden* or deterrent? or effort? or habit? or influenc* or incentiv* or knowledge or practical* or practi?e* or self-efficacy or self-esteem or socio?economic* or responsibilit* or ritual* or routine? or motivat*).tw.
13. ((price? or cost? or expens*) adj3 (food* or fruit* or vegetable* or grocer* or produce)).tw.
14. ((financial or food) adj2 (secur* or secur*)).tw.
15. ((women? or woman? or wife? or wife? or female or gender) adj2 (task? or role?)).tw.
16. ((culture or cultural) adj2 tradition?).tw.
17. (time adj3 (scarc* or constraint* or pressure? or availab* or organi?ing or organi?ation or plan* or prepar* or clean* or lack*)).tw.
18. (experience adj3 (cook* or prepar*)).tw.
19. ((lack* or limit*) adj3 (experience? or skill? or confidence)).tw.
20. socioeconomic factors/ or *self concept/
21. or/12-19
22. 11 and 21
23. ((better or improv* or enhanc*) adj3 (diet* or nutrition* or outcome* or sociab* or sociali?ation or self-esteem or "social determinant?" or survival or mortality or communication*)).tw.
24. ((reduc* or decreas* or improv*) adj3 (inequal* or obesity or bmi or "food secur*" or portion? or calories)).tw.

25. ((better or improv* or increas* or enhanc*) adj3 (health or survival or mortality or "food secur*" or financ* or communication*)).tw.
26. (better or improv* or increas* or enhanc*).tw.
27. ((health* or social) adj3 (determinant? or outcome?)).tw.
28. (cook* adj2 (skill* or abilit*)).tw.
29. ((better or improv* or increas* or enhanc*) adj3 (((health* or social) adj3 (determinant? or outcome?)) or (cook* adj2 (skill* or abilit*))))).tw.
30. (esteem or confidence or self-efficacy).tw.
31. (cook* adj2 (skill* or abilit*) adj5 (esteem or confidence or self-efficacy)).tw.
32. ((better or improv* or increas* or enhanc*) adj5 outcome*).tw.
33. (health* adj2 (choose or choice?)).tw.
34. ((chang* or health*) adj2 (behavio?r* or habit*)).tw.
35. ((better or improv* or increas* or enhanc* or skill*) adj3 ((meal* or food) adj2 (manag* or plan*))).tw.
36. ((increas* or higher) adj3 (fruit* or vegetable* or vitamin* or nutrient*)).tw.
37. Long?term health.tw.
38. "disease prevention".tw.
39. (decreas* adj3 disease*).tw.
40. (health* adj3 (eat* or habit*)).tw.
41. (health* adj2 consumption*).tw.
42. ((reduc* or control) adj2 weight).tw.
43. ("lose weight" or weight?loss or "weight loss").tw.
44. (enjoy* adj2 (food* or cook* or fruit* or vegetable*)).tw.
45. or/23-25,29,31-44
46. 11 and 21 and 45

Appendix C. Data extraction template for Chapter 3

Study ID	Reviewer	Date

First author	Year	Location/country

Inclusion criteria checklist: all must be met	
Home cooking is the main focus of paper and discussed in methods/results section	
Qualitative or quantitative data presented on home cooking	
Peer-reviewed study and full paper	
Population from high/very high HDI country	
Cooking not for specific disease groups (excl. DM); physical incapacities; commercial cooking; food safety; specific food preparation techniques	

Study characteristics	
Aim/objectives of study	
Study design	
Recruitment	
Time period	
Home cooking determinants/outcomes/both	
Study conclusions	
Reviewer's comments	

Participant characteristics	
Age (range, mean etc)	
Baseline number	
Gender %	
Other factors eg ethnicity, SES, BMI	

Cross-sectional/cohort studies	
Setting	
Parameters compared	
Statistical techniques	
Outcome measurement	
Quantified outcomes	
Overall outcomes	

Qualitative studies	
Setting	
Perspective	
Theme 1	
Theme 2	
Theme 3...	

Other relevant information

Appendix D. Quality appraisal tool for quantitative studies (214)

Providing the Research Evidence for Public Health Nursing

TABLE 2
Quality assessment components and ratings for EPHPP instrument

COMPONENTS	STRONG	MODERATE	WEAK
Selection bias	Very likely to be representative of the target population and greater than 80% participation rate	Somewhat likely to be representative of the target population and 60–79% participation rate	All other responses or not stated
Design	RCT and CCT	Cohort analytic, case-control, cohort, or an interrupted time series	All other designs or design not stated
Confounders	Controlled for at least 80% of confounders	Controlled for 60–79% of confounders	Confounders not controlled for, or not stated
Blinding	Blinding of outcome assessor and study participants to intervention status and/or research question	Blinding of either outcome assessor or study participants	Outcome assessor and study participants are aware of intervention status and/or research question
Data collection methods	Tools are valid and reliable	Tools are valid but reliability not described	No evidence of validity or reliability
Withdrawals and dropouts	Follow-up rate of >80% of participants	Follow-up rate of 60–79% of participants	Follow-up rate of <60% of participants or withdrawals and dropouts not described

RCTs, but also nonrandomized studies. Therefore, it was necessary to develop an appropriate quality assessment tool to encompass a variety of research designs.

The quality assessment instrument for primary studies was developed using the following process. The research team reviewed available instruments in the peer-reviewed literature and devised a list of components to be included (Mulrow & Oxman 1994; Jadad et al. 1996). The components were sample selection, study design, identification and treatment of confounders, blinding of outcome assessors and of participants, reliability and validity of data collection methods, and withdrawals and dropouts. The components are rated strong, moderate, or weak according to a standardized guide and dictionary (see Table 2 for details). The overall rating for the study is determined by assessing the six component ratings. Those with no weak ratings and at least four strong ratings are considered strong. Those with less than four strong ratings and one weak rating are considered moderate. Finally, those with two or more weak ratings are considered weak. (Copies of the instrument and dictionary are available from the first author on request.) Strong and moderate studies are included in a review.

Two other areas are included in the assessment, but they are not included in the overall score. First, the integrity of the intervention refers to what proportion of participants actually received the duration and intensity of the intervention as it was designed. In public health, particularly in group interventions, this is very important because outcomes can differ depending upon the amount of intervention received. Also, consistency of the intervention is important because if few participants received the intervention as designed, the outcome of no differ-

ence between groups relates to program delivery rather than its effectiveness (Rychetnik, Frommer, Hawe & Shiell 2002). Since many public health interventions relate to population-wide health concerns (e.g., smoking cessation), it is important to know if contamination or cointervention occurred in order to accurately interpret results of a specific study.

Second, use of appropriate analysis is also an important consideration in the strength of a study. In the pilot testing of the instrument, this item for quality assessment was included; however, many reviewers had difficulty responding to the questions. After training, there was still very low interrater reliability. Data are collected about the unit of allocation, the unit of analysis, appropriateness of the statistical methods, and whether or not the analyses are performed by intervention allocation status (i.e., intention to treat) or by actual intervention received. Information about the integrity of the intervention and the use of appropriate analysis is used in the summary of the article, if it is included in the review. These data are often helpful in understanding the results of the studies.

To assess content validity of the instrument, the draft was circulated to six experts in appraising study quality for their comments and feedback. Once their comments were incorporated, the final draft of the instrument was independently pilot tested on ten primary studies by four experts in critical appraisal and community health. Further clarification of the instrument was completed. A detailed dictionary to describe the items and to clarify the criteria for rating each item was developed. Finally, guidelines for assessing the overall strength of the articles were described. (The instrument and dictionary are available from the first author.)

Appendix E. Quality appraisal tool for qualitative studies (215)

complex public health interventions and the existing guidance for the evaluation of non-randomized studies (Box 2).^{19–22} The critical appraisal criteria were applied with respect to the general design of studies, once it had been decided to include them (as opposed to being applied to the ability of studies to address the systematic review question), and the results were used for descriptive purposes only, to highlight variations in the quality of studies. No quality score was calculated.

Of the 31 papers where data were extracted, 16 were excluded for one or both of the following reasons: (i) the study did not fulfil any quality appraisal criteria ($n = 5$) and (ii) the study did not adequately examine outcomes relating to health or health inequalities ($n = 10$). In relation to the quantitative evidence base, studies that were not 'before and after' designs were also excluded ($n = 1$).

Synthesis

Narrative synthesis was performed to combine the qualitative and quantitative evidence. Results are tabulated (Tables 1–3) as well as summarized in the following text.

Results

Only 15 studies met the review criteria and specifically assessing the impact of partnership working on public health outcomes was not the main focus of most of these (see 'Limitations of this Study'). This supports previous claims that there is a dearth of research adequately exploring the impacts of partnership working and that persistent policy support for the concept is largely faith based.^{2,23} The studies covered the following six interventions (described in Box 3): HAZs (eight studies), HImPs (two studies), New Deal for Communities (NDCs) (two studies), Health Education Authority Integrated Purchasing Programme (HIPP) (one study), HLCs (one study) and National Healthy School Standard (NHSS) (one study). Seven studies reported on direct health outcomes, while the others related to indirect outcomes (such as the profile of health inequalities or the commissioning of new health improvement interventions). Two studies were largely quantitative, two used mixed methods and the remainder were largely qualitative (documentary analysis, semi-structured interviews and focus groups). Summary details of the reviewed studies are available in Tables 1–3.

Box 2 Critical appraisal criteria

These criteria were used to appraise all of the included studies with respect to their general design. The results of this process are presented in Tables 1–3, with the numbers 1–10 representing satisfactory fulfilment of the corresponding criterion.

Qualitative studies^{17,18}

- (1) Is there a clear statement of the research question and aims?
- (2) Was the methodology appropriate for addressing the stated aims of the study?
- (3) Was the recruitment strategy appropriate and was an adequate sample obtained to support the claims being made?
- (4) Were the data collected in a way that addressed the research issue?
- (5) Are the methods of data analysis appropriate to the subject matter?
- (6) Is the description of the findings provided in enough detail and depth to allow interpretation of the meanings and context of what is being studied? (Are data presented to support interpretations, etc.?)
- (7) Are the conclusions/theoretical developments justified by the results?
- (8) Have the limitations of the study and their impact on the findings been considered?
- (9) Is the study reflexive? (Do authors consider the relationship between research and participants adequately and are ethical issues considered?)
- (10) Do researchers discuss whether or how the findings can be transferred to other contexts or consider other ways in which the research may be used?

