Exploring stakeholders' views on the Change4Life 'Sugar Smart' campaign and school food to improve children's diets: two qualitative studies

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Abstract

There is a current childhood obesity pandemic and a high prevalence of dental caries amongst children worldwide. This thesis comprises two studies which provide an in-depth qualitative exploration of stakeholders' views on the impact of the national Change4Life 'Sugar Smart' campaign, and the influence of school food on children's diets in Newcastle upon Tyne.

In 2017, twenty-seven telephone interviews were conducted with parents, one-year post 'Sugar Smart' campaign. Key findings were: a reported raised awareness of child sugars intake by parents and children; 'hidden sugars' were a barrier to reducing sugars intake; and, reported household shopping changes including reduced purchasing of 'sugary' drinks and breakfast cereals. The national campaign was helpful in raising awareness of the impacts of Free Sugars, one-year post-campaign. However, a more integrated approach is needed to increase the impact and sustainability of future health marketing campaigns.

A number of parents who participated in the 'Sugar Smart' campaign evaluation reported a difficulty in reducing their child's Free Sugars intake when their children were at school. This finding warranted further research, therefore, a second study was designed to explore stakeholder views on school food contribution to the diets of children. Three schools in Newcastle upon Tyne were recruited. Focus groups were conducted with parents and children. Head teachers, canteen staff and employees of Newcastle City Council who are involved in school food provision were interviewed. Identified themes included puddings being a controversial addition to school dinners, a preference for school dinners over packed lunches, and the ability of school dinners to encourage children to try new foods. Communication between stakeholders needs to be improved, and clearer, more consistent messages about the importance of nutritionally balanced school meals are needed.

This research highlights that a diverse range of initiatives are needed across different settings to improve children's diets. A single approach to achieving positive improvement is unlikely to be successful. To ensure the environments which children interact with allow easy and accessible healthy food and drink choices, there is a need for change within legislation and policy, as well as the development of whole

school approaches. All stakeholders involved should prioritise the health of children and work together to achieve a positive improvement of children’s diets.

Dedication

For my mum and dad, because I would not have got this far without your invaluable support.

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List of Abbreviations

American Dental Association	ADA
Applications	Apps
Body Mass Index	BMI
Cardiovascular disease	CVD
Centre for Disease Control	CDC
Change4Life	C4L
Computer Assisted Qualitative Data Analysis Software	CAQDAS
COnsolidated criteria for REporting Qualitative research	COREQ
Consolidated Standards of Reporting Trials	CONSORT
Dental care professionals	DCPs
Department for Education	DfE
Department of Health	DH
Department of Health and Social Care	DHSC
Dietary Guidelines for Americans	DGA
Early Childhood Caries	ECC
European Union	EU
Face-to-face	FTF
Food and Agriculture Organisation of the UN	FAO
Food Standards Agency	FSA
Glycaemic Index	GI
Head of household occupation	HOH
High fat, sugar, salt	HFSS
High Fructose Corn Syrup	HFCS
Index of Multiple Deprivation	IMD
National Centre for Social Research	NatCen
National Child Measurement Programme	NCMP
National Diet and Nutrition Survey	NDNS

National Health and Nutrition Examination Survey	NHANES
National Health Service	NHS
Newcastle City Council	NCC
Non-alcoholic fatty liver disease	NAFLD
Non-communicable diseases	NCDs
Non-milk extrinsic sugars	NMES
Non-starch polysaccharides	NSPs
Overweight and Obesity	OW/OB
Public Health England	PHE
Randomised controlled trials	RCTs
Royal College of Surgeons Faculty of Dental Surgery	RCSEng
Royal Society for Public Health	RSPH
School Fruit and Vegetable Scheme	SFVS
Scientific Advisory Committee on Nutrition	SACN
Socio-economic status	SES
Soft Drink Industry Levy	SDIL
Standards for Quality Improvement Reporting Excellence	SQUIRE
Standards for Reporting Qualitative Research	SRQR
Sugar Sweetened Beverages	SSBs
Total Energy	TE
Type 2 Diabetes Mellitus	T2DM
U.S. Department of Agriculture	USDA
U.S. Department of Health and Human Services	HHS
United States	US
Universal Infant Free School Meals	UIFSM
University College Dublin	UCD
World Health Organisation	WHO

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Chapter 1. Introduction

There is currently an excessive consumption of Free Sugars in the UK and other countries, making it an issue of global importance. The worldwide consumption of sugars was reported to be 173.95 million tonnes in 2018/2019, compared to 154.1 million tonnes in 2009/2010 (USDA, 2019).

A high intake of Free Sugars has been found to impact negatively on good health (WHO, 2015). The World Health Organisation (WHO) has recommended that no more than 10%, and preferably less than 5%, of a person's total energy intake should come from Free Sugars (WHO, 2015).

However, children in the UK are currently consuming up to three times more sugars than is recommended (PHE, 2019c). Free Sugars intake can have a negative effect on health at any age, but a high intake in childhood is of particular concern as it is at this age when individuals develop their food and taste preferences which they are likely to carry with them throughout their lives (Montaño et al., 2015).

Foods rich in Free Sugars often have no nutritional benefit, and high intake levels are linked to disease risk and poor dietary quality, (WHO, 2003, PHE, 2015a). Free Sugars contribute to the overall energy density of diets, promoting a positive energy balance, which can result in an increased risk of overweight and obesity (OW/OB) (Mathers and Wolever, 2009). Diets high in Free Sugars also contribute to the development of dental caries and various other non-communicable diseases (NCDs) including heart disease, type 2 diabetes, stroke and some cancers (PHE, 2015a).

The number of people across the world who are classified as OW/OB has reached epidemic proportions. According to the Global Burden of Disease data, nearly 268 million children and adolescents in 200 countries will be overweight, and 124 million will be obese, by 2025 (GBD Obesity Collaborators, 2017, Swinburn et al., 2019). In the latest Health Survey for England findings, 28% of children aged 2 to 15 years old were classified as overweight or obese (National Statistics, 2019). Excessive sugars consumption is one factor in promoting OW/OB.

In the UK, the financial burden associated with OW/OB for the National Health Service (NHS) is vast. Treating obesity-related conditions costs the NHS £6.1bn a

year (PHE, 2017b) with a further £27bn cost to the wider economy (Daneshkhu, 2015). The 2007 Foresight Report documented that the NHS costs attributable to OW/OB were projected to double to £10 billion per year by 2050, in line with the increased projection of obesity to 60% men, 50% women and 25% children by 2050 (Butland et al., 2007).

Children's dental health in England has shown improvement in recent decades, however, significant inequalities still exist (PHE, 2018a). A reported 23.3% of 5-year-olds have obvious decay, with the average number of affected teeth being 3.4 (PHE, 2018a). Alarmingly, dental caries remains the number one reason why children aged 6-10 in the UK are admitted to hospital each year for general anaesthetic (PHE, 2019a).

Dental diseases are also a costly burden to health care services as the treatment of dental diseases is currently consuming 5-10% of health-care budgets in industrialised countries (WHO, 2015). Dental care costs the NHS £3.4bn a year (Oral Health Foundation, 2016), and an additional £2.3 billion in the private sector (PHE, 2017a). In 2015, the average cost for tooth extraction in hospital for a child aged five and under was £836 (PHE, 2017a). In 2015/16 the cost of tooth extractions among children aged 0 to 19 was approximately £50.5 million, with the majority of extractions being a result of tooth decay (PHE, 2017a). Free Sugars intake in contributing to dental caries is contributing to these costs.

Developing adverse health outcomes in childhood, such as OW/OB and dental caries, often results in these children being at an increased risk of retaining the conditions in adulthood. This is due to the trajectory and cumulative nature of these conditions (Häkkänen et al., 2016, Biro and Wien, 2010). A 2008 systematic review found that the risk of OW/OB in adulthood was at least twice as high in children who are OW/OB compared to children who are of healthy weight (Singh et al., 2008). The restorative cycle of dental caries is also cumulative, as once a small restoration is placed in a child's tooth it is only likely to increase in size and have further consequences throughout their life course (Broadbent et al., 2013).

Effective, feasible policy actions are needed to reduce the availability and affordability of sugar and sugary products, influence the acceptability of alternatives and raise awareness about the sugar contained in products (HM Government, 2018).

Health marketing campaigns are one way of attempting to raise awareness and increase consumer knowledge and education around issues such as the importance of eating a healthy diet and reducing Free Sugars intake levels. There have been numerous initiatives and attempts to combat a high Free Sugars intake by children worldwide. The focus of this thesis is on UK initiatives, specifically Public Health England's (PHE) 2016 Change4Life (C4L) 'Sugar Smart' health marketing campaign. This campaign aimed to help families cut their children's sugars intake by increasing awareness of Free Sugars through the development of a novel smartphone app, and the provision of education tools such as information sheets, stickers and recipe cards (Change4Life, 2018).

Access and availability of food and drinks is an important influence on what individuals consume. Most children in the UK spend a large proportion of their time within the school environment. There is a total of 8.82 million pupils in all schools in England, including 4.73 million children in state funded primary schools (DfE, 2019b). In the most recent survey of school meal take-up in the UK, Wollny; et al. (2015) reported that the highest take-up of school lunch varied by region. The highest take-ups were in the North West of England (51.7%), followed by the North East (51.6%) (Wollny; et al., 2015). This is displayed in Figure 1.

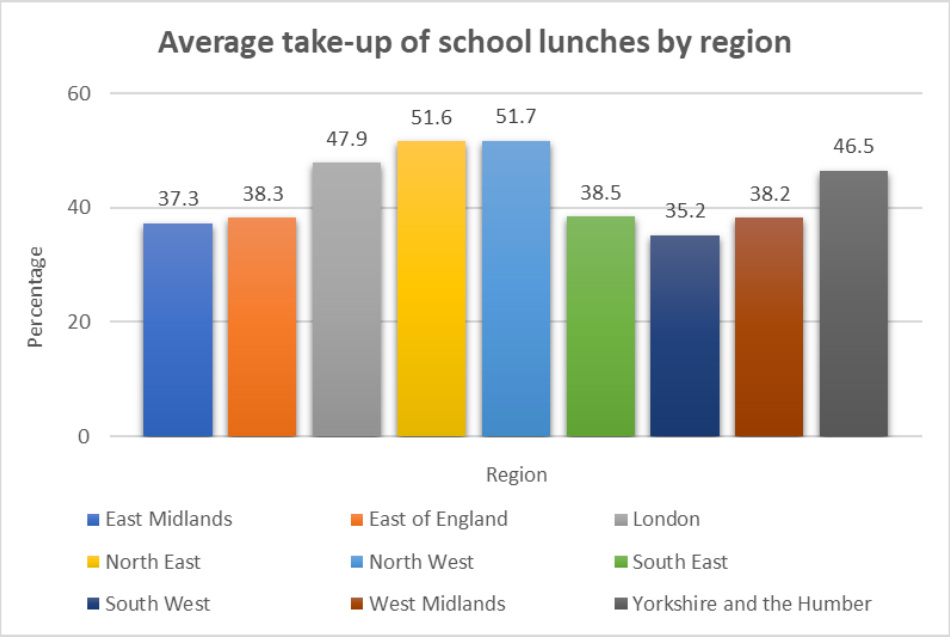

Figure 1: Average take-up of school lunches by region in the UK.

Derived from Wollny; et al. (2015) report 'School Lunch take-up survey 2013 to 2014'.

The school environment is potentially an important setting for creating and developing taste preferences and eating behaviours for these children. Understanding stakeholders' views and the issues they place importance on relating to school food is therefore an important area of research.

Socioeconomic status (SES) is defined as a measure of an individual's combined economic and social status and tends to be positively associated with better health (Cockerham et al.). Operationalising SES can be challenging due to the various ways in which participants can be grouped. It is important to keep SES in consideration when carrying out research and selecting research participants, as it has an influence on aspects of an individual's life including the environment in which they live and how accessible a healthy diet is to them. More healthful behaviours are typically observed among more affluent individuals (Consortium et al., 2007, Stringhini et al., 2010), and health outcomes and life expectancy in the UK both improve with increased SES (Marmot et al., 2010).

Public health campaigns and interventions primarily aim to change health behaviours and improve health outcomes (Randolph and Viswanath, 2004). Health inequalities have been described as systemic and avoidable unjust differences in health and wellbeing between groups of people or communities (PHE, 2017c). Individuals with a lower SES are less likely to have the financial and social resources to improve things for themselves whereas more affluent people are more likely to actively seek out and engage with health information (PHE, 2017c). There is the possibility that campaigns to improve public health actually fail to engage the groups who stand to benefit most from them (Pickett, 2005). It has been previously shown that interventions which improve the health of a population overall may also increase inequalities in health (Macintyre, 2000, Victora et al., 2000, Tugwell et al., 2006).

Family SES influences children's diets, and it has been shown that less affluent families tend to have more unhealthy dietary habits (Richter et al., 2012, Drouillet-Pinard et al., 2017). As socio-economic discrepancies in many health behaviours emerge in childhood (Hanson and Chen, 2007), interventions to improve childhood health behaviours, delivered through schools (Wakefield et al., 2010), may play a role in reducing inequalities (Moore et al., 2014). However, universal interventions may also have the opposite effect, widening inequality through disproportionately

benefitting more affluent groups (Moore et al., 2014), and it has been shown that children of higher-educated parents seem to benefit more from interventions than children of lower educated parents (Grydeland et al., 2014).

The two studies within this thesis are linked through common themes surrounding the need to improve children's diets, with a particular focus on reducing their Free Sugars intake and the roles of the Sugar Smart campaign and school meals provision therein. The terms 'children' and 'adolescents' are used interchangeably throughout the literature review, depending on the terms used in the source publications and refer to anyone 18 years and under. However, the main focus of this thesis, and of the primary data collection, is on children aged 5 – 11 years old. The thesis takes an iterative approach as the initial research findings from the first study influenced the design of the second study. The aims and objectives of this research are detailed in the following section.

1.1 Aims and objectives

Study One: Exploring the impact of the 'Sugar Smart' campaign on parental knowledge of children's sugars intake after one year: a qualitative study

Aims

To assess any long-term impact of the Change4Life 'Sugar Smart' campaign on parental awareness of their child's sugars intake, as well as their knowledge of different types and sources of sugars in general, one year after the campaign was launched.

Objectives

1. To explore any impact of the campaign on parental awareness of their child's sugars intake one-year post launch
2. To explore any impact of the campaign on household shopping behaviours, one-year post launch
3. To examine parental knowledge of sugars in general, one-year post campaign

Study Two: Examining stakeholders views on school food contribution to children's diets in Newcastle upon Tyne: a qualitative study

Aims

To perform an in-depth qualitative exploration on the views of stakeholders on school food contribution to the diets of children aged 5-11 years, in schools from across the socio-economic status (SES) spectrum in Newcastle upon Tyne.

Objectives

1. To explore the views of parents and children on school food contribution to children's diets
2. To explore the views of head teachers, canteen staff and staff from Newcastle City Council on school food contribution to children's diets
3. To capture views from across the SES spectrum by including schools from different areas in Newcastle upon Tyne

Chapter 2. Literature Review

2.1 Introduction

The following chapter comprises a narrative scoping review rather than a systematic review. Scoping reviews are similar to systematic reviews in that they follow a structured process (Munn et al., 2018), however, the general purpose for conducting scoping reviews is to identify and map the available evidence (Arksey and O'Malley, 2005, Anderson et al., 2008). A narrative scoping review was chosen for this thesis to scope the body of literature on Free Sugars intake by children and school food, to clarify concepts and definitions in the relevant literature and to investigate different research conduct (Munn et al., 2018).

The first section of this chapter provides an overview of definitions related to ‘sugars’ for the reader, this is then followed by the narrative scoping review of the literature.

2.2 Carbohydrates

Carbohydrates are diverse molecules which are principally substrates for energy metabolism, but can also influence satiety, blood glucose and insulin levels, lipid metabolism, and can exert a major control on colonic function (Cummings and Stephen, 2007). Carbohydrates are classified by molecular size into oligosaccharides, polysaccharides, and sugars.

Oligosaccharides are either α-glucans or non- α-glucans. Polysaccharides may be divided into starch and non-starch polysaccharides (NSPs). ‘Sugars’ include mono- and di-saccharides, and polyols. Monosaccharides have one sugar molecule and include glucose, galactose and fructose. Di-saccharides have two molecules, and the most common di-saccharide is table sugar or sucrose. Polyols, such as sorbitol, are classified as sugar alcohols. They are either found naturally in some fruits or are made commercially by using aldose reductase to convert the aldehyde group of the glucose molecule to the alcohol.

Carbohydrates are the single most abundant and economic source of food energy in the human diet, constituting 40-80% of total energy intake in different populations (Mathers and Wolever, 2009). Most of the energy from carbohydrates is derived from plant material, except when milk or milk products containing lactose are consumed. Glycaemic carbohydrates are digested to sugars, in the form of monosaccharides, in

the small bowel where they are absorbed and metabolised (Mathers and Wolever, 2009)

2.3 Terms and definitions of sugars

Globally, various terms for sugars are used in dietary recommendations. Research has shown that the different terms and definitions for sugars which are routinely used by health professionals and reiterated by the media may not always be understood by the public (Borra and Bouchoux, 2009).

Non-milk extrinsic sugars (NMES) are sugars which are not contained within the cellular structure of a food, with the exception of lactose in dairy products. Lactose is considered to be an extrinsic sugar, as it is not bound to a cellular structure. (SACN, 2015).

NMES have been previously used as an indicator of dietary sugars intake in the National Diet and Nutrition Survey (NDNS) Rolling Programme in the UK; more recently, the NDNS has changed to using the term 'Free Sugars'. The difference between NMES and Free Sugars is the fact that NMES include 50% of the fruit sugars from stewed, dried or canned fruit as extrinsic and 50% intrinsic (PHE, 2018b).

Free Sugars were defined by Public Health England (PHE) in a response to the Scientific Advisory Committee on Nutrition (SACN)'s, 2015 report on Carbohydrates and Health (Scientific Advisory Committee on Nutrition, 2015). This report recommended that a clear definition of Free Sugars should be adopted, to estimate more accurately the intakes of Free Sugars in the NDNS. PHE has therefore set the definition for Free Sugars in the UK as: '*Free Sugars include all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition'* (Swan et al., 2018).

The term **'added sugars'** is often used on food labelling and is widely used in countries such as the United States (US). Added sugars have been defined by the US Department of Agriculture as those sugars including honey, molasses, fruit juice

concentrate, brown sugar, corn sweetener, sucrose, lactose, glucose, high-fructose corn syrup and malt syrup, which are added to foods and beverages during processing or home preparation (Pehrsson et al., 2005).

Intrinsic sugars are defined by the WHO as sugars which are incorporated within the structure of intact fruit and vegetables (WHO, 2015). They are encapsulated by a plant cell wall and are digested more slowly and take longer to enter the blood stream than Free Sugars. They are naturally occurring and always accompanied by other nutrients. For example, fruits and vegetables are also valuable sources of vitamins, minerals and fibre.

The differing terms and definitions for sugars could lead to confusion when distinguishing which sugars should be reduced in the diet. Misunderstanding can arise from the misperception that natural or raw sources of sugars such as honey, agave and coconut syrup are less harmful as they have a low glycaemic index (GI). However, their fructose levels are very high and they are classed as Free Sugars. Excessive intakes of these sugars may, therefore, still have a negative impact on weight status and dental health. It is important that consumers are able to distinguish between different types of sugars, to make informed decisions about food and drink purchases. As parents are often the main provider of food and drink for their children, it is important that they are aware of the types of sugars which, if taken above recommended levels, could be harmful to their child's health.

2.4 Overweight and obesity

The prevalence of obesity is increasing throughout the world in both affluent areas and poorer countries. Childhood obesity, in particular, is one of the most serious global challenges of the 21st century as it is a contributing factor to poorer health throughout the life course (Nishtar et al., 2016). Despite the vast amount of research and policy changes over recent years, there has been a continued rise of OW/OB worldwide (Viner et al., 2018). The UK is listed within the top 20 countries in terms of obesity prevalence (Lobstein and Jackson-Leach, 2016). There are 268 million school-aged children worldwide who are reported to be overweight and 91 million are obese (Lobstein and Jackson-Leach, 2016, Rose et al., 2019).

Dietary factors, including Free Sugars, have been found to affect energy intake and eating motivation, which are also important in the aetiology of obesity (Blundell et al.,

2010). The World Health Organisation (WHO) reported in 2015 that increasing or decreasing Free Sugars intake is associated with parallel changes in body weight (WHO, 2015).

In 2013, a systematic review and meta-analyses of randomised controlled trials and cohort studies was conducted, researching the relationship between dietary sugars and body weight (Morenga et al., 2013). It found that among free-living people following *ad libitum* diets, intake of Free Sugars or sugar-sweetened beverages (SSBs) was a determinant of body weight. SSBs have been defined by the Centre for Disease Control (CDC) as drinks including "*regular soda, fruit drinks (including sweetened bottled waters and fruit juices and nectars with added sugars), sports and energy drinks, sweetened coffees and teas*" (Momin and Wood, 2018). The change in body fatness that occurred with modifying intakes seemed to be mediated via changes in energy intakes, as an equally active exchange of sugars with other carbohydrates was not associated with weight change (Morenga et al., 2013). The systematic review showed a clear positive association between higher intake of sugars and body fatness in adults, and provided an explanation as to why the findings in children were less conclusive – these were mainly due to poor compliance with dietary advice.

This research suggests that the change in body fatness that occurs with modifying intake of sugars results from an alteration in energy balance rather than a physiological or metabolic consequence of monosaccharides or disaccharides. The extent to which population-based advice to reduce sugars might reduce risk of obesity cannot be extrapolated from the findings of this review, since follow-up in the majority of the included studies was for less than ten weeks. However, when considering the rapid weight gain that occurs after an increased intake of sugars, it seems reasonable to conclude that advice relating to decreased sugars intake is a relevant component of a strategy to reduce the high risk of OW/OB in most countries (Morenga et al., 2013).

2.4.1 Current child weight status in the UK

Obesity can be identified by calculating body mass index (BMI), which is measured by dividing body weight in kilograms to height in meters squared (kg/m2). BMI has a high correlation with adiposity and it also correlates well with excess weight at the

population level. However, as it does not quantify total body adiposity, or distinguish between fat and muscle or predict body fat distribution, this method may therefore be inaccurate as it could overestimate adiposity in a child with increased muscle mass or underestimate adiposity in a child with reduced muscle mass. On a population level, nonetheless, BMI does track trends in adiposity (Güngör, 2014).

The National Child Measurement Programme (NCMP) measures the height and weight of roughly one million school children across England each year, allowing for trends in child weight status to be tracked. The latest figures from 2018-19 show that 9.7% of children in Reception (aged 4 – 5) were obese, and another 12.9% were overweight. Of children in Year 6 (aged 10 – 11), 20.2% of children were obese and a further 14.1% were overweight (NCMP, 2019). An increase in the number of OW/OB children since the previous year occurred in both year groups. There is a strong relationship between child weight status and deprivation. Obesity prevalence in Reception ranged from 5.9% of children in the least deprived areas, rising to 13.3% of children in the most deprived areas. In Year 6, 11.4% of the children were obese in the least deprived areas, which rose to 26.9% in the most deprived (NCMP, 2019).

2.4.2 Sugars and the obesogenic environment

An obesogenic environment was initially defined by Swinburn et al. (1999) as "*the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations*". Obesity reflects complex interactions of genetic, metabolic, cultural, environmental, socioeconomic and behavioural factors (Malik et al., 2006). It was shown in the 2007 Foresight Report that the causes of obesity are complex and multifaceted; energy balance is determined by a complex system of determinants, in which no one single influence dominates (Butland et al., 2007). The Foresight report calls for the need to take a 'whole-systems' approach. A whole-systems approach has been described as one which '*encourages joint working between national and local government, families and communities, third sector groups, schools, healthcare professionals, industry and academia*' (House of Commons Health Committee, 2018).

It is recognised that many Westernised countries, including the UK, have become 'obesogenic' environments (Delavari et al., 2014), where food and drinks with a high

Free Sugars content often have a lower cost, higher availability and bigger portion size (RSPH, 2018). The environment encompassing culture, societal norms, and commercial interests may influence obesity through food intake, for example through increased portion sizes, high-calorie foods, and easy access to inexpensive, less healthy foods and drinks. Physical activity may also be hindered by an environment which does not encourage or require walking, and by an increase in sedentary behaviour. This environment may influence an individual's behaviour, and it is likely to have a strong influence on people's diets (including levels of excess calorie consumption) and degree of physical activity .

Obesogenic environments are often dominated by fast food outlets and unsafe neighbourhoods which significantly restrict any healthy choices available; whereas affluence and health-promoting neighbourhoods and environments have been shown to have a positive effect on health (Swinburn et al., 2019). A higher percentage of unhealthy food sales at local UK supermarkets was discovered to have an association with the prevalence of OW/OB children in the same area (Wilsher et al., 2016). Takeaways are a popular choice amongst individuals in the UK, with a fifth of children and adults eating them at least once a week, and more so in less affluent areas (Tyrrell et al., 2016). Neighbourhoods in England which were more saturated with unhealthy food outlets were found to be associated with higher levels of OW/OB in children, in a study by Lachat et al. (2012). The foods and drinks available from these outlets generally lack nutritional quality and often contain high levels of fat, salt and sugar (HFSS), which may contribute to weight gain in individuals utilising these sources.

In a review of the evidence from 2006 to 2016 relating to obesogenic environments by Townshend and Lake (2017), a number of areas of concern were highlighted relating to the various different environments in which people spend most of their time. From both physical activity and food environment perspectives, the importance of the journey to school for children and adolescents was mentioned, and it was suggested that more health supportive environments are required which encourage active travel (Townshend and Lake, 2017). The authors concluded that there is a need for immediate action. Health and planning professionals must work together, providing a step towards a whole-systems approach to changing policy and practice.

This in turn could help combat any effect the environment may have on the development of OW/OB (Townshend and Lake, 2017).

However, there are still gaps in the literature regarding the evidence around the influence of the environment (Townshend and Lake, 2017). A 2011 UK study aiming to objectively explore environmental factors on the energy balance equation and their relationship with BMI and dietary behaviour, acknowledged that addressing the physical, built, 'obesogenic' environment alone will not combat the current obesity epidemic (Burgoine et al., 2011). This study further highlighted the need for additional research on how the individual themselves chooses to interact and react with the environment (Burgoine et al., 2011).

2.4.3 Consequences of childhood OW/OB

There are a number of short and long-term consequences of OW/OB in childhood. Childhood OW/OB can adversely affect nearly every organ system and has serious consequences at both physical and psychological levels. Examples of adverse outcomes include hypertension, dyslipidaemia, insulin resistance, prediabetes, Type 2 Diabetes Mellitus (T2DM), fatty liver disease and psychological complications (Daniels, 2009, Han et al., 2010, Nicolai et al., 2017). Childhood OW/OB is also associated with premature mortality (Reilly and Kelly, 2011).

Traditionally, T2DM has been transformed from a disease historically known to affect only adults, to a now serious paediatric public health problem affecting children as young as 6 years old (Aye and Levitsky, 2003).

OW/OB also causes changes in other hormonal systems, and the age of onset of puberty continues to decrease. This has particularly been seen in African Americans, and can, in part, be attributed to over nutrition and increased BMI values in this population (Kaplowitz et al., 2001).

Obstructive sleep apnoea syndrome is a disorder of breathing during sleep which is characterised by prolonged partial upper airway obstruction and/or intermittent complete obstruction that disrupts normal ventilation during sleep and also distorts normal sleep patterns; it is amongst the respiratory complications of obesity (Kaplowitz, 1998). Obstructive sleep apnoea is independently related to the development of hypertension, cardiovascular disease, behavioural disorders and

poor school performance in children. The prevalence of asthma is also increased in OW/OB children (Young et al., 2004).

There are also a number of psychosocial effects of OW/OB, including body dissatisfaction, symptoms of depression, loss-of-control in eating, unhealthy/extreme weight control behaviours, impaired social relationships and decreased health-related quality of life (Rankin et al., 2016). Further associations include low self-esteem, clinically significant depression, suicide attempts and full-syndrome eating disorders (Vander Wal and Mitchell, 2011, Wardle and Cooke, 2005).

Low self-esteem has been observed in children with OW/OB compared to their 'healthy' weight peers (Franklin et al., 2006) and OW/OB children may also be more susceptible to being bullied (Van Geel et al., 2014), having more absences from school leading to poorer learning and achievement than their peers (Kamhöfer, 2015), as well as less physical activity.

Childhood OW/OB can have an impact on social and economic factors later in life such as educational attainment, employment and marriage. The early development of cognitive skills and character are important for educational attainment and thus future employment, earnings success and well-being (Heckman, 2006).

2.5 Sugars and metabolic syndrome

Metabolic syndrome is the medical term for a combination of diabetes, high blood pressure and obesity. As well as its association with obesity, it is linked to a lack of physical activity, and to insulin resistance - which is a key feature of T2DM (NHS, 2018a).

An association between SSBs' impact on weight status has been supported by a 2010 review (Malik et al., 2010). Based on data from three prospective cohort studies including 19,431 participants and 5,803 cases of metabolic syndrome, participants in the highest category of SSBs intake had a 20% greater risk of developing metabolic syndrome than those in the lowest category of intake. Higher consumption of SSBs may be associated with development of weight gain, but also metabolic syndrome and T2DM. These data provide empirical evidence that intake of SSBs should be limited to reduce obesity-related risk of chronic metabolic diseases (Malik et al., 2010). In addition to their contribution to weight gain, SSBs may also have an independent effect on metabolic syndrome from the high levels of rapidly

absorbable carbohydrates in the form of added sugars, which are used to flavour these beverages (Malik et al., 2010).

Over the last decade, numerous randomised controlled trials (RCTs) on the effects of sugar consumption on weight gain have been performed (Morenga et al., 2013, Bray and Popkin, 2014), in both adults and children. These RCTs showed that weight gain slowed when SSBs were replaced by different beverages. In a US study by Ebbeling et al. (2012) which randomly assigned 224 overweight and obese adolescents who regularly consumed SSBs into two groups. The experimental group received home deliveries of non-caloric beverages (bottled water and 'diet' beverages), and the control group did not. The experimental group gained significantly less weight after one year than the control group (Ebbeling et al., 2012). A similar study was carried out with normal weight children aged 4-11 years old, in an urban area near Amsterdam by de Ruyter et al. (2012). The BMI, fat mass, skin-fold thickness and weight significantly increased less in the children who received the lower caloric beverage, highlighting that replacing SSBs with non-caloric beverages reduced weight gain and fat accumulation in normal weight children (de Ruyter et al., 2012).

Epidemiological data, plausible mechanisms and clinical data from diet intervention studies provide strong support for a direct causal and/or contributory role of sugar in the epidemic of metabolic disease (Chan et al., 2014, Hosseini-Esfahani et al., 2011). They also suggest an indirect causal and/or contributory role mediated by sugar consumption promoting body weight and fat gain (Balcells et al., 2011, Rhee et al., 2012, Stanhope, 2016).

It has been hypothesised that, directly, the fructose component in sugar causes dysregulation of lipid and carbohydrate metabolism. Indirectly, sugar promotes positive energy balance, thus body weight and fat gain, which cause dysregulation of lipid and carbohydrate metabolism. Due to the direct and indirect pathway, it has been suggested that the risk for metabolic disease is exacerbated when added sugar is consumed along with diets which contribute to an increase in fat gain and body weight (Stanhope, 2016).

2.6 Sugars and dental caries

Oral health is integral to overall health and is essential for wellbeing. Despite a reported decline in levels of dental caries in developed countries, dental caries remains prevalent and is increasing in some developing countries. Many developing countries are currently undergoing nutrition transition, which has resulted in an increasing access to Free Sugars, and thus an increased intake. Dental diseases are, therefore, a major public health problem (FDI World Dental Federation, 2016, The Lancet, 2019).

Populations that had reduced sugar availability during the Second World War years had a reduction in dental caries which subsequently increased when the restriction was lifted (Sognnaes, 1948, Makthaler, 1967). Makthaler (1967) analysed data from Switzerland and re-analysed wartime data from Norway and New Zealand to look at annual caries increments rather than absolute whole mouth caries experience and likewise found that caries increments mirrored sugars consumption. However, these analyses reported on amount of sugars only and did not investigate the effect of frequency of sugars consumption on caries.

Dental caries is a diet-dependent infectious disease primarily attributed to the presence of oral bacteria (WHO, 2017). Oral diseases currently affect over 3.5 billion people globally (Watt et al., 2019). The most prevalent oral diseases are dental caries, periodontal disease, tooth loss and cancers of the lips and oral cavity (Peres et al., 2019). Dental caries affect 560 million children's primary teeth (WHO, 2017, The Lancet, 2019).

Dental caries is the result of demineralisation of enamel and dentine in the presence of acid. Resident bacteria in the mouth ferment sugars, which produces acidic end-products such as lactic acid, which results in a drop in dental plaque pH (Mathers and Wolever, 2009). When the pH falls below 5.5 (commonly known as the 'critical pH'), the acid diffuses from the plaque across the enamel surface and causes sub-surface demineralisation. The acids that induce demineralisation at this level are produced by the fermentation of dietary sugars by acidogenic bacteria from the oral microbiota (SACN, 2015). This continues over time until the surface cavitates and a cavity is formed.

The development of caries requires sugars and bacteria to co-exist but it is influenced by the susceptibility of the tooth, the bacterial profile, quantity and quality of the saliva and importantly, the time for which fermentable dietary carbohydrates are available for bacterial fermentation. It is also influenced by lifestyle choices, the behaviour of the individual and their oral hygiene regime, for example their use of fluorides are likely to have a positive influence. Streptococcus mutans and streptococcus sorbrinus are important bacteria in the development of dental caries. These bacteria readily produce organic acids from dietary sugars and like most acidogenic bacteria, can synthesise insoluble plaque matrix polymers from dietary sugars – a factor that aids bacterial colonisation of the tooth surface. Growth of these streptococci requires the presence of fermentable monosaccharides. Mutans streptococcal invertase splits sucrose into glucose and fructose, which can be metabolised to produce mainly lactic but also other acids including acetic and formic acids (Moynihan and Petersen, 2004).

As dental caries does not occur in the absence of Free Sugars, they are considered to be undeniably the most important dietary contributor to dental caries development, playing a harmful role in fuelling the oral bacteria's acid formation (RCSEng, 2015).

The strength of evidence for the role of dietary sugars in the aetiology of dental caries comes from the multiplicity of the studies rather than the power of any one study alone (Arens, 1998). An in-depth systematic literature review by Moynihan and Petersen (2004) identified largely consistent evidence supporting a relationship between the amount of sugars consumed and the development of dental caries across age groups. Using the GRADE process, this evidence was classified as moderate quality. There is also evidence of moderate quality to show that dental caries is lower when Free Sugars intake is less than 10 per cent energy (%E). Analysis of the data suggests that there may be additional benefit in limiting sugars to <5%E to minimize the risk of dental caries throughout the life course (PHE, 2015b).

The WHO guideline on sugars for adults and children was based on systematic reviews of the evidence (WHO, 2015). The evidence for an association between intake of Free Sugars and risk of dental caries was provided from epidemiological studies including cohort studies in children which showed positive associations

between amount of Free Sugars consumed and dental caries. Five cohort studies that enabled comparison of the levels of dental caries for intake of Free Sugars of above and below 10% of energy intake showed that dental caries experience was higher when the intake of Free Sugars was greater than 10% of energy intake than when it was below that threshold. However, dental caries still occurred at levels of Free Sugars intake below 10% (Moynihan and Kelly, 2014). Even low levels of dental caries in childhood are significant, as caries is a cumulative and progressive disease (Broadbent et al., 2013). Accordingly, the systematic review also compared data on dental caries when the intake of Free Sugars was below 5% with an intermediate level of between 5% and 10% of total energy intake. These data were from population-based ecological studies and showed lower levels of dental caries when the intake of Free Sugars was at a level equivalent to approximately 5% of total energy intake compared with when it was above 5% but below 10% (WHO, 2015).

2.6.1 Dental caries in childhood

Children's primary teeth are more susceptible to decay than permanent teeth due to differences in their chemical composition and physical properties.

The Children's Dental Health Survey series provides statistical estimates on the dental health of children aged 5, 8, 12 and 15 across England, Wales and Northern Ireland, based on data collected from dental examinations carried out in schools on a random sample of children. This survey has been carried out every 10 years since 1973 (National Statistics, 2015a).

Levels of decay amongst children in the UK compared with children across Europe are low (Skafida and Chambers, 2018) which is largely the result of improved dental care and prevention, particularly an increased access to fluoride toothpaste since the 1970's. Prevention has, however, mainly focused on improving oral hygiene practices rather than diet; recommendations include tooth brushing twice daily with fluoride toothpaste, topical fluoride (fluoride varnish application) and in some areas, water fluoridation (Marinho, 2009, PHE and DH, 2017). There is conflicting evidence regarding whether oral hygiene habits, such as brushing with fluoride toothpaste, can attenuate the detrimental effects of high sugars intake by children (Harris et al., 2004). In a cross-sectional study, Masson et al. (2010) found that dental decay was

linked to consumption of NMES but not to total sugar in the diets of Scottish children. The highest risk of dental decay was found among children who brushed their teeth once a day or less and were also in the highest tertile of NMES intake (Masson et al., 2010).

2.6.2 Frequency versus amount of sugars intake for caries development

There is convincing evidence collectively from animal studies, human intervention studies and epidemiological studies, for an association between the amount and frequency of Free Sugars intake and dental caries. Both amount and frequency of consuming sugars-containing foods are considered of high aetiological importance with regards to dental health (Rugg-Gunn et al., 1984, Moynihan and Kelly, 2014, SACN, 2015), but it is not conclusive which is *more* important.

The frequency of sugars consumption has been found by some human studies to be an important contributing factor for dental caries development (Sreebny, 1982, Kalsbeek and Verrips, 1994). In a longitudinal study of English preschool children, Holt et al. (1982) found that decayed, missing or filled teeth were higher in children who had four or more sweetened snacks and drinks a day compared with children who only had them once a day. Similarly in following years, Holbrook et al. (1995) found a threshold effect for the frequency of sugars consumption on caries development of four times a day. These studies suggest that caries levels will be reduced if Free Sugars intake is limited to a maximum of four times a day (Moynihan and Petersen, 2004).

The frequency of snacking was positively associated with dental caries in the primary dentition of 4-year-old children in Sweden (Stecksén-Blicks and Holm, 1995), and it was observed that high frequency of consumption of sweets and sugary drinks led to the risk of dental caries being significantly higher in 6-year old Danish children (Petersen, 1992). In 1995, a UK survey of children aged 1.5 to 4.5 years reported an association between frequency of consumption of confectionery and soft drinks and high intake of confectionery and soft drinks on dental caries development (Hinds, 1995).

A study by Skafida and Chambers (2018) showed children were significantly more likely to have dental decay by age 5 if they consumed soft drinks more frequently and if they ate sweets or chocolates once per day or more often. In their study,

snacking habits was the variable most strongly associated with decay. Children who snacked all day without eating meals had twice the odds of decay as those who snacked less (Skafida and Chambers, 2018). Therefore, snacking generally can be seen as detrimental to children's teeth due to the cumulative time of exposure to acid.

An influential study showing the role of frequency of sugars intake in adults was the Vipeholm study, which was carried out between 1945 and 1952 in a Swedish mental institution by Gustafsson et al. (1953). This study showed caries development was low when sugars were consumed up to four times a day at mealtimes (Gustafsson et al., 1953). However, the findings could be questionable due to the population studied, and the nature of the sugars intake which were not likely to be representative of real-world sugars consumption (Burt and Eklund, 2005).

The timing of sugars consumption has been found to be an important factor with regards to caries development. Consumption of sugars at mealtimes is of significance as salivary flow rate is greater and plaque acids may be more rapidly neutralised at this time due to stimulation by other meal components. It has been discovered that sugars, even when consumed in large amounts, had little effect on caries increment if consumed up to a maximum of four times a day at mealtimes only (WHO, 2003). Rodrigues et al. (1999) found that nursery school children with a frequency of sugars consumption of 4-5 times per day were six times more likely to develop high caries levels over one year compared with children with the lowest frequency. In this study it was also shown that there was a direct relationship between amount and frequency of intake (Rodrigues et al., 1999). Ismail et al. (1984) also found a very high correlation between frequency of consumption of sugary drinks between meals and amount consumed in American children, and reported that both increased frequency and amount were associated with higher caries risk (Ismail et al., 1984).

On the other hand, a number of epidemiological studies provide evidence for an association between amount of sugars consumed and dental caries, with several longitudinal studies suggesting amount to be more important than frequency (Rugg-Gunn et al., 1984, Burt et al., 1988, Szpunar et al., 1995). A study by Jamel et al. (1997) supported the view that both frequency and amount of sugars intake are

important. This finding was reflected in a longitudinal study among Finnish adults (Bernabé et al., 2016) which showed that both the frequency and amount of sugars consumption to be linearly related to dental caries. The latter study however, indicated that the amount of sugars consumed was more relevant to the prevalence of dental caries than the frequency of sugars consumption (Bernabé et al., 2016).

In summary, there is evidence to show that both the frequency of sugars intake from sugars-rich foods and drinks, and the total amount of sugars consumed are related to dental caries. There is also evidence to show that these two variables are strongly associated with one another (van Loveren, 2019). In 2017 PHE and the Department of Health (DH) updated the original 2014 version of: 'Delivering better oral health: an evidence-based toolkit for prevention'. This provides dental teams with the evidence-based advice to promote the main message of reducing both the amount and frequency of consuming foods and drinks that contain Free Sugars, amongst other issues including smoking, alcohol, and use of fluorides, in order to prevent tooth decay (PHE and DH, 2017).

2.6.3 Impact of environmental factors on prevalence of dental caries

Evidence for an association between dental caries and the intake of dietary sugars comes from epidemiological observational studies of dental caries levels in populations before and after an increase in sugars consumption (Moynihan and Petersen, 2004).

Dental caries could be considered as a multifactorial disease, resulting from numerous environmental factors including age, sex, ethnicity, tooth-brushing frequencies, use of fluoride-containing toothpaste, water-fluoridation levels in the area and diet. Generally, older children experience higher levels of caries as their teeth have been exposed to environmental risks for longer; girls have been found to typically exhibit higher caries prevalence than boys due to reasons including differences in salivary flow rates and compositions; and caries prevalence has been observed to be higher in specific ethnic groups with differing dietary habits (Ferraro and Vieira, 2010, Wang et al., 2012). Tooth-brushing behaviours, water fluoridation levels and socioeconomic class are also likely to have an environmental effect on prevalence of dental caries in children (Menghini et al., 2008, Wang et al., 2012).

Nonetheless, diet has a crucial impact on caries prevalence and Scheutz and Poulsen (1999) explained that referring to the causes of caries as multifactorial merely reflects that bacteria, as well as sugar and other factors, are needed for caries to develop. However, as sugar is a necessary factor for caries occurrence, other factors should be seen as additional to sugars consumption, not alternatives to it (Scheutz and Poulsen, 1999).

2.6.4 Consequences of childhood dental caries

There are many problems associated with tooth loss at an individual level in childhood, as oral health in children has wide implications beyond teeth – it is a fundamental indicator of overall health, and can affect a child's ability to learn, thrive and develop (WHO, 2018). Dental disease can seriously impair a child's overall quality of life leading to psychological problems such as not wanting to smile or socialise, reduced self-esteem and difficulties in sleeping. Toothache and infection may alter eating habits, which can result in inadequate nutrition (Çolak et al., 2013).