Quantitative studies^{19–22}

- (1) Is the study prospective?
- (2) Is there a representative sample?
- (3) Is there an appropriate control group?
- (4) Is the baseline response greater than 60%?
- (5) Is the follow-up greater than 80% in a cohort study or greater than 60% in a repeat cross-sectional study?
- (6) Have the authors adjusted for non-response and dropout?
- (7) Are the authors' conclusions substantiated by the data presented?
- (8) Is there adjustment for confounders?
- (9) Were the entire intervention group exposed to the intervention? Was there any contamination between the intervention and control groups?
- (10) Were appropriate statistical tests used?

Appendix F. Interviews recruitment poster

Institute of
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Participate in Research!



fuse

The Centre for Translational
Research in Public Health



What is this research about?

Our research team at Newcastle University are looking into the factors that influence how people eat and prepare food at home.

What is involved?

We are seeking individuals to take part in interviews. The interview process will involve answering questions about how you eat and prepare food at home, and taking photographs of your interactions with food, such as shopping, cooking and mealtimes. You do not need to be a good cook, or particularly interested in food or cooking to take part: we are interested in a wide range of opinions and experiences.

Will I receive compensation?

Yes. You will receive a £20 High Street Shopping Voucher as a 'thank you' for your time.

Who can participate?

You can take part, and/or you can invite interested family, friends and colleagues.

Who is the contact?

Please contact: Dr Susanna Mills, Email: susanna.mills@newcastle.ac.uk, Tel: 0191 208 8124

Appendix G. Interviews screening questions



Interviews on home food preparation behaviour

SCREENING QUESTIONS

In order to participate in interviews, individuals must meet the following criteria:

	Yes/No
1. Aged 16 years or over.	
2. Primary or shared main household food provider.	
3. Able to communicate in English to standard required for interview, as assessed during screening telephone call.	
Summary	
This individual meets all the required inclusion criteria.	
This individual will undertake the interview with another household member (eg partner, child aged at least 16 years).	

Name of researcher

Date

Signature

Appendix H. Interviews consent form



Interviews on home food preparation behaviour

CONSENT FORM

Please read the following statements, **initial** the boxes if you agree and then sign and date at the bottom where indicated:

	Please initial
1. I confirm that I have read and understood the information sheet version 4.0 dated 31/03/15 for this study.	
2. I have had the opportunity to consider the information provided, ask questions and have had these questions answered satisfactorily.	
3. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.	
4. I have had the procedures regarding confidentiality, and the use of data in research, publications, sharing and storing explained to me.	
5. I agree to take part in the study.	

Name of participant

Date

Signature

Name of researcher

Date

Signature

Appendix I. Interviews information sheet



Interviews on home food preparation behaviour INFORMATION SHEET

You are being invited to take part in an interview to discuss how you prepare food and eat at home. The interview will take place at Newcastle University, or another convenient public location, and will last for about an hour. You will also be asked to take some photographs in the week leading up to the interview. We will reimburse childcare or carers costs for the duration of the interview, where these are required. We will also give everyone who takes part a £20 voucher, as a small 'thank you' for helping with the study.

What is the study about?

Our aim is to gain a better understanding of behaviour around preparation of food at home, including the use of alternatives to home cooking, such as takeaways and pre-prepared ready meals.

Why have I been chosen?

You are receiving this information because you have expressed an interest in taking part in the study. We are asking about 30 people to take part in interviews. Every person is unique, and has a different experience of home food preparation. We want to include a range of people with different experiences and backgrounds so that we can understand as wide a variety of views as possible. In order to participate we ask that you are: aged 16 years or over; the primary or shared main household food provider; and able to communicate in English to the standard required for an interview. If you wish, you can undertake the interview alongside another household member, such as your partner, or a child aged 16 years or over. They will also be welcome to participate fully in the interview, and will therefore go through the same steps to take part as you, described in the section below. If you are a young person aged 16-17 years we will need a signature from your parent/guardian to say they are happy for you to take part, so they will need to be present at the meeting. However, your parent/guardian will not need to be present at the second visit for the interview, unless you particularly want them to be there.

What will taking part involve?

Please take the time to read this information and consider whether you are interested in taking part. After you've had at least 24 hours to think about it, we will contact you using the details you provided. We will ask you whether or not you wish to take part, and if so, will arrange a convenient time for the meetings to take place. We will also

ask you to complete the consent form. We will answer any questions you may have about the study, and you can contact us again in future if you think of anything else.

If you decide to take part, we will meet with you twice, roughly one week apart. At the first visit we will explain what is going to happen, check that you understand what taking part will involve, and that you are happy to continue. We will collect your consent form, and ask you to undertake a task during the following week, before we return to do the interview. The task will be to take photographs of situations involving food, such as mealtimes, food shopping, and the cooking equipment that you have at home. We would like you to take photographs and send them to us each day. If you have a smartphone camera you can use this and send us the photographs by email, and if you don't, we will give you a disposable camera and money to develop the photographs at the end of the week. If you're willing, we'll send you a text message every day during the week to remind you about taking the photographs, and if you have any questions you can contact us.

During the second visit, a researcher will interview you about how you prepare food and eat at home, using your photographs to help the interview. We will also ask you about the food and drink that you've consumed and any cooking that you've done recently. The discussions will be very informal and there are no 'right' or 'wrong' answers to the questions – we are interested in everybody's unique opinions and experiences. The session will last about an hour and with your permission, we will audio record the discussion. We do not expect there to be any significant risks in taking part in this study.

What will happen to the results of the study?

Your views and experiences of home food preparation will help us to understand better what people do and don't do, and what factors influence their behaviour. This will enable us to make recommendations to those working in diet and nutrition, including people who work in the community or produce guidance. We will make presentations and reports to other researchers, and to professional and voluntary bodies. The results will also be published in scientific journals. Your name will not appear in any of these reports or presentations and no-one will be able to tell that you took part in the study, or what you said.

What about confidentiality?

All the information collected will be kept confidential, and only members of the research team will have access to identifiable information. With your permission we will audio record the interview. The recording will be kept confidential and will be destroyed at the end of the study. Anonymised data collected from you and other participants will be stored securely at Newcastle University. The data will be used to produce research reports and publications, and no-one will be named or identified in these outputs. The data you have provided will be kept for 10 years, during which time it may be used by other researchers. If other researchers use your data, it will only be used in the anonymised form. This means that they will not have any access to any identifiable personal information.

Do I have to take part?

Your participation is entirely voluntary. You do not need to take part and you are free to withdraw from the study at any time without giving a reason. Your decision will not affect any services you or your family receives now or in the future. If you decide to

leave the study you can notify us using one of the contact methods listed at the end of this information leaflet, or you can inform us when we contact you during the study. If you decide to leave, we will keep any information that you have provided to us for analysis in the study, unless you specifically say that you would like us to erase your data.

Who is organising the study?

The study is part of a larger project on home food preparation led by Dr. Susanna Mills and a small team of researchers at Newcastle University. The project is funded by the National Institute for Health Research (NIHR) which is a government funded research organisation. The study has received ethical approval from Newcastle University's Research Ethics Committee.

Who can I speak to about the study?

If you have any questions or comments about this study, please do not hesitate to contact Dr. Susanna Mills at Newcastle University on 0191 208 8124, or by email at susanna.mills@newcastle.ac.uk

What if I have a complaint?

If you have any complaints regarding this research, please contact Dr Wendy Wrieden at Newcastle University, who is supervising the study. She is available on 0191 208 5581, or by email at wendy.wrieden@newcastle.ac.uk

Thank you.

Appendix J. Interviews topic guide

Interview topic guide

The aim of these interviews is to understand how adults prepare food at home, what factors influence their behaviour, and the barriers to home cooking. The research also aims to identify facilitators and barriers for cooking healthily. The interview topic guide will be developed on the basis of findings from a systematic review of determinants and outcomes of home cooking, undertaken in phase one of this programme of research. The topic guide will also be iteratively revised according to learning and feedback gained from piloting and early interviews. It is anticipated that each interview will last for up to one hour. The questions will be semi-structured, and the examples below provide an indication of the proposed areas for questioning.

Introduction

Interviewer introduces themselves, and the aims of the study.

Ground rules:

- Participant is free to state at any time if they feel uncomfortable with questions or want to stop the interview.
- The interview will be audio recorded and the interviewer will make brief notes. Both will be anonymised after the interview.
- There are no right or wrong answers and all responses are valid.

Prompts

- Tell me about the meals that you've had over the past week. Did you cook any meals? What did you prepare?
- Tell me about your cooking photos.

General questions

- Tell me about your eating habits and your usual home food preparation behaviour.
- What does home cooking mean to you?
- How do you feel about cooking (eg enjoyable, a nuisance)
- Are there particular aspects that you do or don't like? Why?
- How would you describe yourself as a cook? (eg good, bad, OK, boring, safe, adventurous, nervous, healthy, unhealthy)
- Are you a confident cook? Why/why not?

Household

- Who prepares meals in your household?
- How often does the household have a cooked meal?
- What sort of meals do you have? (favourites/last night)

- During a typical week, how often do you cook a meal from scratch? (for example using raw chicken, spices and vegetables to make a chicken curry)
- During a typical week, how often do you cook a meal using pre-prepared ingredients? (for example using dried pasta and ready-made sauce)
- During a typical week, how often do you have ready meals and/or takeaways?
- During a typical week, how often do you skip meals or have snacks instead?
- What factors influence these choices?
- Which main dish do you consume most often? (to inform phase 3 analysis)
- Where do you eat your meals? Why?
- Do you eat with anyone else? Who and why?