Other issues may include social anxiety, bullying, and a loss of learning time from being absent from school, as poor oral health is significantly associated with poor school performance (Blumenshine et al., 2008), and tooth decay is a frequent cause of absence from school or work (WHO, 2018). Extensive dental caries can impair quality of life and may ultimately lead to the need for tooth extraction. Tooth extraction may affect the alignment of the teeth in childhood, and increase the need for orthodontic treatment (RCSEng, 2015). Tooth loss is permanent and may reduce the ability to eat a varied diet. Tooth loss may also inhibit achievement of dietary goals as it is particularly associated with a diet low in fruits, vegetables, and NSP, and with low plasma vitamin C level (Moynihan et al., 1994, Sheiham, 2001).

The Second International Collaborative Study of Oral Health Systems revealed that in all surveyed countries, substantial numbers of children and adults reported impaired social functioning due to oral disease, such as avoiding laughing or smiling due to poor perceived appearance of teeth (Moynihan and Petersen, 2004). Dental diseases may also contribute to dental anxiety and pain (Dou et al., 2018).

Poor oral health on transition to adulthood also has implications in terms of subjective health and wellbeing. Older children in the Children's Dental Health Survey 2013 were asked if they experienced any of eight different problems related

to the condition of their teeth and mouth (National Statistics, 2015a). These comprised:

1. difficulty in eating
2. difficulty in speaking clearly
3. difficulty in cleaning teeth
4. difficulty relaxing (including sleeping)
5. whether they felt different (more impatient, irritated, easily upset)
6. difficulty smiling, laughing and showing teeth without being embarrassed
7. difficulty doing homework
8. difficulty enjoying being with people.

More than half (54%) of 15-year olds who had severe or extensive dental decay had at least one of these problems in the last 3 months compared to 44% without this decay (National Statistics, 2015a).

The majority of dental caries occurs in adults because the disease is cumulative, staying with an individual since childhood (Broadbent et al., 2013). Research from a 2012 prospective cohort study in Dunedin, New Zealand reported that children with parents who have poor oral health are more likely to have poor oral health in adulthood themselves. Shared genetic and environmental factors within families could be considered to contribute to an individual's oral health status (Shearer et al., 2012).

2.7 Associations between body weight and dental caries

There is an argument that there is a U-shaped relationship between weight status and dental caries, however, there is also research on associations or lack of associations between weight status and dental caries. These relationships are detailed further below.

Dietary habits and energy-dense, highly refined foods not only contribute to the obesity epidemic, but also increase the likelihood of dental caries (WHO, 2003). Sugar consumption has been found to be a common risk determinant between obesity and dental caries incidence by Honne et al. (2012). A direct association between dental caries and obesity was also shown by Costacurta et al. (2014), who noted that specific dietary habits, including intake of SSBs and frequency of sugars

intake, to be risk factors that are common to both dental caries and obesity (Costacurta et al., 2014).

Child body weight was demonstrated to have a significant association with caries incidence in German elementary school children (Willerhausen et al., 2007), in the primary dentition of preschool children in Mexico (Vázquez-Nava et al., 2010), and caries frequency in school children in India (Sakeenabi et al., 2012). Sharma and Hegde (2009) discovered that OW/OB children not only have an increased prevalence of dental caries, compared to normal weight children, but they also have an increased preference for sweet food (Sharma and Hegde, 2009).

On the other hand, some studies have discovered that children with a lower body mass have a higher prevalence of dental caries. Cameron et al. (2006) conducted a cross-sectional study in Scotland and concluded that children with the most severe dental decay were underweight. Underweight children were also found to be more likely to have caries experience in a study exploring the association of dental caries with social factors and nutritional status in children in Brazil (Oliveira et al., 2008).

Conversely, other cross-sectional studies have not found an association between childhood obesity and dental caries prevalence. Goodson et al. (2013) discovered an inverse obesity-dental decay relationship when examining the inference of the role of dietary sugar in the development of obesity and dental decay in Kuwaiti children. Being overweight was also found to be negatively associated with caries prevalence in Serbian schoolchildren Markovic et al. (2015), and Tramini et al. (2009) found no association between the two variables in French children. A systematic review carried out in 2012 investigated associations between BMI and dental caries in children, and concluded a non-linear U-shaped association between the variables as dental caries was associated with both high and low body mass index (Hooley et al., 2012).

There are various reasons why studies have not reported an association between child body weight and dental caries prevalence, such as in different countries being overweight is related to affluence and better tooth brushing habits. Also, as many studies in the current research are cross-sectional, they are not able to measure the impact of the children’s diets on the development of disease, in the way cohort studies would.

Obesity and dental caries are both complex, multifactorial conditions. In a recent narrative review examining an association between dental caries and obesity in children and young people, Alshihri et al. (2019) reported nine studies concluding no relationship, five studies concluding a positive association and eleven studies concluding an inverse association (Alshihri et al., 2019). This analysis therefore stated that it was not possible to draw a firm conclusion regarding an association between obesity and dental caries, due to the presence of many confounding factors such as diet, lifestyle and methodological considerations of studies (Alshihri et al., 2019).

2.8 Free Sugars intake by children

2.8.1 Current Free Sugars intake recommendations

As previously mentioned, the WHO has recommended that no more than 10% of a person's total energy intake should come from Free Sugars (WHO, 2015). The 2015-2020 Dietary Guidelines for Americans (DGA) also recommend limiting consumption of added sugars to <10% of total energy (TE) intake and consuming at least half of the recommended amounts of fruit from whole fruit rather than juice (USDA; and HHS;, 2015).

In 2015, SACN produced a report which reviewed the evidence from eleven randomised controlled trials and recommended that population average intake of Free Sugars in the UK should not exceed 5% total dietary energy (SACN, 2015). This supported the WHO recommendations. SACN's recommendation is designed to reduce obesity risk and improve dental health, by minimising the risks associated with high Free Sugars intakes and reducing energy intakes across the population by approximately 100kcal per person per day (PHE, 2015b).

2.8.2 Current Free Sugars intake levels by children

It is estimated that the total global consumption of sucrose alone is 173 million tonnes per annum – an average 24kg per person per year. Africa and Asia have the lowest consumption, averaging 16.8 and 17.3kg per person per year respectively. The US and Europe have the highest averaging respectively 43.8 and 36.7 kg per capita (Moynihan et al., 2018). Sucrose consumption in developed countries is high and stable, whereas in developing countries, the intake of sugars is rapidly increasing (Sucden, 2017).

A large cross-sectional study was carried out to estimate usual intakes and the primary food sources of added sugars across the range of intakes among US children, adolescents and teens, and adults using the National Health and Nutrition Examination Survey (NHANES) data from 2009-2012 (Bailey et al., 2018). It found that for 2 – 8 year olds, the proportion of energy contributed by added sugars was 14.3%. NHANES data from the US indicate that added sugars provide roughly 14.6% of total energy intake, ranging from 13.4% in children aged 2-5 years to 17.3% in adolescents (Welsh et al., 2011). However, these figures exclude Free Sugars found in 100% natural fruit juices.

The NDNS rolling programme is a continuous cross-sectional survey which gathers nationally representative data on food and drink consumption and nutrient intakes by the UK population aged 1.5 years old and above. The data generated from the NDNS enable PHE to identify and address nutritional issues in the population and monitor progress with regards to public health nutrition objectives. The most recent available results for Years 1 to 9 (2008/2009 – 2016/2017) showed that Free Sugars intake in children significantly decreased over time. As a percentage of total energy, Free Sugars intake dropped by 2.7, 2.4 and 3.5 percentage points over the 9 years for children aged 1.5-3 years old, 4-10 years old and 11-18 years old respectively, suggesting some improvement over time (PHE, 2019b). This could be due to a number of things including changes to policies or reformulation of food and drink products, however, it is difficult to positively associate this effect.

Despite these decreases, average intakes exceeded the current recommendations of no more than 5% of total energy from Free Sugars in all age/sex groups over the whole 9 years (PHE, 2019b). Data from the NDNS show Free Sugars provide 13.6% total energy for boys aged 4-10 years old and 13.4% total energy for girls aged 4-10 years old; and 13.9% total energy from boys aged 11-18, and 14.4% total energy from girls aged 11-18 (PHE, 2018b).

2.9 Main contributing sources of Free Sugars for children

The main source of Free Sugars in children aged 1.5-3 years old and 4-10 years old was ‘cereal and cereal products’ (31% and 33% respectively), followed by ‘non-alcoholic beverages – soft drinks and fruit juice’ (21% and 22% respectively) and ‘sugar, preserves and confectionary’ (20% and 23% respectively) (PHE, 2018b).

For children aged 11-18 years, ‘non-alcoholic beverages’ provided the main source of Free Sugars (33%), followed by ‘cereal and cereal products’ (29%) and ‘sugar, preserves and confectionary’ (21%) (PHE, 2018b).

In the US, among children aged 2-8 years old in the lowest decile of added sugars consumption, sugars intake primarily comes from ready to eat cereals (14.8%), sweet bakery products (14.7%) and sweetened beverages (12.4%). At the highest level of sugars intake, sweetened beverages (36.8%) ranked first, sweet bakery products (14.3%) ranked second and candy (9.1%) ranked third (Bailey et al., 2018). The amount of added sugars contributed by sweetened beverages increased dramatically across deciles of intake. Within this category, fruit drinks were the highest source of added sugars consumed, followed by soft drinks.

The figures of Free Sugars intake from the NDNS are likely to be an underestimation of the full extent of Free Sugars consumption, due to a high prevalence of under-reporting in this survey (Rennie et al., 2005). Nevertheless, as it is now recognised that excessive Free Sugars consumption is associated with conditions such as obesity, T2DM and dental caries, which are all major public health problems in the UK and in many other countries, with significant costs to the health service (Hashem et al., 2016), public health efforts need to be undertaken by a wide range of stakeholders, including government, policy makers, producers and retailers.

The sources which contribute most to children’s Free Sugars intake in the UK are ‘cereal and cereal products’, ‘soft drinks’ and ‘fruit juice’ and are discussed separately with regards to their impact on child weight status and risk of dental caries.

2.9.1 Children’s breakfast cereals

2.9.1.1 Impact of children’s breakfast cereals on weight status

The largest contributor to child sugars intake in the UK is ‘cereals and cereal products.’ This food group encapsulates a number of different foods, including pastas, breads, biscuits and puddings. One of the largest contributors to children’s Free Sugars intake within this group is breakfast cereals. High fibre breakfast cereals currently provide 3% total contribution to sugars intake for 4-10 year olds in the UK, and other breakfast cereals i.e. those marketed directly at children, provide 5% total contribution to sugars intake of this age group (PHE, 2018b).

Nine out of every ten school age children in the UK aged between 7-10 years old regularly consume cereal at breakfast time (Khehra et al., 2018). Although they are eaten primarily at breakfast time, it has also been reported cereals are consumed at times other than breakfast (Mintel, 2012). Manufacturers have been criticised for targeting their marketing to this audience, as it was found in the NDNS that children consume half their recommended maximum daily intake of sugar at breakfast (Khehra et al., 2018).

Free Sugars have been found to be an important factor in the flavour, texture, bulk and acceptability of breakfast cereals (Sacchetti et al., 2003). A 2015 study looking at breakfast consumption in a UK population sample showed that the average sugars content in breakfast cereal products was 20.83g/100g (Pombo-Rodrigues et al., 2017). On average, a typical serving size (30g) of breakfast cereal contained 6.25 (SD 2.60) g sugars, a third of a 4-6 year-old's (19g/d) maximum daily recommendation for Free Sugars intake in the UK. Among sixty-three children's breakfast cereal products (sugars content 8.07 (SD 2.50) g/30g), 79% contained more than a third of a 4-6 year-old's maximum daily recommendation for Free Sugars per 30g serving, and 58% contained more than a third of 7--10 year-olds maximum recommendations (Pombo-Rodrigues et al., 2017). Sweetened breakfast cereals can be highly palatable and their overconsumption may contribute to positive energy balance and thus weight gain (Shrapnel, 2013).

Breakfast cereals also contribute to sugars intake in other countries (Grieger and Cobiac, 2012). In a 2011 US study, a greater liking of high-sugars cereals was reported among children who were in the intervention group who consumed almost twice the amount of cereals per eating occasion compared with those served the low-sugar varieties (Harris et al., 2011). However, in a previous US study, children who were offered low-sugar cereals added more table sugar than those eating high-sugar cereals. Children may have a stronger sweet taste preference than adults, and it could be argued that if they are exposed to such tastes from a young age they could then become habituated to eating high-sugar cereals (Mennella et al., 2005).

However, there are a number of nutritional benefits of consuming breakfast, and it is considered the most important meal of the day. This is of particular importance for the younger population and those on a low income (McKevith and Jarzebowska,

2010). Regular breakfast cereal consumption has also been associated with a more nutritionally balanced diet and a lower body mass index (Barton et al., 2005). Many breakfast cereals on offer are a low-fat, nutrient-dense food that could provide a valuable source of carbohydrates, fibre and micronutrients (Aisbitt et al., 2008). Examples include porridge and no added sugar bran flakes. This is particularly important for young children who may have difficulty meeting their nutrient intakes if they skip breakfast. Breakfast consumption may also improve cognitive function, memory and school attendance (Barton et al., 2005). Many cereals are fortified with iron, vitamin B12, folate, vitamin D and other B vitamins, and when combined with milk, breakfast cereals also provide protein, zinc, calcium and fat-soluble vitamins, which are especially important for children for healthy growth and development (Barton et al., 2005). Even though breakfast cereals and cereal products can contribute to these nutritional aspects, it important to consider that they need to be balanced and the current levels of Free Sugars in them reduced by manufacturers.

2.9.1.2 Children's breakfast cereals and their impact on child dental health

Khehra et al. (2018) investigated oral and general health messages contained on breakfast cereal packaging of brands popular with children in the UK. It was discovered that at the manufacturer's suggested portion size, eight out of the 13 cereals provided over one-half of the recommended daily sugars intake for a 4 – 6 year-old child. Moreover, the imagery on the packaging was misleading in terms of portion sizes, as the manufacturers recommended portion sizes were at least two thirds less than those depicted. The study's conclusions were that most of the breakfast cereals contained high levels of sugars, and package imagery of portion sizes were completely misleading, giving cause for concern (Khehra et al., 2018).

Many breakfast cereals contain high levels of sugars, based on total product weight – with some exceeding one-third sugar. Regular consumption of high-sugar breakfast cereals is concerning in terms of dental and general health. However, a study by Gibson (2000) examined evidence for associations between breakfast cereal consumption, sugar intakes and caries experience in 1450 preschool children eating their normal diets, and found that children with the highest cereal intakes as a percentage of energy had the lowest concentration of NMES in the diet despite having diets higher in carbohydrate (Gibson, 2000). There are two potential reasons for this, firstly breakfast cereals were only a minor source of NMES for most children,

and secondly, children who ate more cereal happened to eat less confectionery, biscuits, cakes and soft drinks.

2.9.2 Sugar sweetened beverages

2.9.2.1 Impact of sugar sweetened beverages on child weight status

One of the most significant sources of Free Sugars for children in the UK and elsewhere is soft drinks, or 'SSBs'. Their frequent consumption has been linked to weight gain and obesity (Malik et al., 2010, Hu and Malik, 2010). There are a number of methodological challenges in studies examining the association between SSBs and negative health outcomes, which must be kept in consideration during analysis. These may include response bias, misclassification bias, and the inability or respondents to correctly distinguish between SSBs and sugar-free alternatives.

SSBs have gained increased attention for their contribution to paediatric OW/OB due to the excess calories from sucrose and/or high fructose corn syrup (HFCS) combined with low nutrient value. Evidence has suggested that habitual SSBs consumption may lead to weight gain by virtue of their high added sugar content, low satiety potential and incomplete compensatory reduction in energy intake at subsequent meals after consumption of liquid calories, leading to positive energy balance (Malik et al., 2006).

The prevalence of SSBs consumption among infants and children and the amount of calories derived from this source SSBs had been increasing both in the UK and internationally (Park et al., 2014, Barrett et al., 2017). However, recent initiatives led to the launch of the Soft Drinks Industry Levy (SDIL) in the UK in April 2018, which is detailed further in section 2.10.4.

Various types of investigations such as cross-sectional studies, cohort studies, and randomised controlled trials of behavioural interventions have been used to evaluate the relationship between SSBs consumption and obesity. Demonstration of a causal relationship between the two factors suggests that a reduction in the consumption of SSBs in children should lead directly to a reduction in obesity risk. However, not all published meta-analyses have reported a statistically significant relationship (Morenga et al., 2013), and the design of many studies has prohibited the establishment of any causal link.

Cross-sectional studies cannot establish causality between SSBs consumption and child OW/OB or BMI; however, they are important to validate the fact there is an association. Cross-sectional studies have been generally consistent in demonstrating this link between SSBs consumption and childhood OW/OB risk (Vartanian et al., 2007, Malik et al., 2009). Prospective cohort studies have the added advantage of addressing temporality (Hu, 2013). Ludwig and colleagues (Ludwig et al., 2001) conducted a prospective observational study over 19 months, in an ethnically diverse sample of school children in Massachusetts. This study demonstrated that the odds ratio for children becoming obese increased by 1.6 for each additional can or glass of SSBs that they consumed every day. By contrast, increased diet-soda consumption was negatively associated with obesity incidence. Their analysis also indicated that both baseline SSBs consumption and change in consumption independently predicted change in BMI (Ludwig et al., 2001). A study by Harnack et al. (1999) showed school children drinking an average of 265 ml or more of soft drinks daily consumed almost 835 kJ more total energy every day than those drinking no soft drinks, therefore, the results of Ludwig's study are consistent with a plausible physiological mechanism that consumption of SSBs could lead to obesity because of imprecise or incomplete compensation for energy consumed in the form of liquid (Ludwig et al., 2001). It has also been discovered that a high SSBs consumption was significantly associated with an increased risk for obesity among a longitudinal cohort of African-American preschool children (Lim et al., 2009).

There are more null associations between SSBs consumption and child or adolescent BMI in individual prospective studies than there are positive associations (Momin and Wood, 2018). However, when studies are combined in meta-analyses the consistent effects do lead to a significant association between SSBs intake and an increase in child weight status over time. Particularly when overall energy intake is controlled for, minimising biases and errors associated with self-reported data (Frazier-Wood, 2015). Energy intake is hypothesised as the primary way in which SSBs could cause weight gain. Prospective cohort studies have demonstrated a causal association between SSBs intake and OW/OB risk (Hu, 2013).

RCTs of interventions aiming to reduce SSBs consumption allow causality to be assessed. As with prospective cohort studies, RCTs on SSBs consumption and BMI in children reveal more non-significant than significant findings (Momin and Wood,

2018). This has led to an overall null effect in meta-analysis which used random-effects models, but a significant effect in studies using fixed models (Malik et al., 2013). The authors of this meta-analysis focused on the significant fixed effects in their conclusions stating their analysis "*showed an overall positive association between consumption of SSBs and body weight gain in children… and the finding from trials generally support those from prospective cohort studies*" (Malik et al., 2013). Along with an earlier systematic review by the same authors in 2006, including cross-sectional, prospective and experimental studies, this meta-analysis and systematic review of prospective cohort studies and RCTs concluded there is evidence that SSBs consumption promotes weight gain in both children and adults (Malik et al., 2006, Malik et al., 2013).

The physiological mechanisms underlying a link between SSBs consumption and OW/OB are not completely clear, and whether the effect of sugars and calories from SSBs is worse than the effect of some other sugars is unclear. As SSBs consumption adds extra calories to the diet, adjustment for total energy intake is suspected to underestimate the association between SSBs and the risk of obesity (Hu, 2013). There is also evidence that some racial and ethnic minorities, as well as individuals with lower education and income, are more likely both to develop OW/OB and to consume more SSBs (Bucher Della Torre et al., 2016).

There are other factors which could also confound an association between SSBs consumption and OW/OB. Firstly, SSBs consumption may be a marker of a largely poor-quality diet (Ambrosini et al., 2013). Therefore, it is difficult in cohort studies to isolate the effect of SSBs from the overall diet. Physical activity is generally associated with a decreased risk of OW/OB and healthier lifestyle (Jakicic, 2002), however, some studies have shown that higher levels of physical activity or organised sport participation was associated with higher sport drinks intake, which is a key form of SSBs consumption (Larson et al., 2014). Energy drinks also contain high levels of sugars, as well as caffeine, and their use is common amongst children and adolescents in the UK, as well as other countries (Ng et al., 2012). In a 2017 qualitative exploration of children and young people's perceptions of energy drinks, their low price (with some brands often on promotional offers) and easy accessibility were highlighted as key contributing factors to purchasing the drinks (Visram et al., 2017). There was also an apparent awareness of the sugars-content by participants

in this study, and a desire for clearer labelling to highlight these high levels (Visram et al., 2017).

Momin and Wood (2018) argue that there are not enough data to suggest that the relationship between SSBs consumption and weight gain is causal, due to the fact RCTs which can more closely address the issue of causality do not provide sufficient evidence to support this (Momin and Wood, 2018).

2.9.2.2 Impact of sugar sweetened beverages on dental health

There has been an increased consumption of SSBs both in the UK and internationally in recent decades (Ng et al., 2012, Shin et al., 2018). SSBs vary in Free Sugars content, with many popular carbonated beverages containing over 10g/100ml (Moynihan et al., 2018). They are therefore recognised as being a major source of Free Sugars and their frequent consumption has been linked to dental caries. Warren et al. (2009) conducted a study in Iowa, US to assess baseline risk factors for early caries prevalence in high risk children. It was discovered that consumption of SSBs in children up to 24 months of age was a strong and identifiable predictor of early childhood caries (ECC) development in a study sample of 212 children aged 6-24 months from low income families in a rural community in Iowa (Warren et al., 2009).

As previously mentioned, dental caries is a multifactorial disease, which may make it difficult to show a solid association between caries prevalence and SSBs consumption (Marshall, 2013). However, as SSBs are considered to be sources of fermentable sugars (which are required for the development of dental caries), Marshall (2013) stipulates that it would be reasonable to accept that SSBs are cariogenic.

In a 2013 cross-sectional study involving over sixteen thousand children aged 5-16 years old in Australia, dental caries prevalence was found to be significantly associated with a higher SSBs consumption, notable even after potential confounders were taken in to consideration (Armfield et al., 2013). Interestingly, this study discovered that the association between SSBs consumption and caries prevalence was significantly reduced in the presence of fluoridated water (Armfield et al., 2013). In the following year, a 4-year prospective study was published by Bernabé et al. (2014) showing that daily SSBs consumption amongst a sample of

Finnish adults led to a greater risk of caries development. This relationship was evident, regardless of use of fluoride toothpaste, gender, age or level of education (Bernabé et al., 2014).

Previously, studies have examined associations between SSBs intake and dental caries in children using cross-sectional or longitudinal data. The longitudinal studies may have had short follow up periods, smaller sample sizes, only included low SES children or only examined one geographical area (Park et al., 2014). These factors would limit the validity of the studies. A longitudinal analysis was therefore carried out by Park et al. (2014), aiming to examine whether SSBs intake during infancy was associated with dental caries in childhood among 1,274 US children. This involved linking data from the largest longitudinal study of infant feeding practices across the US (Infant Feeding Practices Study II), to its follow-up study conducted when children were 6 years old. It was found that the odds of children aged 10-12 months developing dental caries increased by 83% if they were frequently consuming SSBs, after adjusting for covariates (Park et al., 2014).

SSBs consumption was found to be associated with higher caries prevalence among children in a study conducted in Georgia in the US (Wilder et al., 2016). The findings from this study mirror data collected from children of the same age in oral health surveys as part of the National Oral Health Surveillance System (Wilder et al., 2016), reiterating a need for urgent action in the area of SSBs provision to children.

The ‘Fenland Study’ was carried out in 2017 using cross-sectional data from 9991 adults in Cambridgeshire, UK by Barrett et al. (2017). This study predominantly aimed to identify factors which were associated with SSBs consumption, taking in to consideration socioeconomic, behavioural and lifestyle influences. They found a number of contradictory findings in comparison to other adult studies: lower socioeconomic class was not associated with a higher SSBs consumption, a lower level of physical activity was not associated with a higher SSBs consumption and eating take-away meals and out-of-home eating was not associated with a higher SSBs consumption. These differences, however, may be due to possible social desirability bias from use of self-reported food frequency questionnaires, differing classifications of terms, or differences in the number of covariates which were taken in to consideration throughout studies (Barrett et al., 2017). The study population did

not include people younger than 30 years old, which could be considered to be a significant limitation as data from the NDNS has shown it is this age-group where SSBs consumption is reported to be the highest (Barrett et al., 2017, PHE, 2019b).

In a UK study focussing on children by Skafida and Chambers (2018), using longitudinal survey data, the presence of dental decay when children were 5 years old was predicted using logistic regression models. Children were significantly more likely to have dental decay by 5 years old if they consumed SSBs more frequently, compared to children aged 2, who primarily ate meals and had low levels of snacking (Skafida and Chambers, 2018).

Based on the evidence, it is reasonable to recommend that consumption of SSBs should be reduced, or removed completely from the diet at any age to prevent negative health outcomes, particularly the onset of dental caries. This advice is reiterated nationally and internationally through guidance for public health (WHO, 2015, NHS, 2019).

2.9.3 The impact of fruit on weight status

2.9.3.1 The relationship between fruit juice and weight status

Fruit juices contain important nutrients (i.e. vitamin C, potassium, folate, magnesium and B-carotene and flavonoids), and could therefore be considered an important source of these nutrients. 100% orange juice consumption was found to be associated with better diet quality, improved nutrient adequacy and improved biomarkers of health in adults (O'Neil et al., 2012). Fruit juice can also help groups such as older adults and young children, who are unable to eat whole fruit attain these vitamins and minerals. There is a need for balance however in considering these nutritional benefits from fruit juices versus their sugars content.

However, unlike whole fresh fruits, fruit juices contain Free Sugars and also contain more calories, weight-for-weight. Fruit juices contain approximately 10% NMES (Moynihan, 2003).

When whole fruit is processed into fruit juice, the sugars present are converted from intrinsic sugars to Free Sugars, as the cells walls are broken down. It has been suggested that fruit juice is linked to weight gain, as 100% fruit juice has a comparable sugar-content to SSBs (Hägele et al., 2018). Fruit juice also contains very little or no fibre, and has been shown to be less satiating than whole fruits

(Flood-Obbagy and Rolls, 2009). As previously discussed, there is evidence to support that a high intake of sugar-containing beverages is associated with OW/OB (Morenga et al., 2013), and is therefore postulated to lead to weight gain. Increased consumption of fruit juice was associated with a 4-year weight gain in a US study of women from the Nurses' Health Study II by Schulze et al. (2004). In contrast to whole fruits, consumption of fruit juices has been shown to promote long term weight gain (Hebden et al., 2017). Sichieri et al. (2014) also found a positive association with fruit juice intake and weight gain among Brazilian children (Sichieri et al., 2014).

As orange juice in particular is often chosen for use in studies, the effect of orange juice consumption on risk of OW/OB has been shown to be controversial. Some studies have displayed a higher risk (Schulze et al., 2004, Shefferly et al., 2016), whereas others reported no effect (O'Neil and Nicklas, 2008, Beck et al., 2014) or found a lower body weight in regular fruit juice consumers compared to people with no fruit juice intake (Akhtar-Danesh and Dehghan, 2010, Fulgoni and Pereira, 2010).

Sugar-containing beverages like orange juice can be a risk factor for obesity and T2DM although the underlying mechanisms are less clear. Hägele et al. (2018) aimed to investigate if intake of orange juice with or in-between meals differentially affects energy balance or metabolic risk. It was discovered that in young healthy adults, a conventional 3-meal structure with orange juice consumed together with meals had a favourable impact on energy balance, whereas juice consumption in-between meals may contribute to a gain in body fat and adverse metabolic effects. Therefore, the impact of orange juice consumption on energy balance and metabolic risk may depend on timing of juice in relation to meals (Hägele et al., 2018).

On the other hand, when compared with in-between meal consumption, intake of orange juice together with breakfast, lunch and dinner prevented a positive energy balance and even led to a loss of body fat mass when no snacks were consumed in-between meals. Despite the high sugars content of orange juice, flavanones and vitamin C may even reduce cardiovascular and diabetes risk, possibly due to their antioxidant and anti-inflammatory activities (Hägele et al., 2018).

2.9.4 The impact of different forms of fruit and dental caries

2.9.4.1 Whole fresh fruit

For both dental and general health, it is important to distinguish between intrinsic fruit sugars and Free Sugars, including those from fruit juice. Whole fresh fruit is a source of intrinsic sugars; however, these sugars are not considered to be an important factor in the development of dental caries; conversely their consumption is strongly recommended as good general health practice. (Moynihan and Petersen, 2004). A joint report by the WHO and the Food and Agriculture Organisation of the United Nations (FAO) expert consultation stated, that despite the limited available evidence from epidemiological studies linking whole fruit with the development of dental caries, it is probable that there is no association present (WHO/FAO, 2003). There are many associated health benefits related to intakes of whole fruit including an array of vitamins, minerals and fibre.

In experimental conditions, such as those in a laboratory, in which fruit is a major dietary constituent, fruits may contribute to the caries process; however, as consumed as part of the mixed human diet there is little evidence to show fruit to be an important factor in the development of dental caries. Animal studies have shown that when fruit is consumed in high frequencies (e.g. 17 times a day) it may induce caries (Stephan, 1966). Animal studies nonetheless revealed that all fruits cause less caries than sucrose. Epidemiological studies have shown that, as habitually consumed, fruit is of low cariogenicity. Sen Savara and Suher (1955) found no association between dental caries and the frequency of fruit consumption.

In a longitudinal study, Clancy et al. (1977) found a negative association between caries increment over one year and the consumption of apples and fruit juice. Similar findings were reported by Rugg-Gunn et al. (1984). They found that, as eaten by humans, fresh fruit appears to be of low cariogenicity and more specifically, that citrus fruits are not associated with dental caries. Rugg-Gunn (1993) also concluded that increasing consumption of fresh fruit in order to replace NMES in the diet is likely to decrease the level of dental caries in a population (Rugg-Gunn, 1993).

2.9.4.2 Fruit juice

It is recommended that consumption of NMES and Free Sugars should be decreased and avoided between mealtimes; it is also advised that these sources of

energy should be replaced with fresh fruit, vegetables and starchy staple foods (DH, 1991, Health Development Agency, 2001). The Food Standards Agency (FSA) state that fruit or vegetable juice may contribute only one portion towards the recommended five a day target regardless of how much is consumed. This is because fruit and vegetable juices do not contain all the beneficial plant cell wall materials and NSP fibre that whole fruit and vegetables do. Importantly, chewing whole fresh fruit stimulates salivary flow that protects against demineralisation of the tooth surface, which does not occur when consuming fruit juice (WHO, 2017).

Even though 100% fruit juice does contain Free Sugars, recent reports have suggested that it may function differently from other SSBs with regards to dental health (Salas et al., 2015, Liska et al., 2019). Regarding ECCs, fruit juice was found not to be associated with the development of dental caries in a number of studies (Marshall et al., 2005, Vargas et al., 2014), including a cross-sectional study which found consumption of 100 percent fruit juice to be associated with a low prevalence and severity of caries (Kolker et al., 2007).

In a recent systematic review by Liska et al. (2019), it was reported that prospective studies in children and adolescents indicated 100 per cent fruit juice consumption not to be associated with the incidence of dental caries or tooth erosion. Existing evidence of 100 per cent fruit juice and its impact on dental health is not conclusive, however, fruit juice consumption may be a marker for more health-conscious individuals with generally healthier diets which could contribute to a reduced risk of caries (Kolker et al., 2007).

For adults, RCTs suggested that 100% fruit juice could contribute to increased tooth erosion or negative effects on markers of dental caries, however, these RCTs employed conditions that were extreme for amounts and exposures relative to normal intakes of fruit juice (Liska et al., 2019). It has also been stated that 100 percent fruit juice contains around the same amount of sugars as soft drinks, and can be cariogenic if consumed frequently (Sheiham, 2001). Frequency of intake is considered to be of higher importance than amount/volume of intake with regards to caries development. This is due to the fact that the period of time that the teeth are exposed to the acid has influence on caries development. Factors including straw use may reduce this exposure to teeth. A two-year longitudinal study of low-income

black children in Detroit, US, discovered that children who increase their consumption of 100 percent fruit juice were at a higher risk of developing dental caries (Lim et al., 2008).

Overall, the relationship between fruit juice and the prevalence of dental caries is not conclusive. Due to the Free Sugars content, dietary advice in the UK recommends drinking 100 percent fruit juice at meal times and limiting consumption to no more than 150ml per day to reduce risk of tooth damage (NHS, 2019).

2.9.4.3 Dried fruit

It has been previously suggested that dried fruit may be more cariogenic than whole fresh fruit, as during the drying process, the cellular structure of the fruit is broken down which initiates the release of Free Sugars (Moynihan and Petersen, 2004).

Dried fruits are approximately 70% sugars. The method used by the FSA to estimate the NMES content of foods, assumes that 50% of sugars in dried fruits are NMES, therefore, dried fruit are estimated to contain approximately 35% NMES, a level comparable to sugared breakfast cereals, biscuits and cakes and certainly a level high enough to classify dried fruit as a ‘sugar snack’, therefore it is generally agreed that consumption of dried fruit should be limited to one portion per day (Moynihan, 2003).

Traditional dried fruits, such as raisins, prunes and dates do not have sugar added to them during the drying process. These dried fruits are also a good source of dietary fibre and micronutrients. On the other hand, other forms of dried fruits including cranberries, candied dried fruits such as mango, and processed fruit snacks made from fruit purees and fruit juice concentrates, have had sugars added to them during the drying process.

To reduce any adverse impact on dental health, UK Government advice is that dried fruit should only be consumed as part of a meal and should not be eaten as a snack. This advice is also promoted by the NHS. In view of this, dried fruits can only be included as one allowance of the recommended ‘5 a day’ fruit and vegetables portions (PHE, 2016b). In the US, the American Dental Association (ADA) recommends eating fresh rather than dried fruit as a snack (ADA, 2016).

The texture and stickiness of foods are thought to affect adherence to teeth and oral retention, and the extent of chewing and food trapping are also thought to influence bacterial metabolism (Sadler, 2016). Dried fruits may have a harmful effect on teeth due to the process of solubilisation of the sugars they contain into saliva and diffusion into dental plaque, thus providing an energy source for plaque bacteria. Factors which aid this process include the location of sugars in the dried fruit, their texture, the force and frequency of chewing, the tooth plaque thickness, and the length of time in which the dried fruit is in the mouth (Sadler, 2016).

Traditional dried fruits have a number of attributes that may offer a protective effect for teeth. Prunes and raisins contain very little sucrose, which may influence their cariogenic potential. However, an investigation of single sugars has shown that the acidogenic oral bacteria will metabolise any sugar, resulting in a rapid pH drop (Touger-Decker and van Loveren, 2003). However some dried fruits, including raisins, have a high content of sorbitol, a sugar alcohol that is not metabolised by oral bacteria and is thus non-cariogenic (Moynihan, 2002). The drying process converts sugars to sorbitol, and although there are few clinical trials on the inhibitory action of sorbitol on caries development, the importance of certain sugar alcohols for the protection of teeth has been underlined by two health claims authorised for use in the European Union (EU). A claim for replacements for sugars and ‘contributes to the maintenance of tooth mineralisation’ is permitted on a number of naturally occurring sweeteners including sorbitol and xylitol, provided that the foods do not lower the mouth pH to below 5.7 during and up to 30 minutes after consumption (Sadler, 2016). Additionally, a disease risk reduction claim for chewing gum sweetened with 100% xylitol has been authorised for the claim ‘chewing gum sweetened with 100% xylitol has been shown to reduce dental plaque’. A high level of dental plaque is a risk factor in the development of caries in children, underlining that xylitol has been shown to reduce the risk of dental caries (European Commission, 2016).

The time over which food particles remain in the mouth is another major influence on dental caries development, particularly in relation to foods containing processed starches, since the time to ferment is influenced by plaque thickness and the ability of the acid to reach the tooth surface. Longer retention times increase the potential for the acidogenic bacteria to ferment the food and reduce the plaque pH.

Techniques for measuring adherence of foods to teeth are not well developed and few studies have been undertaken. A comprehensive review of the limited evidence found a lack of good quality studies to support the hypothesis of dried fruit 'sticking' to teeth (Sadler, 2016). Measurement of net demineralisation, following consumption of raisins seven times a day for 10 days, showed comparable effects with fresh fruit and vegetables under similar conditions. Oral retention/'sticking' has been investigated in few subjects. The results do not demonstrate that dried fruit is worse in terms of oral clearance than other snack foods, Kashket et al. (1991) found that oral clearance rates of cookies, potato chips and crackers were actually slower than for dried figs.

Sadler's review of the evidence found there is currently limited and unconvincing evidence to draw conclusions regarding an association between dried fruit and dental caries, as well as a lack of high-quality information in order to formulate evidence-based advice to discourage consumption of dried fruits as a snack. The positive qualities of dried fruit need to be taken in to account for intake recommendations as their contribution to fibre, vitamins and minerals intakes lead to the potential of traditional dried fruits positively contributing to a healthy diet. When attempting to reduce Free Sugars intake, focus should be on less nutritious sources of sugars instead (Sadler, 2016).

2.10 Public Health Approaches to Sugars Intake

For a global reduction in Free Sugars intake and to meet the WHO's sugars guidelines, new initiatives and policies are required. A number of these are discussed below.

2.10.1 Initiatives to combat high sugars intake levels

To bring levels of Free Sugars consumed more in line with WHO recommendations, both upstream and downstream approaches to reducing consumption are needed (Moynihan et al., 2018). Upstream approaches are those which involve policy and can affect large populations through regulation, increased access, or economic incentives. Examples of upstream approaches to tackle high levels of sugars exposure and to reduce sugars intake are required. These include the need for adjustment of agricultural policies that lead to less sugars production, reformulation

of food products, reduced portion sizes and taxation on items high in Free Sugars (Moynihan et al., 2018).

Downstream, on the other hand, will often involve individual-level behavioural approaches for prevention or disease management (Brownson et al., 2010). There needs to be improved education for health professionals, as well as all professionals involved in provision of food. This may be classified as mid-stream. There needs to be support for individuals to eat less Free Sugars through better provision of information on sugars and health and the use of appropriate behavioural change techniques to motivate people to change (Moynihan et al., 2018). It is recognised that success will not come solely through approaches that rely on individuals changing their eating behaviour, or by the provision of dietary information to individuals (PHE, 2015a).

A number of initiatives are displayed in Figure 2. In order for success of this comprehensive approach, dialogue will also need to be undertaken with stakeholders in the sugar supply chain to identify which ‘upstream’ actions can be taken to reduce the supply and demand for sugar, taking in to consideration the economic impact of such actions. In the following sections I will first discuss a few global initiatives, as it is beyond the remit of this thesis to comprehensively review all global initiatives. I will then go on to focus on work that is being carried out in the UK specifically.

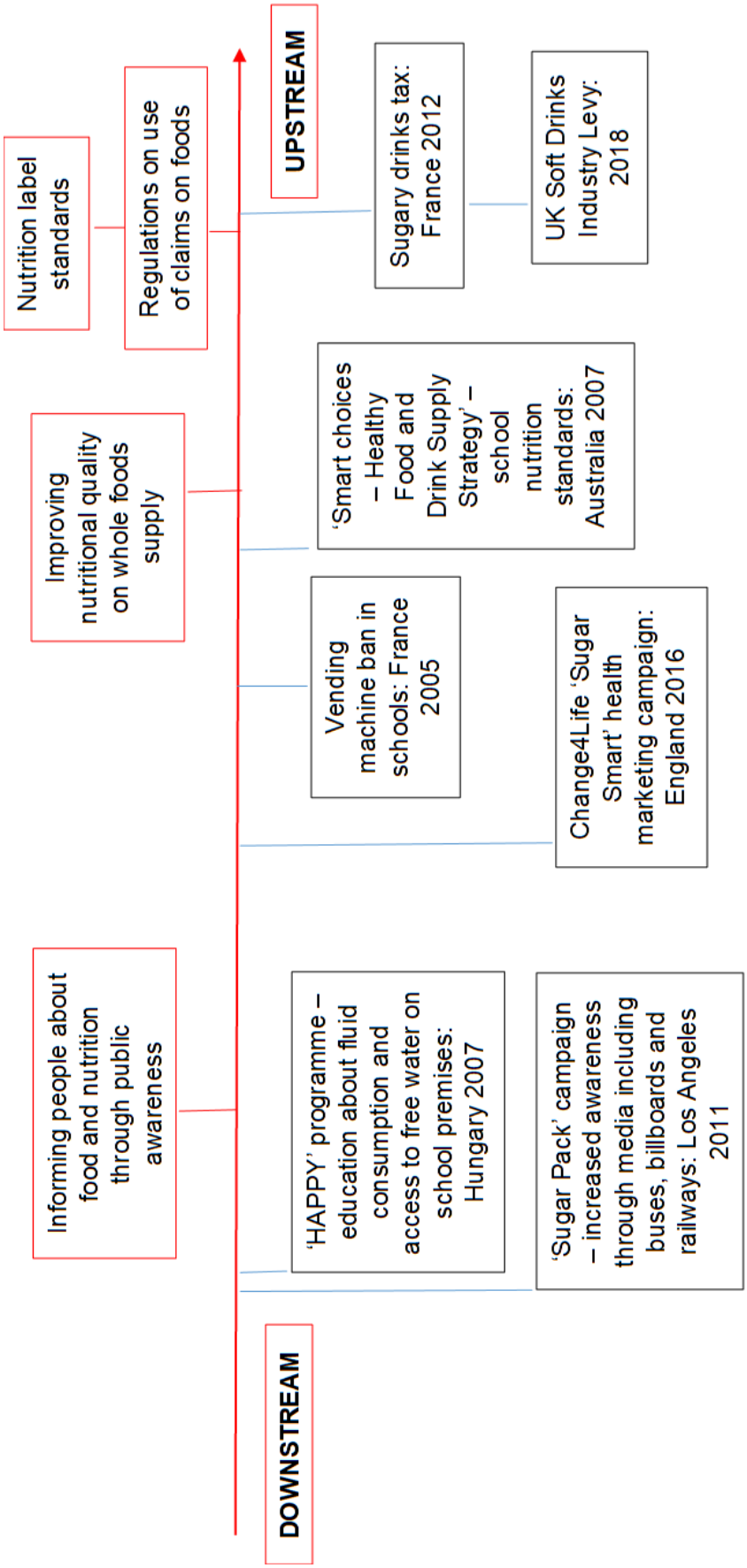

Figure 2: Upstream and Downstream initiatives to reduce sugars intake.

2.10.2 Global initiatives

A comprehensive approach is needed to reduce sugars consumption at a population level. The World Cancer Research Fund International came up with a NOURISHING framework which can be used to identify ten areas where policy for action to be focussed (World Cancer Research Fund International, 2015). This framework outlines three policy domains where action is needed:

1. The food environment,
2. The food system,
3. Behaviour change communication

There are a wide range of policies available to reduce the availability and affordability of sugar and sugary products, increase the acceptability of alternatives and increase awareness about sugars in foods. Some examples of this include nutrition label standards and regulations on the use of claims and implied claims on foods, improving nutritional quality of the whole food supply, and informing people about food and nutrition through public awareness (World Cancer Research Fund International, 2015).

There is limited evidence of initiatives which have taken place in developing countries, however, some examples of policy actions from developed countries which are highlighted in the 'Curbing global sugar consumption' document by the World Cancer Research Fund International are listed below.

In Queensland, Australia the "Smart Choices – Healthy Food and Drink Supply Strategy" was launched in 2005 and became mandatory in 2007. These Smart Choices were school nutrition standards which separated foods and drinks into three categories based on their nutritional content: green, amber and red. Those foods and drinks classed as 'red', which were high in sugars, saturated fats or salt, were eliminated from school environments. Targeting drink vending machines was particularly effective in reducing the supply of sugary drinks (QAST Inc., 2016).