Determinants

- What influences your eating habits?
- What factors make it easier for you to cook? (eg lots of time, good kitchen facilities, enjoyment)
- What factors make it difficult for you to cook? (eg too busy, ingredients are expensive, don't have necessary skills)
- What factors would you like to change?
- Who has an impact on what and how you cook?
- Has your home food preparation behaviour changed over time? Why/why not? Would you like to change in the future?

Health

- What does healthy cooking and eating mean to you?
- Does the healthiness of foods influence your cooking and eating patterns?
- What comes before health in your priorities and why?

Skills, facilities and shopping

- What cooking and storage facilities do you have? (eg hob, fridge, cupboards)
- What utensils and equipment do you have? (eg pans, knives, chopping board)
- Do you have any cooking skills? If so, which? (show card of different skills eg frying, grilling, roasting)
- Where did you learn? (eg mother, school, picked it up as you went along)
- Do you use recipes? Where from and why? Do you find them easy to follow?
- Do you plan your meals and/or food shopping in advance?
- Who does the food shopping and why? How often do you go shopping? What kind of shops/online? How do you decide what to buy?

Wrap up

Is there anything else you'd like to mention that we haven't covered?

Close; thank the participant; and provide debriefing sheet and 'thank you' voucher.

Appendix K. Interviews debriefing sheet



Interviews on home food preparation behaviour DEBRIEFING SHEET

Thank you for taking part in our research. This leaflet gives some information about what the aims of the research were and what will happen now that the study is nearing completion.

Purpose of research

The purpose of this project was to gain a better understanding of behaviour around preparation of food at home, including the use of alternatives to home cooking, such as takeaways and pre-prepared ready meals.

What happens next?

Now that we have collected the necessary information, we plan to analyse it to identify common themes around factors that influence home food preparation behaviour. The study is part of a larger three year project on home food preparation led by Dr. Susanna Mills and a small team of researchers at Newcastle University. Next we will test these themes out with a larger number of people in the wider population, using a type of survey. We hope that this will help us in future to develop methods to encourage people to eat more healthily.

As a participant, you do not need to do anything else now that data collection is complete.

Will individual feedback will be available?

Due to the large amount of data collected, it is not possible for us to provide individual feedback. If you have any questions or concerns about your diet, we would recommend speaking to your GP, who may be able to give you advice or refer you to other services that can provide assistance.

What will happen to the information I provided?

After we have completed the analysis, the data will be stored. Data recorded electronically and on paper will be stored in secure areas in buildings that the general public have no access to. The audio recordings of interviews will be erased once transcribed.

Data you have provided will be kept for 10 years, during which time it may be used by other researchers. If other researchers use your data, it will only be used in anonymised form. This means that they will not have any access to any identifiable personal information.

How will the results of the research be disseminated?

The results of this research will be submitted as a report to the research funders, which are the National Institute for Health Research (NIHR). The report will summarise the results of the study and how this will inform the next steps for research.

Some results from the research may also be published in scientific journals and presented at conferences of scientific associations and learned societies. No personal data will be published in any outputs of this research.

Who should I contact for further information?

If you have any questions, please contact:

Dr. Susanna Mills – Lead Researcher

Tel: 0191 208 8124 Email: susanna.mills@newcastle.ac.uk

Dr. Wendy Wrieden – Lead Supervisor

Tel: 0191 208 5581 Email: wendy.wrieden@newcastle.ac.uk

Thank you.

Appendix L. Focus groups published study (49)

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What does cooking mean to you?: Perceptions of cooking and factors related to cooking behavior



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ABSTRACT

Despite the importance of cooking in American life and evidence suggesting that meals cooked at home are healthier, little is known about perceptions of what it means to cook in the United States. The objective of this study was to describe perceptions of cooking and factors important to how cooking is perceived and practiced among American adults. Seven focus groups ($N = 53$; 39 female; 35 Black, 16 White, 2 Asian) were conducted from November 2014 to January 2015 in Baltimore City, Maryland. Participants were recruited from two neighborhoods; one with higher median income and access to healthy food and the other with lower income and low access to healthy food. Focus groups were audio recorded, transcribed verbatim and analyzed using a grounded theory approach. Participants' perceptions of cooking varied considerably, regardless of neighborhood income or food access, and spanned a continuum from all scratch cooking to anything made at home. Perceptions of cooking incorporated considerations of whether or how food was heated and the degree of time, effort and love involved if convenience foods were used. Key barriers to cooking included affordability, lack of time, and lack of enjoyment. Key facilitators of frequent cooking included extensive organization and time management to enable participants to incorporate cooking into their daily lives. Cooking is a complex concept and not uniformly understood. Efforts to encourage healthy cooking at home should consider the broad spectrum of activities Americans recognize as cooking as well as the barriers and facilitators to preparing food at home. Public health messages to encourage more frequent cooking should account for the heterogeneity in perspectives about cooking. More research should explore differences in perceptions about cooking in other diverse populations.

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1. Introduction

Despite the importance of cooking in American life, little is known about how Americans perceive cooking. The Oxford English Dictionary defines cooking as “to prepare food by the action of heat” (Oxford English Dictionary and 2015). However, limited evidence suggests that people interpret the meaning of cooking quite differently (Short, 2006). Moreover, the terms ‘homemade’, ‘convenience’, ‘proper cooking’, ‘cook’, ‘basic ingredients’ and ‘ready prepared’ are not uniformly understood (Carrigan, Szmigin, & Leek, 2006; Short, 2003; Short, 2006). In addition, most available studies have been conducted outside of the United States and may lack

relevance to Americans (Costa & et al., 2007; Daniels & et al., 2012; De Backer, 2013; Kaufmann, 2010; Short, 2006, 2003). Therefore, the meaning of cooking in the U.S. context is not well understood and this is an important limitation in studies examining cooking skills and behavior (Hartmann, Dohle, & Siegrist, 2013; Virudachalam & et al., 2013; Smith, Ng, & Popkin, 2013; Soliah, Walter, & Jones, 2012; Sobal & Hanson, 2014). Improved knowledge in this area is important as greater frequency of cooking at home is associated with consumption of a healthier diet (Wolfson et al., 2015a) particularly among households with higher income (Wolfson et al., 2015b).

What is clear is that Americans cook less frequently and spend less time cooking now than in the past (Smith et al., 2013; Zick & Stevens, 2010). Yet, half of Americans still report engaging in meal preparation on a daily basis (Hamrick & et al., 2011), and in a typical American household, dinner is reported as being cooked an average of 5 nights per week (Virudachalam & et al., 2013;

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Wolfson et al., 2015a). The frequency of cooking is associated with a variety of socio-demographic characteristics (Virudachalam & et al., 2013). Employment status, particularly female employment, is associated with decreased time spent cooking (Mancino & Newman, 2007) while lower income (<185% of the poverty threshold) is associated with increased time spent cooking (Hamrick & et al., 2011). Younger individuals are less likely to cook. Among race/ethnic groups, frequency of cooking dinner is lower among Black households (4.4 days/week) and higher among Hispanic households (5.6 days/week) (Virudachalam & et al., 2013).

Reductions in the time available for cooking have been associated with an increased role for convenience foods in the American diet. Convenience foods, (“any fully or partially prepared foods in which significant preparation time, culinary skills or energy inputs have been transferred from the home kitchen to the food processor and distributor” (Celnik, Gillespie, & Lean, 2012)), are now ubiquitous in the marketplace, and 90% of Americans purchase convenience foods (Harris & Shiptsova, 2007). Approximately 20% of all food expenditures are spent on convenience foods compared to 10% for fruits and vegetables (Guthrie & et al., 2012). Although convenience foods have become common in the marketplace (Caraher & et al., 1999; Lang & Caraher, 2001), are marketed as an essential component of a home-cooked meal (Shapiro, 2004), and are widely used (Carrigan et al., 2006), the extent to which the American public considers use of these products to be cooking is unknown. Furthermore, the extent to which the meaning of ‘cooking’ or ‘homemade’ differ systematically is unclear. Interestingly, one study found that younger people incorporate convenience foods into their definition of homemade to a much greater extent than older people who emphasize ‘cooking from scratch’, using fresh ingredients, and tradition into their definition of homemade (Moisio, Arnould, & Price, 2004).

The objective of this qualitative study is to examine American adults’ perceptions of concepts related to cooking. The specific aims of this formative research are to: 1) explore how individuals perceive what it means “to cook”, and 2) describe factors that are important to how cooking is perceived and practiced. We used a social-ecological framework to inform the study design. Evidence suggests that perceptions of cooking and cooking behavior may be influenced by individual factors such as age, gender, socio-economic status, time pressures, taste preferences, and values around food (Fitzgerald & Spaccarotella, 2009; Furst & et al., 1996; Glanz & et al., 1998; Kolodinsky & Goldstein, 2011; Mancino, 2012; Zick, Stevens, & Bryant, 2011). These individual factors are closely tied to other interpersonal factors, most specifically family cooking habits and food preferences (Simmons & Chapman, 2012; Stead & et al., 2004). Cooking knowledge, skills and behavior for both individuals and families are shaped by the physical built environment, the community culture, norms and values, and the accessibility of affordable, quality food in the communities in which people live (Andreyeva & et al., 2008; Chenhall, 2010; Drewnowski, 2012; Gittelsohn & et al., 2010; Poti & Popkin, 2011; Sallis & Glanz, 2006; Singh, Siahpush, & Kogan, 2010). Individual and family cooking knowledge and behavior while being influenced by community factors, also play a role in determining the norms and values in the community, and due to the dynamics of supply and demand, help to shape the food environment in which food purchasing decisions are made. Thus, while we did not have specific hypotheses (due to the exploratory nature of the research), we theorized that cooking perceptions and practices would be a function of individuals’ family backgrounds, as well as their local communities, neighborhoods and social environments.

2. Methods

This study used qualitative methods to explore cooking perceptions and practices among adults. We conducted seven focus groups in two neighborhoods in Baltimore, MD between November, 2014 and January, 2015; participants were recruited from one neighborhood with higher median income and access to healthy food and another with lower income and low access to healthy food. The study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

2.1. Site selection

Two neighborhoods were purposively selected for participant recruitment and data collection based on differences in socio-economic status (SES) and food environment indicators. Neighborhoods were identified using data from the Maryland Food System Map (Center for a Livable Future, 2014) and Baltimore City Department of Public Health (Baltimore City Health Department, 2012). The two neighborhoods were selected to facilitate comparisons between individuals with high SES living in a neighborhood with high food access, and individuals with low SES living in a food desert neighborhood. Appendix Table 1 describes demographic, socio-economic and food environment characteristics of the two neighborhoods and Baltimore City overall.

2.2. Recruitment and selection of participants

We used the Maryland Food System Map to identify all food stores and businesses in the two recruitment neighborhoods. Neighborhood specific fliers (identical except for different information about where the focus groups would be conducted) were posted at a random selection of those food outlets (with permission of the owner or manager). In addition, fliers were posted on bulletin boards at libraries, churches and apartment buildings in the neighborhoods. Fliers specified that we were conducting research about home cooking and that we were interested in the views of people who “love to cook, hate to cook, cook all the time or not at all”.

Participants could respond to the flyer via telephone or email. The lead author responded to all inquiries, and participants who fit the inclusion criteria (over 18 years old and living in the recruitment neighborhood (based on self-report)) were accepted on a first come first served basis. In order to achieve a more diverse sample, before recruitment began for the final group in the higher income/food access neighborhood (hereafter called Neighborhood 1), the flyer was posted on social media website of a neighborhood group, and individuals who had previously inquired about the groups but who had been unable to attend were re-contacted. Participants accepted to this group met the additional inclusion criteria of identifying as non-Black and having at least some college education.

2.3. Data collection

Focus groups were held in meeting rooms at public libraries centrally located within the neighborhoods. Four focus groups took place in Neighborhood 1, three with all female participants and one mixed gender group. Three groups took place in Neighborhood 2, two with all females and one with all males. In Neighborhood 2 all participants were Black and, in Neighborhood 1, one focus group was comprised of all Black participants, one with all White participants, and two groups were comprised of White, Black and Asian participants. At the start of each group participants filled out a short demographic survey. In this survey,

participants were asked to report how frequently they, or someone in their household cooked dinner during an average week. The focus groups lasted 90 min and were moderated by the lead author. A research assistant also took notes at all groups and all discussions were audio recorded. Participants were compensated for their time with a \$40 CVS gift card and could only participate in one focus group.

A single discussion guide was developed by the research team. Questions were open-ended to encourage discussion among participants and to facilitate respondent-driven content through an inductive process. Topics or opinions raised in the initial groups were posed to later groups, such that the discussion guide evolved throughout data collection. This semi-structured approach provided some level of consistency in content across all groups while also allowing for flexibility to react to the dynamics and flow within each discussion and incorporate new findings into subsequent groups. To facilitate discussion about what activities or ingredients are considered cooking, we used pictures of fresh, frozen, and packaged products taken at a local grocery store and asked participants to consider whether using those products constitute cooking. [Table 1](#) shows key discussion questions from the final guide.

2.4. Analysis

Audio recordings from the focus groups were transcribed verbatim by a professional service. The lead author coded each transcript using a grounded theory approach ([Charmaz, 2006](#)). Coding began without any codes defined *a priori* and followed an iterative and inductive process ([Charmaz, 2006](#)). First, line-by-line initial codes were defined. Transcripts were revisited multiple times as new initial codes were identified. Then, initial codes were grouped into focused codes, and finally into broad themes or categories. The lead author also used reflective memos throughout data collection and detailed focused code memos during data analysis ([Charmaz, 2006](#)). The qualitative data analysis software HyperRESEARCH 3.7.2 (ReserachWare, Randolph, MA) was used to facilitate coding, data management, and analysis.

3. Results

Fifty-three individuals participated in seven focus groups – 36 participants in Neighborhood 1 (high income/food access) and 17 participants in Neighborhood 2 (low income/food access). Characteristics of the study participants are presented in [Table 2](#). The mean age of the study participants was 51 years (50 years in Neighborhood 1 and 53 years in Neighborhood 2). Overall, participants were 66% Black, 31% White and 4% Asian, though in Neighborhood 2 all participants identified as Black. The majority of participants were female (74% overall, 81% in Neighborhood 1, 59% in Neighborhood 2). Participants in Neighborhood 1 also tended to be more highly educated than participants in Neighborhood 2 (69%

of Neighborhood 1 participants had at least some college compared to 37% of Neighborhood 2 participants). On average, participants reported that they or someone in their households cooked dinner 4.3 days per week. In Neighborhood 1, 13% of participants reported cooking dinner infrequently (zero or one days) and 33% of participants cooked dinner frequently (six or seven days). In Neighborhood 2, 24% of participants reported cooking dinner zero or one day per week and 41% reported cooking dinner six or seven days per week (see [Appendix Table 2](#)).

Pooling responses across the seven focus groups, we identified three emergent themes: 1) perceptions of cooking, 2) cooking in the context of modern life, and 3) cooking strategies among frequent cooks. During analysis, comparisons were made across groups and individuals to identify any notable patterns by gender, age, race/ethnicity, or between the two neighborhoods. Because few differences between the neighborhoods or among participant demographic groups were noted, results are presented collectively, but where observed, differences by neighborhood or demographic characteristics are noted.

3.1. Perceptions of cooking

Perceptions of cooking varied considerably, regardless of neighborhood, and spanned a continuum from all scratch cooking to any food made at home. [Table 3](#) reports illustrative quotations demonstrating the spectrum of cooking perceptions. Perceptions incorporated considerations of the importance of scratch ingredients, the degree of time, effort and love involved if convenience foods were used, and whether or not food was heated in some way. For many, the application of heat was unimportant, and cooking was understood to encompass any food preparation. The importance of heat for a few participants was based on a literal definition of cooking meaning “to heat” but did not carry any sort of value judgment.

“It’s not a judgment for me. It’s not like, oh, it’s better or worse because it’s cooked or not cooked. It’s just that for me, cooking does mean something was heated.” (Participant 3, Focus Group 7)

On the other hand, scratch cooking was perceived as preferable, or “the best” and there was consensus that if a person used scratch or fresh ingredients to make a meal, that person had cooked (though as noted above, for some participants heat would have to have been applied). However, while scratch or fresh ingredients were highly valued, as one participant put it, “you don’t have to go back to the 1800’s. We don’t have to churn our own butter and make our own noodles ... Everything won’t be totally from scratch.” (Participant 8, Focus Group 1) Opinions differed as to under what circumstances using prepackaged, boxed or otherwise processed products (convenience foods) should be considered cooking. Putting one’s own twist on a product or recipe, investing time, or

Table 1
Key focus group discussion questions.

Food preparation practices
<ul style="list-style-type: none"> ■ What was the last meal you cooked? Why did you choose it? How did you make it? ■ What influences the way you prepare meals? ■ Describe any challenges you face when it comes to cooking. ■ Some people promote eating more home cooked meals as a way to eat healthier. What do you think of this recommendation? ■ Have/how have your cooking habits changed over time?
Perceptions of cooking
<ul style="list-style-type: none"> ■ How do you feel about cooking? ■ What does home cooking mean to you? ■ In surveys, people report cooking, on average, 6 or 7 nights a week. Based on your experience, what kinds of activities do you think they are talking about? ■ What kinds of things do you consider when deciding if something was homemade? ■ Is cooking important to you? Why or why not?

Table 2
Demographic characteristics of the study sample overall and by recruitment neighborhood.

	Total	Neighborhood 1	Neighborhood 2
Number of focus groups	7	4 (FG 1 & 5–7)	3 (FG 2–4)
Number of participants [n (%)]	52 (100)	36 (68)	17 (32)
Mean age (SD)	51 (14.8)	50 (16.1)	53 (12.1)
Age [n (%)]			
18–44	15 (28.3)	12 (33)	3 (18)
45–64	29 (55)	17 (47)	12 (71)
65+	9 (17)	9 (19)	2 (12)
Sex [n (%)]			
Male	14 (26)	7 (19)	7 (41)
Female	39 (74)	29 (81)	10 (59)
Race [n (%)]			
Black	35 (66)	18 (50)	17 (100)
White	16 (31)	16 (44)	0 (0)
Asian	2 (4)	2 (6)	0 (0)
Education [n (%)]			
Some high school	2 (4)	1 (3)	1 (6)
High school	19 (37)	10 (28)	9 (56)
Some college	12 (23)	7 (19)	5 (31)
College graduate	19 (37)	18 (50)	1 (6)
Employment [n (%)]			
Working part time	8 (15)	17 (6)	2 (12)
Working full time	12 (23)	11 (31)	1 (6)
Not working/retired	32 (62)	18 (51)	14 (82)
Marital status [n (%)]			
Single	26 (49)	19 (50)	8 (47)
Married	8 (15)	5 (14)	3 (18)
Living with a partner	10 (19)	8 (22)	2 (12)
Divorce, separated, widowed	9 (17)	5 (14)	4 (24)
Has children [n (%)]	32 (61)	19 (53)	13 (76)
Weight status* [n (%)]			
Underweight	4 (8)	3 (9)	1 (6)
Healthy weight	32 (62)	22 (63)	10 (59)
Overweight	9 (17)	4 (11)	5 (29)
Overweight by > 20 lbs	7 (14)	6 (17)	1 (6)
Cooking frequency- days/week cooks dinner* [Mean (SD)]	4.3 (2.0)	4.4 (1.6)	4.2 (2.7)

Note: One participant in Neighborhood 1 declined to answer the question about frequency of cooking dinner.

* Self reported.

putting love or effort into a meal were important determining factors when deciding whether a meal should be counted as cooking. However, even participants who thought convenience foods constituted cooking still attached a higher value to meals made from scratch ingredients.