In 2004, France's Public Health Law included a vending machine ban in schools, which has been enforced since September 2005. Comparing the data from before the ban was implemented in 1998 to 2006, a significant reduction in calories, fat, sodium and Free Sugars intake (10-12g) was observed during morning break after the ban came into force (Capacci et al., 2018). In January 2012, France also

implemented a sugary drink tax. The beverages eligible for tax were all non-alcoholic beverages with added sugars or sweetener, and research shows that the tax significantly increased the price of these beverages. Mexico has had a sugary drink tax in place since January 2014, and increased the price of sugary drinks by 10% per litre. Preliminary results of the Mexican sugary drinks tax showed that in the first quarter of 2014, there was approximately a 10% decrease in sales of taxed beverages (Roache and Gostin, 2017).

In an attempt to increase the acceptability of water relative to sugary drinks, Hungary implemented a programme in 2007 called HAPPY (Hungarian Aqua Promoting Programme in the Young). HAPPY aimed to increase the popularity of drinking water among primary school children aged 7-10 years old. The programme educated students about adequate fluid consumption and made free water from water coolers available on school premises. At the end of the intervention, there was a significant increase in the children's knowledge about fluid intake, a significant decrease in sugary drinks consumption and an increase in water consumption. Based on the success of the HAPPY intervention, in 2010 the National Institute for Food and Nutrition Science extended HAPPY nationwide for voluntary adoption by schools, and in 2014 114 schools had implemented the programme (World Cancer Research Fund International, 2015).

In 2011, the 'Sugar Pack' campaign was launched in Los Angeles County, aiming to increase awareness of the number of 'sugar packs' (3g) in sugary drinks, as well as adverse health outcomes of obesity. Between October 2011 and December 2012, the campaign used paid media messages placed on buses, billboards and railways, as well as the development of a website that included a sugar calculator. Results from an evaluation demonstrated that the campaign increased the public's knowledge of the number of sugar packs in drinks and the health effects on obesity. The campaign also resulted in favourable recognition of health messages, and over 60% of respondents reported that they were likely to reduce their daily intake of sugary drinks (Barragan et al., 2014). A follow-up evaluation of this campaign is needed to assess if it contributed to behaviour change among individuals involved.

2.10.3 UK initiatives

PHE currently lead the way in attempting to tackle the high levels of OW/OB and sugars intake in England. Parallel incentives to those of PHE in the devolved nations include the following:

The Scottish Government published 'A Healthier Future: Scotland's diet and healthy weight delivery plan' in July 2018, which set out its ambition to halve childhood obesity by 2030 and significantly reduce diet-related health inequalities (Scottish Government, 2018). Their plan identified five key outcomes, including ensuring that children get the best start in life by eating well and having a healthy weight; the food environment supports healthier choices; people have access to effective weight management services; leaders across all sectors promote healthy weight and diets; and diet-related health inequalities are reduced (Scottish Government, 2018).

The Welsh Government have stated that, by 2030, they want Wales to have an environment and society in which healthy choices are the easy choices, by increasing physical activity and promoting healthy weights. In January 2019, a 'Healthy Weight: Healthy Wales' strategy was launched, with the specific aim to reduce obesity over the next 10 years (Welsh Government, 2019).

The Public Health Agency in Northern Ireland is responsible for leading on the health-related aspects of 'A Fitter Future for All', which is a regional framework for preventing and addressing overweight and obesity in Northern Ireland 2012-2022. They do this through a multi-agency Regional Obesity Prevention Implementation Group, and its current plan sets out priority actions for 2018-2019 structured under the key settings for interventions: schools, workplaces, community and Health and Social Care, focussing on weight management, healthy eating, physical activity and public information (Public Health Agency, 2019).

Within this thesis, I will focus on the work of the UK Government, and in particular PHE.

2.10.4 Public Health England

Following the SACN report (2015), PHE published 'Sugar reduction: Evidence for Action', in which it set out future work needed to review the evidence for what drives sugars consumption and identify possible actions to reduce sugars intake (PHE, 2015a). It is widely recognised that there is no one solution which can combat

childhood obesity, and a structured approach of a combination of upstream policy level actions, mid-stream initiatives operating at a community level and downstream individual level initiatives are needed. A number of drivers contributing to a high sugar consumption level were included in PHE's review, under three main categories: influencers (food and drink marketing and advertising campaigns and product promotions); the food supply (the food and drink available to purchase) and knowledge; education; training and tools (to help steer food and drink choices towards healthier diets through increased knowledge and improved education).

2.10.4.1 Influencers

Promotional and marketing techniques through methods such as television, advertising, radio, and social media are designed to influence food choice and achieve an increase in sales. In 2014, the UK food industry spent £256 million promoting 'unhealthy' food within the retail sector. Children watch an average of 14 hours of television a week (Ofcom, 2017), where they are exposed to advertising of high fat, salt and sugar (HFSS) products aimed at all age groups. Exposure to food advertising can have an impact on children's diet-related health, nutrition knowledge, preferences and consumption patterns (Cairns et al., 2013).

A 2012 detailed evaluation of the effect of the 2007 UK scheduling restrictions on television food advertising to children discovered that, despite evidence of good adherence to the scheduling restrictions on television food advertising to children, exposure of children to advertisements for 'less healthy' foods increased following introduction of the restrictions; and the restrictions did not achieve their aim. It was suggested that this was likely due to the fact they only applied to a very small proportion of all television broadcasts (Adams et al., 2012).

The UK has the highest level of goods/marketing promotions in Europe, and it has been reported that 40% of what people spend on food and drink are products which are on promotion (Ofcom, 2017). Food and drinks on price promotions such as 'buy one get one free' and multi-buy offers are often those which are 'unhealthy', and such promotions have been seen to increase the amount of these products people buy by roughly one fifth (PHE, 2015a).

2.10.4.2 Food supply

As evidenced by salt reduction in the UK, a gradual sugar reduction in everyday foods and drinks, accompanied by reductions in portion sizes, and education to the public about food labelling and appropriate portion sizes for different products could be beneficial (PHE, 2015a).

For effective public health promotion, upstream policies and comprehensive prevention strategies such as regulation or taxes could be considered most powerful, as evidenced from previous tobacco and alcohol control policies and initiatives (PHE, 2016c, DH, 2017). Intakes of sugars are higher in lower income groups, and therefore reducing levels of sugars in products through reformulation may have the biggest effect on this group, contributing to a potential reduction in health inequalities.

In 2016, the UK Government released their report titled 'Childhood Obesity: A Plan for Action' (HM Government, 2016). The government aimed to significantly reduce England's rate of childhood obesity in ten years by employing a number of initiatives. These included the introduction of a SDIL, removing 20% of sugar in products, supporting innovation to help businesses to make their products healthier, making school food healthier, and clearer food labelling (HM Government, 2016).

In April 2018, the SDIL was launched in the UK. The SDIL was designed to encourage producers to reduce the amount of sugar in their products, and to move consumers towards healthier alternatives. This came in the form of two tax bands, 18p per litre on drinks containing more than 5g of sugar per 100ml, and 24p per litre for drinks containing more than 8g of sugar per 100ml. Pure fruit juice, vegetable juice, and milk-based drinks are excluded from this levy (HM Treasury, 2018).

Also in response to the 'Childhood Obesity: A Plan for Action' report, a voluntary sugar reduction programme was launched, which applied to all sectors of the food industry i.e. retailers, manufacturers and the out-of-home sector. This aimed to reduce overall sugar across a range of products that contribute the most to children's sugars intake by at least 20% by 2020. The programme initially focused on the nine categories which made the biggest contributions to children's sugars intakes. These comprised breakfast cereals, yoghurts, biscuits, cakes, confectionery, morning goods (e.g. croissants), puddings, ice creams and sweet spreads.

In September 2019, PHE published a report detailing the progress of this programme. It was revealed that there was an overall 2.9% reduction in total sugar (per 100g) since 2015 in retailer own brand and manufacturer branded food. This is significantly lower than the 20% sugars reduction ambition set for 2020. As this sugars reduction programme was voluntary, it could be suggested going forward that a mandatory reduction programme would be more successful. For products purchased from the out of home sector, there was a 4.9% reduction in average sugars content since 2017 (PHE, 2019c). It was also stated that for drinks subject to the SDIL, the average sugars content decreased by 28.8% between 2015 and 2018 (PHE, 2019c). It is important for PHE to monitor progress as this information is used by government to determine whether sufficient progress is being made, or if other levers to reduce calories in food and drink consumed by children need to be used (HM Government, 2016).

In June 2018, the UK Government released the 'Childhood Obesity: a plan for action. Chapter 2' (HM Government, 2018). This report details progress which has been made to date following the release of the first Childhood Obesity plan for action in 2016. Regarding sugars reduction, the SDIL was a key part of this aim and strong results have been seen through reformulation of soft drinks since before the Levy was launched in 2018. It was also noted that the 5% sugars reduction target in foods and drinks most consumed by children after one year had not been achieved. PHE's aim to reduce the calories in a range of everyday foods and drinks consumed by children by 20% by 2024 was also mentioned, and highlighted the need for consistent calorie labelling for the out of home sector in England to be introduced as legislation.

The report reiterated that PHE are committed to updating current marketing restrictions to ensure they reflect current nutritional and dietary advice. It was stated that a consult would be held on introducing a 9pm watershed of HFSS products, and similar restrictions online, with the aim to reduce children's exposure to these. The importance of local areas was highlighted in the report, and their impact on the food and drink choices that people make. PHE stated their aim to develop a trailblazer programme with local authorities to see what works in different communities in finding solutions to childhood obesity levels in their areas. The school environment was also emphasised as having an important role in providing children with a high

quality nutrition and at least 30 minutes of physical activity per day. The report reiterated PHE would be bold in their aim to reduce sugars consumption in schools through updated guidance to caterers and schools (HM Government, 2018).

2.10.4.3 Knowledge; education; training and tools

Health marketing has been defined as '*creating, communicating, and delivering health information and interventions using consumer-centred and science-based strategies to protect and promote the health of diverse populations*' (Bernhardt, 2006). It is central to developing effective communication models which can be used to inform, educate and motivate the public about issues which directly impact upon their health.

Health marketing is an important aspect of PHE's research and information strategy, and was a key tool employed for launching their childhood obesity prevention campaign Change4Life (C4L) in 2009, as England's first ever national social marketing campaign aiming to reduce obesity.

The goals of C4L include delivering effective campaigns, motivating and supporting people to make and sustain changes that will improve their health, and to ensure public health messages reach everyone who can benefit from them. Resources, materials and support are provided to influence behaviours and ultimately change health outcomes across England with the help of national retailers, household name brands and government departments (Change4Life, 2019a).

In 2015 a 'Smart Swaps' C4L campaign was launched. This used television, leaflets, social media and radio to encourage the public to make swaps from sugary fizzy drinks to water, lower fat milks and no added sugar drinks. Wrieden and Levy (2016) evaluated this campaign, with an aim of investigating its impact on food purchasing behaviour in an intervention group (those who had signed up to the 'Smart Swaps' campaign and were directly exposed to the promotions through various media) compared to a control group (families in Wales who had signed up for C4L materials, but were not exposed to the campaign). Data were collected from participants via specific questions delivered through a smartphone app, such as 'Did you deliberately choose to buy a lower fat product than you normally buy?' Data collection continued over 3 weeks, with a 'Smart Swaps' information pack being provided to the intervention group. The evaluation of results concluded that a national campaign

may have value in the short term, as the intervention group of interested individuals were seen to make healthier swaps (Wrieden and Levy, 2016).

In light of SACN'S 2015 report, PHE came up with Free Sugars thresholds, based in terms of the number of sugar cubes for different age groups. For example, children aged 4-6 years were recommended to have no more than 19g of sugar per day (five cubes), children aged 7-10 were recommended to have no more than 24g (six cubes), and anyone aged 11 and older were recommended to limit their sugars intake to 30g (seven cubes) (Change4Life, 2018).

In 2016 PHE launched the C4L 'Sugar Smart' campaign and employed the maximum Free Sugars intake levels in sugar cubes. This campaign aimed to raise awareness of dietary sugars and reduce sugars intake by children. Through primary schools, participants were provided with education packs containing recipe cards, stickers and information on sugars. In an attempt to encourage parents to be more 'Sugar Smart', a novel feature of this campaign was the development of a smartphone app which allowed parents to scan barcodes of different foods and drinks, in order to see how much 'total sugar' they contained. The total sugars content was also presented in sugar cubes in order for participants to be able to visualise the content. The app provided the opportunity for users to make comparisons between food and drink products and ideally choose alternative lower-sugars options.

It could be suggested that to achieve a sustained impact, health marketing campaigns, such as the 'Sugar Smart' campaign, need to employ and promote strategies which are accessible, affordable and attainable to their target populations. Therefore to be successful, they should attract interest, inspire action and be capable of changing behaviours, not just in the short term but in the long term.

However, while health marketing is an important enabler, it can be expensive to utilise and sustain, so often produces mainly short-term results. It also tends to have the biggest effect among those who are already interested and engaged with the concept of healthy lifestyles. Its use may therefore only serve to widen health inequalities (PHE, 2015a). Reducing the sugars content in food and drinks as well as portion size control does not rely on individual behaviour change, therefore actions on promotions, marketing, reformulation and portion sizes could together help make healthier choices easier and help all consumers equally.

2.11 Child dietary behaviour

In the UK, most people know what constitutes a healthy diet (Roberts; and Marvin;, 2011), however, data from the NDNS shows diet quality generally remains poor in the UK (PHE, 2018b). Dietary preferences are developed during childhood and shaped over time (Birch et al., 2007, Montaño et al., 2015). It is therefore important that healthy eating habits and behaviours are established during this time, as they are likely to track from childhood to adulthood and influence long-term health behaviours (Veugelers and Fitzgerald, 2005, Lake et al., 2006).

2.11.1 Development of dietary preferences in childhood

Dietary preferences are not innate and they develop as the child experiences food, a process which begins as soon as an infant is fed solid foods. The development of food preference is not the same for every child; there are many biological, individual, social and environmental factors which influence the development of children's dietary behaviours (Cohen and Bhatia, 2012, Ventura and Worobey, 2013).

2.11.1.1 Infancy

The food fed to infants and young children not only determines their health in childhood but also predicts the foods that they eat in later life (Venter and Harris, 2009). There are genetic differences in the willingness to accept new foods, especially those which possess strong tastes, for example bitter (Turnbull and Matisoo-Smith, 2002) or foods with different textures (Breen et al., 2006).

The reluctance to try new foods is known as 'neophobia'. This neophobic phase starts at the beginning of the toddler years, and is less extreme if the child has role models who eat a wider range of foods, such as parents and siblings. Children may be more or less neophobic according to their temperament (Pliner and Loewen, 1997). The development of food preferences are therefore determined by two factors: firstly, exposure to food (Birch et al., 1987) and secondly, if the child models eating behaviour and preferences which they see within their social groups (Harper and Sanders, 1975).

In infancy, exposure seems to facilitate acceptance of new foods. However, when the neophobic response develops in toddler years, it is the modelling effect that becomes more difficult. Toddlers learn to like both what they are given (Cooke et al., 2004), and those foods that they see their family eating. They are also more likely to

accept new foods if they see an adult eating it at the same time (Addessi et al., 2005).

In a poll initiated by the Infant and Toddler Forum 2009, it was found that there is considerable confusion over what constitutes a healthy diet for infant and toddlers. One thousand mothers from different socioeconomic classes and regions across the UK with children aged nine months to three years were surveyed and asked fifteen questions about their feeding habits and attitudes as well as their nutritional knowledge. A reported 95% of mothers said they were following government guidelines to feed their toddler like the rest of the family – but for 44% of those this meant pre-prepared convenience foods. Takeaways were fed to 29% of under three's at least once a week and 19% of toddlers were fed takeaways or adult-ready meals for most meals (Venter and Harris, 2009).

Early-life experiences with various tastes and flavours have a role in promoting healthy eating and favouring wider consumption of fruit and vegetables. Offering infants different foods beginning in the complementary feeding period and providing repeated exposure of disliked foods to stimulate their taste and help them to accept many foods later in life has been found to be a necessary strategy to develop good eating habits (Scaglioni et al., 2018).

2.11.1.2 Parents

The family system that surrounds a child's domestic life will have an active role in establishing and promoting behaviours that will persist throughout their life. Parents are one of the biggest influences on children's diets as they provide food environments and experiences, and as a result children model themselves on their parents' eating behaviours, lifestyle and eating-related attitudes (Scaglioni et al., 2018). Parents directly control the choices offered to the child, portion sizes, and role-modelling of eating behaviours (Middleton et al., 2014); and should therefore promote healthy food choices while acting as positive role models to shield children from the hazards of the obesogenic environment, as much as possible. Socioeconomic status has been found to be a key driver of nutritional habits, as knowing which foods are healthy and being able to afford those foods will largely determine the food purchased, and parents with a higher educational levels are likely

to consume more healthy foods than other families who are less aware of the issues (Middleton et al., 2014, Scaglioni et al., 2018).

2.11.1.3 School

The school environment provides a unique way to reach large numbers of children, providing the opportunity to deliver information and education that will inform their future activities, general choices, lifestyle and productivity (Stemler, 2012). The school environment also has potential to influence pupil food choices and behaviours (Mâsse et al., 2013).

A balanced and nutritious diet feeds the mind as well as the body, and various studies have shown that children who eat well perform better at school (Dimbleby and Vincent, 2013). Food in schools is about more than provision of nutrients; it also offers a social opportunity and an opportunity for learning across the wider curriculum (Adamson et al., 2012). This was further reiterated in the recent Childhood Obesity A Plan for Action: Chapter Two, which stated that schools have a fundamental role to play in defining habits and helping equip children with the knowledge they need to make healthy choices (HM Government, 2018).

Children in the UK are currently taught basic food and nutrition education as part of the national curriculum. However, teaching these messages may be seen as contradicting and conflicting as the food and drinks currently on offer in schools may not reflect these messages (Sharps and Robinson, 2017). This in turn may affect the healthy dietary choices children make at school (Hemar-Nicolas et al., 2013). The School Food Plan (Dimbleby and Vincent, 2013) emphasises that a whole school approach is required to successfully impact the eating habits of school children, and it is therefore important that they learn the importance of healthy eating, develop an understanding of where food comes from, and know how to prepare healthy meals (Dimbleby and Vincent, 2013, Weichselbaum and Buttriss, 2014). Nelson and Breda (2013) discovered that a balanced school lunch was associated with overall healthier eating patterns outside school, particularly with younger children. Schools in England teach children the importance of maintaining a healthy diet and lifestyle (DfE, 2015), and it is crucial that these messages are reiterated and reflected in the foods and drinks provided through schools. Nutrition education must therefore reinforce both school food policies as well as wider health policies (Nelson and Breda, 2013).

A study examining the impact of a change in school food policy on children's food and nutrient intake revealed the positive impact which school dinners can have on children's total diets and thus a beneficial effect of the school food policy. To maximise the impact, school meals should continue to be promoted to both children and parents (Spence et al., 2013).

The provision of school meals undoubtedly benefits large numbers of disadvantaged school children, as poor diets or unhealthy lunchtime snacks are known to produce lethargic and less responsive pupils in afternoon teaching sessions (Finch, 2019). Schools can provide an important opportunity for prevention, and appropriate school nutrition policies are critical pillars for success in combating malnutrition in all its aspects and should be included in all public health nutrition policy development (WHO, 2006).

2.11.2 The changes to Primary School food in England over time

Figure 3 displays the history of school food provision in England.

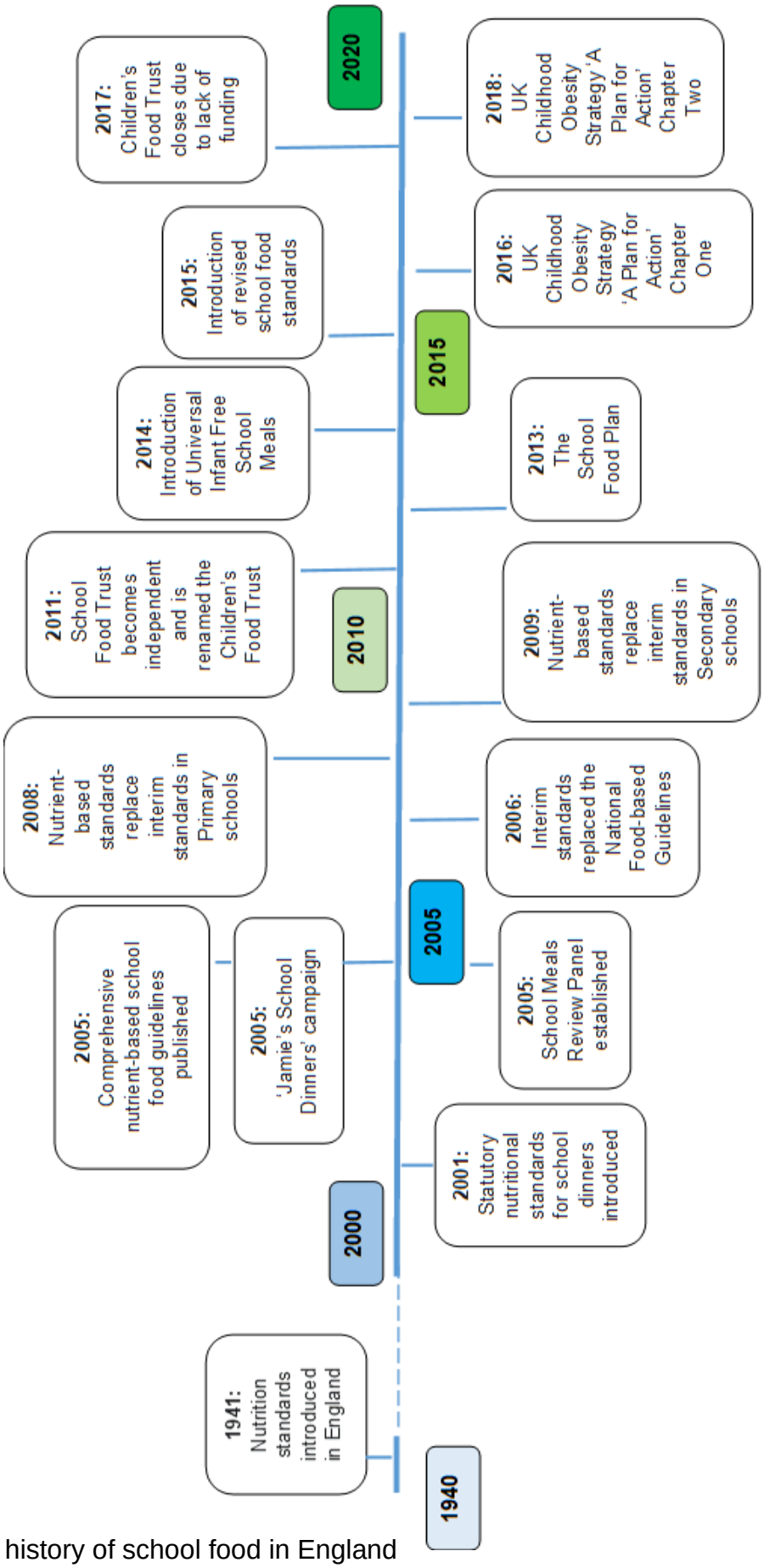

Figure 3: A history of school food in England

Nutrition standards for school food provision were first introduced in England in 1941. In the early 2000s, school dinners were low-quality with too many foods high in fat and drinks high in sugar, and they were often low-cost (Nelson et al., 2006). In April 2001, statutory nutritional standards for school dinners were introduced, which advised that school dinners should include at least one type of food from the major food groups. However, these did not restrict availability of less healthy options (Long, 2018). In 2005, the Caroline Walker Trust published comprehensive nutrient-based 'aspirational' guidelines for school food, based on the UK dietary references values (DH, 1991). In 2005, UK-based celebrity chef Jamie Oliver released a number of television programmes, which showed that these aspirational guidelines were not being met, and highlighted the poor quality of some school food on offer to children in England. This led to the Secretary of State for education announcing the formation of the School Meals Review Panel to review the nutritional standards and school meals service (School Meals Review Panel, 2005). The panel produced a report, which made thirty-five recommendations to government including the introduction of compulsory food- and nutrient- based standards for any food provided by schools (School Meals Review Panel, 2005).

The School Food Trust was soon-after set up, in order to advise the government, develop standards and support schools to improve their food provision. In 2006, mandatory interim food-based standards for school dinners came in to force, with final food- and nutrient- based standards being fully implemented in primary schools in 2008, and secondary schools in 2009, in an attempt to ensure that the food provided to children in schools was of high quality and promoted good health and eating behaviours (Adamson et al., 2013, Rose et al., 2019).

The School Food Trust developed a whole systems approach, which mapped four areas of influence comprising positive customer experience, positive mind-set, economic viability and a positive infrastructure and capacity (Haroun et al., 2011). Insights to creating an improved nutritional intake of children's school dinners were provided by a 'sphere of influence', including, for example, a relaxed and enjoyable dining experience for children, ensuring catering staff and teachers were involved in any changes, and staff education on customer decision making processes (Adamson et al., 2013).

In 2011, the School Food Trust became independent and was renamed the Children's Food Trust. This Children's Food Trust provided school food resources and opportunities for research and collaboration between Local Education Authorities and schools, however, due to a lack of funding it closed in September 2017 (Rose et al., 2019).

The School Food Plan was published in 2013 (DfE, 2013) and presented evidence of the numerous benefits which could be achieved through the introduction of a Universal Infant Free School Meal (UIFSM) policy, including how it would help families with the cost of living. This policy was subsequently announced by the then Deputy Prime Minister and was launched in September 2014. It was introduced on the basis of evidence that it would benefit all children's health, development and attainment, but particularly those children most in need, and provided funding for all government funded schools to offer free school meals to pupils in Reception, Year 1 and Year 2 (Education and Skills Funding Agency, 2019). The School Food Plan presented evidence that the UIFSM provision led to an increased school meal uptake, healthy dietary behaviours, academic benefits, social cohesion and ultimately saved families' money (Day et al., 2015).

Following an independent review of school food conducted by the founders of Leon restaurants in 2012-13, revised school food standards were produced and have been in force since January 2015. The standards apply to all local-authority maintained schools, pupil referral units, academies that opened prior to 2010, academies and free schools with agreed funding from June 2014 and non-maintained special schools (Long, 2018).

Strong and consistent school food policies could be suggested to help pupils establish healthy behaviours that will benefit them throughout their lives, as well as being able to address issues of obesity, health inequalities and inadequate nutrient intakes (Rose et al., 2019). It has been found that schools are more likely to meet school food standards if less choice was offered, with an increase in choice associated with higher consumption of high-fat and high-sugar options (Nelson et al., 2007). Reducing the choices available to children may make it easier for caterers to put school policies into effect, and help to support healthier food choices (Nelson and Nicholas, 2006).

As previously mentioned, in 2016, Chapter one of the UK 'Childhood Obesity: A Plan for Action' was published. This report stated that '*food served in some schools and academies in England must meet the School Food Standards in order for children to have healthy and balanced diets*' (HM Government, 2016). Chapter two of the plan (2018) specified School Food Standards as a legal requirement for most schools. It also stated the need for updated school food targets to meet nutritional recommendations for Free Sugars and dietary fibre. Chapter two also committed to supporting 'all children with high quality nutrition,' (HM Government, 2018) as well as adhering to the School Food Plan, and incorporating healthy eating and practical skills education in to the curriculum; providing student voice for peer involvement in healthful behaviours; and promoting healthful choices as part of the school ethos (DfE, 2013, HM Government, 2018, Rose et al., 2019).

2.11.3 School fruit and vegetable scheme

It is highlighted in the UK Eatwell Guide that everyone should aim to consume at least 5 portions of a variety of fruits and vegetables every day (NHS, 2019). However, despite this and other clear public health messages over recent years which have aimed to encourage consumption of fruit and vegetables, data from the NDNS consistently shows that children do not eat enough of these foods (PHE, 2018b). Children's eating behaviour is largely governed by what foods are available and accessible to them, and it has been experimentally shown that providing children with free fruit and vegetables affects long-term eating behaviours (Rasmussen et al., 2006, DeCosta et al., 2017). Providing free fruit and vegetables to school children is seen as a way to tackle health inequalities and to help ensure that all children get a healthy start in life (Weichselbaum and Buttriss, 2014). Therefore, in an attempt to increase children's dietary intake in schools further to school dinners, all children aged four to six attending a state-funded school in England are entitled to receive a free piece of fruit or vegetable each school day through the School Fruit and Vegetable Scheme (SFVS) (NHS, 2018c). The SFVS was launched in 2004 as part of the national '5 a day' programme, and is funded by central government. An early evaluation of this scheme showed clear evidence of a positive impact on children's consumption of fruit, and they were significantly more likely to achieve the '5 a day' goal (Teeman et al., 2004). In a 2008 review of school fruit and vegetable programmes, out of thirty studies included, 70% increased fruits and vegetables

intake, and none of them observed a decrease in intake (de Sa and Lock, 2008). This review concluded that EU agriculture policy for fruits and vegetables in schools should be an effective approach with both public health and agricultural benefits, and will support a range of EU policies including obesity and health inequalities (de Sa and Lock, 2008).

2.11.4 School dinners versus packed lunches

There are currently no mandatory standards for the home-packed lunches which children bring to school. Many UK primary schools implement packed lunch policies, however, these vary amongst schools. There have been numerous studies which have raised concerns over the nutritional quality of packed lunches in comparison to school dinners (Evans et al., 2010, Harrison et al., 2013). In a 2010 cross-sectional survey of primary school children's packed lunches in the UK, it was found that only 14 (1.1%) out of 1294 surveyed packed lunches actually met the school meal standards (Evans et al., 2010).

It could therefore be suggested that it would be beneficial for packed lunches to be subject to food-based standards, as well as recommendations about nutrients, which was evidenced in a cross-sectional assessment of food- and nutrient-based standards applied to packed lunches in eighty-nine primary schools across the four regions in the UK (Evans and Cade, 2017). However, the practicalities of such standards need to be considered in order to assess if this would be feasible.

According to The School Food Plan, parents spend around £1 billion a year on packed lunches; therefore, persuading a proportion of them to switch to school meals would make the system more economically flexible, and economies of scale would lead to a decrease in price, and caterers could improve food quality (Schabas, 2014, Day et al., 2015). There are many influences on whether children choose to have a school dinner or a packed lunch, which must be taken in to consideration, including choice available, the dining room experience and encouragement offered to children. Issues around queueing for lunch and the general ambience of the dining room have been reported to have discouraged some children from choosing a school lunch (Adamson et al., 2013). Improved school food and dining environments are associated with higher levels of school dinner take-up (Adamson et al., 2013).

Research has suggested that the introduction of nutritional standards has improved the nutritional quality of school meals, however, packed lunches have been found to be lacking in adequate nutrition (Stevens et al., 2013, Day et al., 2015). The impact of change in the school food policy on food and nutrient intakes in children was examined by Adamson et al. (2013). It was found that while there was evidence of improvements in packed lunches consumed by children, overall school lunches were of higher nutritional quality (Adamson et al., 2013). When examining the impact of food- and nutrient- based standards legislation on children's mean intake at lunchtime and in total dietary intake, a widening difference in mean macro- and micronutrient intakes between a school and packed lunch was discovered, and an average school dinner proved to be a 'healthier' option (Spence et al., 2013). Packed lunches were discovered to contain higher levels of sugars, sodium and fewer vegetables thus contributing to a lower-quality diet than school dinners (Evans et al., 2016).

In a 2018 qualitative study on parental perspectives of packed lunches, it was highlighted that children have a growing authority over everyday food decisions (Ensaff et al., 2018). It has also been shown that, in relation to fruit and vegetable consumption, school children we significantly less likely to consume fruit and vegetables when having a packed lunch from home, compared to having a school dinner (Taylor et al., 2019).

Therefore, if packed lunches are going to continue to be a popular choice amongst children, it is important that children are provided with, and engage in, adequate nutrition education, as they are becoming more active decision makers regarding their food choices (Ensaff et al., 2018).

2.12 Chapter overview

This chapter has provided a review of the literature and has discussed the evidence behind current advice recommending a reduced intake of Free Sugars. There are various negative outcomes of a high Free Sugars intake, in particular OW/OB and dental caries. A high intake of Free Sugars in childhood is of particular concern, as conditions such as OW/OB and dental caries have been found to be trajectory in nature, likely to follow children to adulthood. In 2018/19, nearly one tenth of 4 to 5

year olds and more than one fifth of 10 to 11 year olds in the UK were classified as obese (DHSC, 2020), Also, dental extractions remain the most common reason children aged six to ten years old are admitted to hospital in the UK each year (PHE, 2019a).

This literature review has detailed a number of initiatives which aim to help individuals reduce their sugars intake, both globally and in the UK. Health marketing campaigns are one way to encourage behaviour change and transfer health-related messages to the public. It has been previously stated that campaigns on obesity prevention to date have tended to be short lived and most have not been evaluated on the scale that would be desirable (DH, 2010).Therefore, there is a need to evaluate the impact of health marketing campaigns. Qualitative research focussing on personal experiences of such campaigns can provide a rich insight by exploring consumers' values, feelings, thoughts, intentions, barriers, motivators, culture, and social norms that affect their behaviours (Longfield et al., 2016). Therefore, discussing a campaign with participants over a year after the launch of the campaign will reveal what worked, what didn't work and which key messages, if any, stayed with participants in the long term. Going forward, qualitative research of health marketing campaigns will add insight into concepts behind campaigns which consumers felt were engaging, relevant and effective (Longfield et al., 2016). It could also complement quantitative research, further explaining contextual factors surrounding why an intervention may have succeeded or failed (Williams et al., 2020).

This thesis will address a gap in the existing knowledge base by providing the first long-term in-depth exploration of PHE's Change4Life 'Sugar Smart' campaign. It will assess which aspects of the campaign were perceived, by parents, to be effective in terms of changing their child's sugars intake, and whether sustained impact was believed to be achieved. Barriers to reducing child sugars intake will also be examined, which could go on to inform and improve future health marketing campaigns.

School food provision has undergone major changes in England in recent years. Children in the UK spend a large proportion of their time in schools. As evidenced by the literature, the school environment is a unique environment which could be used

to influence children's taste preferences and eating behaviours (Mâsse et al., 2013). Existing qualitative literature which has researched views on school food generally involve a limited subset of stakeholder groups, for example including only parents and children, or school staff only. This thesis will broaden the perspective to encompass the views and opinions of all stakeholders involved in the school dinner experience. This research will also keep topic areas and discussions amongst participants as broad as possible, and allow them to introduce new areas of interest, therefore adding to existing knowledge and potentially highlighting gaps in the evidence base which could be addressed through further research.

Chapter 3 will discuss various research paradigms and their underlying schools of thought. Subsequent chapters 4 and 5 comprise the studies which aim to address the objectives of this thesis. An overall discussion and conclusion of the thesis is then detailed in chapter 6.

Chapter 3. Research paradigms and their underlying schools of thought

This chapter will discuss the underlying schools of thought behind the research within this PhD thesis, as well as the chosen methodology and methods. Although different concepts and positions are considered, this PhD thesis does not intend to provide a comprehensive debate of the philosophical positions other than to acknowledge them and provide a rationale for the methods adopted.

A paradigm comprises components including ontology, epistemology, methodology and methods (Scotland, 2012). To understand the different approaches adopted by researchers, it is helpful to have some understanding of the philosophical debates underpinning the development of social research in general. The issue of how the social world can be studied raises a number of philosophical questions, stemming from an ontological or epistemological standpoint.

Figure 4 provides a diagrammatical representation of the concepts of ontology and epistemology, and which methodology they fit under. This figure was adapted from text within Ritchie et al. (2014) book '*Qualitative Research Practice*.' The following sections explain these positions in more detail.

Figure 4: Ontology and Epistemology

3.1 Ontology

Ontology is concerned with the nature of reality and what there is to know about the social world. It is the study of being, and ontological assumptions are concerned with '*what is*' and what constitutes '*reality'* (Scotland, 2012). Social science has been shaped by two overarching ontological positions in relation to these issues, realism and idealism.

Realism is based on the idea that there is a distinction between the way the world is, and the meaning and interpretation of that world held by individuals. Types of realism are displayed in Figure 4 and include:

- naïve realism or shallow realism, which is when reality can be observed directly and accurately (Madill et al., 2000, Blaikie, 2007);
- cautious realism, where reality can be known 'approximately' or 'imperfectly' rather than accurately;
- depth, critical or transcendental realism, which is when reality consists of different levels: the 'empirical domain' that is made up of what we experience through our senses, the 'actual domain' that exists regardless of whether or not it is observed, and the 'real domain' that refers to underlying processes and mechanisms (Blaikie, 2007);
- subtle realism, where an external reality exists but is only known through the human mind and socially constructed meanings (Hammersley, 2002, Blaikie, 2007); and
- materialism, i.e. a variant of realism which only recognises material features, or physical features of the world as holding reality. Values, beliefs or experiences are 'epiphenomena' – which means features can arise from, but do not shape, the material world (Ritchie et al., 2014).

On the other hand, idealism asserts that reality is only knowable through the human mind and through socially constructed meanings, and there is no reality which exists independently of these (Ritchie et al., 2014). Forms of idealism include:

- subtle, contextual or collective idealism, in which the social world is made up of representations constructed and shared by people in particular contexts; and

- relativism or radical idealism, where there is no shared social reality, only a series of different, individual constructions (Hughes and Sharrock, 2016, Madill et al., 2000, Shaw, 1999).

Ontology is one component which may help to determine a researcher's theoretical perspective, which then influences their philosophical stance and may therefore inform the methodology of their research project. The other component is epistemology.

3.2 Epistemology

Epistemology relates to the way knowledge about the social world is acquired, particularly the relationship between the researcher and the reality, and how this phenomenon of reality can be explored or known (Carson et al., 2001). Epistemology directs the researcher towards one of two polar extremes presented as a dichotomy, ranging from a positivism approach, which supplements knowledge or fills an existing gap; or an interpretivism approach, which is more about exploring the phenomenon under study, according to research objectives (Creswell and Poth, 2017). Guba and Lincoln (1994) identified two types of epistemologies; an objectivist epistemology, which fits in with positivism, and a subjectivist epistemology, which fits in with interpretivism.

3.2.1 The positivist paradigm

The ontological position of positivism is one of realism; that is the view that there is one discoverable reality which exists independently of the researcher, and objects have an existence independent of the knower (Pring, 2004, Cohen et al., 2007). Positivism takes an objectivist epistemological approach, which states that the discovered and known reality is real and factual. It is the aim of the researcher to obtain the meaning which already resides in objects (Scotland, 2012).

Positivist methodologies seek to explain relationships, and aim to identify causes which influence outcomes (Creswell, 2009). A deductive approach is undertaken, where knowledge is acquired by a 'top-down' process, starting with a theory from which a hypothesis is derived, and then applying that to observations about the world. This approach aims to seek predictions and generalisations, therefore, these methods often generate quantitative data.

Quantitative research articulates assumptions which are consistent with this positivist philosophy (Johnson and Onwuegbuzie, 2004). Quantitative pursuits maintain that social science enquiry should be objective, and real causes of social scientific outcomes can be determined reliably and validly (Nagel, 1989). It is also believed that researchers should eliminate their biases, remain emotionally detached and uninvolved with the objects of study, and test or empirically justify all stated hypotheses (Khan, 2014).

3.2.2 The interpretivist paradigm

On the other hand, the ontological position of interpretivism is relativism, where multiple realities are believed to exist (Scotland, 2012). Reality is individually constructed through interactions in an independent world, and is interpreted differently between people. Interpretivism incorporates a subjectivist epistemology, where reality is created and discovered. People may construct meanings in different ways, and meaningful realities emerge from interactions between people and the world (Crotty, 1998).

Interpretive methodology involves an understanding of the phenomenon from an individual's perspective, looking at how individuals interact with each other and the cultural contexts they inhabit (Creswell, 2009). The view that knowledge is based on induction is employed in interpretivism, where research questions are broad and knowledge is acquired from a 'bottom-up' or 'grounded' process. This involves evidence being collected first, and knowledge and theories built from this. Interpretive methods produce insight, understanding and explanation of participant's actions through their own perspectives. Interpretivist methods generate qualitative data, and analyses are the researchers' interpretations.

A qualitative research paradigm takes an interpretivist view which allows for subjective values. Individuals are understood to form their own realities in different contexts through interactions with others, and in an interpretivist paradigm the researchers have no direct access to the real world (Carson et al., 2001).

3.2.3 The 'mixed methods' paradigm

Further to the positivist paradigm (quantitative methodology) and the interpretivist paradigm (qualitative methodology), a third research paradigm was introduced by Johnson and Onwuegbuzie (2004). Moving beyond a quantitative versus qualitative

dichotomy, a 'mixed methods' approach was proposed. Johnson and Onwuegbuzie (2004) defined mixed methods as '*the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study*.' As recognised by mixed methods research, both quantitative and qualitative research are useful and important, and the goal is not to replace them but rather to draw from the strengths and minimise the weaknesses of both in a single research study (Johnson and Onwuegbuzie, 2004).

3.3 Methodology

Methodology is concerned with the process and the method by which the researcher acquires knowledge about the world (Edwards and Skinners, 2009, Creswell and Poth, 2017). It has been described as '*the philosophical framework within which the research is conducted or the foundation upon which the research is based'* (Brown, 2006). Methodology plays an important role in achieving research objectives, and the chosen approach should be that which is the most appropriate to the underlying research question(s) and objectives.

As previously mentioned, qualitative research is largely associated with interpretivism. Although qualitative research is often viewed as a predominantly inductive paradigm, both deduction and induction are involved at different stages of the qualitative research process (Ritchie et al., 2014).

It has been suggested that qualitative research has an ever-changing definition and begins with assumptions, a worldview, and the study of research problems examining the meaning individuals or groups ascribe to different issues (Creswell and Poth, 2017). Qualitative research aims to generate insight, describe and understand the nature of reality in human experiences, and associated methods are underpinned by a holistic approach which aims to gain an insider's perspective (Williamson, 2009). Researchers are interested in '*how humans arrange themselves and their settings and how inhabitants of these settings make sense of their surroundings through symbols, rituals, social structures, social roles and so forth'* (Lune and Berg, 2016).

The volume and richness of qualitative data are often highlighted as important, as are the distinctive approaches qualitative researchers bring to analysis and

interpretation, and the kinds of data that are derived from qualitative research (Ritchie et al., 2014).

3.4 Data collection methods within this thesis

Each philosophical paradigm has its own strengths and weaknesses (Cavana et al., 2001). The most important thing when deciding on methods for data collection are the research requirements, aims and objectives (Cassell and Johnson, 2006).

Research methods are the practical activities of research, which could include sampling, data collection, data analysis and reporting (Carter and Little, 2007). Appropriate research methods are crucial to ensure high-quality research, and interviews are the most widely used technique of data collection in qualitative health research (Draper and Swift, 2011).

"If you want to know how people understand their world and their lives, why not talk to them?" (Kvale and Brinkmann, 2009).

An interview 'provides a unique opportunity to uncover rich and complex information from an individual' (Cavana et al., 2001). Interviews are often used for qualitative data collection, and there are various types to choose from including in-depth interviews, semi-structured, open-ended, face-to-face (FTF), and focus group interviews.

There are a number of ways of administering interviews, including FTF or using the telephone. Willis (2007) states that the environment and situation in which the research is conducted plays a crucial role in the organisation and conducting of interviews, the selection of interviewees, the questioning material, the structure for the interview and how the data is understood and interpreted.

Topic guides are useful tools for qualitative data collection. They comprise key questions that the interviewer would like to cover, as well as prompts to encourage interviewees to expand on discussions about specific issues, or talk about other issues which may not have yet come up spontaneously (Bricki and Green, 2007). The researcher must have the ability to use the guide in order ensure that the information collected across different interviews covers the same general topic areas, while still allowing for freedom and flexibility among the interviewees' responses (Turner III, 2010).

My research primarily aims to explore participants' own perspectives, perceptions and experiences of the 'Sugar Smart' campaign and of school food in Newcastle upon Tyne. Therefore, I employed a subjectivist epistemology, following an idealist ontology approach, as the purpose of the research is to gain deeper understanding of each issue in terms of its features and aspects through the participants' own experiences and understandings. Qualitative research methods were therefore selected as the most appropriate methodology to collect the relevant data and to discover and understand the breadth and depth of this data in detail.

Semi-structured telephone interviews, FTF interviews and focus groups were utilised. In the methods section of each study chapter, sections 4.3 and 5.3, I explain in further detail exactly how these were carried out. The following sections provide a general overview of the chosen techniques.

3.4.1 Individual in-depth interviews

In-depth interviews are often described as a form of conversation, and historically described as a '*conversation with a purpose'* (Passfield et al., 1975). However, the researcher's role, the objectives of the conversation and the role of the research participant are all different to that of a normal conversation (Kvale and Brinkmann, 2009). FTF interviews have often been the preferred mode of carrying out interviews, and have previously been claimed to provide a stronger basis for the establishment of a good rapport between the researcher and the participant (Oltmann, 2016), but in-depth interviews can also be carried out on the telephone. Building a rapport may make participants feel more comfortable and minimise the risk of power imbalance within the interview. Examples of ways for building a rapport include small talk about the weather, the participant's work, and how their day has been progressing (Elmir et al., 2011). Also, physical cues of body language or facial expression may be important pointers for probing for further detail (Draper and Swift, 2011). For this reason, in particular, telephone interviews have at times been criticised in traditional research literature (Irvine, 2010). However, telephone interviews may be preferred by participants in some situations, for example those who are busy or on a budget, or for interviews on sensitive topics where greater anonymity may help, or if the participant is in a different geographical location (Oltmann, 2016).

The first study within this thesis employed semi-structured telephone interviews as the chosen data collection method. Semi-structured interviews are a simple, efficient and practical tool, and are the most widely used interviewing format for qualitative research (DiCicco-Bloom and Crabtree, 2006). They combine a mix of open and closed questions, and the questions are designed to be flexible. Phone interviews were chosen primarily because the participants were spread across England. This allowed a diverse sample of participants to be collected, which could also take into consideration different ethnicities, SES and age groups.

The second study within this thesis utilised FTF interviews with stakeholders including canteen staff, head teachers and staff from Newcastle City Council, at times convenient to each participant group and at locations with which they were familiar. Due to the geographical location of these participants being close in distance, FTF interviews were deemed the most appropriate data collection method as it was feasible for me to interview these participants in person, within the constraints of the study.

3.4.2 Focus groups

Focus groups have been defined as '*a carefully planned discussion, designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment*' (Krueger and Casey, 2014). Focus groups have the distinguishing feature of group interaction which is used to encourage in-depth discussion. The aim of a focus group is to understand how a particular group or population process meaning around a given situation, and produce qualitative data that provides insight into the attitudes, perceptions, motivations, concerns and opinions of participants, by generating a collective consciousness (Gibson, 2007). The collective context of focus groups creates a process which is very different from an in-depth interview, as data are generated by interaction between group participants, i.e. participants present their own views and perspectives, but also hear from other people.

It has been suggested that a key benefit of focus groups over individual interviews is that the peer environment may promote and encourage disclosures differently than a one-on-one experience (Coenen et al., 2012). In a study by Guest et al. (2017) it was also found that focus groups were more likely to bring about conversation around personal or sensitive disclosures, compared to individual interviews. This was

particularly the case if the participants and the researcher were from different genders or cultural backgrounds (Guest et al., 2017).

Focus groups employ an interviewing technique with discussion taking place under the guidance of a moderator, who uses a topic guide. Flexibility is key and the 'questions' may be posed differently in each focus group. The focus group presents a potentially more '*natural environment than that of the individual interview because participants are influencing, and are influenced by others – just as they are in real life'* (Krueger and Casey, 2009). Diversity in the group setting enriches the discussion, but there also needs to be some common ground between participants i.e. based on how they relate to the research topic or their socio-demographic characteristics or their age, which is particularly important with children. This social context offers an opportunity to see how ideas and language emerge in a more naturalistic setting than an in-depth interview, how they are shaped through conversation with others (Ritchie et al., 2014). Focus groups with children offer knowledge, opinions and insights from the child's point of view which is invaluable for research which aims to positively impact children. Goldthorpe et al. (2019) conducted two focus groups, each containing 10 children, and discovered that their views on who is responsible for children's health lies with a wide range of stakeholders including families, school staff, food producers, retail outlets and the government. It was therefore found that these children's views support a focus on integrated, system-wide approaches to protecting the health of themselves and other children (Goldthorpe et al., 2019).

As previously mentioned, focus groups were the chosen method for the second study within this thesis, for data collection from parent and child participants. This form of interviewing in particular offers a valuable, versatile, interactive and a developmentally effective method for use with children and young people (Gibson, 2007).

3.5 Researcher background and reflexivity

As the principal researcher of this thesis, I am a nutritionist and food marketer by background, with a particular interest in the diets and food choice behaviour of children.

I am a single, white female in my mid-20s and I do not have children. In the first research study within this thesis, participants were unaware of my physical appearance as data collection occurred over the phone, but they were aware I was a female researcher from the Human Nutrition Research Centre at Newcastle University due to email correspondence. Participants in the second research study also knew I was a researcher from Newcastle University, but they were also able to visually see my appearance during data collection.

I have undertaken a number of qualitative research training courses, including two at NatCen in London, on 'An Introduction to Qualitative Research' and 'Analysis of Qualitative Research.' As a result, I have followed the approach taught by NatCen, which has been adapted to suit the nature and aims of qualitative research, providing well-designed and well-conducted research to generate rigorous, well-founded and trustworthy evidence (Ritchie et al., 2014)

Reflexivity is the process of continual reflection upon the research process by the researcher (Dixon, 2018). Due to the subjective nature of qualitative research, reflexivity is important due to the number of ways in which researcher bias could affect the study, from collection of the data to analysis and reporting (Dixon, 2018). Reflexivity is both a concept and a process, whereby researchers acknowledge the changes brought about in themselves as a result of the research process, and how these changes may have affected the research process (Palaganas et al., 2017). By clearly describing the relationship between participants and themselves, the researcher increases the credibility of findings and deepens readers' understanding of the work (Dodgson, 2019).

3.5.1 Qualitative data analysis

The term 'qualitative research' refers to an approach in which researchers attempt to identify relevant themes rather than position their research in a particular ontological or epistemological stance (Mihas, 2019).

Qualitative studies can be directed by a conceptual framework or they can be driven by the data. Many qualitative studies rely on a general approach called 'constant comparative analysis', which involves taking one piece of data and comparing it with others in order to discover any similarities or differences. Thematic analysis and

interpretive description are methods that depend on constant comparative analysis to understand human phenomena as it is experienced (Thorne, 2000).

Exploratory research is a methodological approach where researchers are concerned with the development of theory from data in a process of continuous discovery, and generating or building theory (Jupp, 2006). This research design intends to explore research questions and does not intend to offer final and conclusive solutions to existing problems. It is conducted to determine the nature of an issue and provide researchers with a better understanding of it (Saunders and Lewis, 2012). Exploratory research has been stated to be 'initial research', which forms the basis of more conclusive research, which can help in determining further research design, sampling methodology and data collection method (Singh, 2007).

Pragmatism is a paradigm which bridges the gap between the scientific method and structuralist orientation of older approaches and the naturalistic methods of newer approaches (Smith et al., 2011). A pragmatic research study focuses on an individual decision maker within an actual real-world situation (Salkind, 2010), and it is accepted that there can be single or multiple realities that are open to empirical inquiry (Smith et al., 2011). Pragmatic scholars agree that there is an objective reality that exists apart from the human experience; however, this reality is grounded in the environment and can only be encountered through human experience (Smith et al., 2011). The process of undertaking a pragmatic study is to first identify a problem and view it within its broadest context. This will then lead to research inquiry, which seeks to better understand and ultimately solve the problem (Salkind, 2010). Pragmatism is focussed on the future (Smith et al., 2011), and the research findings often result in policy suggestions, new environmental initiatives, or social change (Salkind, 2010).

Some qualitative methods, such as phenomenological approaches, seek to discover some of the underlying structure or essence of human experience through studying individual cases. Phenomenological approaches challenge the researcher to work inductively with the data, without any preconceptions, in order to generate entirely new descriptions and ideas (Thorne, 2000). Ethnographic research methods are used by a researcher who has immersed and engaged themselves in participant observation or fieldwork (Boyle, 1994). This method involves sorting through data in

order to detect and interpret thematic categorisations, while searching for contradictions and inconsistencies to generate conclusions (Thorne, 2000). Narrative analysis recognises the extent to which the stories which individuals describe provide insights about their lived experiences, in order to generate main narrative themes to discover how they make sense of their lives (Sandelowski, 1994). On the other hand, discourse analysis strategies attempt to understand what is signified by the ways individuals communicate their ideas and experiences. They capitalise on critical inquiry into what language is used and how it is used, to reveal the influences underlying people's thoughts and behaviour (Boutain, 1999).

Thematic analysis is a method for identifying, analysing and reporting patters and themes within data, interpreting various aspects of the research topic (Boyatzis, 1998). Thematic analysis is characterised by ontological theories such as critical realism, which acknowledge the ways in which individuals make meaning of their experiences and the ways the broader social context impacts on those meanings, while retaining focus on the material and other limits of 'reality'. It is a method which involves searching across data sets to find repeated patterns of meaning and then identifying, analysing and reporting these patterns within data (Braun and Clarke, 2006). Through its theoretical freedom, thematic analysis provides a flexible and useful research tool which can provide a potentially rich and detailed, yet complex, account of data (Braun and Clarke, 2006).

The Framework Method was developed by researchers from the Qualitative Research Unit at the National Centre for Social Research (NatCen) in the 1980s, and is a particular approach to thematic analysis. Commonalities and differences within data are identified before focussing on relationships between different parts of the data, seeking to draw conclusions around themes (Gale et al., 2013) . The Framework Method is appropriate for the thematic analysis of textual data, especially interview transcripts, where it is important to be able to compare and contrast data by themes across many cases, while also situating each perspective in context by retaining the connection to other aspects of each individual's account (Gale et al., 2013) .

It was therefore decided that thematic analysis, particularly the Framework Method, would be the qualitative data analysis method for both studies presented in this thesis.

There are a number of stages to be implemented when employing the Framework Method for data analysis including:

- familiarisation
- identifying a thematic framework
- indexing
- charting and
- mapping and interpretation.

Firstly, **familiarisation** refers to the process during which the researcher becomes familiarised with the transcripts of the collected data, by repeated reading of the transcripts to become immersed and gain an overview of the data leading to an awareness of key and recurrent themes (Ritchie et al., 2014). After the familiarisation stage, the researcher must **identify a thematic framework**, where emerging themes or issues highlighted during the familiarisation stage are documented. This stage involves both logical and intuitive thinking in order to make judgements about meaning and about the relevance and importance of issues (Srivastava and Thomson, 2009). The key issues, concepts and themes expressed by the participants then form the basis of a thematic framework which can be used to filter and classify the data. The framework at this stage is only tentative and further refinement or changes are able to, and should, occur in subsequent stages of analysis (Ritchie et al., 2014).

The **indexing** stage then identifies portions or sections of the data which correspond to particular themes, a process which is applied to all data that has been collected. Computer Assisted Qualitative Data Analysis Software (CAQDAS) is particularly useful at this stage, and in this research NVivo Version 11 (QSR International Pty Ltd, 2019) was utilised for this purpose. This was because NVivo provides structure and allows for a rigorous, systematic approach to qualitative data analysis. All documents including transcripts and coding, are able to be kept in the same place at the same time within the software, which is helpful when a large number of transcripts are being analysed for a study.

The next stage in the Framework Method is **charting**, where the data which has previously been indexed is placed in to charts of themes. This is the method's distinctive feature as it forms the basis of a series of thematic matrices, in which every participant is allocated a row and each column denotes a separate subtheme. Data are summarised by a case and by subtheme and the summary entered in the appropriate cell (Ritchie et al., 2014).

The final stage is **mapping and interpreting the data**. The Framework Method can facilitate management of large data sets, as its matrix form provides an intuitively structured overview of summarised data (Gale et al., 2013). The researcher should now be conscious of the objectives of qualitative analysis, and be ready to employ qualitative research skills to appropriately interpret the data matrix, and facilitate the generation of descriptions, categories, and explanations (Gale et al., 2013). As with all qualitative research, reflexivity, rigour and quality are issues which are essential in the Framework Method. Researchers should aim to be reflexive about their role and the influence they may have on the research process, this involves a process of on-going mutual shaping between researcher and research (Attia and Edge, 2017). In relation to the rigour and quality of qualitative research, studies should be well-designed and well-conducted in order to successfully generate reliable, well-founded evidence (Ritchie et al., 2014).

3.6 Reporting of qualitative research

To guarantee the trustworthiness and value of findings and rigour of methods used within a qualitative research study, the reporting must be clear, transparent and complete (Tong and Craig, 2018). There are a number of different standards for reporting original research, for both qualitative and quantitative studies. Some of these include Consolidated Standards of Reporting Trials (CONSORT) which can be used for RCTs; COnsolidated criteria for REporting Qualitative research (COREQ) for qualitative research, specifically interviews and focus groups; Standards for Reporting Qualitative Research (SRQR) for statistical analysis and methods; and Standards for Quality Improvement Reporting Excellence (SQUIRE) for quality improvement reporting (Hannes et al., 2015).

As focus groups and interviews were utilised within this thesis, the COREQ checklist (Tong et al., 2007) was utilised. The COREQ guidance offers researchers a thirty-

two question checklist, covering three domains which are necessary components of study design; ranging from research team and reflexivity, taking in to account the personal characteristics of the interviewer and their relationship with the participants of the study, through to data analysis, findings and reporting the research (Tong et al., 2007).

3.7 Summary

In summary, this chapter has outlined the underlying schools of thought related to the research paradigms, including qualitative research. I have also considered the topic of methodology and a number of key issues related to conducting, analysing and reporting in-depth qualitative research. The studies within this thesis adopted an idealist ontology and subjectivist epistemology approach, and employed telephone interviews, FTF interviews and focus group data collection methods. The following chapters will describe each study in detail, and provide further justification and explanation of the chosen data collection methods.

Chapter 4. Study One: Exploring the impact of the 'Sugar Smart' campaign on parental knowledge of children's sugars intake: a qualitative study

4.1 Introduction to study

In January 2016, PHE launched the C4L 'Sugar Smart' campaign, as part of a broad range of measures to combat childhood obesity, and particularly to help families reduce their sugars intake. To date, there has been no evaluation to explore the impact of this campaign on parental knowledge and awareness on children's sugars intake one year after the campaign was launched.

4.2 Aims and objectives

The aims of the first study of this PhD project were to determine the impact of the C4L 'Sugar Smart' campaign on parental awareness of their child sugars intake, and parental knowledge of sugars in general. The objectives for this phase of the research were:

1. To explore parent's perceptions of the impact of the campaign on their awareness of their child's sugars intake one-year post launch
2. To explore parent's perceptions of the impact of the campaign on household shopping behaviours, one-year post launch
3. To examine parental knowledge of sugars in general, one-year post campaign

4.3 Methods

This phase of the research comprised one-to-one semi-structured interviews, exclusively by telephone, with parents, one year after the launch of the C4L 'Sugar Smart' campaign.

4.3.1 Participant recruitment

The 'Sugar Smart' campaign was launched on January 4th 2016. Prior to the launch of the campaign, participants for its evaluation were recruited in collaboration with PHE and the social marketing company TNS BMRB. The sampling frame for this recruitment was a list of those families who had previously registered with the PHE C4L database. These participants were recruited for quantitative dietary intake information data collection, using an online self-completed 24-hour dietary recall

system ‘INTAKE24’ (Bradley et al., 2016). Each participant was invited to complete a two-day dietary recall over a weekend at five time points, as depicted in Figure 5, including baseline (2nd and 3rd January 2016) and one-year follow-up (29th and 30th December 2016), to identify any sustained long-term effects of the ‘Sugar Smart’ campaign.

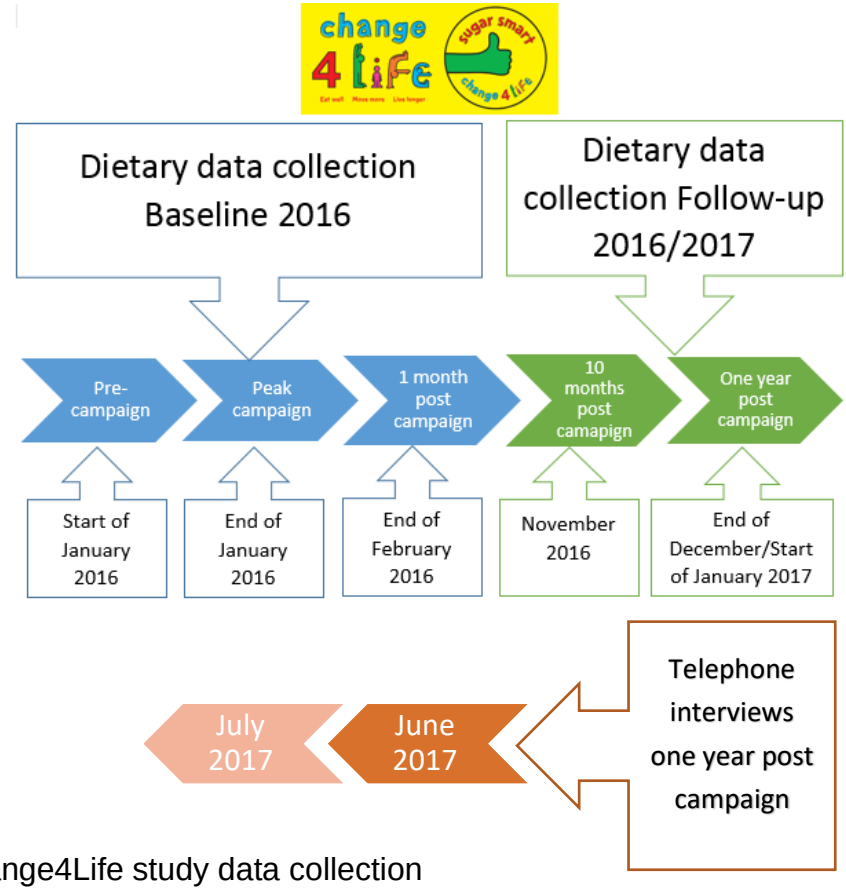

Figure 5: Change4Life study data collection

At the point of recruitment into that quantitative C4L study, participants were also asked if they would be willing to take part in an individual qualitative interview after the campaign. Those who had agreed to be interviewed, and who had also completed two dietary recalls at baseline and one-year follow-up respectively were eligible to take part in the qualitative study.

The sampling technique for the qualitative interviews was purposive. Purposive sampling is a technique widely used in qualitative research for the identification and selection of information-rich cases combined with the most effective use of limited resources (Patton 2002). This involves identifying and selecting individuals or groups of individuals that are especially experienced with a phenomenon of interest

(Cresswell and Plano Clark, 2011). Sampling first of all took into account any noticeable changes in sugars intake over time, such as a big or small increase or a big or small decrease. This was determined by comparing the child's Free Sugars intake from baseline to their intake at 12 months follow up. Any increase or decrease was considered to be 'small' if it was a less than 2g/day change. Any increase or decrease was considered to be 'big' if it was a more than 120g/day change.

A range of characteristics were taken into consideration, comprising: parent gender, child gender, child age, head of household occupation (HOH) (Office for National Statistics, 2019), geographical location, number of children per household and ethnicity. As data collection progressed, it was observed that the sample was not ethnically diverse enough to attain maximum variation, therefore subsequent sampling exclusively included those from ethnic minorities.

4.3.2 Ethical approval

Ethical approval for both the quantitative C4L study (Application number: 01030_3 2015 – 2017) and this qualitative study was sought from and granted by the Newcastle University Faculty of Medical Sciences Ethics Committee.

4.3.3 Procedure

A purposive sub sample of participants (see 4.3.1) were contacted via email, one-year following the launch of the C4L 'Sugar Smart' campaign, and asked if they would like to take part in a one-to-one semi-structured telephone interview. As previously mentioned in section 3.4, there are a number of logistical conveniences and practical advantages of individual telephone interviews, including the enhanced access to geographically dispersed interviewees (Drabble et al., 2016, Cachia and Millward, 2011). Telephone interviews were chosen as the most appropriate qualitative method to use for this study as participants were geographically spread across England and it would not have been physically possible to interview them in person.

An incentive of a £20 Love2Shop voucher was offered for participation, details of which were included in the recruitment emails. A copy of these are attached in Appendix B. All interviews were conducted at a time which was convenient for each participant.

A semi-structured topic guide was developed to ensure discussion during interviews was relevant to the research questions. The semi-structured method allowed the participant to build on answers and discuss questions or topics in further detail, which they felt were most applicable to them, and allowed discussion to focus on areas they felt were particularly important. Interviews were anticipated to last around 45 minutes in duration, and they were digitally audio recorded with participant consent. All participant names were replaced with individually assigned user IDs to respect anonymity and confidentiality. Interviews were carried out to the point of data saturation – that is, when no new topics or themes were emerging from the data.

Interviews were carried out by myself over a period of two months in 2017, as displayed in Figure 5. I was not personally known by the participants prior to contact by email, however, all participants had completed dietary recalls and were familiar with the C4L study. Interviews began by gathering background information on the interviewee, including who lived in their household and what motivated them to get involved with the C4L 'Sugar Smart' study. Interviews explored in-depth the participant's experience of the 'Sugar Smart' campaign, whether they used the 'Sugar Smart' smartphone app and the 'Sugar Smart' materials (recipe cards and stickers), and whether this use had varied over the year since the campaign was launched. Participants were asked what they felt their child's sugars intake was like before the campaign was launched, and if they thought this had decreased over the year. Interviews also identified any key messages participants took away from the campaign, any aspects they found useful or memorable one year later, whether any household purchasing or dietary changes were made as a result of the campaign and any barriers participants may have experienced when trying to reduce their child's sugars intake. Perceptions of 'hidden sugars' and 'good versus bad' sugars were also examined. A sample topic guide for these interviews is attached in Appendix C.

4.3.4 Quality control

Audio recordings from the interviews were transcribed verbatim by a professional transcriber at an independent company (The Transcription Company, 2018) outside Newcastle University. Once transcripts were returned to me, they were thoroughly checked alongside the audio recordings to ensure accuracy of transcription. This was also an important step in allowing me to become familiar with the data. A

random selection of transcripts was independently read by one of my supervisors and the coding was discussed prior to analysis. This was to ensure that the interpretation of the data, and the coding of transcripts and emergent themes were reasonable and relevant to the research questions.

4.3.5 Analytical methodology

Interview transcripts were imported into the CAQDAS, NVivo version 11 (QSR International Pty Ltd, 2019). Participants were identified using individually assigned participant numbers, and transcripts were labelled with parent gender, child gender, child age, head of household occupation, and whether the child's sugars intake had increased or decreased from baseline.

Transcripts were coded soon after the data was collected and the constant comparative technique was employed, to allow the semi-structured topic guide to be refined so that emergent findings could be further explored during subsequent interviews. As interviews were carried out, additional questions were added and some existing questions were re-worded in the topic guide to aid participant understanding and add more insight into emerging areas of interest.

I read each transcript thoroughly read line by line, to familiarise myself with the data. After the familiarisation process, I carried out an initial manual analysis (Appendix D), to visually depict how everything linked together. I then organised the transcripts and thematically coded the data digitally on NVivo; a form of CAQDAS which provides a useful way to keep track automatically of new codes, to classify all of the data so that it could be compared systematically with other parts of the data set and to identify the emerging themes (Gale et al., 2013). This was followed by further manual analysis, which is attached in the appendices (Appendix E to Appendix G), to assist with my connection with the data. As the interview topic guide followed the format of a semi-structured interview, a number of codes were developed based on the questions that were asked.

The Framework Method was chosen as the form of analysis for this research, as it supports thematic analysis by providing a systematic model for managing and mapping data (Gale et al., 2013). As previously discussed (see 0), it is arguably the most suitable method for analysis of interview data, where it is desirable to generate themes by making comparisons within and between cases (Gale et al., 2013).

4.3.6 Theme development

Six meta-themes were identified at this stage, which are described in more detail in the next section. These meta-themes are detailed in Figure 6.

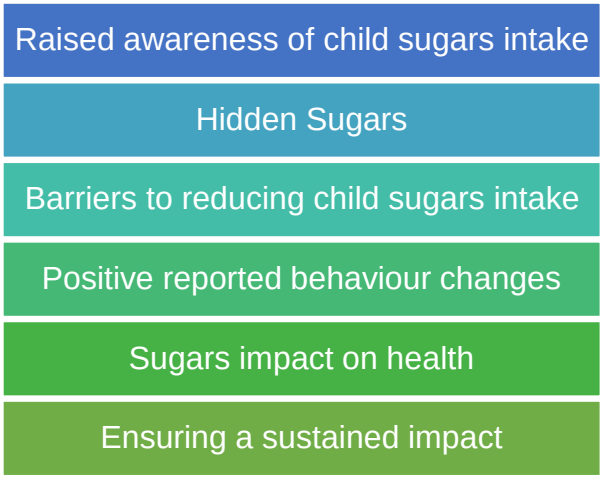

Figure 6: Change4Life study meta-themes

These meta-themes were selected based on their links to the research aim, and related codes were organised and linked to each. The Framework Analysis method also allowed for a clear audit trail from original raw data to final themes, including illustrative quotes (Gale et al., 2013).

4.4 Results

Forty-four participants were contacted, and data saturation was achieved at twenty-seven interviews. The identifying characteristics of the participating parents are listed in Table 1. Head of Household occupation (HOH) is linked to socio-economic status (SES), and was therefore used to determine the participant's level of deprivation in this study (Office for National Statistics, 2019). The different levels of HOH are listed in Figure 7.

Head of Household Occupation	
1	High managerial
2	Intermediate managerial
3	Supervisor/Clerical/Intermediate managerial
4	Skilled manual
5	Unskilled/ semi-skilled manual
6	Housewife
7	Unemployed

Figure 7: Head of Household Occupation key

Parental participation was highly skewed towards female (*n*=25), as there were more females within the available sampling frame. The gender of children whose parents were interviewed were roughly evenly split between boys (*n*=13) and girls (*n*=14), and there was a representative spread across child age. HOH and geographical location were also representatively spread across participants. Ethnicity was skewed towards white participants (*n*=19).

Table 1: Change4Life Study participant characteristics

ID	Parent Gender	Child Gender	Child Age	Number of children per household	Head of household occupation (HOH)	Ethnicity	Geographical Location	Sugars intake increased or decreased	Used app or not
P1	Female	Male	9	2	Unemployed (7)	White	North West	Increased	No
P2	Female	Female	7	3	Supervisor/Clerical/Intermediate managerial (3)	White	South East	Decreased	No
P3	Female	Male	7	2	Skilled manual (4)	White	South East	Increased	Not much
P4	Male	Male	7	2	Supervisor/Clerical/Intermediate managerial (3)	White	East Midlands	Increased	Not much
P5	Female	Male	11	2	Supervisor/Clerical/Intermediate managerial (3)	White	South West	Increased	Yes
P6	Female	Female	10	2	Supervisor/Clerical/Intermediate managerial (3)	White	North West	Decreased	Yes
P7	Female	Female	9	4	High managerial (1)	White	South East	Decreased	Yes
P8	Female	Female	9	1	Intermediate managerial (2)	White	North West	Increased	Not much
P9	Female	Female	6	1	High managerial (1)	White	South West	Decreased	Yes
P10	Female	Female	10	2	Supervisor/Clerical/Intermediate managerial (3)	White	Yorkshire/ Humberside	Decreased	Yes
P11	Female	Male	7	2	Skilled manual (4)	White	Yorkshire/ Humberside	Decreased	Yes
P12	Female	Female	8	2	Intermediate managerial (2)	White	South West	Increased	Yes
P13	Female	Female	5	1	Intermediate managerial (2)	Mixed/ Multiple ethnic	London	Decreased	Yes
P14	Female	Male	8	2	Housewife (6)	White	East Midlands	Increased	Yes
P15	Female	Male	10	1	Intermediate managerial (2)	White	East Midlands	Increased	Yes
P16	Female	Male	8	3	Supervisor/Clerical/Intermediate managerial (3)	White	Yorkshire/ Humberside	Decreased	No
P17	Female	Female	7	2	Intermediate managerial (2)	White	South West	Decreased	Yes
P18	Female	Male	8	3	Skilled manual (4)	White	East England	Increased	Yes
P19	Female	Male	7	1	Housewife (6)	White	Yorkshire/ Humberside	Increased	Yes
P20	Female	Male	10	3	Supervisor/Clerical/Intermediate managerial (3)	White	West Midlands	Decreased	Yes
P21	Female	Female	5	1	Housewife (6)	Asian/ Asian British	West Midlands	Increased	Not much
P22	Female	Female	9	1	Unskilled/ semi-skilled manual (5)	Black/ Black British	London	Decreased	Not much
P23	Male	Female	9	2	Intermediate managerial (2)	Asian/ Asian British	London	Decreased	Yes
P24	Female	Female	10	4	Housewife (6)	Mixed/ Multiple ethnic	London	Decreased	No
P25	Female	Female	5	1	Intermediate managerial (2)	Mixed/ Multiple ethnic	Yorkshire/ Humberside	Increased	No
P26	Female	Male	8	2	Supervisor/Clerical/Intermediate managerial (3)	Black/ Black British	London	Decreased	Yes
P27	Female	Male	5	2	Housewife (6)	Asian/ Asian British	London	Increased	No

The previously mentioned six meta-themes which emerged from the data are displayed in Figure 8.

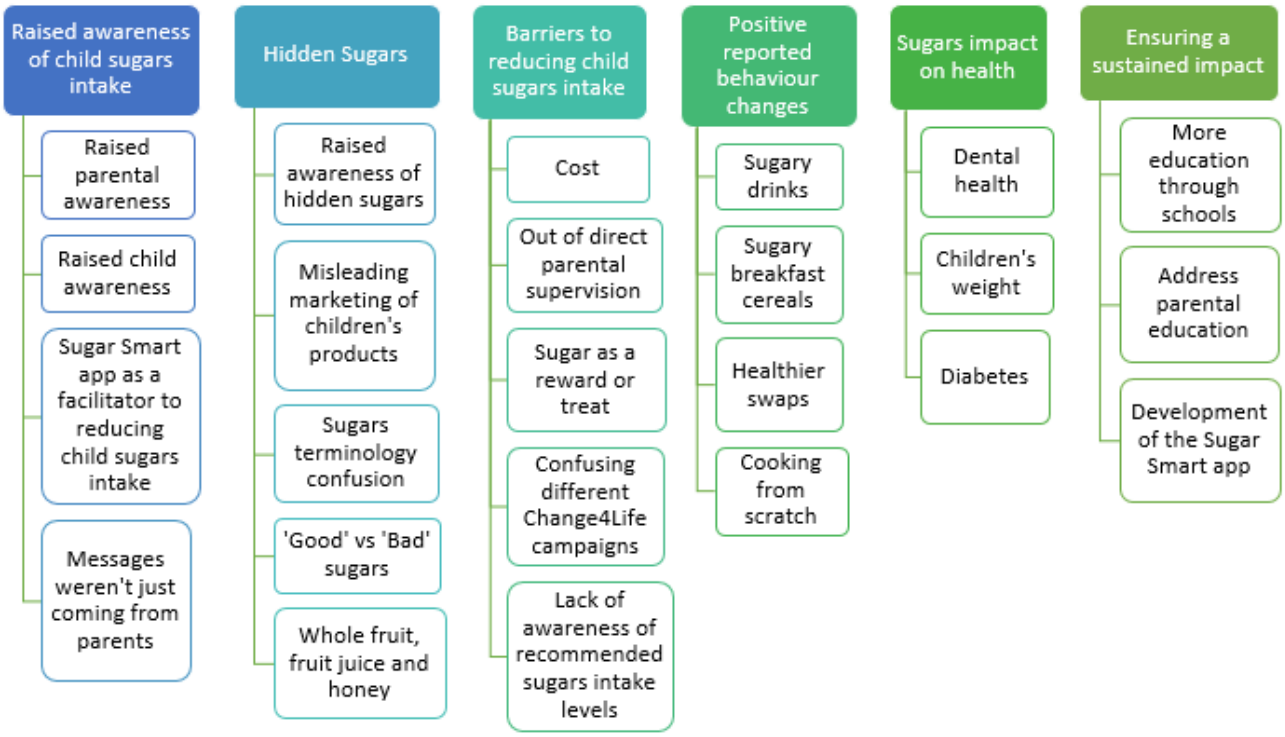

Figure 8: Telephone interview emergent meta-themes and themes

Quotations have been used throughout this section of the chapter to provide the evidence upon which the analysis was based.

4.4.1 Raised awareness of child sugars intake

One year post launch of the C4L 'Sugar Smart' campaign, there was a reported raised parental awareness of their child's sugars intake.

> *It made me more aware of what my children were eating… so I think it's good from that point of view; of being aware of how much sugar is in things...I suppose a little bit because it gave me the kick up the bum to look at what they were eating and think, 'Mmm, this isn't great'. (Boy, aged 7, HOH 4 - P3)*

> *It just made me more aware of what to look for when I was sort of like buying stuff for the house really... it gave me a sort of like a clearer idea of what I was actually feeding my son. (Boy, aged 8, HOH 3 - P26)*

I thought [the campaign] was brilliant, it really opened my eyes up to a lot, I mean I thought I was quite, sort of, savvy when it came to sugar, but it did actually open me up, especially the…sugar cube counter app… Because I'm actually, even though I thought I was aware before, I'm more aware and I'm more on it with the app. (Girl, aged 7, HOH 2 - P17)

When asked, the majority of parents (22 out of 26) believed their child's Free Sugars intake to have decreased since the campaign was launched one year previously. Figure 9 visually depicts parental perceptions of their child's sugars intake, as well as if they were correct. Thirteen of these parents were correct as their child's sugars intake did in fact decrease, however, nine parents were wrong as their child's sugars intake had increased. When asked if they thought their child's sugars intake had decreased, three parents said no and one parent said they thought their child's intake was the same as before the campaign was launched. As a result of this question being added after the first participant had already been interviewed, one parent was not asked if they thought their child's sugars intake had decreased.

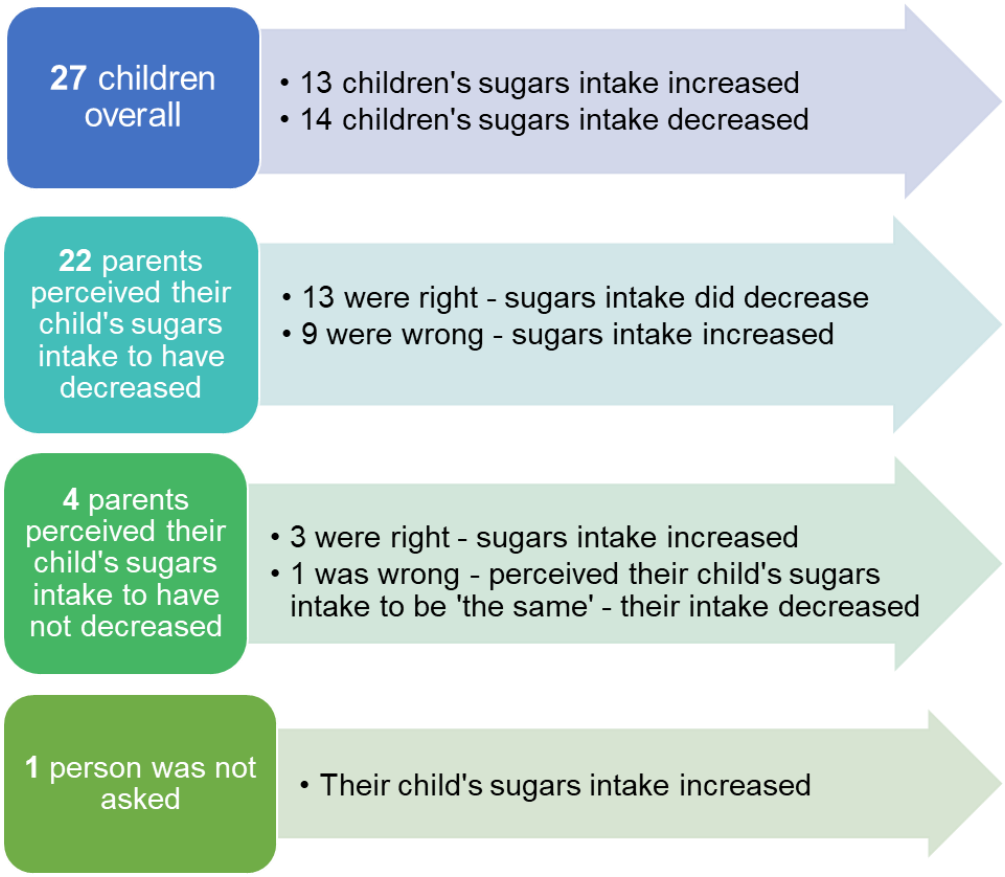

Figure 9: Perceptions of child sugars intake

One year after the campaign was launched, there was also a perception amongst parents of raised child awareness of their own sugars intake.

> *I think it did have an impact on him. It has made a definite difference to him, really… he thinks a lot more now than he used to.... I suppose it's just made him more aware, really, so he will do more - he will think more about it himself.* (Boy, aged 10, HOH 3 - P20)

> *My boys are now becoming a bit more aware of how much sugar is in certain things… [my daughter] was becoming more aware of the sugars in these foods because she thought, 'Oh, you know, fizzy drinks, mum, I don't ever want that. Do you see how much sugar cubes are in there?' (Girl, aged 10, HOH 6 - P24)*

It was reported that the C4L 'Sugar Smart' campaign, and particularly the associated smartphone app, successfully acted as a facilitator to reducing children's sugars intake.

> *I did download the app. I think my husband also downloaded the app as well, so we was more sort of like conscious when we was actually going into the supermarket and we was purchasing items and everything, thinking, 'Oh, that's quite a high sugar intake' and everything… trying to find the alternatives in that way as well. (Boy, aged 8, HOH 3 - P26)*

> *I know my children enjoyed using the app and actually realising what was contained in what we didn't even think as being sugary foods and drinks so it was definitely beneficial. (Girl, aged 10, HOH 3 - P6)*

> *I thought it was very useful. I thought it was very good for her because she can use it and it sort of made her think sometimes, 'Actually, that's got four teaspoons of sugar in it. It's probably not a very good food for me.' Yeah, I liked that. (Girl, aged 9, HOH 1 - P7)*

Parents felt that the campaign also may have had more of an impact based on the fact the children were more likely to engage with something electronic, rather than having their parents tell them what to do, or listening to health messages from their parents.

So I think actually making him aware of it, rather than it being mum or dad saying to him, 'Oh, do you think you should be eating that?' or, you know, 'Are you sure you want that?' and then he thinks you're having a bit of a dig, but because it was something else telling him, something electronic was telling him, he was like, 'Ah okay, if that's telling me it's got that much sugar in then I believe that, you know. I don't always believe mum or dad but if this is telling me.' So yeah, I think it did have an impact on him. It has made a definite difference to him, really. (Boy, aged 10, HOH 3 - P20)

After the campaign, it's stuck with them. It's not just coming from Mum. It's not just Mum just making up. It's not – like sometimes, they think it's just me making up that they shouldn't eat these things, so it's nice that they can see it and then they think, 'Oh my goodness. Is that how much?', and then they kind of take the initiative to stay away from it for a while. (Girl, aged 7, HOH 3 - P2)

4.4.2 Hidden Sugars

One year after the 'Sugar Smart' campaign, parents reported having a heightened awareness of 'hidden sugars' in different food and drink products, and often reflected on being surprised about the sugars content in savoury foods, such as pasta sauces.

I have talked to [child] about hidden sugar and, and how it's in things you wouldn't think of. (Boy, aged 9, HOH 7 - P1)

...I think that it's not until you actually see 7 sugar cubes and think actually you wouldn't just shove 7 sugar cubes in your mouth would you and eat them, so it's actually quite scary when you think that's actually hidden in your food. (Girl, aged 7, HOH 3 - P2)

…cereals, some yoghurts, especially obviously the chocolate versions, the Dolmio tomato sauce, because we eat a lot of pasta… but there was an advert, showed I think about 6 teaspoons of sugar in a jar, so obviously that's what made me swap that, so yeah, you just don't realise there's sugar in almost everything… Especially if it's savoury you think, well I don't think there's sugar in there… (Boy, aged 8, HOH 4 - P18)

Food companies should be held responsible, I think it's disgusting I'm sorry, it's made me really aware that companies shouldn't be adding so much sugar to our food, just to sell it and make it taste nice and the low fat stuff yeah, you think you're being healthy by low fat, I mean even at school, we have yoghurts come in and they're supposed to be low fat but when I compared them to the normal ones, this is actually the same amount of sugar, in one brand there was actually more sugar, so the full fat ones are actually healthier than the low fat ones. (Girl, aged 7, HOH 2 - P17)

Food and drink products that are specifically marketed and advertised for children were a cause of concern for a number of parents, as there was a belief that these products aimed at children would be 'healthier' than alternatives.

What it's done really is made us more aware of those hidden sugars, in things like yogurts and snack bars that are really naughty, actually, because they're aimed at children for children's lunchboxes. But actually when you look at those things they're the things that are containing like ridiculous amounts of sugar, really… you kind of think that you're giving your children healthy foods…like yogurts and stuff that seem to be aimed at children but actually a lot of them contain an awful lot of sugar so though you think you're doing the right thing in giving them that kind of healthy sort of thing… when things are manufactured and targeted to children, you kind of assume, obviously wrongly now I know, that they are okay for children to eat… That's how they promote them…as being a healthy snack or whatever. The yogurts and like cereal bars…you kind of assume that they're fairly healthy and they're fairly low in sugar because they are sold as a healthy snack. So yeah, they were probably the things that surprised me more than anything. (Boy, aged 10, HOH 3 - P20)

Yoghurt, you know, 'No, we're not having those yoghurts now'… Obviously I know the ones with the chocolatey things would be more sugar but just some of the plain fruit, well the fruity type yoghurts, especially the low fat ones seem to have quite a lot of sugar in. (Boy, aged 10, HOH 2 - P15)

It was evident that there was confusion around differing terminology and definitions of sugar. There are many different terms used for sugars and it is important that consumers are aware of these.

> *Some of the terminology as well of different things, sucrose, fructose, you know. I don't know, I mean it definitely means sugar and I think that maybe the manufacturers need to be a bit more transparent about what's in the items without it being hidden in fancy terms and small writing at the back of the packet. (Boy, aged 10, HOH 2 - P15)*

> *I get confused between 'no added sugar' and 'natural sugars' because I think, I believe there is a difference. It's the meanings of what the manufacturers put on sugar, like the sugar – what's the two? There's sugar free and then the no added sugar but you've still got the naturally hidden sugars in and I think that's, the three that probably people get most confused with. (Boy, aged 11, HOH 3 - P5)*

There was confusion around what consisted of a 'good' sugar and a 'bad' sugar, and whether there was even a distinction between the two. This often came back to the issue regarding knowledge and understanding of the difference in sugars present in whole fruit, fruit juice and honey, and whether parents were comfortable giving these products to their children, regardless of their sugars content.