Older participants and those who identified as a healthy eater/cook recognized convenience foods as an integral part of everyday food preparation, but generally did not consider using convenience foods to be cooking. For others, anything made in the home was considered cooking. These discussions often became quite lively and in some cases became heated disagreements about both whether convenience foods, as well as whether heating something in the microwave, considered by some participants to be a less skilled and traditional mode of preparing food, should be considered cooking.

Moderator: "This is frozen macaroni and cheese. Is this homemade? Is it cooking?"

Participant 10, Focus Group 1: "That's not homemade."

Participant 1, Focus Group 1: "Wait a minute now!"

Participant 8, Focus Group 1: "It's packaged for sale. You make it at home."

Participant 7, Focus Group 1: "Its factory made."

While most participants discussed microwaves in a positive light and described them as a helpful tool that facilitated their ability to eat home cooked meals (even if they didn't consider using them to re-heat leftovers to be cooking), a few individuals expressed negative perceptions of microwaves as either being less healthy (due to radiation or "zapping" nutrients out of the food) or as being a "lazy" or "cheating" way of cooking. Many older

participants in particular dismissed microwaves (particularly when being used to heat convenience foods rather than re-heat home cooked leftovers) as a sign of diminished cooking skills and interest among the younger generation.

"The young ones don't know how to cook. All they're going to do is go to the store and go to a restaurant or something like that. Don't even sit down and try to cook ... coming up, we really cooked. Nowadays basically, the kids coming up now, mostly everything is microwaved. It's the fast thing nowadays." (Participant 5, Focus Group 4)

Individuals who self-identified as a good cook and incorporated being a person who cooks and enjoys cooking into their identity articulated a difference between anything made at home and a homemade meal. For these individuals the amount of time, effort or skill used during preparation, in addition to the use of convenience foods, were important factors used to distinguish between whether a meal made at home should be considered homemade. In contrast, some participants emphasized that they were not cooks, did not know how to cook and did not enjoy cooking.

"My favorite food in the whole wide world is spaghetti, every day, every night. But again, I live by myself, and I can't cook. My idea of spaghetti is—this is real homemade. ... I make Oodles of Noodles, I boil my hot dogs ... I cut my hot dogs up in the Oodles of Noodles and my sauce is ketchup. That's homemade." (Participant 3, Focus Group 4)

The other members of this man's group responded with validation that his description qualified as homemade meal, even if

Table 3
Cooking perception considerations and illustrative quotes.

All scratch cooking	<p>"What defines home cooking is that you put all of the ingredients in it and it's not pre-packaged, pre-prepared or persevered ... It's fresh. And the other ingredient is the love, because it's something about knowing somebody took two hours to make this from scratch." (Participant 1, Focus Group 1)</p> <p>"Anything microwaved is not cooking, no matter what it is." (Participant 4, Focus Group 4)</p> <p>"I think if you buy a can of pasta sauce and boil the noodles and put it together, I wouldn't call that home cooking ... But I would call it home cooking if you made that pasta sauce from canned tomatoes with the spices ... I think there is definitely a level of physical effort involved maybe to call it home cooking versus eating at home." (Participant 6, Focus Group 7)</p> <p>"No, not cooking because it's already precooked and everything there is pre measured. It's nothing you have to do. It's no imagination. It's nothing" (Participant 5, Focus Group 2, in reference to a box of macaroni and cheese).</p> <p>"When you go to the store, you buy a 'Hungry Man,' you didn't make that ... Like you take the work, you do the preparation, and do the seasoning and do all of that, that's cooking at home ... I think it's different to me, far as cooking it at home or putting the box in the microwave." (Participant 5, Focus Group 5)</p> <p>"But there's a lot of ways—and the cornbread, I love cornbread, especially homemade cornbread. I'll use the box but I'm going to add [my own] touch with that box." (Participant 10, Focus Group 1)</p> <p>"If I cook a bunch of things and freeze portions and come home, defrost it and eat it, to me that serves the function of I didn't pay to eat out today, I ate something that was healthy that I made myself. I don't have an ego invested in 'oh, I did Top Chef tonight.' I'm just keeping to my budget and to my way of life which is to eat healthy foods every day." (Participant 4, Focus Group 7)</p> <p>"On the stove, anything prepared hot, or baked, fried, that's cooking." (Participant 2, Focus Group 3)</p> <p>"For me, cooking is anything you prepare, whichever way, hot, cold, steamed, whatever. Anytime you prepare food in any form for consumption, it's cooking." (Participant 5, Focus Group 3)</p>
Anything made at home	<p>"A homemade meal is a meal made at home. It's simple as that." (Participant 8, Focus Group 1)</p>

they wouldn't consider it homemade themselves. The participant then went on to clarify that even though this was his homemade, he didn't consider it as good as "real spaghetti" and it wasn't "real" cooking because it wasn't made from scratch.

Regardless of neighborhood, the manner in which participants categorized different kinds of cooking was primarily a function of their values and feelings about food and cooking:

"I have different categories of my cooking. I have home cooking—that's scratch. Which means I use every ingredient and it's done by hand. Then I have semi-home cooking, where I may use a box meal, you know, like Betty Crocker something. And then add my own ingredients to that. That's semi-cooking. So that's quick meals ... But most of the time, it's between semi- and home cooking-scratch. And then every now and then, those quickie foods like Oodles of Noodles or something like that ... Like things like frozen dinners, quickie foods, hot dogs, frozen hamburgers, all right? That's quickie." (Participant 5, Focus Group 3)

Regardless of an individual's personal standard when it comes to cooking, there was a general consensus that perceptions of cooking and whether something counts as cooking is a personal decision and there was not a single standard or definition that could or should be applied to everyone.

3.2. Cooking in the context of modern life

Among participants from both neighborhoods there was a strong perception that cooking at home was less expensive than eating at restaurants, and participants cited cooking at home as a way to save money and to avoid unhealthy or unsanitary practices in restaurants.

"I think it's cheaper to cook at home versus going out all the time, you know? Because some of the restaurant food, you don't know what's in it. And it's not healthy, you know. So its cheaper to me, and more safe." (Participant 1, Focus Group 3)

Though cooking at home was viewed as being more affordable than eating in restaurants, cooking healthfully at home was challenging for many participants. Being able to afford scratch or fresh ingredients, especially fresh fruits and vegetables, meat or fish was brought up as a challenge, particularly among participants in Neighborhood 2 (lower income/food access). The biggest challenges participants in Neighborhood 2 cited when it came to

cooking at home was the price of food, the price of healthy food, insufficient benefits from programs such as Supplemental Nutrition Assistance Program (SNAP) or Social Security, or just the poor economy overall. As one participant put it, *"The economy makes it almost impossible to eat healthy seven days a week."* (Participant 6, Focus Group 1) Though people did talk about shopping at multiple stores to find the best deals, or to find retailers that accepted their SNAP benefits, participants did not cite lack of physical access to food as a challenge-affordability was by far foremost in their minds.

"I don't know about anyone else, for me, buying food is really hard for cooking. Okay, for one thing, I'll say they cut food stamps bad ... So I really have to make all my dollars stretch, because I'm using cash now more than food stamps, right? And it's very limited. So I think the problem with a lot of people with cooking, it's not so much the cooking, it's getting the food to cook." (Participant 5, Focus Group 3)

The need to balance time, cost and health became a dominant theme throughout the groups. Participants in both neighborhoods felt that one of these three always had to give, or if they had more time or if food was more affordable (either due to lowering prices or increasing income) they would be able to eat more healthfully than they do.

"And it goes back, to me, to like the balance of like the health, time and cost factor. So I've noticed like if you—like we buy a lot in bulk, and get a lot of things that you do, like dried lentils and dried beans, and things like that ... And when I looked at cost per serving when I looked at it, can be lower some of the like quick-fix kind of prepared foods, which you're kind of paying for convenience, but you have to have either the time or the resources up-front to buy those things in bulk, or the storage space for it, or the time to soak them, or whatever it takes. So it's like I said, a triple-balance that I'm always trying to achieve." (Participant 2, Focus Group 5)

While participants from Neighborhood 2 (lower income/food access) discussed making tradeoffs between eating inexpensive and highly processed products versus fresh fruits and vegetables or, in some cases, not being able to afford food at all, individuals from Neighborhood 1 (higher SES/food access) were making tradeoffs of a different kind (deciding to purchase expensive items like red meat or organic produce) or weighing the long term health consequences of their diet choices. Regardless of neighborhood income, participants who identified as good cooks and healthy eaters seemed to take a great pride and satisfaction in cooking foods at

home rather than paying more money for them elsewhere.

"When I'm home I can take the same money that I'm going to give to this restaurant that I'm going to have to tip somebody to bring it to me, and I can stay home and fix my own stuffed clams, my own calamari, and then have enough to get a bottle of wine! ... stay home and keep the tip for yourself!" (Participant 3, Focus Group 6)

Having enough time to cook, or the need to balance busy lives and many time commitments with providing food for families was a recurring theme in all groups. People in both neighborhoods discussed the need to plan extensively or find ways to cook easy/fast meals due to busy schedules. In addition to relying on cooking with crockpots or using leftovers to mitigate time constraints, some participants talked about not being able to adopt healthy eating habits because their lives were too busy or they didn't have enough time. This was particularly true in the Neighborhood 2 groups.

"I try to watch my pizza intake because I was eating like pizzas, whole pizzas all the time because by the time I get home from school, eat, done with the kids homework, it's really no time to even cook so I would just order, order, order." (Participant 4, Focus Group 2)

Participants in both neighborhoods talked about struggling with lack of time but participants who made cooking meals at home a priority found ways to cook meals in spite of their time constraints.

"For me it's time mostly. I try to be as efficient as possible and when it gets to Sunday or Saturday and I have some free hours there I try to cook something that will last me for part of the week and then pack it so every day I will take something out and cook it. I will spend two or three hours doing many things so that I will have that. If I had the time every day to go and cook, I would try to do that, but that's the most efficient system." (Participant 9, Focus Group 6)

In Neighborhood 1 (higher income/food access), cooking as a hobby, or cooking as a source of relaxation or enjoyment, and the joy of sharing home cooked food with others was a more prominent theme than in Neighborhood 2.