> *I thought it's a bit confusing, like apple juice, for example, like apples is a good sugar but in the apple juice you don't know if it's a good sugar or if it's added sugar. You have to go through and read the ingredients rather than just sitting and eating an apple. It's obviously still sugar but it's a good sugar. Whereas the kids just think, 'Well, it's apple juice so it's, it's a good sugar because it's apple juice.' (Girl, aged 10, HOH 3 - P10)*

> *Good sugar is like fruit and things like that, that are like natural, and bad sugar's obviously what's got like - when it's food obviously packed food and things like that is bad because obviously it's got sugar in it. But I've learned good sugar is what's in fruit and things like that. (Girl, aged 5, HOH 6 - P21)*

Oh I mean you need some sugar but obviously I think the bad sugars they mean like doughnuts and high sugary cereals, things like that. But if you had a bit of sugar in muesli, which was natural anyway - natural sugars are fine. (Girl, aged 6, HOH 1 - P9)

Whole fruit was largely seen as a positive source of 'natural sugars'. There was a reported belief that the sugars in whole fruit were less harmful than sugars from alternative sources, and other benefits from eating whole fruit were mentioned, such as fibre and vitamins.

I let them have whatever fruit they want, really. I don't think about the sugar in fruit as being bad. I don't think about the amount of good sugars that are in anything because I think they're just naturally occurring. (Boy, aged 10, HOH 3 - P20)

the way we understand it is they are kind of less intense, I don't know what the chemistry is, but apparently when [sugar is] in the fruit it's a lot less dangerous. (Girl, aged 9, HOH 2 - P23)

I know there's a lot of fruit and veg that have low and high contents of sugar but in the same way it's got all the things that are good for them … there's different vitamins in each one… (Boy, aged 8, HOH 6 - P14)

I don't mind the whole fruit, that kind of thing so much. As long as they're eating it and it's a whole fruit, so the fact they're eating fibre at the same time so their bodies could digest it. (Girl, aged 9, HOH 1 - P7)

Fruit juice was seen in a more negative light than whole fruit; often participants made reference to the fact they no longer buy it any more after the campaign, due to the realisation of the sugars content in it.

So say fruit juice – so say, orange juice – I tend not to buy that because it's high in sugar and, we did used to buy more of it…my wife's the one whose – don't mean to slag her off but she still like, 'Ah, fruit juice is good for you' and I'm the one who says, 'No, it's full of sugar'… Rather than buy the fruit juice, we buy no added sugar squash. (Boy, aged 7, HOH 3 - P4)

I wouldn't give her lots and lots of fruit juice… because for one, no matter how much you drink, it only counts as one of your five a day…and also, there's no real fibre in there. When you eat a piece of fruit, you obviously get the skin and all the fibre, which I think is better for you. (Girl, aged 5, HOH 2 - P25)

We don't drink juice… My daughter used to drink apple juice but I used to water it down with water… Because I found out there's a lot of sugar in apple juice. In a little carton there's like five spoons of sugar, which was a lot. (Girl, aged 6, HOH 1 - P9)

[Fruit juice] has probably been cut down quite a bit now, partly because it starting affecting the teeth. (Girl, aged 9, HOH 2 - P23)

Fruit juice is the devil's work. (Boy, aged 9, HOH 7 - P1)

However, a redeeming feature of fruit juice mentioned by a couple of participants was its vitamin C content, which was perceived to be beneficial for the child.

He usually has a small glass, it's probably only about 50 ml of fresh orange juice in the morning, takes a hay fever tablet. Obviously its breakfast juice and, it sort of washes his tablet down and gets him some vitamin C as well. (Boy, aged 10, HOH 2 - P15)

We drink a lot of natural orange juice so that's got its own natural sugar in it… and I'd rather keep on with things that I feel have some benefit for the children and reduce the things that are less beneficial. So obviously anything that's got obvious sugar added to it to avoid that rather than avoid things that also have a sort of fibrous and vitamin C content. (Girl, aged 10, HOH 3 - P6)

Honey was also mentioned as a source of natural sugars, and perceived as a favourable alternative to 'refined sugars'. It was reported to have helped one participant's hay fever, and children were engaged when learning in school about how honey is made.

Well naturally occurring sugars that you get in food anyway. Erm, you know, like honey, things like that. It's all right to have that in moderation. (Girl, aged 6, HOH 1 - P9)

…if you are going to have [sugar], have like your fructose sort of sugar, the sugar from your fruit and honey is the other one that I use because we've both got hay fever so I find the local honey helps. I'd rather use that than sugar, like refined sugar. (Girl, aged 7, HOH 2 - P17)

I've been showing them all different sorts of sugar and the forms it comes it and saying, 'Well, this is honey but it's still sugar' and they find that quite interesting and they've also been learning all about plants, and photosynthesis, and also pollen and how bees make honey, and – so they are interested in it, I think. (Boy, aged 7, HOH 4 - P3)

4.4.3 Barriers to reducing child sugars intake

There were a number of reported barriers to reducing child sugars intake, one year post campaign. A key issue for parents was cost, as there was a belief that healthier foods and drinks were more expensive than less healthy, sugary products. Reducing child sugars intake was also seen as difficult when the child was out of direct parental supervision, for example, when they were at school, with grandparents, or at parties with friends. Using sugar as a reward or a treat was reported, which could be considered a barrier to reducing child sugars intake if the child developed an expectation of having something sweet as a reward.

4.4.3.1 Cost

If you get some of the lower calorie foods or lower sugar foods, they can be at a more premium price, and also thinking when you go to the supermarket, you always see kind of special offers on cakes and this, that and the other; you know, it's all very prominent, isn't it? (Girl, aged 5, HOH 2 - P25)

You know, you're paying sort of, £2 for 6 apples, where you can get, I know it's no excuse, but you can get like 4 bars of chocolate for a £1 and you think well… I can get more chocolate than apples for my children, I know that's seems a cop out excuse. (Boy, aged 8, HOH 4 - P18)

When you go round the supermarket it still is much cheaper to buy the more unhealthy sugar-laden foods than it is to buy the more healthy options… I think you can throw whatever ad campaigns and apps, and all sorts of things at people but when it comes down to it the thing that makes a difference is, 'What, what can I afford to buy to feed my family?' (Girl, aged 9, HOH 2 - P8)

4.4.3.2 Out of direct parental supervision

…in school they tend to give treats and it's not just when it's somebody's birthday so if it's the last day of school, which was Wednesday, he came home and he said he had like four chocolates and that's not something I'd do. (Boy, aged 5, HOH 6 - P27)

[child] doesn't tend to have [puddings] on the week, except what he has at school dinners of course 'cause he always has pudding at school dinner. They do all sorts. They do sponge puddings, flapjacky type things, mousses, ice cream … it's not really much of a piece of fruit. It tends to be, if there's any fruit it's mixed in with a sponge pudding or it's on top of some rice pudding or anything like that. (Boy, aged 10, HOH 2 - P15)

He'll go for the things like the puddings and I'll say, 'Have fruit or yoghurt' and he'll opt for, you know, the cakes and the custard and things… I mean I don't see why they have to have a pudding at school… I don't serve puddings at home. So I don't see why school gives them…They're used to, at home, not getting [a pudding], but, you know, if they go anywhere else, they sort of have an expectation of a dessert. (Boy, aged 9, HOH 7 - P1)

I think I worry about the things that I don't know about. So like school dinners, things like that, I don't know what sort of products they use there. So it's more things that are out of my control I worry about… I wouldn't say that her school is the kind of healthiest school… Sometimes she gets puddings there, sometimes she doesn't… She has such a good appetite I would say she probably eats pudding to fill herself up after the meal. (Girl, aged 9, HOH 2 - P8)

It's also when I'm not with him –I know for a fact he goes to my mum's and raids the sweet jar the minute he walks in the door. I definitely worry my children eat too much sugar when they're at their grandparents… I think the older generation aren't as aware, or don't care as much really…certainly the older family. (Boy, aged 7, HOH 3 - P4)

When she's been invited out to friends' houses and she'll have what they - obviously the mums give them what their kids eat. So she'll come home and say, 'I've had this, this and this.' And also she goes to parties. Or when we're on holiday it's harder because everyone else is having what they like. (Girl, aged 6, HOH 1 - P9)

4.4.3.3 Sugar as a reward or treat

I'd say, 'You have to eat your evening meal' then they can have a treat after, or ice cream, or a chocolate bar, or something. So yeah, it's more of a reward for eating the evening meal. (Boy, aged 7, HOH 3 - P4)

Explicitly I think [sugar] is a treat from time to time not every day, so it would probably be usually at the end of a meal, so like a sugar treat. I think the occasional treat… mostly for a reward for being good or doing good things. (Girl, aged 9, HOH 2 - P23)

…the extent of a treat is like raisins which yeah, I mean they are sugary but it's not a chocolate bar. (Boy, aged 8, HOH 3 - P16)

4.4.3.4 Confusing different Change4Life campaigns

It was evident from a number of telephone interviews that parents were confusing different C4L campaigns and mixing up the associated messages. Interviews were specifically asking about the impact of the 'Sugar Smart' campaign one year after campaign launch, but some parents were basing their answers on other campaigns and messages, such as exercise and physical activity orientated campaigns.

the 'you need to move your body more' has been a big thing for us and small – actually, the one thing that was really useful was we had, little bite size activities and that came at just the right point in the summer holiday

where they were really bored and I said, 'Right, you can do your ten minute activities then' and they actually did… (Boy, aged 7, HOH 4 - P3)

…because obviously, you're using like the Disney characters, for the whole sort of like – to get up and shake up and everything like that as well which obviously grabs their attention and everything. (Boy, aged 8, HOH 3 - P26)

I know there was some of the cards that they had err it was like to half an hour of running round or doing star jumps and stuff like that and actually choose the cards. (Girl, aged 10, HOH 3 - P10)

I've got a lot of the Change4Life things so erm I'm trying to actually think back to what actually came in the pack... We have a lot of leaflets you see ... so no we don't remember it specifically as I say because we do have a lot of the Change4Life products ...erm menu cards and the wheels for the exercise and things so… I can't say I can particularly pull out the 'sugar smart' as a separate. (Girl, aged 10, HOH 3 - P6)

4.4.3.5 Lack of awareness of recommended sugars intake levels

When asked if participants knew what the UK recommended maximum intake levels for Free Sugars were. Many admitted to not knowing what these were:

[I don't know] not off the top of my head, no. (Boy, aged 10, HOH 2 - P15)

I know I looked it up at one point, but no, [I don't know] anymore? (Boy, aged 7, HOH 6 - P19)

No I don't, no I don't [know]. (Boy, aged 8, HOH 4 - P18)

Erm I should [know] but no. (Girl, aged 10, HOH 3 - P6)

I don't actually. No, I don't. I don't know what they are… I do think the recommended intake levels should be advertised more because I wasn't aware of them, but, you know, I'm aware of other things, like the salt…they do publicise that you shouldn't have too much salt and yeah, this is the recommended amount and so forth, but I wasn't aware of sugar. I just knew that sugar was a bad thing. I haven't looked it up. People would need to have the inclination to go away and look it up, wouldn't

they?...Whereas, if it was advertised more – campaigned more what it was, I think it would – it can only be a good thing. (Girl, aged 5, HOH 2 - P25)

No idea…I think recommendations are the same as everything that gets recommended by the government and health authorities and things like that. People will kind of listen to it and then do what they want to do anyway, probably… (Girl, aged 9, HOH 2 - P8)

Whereas, other participants guessed what these recommendations would be, and were often inaccurate:

No, I wouldn't really know. Er, 40g a day maybe? (Boy, aged 7, HOH 3 - P4)

Er... is it nine teaspoons? (Boy, aged 7, HOH 4 - P3)

Er, I think, oh God, no. No, you've got me but I think it's 10, 10 cubes a day? (Girl, aged 5, HOH 2 - P13)

Is it seven to eight table - teaspoons maybe? (Girl, aged 9, HOH 1 - P7)

4.4.4 Positive reported behaviour changes

However, despite this apparent lack of awareness of the maximum amount of sugars their children should be having, it was still widely reported that as a result of the campaign, parents were employing positive changes in household shopping behaviours. These included a reduction in 'sugary' drinks and breakfast cereal purchases and other health conscious shopping behaviours, such as looking at the labels more and making healthier swaps.

4.4.4.1 Sugary drinks

I've stopped buying certain things… so I've stopped buying like milkshakes, stopped buying some of the cordials. (Boy, aged 10, HOH 2 - P15)

Yes we've certainly stopped buying a lot less of the fizzy drinks to start with because we were quite surprised, even with the diet versions, whilst there was no sugar in them, in terms of the added sweeteners, that was

not something that we were comfortable with so we definitely did cut down a lot in terms of just the fizzy drinks. (Girl, aged 9, HOH 2 - P23)

4.4.4.2 Sugary breakfast cereals

I've changed my shopping habits… we're on better cereals, I don't buy chocolate cereals anymore. (Boy, aged 8, HOH 4 - P18)

Yeah, I have switched breakfast cereals before because I've looked at the back and gone, 'Oh! That's not coming home with us'. (Boy, aged 7, HOH 4 - P3)

Yeah, I think that's the reason I remembered it, I think we stopped kind of buying the kid versions of cereals like Frosties and everything… the Frosties that the kids used to eat in the morning, that came as a shock so that got stopped. (Girl, aged 9, HOH 2 - P23)

4.4.4.3 Healthier swaps

So we often used a lot of sugary foods… after we downloaded the app we were more sugar aware so we made conscious decisions about what we eat now and we always double check and think again. (Girl, aged 9, HOH 5 - P22)

Yeah, before I didn't look on it and I just used to buy it before because like if it was something that my daughter liked but now I would look and think, 'Is that the right thing I should be buying?' (Girl, aged 5, HOH 6 - P21)

…our family shopping has definitely changed. It's certainly got more expensive. (Girl, aged 9, HOH 1 - P7)

4.4.4.4 Cooking from scratch

There was also a reported increase in cooking from scratch, particularly after discovering the sugars content in savoury foods such as ready-made pasta sauces.

…[the campaign] just made me sort of like so totally aware now, I'm more eager to like cook it myself, so I know what's actually in it and I can

obviously reduce that amount and obviously look at different alternatives in my ingredients as well. (Boy, aged 8, HOH 3 - P26)

…in the food shopping we buy natural and we tend to cook at home so sometimes we'd buy sweet things but now we are making that at home, in our own way with less sugar. (Boy, aged 5, HOH 6 - P27)

That was one thing that really shocked me about pasta sauces. I was like, 'Oh, I'll make my own now.' I can't do it all the time ... if I've got time but I do make my own now. Much prefer to make my own. The desserts definitely I've changed. I make a lot more myself. (Girl, aged 9, HOH 1 - P7)

4.4.5 Sugars impact on health

When teaching their children the effects a high sugars intake may have on their health, parents tended to focus on 'dental health', rather than the impact sugars may have on their child's body weight. Diabetes was also mentioned as a health related impact of a high sugars intake, which came from participants who already had diabetes in the family, potentially resulting in the child having a heightened awareness of the effects of sugars in this way.

4.4.5.1 Dental health

The teeth element, I do sort of go on about that. We do go to the dentist every six months and I do say, 'The dentist will know if you've been eating those sweets.' (Boy, aged 10, HOH 3 - P20)

… he had to have a filling last time he went and I asked the Dentist just to explain to him that's because of all the sugars that are still in your food and stuff…just that the sugar will affect your teeth and you'll end up with no teeth and stuff, that's it. (Boy, aged 7, HOH 6 - P19)

…they were teaching them how to brush properly and that's how the actual conversation comes up about how much sugar. Like the breakfast that they're choosing now they call it Chocolate Pillows and I notice when I'm helping my six-year-old brush his teeth the chocolate is embedded into the teeth… I said, 'You can see what it's doing to your teeth, let alone what it

could be doing inside your body.' So obviously, he's becoming aware because obviously he's seeing all this black stuff stuck in his teeth. So we're trying to avoid things like chocolatey cereals in the morning now… and it's now them questioning it. 'It's causing my teeth to get bad, mummy.' (Girl, aged 10, HOH 6 - P24)

I think it ends up being in terms of rotting teeth… 'cause she doesn't have a weight issue so yeah, it is down to mouth health… if you eat the wrong things or eat too much sugar your teeth are going to fall out and you'll have awful teeth and you won't have any friends… No, it doesn't go that far but yeah, it is pretty much, 'You need to brush your teeth and don't eat that an hour before bed.' (Girl, aged 5, HOH 2 - P13)

4.4.5.2 Children's weight

I don't tend to spend too much time talking about the weight issue, although I have talked to him about weight problems in the future. So, you know, 'If you sort of eat poorly now it will have an impact on your life when you're an adult, maybe.'…the weight and the health issue is more of a something for in the future rather than now, if that makes sense, because I'm just a bit conscious that he is a little bit self-conscious himself about it. So I don't want to, you know, have issues around food and so it's sort of getting that balance, really. (Boy, aged 10, HOH 3 - P20)

I don't want him to like, have the image issues and so I won't like, mention about his body size or anywhere on his body or anything like, his stomach getting bigger, just that the sugar will affect your teeth and you'll end up with no teeth and stuff, that's it. (Boy, aged 7, HOH 6 - P19)

He is getting a bit body conscious now of his style and his image, so he can persuade himself not to have a thing or if he's feeling a bit fat or someone's teased him at school maybe, that will encourage him you know, ooh I'm not having that…if you eat all these then you get an extra layer of chubs round your belly don't you…if the trousers are getting a bit tight you know, maybe we can just try these new yoghurts. (Boy, aged 8, HOH 4 - P18)

4.4.5.3 Diabetes

…they know that side of things about the different sugars but we mainly go on, basically on health and diabetes about sugar, because we've got diabetes in the family… we've just had an aunt that's got diabetes and she nearly lost all her foot because of infections and things like that so my kids are quite aware of the bad side of things… (Girl, aged 7, HOH 2 - P17)

When they were younger, I was quite strict. Now, I've kind of lost control a little but I am quite aware of… my dad's got diabetes and things and it's something that I've always been aware of what I eat… having lived with someone that struggled with Type 1 diabetes, I think that's kind of been the major player for me. (Girl, aged 7, HOH 3 - P2)

…we've just had somebody in our family diagnosed with diabetes so I really need to look at sugars… that's the biggest thing that's made a change in me thinking about sugars is kind of seeing the consequence of something like that and having to think about things… (Girl, aged 9, HOH 2 - P8)

4.4.6 Ensuring a sustained impact

In order to ensure a sustained impact, a number of suggestions were made by parents including increasing the level of education around the subject area to children during school time but also increasing parental education. Parents are often the main provider of children's' food and drink and arguably have the biggest influence on the development of their child's taste preferences and eating habits. Another implication for future work included the development of the novel 'Sugar Smart' smartphone app, in particular the addition of a 'game' element, to make learning more accessible and fun for children, and to make messages engaging and relevant through use of cartoon or celebrity endorsement.

4.4.6.1 More education through schools

Maybe do a little bit more in like schools … get the children more involved because I think if you go into school and you get the kids involved they're likely to go home and say to their mum and dad, 'Oh mum, we've done this today,' and, you know, 'Can we do this?' and, 'Can I help you with the cooking?' or, 'Can I help you make this for tea?' Whereas I think when

you just send stuff to adults it sort of sometimes is like, 'Oh yeah, there's another letter.' (Boy, aged 10, HOH 3 - P20)

Well I think it should be implemented within all schools, to be honest, and for the kids to actually learn about the sugar in stuff… I think it would be helpful for them to actually do stuff that did help you to have a healthy lifestyle. (Girl, aged 10, HOH 3 - P10)

Maybe introduce competitions in schools to try and get children to create a recipe without using sugars. Maybe trying to work with the schools a bit more. (Girl, aged 9, HOH 1 - P7)

4.4.6.2 Address parental education

Parents – through letters from school about what to pack them in their lunchbox…maybe just that education from school for parents, of suggestions of what they could pack for their kids, I suppose that would help. (Boy, aged 7, HOH 3 - P4)

Parents are the ones that need to control the sugar intake of their children… if a parent gives in to a child that has a biscuit treat, they're the ones that are putting the sugars into their body. They're the ones that are encouraging the children to eat sugar so, parents need to play their part as well as, it's all right people focusing on schools but what about at home? That's where it all starts. (Boy, aged 8, HOH 6 - P14)

It's education – letting people make their own choices but kind of informing them, about why sugar's bad, what they can do to reduce it. I do strongly believe people are individuals, you can't force them to do anything which is why I think education is so important; there has to be people wanting to do it and wanting to make these changes, so anything that supermarkets do to support that, maybe special offers on healthy foods. If you educate people on too much sugar's bad, then you give them the access to see how much hidden sugar – or how much sugar's in a product. I think, hopefully you can get them to – of their own accord – not to buy it. (Girl, aged 5, HOH 2 - P25)

I would say that… early intervention and getting in young with parents, health visiting, all those sorts of things… You can put whatever you want on the telly and you can put whatever you want through the front door but actually unless you've got people there consistently educating new parents…I think campaigns are going to be limited in their impact. (Girl, aged 9, HOH 2 - P8)

4.4.6.3 Development of the 'Sugar Smart' app

Maybe a bit more colourful or a bit…more for kids to do maybe, like a bit more interesting for kids. That's something for the kids to do more than the parents. Like you know that app…you could play games and things like that. Like a sugar game or something like that. So the kids could play on the iPad or something, they'd understand what's going on with it as well. (Girl, aged 5, HOH 6 - P21)

I think to engage children, they need to see an actual reward. You know, like if you look at, say, the Pokémon Go sort of app, if they were collecting things and being rewarded and stuff like that; if they were the lowest sugar in something, they might get more excited and involved. (Boy, aged 9, HOH 7 - P1)

Like more with it, you know; cool, I mean this campaign was fine for the little ones but the older ones wouldn't pay any attention to that, to be honest. Maybe if they got a famous person or a cool pop star to do the campaign then they'd probably look at it a lot more, if they did like their advertising. (Girl, aged 6, HOH 1 - P9)

4.4.7 Results by demographics

Looking at the results by demographics including gender of child, age of child, HOH, ethnicity and geographical location shows that there are no particular 'high risk' groups for any of the results discussed above. This highlights the fact that sugars confusion in particular is a population-wide issue.

4.5 Discussion of results

Meta-themes which emerged comprised raised awareness of child sugars intake; hidden sugars; barriers to reducing child sugars intake; positive reported behaviour changes; sugars impact on health and ensuring a sustained impact.

4.5.1 Raised awareness of child sugars intake

There was a reported raised awareness of child sugars intake one year after the 'Sugar Smart' campaign was launched. Parents reported a raised awareness amongst themselves, but in some cases, also by their children. This is a promising finding, as an important feature of health marketing campaigns is that they are able to provide a long-term impact, particularly with participants retaining information and key messages. The 'Sugar Smart' campaign aimed to increase public knowledge and awareness of sugars, so a reported raised awareness 12 months after the campaign amongst the participants in the present study is welcome.

The number of smartphone users worldwide is forecast to grow from 2.1 billion in 2016 to around 2.87 billion by 2020 (Statista, 2018), therefore associated applications (apps) are potentially an important way to reach and engage the public. Today, children are surrounded by digital technologies, and apps offer a digital doorway between the physical world in which children and families live and the rapidly growing digital cloud (Hirsh-Pasek et al., 2015). As part of the 'Sugar Smart' campaign, a novel smartphone app was developed, which allowed participants to scan the barcodes of different food and drink products to see visually how many sugar cubes that product contained and to engage their children in this activity. Couse and Chen (2010) reported that children generally prefer a technology-mediated method to learning over traditional methods such as paper and pencil. This may explain why the 'Sugar Smart' app was able to engage children and give them information without it having to come from their parents. Parents felt children may be more likely to disregard information if they felt it was the parents 'nagging' them.

As shown in Figure 9, 22 out of the 26 parents who were asked believed their child's Free Sugars intake had decreased. 16 out of the 26 parents correctly identified if their child had either increased or decreased their Free Sugars intake since the campaign was launched, therefore 10 parents did not. There may be a number of different reasons for this including social desirability bias (Grimm, 2010) or optimism bias (Sharot, 2011). The issue of Hidden Sugars may also have resulted in parents reporting their child had a decreased intake of Free Sugars one year after the campaign was launched, if they were unaware of the

amount of sugars present in certain food and drink products. The issue of Hidden Sugars is described in further detail in section 4.5.2.

It is noteworthy that the majority (14 out of 27) of children involved in this sample had a decreased sugars intake, one year after the campaign was launched. Health marketing campaigns, such as the 'Sugar Smart' campaign, along with further education and information could therefore help to achieve a reduction of sugars intake by children. These may include the initiatives currently being undertaken by PHE, for example encouraging product reformulation and reducing potential exposure of products high in Free Sugars to children.

4.5.2 Hidden Sugars

'Hidden sugars' are those contained in food and drink products which consumers may not be aware of. Hidden sugars are often present to increase the palatability of 'diet' or 'low-fat' products, and examples include those present in savoury foods such as ready-made pasta sauces and ketchup. It is important that consumers are educated about these sugars as they may otherwise be significant contributors to their child's sugars intake. One year after the 'Sugar Smart' campaign, parents reported having a heightened awareness of 'hidden sugars' in different food and drink products.

Food and drink products which are specifically marketed towards children, including children's yoghurts and breakfast cereals, may contain a larger amount of sugars than consumers may be aware of. Lythgoe et al. (2013) discovered a significant number of products marketed towards children were higher in fat, sugar and salt than those marketed to the general population; therefore, efforts need to be taken to address this issue. It must be kept in consideration, however, that food products such as yoghurts and breakfast cereals are also often nutrient-dense and could be an important source of calcium, protein and fibre for children. There are complexities of messages being taken out of context, for example, children are encouraged to eat more fruit and vegetables but when parents look at the labels of tomato or vegetable-based pasta sauces, these could contain a large amount of sugars. There may be undesirable consequences of public health campaigns which focus solely on one area, for example parents focussing only on the sugars content of food products which overall make a small

contribution to children's sugars intake. However, the C4L 'Sugar Smart' campaign specifically focussed on the sugars content of food and drink products, as it was not the aim of the campaign to provide information on the overall nutritional content of products. Nevertheless, the campaign did encourage parents to look at the food labels more, and through the use of the smartphone app which enabled users to scan barcodes of products, a number of parents reported looking at food labels more carefully and more often.

It is important that parents are encouraged to look at and understand food labelling as nutrition information on food labels is regarded to be a major means for encouraging consumers to choose healthier alternatives when shopping (Grunert et al., 2010), however, it has been shown that food label usage is mainly related to consumer interest in healthy eating, whereas actually understanding the labels is related to nutrition knowledge (Grunert et al., 2010). The link between nutrition label use and dietary quality is attributable to nutrition knowledge, as regular label use has been associated with healthier dietary behaviours (Kakinami et al., 2016). However, studies have shown that large proportions of parents report that they rarely or never use nutrition labels (Graham et al., 2016). Parents' nutrition-related knowledge and attributes influence their behaviour towards feeding their children, therefore, those who lack nutrition knowledge may be limited in their ability to understand labels and evaluate health claims (Chien et al., 2018). Increasing parental education on accurate interpretation and usage of food labels could be an important part of a future health marketing campaign.

In the present study, although 13 of the children's sugars intake increased, there were a number of positive reported household purchasing-behaviour changes. These included a reduction or a stop in purchasing 'sugary' drinks and breakfast cereals, as well as making healthier swaps and cooking from scratch at home more. Parents reported this raised awareness of hidden sugars was through use of the app and other information and education provided through the 'Sugar Smart' campaign.

It is imperative that manufacturers make it clear to consumers what the nutritional content of their products are, in order for parents to be able to make the best

choices for their children. There are many different terms and definitions used for ‘sugars’ on food and drink labelling, used by health professionals and the media. Examples include sucrose, glucose and lactose. If these terms are confusing or unclear to the public, this could lead to misunderstanding around which sugars should be reduced.

When differentiating between a ‘good’ sugar and a ‘bad’ sugar, the debate among participants in this study often resided around whole fruit and fruit juice, and whether parents were comfortable giving these products to their children based on their sugars content. Whole fruit was largely seen as a positive source of ‘natural sugars’, whereas fruit juice was seen in a more negative light. It is promising that whole fruit was seen as a beneficial part of children’s diets, as these items also contain a number of essential vitamins and fibre. Fruit juice also contains important vitamins; however, during the process of making fruit juice the cell walls containing intrinsic sugars are broken down and these sugars are converted to Free Sugars, which may have a negative impact on health, especially with regards to weight gain and/or caries development, as previously discussed in the literature review (sections 2.9.3 and 2.9.4). Honey was misperceived to be a less harmful source of sugars as it was ‘natural’.

A key opportunity for parents to learn about the impact Free Sugars may have on dental health could be during dental appointments with their children. If dental care professionals (DCPs) explained to parents, as well as their children, the impact such sugars could have on oral health, this could be helpful for changing behaviours and increasing knowledge. This was portrayed by Moynihan et al. (2018), who reinforced the fact that DCPs have an opportunity to support patients to reduce their intake of Free Sugars. It was further acknowledged that such support would contribute to overall health benefits for these patients (Moynihan et al., 2018). Parents generally respond well to positive reinforcement, therefore dentists should provide parents with constructive advice, especially if the child is presenting with decay (PHE and DH, 2017). Due to time constraints during dental appointments, DCPs are not expected to take on the role of primary educators, but by reinforcing positive behaviours this could make a meaningful difference to parents. An increasing number of DCPs (as opposed to dentists) are becoming key in the delivery of disease prevention advice. However, whilst the involvement

of DCPs may take some the pressure off dentists' limited time with patients, relying upon the dental team to deliver this information is potentially flawed as patients must initially choose to seek access to dental care in the first place. This approach should therefore also be joined with other sources of advice and interventions available elsewhere. For example the Ottawa Charter (WHO, 1986) acknowledges the incorporation of health literacy, skills, enabling and empowering people to make better health choices without relying purely upon health professionals in traditional health settings. As previously mentioned, more mid-stream community-based interventions are needed, rather than reliance upon downstream dental and oral health advice delivered solely at the chairside.

Guidance from the National Institute for Health and Care Excellence (NICE, 2015) formally recommends that all patients (or their parents or carers) are given tailored advice during dental examinations based on the oral health messages contained within PHE's evidence-based toolkit on 'Delivering better oral health' (PHE and DH, 2017). In Scotland, the dental team should include the family in the process of continuously communicating messages regarding prevention and the management of dental caries in children (NHS, 2018b). The Welsh Government's oral health policy aims for an improvement in oral health literacy, and indicated that dental teams need to support patients and empower them to understand how their behaviour affects their likelihood of developing dental disease (Llywodraeth Cymru, 2018). This approach acknowledges the need for incentives to step-up disease prevention activities and to utilise the preventative-skills of the whole dental team to meet patients' needs (Llywodraeth Cymru, 2018). Robust measures of need and outcomes will capture the clinical challenges that dental teams experience and the impact dental services are making to ensure that evidence-informed prevention is being delivered (Llywodraeth Cymru, 2018).

4.5.3 Barriers to reducing child sugars intake

One year after the C4L 'Sugar Smart' campaign was launched, there were still a number of reported barriers to reducing child sugars intake. The cost of food and drink products was a perceived barrier, as 'healthier' products were seen as more expensive than less healthy products. This belief is in line with previous research (Hardcastle and Blake, 2016, Haws et al., 2016, Nepper and Chai, 2016). Cost is

a major factor for many families when choosing what to buy to feed their families. Supermarkets often have price promotions on food and drink products; however, these are generally on products which are high in saturated fat, salt and sugar. Families on a budget may therefore feel they are getting more value for money if they make use of these offers, but these choices may negatively impact their health in the long term. It has been reported that healthier products are often more expensive than less healthy products (Rao et al., 2013). Educating parents on 'smarter shopping' is an important part of health marketing campaigns, such as the 'Sugar Smart' campaign. Change4Life (NHS, 2019) currently provide parents with information on healthier alternatives to popular food and drink products for their children, particularly via their website (NHS, 2019). As the cost of healthier products has been reported by parents as a barrier to choosing to buy them for their children, a useful part of future campaigns could include information for parents on how to get healthy products for the best value and a more inclusive list of healthier, as well as cheaper alternatives. The impact of 'smarter shopping' education would require further research to assess if it has the potential to be successful.

Parents also reported finding it difficult to reduce their child's sugars intake when the child was out of direct parental supervision, for example, when they were at school. As previously mentioned in the literature review (section 2.11.1.3 and 2.11.2), school dinners are often a main source of food and drink intake by children during weekdays, and should adhere to nutritional standards in order for parents to be able to trust that school dinners are utilising 'healthy' products in their meals. School dinners often contribute to the development of children's taste preferences and eating behaviours from a young age (Birch et al., 2007), and it is therefore vital that they are as healthy and nutritionally balanced as possible. School dinners in England also frequently include a pudding, which could be viewed as an additional source of arguably unnecessary sugars for children, and it should be considered if it is justifiable to continue to include these within a school meal. These observations and considerations informed the focus for Study 2, reported in the next chapter.

Sugar is often also used as a 'treat' for rewarding children, which may encourage children to associate sugar with something positive and create the expectation of

receiving something sweet as a reward for admirable behaviour. Using sugary foods and drinks in this way could be seen as a barrier to reducing child sugars intake. In order to combat this issue, health marketing campaigns should encourage parents to take an alternative approach to rewarding their children, by providing suggestions including healthier food and drink products, or other rewards such as stickers or toys. This would need to be a rounded approach, discouraging the use of sugar as a reward for children in other settings including treats such as sweets from school teachers for good work. An integrated approach is needed to alter this social norm and eliminate sugar being associated as a reward or a treat.

Since 2016, more Change4Life campaigns have been developed and launched including the 2017 ‘Be Food Smart’ campaign. As part of ‘Be Food Smart’ campaign, the original ‘Sugar Smart’ smartphone app was further developed, and incorporated information on saturated fat and salt, as well as sugars. This was a positive development as it is important for parents to be aware of their children’s saturated fat and salt intake, as an excess intake of these could also contribute to negative health outcomes including overweight and obesity. Although it was after the timing of the telephone interviews for this research, a further C4L campaign was launched in January 2018 which highlighted the message to parents of restricting their child’s snacking intake to only two snacks a day, both with 100 calories or less. The C4L brand also launched ‘Move More’ campaigns focussing on promoting physical activity messages (Change4Life., 2018). In January 2019, the C4L campaign aimed to encourage families to cut down their sugars intake by suggesting a number of swaps for families to make to their everyday food and drink products (Change4Life, 2019b).

During the interviews for this phase of the research, there was an observed confusion between campaigns. Interviews carried out for this study asked participants about the ‘Sugar Smart’ campaign, however, on a number of occasions participants confused it with a physical activity oriented campaign, which was also launched by C4L. There is a risk that launching a number of campaigns, under the same brand name of ‘Change4Life’ may lead to parental confusion and the mixing-up, misunderstanding, or the dilution or loss of key messages. For any health marketing campaign to have a sustained long-term

impact, there must be a clear, central message, consistently portrayed to the public (Basu and Wang, 2009). If participants do not understand the message of a campaign, or if the message gets lost amid an array of different campaigns, this could lead to a waste of time, money and resources which could have been better employed elsewhere to achieve a sustained impact. Campaign confusion may therefore act as a barrier to reducing child sugars intake if parents miss the key message from the 'Sugar Smart' campaign and are instead focussing on other messages stemming from alternative campaigns.

PHE's Free Sugars thresholds were employed as part of the 'Sugar Smart' campaign in order for participants to be aware of the recommended maximum intake levels for each age group. However, there was a significant lack of awareness of these among participants. It is recommended that children aged 4-6 years old have no more than five sugar cubes (19g) a day; children aged 7-10 years old have no more than six sugar cubes (24g) a day; and anyone over 11 years old limit their intake to 7 sugar cubes (30g) a day. Further work may therefore need to highlight these recommendations to the public for participants to fully utilise the 'Sugar Smart' app to track their child's sugars intake.

4.5.4 Positive reported behaviour changes

The 'Sugar Smart' campaign facilitated a number of reported household shopping behaviour changes one year later, such as a reported reduction in 'sugary' drinks and breakfast cereal purchases. A number of participants also reported that the campaign encouraged them to look more closely at the labels of food and drink products and to cook from scratch more often, in order to have control on the level of sugars going into their meals. However, it should be acknowledged that underlying trends or events may have had an impact on this change in purchasing behaviours, resulting in them not being a direct result of the 'Sugar Smart' campaign. The aforementioned SDIL was announced by the UK Chancellor in his 2016 Budget. This has led a number of soft drinks manufacturers to independently reformulate their products to reduce the sugars levels in them, but also to launch new zero-sugar products, which consumers may have chosen to purchase in substitute of 'sugary' soft drinks. In the 2016 Childhood Obesity Strategy: A Plan for Action, the sugar reduction programme was also launched, which aimed to reduce overall sugars across a range of

products which contribute to children's sugars intake by at least 20% by 2020 (HM Government, 2016). This again may have led to the production of new lower-sugar alternative products, including children's breakfast cereals. Research is needed on the impact of these changes to reformulation on consumer behaviour change, to evaluate if they have been successful.

4.5.5 Sugars impact on health

The 2016 'Sugar Smart' campaign used mass media sources such as billboards and television advertisements to portray information and educational messages of the impact a high sugars intake can have for children, including '*painful toothache and needing fillings'* and '*the build-up of harmful fat on the inside, which could lead to further problems such as type 2 diabetes, heart disease and some cancers*' (Change4Life, 2018). The in-depth interviews revealed that, when parents were teaching their children about the impact of sugars, they more often took a 'dental health' perspective, rather than a 'body weight' one. This could be due to a number of different reasons, but the issue of body weight and children is recognised to be a sensitive topic, and parents reported not wanting to give their child any issues with body confidence or self-confidence, or to establish a negative relationship with food which may lead to things like eating disorders. Previous literature has also shown that parents tended to avoid discussing children's weights with each other and with children themselves (Eli et al., 2014). Another health-related impact of a high sugars intake which was mentioned was diabetes. Participants who reported that they had a family member who had diabetes often referred to the fact this gave the extended family, including the children, a heightened awareness of the effects of a high sugars' intake, external from the impact of the 'Sugar Smart' campaign. Having diabetes in the family acted as a key driver for parents wanting to be aware of and control the level of sugars their children were consuming.

4.5.6 Ensuring a sustained impact

In order for a health marketing campaign such as the 'Sugar Smart' campaign to be successful, it must be able to sustain any impacts in the long-term. Education is imperative for participants to be able to benefit from the messages of such campaigns, if they learn why change is necessary and how to change their behaviours, this may have a more sustained impact. Educating both parents and

children should therefore be at the forefront of any health marketing campaign in order to make a meaningful and lasting impact. Although education is important, this may not be successfully attained by all of those involved in such campaigns. The C4L 'Sugar Smart' campaign resulted in participants reporting a raised awareness of sugars intake and a number of reported household behaviour changes, however education is only one piece of the puzzle and other aspects may be more beneficial such as policy level changes.

Further enhancement of existing 'Sugar Smart' materials, such as the smartphone app, was also suggested by participants to improve the impact of the campaign. In an attempt to make learning 'fun', it was proposed that a gaming element could be incorporated in to the app, to get children more involved; there could potentially be physical rewards for gaining points in such a game, for example healthier food or drinks vouchers with participating supermarkets. A further improvement suggestion was making messages engaging and relevant through celebrity or cartoon endorsement. A 2013 study found that the influence of a celebrity endorser on food intake by children aged 8-11 years old increased the consumption of the endorsed brand (Boyland et al., 2013). The 'Sugar Smart' campaign was targeted at children aged 5-11 years old, and as this is a potentially impressionable age-group, having celebrities or cartoons providing key messages as part of the campaign there is potential that this could have a lasting impact on the children. However, without planned evaluations to measure longer term impact, this is a limitation of the results from these previously reported initiatives.

4.6 The research in context

As previously discussed, health marketing is an important aspect of PHE's research and information strategy, and has been defined as '*creating, communicating, and delivering health information and interventions using consumer-centred and science-based strategies to protect and promote the health of diverse populations*' (Bernhardt, 2006). To develop effective communication models for informing, educating and motivating the public about issues which directly impact upon their health, health marketing is therefore an important tool. The use of mass media campaigns, such as 'Sugar Smart', are widely used to portray messages to high proportions of large populations through

the use of existing media such as television and radio; however, exposure to such messages is generally passive (Wakefield et al., 2010). Such campaigns frequently have to compete with factors such as persuasive marketing from, for example, the food industry marketing their high-sugar products to children, using attractive features such as bright colours and cartoon characters to entice children to purchase their products. ‘Pester power’ may be defined as a child's attempts to exert influence over parental purchases in a repetitive and sometimes confrontational way, with some degree of success (Nicholls and Cullen, 2004). Research suggests that ‘pestering’ is often one of the most successful influencing techniques in parents’ decision-making process when purchasing products (Nicholls and Cullen, 2004). As well as pester power, parents may also choose certain food or drink products based on habit. If a parent is used to buying certain products, health marketing campaigns must employ powerful strategies to overcome such habits and produce positive changes. Campaigns may directly affect individuals by invoking cognitive or emotional responses, intending to affect the decision-making process at an individual level (Wakefield et al., 2010). Engaging parents’ through messages involving the health of their child may therefore strengthen their intentions to adopt healthier food and drink consumption behaviours in their families. Behaviour change may also be achieved through indirect routes, including prompting public discussion of issues, which could lead to changes in public policy, resulting in an indirect impact on individuals’ behaviour (Wakefield et al., 2010).

A 2006 review of the literature on research in health mass media campaigns, concluded that targeted and well-executed campaigns could have small to moderate effects on health knowledge, beliefs, attitudes and behaviours, and that large-scale health campaign efforts could be successful in achieving a broad public health impact (Noar, 2006). However, to achieve a sustained impact, health marketing campaigns need to attract the public’s interest, inspire positive action and be capable of changing behaviours, not just in the short-term but also in the long-term.

It could be suggested that one of the difficulties with health marketing is that its results are not immediate, so trust must be established and assurance must be provided that any efforts made now will show benefit over time. For example, the

message to brush your teeth twice a day and limit intake of sugary foods and drinks is widely promulgated (PHE and DH, 2017). Nonetheless, it may prove difficult to convince young children, in particular, to adopt these behaviours as they will not immediately see any physical benefits. They have to trust the source of information and be encouraged to look at examples of achievements of others over time, whom they may wish to emulate.

A single approach to achieving changes in dietary behaviour is likely to be unsuccessful. To make a difference all stakeholders must work together to implement changes at a micro and macro policy level, to behaviour change approaches and to food and drink environments. Maintaining continued engagement is a challenge for all health marketing campaigns. Even if the target groups are successfully engaged initially, there can be a reduction in interest over time if campaign messages do not continue to be reinforced on a planned basis. Health marketing campaigns need to keep the public engaged and provide them with the tools through education for them to be able to continue positive health related behaviours on their own. A whole-systems approach is therefore needed in order for successful behaviour change, and a range of options to prevent the negative impacts of Free Sugars intake across the spectrum of action from upstream to downstream approaches are illustrated in Figure 10.

This figure is developed and modified from Richard Watt's paper (Watt, 2007) looking at tackling the social determinants of oral health inequalities. Mass media campaigns in isolation have been shown to be unable to change behaviour in the long term, even if they are able to raise awareness (Jepson et al., 2010). A range of interventions are needed across the spectrum for the best chance of success, at local, national and international levels. An example by Watt (2007) was that nutrition and oral health guidelines could be used by institutions such as nurseries, schools, hospitals and workplaces to create an environment where healthy food and drink options are widely available and affordable. Initiatives are also needed at a 'downstream' level such as 1:1 advice and information to parents and children on the potential negative health outcomes of a high Free Sugars intake.

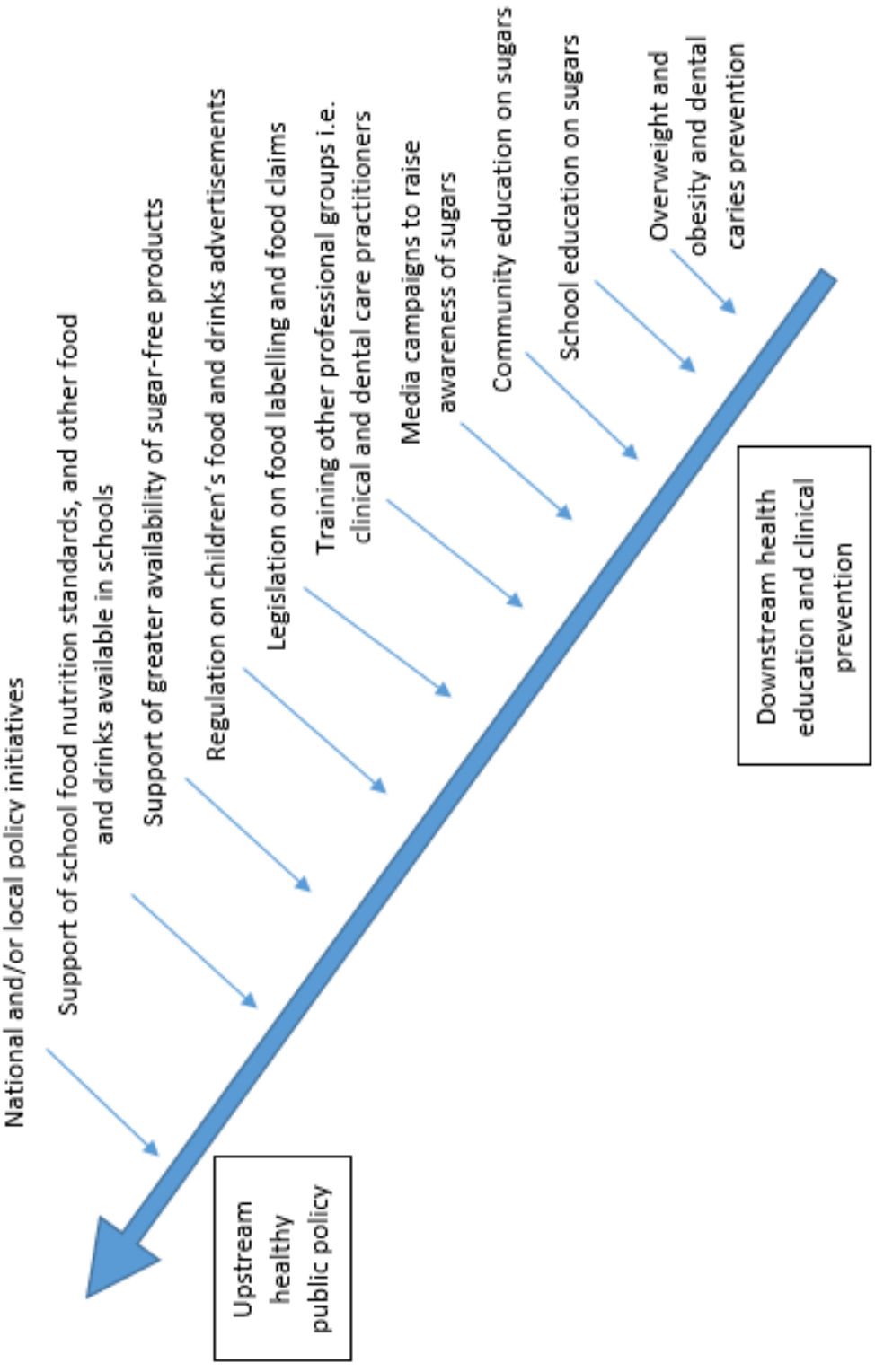

Figure 10: Upstream/downstream: options for prevention of negative impacts of Free Sugars, developed and modified from Richard Watt's paper (Watt, 2007).

4.7 Strengths and limitations of this research

There are various strengths of this study, in particular it provides the first study to examine parental views of the impact of the 'Sugar Smart' campaign after one year. Participants were recruited from across England, by using a maximum variation sampling approach. Therefore, there was reasonable diversity with respect to demographics among participants. A number of issues were examined such as how the campaign was received, which messages were considered to be important, and which made the most impact within the target group. The study was also able to assess the acceptability of requiring participants to use smartphone technology to increase their knowledge and understanding and potentially change their buying and eating behaviours, based on the information obtained using this form of health marketing. It was able to determine at first hand the perceived value to the target audience, of a range of media including billboards and television advertisements, in raising awareness, obtaining information and influencing behaviour relating to health. It also provided insight into participants' general knowledge of, and attitudes towards, 'healthy' eating regarding sugars consumption.

On the other hand, the research may have been somewhat compromised by the launch of additional campaigns under the 'Change4Life' brand following the launch of the 'Sugar Smart' campaign. As a result, responses suggested that there could be confusion, misunderstanding and mixing-up of messages amongst campaigns. There were also policies and initiatives running parallel to the launch of the C4L campaigns which may have had an impact on child sugars intake, such as the launch of the SDIL, sugars reduction programmes and product reformulation by industry.

The underlying issue of social desirability bias (Grimm, 2010) must also be considered, as participants when questioned about their parenting behaviours may be tempted to claim behaviours that they believe make them appear to be 'good' parents rather than reflecting their actual actions**.** Optimism bias (Sharot, 2011) could also have hindered the study results, as participants may find it more comfortable and acceptable to talk about the actions they perceive to be 'healthy' behaviours while potentially avoiding reporting activities which could be perceived as 'unhealthy'. The reported changes in household shopping must also be interpreted with caution as household purchases were not quantitatively recorded. This study

only included the views of parents, as no children were interviewed to attain their perspectives.

4.8 Implications for policy and practice

The findings from this phase of the research have implications for the planning, design, timing, cost-effectiveness and success of future health marketing campaigns, particularly in the UK but also globally. Efforts made to improve the health behaviours of the public, specifically to reduce families' sugars intake, have the potential to contribute to the UK Government's and PHE's efforts to combat childhood obesity. Future policy should focus on providing a broader and more inclusive message on achieving a healthy lifestyle that will address the need to reduce dietary sugars, saturated fats, salt consumption and increase levels of physical activity. As demonstrated in this study, health marketing campaigns could have the potential to positively influence the lifestyle behaviours of 5-11 year olds supported by their parents. However, several barriers to successful behaviour change have been identified such as cost, consumption of food and drinks when children are out of direct parental supervision such as at school and a lack of awareness of recommended sugars intake levels. These points should be considered in more detail, to assess what policy might achieve at a local or national level to address these issues. For example, healthier products being subsidised in supermarkets, continued improvements in the nutritional content of foods and drinks provided through schools and continued working with parents to discover how to portray dietary guidelines and recommendations in a more understandable way. These in turn have the potential to ensure that health marketing campaigns, such as the 'Sugar Smart' campaign, achieve a more sustained impact in the long-term.

More parental education is needed to ensure they are equipped with accurate knowledge, increased understanding and practical tools to help them address the issue of successfully reducing the level of sugars in their children's diets. Parents need to be educated to 'shop smarter' and to understand that healthier diets do not need to cost more. However, education alone is unlikely to be successful. A balanced approach utilising a basket of complementary strategies from upstream, midstream and downstream levels (as per Figure 10) is needed. As sugars confusion was evident from participants across a range of demographics, public health policies must therefore not focus on any particular suspected 'high risk' groups, but on a

population level instead. High risk approaches may miss silent minorities who may not yet show ‘symptoms’ of any problem.

4.9 Conclusion

One year post-campaign, parents perceived the national ‘Sugar Smart’ health marketing campaign as helpful in raising awareness of the general and oral health impacts of Free Sugars. The development of the novel smartphone app also facilitated an increased awareness of hidden sugars, particularly in food and drink products marketed specifically to children. Some changes in shopping behaviours were also reported.

The findings suggest that within the limitations of the study, the discussions with parents indicated that they felt they had increased awareness of the sugars content of different foods and drinks, as well as hidden sugars, one year after the launch of the ‘Sugar Smart’ campaign. It could also be suggested that the campaign helped to generate a parental desire for changing their child’s sugars intake. However, to achieve a sustained reduction in child sugars intake, changes to policy are required at a local and national level. Engagement with communities should be facilitated and consideration should be given to environments where food and drinks are purchased or consumed. The involvement of retailers should be encouraged to achieve positive price promotions and continued liaison with industry undertaken, to promote the production of ‘healthier’ products, particularly those targeted at children.

Chapter 5. Study Two: Examining stakeholders views on school food contribution to children's diets in Newcastle upon Tyne: a qualitative study

5.1 Introduction to study

Parents are often the key providers of food and drink for their children. Previous qualitative exploratory work with parents from the C4L 'Sugar Smart' findings (Chapter 4, page 80) highlighted that parents often find it difficult to monitor what their child was eating, and to reduce their Free Sugars intake, when their child was out of their direct supervision. This included when children were with grandparents, at a friends' house, and particularly when the child was at school. Concern was also expressed around the fact that children receive puddings as part of school dinners in England, and some parents reported their belief that school dinners may generate an expectation by children of consuming something sweet after a savoury/ main meal.

As schools were a key setting where parents expressed concerns about what their children eat whilst not under their supervision, it was decided to explore this setting in further detail, by capturing multi-stakeholder views. Therefore, in the following section, I will provide an in-depth qualitative exploration of stakeholders views on school food contribution to children's diets, through focus groups with parents and children, and face-to-face (FTF) interviews with head teachers and canteen staff from three primary schools across Newcastle upon Tyne. An interview with two staff members from Newcastle City Council (NCC) involved in the development and provision of school dinners provides a further perspective.

5.2 Aims and objectives

The aims of this study were to explore the views of stakeholders on school food contribution to the diets of children in Newcastle upon Tyne.

Objectives

1. To explore the views of parents and children on school food contribution to children's diets
2. To explore the views of head teachers, canteen staff and staff from Newcastle City Council on school food

3. To capture views from across the SES spectrum by including schools from different areas in Newcastle upon Tyne

5.3 Methods

5.3.1 Ethical approval

Ethical approval was sought from the Newcastle University Faculty of Medical Sciences Ethics Committee and given a favourable ethical review (Application number: 1535/6826/2018).

5.3.2 Setting, recruitment and procedure

The recruitment for this study focussed on state primary schools in Newcastle upon Tyne, with the aim to recruit three schools from across the SES spectrum. Level of deprivation was measured by the Index of Multiple Deprivation (IMD) (National Statistics, 2015b), which was derived from the schools postcode. Three schools were recruited, comprising a level 1 (most deprived), 5, and 10 (least deprived), which would provide representation across the deciles to compare and contrast findings. Schools were selected from NCC's website, which contains a list of all of the schools to which they provide school meals. The sampling technique was purposive, I manually entered each school's post codes to the IMD website (National Statistics, 2015b) to attain their respective level of deprivation. Schools were contacted in groups based on their IMD score, until a head teacher from each group expressed interest in participation. The level of deprivation of each school was taken into consideration upon recruitment; individual post code information was also taken from children and parents to assess participant level of deprivation on an individual level.

Head teachers of primary schools were initially contacted by myself via email, inviting their school to take part in the study. A copy of this recruitment letter is attached in Appendix I. I explained that participation would comprise FTF semi-structured interviews with themselves as head teachers and the canteen staff, and that focus groups would be carried out with consenting parents and children on school premises, with which they were familiar. Head teachers were informed that one-to-one interviews would take approximately 30 minutes, and focus groups approximately 45 minutes. Emails were followed up by myself via telephone to discuss the study further and to arrange a time for me to come in to the school and

have a conversation about the study in person. A primary school of high deprivation (IMD 1) and a primary school of medium deprivation (IMD 5) were successfully recruited. Seven head teachers from primary schools of low deprivation with an IMD of 10 were contacted, however they either did not reply or expressed that they would not be willing to take part in this research. Therefore, due to unsuccessful recruitment of a primary school from IMD 10, an IMD 10 first school who are provided with NCC school dinners was recruited instead. The difference between a primary school and a first school is that a first school does not include Years 4 – 6.

A combination of FTF interviews and focus groups were selected as the most appropriate form of data collection for this study, and their related strengths and limitations have been discussed in sections 3.4.1 and 3.4.2. Consent for the participation of school staff was obtained from head teachers' during the first meeting in person with the researcher. Recruitment of children and parents was achieved through information letters and consent forms being distributed at each school, following either a full school assembly to children in all age groups or class-by-class assemblies on the topic of 'Healthy eating and nutrition'. Copies of these letters and forms are attached in the appendices (Appendix J to Appendix N). These documents were sent home with the children with instructions to return by a certain date, for example by the end of the following week, when I would return and collect them. The parents of children who wished to take part in this research consented for their children, and child assent was also attained, both through the consent forms. It was further explained to children at the point of data collection if they no longer wished to take part, there would be no negative consequences and the focus group moderator would accompany them out of the room. Parents who wished to take part consented for themselves, regardless of whether their own children were involved in the child focus groups within this study.

An incentive of £50 Love2Shop vouchers for the school were offered to head teachers for participation by themselves and canteen staff. Incentives of £10 Love2Shop vouchers were offered to children and parents for participation in the focus groups. All interviews and focus groups were conducted at locations and times which were familiar and convenient for the participants.

To attain perspectives of the school dinner experience from those who are directly involved in the design of school dinner menus and the provision of food to schools, a technical officer and a senior operations manager from Newcastle City Council were emailed and invited to take part in the study. This email explained the purpose of the study and that participation would involve an interview, with the two of them together, carried out by myself to explore their views on school food contribution to the diets of children in Newcastle upon Tyne. These participants were selected based on their skills and experience, as well as their previous engagement with research in this area carried out by other researchers at Newcastle University.

5.3.3 Data collection

Semi-structured topic guides were generated by myself for each participant group based on broad questions around school dinners. These guides were able to be adapted and allowed for additional questions to be added, enabling participants to discuss issues which they felt were most applicable and important to them. Interviews were digitally audio recorded with participants' consent and all participant names were changed to an alias to respect anonymity and confidentiality.

Interviews and focus groups in schools were carried out by myself in January and February 2019. The interview with staff from NCC took place in April 2019. A fellow researcher from Newcastle University was present at the focus groups and acted as a facilitator, taking notes from the discussions during these sessions. Prior to data collection, I had visited all three schools and either carried out a full school assembly or class-by-class talks on 'Healthy Eating and Nutrition'. The interview with staff from NCC was carried out by myself based on participant availability, after all of the school data collection was completed.

Head teacher and canteen staff interviews began by gathering background information on each interviewee, including how long they had been working in a school environment in general. Focus groups with parents started by discussing their general, broad opinions and experiences of school dinners and whether or not their children received these. An ice-breaker activity was incorporated into the start of the child focus groups, in an attempt to put the children at ease and allow them to familiarise themselves with myself, the group facilitator and the other children. The chosen ice breaker asked them to consider if they were stuck on a desert island,

which three items would they bring with them. Child age, gender and ethnicity was collected during the focus groups.

Interviews explored in-depth the participant's experience of school dinners in general, in order to assess how much importance each stakeholder group placed on the different elements of the school dinner process. Interviews also identified any key issues participants felt were worth discussing, but had not been brought up by myself by the end of the sessions. Sample topic guides for these interviews and focus groups are attached in the appendices (Appendix R to Appendix V).

5.3.4 Quality control

As per the C4L study within this thesis, audio recordings from the interviews and focus groups were transcribed verbatim by an external transcriber (The Transcription Company, 2018). I thoroughly checked the transcripts alongside the audio recordings of each interview and focus group, to ensure accuracy. A random selection of transcripts were sent to the supervisors on this project, for coding to be discussed and cross-checked prior to analysis, so that understanding and coding of the data was agreed to be appropriate and applicable.

5.3.5 Analytical methodology and theme development

As in Study One, the Framework Method was chosen as the form of analysis for this study. Transcripts were organised once data collection was completed, and were labelled with the initials of the school, whether it was an interview or focus group, and participant group. Each transcript was carefully read and areas of interest were coded. Results were initially analysed by participant group, to assess which areas of importance emerged for each group individually. Once these 'silo' analyses were completed, I combined the results, producing a number of meta-themes, which are described in more detail in the next section. Copies of this manual analysis are attached in the appendices (Appendix W to Appendix EE). NVivo version 11 was then used to aid the qualitative analysis further. These seven meta-themes are detailed in Figure 11.

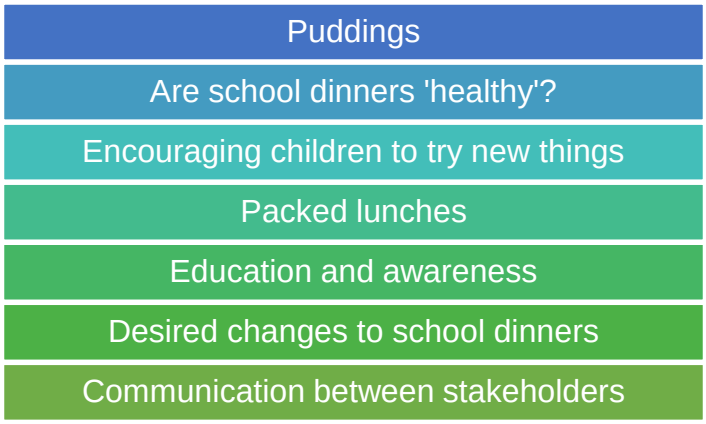

Figure 11: School Food Study meta-themes

5.4 Results

In total, 35 participants took part, comprising 15 children, 11 parents, two head teachers, one deputy head teacher, four members of canteen staff, and two staff members from Newcastle City Council. Demographics of child participants are detailed in Table 2 and parent participants in Table 3 below. Participation across the board was skewed towards female, as head teachers and the deputy head teacher of the school of medium deprivation, canteen staff and NCC participants were all female. There was representation from a range of ethnicities and level of deprivation in the child and parent focus groups. Table 4 presents the characteristics of the schools involved in this study.

Table 2: School Food Study participant characteristics of children

		Low Deprivation First School	Primary School of Medium Deprivation	High Deprivation Primary School	Total
Child Focus Group					
No. of participants		**5**	**4**	**6**	**15**
Gender	Male	2	3	1	**6**
	Female	3	1	5	**9**
Year Group	Reception	1	-	-	**1**
	Year 1	1	1	-	**2**
	Year 2	1	-	2	**3**
	Year 3	1	2	-	**3**
	Year 4	1	-	2	**3**
	Year 5	NA	1	2	**3**
	Year 6	NA	-	-	**-**
Ethnicity	White British	3	3	3	**9**
	Black British	-	-	2	**2**
	Asian British	2	1	1	**4**
Individual IMD (based on home address)	Low (1-2)	-	1	6	**7**
	Medium (3-8)	2	-	-	**2**
	High (9-10)	3	3	-	**6**

Table 3: School Food Study participant characteristics of parents

		Low Deprivation First School	Primary School of Medium Deprivation	High Deprivation Primary School	Total
Parent Focus Group					
No. of participants		**4**	**5**	**2**	**11**
Gender	Male	1	1	-	**2**
	Female	3	4	2	**9**
Employment Status	High Managerial	1	-	-	**1**
	Intermediate managerial	2	1	-	**3**
	Supervisor/ clerical/ junior managerial	-	1	-	**1**
	Skilled manual	1	-	-	**1**
	Unskilled/ Semi-skilled manual	-	-	-	**-**
	Housewife/ husband	-	3	1	**4**
	Unemployed	-	-	1	**1**
	Retired	-	-	-	**-**
Ethnicity	White British	2	5	1	**8**
	Black British	-	-	1	**1**
	Asian British	2	-	-	**2**
Individual IMD	Low (1-2)	-	-	2	**2**
	Medium (3-8)	1	4	-	**5**
	High (9-10)	3	1	-	**4**
Number of children per household	1	-	1	-	**1**
	2	2	3	-	**5**
	3	2	1	2	**5**

Table 4: School Food Study School Characteristics

	Low Deprivation First School	**Primary School of Medium Deprivation**	**High Deprivation Primary School**
Type of School	Maintained school	Maintained school	Academy
Number of pupils	268	220	247
Percentage of pupils eligible for Free School Meals	2.2%	10.5%	45.7%
Percentage of pupils with English not as first language	13.4%	15%	8.1%

The previously mentioned meta-themes and related sub-themes which emerged from the data are displayed in Figure 12.

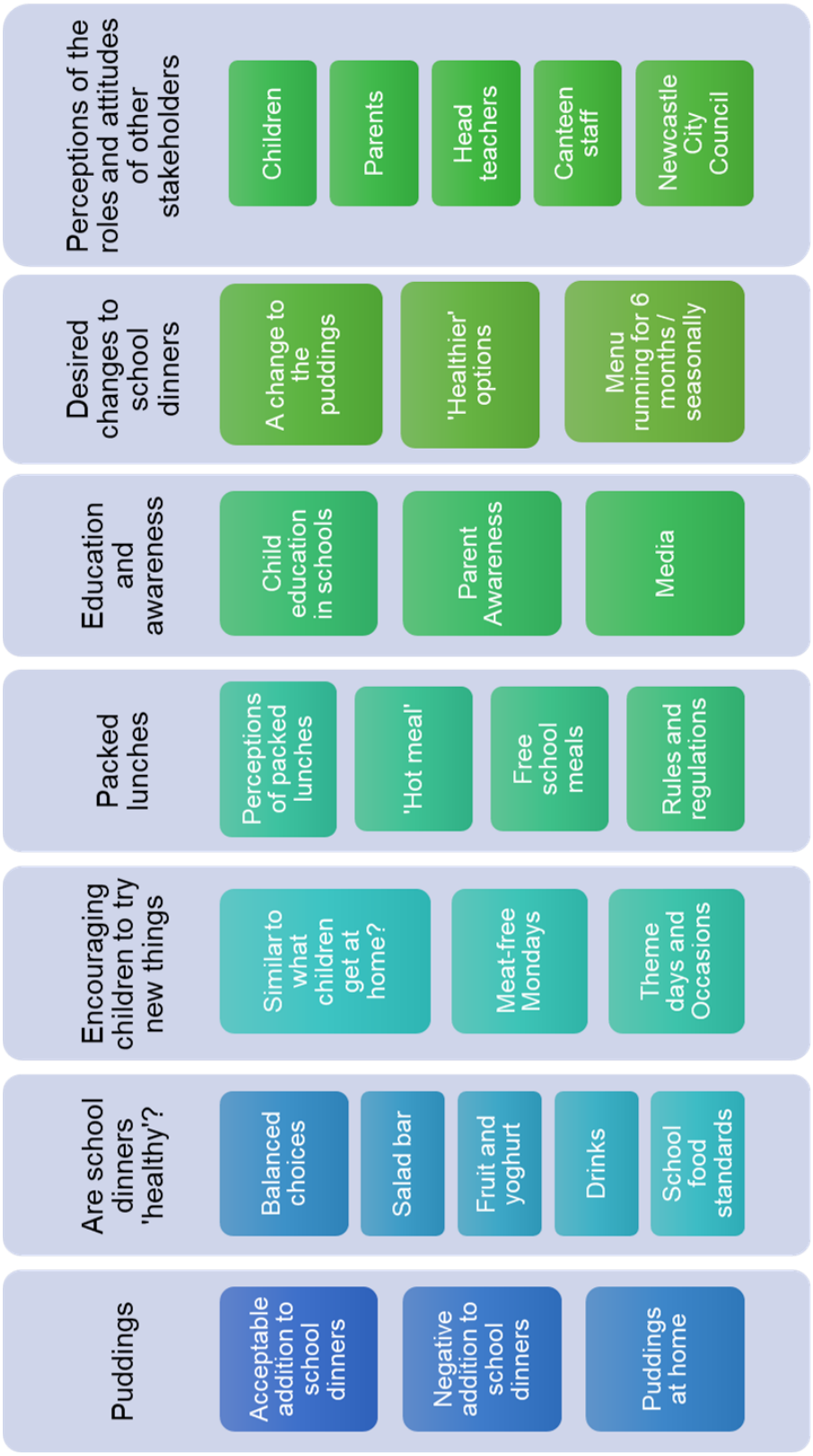

Figure 12: Focus group and interview emergent meta-themes and related sub-themes

The following results are depicted as quotations in tables per each meta-theme. Stakeholder groups are listed along the top of the columns and sub-themes are detailed down the left-hand columns. Quotations are labelled and are presented in rows in order to assess any similarities and common voice, as well as differences between what each group states about individual themes, and to clearly see if any group does not mention a theme as an area of importance to them. Quotations are colour-coded, shaded and are labelled with the level of deprivation of the school. The lightest shade of each colour links to the most deprived school, the middle shade is the school of medium deprivation and the darker shade is the least deprived school. Where there is a grey box, the participant group did not mention the corresponding meta-theme as an area of interest to them. This is visually depicted in Figure 13.

Children = Orange	**Parents** = Blue	**Head teachers** = Yellow	**Canteen staff** = Green	**Newcastle City Council** = Purple
Lightest shade = **Most deprived** school	**Middle** Shade = School of **medium deprivation**	**Darkest** shade = **Least deprived** school	Participant group did not mention anything about this theme	

Figure 13: School Food Study Results Key

5.4.1 Puddings

Puddings are available to children after their main course with school dinners in schools across England each day. These are a controversial addition to children's diets, and stakeholder views from this study are outlined in Table 5, Table 6 and Table 7.

Table 5: Puddings – Acceptable addition to school dinners

Puddings	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Acceptable addition to school dinners	I think it's quite good that you get a choice, so like one day you might get a piece of fruit and then the next day, you might get something else (Least deprived school, Female, Y4, White)	I'm okay with it… I'd rather them be full and rather them be able to concentrate in the afternoon… I'll take the hit on it being a chocolate brownie with chocolate sauce which is fairly chocolatey… but that's the balance at the moment. (Least deprived school, Male, Int. Manag, White)	…the desserts usually aren't that large. It's more of a finishing off... I quite like them being available every day. I think, if you've got a balance… I think its fine. (Least deprived school)	They're all right 'cause we've got two, two days where it's like fruit. We have a fruit day and a fruit salad day, so it's taken quite a lot of the sugar content out of it. (Least deprived school)	We looked at all our desserts and we had six development chefs and they looked at the dessert recipes and reduced the sugar and it did - it brought it down and we opted, two days a week, to just have fruit and yoghurt. So that really brought the sugar down…
				They prefer the puddings. They take [fruit and yoghurt] because that's all that is there but they would have cake and custard every day… the majority of the days, they say, 'Oh yeah! Cake and custard,' or 'Pizza!' (School of medium deprivation)	
	They're really tasty and yummy (Least deprived school, Male, Y2, Asian British)	…it's a treat for them isn't it? …it's just something that gives them a bit of a buzz for the rest of the day doesn't it? …at the end of the day if you've got a happy child they'll work better in the afternoon. (Least deprived school, Female, High Manag, Asian/ Asian British)	It's more varied than what we would have got when I was at school… it used to be sort of like a lot of custard things and more sort of sugary …now they can have yoghurt and there's always some sort of fruit on as a choice. (School of medium deprivation)	…well actually they have reduced the sugar down on that as well. It's made with dates. We soak them but then there's a fair bit of sugar in that. The menu has been amended to reduce the sugar down again. The rest is pretty alright. (School of medium deprivation)	
	I like the puddings (Most deprived school, Female, Y4, Black/ Black British)		Well for me I wish there was more fruit crumbles and fruit pies… but in terms of health… fruit and yoghurt is as healthy as anything else you're going to be offered. (Most deprived school)	… I mean so the sticky date [pudding]… that's not got much sugar in and plus they use the caster sugar instead of the ordinary brown sugar… It's more healthier, the kids seem to like it… (Most deprived school)	

Table 6: Puddings - Negative addition to school dinners

Puddings	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Negative addition to school dinners	It's okay if you have one but I kind of hate it when a lot of people just have seconds cause it can be really unhealthy for your body. (School of medium deprivation, Male, Y5, Asian/Asian British)	I'm a bit bothered by the desserts. I don't really understand why they need a dessert every day and that doesn't seem to me to fit in with kind of the general learning about food for kids… I worry that it's encouraging them to eat more sweet stuff than they need which doesn't seem to be necessary to me. (Least deprived school, Female, Int Manag, White)		…the chocolate brownies and chocolate sauce, you wouldn't believe how much sugar there is in that chocolate brownie. So I laugh, because they've put reduced sugar custard on, but I think how much sugar is in that chocolate brownie, that's unreal. (Most deprived school)	
	The pudding because, even though it's really good… they give you sticky toffee pudding and it really is actually sticky. It gets all in your teeth and it's very bad…. They always used to give us chocolate cake and I kept on getting toothache every time I had it. My mum took me to the dental hospital to get the silver tooth… The man just said, 'Try not to eat as much chocolate cake as the school give you.' (Most deprived school, Female, Y5, Asian/ Asian British)	I think this need to have pudding every day; it really riles me and my husband... I think it's totally unnecessary and I think it's teaching them that like you have to have this like massive load of sugar after you've had your main meal and I just think it's a really unhealthy thing to be teaching them at such a young age. (School of medium deprivation, Female, Housewife, White)			
	Chocolate cake is not healthy! (Most deprived school, Female, Y5, Asian/ Asian British)	I think it's quite a British thing to say, like I have a lot of friends who are like very well-educated and they'll say 'Oh, but I do think it's important for them to have a hot pudding in winter' and I'm like 'Why?'. I just feel quite strongly that's it's not doing them any favours… So yeah, I would say I don't think a big bowl of sugar is a good treat. (School of medium deprivation, Female, Housewife, White)			
		I don't think it should be on offer every day because it's like its bad for you to eat cake every day isn't it. (Most deprived school, Female, Un/Semi-Skilled, White)			

Table 7: Puddings - Puddings at home

Puddings	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Puddings at home	I don't think there's anything that's really different… my mum makes most of the puddings we have at home, because my sister's allergic to milk, so she makes like dairy free puddings, like she makes dairy free rice pudding sometimes. (Least deprived school, Female, Y4, White)	…at home they'll often then say like 'Oh, what's for pudding? What's for pudding?' and they expect all these cakes and biscuits at home now and I just think it's a really odd thing for schools to be teaching small children. (School of medium deprivation, Female, Housewife, White) Yeah like mine usually do want a pudding as well, usually I might have to go like for an ice lolly or something because I know like they've ate cake and stuff during the day. (Most deprived school, Female, Un/Semi-Skilled, White)	My little boy will always say, 'What's for pudding?'…they always say, 'What's for pudding?' My little girl's even worse. She's really into her sweet things (School of medium deprivation)		

5.4.2 Are school dinners 'healthy'?

The question of whether school dinners are considered to be healthy comprised five sub-themes which were mentioned by the participants. These included the fact the choices available to children were perceived to be 'balanced', along with the options of a salad bar and fruit and yoghurt. The drinks available to children with their dinners are milk and water, and in some cases 'cordial' juice or 'squash'. NCC have to adhere to school food standards when designing school dinner menus, and they were the only stakeholder group who spoke about these standards. These issues are further outlined in Table 8, Table 9, Table 10, Table 11 and Table 12.

Table 8: Are school dinners 'healthy'? – Balanced choices

Are school dinners 'healthy'?	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Balanced choices	I love it when they give you a balanced plate of food, that's my favourite thing because I don't want to have a really bad body so in the future I won't be like 'Oh I'm not healthy' and don't look disgusting. (School of medium deprivation, Male, Y5, Asian/Asian British)	I feel like I might say something quite unpopular, but I think for the younger children maybe the element of choice should just be taken away and they should be given a balanced meal… they'd always go for pizza, if given the choice. (School of medium deprivation, Female, Int Manag, White)	I would say that they have quite a large degree of choice… we have vegetarian choice and non-vegetarian and… most children manage to find something that they like on most days. So for me I'd like to hang onto that because just having one meal, I think you'd get even more waste than we do now. (Least deprived school)	There's a bigger choice for the children, better choice for the children… I think if there wasn't a choice that would reduce the numbers because the children do like the choices (Most deprived school)	…if they're choosing the right choices, then yeah [it is healthy]. I'm not saying that if somebody comes along and has a pizza and then there's a cake and custard, that that would be classed as healthy but it is to our standards and the Government's standards. We definitely meet them and, I'm happy with what we provide.
	I don't like too much sugar in my food, I just want it balanced so its half, half… like pizza and then I had potatoes on the side with sweetcorn. (School of medium deprivation, Male, Y5, Asian/Asian British)	Sometimes I think there's too much choice for kids, sometimes I do think that, but then at least, as I've said, they've eaten something. (Least deprived school, Female, High Manag, Asian/ Asian British)	I'd say… the choice is quite balanced. You know, there seems to be every day, I know there's a vegetarian choice. I know there's a meat choice and then usually, there's another choice as well. (School of medium deprivation)	I think, on the whole, the menu is a healthy, balanced one over the full course of the week. You may have something like cake and custard and pizza one day but the next day, you've got fruit and so it kind of balances out over the week. (School of medium deprivation)	
		I would think they're balanced, I wouldn't necessarily say they're healthy, but then I'm also very happy with it being balanced. (Least deprived school, Male, Int. Manag, White)	…in the morning they choose what they're going to have, they wear the band and that means the cooks can just cook what they need to cook… So it's quite varied and there are three choices and there's always a sandwich option as well. (Most deprived school)	…they've got less sugar, they've got less fat in them. They're more nutritionally balanced to what they used to be 20 years ago (Least deprived school)	

Table 9: Are school dinners 'healthy'? – Salad bar

Are school dinners 'healthy'?	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Salad bar	I hate it when [head teacher] says you have to go to the salad bar and get some salad. (Most deprived school, Female, Y5, Asian/ Asian British)	Again, that's all a bit ambiguous, I don't know what's on the salad bar, I've heard that there's never any tomatoes and there's white bread… why are they providing children with just white bread? I don't buy white bread at home… and no tomatoes, to me that's a standard salad item isn't it? I know there's cucumber, pasta salad and peppers, but I don't know again how varied it is and what the choices are. (School of medium deprivation, Female, Junior Manag, White)	I think [salad bar] a good thing, definitely… you know, they might not like what they thought they would, so they've always got that choice to go to the salad bar as well. (School of medium deprivation)	…if [head teacher]'s in the dining hall when the kids are having jacket potato we've always got a salad bar on, she says get some salad on your plate, she sends them all to get their salads… She's really good at doing things like that… she likes to encourage them to have their vegetables and like the salads she's really good. (Most deprived school)	…there's a free salad bar every day for them. There's free bread put out for them… so we're thinking, 'Right, well if we can just get them to come and take that meal off us.'
	…if they weren't healthy, then the salad bar wouldn't be a thing. If they weren't healthy, I think the school would be closed down because the parents wouldn't allow their children to eat unhealthy food… (Most deprived school, Male, Y5, White) If we were allowed to do that, I think [head teacher] would have got in lots of trouble. (Most deprived school, Female, Y4, Black/ Black British)	I don't know how often they dip into the salad … but the fact they've got that is great because that kind of is a get out if you really don't like a lot of anything else there must be something there. (Least deprived school, Male, Int. Manag, White)	… it wouldn't be so healthy if we didn't have the salad bar… if they eat the school dinner with some salad or vegetables I think it's quite healthy especially if having yoghurt or fruit for afters. (Most deprived school)	We do put a salad trolley on… If they don't like their dinner, they have the option… They can pick whatever they want off the trolley. (School of medium deprivation)	
	And there's also the salad bar so you can choose things from there that you don't like as alternatives for things you've got on your plate that you do like (Least deprived school, Female, Y4, White)	And what they do with the salad is really good because they don't just obviously mix everything up together because some kids don't like carrots and some do. So they have separate bowls of everything … I think that's done really nicely. (Least deprived school, Female, High Manag, Asian British)	…the salad bar is there every day and it isn't always the same… there's pasta, extra bread and then things like tomato, cucumber, sweetcorn, etc., and the children do like that option. (Least deprived school)		

Table 10: Are school dinners 'healthy'? – Fruit and yoghurt

Are school dinners 'healthy'?	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Fruit and yoghurt	I normally get pears. If it's chocolate cake for the dessert, then I won't get fruit but if it's something horrible for the dessert, like coconut cake, then I either have a banana or a pear. (Most deprived school, Female, Y5, Asian/ Asian British)	… it says it's available daily, but it's not I think in reality because we said 'Why don't you pick a yoghurt or some fruit?' and it's like 'Well it's not there' …but it is advertised as being available daily. (School of medium deprivation, Female, Housewife, White)	…And actually a lot of our children choose fruit and yoghurts and things as well (Least deprived school)	I'm surprised at how many like the fruit and yoghurts as well, quite a few like fruit and yoghurts. (Most deprived school)	All the menus had to be redesigned …we had to look at trying to get - hidden - vegetables and fruit into everything… That was hard… we did a chocolate and pear sponge - you didn't dare have pears that could be seen. You had to mush them, blend them down and put them through… It's definitely getting better but it still has to be hidden. We still hide in the sauces and things.
	So there's normally fruit and yoghurt, that's the normal ones but then there's other things as well like fruit salad and cake and custard. (Least deprived school, Female, Y4, White)	…they're actually making the choices to have fruit normally as well, which I know has got other types of sugars in it as well. So if you solely ate bananas you'd be in a lot of problems. (Least deprived school, Male, Int. Manag, White)	… sometimes we don't have time, we don't have the staff to cook elaborate puddings. So sometimes if we're short staffed or something it will just be fruit or yoghurt …I always say the priority's the main course. So if anything has to be cut it will be the pudding, more fancy puddings and it will just be yoghurt of fruit. (Most deprived school)	There's more fruit on and less puddings… There is at least one day a week when it's just fruit and yoghurt and cheese and crackers (School of medium deprivation) They prefer the fruit salad to the whole bits of fruit… but I think they're getting used to it 'cause we're seeing it more and more. Like every week there's a little bit more goes so like I think they're coming to terms with it now. (Least deprived school)	Crumbles or anything with fruit. [are unpopular] … Sometimes, I think it's something you have to chew… Yeah, for the children; that if they have to chew an apple crumble - if they have to chew something that doesn't go down easy. It's something they're not familiar with; apple crumbles, apple pies. Any fruit based pudding…

Table 11: Are school dinners 'healthy'? – Drinks

Are school dinners 'healthy'?	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Drinks	Yeah, it's only milk and water that you can get. (Least deprived school, Female, Y3, White) I'd have cola…diet…cause it doesn't have any sugar… cause a classic one has sugar (Least deprived school, Male, Y2, Asian British)	I just would not want fruit juice at all… Just because it's not good for them basically… And then if you gave them the option between water, milk or fruit juice there's 90% are going to go for the unhealthiest option, so there's just no point in putting it out there… it's just so bad for your teeth. (Least deprived school, Female, High Manag, Asian British)	…we started off with juice, I didn't particularly value the juice… to me it's not necessary… some parents don't let their children have juice anyway, and our policy is if you're sending a water bottle it has to be water, not juice. So then I thought well why give them juice at lunchtime? (Least deprived school)	We only offer, milk and water, which is the head's choice. She doesn't want them to have fruit juice or anything like that… I quite agree with her actually 'cause I think they would drink more of the fruit juice… the first ones in, they would just drink it all, whereas water, we've kind of unlimited amount of water (Least deprived school)	Water has got to be readily available for every child; milk and we have school compliant fruit juice. We did have the milk shakes but we're working very closely with the Sugar Smart forum… so when we looked at the sugar content in the milk shake, we took it straight off.
	…I normally have lots of water at school. Only like sometimes, every two weeks, I have like orange juice… but like a long time a long time till I have another orange juice… because I don't want to be unhealthy, I really want to be really healthy so, I can like be strong (School of medium deprivation, Male, Y3, White)	…mine would go for the juice and I don't really see the point of juice. It doesn't fill them up and damages your teeth… And I think again that's something that we haven't realised or hasn't been widely known until relatively recently because the assumption was always 'Oh you know, a glass of fruit juice, that's one of your five a day, it's really good for you, it's really healthy' and I think it's really only in recent years people have started to say 'Well actually it's not that good, it's really bad for your teeth'. (Least deprived school, Female, Int Manag, White)	I'd prefer them to just drink water, personally… I don't think it needs to be juice… I think it's like - even when I've been to the dentist, the dentist has always said to us - my own children - 'Just stick to water as much as possible.'… I think within schools, they can have water bottles in class… all day, and we've got a water fountain and they can go and have a drink when they want to. (School of medium deprivation)	We used to put milkshakes out but they've taken the milkshake off… They loved the milkshakes but they took that off…. it's everything they like, they take off… (School of medium deprivation)	
	…we used to get cartons but now, I don't get them anymore… Do you know Ribena...? It's like that… but more sweeter… Now we only have it at Christmas. (Most deprived school, Female, Y5, Asian/ Asian British)	I just don't think they should have juice, I think it should just be water or milk… I just don't think it should be an option because that's what they're going to choose. (School of medium deprivation, Female, Housewife, White) …as long as [the juice] is sugar free… she's not a big like plain water drinker, she'll sit and drink juice and she's quite happy. But if it was just say milk and water she wouldn't really drink it, she doesn't drink milk so she would like maybe have a few sips… and I would think that's all she's had to drink all day. (Most deprived school, Female, Un/Semi-Skilled, White)	…there's always water, sometimes there's juice, squash and sometimes there's milk but there's always water obviously. (Most deprived school)	Fruit juice, milk or water… a juice drink, orange, we normally have apple and blackcurrant or orange but the school prefers the orange. (Most deprived school)	

Are school dinners 'healthy'?	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
School Food Standards					'Saffron' was brought in when the Government brought out the food based standards and it was to nutritionally report on what we were giving the children every day, and it was hard work meeting those guidelines. So you were having to add spinach into everything to get the iron in and the zinc and everything… we still use Saffron to nutritionally analyse our menus, so we're still compliant even though we don't actually have to be.
					We've also got the Food for Life Bronze Award… so to get that award, you've got to be school compliant with the Government guidelines and then there's just more stuff they ask you to evidence… we've just won it for the fourth year

Table 12: Are school dinners 'healthy'? – School Food Standards

5.4.3 Encouraging children to try new things

Participants in this study generally believed that school dinners encouraged children to try new things in a range of different ways. There was the belief that food available with school dinners was not similar to food children receive with their evening meal at home. Meat-free Mondays offer the opportunity for children to try something new, and theme days and occasions such as Christmas and Halloween were seen as good outlets for expanding children's eating experiences. These views are further outlined in Table 13, Table 14 and Table 15.