"I can come home at eight o'clock and still cook for two hours even if I'm dog tired because I like it so much ... I actually find it to be really energizing and I think also that it does make me happy ... So even if it takes time after work I think I'm usually willing to give that time because I like it." (Participant 2, Focus Group 6)

There was strong consensus that the high importance attributed to cooking (particularly scratch cooking) that emerged as the dominant view in each focus group was not typical of most participants' communities: "It's not many people out there who do a lot of cooking, that make a lot of things from scratch any more. You very seldom find it." (Participant 1, Focus Group 2) Focus group participants recognized that their cooking habits were not typical and expressed that they perceived a lack of cooking knowledge and/or interest in their community particularly among younger people.

"When I talked about stuff that I'm cooking or I'm planning to cook, my coworkers they kind of look at me with these weird stares of like you are really going to spend that much time cooking that? ... I probably spend four or five times more in preparing the foods that I eat than the rest of my coworkers do." (Participant 7, Focus Group 6)

3.3. Strategies among frequent cooks

With a few exceptions, focus group participants cooked

frequently and highly prioritized incorporating cooking into their lives. Wanting to eat healthfully (or healthier) and the desire to have control over the food one eats emerged as prominent themes. Though not universally the case, among participants in Neighborhood 1 (higher income/food access), cooking was seen as a way to create a healthier diet.

"I have to be in control of what I eat- put in my body. What you buy all made up is full of chemicals that are dangerous, so I try to avoid things with aluminum or all that stuff that you will find in the prepared food, or in the junk food." (Participant 7, Focus Group 5)

In contrast, Neighborhood 2 (lower SES/food access) participants conveyed an interest in changing their diets to be healthier in response to already existing diet-related health problems such as high blood pressure, diabetes and overweight or obesity.

"I like to eat salt all the time, but I can't eat it now ... because I'm a diabetic. I can't eat a lot of cake and stuff that I like, and I got to change my way or eating, and it's kind of difficult for me ... I'm not where I want to be, but I'm not like I used to be, eating crazy." (Participant 1, Focus Group 4)

Several common strategies emerged that enabled participants to incorporate cooking into their lives. First, many participants used extensive planning and organizational skills to enable them to find time to cook and cook in the most efficient way possible. Meal planning on a weekly basis was a common theme, especially among employed participants with young children.

"I am sort of rigorous in my process. I have a daughter and I work three days which is great. Monday is the day that the whole week gets planned out food wise so I'll normally do three or four things ... It's a lot of just sitting down and figuring out what we're going to eat." (Participant 6, Focus Group 7)

Cooking meals in bulk and using leftovers were another prevalent theme. Participants in both neighborhoods who cooked frequently and were trying to eat healthfully spoke enthusiastically about how cooking large meals and freezing leftovers for later was a very helpful strategy. And, finding shortcuts and preparing or processing ingredients in advance (such as blanching vegetables or portioning proteins such as chicken) and freezing them for later use were other common strategies people used to help them cook affordably and efficiently. Participants from Neighborhood 2 described slow cookers or crockpots to be particularly helpful when cooking meals at home on a budget, and leading busy lives.

"I find it easier when I cook a lot on Saturdays and put it in containers. That way I can use my microwave through the week when we rushing in or when we come home late ... I try to cook one day and then microwave everything during the week. If I can't do that, then I have to go to my slow cooker." (Participant 4, Focus Group 2)

"I have lived alone in the last 20 years or so but I got in the habit when I buy meat right out of the package I divide it into one-section portions and freeze it all except for the one portion I'm going to cook." (Participant 4, Focus Group 7)

Participants utilizing these skills were highly motivated to cook and prioritized ensuring they were able to cook meals for themselves or their families. Not all participants were similarly

motivated to cook or possessed the same level of organizational, planning and management skills. Those participants who did not cook frequently provided rationales based around not enjoying cooking, or not thinking they were good enough cooks, or, in some cases living alone and not wanting to cook for just one person.

"I'm not a cook. I come from a family of cooks, my sister, my mom and my dad. But me, I'm really not domestic ... I just don't like it. I don't like to cook. I don't." (Participant 11, Focus Group 1)

4. Discussion

This is the first study to examine how people perceive cooking as well as the barriers and facilitators to incorporating cooking into their lives. The results indicate that there is no universal definition of cooking, even within a single neighborhood income or a shared level of food access. People perceive cooking quite differently based on whether heat, scratch ingredients or convenience foods are used. Convenience foods were widely used in the cooking process but there was broad agreement that scratch cooking was preferable. Commonly cited barriers to cooking included: lack of time and inability to afford scratch or fresh ingredients. Commonly cited facilitators to cooking included: organization, planning, and enjoyment of cooking.

Our finding that the meaning of cooking lacks a single definition is consistent with prior literature (Lang & et al., 1999; Short, 2006). In fact, there was a general consensus in our sample that how one defines cooking is a personal decision and there was not a single standard that could or should be applied to everyone. Similar to prior studies, study participants conceptualized cooking based on the degree of time taken or effort expended (Kaufmann, 2010; Short, 2006) and viewed scratch cooking as preferable to cooking with convenience foods (even among participants who frequently cooked with convenience foods and included them in their definition of cooking) (Bowen, Elliott, & Brenton, 2014). Our findings challenge prior studies that concluded that among home cooks, convenience foods are as acceptable as scratch ingredients in the cooking process (Short, 2006). Our findings suggest that rather than defining a meals as cooked vs. not cooked, different categories of cooking that incorporate the use of convenience foods and span the continuum from all scratch cooking to fully prepared meals may be more useful. These categories could include, for example, scratch cooking (all or almost all scratch ingredients are used and time and energy are invested), semi-scratch cooking (convenience foods are used, but some scratch ingredients and/or personal touches are added, preparation is fast and less skill and planning is necessary), and quick meals (no scratch ingredients, mostly re-heating or de-frosting). It will be important for future research to examine the utility or applicability of this way of categorizing home cooking practices in other, broader populations.

Although we found few differences by neighborhood SES or food access in cooking perceptions or in the strategies people used to help them eat home cooked food, we did observe differences in the challenges people described facing when it comes to fitting cooking into their lives. People in the low income/food access neighborhood cited affordability of food (particularly fresh produce and other scratch ingredients) as a major barrier to cooking. In contrast, people in the high income/food access neighborhood also cited affordability as a concern, but in the context of making tradeoffs between high cost items such as organic produce or hormone free red meat.

Interestingly, access to food was not mentioned as a barrier in these focus groups - even among participants living in a food desert neighborhood. Rather, affordability of food was overwhelmingly mentioned as their biggest concern. Participants felt

that they had access to food, but could not afford it. This contrasts with a robust literature emphasizing disparities in access to healthy food between high and low income neighborhoods and the importance of the neighborhood food environment for food choices (Andreyeva & et al., 2008; Larson, Story, & Nelson, 2009; Lee, 2012; Ploeg & et al., 2009; Powell & et al., 2007). The Healthy Food Financing Initiative and the Healthy Corner Store Network are policy responses to this literature that have sought to increase the number of stores and improve the availability of healthy products in food desert neighborhoods (United States Department of Agriculture and 2015 July 14; Healthy Corner Stores Network and 2015 July 14). Our results suggest that people are willing to seek out the food they want even if it is not readily available in their neighborhoods, but that increasing physical access to food without addressing high prices of fresh produce and other healthy and desirable products may have limited impact on shifting eating (and cooking) habits. Increasing SNAP benefits and expanding programs that increase SNAP participant's spending power (such as the Double Up Bucks program which matches SNAP spending at farmers markets) (Fair Food Network, 2014), in combination with increased access to fresh, healthy food, could help lower-income individuals both afford the food they want and decrease the time they spend procuring it.

Our findings suggest that the meaning of cooking is complex and not uniformly understood. This underscores the need for public health messages about healthy eating to account for heterogeneity in perspectives about cooking which may, in turn, encourage more frequent cooking. For example, de-emphasizing scratch cooking may encourage cooking among those who report lack of confidence or negative attitudes towards cooking. Messages to reach this group might focus on incorporating healthy convenience foods (such as pre-cut and portioned vegetables, frozen vegetables and proteins, and ready-made sauces) into the preparation of healthy meals as it would be less time consuming (Buckley, Cowan, & McCarthy, 2007). Notably, a message focused on convenience might be considered "cheating" and not resonate among those who define cooking as the use of scratch ingredients. Our findings related to facilitators which encourage cooking (e.g., organizational and planning skills) suggest that cooking classes should emphasize these skills in addition to the food preparation process itself.

This study should be considered in light of several limitations. First, the research was conducted in an urban setting in Baltimore, MD, and the generalizability to other, particularly non-urban, settings is limited. Second, the participants self-selected into the study by responding to fliers posted in their neighborhoods. Although the fliers emphasized that we were interested in the views of people who both liked and did not like cooking, and people who cooked infrequently, the participants were composed of people who were interested in the topic and a majority liked to cook. The participants, themselves, observed that their cooking practices and attitudes were not representative of their social networks and broader communities. However, this was not universally the case, and we did observe a diversity of both cooking behavior and opinions about cooking among participants from both neighborhoods. In addition, the sample in Neighborhood 2 was substantially smaller than that of Neighborhood 1. This was due to a higher rate of confirmed participants not showing up for their scheduled focus group and could have contributed to self-selection bias. Third, although we designed the study to recruit participants from two distinct neighborhoods, there was considerable heterogeneity among the participants in Neighborhood 1 (high income/food access). This may have been because Neighborhood 1 was a mixed income

neighborhood, or because we placed the fliers in locations with high foot traffic and only confirmed neighborhood residence by self-report. Fourth, we did not attempt to collect data on cooking knowledge or skills, both of which may be related to cooking perceptions and practices. More research is needed to explore how knowledge is related to cooking perceptions and the strategies people use to overcome the barriers they face in preparing food. Finally, to build upon this formative study, additional research is needed in a larger sample to further refine and quantify how people perceive the meaning of cooking and how those perceptions are related to cooking behavior.