Encouraging children to try new things	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Similar to what children get at home?	You get bigger portions at home than school... Just stuff you like and if you want some more, you can have some. (Least deprived school, Female, Y3, White)	…kids tend to try something different at school. At home you wouldn't be able to get them to try even half of them things, so hopefully when they see other kids eating, that's why I've always encouraged from a younger age to have school dinners… (Least deprived school, Female, High Manag, Asian/ Asian British)	I think a lot of our families cook in the evening… and if you tell parents they're not eating a huge amount at school they're not hugely concerned because they know they're going to feed them in the evening as well. (Least deprived school)	I hope they still live with healthy, healthy choices. (Least deprived school)	A lot of children… in specific areas are not used to maybe fresh vegetables… they'll have peas, they'll have sweetcorn, you know, that kind of thing. When carrots are on, turnip are on, sweet potato… you can see children crying because they don't want to take those.
	At home, I can have anything I want but at school... well, you can have anything you want at school but it's not what you would have at home… at home, there are no choices. You can just get whatever you want from the freezer and just ask your parents to make it. (Most deprived school, Female, Y5, Asian/ Asian British)	I think it's probably more varied quite frankly than what we give them. I do just devolve to reasonably simplistic whether its pasta based or potato based… they get an opportunity to have different things here which they could try, which is great (Least deprived school, Male, Int. Manag, White)			We've got to be careful how we name them… we've been pulled up on that a few times. We had - on our last menu, we had Hunter's chicken…just didn't know what Hunter's chicken was but you and I know… you're trying to look at it, and modernise it, and terminology that maybe people would recognise or you think they would recognise. It's not easy.
	Different. At home, I have less vegetables and fruit but here, I have to eat peas and carrots. I don't normally eat vegetables because I don't really like them a lot. (Most deprived school, Male, Y5, White)	My husband is quite into sort of health and diet and stuff… we tend to be like low carbs, low sugar you know, at home. But then it's like just the total opposite when the kids come to school. (School of medium deprivation, Female, Housewife, White)			
		I think sometimes the descriptions make them sound not bland like and the children don't actually know what they are, like katsu chicken, well what's that? And how spicy is the curry? (School of medium deprivation, Female, Int. Manag, White)			

Table 13: Encouraging children to try new things – Similar to what children get at home?

Encouraging children to try new things	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Meat-free Mondays		The little one really likes the curries …and she quite enjoys the meat free ones and stuff … which is something like I would never give them, like Quorn and stuff like that. I'm one of these that's all or nothing either have proper meat or you just don't have meat. I don't know just the way I was brought up, either you have meat or you don't have meat. But they're quite happy to try it (Most deprived school, Female, Un/Semi-Skilled, White)		[meat-free Mondays] They're quite good. Most of them think its fine, like, and they have their Quorn cottage pies stuff like that… by the time you put your flavourings and all in it makes it taste nicer for them so they quite like that. (Most deprived school)	I think it's definitely a lifestyle, isn't it? It's about doing healthy choices and healthier choices but just letting them see that you don't have to have meat with everything…you can still have choice. You can still have a lovely tasting meal. It doesn't have to have a chunk of meat on it.
		I think the meat-free Mondays that they're introduced this year is welcome because we don't eat a lot of meat as a family. (School of medium deprivation, Female, Junior Manag, White)		It's cleverly disguised. Today, there was lasagne on… Quorn bolognaise pizza. They don't know it's Quorn. They don't ask, so we don't tell them (School of medium deprivation)	
		I think it's great yeah… there's meat-free Monday, gosh they've joined the sort of vegan bandwagon now. (Least deprived school, Female, High Manag, Asian British)		I agree with [meat-free Mondays] in some ways but I don't agree with it in other ways. I think it's if you don't want to eat meat on that particular day you don't eat meat. It's up to yourself rather than being forced upon you. (Least deprived school)	

Table 14: Encouraging children to try new things – Meat-free Mondays

Encouraging children to try new things	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Theme days and occasions		I think I remember, was it Mexican day or they certainly have world food days as well occasionally to tie into celebrations and festivals and the like and that's really good. They'll come back and talk about that as part of learning about an area or a place or a culture or something like that… (Least deprived school, Male, Int. Manag, White)	I think it's quite good when they have some theme days. I think it sort of opens them up to trying new things for some of those children who might not have tried, certain types of food at home… it gives them that little bit of variation and maybe then they're likely to go home and try it again. So I think it's - I think it's quite a good thing. (School of medium deprivation)	…we do Christmas lunch… it's not so much the dinner we don't change for them. It involves quite a lot of work for me…It's puddings we sometimes do when we do Pudsey Bear biscuits… for Children in Need…last year we made Christmas tree biscuits, things like that. It's mainly a pudding we try and change, which is easier. (Least deprived school)	Christmas lunch is always popular, isn't it? The numbers shoot through the roof - it's unbelievable. Well, the thing is about the Christmas lunch is - it's a big celebration and every child in the school will sit down for that one meal which is great but then it's a little bit off putting when you think, 'Well, they're happy to come in and have that meal but the rest of the year, their mams have not let them come in and have a meal,' and it's the same people cooking it. It's frustrating.
		Yeah, I think the world is changing and it's getting smaller in so many ways and things are more accessible, it's important to learn about different cultures and different foods. (Least deprived school, Female, High Manag, Asian British)			
		They could always have a vegan day… or a no pudding day (School of medium deprivation, Male, Househusband, White)	We had Christmas lunch as well… the whole staff had Christmas lunch together with the children and they love it when you do that with them. It was really nice that day, you know, and they all seem quite happy (School of medium deprivation)	The Christmas lunch. This week, we're putting a Valentine's biscuit on instead…heart shaped biscuit… For Halloween, we just change the wording of the food. Spine-chilling chips. Salmon flesh fingers. We just changed the wording… We do American Independence Day with a cheeseburger, hotdog and a Quorn cheeseburger. We do quite a few of those. As I said, if the school is doing anything and they want to bring a theme day in, we'll go along with that (School of medium deprivation)	We always celebrate whatever school wants to celebrate. We've got a calendar that's a theme day calendar, which gets sent out to every primary school… Yeah, so the head teacher gets a copy… It's also good for our staff because it gets them motivated and gets them involved and they decorate the hatch and they decorate themselves. They always do things for, you know, Red Nose Day, or whatever - always get involved in those … because we do a yearly menu which just sort of can enhance a little bit with this… Yeah, a bit of morale.
			We've done, sort of the cook's really good at doing a themed week as well if we want to or a themed day, so that's been quite nice tied in with something going on in school. (Least deprived school)	We do do different theme days like for bonfire night and stuff like that and Christmas, Halloween we try and make a fun day that just encourages the children. (Most deprived school)	

Table 15: Encouraging children to try new things – Theme days and occasions

5.4.4 Packed lunches

School dinners were perceived to be preferable to packed lunches, by the adult stakeholders. However, this was not necessarily the case with the children. School dinners were referred to as being a ‘hot meal’ and therefore more beneficial for children. Free school meals were a further incentive for children to receive school dinners instead of bringing packed lunches. The rules and regulations surrounding packed lunches may also deter parents from choosing this option for their children. Interviewees from NCC also believed it was preferable for children to receive school dinners instead of bringing packed lunches. These issues are further depicted in Table 16, Table 17, Table 18 and Table 19.

Table 16: Packed lunches – Perceptions of packed lunches

Packed Lunches	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Perceptions of packed lunches	In [friend]'s packed lunch, there's normally a bar like when I come past to try and find a table, my belly rumbles and I say, I wish I had that… I think its that oat and honey bar that I really like, I really ask my mum if I could buy one (School of medium deprivation, Male, Y3, White)	I think it's mainly her friends' go packed lunch now so I think they've all changed to packed lunch so she wants to go packed lunch with her friends… But it's a novelty when mine want to go packed lunch (Most deprived school, Female, Un/Semi-Skilled, White)	Packets, packets, packets… I encourage them to try brown bread… I'm always on at them, have you got your fruit, have you got your yoghurt. So it's packet, packet, packet, those dunker things, I try and encourage them to have sandwiches. (Most deprived school)	A lot more healthier the school dinners when you see some of the packed lunches you're like wow. I mean Mrs D the head teacher she's come in a couple of times and like, why have you got that in your packed lunch, no you're not having that, and it's like crisps and chocolate biscuits she doesn't like stuff like that. (Most deprived school)	… we can't manage what goes into that. You know, you're hoping that it's good but the other thing, is those packed lunch boxes are sat in those classrooms all day in that box. There isn't a chilled area to put them in. They're hanging them in their coat hooks, or they're sitting in the window. There isn't like a chiller where you're putting it in… You've got ham sandwiches and stuff and it's maybe been made up the night before, put in their box at 8 o'clock in the morning. They're not having that till 12.
	I'd rather have a packed lunch…because I don't like peas (Most deprived school, Female, Y2, White)	…she will often say 'Oh, I think I'd like packed lunch on that day because my friend is having a packed lunch on that day and we like to sit together and chat'. (School of medium deprivation, Female, Junior Manag, White) … it's limited as to what you could send them with. You can't send them with anything that needs heating up… there's no facilities to actually chill anything. So if you're giving them meat or you're bringing anything in that needs to be kept cool, you can't. (School of medium deprivation, Female, Junior Manag, White)	It can vary a lot. I mean we'll have some children whose families are really health conscious and they can bring in some quite like nice dishes, and then other times, you can get people who have been to Greggs in the morning and put in a couple of sausage rolls or a packet of biscuits… it does depend on the families quite a lot but I, I think it is very much sort of quite hit and miss with packed lunches. (School of medium deprivation)	We just see their rubbish (School of medium deprivation)	
		On the odd occasion when [the children] have said 'I want a packed lunch' I've just said no because it's actually a function of us looking after ourselves because that's just another thing to do. You know, it's another argument, it's another point of contention (Least deprived school, Male, Int. Manag, White) Packed lunches is a different thing altogether, it's what you put in it as well, it becomes difficult as well. What do you put in a packed lunch to make it healthy? …it's opening a can of worms I think. (Least deprived school, Female, High Manag, Asian/ Asian British)	…their packed lunches tend to be quite balanced. You know, they'll have a wrap or a sandwich. They often have, lots of bite-sized breadsticks, sort of cheese, fruit, so they have a real variety in there. (Least deprived school)	I think it's beneficial for them to have a school meal 'cause you know it's nutritionally balanced for them. (Least deprived school)	

Table 17: Packed lunches – 'Hot meal'

Packed Lunches	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
'Hot meal'		…I prefer them to come to school and have a hot meal. A hot meal like they're running around outside and I just think they need something like on their stomach. (Most deprived school, Female, Un/Semi-Skilled, White) But school meal is good because it's warm and it's hot, it's better to have something hot than something cold all the time. (Most deprived school, Female, Unemployed, Black British)	…packed lunches can be a bit hit and miss as to what they're actually getting in them… Well, I know, just from when we make our own packed lunches, it can be easy to sort of overload them with things that aren't as healthy as what you think they are… so I prefer them to have a hot meal (School of medium deprivation)	I would say a school dinner [is better] because it's a hot meal. (School of medium deprivation)	
		Yeah, my son has school dinners and I think it's important to have a hot meal at lunchtimes. (School of medium deprivation, Male, Househusband, White)			
		…sometimes I'll say to them 'You have to have a hot lunch today because I haven't got time to do a proper meal at tea time'. (Least deprived school, Female, Int Manag, White) And this is generally a hot meal. It's a hot meal, so that's the advantage, yeah. (Least deprived school, Female, High Manag, Asian British)			

Table 18: Packed lunches – Free school meals

Packed Lunches	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Free school meals	If you go on a trip… If you have free school meals, then you can get a school packed lunch but also, you can bring your own packed lunch… we don't get a lot in the packed lunch. We get a tuna mayo sandwich which is horrible; an apple which is horrible; a yoghurt which has bits in and is horrible. You get a biscuit or something which is horrible and juice which is good… Most of the puddings are good when you get in there. (Most deprived school, Female, Y5, Asian/ Asian British)	Well out of my two children one has school dinners every day and she's in year two, but I guess that is the default option because they're funded, paid for. (School of medium deprivation, Female, Int Manag, White) Both of mine have the school dinners because it's funded, they're in reception and year two. Once we have to start paying I will think about what to do. (School of medium deprivation, Female, Housewife, White)	I think there's always such a high intake in Key Stage One because of the universal free school meals but it does, it does tail off quite a lot in Year - once they get into Key Stage Two. (School of medium deprivation)	[better to have a school dinner]… Especially if they're free school meals, then they're getting their dinners free (School of medium deprivation)	…we've got universal free school means which every Key Stage 1 child's entitled to a free school meal and we have schools out there where head teachers allow free - allow the Key Stage 1 students to bring a packed lunch… some are really adamant and said, 'No, it's provided so it's free, so you're taking it.' So if you're coming into this school, you have the free school meal option but there's a lot of schools that don't and we still have little ones coming in with a packed lunch.
		I think they do an incredible amount with the money that they get for it… the choice and the quantity and the quality is excellent and it's amazing how they can do that you know. So I'm very impressed about these sort of things, so I think there's a lot of kudos for producing something like this with the amount of money that goes into each meal. (Least deprived school, Male, Int. Manag, White) I do think yeah, you know how they're free and I think a lot of people who wouldn't normally try it try it for that reason because it's free. And then obviously then the kids enjoy it and then they stay on for school dinners, so I think it was a really good incentive to do that and yeah I think it's just brilliant and if you went to packed lunches it probably would cost you more money than school dinners themselves. (Least deprived school, Female, High Manag, Asian/ Asian British)			…especially when it's free, you know. It's a lot of money for parents and I understand there's fussy eaters out there… but you know, it is really about educating. When you've got a little four year old or a five year old, you know, I'm sure you can encourage them to eat and take some vegetables or whatever…

Table 19: Packed lunches – Rules and regulations

Packed Lunches	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Rules and regulations	…you can bring anything you want in packed lunch but you're not allowed to eat sweets. The only things you're basically allowed are crisps, yoghurt, fruit and maybe a chocolate bar or something… (Most deprived school, Female, Y5, Asian/ Asian British)	… how strict they are and what they can have as a treat in a packed lunch. And you're thinking you're giving one child cake and custard and the other one can't have like a certain chocolate biscuit… they're very like oh they can't eat this but yet in school dinners they're allowed like cake and custard. (Most deprived school, Female, Un/Semi-Skilled, White) … if I've been shopping I'd be like, oh would you like some of that for your packed lunch, She's like 'ee no I'll get wrong, I'll get wrong if I take that to school' and I'm like, okay then. So when she first went packed lunch I was very like, oh like what actually to put in your packed lunch where you're not going to get like in to trouble. (Most deprived school, Female, Un/Semi-Skilled, White)	I do a lot of encouragement around school dinners. And it's very important that we also encourage them to use their cutlery properly as well so we would focus on that… some of them would eat with their hands. So we encourage good manners and good behaviour and trying to eat healthily etc. (Most deprived school) They're not allowed chocolate but they are allowed a chocolate biscuit as long as it's got a biscuit in it. And things like chocolate spread sandwiches are not allowed. Nuts are not allowed, but that's more for allergy reasons. They're not allowed fizzy drinks, they're not allowed sweets (Most deprived school) Sweets, fizzy pop, no chocolate or sweets are allowed in packed lunches (School of medium deprivation) I mean sometimes they'll bring a homemade cake in so we wouldn't say you can't have that because we've got biscuits and cake on the counter but as in a packet of smarties or whatever, we just, no, we don't want sweets brought in. Which might sound like a double standard but it just, for me there's a distinction. (Least deprived school)	Just as far as I know it's like crisps, chocolate biscuits, [head teacher] likes them having sandwiches and she prefers them to have fruit and a yoghurt and stuff like that. I don't really see much of their packed lunches it's just when you hear her shouting, why have you got that. (Most deprived school)	…unfortunately, we can't police [packed lunches]

5.4.5 Education and awareness

Children learn about healthy eating and healthy lifestyles in school, and some schools place more importance on this than others. In terms of parental awareness of the school dinner process, a number of parents raised that they would like to be more involved and have more information about this from the school and the local council. The media is also a useful source of education and raising awareness on healthy eating for children, however, the only stakeholder group to mention the media was parents. Further views are outlined in Table 20, Table 21 and Table 22.

Table 20: Education and awareness – Child education in schools

Education and awareness	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Child education in schools	There's this topic that we're learning and its 'Healthy Me', and I changed my mind and said, well we're learning about Healthy Me, and it's about healthy things so, now I'm going to decide I'm eating healthy things (School of medium deprivation, Male, Y3, White)	I think the awareness is there because they talk about it a lot… they talk about it with their teachers as well because there was a day [child]'s teacher passed a comment, oh [child] she knows all about all this fruit and veg, what is healthy and what is not healthy… the awareness is there. (Most deprived school, Female, Unemployed, Black British)	…they do a full topic in Year 3 on healthy eating. It's called Healthy Me…so they're taking account healthy eating; keeping active. They do that for a full term and they look at your balanced plate and healthy food options and, the different food groups and things… they do understand it at that age… It is quite a good age for them to understand that. (School of medium deprivation)		
		I do think there should be an age where they speak to children like about it… two days before her fourth birthday she said, mum when you make my birthday cake, can you make it without sugar because otherwise I'll get really fat. And I was like, this is not what I want my child to come home and say… I don't want my three year old thinking I can't have this because it will make us fat. (Most deprived school, Female, Un/Semi-Skilled, White)			
		… it's like you know 'Do as I say, not as I do' because they get told all this and then they get served all this at lunchtime… I think maybe that could go hand in hand even better. Yeah, it's contradicting. (School of medium deprivation, Female, Housewife, White)			
		…we say the kids always choose the sugary things, but I would say my kids, for their age, know way more about healthy and unhealthy food than when I was little… they often say 'You can't have that, it's got too many sugar cubes in', they do know… people have come into school and told them, so it's good. (School of medium deprivation, Female, Int Manag, White)			

Table 21: Education and awareness – Parent awareness

Education and awareness	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Parent awareness		I've never been into school at lunchtimes and it's something that I flagged up with [head teacher] in October and actually said 'Could parents be invited in to spend lunchtime with their children?' or at least taste or see the quality of food. (School of medium deprivation, Female, Junior Manag, White)	It might be that we should do more promoting school dinners because we used to years and years ago and get parents in to see the school dinners to try and get them to see that actually school dinners are nice. A lot of parents either their children are what they call fussy eaters or, it's the funding, money and they can't afford to pay for two or three children's dinners so they have packed lunches. Which probably if they added it all up it wouldn't be much different. (Most deprived school)		We have what we call 'The Road Show'; so parents' evenings or new intake - any times when parents are coming up the school. So we've got a whole marketing table, with all of our information on which has like copies of menus, the nutritional standards and school food standards; things like little samples of the meals to show people portion sizes… We also give the information on how much you can save, if you had to have a free meal through the benefit system…
		[head teacher] did reply to say that he'd look into the feasibility of it, maybe putting some food out for parents to taste at the Spring parent's evening, but it's dependant on the Newcastle city council policy. I'm still waiting for a reply back on that… I guess then the council should take a lead on that then… It's their food, it's a council service… (School of medium deprivation, Female, Junior Manag, White)			We invite parents in to have a meal… it's well worth the exercise but it's very difficult for the chefs because the rumours go round that the food in that school is shocking and that follows around, unfortunately. It causes huge problems for our staff.

Table 22: Education and awareness – Media

Education and awareness	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Media		Going back to the Change for Life, they do put leaflets and activities in their bag, I know S had one last week and we actually sat and did it on Friday night and it was the sugar cube invaders…how many sugar cubes were in a pot of yoghurt. So that was quite good fun and quite interesting as well to do. (School of medium deprivation, Female, Junior Manag, White)			
		…with the five a day… it's come on in the media, if you open newspapers… my kids bring leaflets home so they are making them aware of eating fruit and veg is important. And with the issue of sugar it's been in the media for so long now and so the other day they bring in leaflets about sugars in foods… And it's good because the kids have been made aware, although they have been made aware but they still like to eat the thing, they say, oh mummy that's not healthy but they still want it anyway. (Most deprived school, Female, Unemployed, Black British)			
		I think that point about things have changed and people are a lot more aware of what goes in school dinners, you know the Jamie Oliver campaigns and things, I think you tend to trust that if the council's running it for all the schools in the area you tend to just assume it's been properly researched and it works. (Least deprived school, Female, Int Manag, White)			

5.4.6 Desired changes to school dinners

On the whole, a number of participants in this study expressed a desire for changes to be made to the school dinner experience. These included a change being made to the puddings on offer, a selection of ‘healthier’ options, and changing the menu rota from running for a whole school year to a more seasonal, six-month rota. These are further detailed in Table 23, Table 24 and Table 25.

Desired changes to school dinners	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
A change to the puddings	If I was a headmistress, I would change every single fruit to a dessert. (Most deprived school, Female, Y5, Asian/ Asian British)	Healthier puddings (Just fruit, fresh fruit and low fat, low sugar yoghurt.) or eliminate the puddings altogether. (School of medium deprivation, Female, Junior Manag, White)		I would put rice pudding back on. Instead of having the likes of the fresh fruit salad or fresh fruit and yoghurt or cheese and crackers, I would, especially the winter, put a hot pudding on for them. (Most deprived school)	I think once a week, you could do a menu where you've got a starter and a main. …a soup and there was a main course and we're just going to class it as a No Dessert Day… we had crudités and we had lots of different things on and to us, it looked really good. Some people - when we sort of showed it round our staff who are caterers, I suppose, they all thought it was a great idea, and one day a week, not having a dessert is not going to hurt people and it's got to be better for their health. It's got to be better and it definitely - your sugar alone, just knocking out a dessert day, is going to really take that right down.
	I would change the salad bar… Maybe instead of a salad bar, we could have a dessert bar (Most deprived school, Male, Y5, White)	I don't think there's anything else [apart from the desserts] for me, I think it's great. (Least deprived school, Female, Int Manag, White)			
	I think we should change the puddings, not that much, they have fruit… because there's not that much healthy things in the puddings, I think they should put a little bit more healthy things in the pudding. (School of medium deprivation, Male, Y3, White)				

Table 23: Desired changes to school dinners – A change to the puddings

Desired changes to school dinners	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
'Healthier' options	I'd change maybe the Bolognese pizza and put in something else like you'd say, maybe what could you put in? Think of a food that's healthy, vegetables and maybe a bit of fruit as well. (School of medium deprivation, Male, Y3, White)	More green vegetables. (School of medium deprivation, Female, Housewife, White)	Well I changed it - the bread and chips in the same dinner so I changed that (Most deprived school)		
	I wouldn't really change anything but I would like more options… Like more fruit and stuff like that. (Least deprived school, Female, Y3, White)				
	I'd put more vegetarian options into the menu. (Least deprived school, Female, Y4, White)				

Table 24: Desired changes to school dinners – 'Healthier' options

Desired changes to school dinners	Children	Parents	Head teachers	Canteen staff	Newcastle City Council
Menu running for six months / seasonally		I think a year seems a long time… in terms of produce and all the rest of it and what's available. So yeah, I would prefer something shorter than 12 months. (Least deprived school, Female, High Manag, Asian British)	This menu runs for a whole year and this isn't something I wanted. I'd wanted a menu for a term and then it changed… if you get the same menu choice every three weeks you're less interested or excited and motivated by it… And the children getting bored and saying, you know, I've put up with that kind of a few weeks but I, it's not really what I want to eat. (Least deprived school)	…we used to change the menu every six months and now it's a 12 month cycle that they do it on …. I think it should change every six months like one time it used to be like Spring/Summer and then the other one was Autumn and Winter which was better because Autumn/Winter that's when you got your rice pudding and all that extra. Whereas this is all year round now. (Most deprived school)	…we used to run from September through to February… we used to have it split but it just makes sense to do it one for the year because - cost, as well; printing and changing; recipes and also it's not an easy process to put a menu together. It really isn't and then you… may have stock levels and if you change it and you're no longer using that, you've got stock on the shelves that you can't use and it's a problem. Erm, it just makes sense.
				We used to change the menu every term… It was the summer, winter and autumn. I thought it was good for the kids… They didn't get bored but it was harder for us because we'd just get into the swing of making it and then they'd change it. Having the theme days does help and breaks it up a bit. (School of medium deprivation)	Most people were happy that we went down to a year. For the first, mmm, three months, that's when you get all your issues. 'Don't like Meat Free Monday. Don't like this. Change that.' All of those things. Then they know what to expect and you get very few complaints from now through till summer. When we used to change it in February, you would just reintroduce in that, so you would have from February through till May before they settled down on menus but now, they're familiar. Parents know what's coming up each week - it just makes sense for everyone.
				Used to have a winter menu and a summer menu. And now we just have one menu from September to July…. we used to have like seasonal menus, which were better. It was more comfort food in the winter where you would get more like mince and dumplings and in the summer you would get more like chicken nuggets and ice cream and things like that or you'd get more custard, warm puddings in the winter. (Least deprived school)	

Table 25: Desired changes to school dinners – Menu running for six months / seasonally

5.4.7 Perceptions of the roles and attitudes of other stakeholders

In the focus groups and interviews, participants made reference to other stakeholder groups a number of times, relating to the school dinner experience. Quotations are listed below, detailing these occurrences. In order for everyone to be on the same page and to reduce the likelihood of miscommunication or misunderstanding, there is a need for a communication platform to be put in place for stakeholders involved in the school dinner process to be able to clearly discuss issues important to them.

Children, parents, head teachers, canteen staff, and Newcastle City Council will be presented in turn. For clarity as to which stakeholder group they are making reference to this is presented in the following format:

Children (active group) – Parents (the reference stakeholder group).

Children – Parents

If [school dinners] weren't healthy, I think the school would be closed down because the parents wouldn't allow their children to eat unhealthy food… (Most deprived school, Male, Y5, White)

I like how we don't have to go to school and choose them at home, any time we could just choose our school dinners and then you get back, they'll know what you want. And some are really healthy like lasagne today and things like that. (School of medium deprivation, Male, Y3, White)

Children – Head Teachers

I hate it when [head teacher] says you have to go to the salad bar and get some salad. (Most deprived school, Female, Y5, Asian/ Asian British)

If the school wasn't healthy… I think [head teacher] would have got in lots of trouble. (Most deprived school, Female, Y4, Black/ Black British)

Children – Canteen Staff

I just have a try of the fishcake, and then if I don't like it, I just tell the teacher and I'll just say, I don't like this, can I please eat my pudding? (School of medium deprivation, Male, Y3, White)

I like how you get a tray and then push it along and then the dinner ladies will say, do you want that, and do you want that. (School of medium deprivation, Male, Y3, White)

Children – Newcastle City Council

Children did not make reference to Newcastle City Council.

Parents – Children

…according to my son whose in year two 'Oh they don't give it to you'. According to him he never gets the broccoli, I said 'Do you need to ask for it?' and he said 'No, they don't even offer'. (School of medium deprivation, Female, Housewife, White)

… it says [fruit] is available daily, but it's not I think in reality because we said 'Why don't you pick a yoghurt or some fruit?' and it's like 'Well it's not there'. But it is advertised as being available daily. (School of medium deprivation, Female, Housewife, White)

My daughter will sometimes say if I make something and I'll say 'But you eat that at school' and she'll say 'But yours isn't as nice'. (Least deprived school, Female, Int Manag, White)

Parents – Head Teachers

I've never been into school at lunchtimes and it's something that I flagged up with [Head teacher] in October and actually said 'Could parents be invited in to spend lunchtime with their children?' or at least taste or see the quality of food. (School of medium deprivation, Female, Junior Manag, White)

Parents – Canteen Staff

I think that the dinner lady should say you have to choose a vegetable or at least try it or if not, something from the salad bar. Because sometimes I get feedback that they haven't had any vegetables. (School of medium deprivation, Female, Junior Manag, White)

I was very worried when it was my daughter's birthday in June and she said 'Oh it's great today, you get extra pudding when it's your birthday'. So the dinner ladies, you

go and you get your second puddings, 'Oh and some children get three puddings' so it's like 'What that's your birthday treat?' and she says 'Yeah, everybody on their birthday can get an extra pudding'. (School of medium deprivation, Female, Housewife, White)

…we realised that she was having orange juice every day and we had to say 'You're not having orange juice, you have to drink water'… it was getting to a point, the dinner ladies would just say 'Oh, we know you're not allowed orange juice'. (School of medium deprivation, Female, Housewife, White)

Parents – Newcastle City Council

I guess then the council should take a lead on [allowing parents to try school dinners] then… It's their food, it's a council service… it's something the schools should demand at the council rather than it falling again on the school. (School of medium deprivation, Female, Int Manag, White)

I'd like to know where it's sourced, if it's local or if it's organic and if it's not, why isn't it because surely it would be cheaper if it was bought in bulk for the whole of every school that signs up for it, they good get a good deal surely on local produce. (School of medium deprivation, Female, Housewife, White)

I think I just trust them and I know because I've got close friend who is head chef at a school in Sunderland, so I kind of know a bit from her. But if I didn't, I'm not sure I would be bothered particularly. (Least deprived school, Female, Int Manag, White)

I don't really mind not knowing. I think sometimes not knowing is a good thing… I think you do know that they're looking for the best interest for the children anyway… I trust the fact that it will be from a good source. (Least deprived school, Female, High Manag, Asian/ Asian British)

Head Teachers – Children

I eat [school dinners] every day and I've eaten school dinners every day since 1982. (Most deprived school)

They don't ask for anything, they like it when there's certain things on the menu. But they don't go out of their way to ask, not to me anyway. (Most deprived school)

…we try to listen to the children and get feedback from them in terms of what's working for them. I eat with them. I eat the school meal on average about twice a week every week. (Least deprived school)

We know the children that aren't eating very much at all. We know the children that will cut corners and we try and encourage children to go back and have a little bit more. (Least deprived school)

Head Teachers – Parents

There was a complaint the other week about they didn't like vegetarian Monday. Meat free Monday, they didn't like that. One person didn't think that was right at all… Because they thought there should be meat. (Most deprived school)

I think too much processed stuff isn't good for you although parents have complained that I've said that. So I have more complaints about me trying to encourage them to eat healthily with their packed lunches than I do about the dinners. (Most deprived school)

I know some parents comment, but it's not necessarily about the choice. It's maybe about, they're not maybe always aware of what they're getting or some children maybe say, 'I couldn't get this,' or 'I couldn't get that.' So then that tends to be when we get a comment. (School of medium deprivation)

…the desserts. Some parents don't particularly think the children need a pudding as they would rather just maybe they were offered fruit or maybe the yoghurt option. But other parents say actually they just want them to fill up at lunchtime so they're actually not feeling hungry in the afternoon and they can concentrate, and then they monitor their food intake at home. (Least deprived school)

Head Teachers – Canteen Staff

The funding for the kitchen staff isn't great so they don't have time to do what they could do if they had more staff. (Most deprived school)

…just taking care. And sometimes it's that little bit of extra time with presentation 'cause they are rushed so you're serving quite quickly. But as long as it's not whacked on. It's a little bit of care and I think, which isn't mentioned in any of the

menus, it's the fact that it's the service, so talking to the children and listening to the children, and that team do that well. (Least deprived school)

They're healthy-ish… some of the children would stick to bread and more of the carb stuff and eat less of the vegetables. So it's as healthy as the supervision is in the hall. (Least deprived school)

Head Teachers – Newcastle City Council

…a lot of it seems to sort of be controlled by what the council have got planned and what their menus… rather than just down to the school. So it's not quite as easy to sort of manipulate, as you would hope. (School of medium deprivation)

[the menus come from the council] …they monitor it in terms of how healthy those meals are. You know, the amount of salt content, fat content etc., and they give us a guide and then we just tweak a little bit. (Least deprived school)

Canteen Staff – Children

You get a lot of children now coming back to the counter and saying, thank you that meal was lovely which makes us feel more appreciated. (Most deprived school)

The majority of the days, they say, 'Oh yeah! Cake and custard,' or 'Pizza!' (School of medium deprivation)

[favourite part] When the kids come up and say, 'Oh miss, that was lovely!'… or we hear them coming along saying, 'Oh, it's pizza!' or 'Oh, it's...whatever.' That makes it worthwhile. (School of medium deprivation)

They always come up and go, 'Oh, yes today's dinner was lovely. This is me favourite one today'. (Least deprived school)

Canteen Staff – Parents

The only contact I have with the parents is the ones that have special diets… I've got one child every single day she has one potato waffle, no sorry two potato waffles and then one chicken finger and a slice of cheese, the cheese that her mum brings in. (Most deprived school)

There is one parent whose son has a very bad allergy. He's not actually in the school yet and she asked if she could come and have a look at the menu and go through the menu. She'll then tell us what he can and can't have. (School of medium deprivation)

In this school, the parents actually pick their lunch. But we don't know if it's actually parents picking their lunch or the kids because we have seen a change since that happened… They're going for what the parents want them to eat rather than what they want to eat. (School of medium deprivation)

We've got quite a few dietaries so have quite a lot of contact with the parents of them children. (Least deprived school)

Canteen Staff – Head Teachers

[head teacher] says get some salad on your plate, she sends them all to get their salads… She's really good at doing things like that. (Most deprived school)

Canteen Staff – Newcastle City Council

[would you like to have a say in what does into school dinners?] No. They have menu planning things but it's all voluntary and, I don't have the time when I finish work. I've got other things to do. (Least deprived school)

[are you happy with the menus from the council?] From our point of view, yeah I suppose. (School of medium deprivation)

I think [the menus] are quite good. Sometimes… it is a bit difficult cooking all the different meals. But 9 times out of 10 yeah it's fine. (Most deprived school)

Newcastle City Council – Children

…we've got like a little evaluation sheet. So we normally go in and get the Student Council; maybe two children from each year group. Agree with the school a certain time; go up and trial things and they're very honest and give you feedback.

…a lot of children from Asian culture - don't eat potatoes and that's where we struggle with the potato products… I've tried different things. I've tried putting rice with casserole… but that didn't go down well… so it's really - for us, the difficulty is

trying to get some of our Asian children to eat and enjoy what they're eating. That's difficult.

Newcastle City Council – Parents

… a meat free day, I had quite a few parents ringing and saying I was forcing their children to be vegetarian, and vegan, I mean we invite parents in to have a meal… we invited them in to have a look and they thought the meals were lovely. So it's well worth the exercise but it's very difficult for the chefs because the rumours go round that the food in that school is shocking and that follows around, unfortunately. It causes huge problems for our staff.

…one of the difficult areas that we have is trying to get something that the children from different cultures can eat. That is a real, real problem for us and I've met with parents and I've had parents give me recipes.

[Parents] can disrupt the meals. They organise petitions - parents outside. They bad mouth the chef.

[reaction to a 'no dessert day'] I don't know about the children. I think it'll be the parents, if I'm honest.

Newcastle City Council – Head Teachers

I think that Heads have got a lot to do, you know, and I'm not saying we're way down the list of their priorities… we certainly wouldn't be at the top of their priorities but I do know that, for some certain schools, some parents can create a lot of problems for head teachers and it is literally about not wanting to rock the boat for some.

…some parents can be really, really problematic to head teachers and so I understand why some Heads just think, 'Let it be the way it is.'

It wasn't so much the children that reacted. It was the head teachers demanded cakes and biscuits to be put back on those days.

Newcastle City Council – Canteen Staff

[theme days]… also good for our staff because it gets them motivated and gets them involved and they decorate the hatch and they decorate themselves. They always do things for, you know, Red Nose Day, or whatever… a bit of morale.

[at parents evening] The chefs talk to them about, any dietary requirements and they're able to speak to the chef.

…the chefs know - if we've said it's got to be an egg sandwich and the chef knows that's not popular, she knows she can put tuna on or stuff like that.

5.5 Discussion of results

5.5.1 Puddings

Puddings, or 'desserts' are available to children as part of a school dinner in schools across England each day and have been highlighted as being controversial. In Newcastle upon Tyne, schools who adhere to NCC's menus have puddings which range from a chocolate brownie with chocolate sauce and sticky date pudding and custard, to fresh fruit and yoghurt (A copy of NCC's school dinner menu is attached in Appendix Q). Providing children with something sweet after their main meal at school is a controversial topic, with some stakeholders believing that these can be 'unhealthy'. A number of the puddings currently on offer are likely to significantly contribute to a child's daily Free Sugars intake and are therefore an arguably unnecessary addition to their diets.

The aforementioned sugar reduction programme was introduced in 2016 by PHE, which aimed to encourage manufacturers to reduce the sugar content of their products voluntarily. Through this encouragement to reformulate products or bring out lower sugar alternatives, PHE aimed to reduce the sugar content of foods which contribute most to children's sugars intake in the UK, by one fifth by 2020 (HM Government, 2018). Industry was challenged to achieve a 5% sugar reduction in the first year of the programme. In a 2018 report assessing this progress, it was highlighted that even though schools continued to include puddings as part of school dinners, they offered a 50% fruit dessert two days a week and schools were encouraged to have a fruit only dessert at least one day a week. In addition, fruit flavoured yoghurts were replaced by natural yoghurt and portion sizes were reduced in line with School Food Standards (PHE, 2018c). A more recent evaluation was published in September 2019, which showed the overall reduction in total sugars per 100g between 2015 and 2018 was only 2.9% (PHE, 2019c). Promisingly, the categories which had the largest decrease in sugars per 100g were 'yoghurts and fromage frais' (-10.3%) and 'breakfast cereals' (-8.5%), however, 'puddings' and 'sweet confectionary' actually increased in total sugars content per 100g, by 0.5% and 0.6% respectively (PHE, 2019c).

Children in this study generally recognised that puddings were 'unhealthy', and one child made a connection between chocolate cake and toothache, however, these were still an aspect of school dinners which children enjoyed. Parents in the least

deprived school were more likely to believe puddings were an acceptable addition to school dinners, and their comments suggested they perceive puddings as providing children with extra stimulation enabling them to concentrate better on their school work in the afternoon. These beliefs could be a result of a lack of knowledge, awareness or understanding on the parent's behalf of how these sugary 'treats' affect their children. On the other hand, parents in the school of medium deprivation stated that puddings were *'totally unnecessary… teaching them you have to have this massive load of sugar after you've had your main meal…it's a really unhealthy thing to be teaching them at such a young age'* (School of medium deprivation, Female, Housewife, White). This participant also suggested that it is '*quite a British thing'* to believe it is important for children to have a hot pudding in the winter.

Head teachers did not mention anything negative about puddings or express a desire to remove these from the menus available to children. Canteen staff and the interviewees from NCC believed that serving puddings with school dinners is generally not an area of concern for children's diets. Both stakeholder groups made reference to the fact the pudding recipes have been adapted, to reduce their sugar levels, and according to the NCC website, *'Since 2015, we have reduced the amount of sugar in our meals by over 21%'* (Newcastle City Council, 2019). The canteen manager from the least deprived school stated *'[Puddings are] alright… we have a fruit day, and a fruit salad day, so it's taken quite a lot of the sugar content out of it.'* The canteen manager in the most deprived school mentioned the fact caster sugar is used in puddings instead of '*the ordinary brown sugar'* and suggested that this was 'healthier', which is in fact not correct. This statement links to the C4L study findings within this thesis relating to a lack of awareness or understanding of different types of sugars, highlighting the need for a raised level of education and awareness around sugars for the general public.

Children who receive school dinners do so five out of seven days a week during a school term. The school setting is an ideal setting for impacting the development of healthy eating habits (Madden et al., 2016). Longitudinal studies have suggested that if healthy eating habits are established early, they will continue in to adolescence (Lytle et al., 2000). Also, eating patterns and habits may track from childhood to adulthood, with factors influencing dietary intake ranging from gender, socioeconomic status to individual experiences (Wardle, 1995, Lake et al., 2006).

Therefore, if puddings are available with every school dinner, this could lead to the development of a routine and create an expectation by children of having something sweet after a main course. Parents and the deputy head teacher in this study made reference to this being something they had experienced, with children asking 'what's for pudding?' when they were having their evening meals at home. According to the most recent data from the NDNS, puddings contribute 4% of children aged 4 – 10 year old's Free Sugars intake (PHE, 2018b), and 'buns, cakes, pastries and fruit pies' contribute 10%. School dinners could potentially lead to the creation of a 'Pudding culture' for children, who learn at this impressionable age that having something sweet after any main meal is normal.

5.5.2 Are school dinners 'healthy'?

The question of whether school dinners were considered to be 'healthy' revolved around a number of different issues raised by stakeholders. One of the main areas of interest every stakeholder group mentioned was the provision of 'balanced choices' available to children in schools. A healthy diet is one that encompasses a balance of the food groups (British Nutrition Foundation, 2016). PHE produced an 'Eatwell Guide' for the public to visually understand which types and amounts of foods are recommended to eat, in order to consume a healthy, balanced diet (PHE, 2016a). NCC's school dinner menus provide children with three choices of main meal each day, including an option of a sandwich or a jacket potato. Children in the school of medium deprivation in particular expressed liking 'balanced' plates of food, and one child explained this was because *'I don't want to have a bad body in the future I won't be like 'Oh I'm not healthy' and don't look disgusting'* (School of medium deprivation, Male, Y5, Asian/Asian British). Parents were generally aware that there was a lot of choice available, but there was a suggestion that it would be better if the element of choice was removed and children were just '*given a balanced meal'* (School of medium deprivation, Female, Int Manag, White). One parent also explained *'I wouldn't necessarily say they're healthy, but I'm very happy with it being balanced'* (Least deprived school, Male, Int. Manag, White). Head teachers and canteen staff made reference to the large degree of choice, suggesting this was a positive thing. Participants from NCC explained that the school dinners on offer could be considered to be healthy, '*if they're choosing the right choices*.' The menus adhere to the government's standards and therefore meet recommended standards

for healthy eating. Regardless of standards, it could be argued that the element of choice has more of an impact on the nutritional-quality of children's diets as studies have shown that when given the choice, children consume more less-healthy foods (Park et al., 2010, Cullen and Zakeri, 2004). Reducing the choices available to children and adjusting school dinner menus may help to support healthier food choices (Nelson and Nicholas, 2006).

Across schools in Newcastle upon Tyne there is a 'salad bar' available for children every day, which contains salad items such as tomatoes and peppers as well as pasta and slices of bread. Each participant group mentioned the salad bar, and it was generally seen as a positive addition. Children in the most deprived school portrayed a sense of trust that school dinners were healthy because '*if they weren't healthy then the salad bar wouldn't be a thing* (Most deprived school, Male, Y5, White). Parents in the least deprived school agreed the salad bar was a positive addition to school dinners, but one parent in the school of medium deprivation explained they thought it was *'a bit ambiguous'* (School of medium deprivation, Female, Junior Manag, White), and explained she didn't know how varied it was or what choices were available with it. Head teachers and canteen staff also believed it was a good addition, especially if children did not like their school dinner, as they then had the option to pick something they wanted from the salad bar instead. NCC participants took the opinion that the salad bar was a good incentive for encouraging children to take school dinners, '*if we can just get them to come and take that meal off us'*.

Fruit and yoghurt are advertised as being available daily as alternative options to the puddings in schools who adhere to NCC's menus. Children in this study did not mention fruit or yoghurt in a negative way, and head teachers and canteen staff were aware that children often chose fruit and yoghurts. However, parents in school of medium deprivation expressed concern that these were not actually available daily, as their children had told them that this choice sometimes was not there. Interestingly, in contrast to children's responses, participants from NCC believed that in order to successfully have fruit on the menu, it would have to be hidden before children would eat it '*you didn't dare have pears that could be seen. You had to mush them, blend them down and put them through'*. They also stated that fruit was 'unpopular' amongst children, as it was something they had to chew, '*if they have to*

chew something that doesn't go down easy.' As these issues were not mentioned by the children in this study, it could be suggested there is a degree of misunderstanding between decision-makers who put the menus together, and the children who receive the food.