5. Conclusion

This study described how Americans understand the meaning of cooking. Cooking is complex and not uniformly understood. Generally, perceptions of cooking are based on whether heat, scratch ingredients or convenience foods are used. Scratch cooking was highly valued and viewed as preferable, though convenience foods were widely used. Key barriers to cooking included lack of time and affordability. Key facilitators to cooking included organization and meal planning. More research is needed to explore differences in cooking perceptions in other, diverse populations and to develop effective interventions to reduce barriers to healthy cooking which are consistent with people's perceptions of cooking.

Appendix

Table 1
Demographic and socio-economic characteristics of Baltimore city and the two recruitment neighborhoods.

	Baltimore city	Neighborhood 1	Neighborhood 2
Age (%)			
18–44	41.3	66.3	40.8
45–64	25.2	18.3	23.4
65+	11.8	8.3	10.8
Sex (%)			
Male	46.7	48.8	45.4
Female	53.3	51.2	54.6
Race (%)			
Black	63.6	35.9	81.4
White	29.7	47.6	12.6
Asian	2.4	11.8	3.2
Education (%)			
Residents ≥25 years old with ≤ a high school degree	52.6	31.0	65.1
Residents ≥25 years old with ≥ a bachelors degree	25	55.6	17.4
Economic indicators			
Unemployment rate (%)	11.1	5.3	16.1
Median household income (\$)	\$37,395	\$34,968	\$19,519
Family poverty rate (%)	15.2	16.5	27.5
Food environment			
Fast food density (no./10,000 residents)	2.4	19.75	5.9
Carryout density (no./10,000 residents)	12.7	55.5	28.5
Corner store density (no./10,000 residents)	9	14.9	9.2
Supermarket proximity (min. by car)	3.7	2.5	4.5

Note: Data compiled from the Baltimore City Department of Public Health's Neighborhood Health Profiles (2011). For both Neighborhood 1 and Neighborhood 2, data from two contiguous neighborhoods were averaged because data collection took place at locations right on the border between the two and recruitment took place in both neighborhoods.

Table 2
Self-reported frequency of cooking dinner among focus group participants (N = 52)^a

	Mean (SD)	Percentage			
		0–1 days/week	2–3.5 days/week	4–5 days/week	6–7 days/week
Overall (N = 52)	4.3 (2.0)	13	21	33	33
Neighborhood 1 (N = 35)	4.4 (1.6)	9	23	40	29
Neighborhood 2 (N = 17)	4.2 (2.7)	24	18	18	41

^a One participant in Neighborhood 1 declined to answer the question about frequency of cooking dinner.

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Appendix M. Focus groups topic guide

IRB Number: 6027

Title: *What's cooking? A mixed methods analysis of cooking perceptions, practices and implications for food policy*

P.I.: Shannon Frattaroli

Version/Date: version 1/September, 2014



Approved: October 9, 2014 IRB No.: 6027

Appendix D Focus Group Discussion Guide*

I. Introductions

Introduce ourselves (moderator and the note taker): We are graduate students at Johns Hopkins in the School of Public Health. We are conducting a research study about how people think about how people prepare food and how they think about cooking. The goal of this discussion group is to learn more about food preparation habits, what factors influence how you prepare food and how you think about cooking. There are no right or wrong answers.

Ask participants to introduce themselves and provide a first name or pseudonym.

Icebreaker: What is your favorite food or cooking memory?

II. Food preparation practices and history

1. What was the last meal you cooked? Why did you choose it? How did you make it?

Probe: Is this typical for you?

Probe: Do you think this is typical of most people?

Probe: What influences the way you prepare meals? Bring up food access, food prices, taste preferences, time, enjoyment, ease of preparation?

2. Is the way you cook similar to the way your family cooked when you were growing up?

Probe: If yes, in what way is it different?

Probe: If yes, why is it different?

Probe: What about your family today?

3. What kinds equipment and food preparation techniques do you use?

(use photos of different equipment, products and techniques to illustrate)

1

*Questions are examples of the kind of questions that may be asked. Later focus groups will solicit feedback on ideas shared in the earlier groups.

IRB Number: 6027

Title: *What's cooking? A mixed methods analysis of cooking perceptions, practices and implications for food policy*

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Version/Date: version 1/September, 2014

4. How did you learn how to cook?

Probe: Ask about mothers, grandmothers, fathers, school, home economics classes, recipes/cookbooks, cooking shows?

5. How have your cooking habits changed over time?

Probe: Have there been specific things in your life that have changed the way you prepare food?

III. Perceptions of cooking

6. How do you feel about cooking?

Probe: Do you enjoy cooking? Does it stress you out? Is cooking work? Is it fun?

Probe: How do you feel about the way you cook? Do you think you are good cook? Are you confident in your cooking skills?

Probe: What are your favorite and least favorite things about cooking?

7. What does home cooking mean to you?

Probe: How is home cooking different from cooking in general? If at all?

Probe: What about scratch cooking?

Probe: In surveys, people report that they cook very frequently, like six or seven nights a week. Based on your experience what kinds of food preparation activities do you think they are talking about?

8. What kinds of things do you consider when deciding whether or not something was homemade?

Probe: What about packaged foods or frozen foods?

9. How would you describe meals made with these things? Are they homemade? Is this cooking? Or something else? Is there no difference?

(use photos or actual products as props to illustrate and guide the discussion)

2

*Questions are examples of the kind of questions that may be asked. Later focus groups will solicit feedback on ideas shared in the earlier groups.

10. What are some of the challenges you face when it comes to cooking?

Probes: Ask about confidence, time, skills, enjoyment, cost, food access, meal planning/organization, preferences of family members.

Probe: What equipment is necessary to cook?

11. Is cooking important to you? Why or why not?

Probe: Is it important for health? For family? For some other reason?

12. Some people promote eating more home cooked meals as a way to eat healthier. What do you think about this recommendation?

Probe: What is the most useful way to help people cook more at home?

Probe: For you personally, or others in your community, what changes would you like to see that would help people cook more?

IV. Conclusion

We've covered a lot and I appreciate your insights. I want to make that everyone has an opportunity to provide any additional ideas.

13. Is there anything else you would like to add or that you think we should know about cooking

3

*Questions are examples of the kind of questions that may be asked. Later focus groups will solicit feedback on ideas shared in the earlier groups.

Appendix N. STROBE-nut checklist for Chapter 6

An extension of the STROBE statement for nutritional epidemiology (325).

This checklist was used to draft the manuscript for *International Journal of Behavioral Nutrition and Physical Activity*, based on the research described in Chapter 6.

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract. (b) Provide in the abstract an informative and balanced summary of what was done and what was found.	nut-1 State the dietary/nutritional assessment method(s) used in the title, abstract, or keywords.	Title; Abstract
Introduction				
Background rationale	2	Explain the scientific background and rationale for the investigation being reported.		Background
Objectives	3	State specific objectives, including any pre-specified hypotheses.		Background
Methods				
Study design	4	Present key elements of study design early in the paper.		Methods (data source)
Settings	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection.	nut-5 Describe any characteristics of the study settings that might affect the dietary intake or nutritional status of the participants, if	Methods (data source)

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
Participants	6	<p>a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up.</p> <p>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls.</p> <p>Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants.</p> <p>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed.</p> <p>Case-control study—For matched studies, give matching criteria and the number of controls per case.</p>	<p>applicable.</p> <p>nut-6 Report particular dietary, physiological or nutritional characteristics that were considered when selecting the target population.</p>	Methods (data source)
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	<p>nut-7.1 Clearly define foods, food groups, nutrients, or other food components.</p> <p>nut-7.2 When using dietary patterns or</p>	Methods (frequency of consumption of home cooked meals, indicators of diet quality, markers of

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
			indices, describe the methods to obtain them and their nutritional properties.	cardio-metabolic health, covariates)
Data sources - measurements	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group.	<p>nut-8.1 Describe the dietary assessment method(s), e.g., portion size estimation, number of days and items recorded, how it was developed and administered, and how quality was assured. Report if and how supplement intake was assessed.</p> <p>nut-8.2 Describe and justify food composition data used. Explain the procedure to match food composition with consumption data. Describe the use of conversion factors, if applicable.</p> <p>nut-8.3 Describe the nutrient requirements, recommendations , or dietary guidelines and the evaluation approach used to</p>	Methods (frequency of consumption of home cooked meals, indicators of diet quality, markers of cardio-metabolic health, covariates)

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
			<p>compare intake with the dietary reference values, if applicable.</p> <p>nut-8.4 When using nutritional biomarkers, additionally use the STROBE Extension for Molecular Epidemiology (STROBE-ME). Report the type of biomarkers used and their usefulness as dietary exposure markers.</p> <p>nut-8.5 Describe the assessment of nondietary data (e.g., nutritional status and influencing factors) and timing of the assessment of these variables in relation to dietary assessment.</p> <p>nut-8.6 Report on the validity of the dietary or nutritional assessment methods and any internal or external validation used in the study, if</p>	

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
			applicable.	
Bias	9	Describe any efforts to address potential sources of bias.	nut-9 Report how bias in dietary or nutritional assessment was addressed, e.g., misreporting, changes in habits as a result of being measured, or data imputation from other sources	Methods (indicators of diet quality)
Study Size	10	Explain how the study size was arrived at.		Methods (data source, statistical analysis)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why.	nut-11 Explain categorization of dietary/nutritional data (e.g., use of N-tiles and handling of nonconsumers) and the choice of reference category, if applicable.	Methods (indicators of diet quality, statistical analysis)
Statistical Methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions. (c) Explain how missing data were addressed. (d) Cohort study—If applicable, explain how	nut-12.1 Describe any statistical method used to combine dietary or nutritional data, if applicable. nut-12.2 Describe and justify the method for energy adjustments, intake modeling, and use of	Methods (indicators of diet quality, statistical analysis)

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		<p>loss to follow-up was addressed.</p> <p>Case-control study—If applicable, explain how matching of cases and controls was addressed.</p> <p>Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy.</p> <p>(e) Describe any sensitivity analyses.</p>	<p>weighting factors, if applicable.</p> <p>nut-12.3 Report any adjustments for measurement error, i.e., from a validity or calibration study.</p>	
Results				
Participants	13	<p>(a) Report the numbers of individuals at each stage of the study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed.</p> <p>(b) Give reasons for non-participation at each stage.</p> <p>(c) Consider use of a flow diagram.</p>	<p>nut-13 Report the number of individuals excluded based on missing, incomplete or implausible dietary/nutritional data.</p>	<p>Methods (data source, statistical analysis)</p>
Descriptive data	14	<p>(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders</p> <p>(b) Indicate the number of participants with</p>	<p>nut-14 Give the distribution of participant characteristics across the exposure variables if applicable. Specify if food consumption of</p>	<p>Methods (data source, frequency of consumption of home cooked meals, indicators of diet quality, markers of cardio-</p>

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		missing data for each variable of interest (c) Cohort study— Summarize follow-up time (e.g., average and total amount)	total population or consumers only were used to obtain results.	metabolic health, covariates, statistical analysis); Results (Table 1)
Outcome data	15	Cohort study— Report numbers of outcome events or summary measures over time. Case-control study— Report numbers in each exposure category, or summary measures of exposure. Cross-sectional study— Report numbers of outcome events or summary measures.		Results (Table 1, Table 2)
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included. (b) Report category boundaries when continuous variables were categorized. (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time	nut-16 Specify if nutrient intakes are reported with or without inclusion of dietary supplement intake, if applicable.	Methods (indicators of diet quality, covariates); Results (Table 1, Table 2)

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		period.		
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions and sensitivity analyses.	nut-17 Report any sensitivity analysis (e.g., exclusion of misreporters or outliers) and data imputation, if applicable.	No additional analyses conducted
Discussion				
Key results	18	Summarize key results with reference to study objectives.		Discussion (statement of principal findings)
Limitation	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	nut-19 Describe the main limitations of the data sources and assessment methods used and implications for the interpretation of the findings.	Discussion (strengths and weaknesses of the study)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	nut-20 Report the nutritional relevance of the findings, given the complexity of diet or nutrition as an exposure.	Discussion (interpretation of findings in the context of existing research, meaning of the study: possible mechanisms and implications for clinicians and policymakers)
Generalizability	21	Discuss the		Discussion

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		generalizability (external validity) of the study results.		(strengths and weaknesses of the study)
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.		Funding
<i>Ethics</i>			nut-22.1 Describe the procedure for consent and study approval from ethics committee(s).	Methods (data source)
<i>Supplementary material</i>			nut-22.2 Provide data collection tools and data as online material or explain how they can be accessed.	Methods (data source); Availability of data and materials

Appendix O. STROBE-nut checklist for Chapter 7

An extension of the STROBE statement for nutritional epidemiology (325).

This checklist was used to draft the manuscript for *Public Health Nutrition*, based on the research described in Chapter 7.

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract. (b) Provide in the abstract an informative and balanced summary of what was done and what was found.	nut-1 State the dietary/nutritional assessment method(s) used in the title, abstract, or keywords.	Title p.1; Abstract p.2-3
Introduction				
Background rationale	2	Explain the scientific background and rationale for the investigation being reported.		Background p.3-4
Objectives	3	State specific objectives, including any pre-specified hypotheses.		Background p.3-4
Methods				
Study design	4	Present key elements of study design early in the paper.		Methods (data source) p.4-5
Settings	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data	nut-5 Describe any characteristics of the study settings that might affect the dietary intake or	Methods (data source) p.4-5

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		collection.	nutritional status of the participants, if applicable.	
Participants	6	<p>a) Cohort study—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up.</p> <p>Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls.</p> <p>Cross-sectional study—Give the eligibility criteria, and the sources and methods of selection of participants.</p> <p>(b) Cohort study—For matched studies, give matching criteria and number of exposed and unexposed.</p> <p>Case-control study—For matched studies, give matching criteria and the number of controls per case.</p>	nut-6 Report particular dietary, physiological or nutritional characteristics that were considered when selecting the target population.	Methods (data source) p.4-5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and	nut-7.1 Clearly define foods, food groups, nutrients, or	Methods (frequency of consuming main meals from

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		effect modifiers. Give diagnostic criteria, if applicable.	other food components. nut-7.2 When using dietary patterns or indices, describe the methods to obtain them and their nutritional properties.	different sources, sociodemographic characteristics) p.5-6
Data sources - measurements	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group.	nut-8.1 Describe the dietary assessment method(s), e.g., portion size estimation, number of days and items recorded, how it was developed and administered, and how quality was assured. Report if and how supplement intake was assessed. nut-8.2 Describe and justify food composition data used. Explain the procedure to match food composition with consumption data. Describe the use of conversion factors, if applicable.	Methods (frequency of consuming main meals from different sources, sociodemographic characteristics) p.5-6

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
.....			<p>nut-8.3 Describe the nutrient requirements, recommendations, or dietary guidelines and the evaluation approach used to compare intake with the dietary reference values, if applicable.</p> <p>nut-8.4 When using nutritional biomarkers, additionally use the STROBE Extension for Molecular Epidemiology (STROBE-ME). Report the type of biomarkers used and their usefulness as dietary exposure markers.</p> <p>nut-8.5 Describe the assessment of nondietary data (e.g., nutritional status and influencing factors) and timing of the assessment of these variables in relation to dietary assessment.</p> <p>nut-8.6 Report on the validity of</p>	

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
			the dietary or nutritional assessment methods and any internal or external validation used in the study, if applicable.	
Bias	9	Describe any efforts to address potential sources of bias.	nut-9 Report how bias in dietary or nutritional assessment was addressed, e.g., misreporting, changes in habits as a result of being measured, or data imputation from other sources	Methods (analytical approach) p.6
Study Size	10	Explain how the study size was arrived at.		Methods (data source, analytical approach) p.4-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why.	nut-11 Explain categorization of dietary/nutritional data (e.g., use of N-tiles and handling of nonconsumers) and the choice of reference category, if applicable.	Methods (frequency of consuming main meals from different sources, sociodemographic characteristics, analytical approach) p.5-6
Statistical Methods	12	(a) Describe all statistical methods, including those used to control for confounding	nut-12.1 Describe any statistical method used to combine dietary	Methods (frequency of consuming main meals from different sources,

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		<p>(b) Describe any methods used to examine subgroups and interactions.</p> <p>(c) Explain how missing data were addressed.</p> <p>(d) Cohort study—If applicable, explain how loss to follow-up was addressed.</p> <p>Case-control study—If applicable, explain how matching of cases and controls was addressed.</p> <p>Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy.</p> <p>(e) Describe any sensitivity analyses.</p>	<p>or nutritional data, if applicable.</p> <p>nut-12.2 Describe and justify the method for energy adjustments, intake modeling, and use of weighting factors, if applicable.</p> <p>nut-12.3 Report any adjustments for measurement error, i.e., from a validity or calibration study.</p>	<p>sociodemographic characteristics, analytical approach) p.5-6</p>
Results				
Participants	13	<p>(a) Report the numbers of individuals at each stage of the study—e.g., numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed.</p> <p>(b) Give reasons for non-participation at each stage.</p>	<p>nut-13 Report the number of individuals excluded based on missing, incomplete or implausible dietary/nutritional data.</p>	<p>Methods (data source, analytical approach) p.4-6</p>

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		(c) Consider use of a flow diagram.		
Descriptive data	14	<p>(a) Give characteristics of study participants (e.g., demographic, clinical, social) and information on exposures and potential confounders</p> <p>(b) Indicate the number of participants with missing data for each variable of interest</p> <p>(c) Cohort study— Summarize follow-up time (e.g., average and total amount)</p>	nut-14 Give the distribution of participant characteristics across the exposure variables if applicable. Specify if food consumption of total population or consumers only were used to obtain results.	Methods (frequency of consuming main meals from different sources, sociodemographic characteristics, analytical approach) p.5-6 Results (Table 1)
Outcome data	15	<p>Cohort study—Report numbers of outcome events or summary measures over time.</p> <p>Case-control study— Report numbers in each exposure category, or summary measures of exposure.</p> <p>Cross-sectional study—Report numbers of outcome events or summary measures.</p>		Results (Tables 1-3, Fig 1)
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval).	nut-16 Specify if nutrient intakes are reported with or without inclusion of dietary supplement intake, if	Methods (sociodemographic characteristics, analytical approach) p.5-6; Results (Tables 1-3, Fig 1)

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		<p>Make clear which confounders were adjusted for and why they were included.</p> <p>(b) Report category boundaries when continuous variables were categorized.</p> <p>(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period.</p>	applicable.	
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions and sensitivity analyses.	nut-17 Report any sensitivity analysis (e.g., exclusion of misreporters or outliers) and data imputation, if applicable.	No additional analyses conducted
Discussion				
Key results	18	Summarize key results with reference to study objectives.		Discussion (statement of principal findings) p.12-13
Limitation	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	nut-19 Describe the main limitations of the data sources and assessment methods used and implications for the interpretation of the findings.	Discussion (strengths and weaknesses of the study) p.13-14
Interpretation	20	Give a cautious overall interpretation of results considering	nut-20 Report the nutritional relevance of the	Discussion (interpretation of

Item	Item nr	STROBE recommendations	Extension for Nutritional Epidemiology studies (STROBE-nut)	Reported on page #
		objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	findings, given the complexity of diet or nutrition as an exposure.	findings) p.14-18
Generalizability	21	Discuss the generalizability (external validity) of the study results.		Discussion (strengths and weaknesses of the study) p.13-14
Other information				
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.		Funding p.20
<i>Ethics</i>			nut-22.1 Describe the procedure for consent and study approval from ethics committee(s).	Methods (data source) p.4-5
<i>Supplementary material</i>			nut-22.2 Provide data collection tools and data as online material or explain how they can be accessed.	Methods (data source) p.4-5; Availability of data and materials p.20

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