The drinks available with school dinners in the least deprived school are milk and water, however, in the school of medium deprivation and the most deprived school in this study the children also have the option of juice. This juice available is a 'fruit juice drink', which is no-added sugar cordial mixed with water. This is in comparison to pure fruit juice, which has nothing added to it. Parents in the least deprived school were pleased that juice was not an option, for a number of different reasons including the fact it '*doesn't fill them up and damages your teeth'* (Least deprived school, Female, Int Manag, White). A parent in the most deprived school did not mind juice being on offer as long as it was sugar-free, as her child '*is not a plain water drinker'* (Most deprived school, Female, Un/Semi-Skilled, White). Head teachers in the least deprived school and the school of medium deprivation stated they did not value the juice option and would prefer the children to drink water, but the most deprived school's head teacher did not mention juice as an area of concern. The canteen manager in the least deprived school agreed with the head teacher to not have juice as an option, but her reasoning for this was not about health or nutritional content, but instead because it is likely that more children would choose the fruit juice, '*the first ones in would drink it all'*, therefore that may not be fair for the other years. NCC staff stated that milkshakes used to be on offer in the schools, but since working with the 'Food Newcastle Sugar Smart forum' and discovering how much sugar was in these drinks, they removed them. NCC working with this group highlights the local importance of cooperation between academics and partners. However, more work is needed as this was viewed negatively by the canteen staff from the school of medium deprivation, stating '*the children loved the milkshakes but they took that off… everything they like, they take off…*'

NCC design school dinner menus following the School Food Plan government guidelines and standards (DfE, 2019a). These rules support school dinners being nutritionally well-balanced, healthy, and appealing. 'Saffron' is an allergen and nutritional analysis software, which was initially used by NCC to report on what they were giving the children (Creed, 2019). Since 2015, NCC have been awarded the

Soil Association Food for Life Catering Bronze Award for their school menus, which means that at least 75% of the food they offer uses fresh ingredients, all meat is from farms which satisfy UK welfare standards, all eggs are from cage-free hens, free drinking water is always available and menus cater for dietary and cultural needs (Newcastle City Council, 2019). Stakeholders from other participant groups in this study rarely brought school food standards up as an issue of importance, suggesting they may not be aware of the extent of work which is carried out in this area or that they have trust in the council to provide the best possible food.

5.5.3 Encouraging children to try new things

There is a total of 8.82 million pupils in all schools in England, including primary, secondary and independent schools (DfE, 2019b). A large proportion of children in England receive school dinners, with 15.8% of pupils in primary schools being eligible for, and claiming, free school meals (DfE, 2019b). These meals largely contribute to nutrient intakes for these children on weekdays during the school year. Dietary habits are shaped at a young age, and the school lunch programme is one of the key factors which influence children's eating behaviours (DeCosta et al., 2017, Scaglioni et al., 2018). As previously discussed in the literature review, the school environment could therefore be key in developing children's taste preferences and eating behaviours outside the home.

Participants in this study believed that school dinners were not always similar to food that children received for their evening meal at home, and therefore widen their exposure to different foods. Some parents also believed their children were more likely to try new things at school if they saw their friends doing the same, thus a positive outcome of 'peer pressure'. On the other hand, some children may experience food neophobia (the reluctance to eat, or the avoidance of, new foods (Dovey et al., 2008)) and be discouraged to try school dinners if they contain unfamiliar foods. This was highlighted in the school of medium deprivation's parent focus group, with a parent explaining *'I think sometimes the descriptions make them sound not bland like and the children don't actually know what they are, like katsu chicken, well what's that? And how spicy is the curry?'* (School of medium deprivation, Female, Int. Manag, White). The head teacher in the least deprived school explained that parents were generally not concerned if children were not eating a lot with their school dinners, as it was likely they would be going home to get

another cooked meal in the evenings. However, this may not be the case with the schools of high deprivation, and it must be taken in to consideration that families from more deprived areas may live in food insecurity (when people do not have the economic, social and physical resources to shop, cook and eat in order to ensure a sufficient supply of nutritionally appropriate food (Purdam et al., 2016)) and for whom school dinners might be the child's only substantial meal of the day.

Participants from NCC believe that children choose the food they eat at school based on familiarity from home, and they therefore assign names and terminology which they consider to be recognisable for the children. They explained there have been scenarios where children have cried over, for example, not recognising or wanting to eat sweet potato. When designing the school dinner menus, NCC cater for ethnic and cultural diversity requirements and preferences where necessary. For example, one school they cater for is exclusively halal, and they therefore source their halal products from a local butcher. However, in the interview with staff from NCC, they explained it was difficult trying to get something that children from other cultures can eat and enjoy.

In today's society, there is an increasingly reduced global red meat consumption, for nutritional as well as environmental reasons (Ekmekcioglu et al., 2018). Some schools in Newcastle upon Tyne have adopted 'meat-free Mondays', reflecting this global trend of a reduced red meat consumption, as well as offering children the opportunity to become familiar with meals without the addition of meat. NCC work closely with a UK meat-substitute brand (Quorn, 2019), and use Quorn™ products regularly on their school menus. It was explained in the NCC interview that is in order to show children, they '*can still have a lovely tasting meal, it doesn't have to have a chunk of meat on it'*. While children and head teachers did not mention meat-free Mondays as an issue of interest, parents across the three schools expressed a liking of these meat-free days. A parent from the most deprived school explained she would never normally give her children Quorn at home, but her child enjoys it at school. Canteen managers also viewed meat-free Mondays in a positive light, although the canteen manager in the least deprived school felt that it should be '*up to yourself rather than being forced upon you*.' On the other hand, it is recognised that children from this age group in the UK, especially girls, may not meet their requirement for daily iron consumption (PHE, 2018b). Red meat is a key dietary

source of iron, therefore to offset this absence of iron from red meat on Mondays, food options available on these days must mirror and meet iron targets from other sources, for example, green leafy vegetables and pulses.

The inclusion of different theme days and celebrations could be used as valuable ways to expand children's culinary experiences, encouraging them to try new foods from different countries and cultures. The school dinner menus from NCC run for a whole school year on the same three-week rota, and theme days and occasions are therefore a good way to break up this pattern and add interest and excitement to school dinners for children, as well as motivation for canteen staff to show they can produce different dishes.

5.5.4 Packed lunches

Parents across the schools believed packed lunches were more of a 'novelty' for their children than school dinners. There was a lack of unanimity between head teachers, as in the most deprived school and the school of medium deprivation they perceived packed lunches to be more hit and miss, including things like '*packets, packets, packets'* (Most deprived school) and '*you can get people who have been to Greggs in the morning and put in a couple of sausage rolls'* (School of medium deprivation), compared to the head teacher of the least deprived school who believed they could be quite balanced and varied. Canteen staff believed that it was more beneficial for the children to have a school dinner instead of a packed lunch because they were '*healthier'* and '*nutritionally balanced'*. The main concern that participants from NCC had about packed lunches was the fact there was no chilled area to keep them cool, and this was also mentioned by one of the parents, as well as the fact there were no facilities to heat food up.

School dinners were referenced as being a '*hot meal'* for children and thus perceived to be more beneficial to them, particularly by parents, but also by the deputy head teacher and canteen manager at the school of medium deprivation. Having a hot meal during the day was perceived to provide children with a range of benefits, especially in the winter months. The fact that school dinners may be the main meal or only meal of the day for some children, being provided with a hot, nutritionally balanced meal was noted to be of the utmost importance for keeping the child sustained through the day. However, the perception that a hot meal is better than a

cold one fails to take into account any vitamins and minerals which could be lost from the foods during the cooking process (Riaz et al., 2009).

In England, the UIFSM programme provides funding for all government funded schools, providing children in Reception to Year 2 a free school dinner every day (Education and Skills Funding Agency, 2019). This may be a further incentive for children to receive school dinners instead of bringing packed lunches, and was mentioned by a number of parents as the reason they choose school dinners for their children.

There are a number of rules and regulations for what is allowed to be included in children's packed lunches, and these are independently decided upon in each school and, although similar, can vary between schools. Parents in the most deprived school made reference to the school being 'strict' and raised concerns about not knowing what to pack for their child that would not get them in to trouble. Things which were not allowed as part of packed lunches included fizzy drinks, sweets and because of the risk of allergen exposure, nuts were also prohibited. Interestingly, it was raised that chocolate biscuits were not allowed; however, this was seen as a double-standard as children who take school dinners receive puddings such as chocolate cake and chocolate sauce. If parents find it difficult to adhere to these rules, it may provide further encouragement for them to opt for school dinners for their children. This raises issues of clarity of healthy eating messages and consistency of advice.

5.5.5 Education and awareness

Upstream initiatives such as changes to the food and drink environment and policy changes, as well as mid-stream initiatives including health professional training and approaches within school settings and are needed to help achieve healthier diets by children. However, child education may also have potential to make a positive difference to children's diets. Children should be taught about the impacts that the foods and drinks they consume could have on their general and oral health. Schools offer the perfect setting to teach children of primary school age the importance of living a healthy lifestyle, including the importance of good nutrition. In this study sample, the children in the school of medium deprivation are taught a topic in Year 3 called 'Healthy Me'. The deputy head teacher from this school explained that this

module takes in to account healthy eating and keeping active. This module gave the children in this study who were from this school, an observed heightened awareness around the topic of health. This was evident from a number of their responses and children from the other schools did not touch on the issue and importance of health in the same way. This suggests that providing children with the opportunity to learn about these issues may bring them to the forefront of their minds and in turn impact on the food and drink choices they make. An example of this is the 'Food Dudes' programme in Ireland, where a school fruit and vegetable scheme delivered through a 'Food Dudes Healthy Eating Programme' proved itself as an effective evidence-based school-based healthy eating programme by changing children's attitudes towards healthy eating and enabling a liking of fresh fruit and vegetables (UCD, 2016).

A number of parents in this study believed that their children had an 'awareness' of what was healthy and unhealthy, however, one parent from the most deprived school highlighted that there is a specific age when this is appropriate to teach children, for example if they are too young these messages may be misinterpreted and misunderstood. *'I do think there should be an age where they speak to children like about it… two days before her fourth birthday she said, mum when you make my birthday cake, can you make it without sugar because otherwise I'll get really fat. And I was like, this is not what I want my child to come home and say… I don't want my three year old thinking I can't have this because it will make us fat…so I think you have to sort of do it the right age where they're going to actually to understand what they're saying to you* (Most deprived school, Female, Un/Semi-Skilled, White). Canteen staff and NCC did not mention educating children about healthy eating or healthy lifestyles as an issue of interest.

Currently, parents do not have any input on how school dinner menus are put together, therefore they have no say in what their children eat at school during the week. In this study, parents in the school of medium deprivation expressed an interest in being better informed about the school food process and be able to experience first-hand what is involved. This in turn could increase the level of trust that parents had in the council to provide acceptable meals for their children. However, participants from NCC stated they already offer parents the opportunity to find out this information, at a 'Road Show', which takes place at schools and

provides the opportunity for parents to come in and try school meals. Therefore, there seems to be a lack of communication or misunderstanding that this opportunity exists as the parents did not seem to be aware that this was an option for them. This highlights the importance for improved channels of communication between these two stakeholder groups in particular.

The press and broadcasting media can be useful in helping to get information to the public in an efficient way, and this can work well for information on health and nutrition (Wakefield et al., 2010). Health marketing campaigns have the ability to reach large numbers of the public from all sectors of the population. In England, there have been a number of mass media and health marketing campaigns which have aimed to get important information about healthy lifestyles to the public, some of which have been detailed earlier in section 2.10.3. Health marketing, therefore, plays a vital part in education and raising awareness of such issues.

In this study, the use of media to increase education and awareness was only mentioned by one stakeholder group - the parents. These parents made reference to the C4L campaigns, the 5-a-day campaign and also 'Jamie Oliver' campaigns. The canteen staff across the three schools did not mention education and awareness as an issue of importance to them.

5.5.6 Desired changes to school dinners

During the interviews and focus groups for this study, each stakeholder group placed importance on a variety of different issues, and a number of participants expressed a desire for changes to be made to the current school dinner layout. These proposed changes included a change being made to the puddings on offer, a selection of 'healthier' options, and changing the menu rota from running for a whole school year to a more seasonal, six-month rota.

When suggesting a change to the puddings, participating children in the most deprived school mentioned that they would prefer to have more puddings, in the form of changing '*every single fruit to a dessert'* (Most deprived school, Female, Y5, Asian/ Asian British) and '*instead of a salad bar, we could have a dessert bar*' (Most deprived school, Male, Y5, White). This is in comparison to a child in the school of medium deprivation who stated '*I think they should put a little more healthy things in the pudding'* (School of medium deprivation, Male, Y3, White). Parents who

mentioned puddings wanted them to be healthier, and the canteen manager from the most deprived school thought it would be better to change the puddings seasonally, for example putting a hot pudding on in the winter. NCC staff had come up with an idea that one day a week, the two courses of the school dinner menu would be a main course and a starter, instead of a pudding. They believed this would be better for the children, especially with regards to sugars intake, '*just knocking out a dessert day is going to really take [sugar] right down*.' This idea was proposed to seventy-seven primary schools in Newcastle upon Tyne, and the council only received a reply from one school. It is to be questioned whether the lack of reply from head teachers was a result of lack of interest in the idea, not wanting to receive negative responses from children and parents, or perhaps simply not seeing the email or having time to respond.

Children in this study were the main participant group to suggest the inclusion of 'healthier options' with their school dinners. In the school of medium deprivation, when asked what they would like to change, one response came from the child thinking out loud, saying 'think of a food that is healthy', and going on to suggest vegetables and fruit. Children from the least deprived school proposed they would '*like more fruit'* (Least deprived school, Female, Y3, White) and '*more vegetarian options into the menu*' (Least deprived school, Female, Y4, White). Parents in the school of medium deprivation stated they would like more green vegetables to be available in the school dinners, and the head teacher of the most deprived school explained she had changed the menu at that school for a healthier option, in this case removing the option of having bread and chips in the same dinner. Canteen staff across the schools, as well as NCC, did not express a desire for more healthy options to be available with school dinners. Participants did not explain why this would be, but it could be suggested that they thought enough was already being carried out in this area.

The NCC school dinner menus run for a whole school year, on a three-week rota. Children were the only stakeholder group in this study who did not mention this as an issue of importance. It was raised by parents and the head teacher of the least deprived school, that they would prefer menus to change on a termly-basis, as the same menu choice every three weeks could mean *'you're less interested or excited and motivated by it… children getting bored.'* Canteen staff across the three schools

in the study all agreed with this concept and made reference to the fact they would prefer the menus to be changed on a more seasonal, six-monthly basis. Using seasonal produce may have a range of benefits including providing an opportunity to teach children about '*seasonal foods'* but also the impact it could have on taste and freshness, as well as a potentially positive contribution to the environmental impact of food production (Brooks et al., 2011).

On the other hand, the interviewees from NCC believed it '*makes sense to do one for the year'* for a number of different reasons including cost, printing and changing recipes and menus, stock level practicalities to reduce waste, and the reduction in parental complaints. Having one menu meant that any issues and complaints about the menus from parents were contained within the first three months. They believed '*most people were happy that we went down to a year' and '…now they're familiar. Parents know what is coming up each week*.'

5.5.7 Perceptions of the roles and attitudes of other stakeholders

There was an observed level of child trust in parents that school dinners were 'healthy', and a child in the most deprived school stated *'if they weren't healthy, I think the school would be closed down because parents wouldn't allow their children to eat unhealthy food'* (Most deprived school, Male, Y5, White). Pupils also expressed trust in head teachers, as it was further stated that school dinners are healthy because '*if the school wasn't healthy… I think [head teacher] would have got in lots of trouble*' (Most deprived school, Female, Y4, Black/ Black British). Children were aware that the canteen staff are available to help with the provision of their school dinner, noting that they have to ask if they can have their pudding once they have tried their main course. NCC was not mentioned by any of the children in the study, suggesting they are unaware of this stakeholder in the process of school dinners. Children appear to be receptive to healthy eating messages if these are part of their school curriculum and this could improve the uptake of healthy food on offer (UCD, 2016). It is important that policy makers consider the value of working to ensure that all primary school aged children have access to this information and that they are encouraged to put their learning into practice.

Parents in the school of medium deprivation had received feedback from their children that sometimes certain things are not available for them within school

dinners, examples used included broccoli or fruit and yoghurt. Some parents made reference to the fact their children sometimes eat foods at school but then not eat it at home because it *'isn't as nice'*. Parental contact with the head teacher in one school revolved around a desire to experience a lunch time at the school and sample the school dinners. Some parents believed the canteen staff should encourage the children to have vegetables on their plates or take something from the salad bar. Concern was raised that when it was a child's birthday, their treat in the canteen would be receiving extra pudding from the dinner ladies. One parent also discouraged her children having orange juice, and were aware that the canteen staff knew about this and would say to the child '*Oh, we know you're not allowed orange juice'*. Parents in the school of medium deprivation believed it was the responsibility of NCC to take a lead in providing them with more information about the food which is provided to their children, '*where it is sourced, if it is local or if its organic and if it's not, why isn't it*' (School of medium deprivation, Female, Housewife, White). On the other hand, parents from the least deprived school expressed a trust in the council that the food will '*be from a good source'*. They were less interested in being part of this process '*I'm not sure I would be bothered particularly'* (Least deprived school, Female, Int Manag, White*)* and '*I don't really mind not knowing…they're looking for the best interests for the children anyway'* (Least deprived school, Female, High Manag, Asian/ Asian British). Therefore, creating a communication platform going forward could provide parents with the option of whether they would like to contribute to co-designing a school dinner menu. The practicalities of this must be taken in to consideration, but it could be useful for parents to help ensure their children have the opportunity to eat food that they will enjoy, as well as satisfying and sustaining them through the school day. The elements of choice are important to them but they largely trust those in authority to be providing healthy options. Parents may, however, have limited understanding of the constraints which the school meals providers work under and this can lead to schools and NCC dealing with complaints which could be avoided if communication between all those concerned was improved.

Head teachers in the most and least deprived schools stated that they eat school dinners with the children and are thus aware of what they are eating. They also listen to the children and take their feedback into consideration. Eating with the children

allows head teachers to see if any children aren't eating enough, and one explained they can '*try and encourage the children to have a little bit more*.' Head teachers receive a number of comments and complaints about school dinners from parents, including a disagreement with meat-free Mondays, and the idea that puddings are an unnecessary addition to school dinners. According to the head teacher at the most deprived school, parents complained more about the children being encouraged to eat healthier with their packed lunches, rather than complaints about the actual school dinners. In the school of medium deprivation, parents commented to head teachers about their children saying they have not been able to get certain things with their dinners, for example broccoli. Head teachers appear to value canteen staff and it was explained in the least deprived school that the 'team' were good at taking extra care with the presentation of the school dinners and talking and listening to the children. The head teacher in the most deprived school made reference to the fact that funding for kitchen staff '*isn't great'* and they weren't able to do things that they would if they had more staff. In terms of health, it was mentioned by the head teacher in the least deprived school that '[*school dinners] are as healthy as the supervision in the hall*,' insinuating that canteen staff have a responsibility to encourage children to choose healthy choices and don't '*stick to bread and more of the carb stuff and eat less of the vegetables'*. Head teachers are aware that, even though the school dinner menus are developed and controlled by NCC, they are still free to '*tweak a little bit'* or '*manipulate'*; however, the deputy head teacher in the school of medium deprivation said this was '*not quite as easy as you would hope*.'

Across the schools, canteen staff mentioned that when the children came to them after they had eaten and expressed gratitude, this made staff '*feel more appreciated'* and '*makes it worthwhile*.' In all three schools, the only contact that canteen staff had with parents was if their child had any special dietary requirements. Depending on each school and the format they have chosen, children can either make their school dinner choices at home with their parents, or in the mornings in school with their teacher. The canteen staff in the school of medium deprivation made reference to the fact they did not know if it was the children picking what they wanted for school dinner, or if it was their parents, as the children appeared to be going for choices '*what the parents want them to eat rather than what they want to eat*.' The canteen manager in the most deprived school mentioned that the head teacher encourages

children to use the salad bar, and explained '*she's really good at doing things like that'*. The schools' canteen staff wish to serve meals that are interesting, enjoyed by children and that are consumed with minimum waste, and this motivates and encourages them to provide a good service. They appear to be open to supplying foods on a seasonal basis which would be cost effective, but this requires good communication with parents to increase their ownership of and support for the meal planning cycle so that areas for potential complaint can be avoided where possible.

The 2013 School Food Plan makes reference to good practice which currently exists within many schools, placing particular importance on a whole school approach to ensuring improvement of the food choices that children make (Dimbleby and Vincent, 2013).The aforementioned discussions with stakeholders in schools also indicate that there is a great deal of good practice already happening in schools with regard to school food. Examples in this study include child and parental trust in the system as well as head teachers occasionally eating their lunch in the canteen with the children. Identifying and building on good practice, is a key way in which schools can continue to improve the school dinner experience for all stakeholders involved.

During the interview with staff from NCC who contribute to developing the school dinner menus in Newcastle, interviewees stated that they work with the children in student councils to trial ideas and attain feedback to influence the school dinner menus. The council expressed that they found it difficult to get children from different cultures to eat and enjoy certain meals, in particular those which contained potato products. Parent interaction with NCC included complaints about the meat-free Mondays. The staff from the council stated parents '*can disrupt the meals, they organise petitions and bad mouth the chef*' and that some spread negative rumours about the school dinners, which '*causes huge problems for our staff*'. The interviewees also believed that any reactions to a 'no dessert day' were more likely to come from the parents than the children, whether these be negative or positive. However, regarding the difficulties with getting children from other cultures to enjoy school dinners, the council has successfully worked with some parents and received recipes from them. In this interview, reference was also made a number of times and in a negative way to parents' interaction with head teachers. NCC staff stated '*some parents can create a lot of problems for head teachers'* and *'some parents can be really, really problematic to head teachers*.'

To increase understanding and awareness, there is a need for parents to be provided with information that school food standards and packed lunch regulations are based on evidence from research and are in place for the health of their children. When referring to canteen staff, NCC interviewees noted that theme days were positive for their staff because '*it gets them motivated and involved… a bit of morale*.' They also explained their staff were able to make adjustments to school dinner menus within schools, for example different sandwich fillings. Canteen staff were also mentioned by NCC colleagues as being available, in principle at least, at parents' evenings to speak to parents about any dietary requirements which their children may have. This was not mentioned by other stakeholders in this study, suggesting this only happens in a select number of schools. It is clear that it would be beneficial for NCC to investigate ways of involving the other stakeholders in the design of school meals. This would help achieve better understanding of the overall aims of the work and the challenges to be overcome such as funding and timing of menus. However, if successful, it could result in greater ownership of the end product, more incentive to see a healthy school meals policy being implemented and ultimately healthier children benefitting from good nutrition during their schooldays. For NCC, success will be the delivery of good quality meals which meet the requirements of government's nutritional guidelines, in the most efficient way possible and within set budgetary constraints.

5.6 The research in context

Extensive work has been carried out to improve the quality and standard of school dinners in England over recent years. It is recognised that those involved in school food provision, in particular, have the ability to implement changes in foods served in schools and they can act as nutritional gate-keepers and potential healthy-eating advocates (Murimi et al., 2015). Therefore, their perceptions, experiences and nutrition training should be a key consideration when attempting to improve the contribution of school food to the diets of children.

This study offers an important contribution to this area of research because it gives a unique insight to what each stakeholder group involved in the process of school dinners thinks, and what they emphasise as issues of importance for themselves. The sample in this study offers a fascinating snapshot of what people are thinking about this topic, at this moment in time. The research shows that each of the

stakeholders involved in the successful design and delivery of school meals has their own view of what makes these a success. No school meal can be described as ‘unhealthy’ as the food used is required to be the best standard possible. However, the big issues are balance and choice and, for providers, the need to provide a range of options in the most cost effective and efficient way possible.

A key point, for both parents and children, is that the information they receive is accurate, motivational and consistent. Parents in this study highlighted the conflict between directives for packed lunches stating that no chocolate biscuits were to be given, while the school dinners had chocolate options available as puddings. This kind of mixed message leads to a lack of conviction among some stakeholders in committing to a healthy eating policy for school meals. The implication is that school meal and packed lunch provision must be looked at as part of a single approach to school meals. Information should be clear, unambiguous and supported by the provision of menus, meals, and guidance on packed lunches that support what children and parents are being told. Communication must be improved between all stakeholders; this in turn should increase understanding and support for action taken to provide the best nutrition possible for the schoolchildren, within any existing guidelines and constraints.

Previous studies examining stakeholder perceptions of school meal provision in England reiterate the value of understanding the role each group plays, in order to improve delivery and acceptability of school meals and ultimately school meal uptake (Moore et al., 2010, Day et al., 2015). In 2002, a campaign was launched in Scotland called ‘Hungry for Success’, which aimed to take a ‘whole-school’ approach involving multiple stakeholders including parents, pupils, teachers and canteen staff to encourage children to eat healthier (Scottish Executive, 2002). It was stated that ‘*a whole-school approach, which promotes consistency across what is taught in the classroom with what is provided in school dining rooms, breakfast clubs, vending machines and after-school clubs is required.’* (Scottish Executive, 2002). However, nearly twenty years on, the present study highlights that various issues raised in other studies still exist and remain unresolved. This study has also introduced new areas of interest which may be key in ensuring that action is ultimately taken to improve the school dinner experience for all those involved. These include the issue of puddings as a controversial addition to school dinners, providing a potential

opportunity for parents to come in to schools and experience the school dinners, and the importance of highlighting to more stakeholder groups that school dinner menus adhere to government school food standards.

5.7 Strengths and limitations of the research

Reflecting on the COREQ checklist (Tong et al., 2007), there were a number of strengths and limitations to the research within this study.

Strengths of this study include the fact it involved a wide range of stakeholders involved in the school dinner experience, and a sample of three schools with representation across levels of deprivation. This study provided rich in-depth qualitative data, as the use of interviews and focus groups allowed participants to expand and explain their thoughts and opinions in great detail. Children of primary school age were included in the study, which is the same age group (5 – 11 years old) as the prior study (Chapter 4). Before data collection was carried out, a full-school assembly or class-by-class assemblies on the topic of 'Healthy Eating and Nutrition' were presented to children by myself. This initial contact aimed to ensure children felt more comfortable participating in the focus groups. Interviews and focus groups were carried out in each of the schools, aiding data collection, as participants were in an environment with which they were familiar.

There were however some limitations to this work. It must be kept in consideration that this study was not focussing on 'healthy eating' but instead exploring stakeholder views on school food. Following talks specifically in the area of 'Healthy Eating and Nutrition', there may have been a risk of bias during data collection if participants had been primed about the importance of this topic prior to their involvement in the study. Regarding puddings, this study did not use quantitative evidence of average sugar content in puddings available to children as part of their school dinners. This information would have been useful to see exactly how much puddings were contributing to children's daily Free Sugars intake, and by how much the 'reduced sugar' puddings made a difference to this level of contribution.

Although there was successful recruitment of stakeholders including children, parents, head teachers, canteen staff and staff from NCC, the overall sample size is small. School recruitment was limited to Newcastle upon Tyne, which impacts generalisability of the study's findings. Data saturation in qualitative research is

widely recognised to be the ‘gold standard’ for quality research (Hancock et al., 2016), however, the literature is limited regarding how qualitative researchers determine data saturation (Hancock et al., 2016). Saunders et al. (2018) propose that saturation has differing relevance and meaning among studies and may usefully serve different purposes for different types of research (Saunders et al., 2018). Therefore, within the limitations of a small sample size, the richness, detail and depth of qualitative data which has been collected from the participants can be considered adequate for understanding their individual perspectives and opinions on the issues surrounding school food provision to children.

With regards to levels of deprivation, the parent participants from the school of medium deprivation included three parents who were considered to be from areas of low deprivation, due to the catchment area of the school. This, therefore, must be taken in to consideration when reflecting on responses from this participant group in terms of deprivation level. Also, as a primary school of low deprivation in Newcastle upon Tyne was unable to be recruited, a first school of low deprivation (IMD 10) was recruited instead.

The sample of children from the schools included those from Reception to Year 6, however, interaction in the focus groups tended to be from the older children. It was decided in this study to interview all children together in one focus group per school, due to the response rates for participation. However, if this work were to be repeated, data collection from the child participants should consist of two focus groups per school based on age, for example, one group containing children from Reception to Year 3, and another consisting of Year 4 to Year 6. This may reduce any feeling of intimidation of the older children among the younger children, and give quieter participants an easier chance to express themselves.

5.7.1 Challenges of working with schools

There were significant challenges in recruiting schools to participate in this research. This may be due to a number of reasons ranging from schools being busy and potential participants perceiving their involvement to be too time consuming, or the subject too controversial.

Recruitment via emails to head teachers began in September 2018, and once I had attained consent from three schools, child and parent recruitment took place from

October 2018 to January 2019. Difficulties in recruitment may be linked to the timing of this study. September is a busy month for primary schools, as it is the beginning of a new school year, and then October half-term and the run up to Christmas holidays are also busy times for schools. The timeframe for recruitment must therefore be taken in to consideration when questioning why more participants were unable to be recruited.

The need to give targeted schools an opportunity to respond to the request proved very time consuming. In the course of recruiting participants for this research, a decision had to be taken on a time scale that was workable. After numerous attempts at attaining parental consent to participate in this research, only three parents from the most deprived school agreed to take part in this research, and only two participated on the day. This reflects the difficulty in recruiting parents for this area of research, and may potentially link to level of deprivation (Bartlett et al., 2017). There may be a number of potential reasons why this happened including the parents may have had other children to look after, childcare issues, home emergencies or they could have simply forgotten. This difficulty in recruitment warrants further investigation, as there may be numerous reasons why parents are unwilling to participate in research in general, such as lack of time, lack of interest or a feeling of inadequacy to take part, regardless of how important and beneficial it is for their children in the long run.

Other challenges which have been found with regards to working with schools include managing the logistics of collaboration, obtaining access to participants within schools with parental consent, and understanding how the topic of study may pose problems with intervention dissemination (Bartlett et al., 2017). Recruiting schools by directly approaching staff was found to be more successful than recruiting via an advisory group or through cold-call invitation in a study by Aventin et al. (2016) investigating recruiting schools, adolescents and parents to a cluster randomised sexual health trial (Aventin et al., 2016).

5.8 Policy and practice implications

There are various policy and practice implications highlighted in the findings of this research. With regards to the question around whether school dinners are considered to be ‘healthy’, communication needs to be improved between

stakeholder groups about what exactly is on offer and being provided to children in these schools. Instead of being hidden, fruits and vegetables should be noticeably available as part of school meals. This may reduce the likelihood of children feeding back to their parents that they have not received any fruit or vegetables, leading parents to worry less that their child did not have a balanced meal.

Efforts should be taken to highlight the amount of work that goes into the use of School Food Standards to design school dinner menus. This should be shared with other stakeholder groups especially parents, in order to justify or increase their level of trust in NCC that the children are being provided with school dinners which meet the high standards set by the UK Government. In the interview with staff from NCC who work on these school menus, the difficulty in meeting these guidelines was mentioned, in particular when trying to incorporate nutrients such as iron and zinc into meals. It is important that both schools and parents are aware of this work, to reduce pressure on the council regarding misunderstandings or complaints.

It is important to teach children of primary school age about different traditions and cultures and one way to do this is through experiencing foods from other countries. This is evidenced in the current theme days that NCC encourage schools to take part in. Exposure to new foods provides a context for children to learn about different people from around the world. Celebrations such as Christmas also bring the school community together as teachers and children enjoy meals together on these occasions, and this can contribute to the development of children's social skills. Going forward, theme days and occasions should remain an important part of school dinners.

When attempting to overcome issues surrounding packed lunches, one area which could be reformed is the provision of fridge space for children's packed lunches in the school kitchen, or in small fridges in classrooms. This would ensure that foods which need to be chilled are able to be kept cold, reducing any concerns of parents who wish their children to bring packed lunches to school.

To increase the levels of education and awareness of the importance of nutritionally balanced school dinners and sustain these long-term, the use of targeted media interventions could be useful to portray messages to stakeholders, in a way in which children, parents and professionals can relate to (Wakefield et al., 2010). This could

be a key step in closing the knowledge gap amongst different stakeholders about what is involved in the process of designing, producing and delivering school dinners. Advertising campaigns can be costly but developing relationships with local print media and the increasing use of social media to highlight local events may be worth investigating further as possible options for informing and educating parents, encouraging children and giving a platform to professionals, with the shared objective of improved nutrition and healthy lifestyles for all.

Increasing stakeholder communication would also allow head teachers and council staff to have protected time to exclusively talk through issues around school dinners, in an environment where ideas such as a 'no dessert day' could be critically evaluated. This would also provide an opportunity to discuss the idea of changing the school dinner menus from one per whole-school year, to a more seasonal six-month menu. Giving parents a clear communication platform with staff from the council could ensure everyone is on the same page and any miscommunication or misunderstanding is significantly reduced. There may be value in NCC considering offering recipes on their website of simple meals for parents so they are able to replicate those school meals which are particularly enjoyed by their children. NCC develop the school dinner menus and it could be suggested that including parents and children in this process would be mutually beneficial, leading to less waste and more children opting for school dinners. It could also give children the opportunity to learn more about the food in the process, for example why certain foods are chosen and where they come from.

5.9 Future research

Overall, there are a number of areas for future research raised from this work. This research was conducted on a small sample in the Newcastle upon Tyne, due to the constraints involved with PhD studies. Going forward, a larger scale study is required to enable generalisability of studies. There is a need for a mixed-methods study, where quantitative and qualitative data is captured on pupil consumption and choices, and the impact these have on diets. For example, how much Free Sugars children receive from puddings, which could support an argument for the potential to remove puddings as an every-day addition to school dinners. There needs to be a better understanding as to why children make the choices they do and what interventions could be feasible in schools to encourage healthier choices.

Co-production of interventions with pupils could improve the choices made in schools. It has been found that even if a child knows that a product is ‘unhealthy’, this does not necessarily mean they would not choose to consume it (Waddingham et al., 2018). It could be questioned whether there should be a restriction on items, or more of ‘healthier’ choices, and have these written in to new school standards, for example ‘Fruit Fridays’. If all schools had to comply with these standards, the variation in implementation would be removed and head teachers would not have to make the decisions themselves. Limiting the range of choice of less healthy products available to children in schools may have more of an impact than simply educating them on what is ‘healthy’ (Waddingham et al., 2018).

Additional research is also required to exclusively explore the reasoning around difficulties of the successful recruitment of schools and schoolchildren. This would help to discover how recruitment issues could be improved for future research projects. This study has shown there could be significant value in re-evaluating current practice in the design, development and delivery of school meals. Acknowledgement of the potential input from a variety of stakeholders should be considered, and a proposed strategy could facilitate this input being collected and coordinated in a way that would inform future work in this area. It would be important to examine how communication of the objectives for the healthiest possible school meals from each of the stakeholders could be collated and considered in the context of the constraints including budgets, seasonal produce, staffing, parental wishes and children’s tastes and needs.

Future planning must ensure that clear, consistent information is communicated to all who need it and funding provided in order to implement, sustain and evaluate effective communication strategies. There is a need for better monitoring of foods and drinks in schools. Studies examining this must be able to be followed-up in longer term impact evaluations. Government must ensure that policy development includes ongoing conversations with food producers and retailers so that healthy eating guidelines are adhered to wherever possible in new product development aimed at the children’s market.

This work could be the first step in a potentially co-produced school dinner menu. Giving different stakeholders the opportunity to feed in to the process in this way, or

to simply learn what happens and why, could close the knowledge gaps of those who have concerns about the school dinners currently provided to children in Newcastle upon Tyne.

5.10 Conclusion

This study portrays a vast range of opinions on school food provision, reported by stakeholders from across the socio-economic spectrum including children, parents, head teachers, canteen staff and staff members from Newcastle City Council. There was no issue with which participants in each group spoke with one voice, and views varied within and between groups. Parents, in particular, were not unanimous in their opinions, and it was evident in some cases that level of deprivation shaped views more than being part of a specific stakeholder group. An example of this includes a number of higher educated parents from the least deprived area reporting that puddings could be seen as an acceptable addition to school dinners, whereas parents from more deprived areas largely believed they were an unnecessary addition. This study has shown that the school dinner experience is multi-faceted in its contribution to the diets of children in Newcastle upon Tyne.

Going forward, a holistic approach is needed and consideration should be given to the introduction of a communication platform for stakeholders involved in school dinners, along with a clear message about the importance of nutritionally balanced meals within schools.

Enabling parents to contribute within such a platform may provide them with greater understanding of food choices in schools, as well as reassurance that evidence-based school food standards enable the provision of healthy foods for their children. They would be able to witness how menus are nutritionally balanced, where foods are sourced from and the associated budgeting constraints. By allowing open communication with other stakeholders, including representation from children, concerns around providing healthy but ‘unfamiliar’ foods could be resolved.

Resultant messages produced by such a platform must be consistent and continuously reiterated over time by all stakeholders, including policy makers, teachers, the council and researchers, in order to increase awareness and understanding by each group.

Chapter 6. Overall discussion and conclusion

6.1 Summary of findings

This research aimed to assess any long-term, sustained impact of PHE's C4L 'Sugar Smart' campaign on parental awareness of their child's sugars intake, as well as their knowledge of sugars in general, one year after the campaign was launched. This research also aimed to elicit the views and opinions of a range of stakeholders on the contribution of school food to the diets of children in Newcastle upon Tyne.

This is the first UK-based study to explore a wide range of stakeholders views on school food with a focus on puddings. Stakeholders included parents, head teachers, canteen staff and staff from Newcastle City Council along with capturing the pupil voice across schools and the socio-economic spectrum, which is unique to this thesis. This research has added to the existing knowledge base on which approaches may achieve effective public engagement with health marketing campaigns, and it has also revealed stakeholders' areas of interest and issues of importance with regards to the school dinner experience. The following discussion describes how the overall research presented in this thesis addressed the associated aims and identified areas for further examination, potential research and future policy development.

Telephone interviews were utilised in Study One, to perform an in-depth qualitative examination exploring parental views of PHE's C4L 'Sugar Smart' campaign. Engaging with parents in this way facilitated the compilation of ideas on how current health marketing campaign materials could be adapted and improved to increase their effectiveness. These suggestions could be used to help achieve a more long-term, sustained impact from similar campaigns.

The C4L 'Sugar Smart' campaign was perceived by parents to be successful in raising their knowledge and awareness of the impacts that Free Sugars can have on children. The advantages of health marketing as a successful way of getting key information to large audiences in a quick and impactful way have been evident. However, despite the strengths of this approach, it is likely to be most effective when it is carried out as part of a comprehensive and sustained programme of work, which will require forward planning, extensive coordination and substantial funding. This

would represent new ways of joint-working for those involved in public health policy, funding and implementation and will require discussion about how this might be efficiently achieved. Using health marketing in this way creates an opportunity for positive impact on the diets and overall health of children. Consumer education is part of a multi-component approach to improving children's diets. If the public are taught *why* change to the diets of children is necessary, and *how* to incorporate change into their everyday lives, this could successfully influence action to achieve a significant improvement to children's diets. It is fundamental that a 'healthy' diet is also the 'easiest' diet (HM Government, 2018). A 'whole-systems' approach is required. Increasing the level of communication between stakeholders could provide opportunities to work together to improve the diets of children. A regular exchange of information and ideas could reduce misunderstandings and develop increased levels of trust between the providers of food and drinks to children.

In the 2019 independent report by the former Chief Medical Officer for England, Davies (2019) reflects on the Government's ambition of halving childhood obesity by 2030. Here, whole school approaches are highlighted as having the potential to improve children's health through doing normal school activities differently, and in turn improving the environment which surrounds each child. A whole school approach is an integrated one, including the physical environment of the school and its surroundings, the social norms and cultures within schools, and the formal curriculum of the school in working to support the health of children (Davies, 2019). The Government has also made reference to whole school approaches in chapters one and two of their Childhood Obesity Plans, highlighting that schools should create environments which encourage their pupils to eat healthily and be physically active, and that they must equip children with the knowledge needed to lead healthy lifestyles (HM Government, 2016, HM Government, 2018). A study researching a multifactorial whole school approach by Townsend et al. (2011) has shown that actions taken by schools to promote healthy eating are indeed significantly associated with healthy food choices made by students (Townsend et al., 2011).

The majority of children in the UK spend a large proportion of their time within the school environment, therefore the food and drink they consume at school will have an impact on the overall quality of their diets (Adamson et al., 2013, Evans et al., 2016). A study by Vik et al. (2019) aimed to investigate if a free, healthy school meal

every day for one year was associated with children's intake of healthy foods at school, weight status and moderating effects of SES. It was found that serving a free school meal for one year increased children's intake of healthy foods, especially among children with a lower SES. A study in Finland found that the intake of free school meals was associated with healthier eating habits, both at school and outside school (Tilles-Tirkkonen et al., 2011). More recently in Japan, a study by Yamaguchi et al. (2018) indicated that a universal school lunch programme can partially contribute to a reduction in the SES-related gradient in dietary intakes (Yamaguchi et al., 2018). Therefore, it has been suggested that socio-economic inequalities in healthy eating, and health in general, may be reduced if all children eat a healthy meal provided at school (Nilsen et al., 2010).

As previously mentioned, in the UK children in Reception, Year 1 and Year 2 in all government funded schools have access to a free school meal, under the UIFSM policy. The benefit of universal school lunch programmes is that they are expected to cover all children equally, compared with selective programmes that may stigmatise socially vulnerable children. Evidence has shown that packed lunches from home typically do not meet government school food standards (Randolph and Viswanath, 2004), and therefore providing all children with a school lunch may result in narrowed health inequalities.

There were a number of common themes identified in both of the studies within this thesis. Firstly, the issue of puddings being a controversial addition to school dinners was highlighted amongst parents. Schools were seen to contribute to an 'expectation' by children of having something sweet after a savoury, main meal. This was also reflected in the views that products containing 'sugar' were often used as a reward or treat, especially when the child was out of direct parental supervision, particularly when at school. Trust and communication is needed between all stakeholders involved. Puddings may often be large contributors to the Free Sugars intake by children who receive them, thus having a potential role in the development of excess weight gain in childhood. The issue of childhood obesity has been mentioned in section 2.4 of this thesis, however, with regards to the challenges laid out in the 2007 Foresight Report (Butland et al., 2007) , it could be argued that providing the option of a sweet pudding with school meals is counterproductive in tackling childhood obesity. The Foresight report used a systems mapping approach

to gain insight into the complexity of obesity and constructed a detailed obesity system map representing a comprehensive 'whole systems' view of the determinants of energy balance (Butland et al., 2007).

To minimise the risk of an unintentional widening of inequalities, public health interventions and campaigns, including the Change4Life campaigns from Public Health England, must focus and target their marketing programmes to ensure they reach where they are most needed (PHE, 2017c). Public health practitioners have to not only capture the attention of the public, but also motivate them to change health behaviours that are often already established or to initiate habits which may be new or difficult (Randolph and Viswanath, 2004).

Studies have shown that public health campaigns tend to be embraced more enthusiastically by better-off families (Pickett, 2005). There are a number of reasons for this, but a common attribute of interventions that lead to increased health inequalities appears to be a reliance on voluntary behaviour change (Mechanic, 2002). It must be considered that health related choices might not be entirely 'free' or independent in every situation, nor should choice be removed from public health interventions (Bioethics, 2007) – but it should be recognised as a potentially important cause of widening inequalities (White et al., 2009). Resultant inequalities may be, for example, because the less affluent or educated are less able to access, understand or engage with the intervention. 'One-size-fits-all' interventions have been recognised to widen inequalities (Ashworth, 1997, Bull et al., 1999, Adams and White, 2007).

It should not be assumed that the general application of an effective public health intervention will reduce inequalities (Blaxter, 2007), as uptake or effect may differ by social group (Arblaster et al., 1996). As previously mentioned, public health campaigns may seek to improve everybody's health, but people who take up the recommendations of these campaigns are generally the more affluent rather than the social group with the biggest potential for improvements in health (Pickett, 2005).

To build on the research from Study One, the views and opinions of those associated with the school dinner experience in Newcastle upon Tyne were assessed in Study Two. Participants in this study included children, parents, head teachers, canteen staff, and staff from NCC who are involved in the provision of

foods and drinks to children in schools in Newcastle upon Tyne. Face-to-face (FTF) interviews and focus groups were chosen as the data collection methods in this study. This provided the opportunity to collect detailed viewpoints relating to the provision of school dinners and collate a range of ideas on how concerns about this service could be addressed. This study allowed a unique exploration of views and opinions that each participant group presented as issues of particular importance to them. It also strongly highlighted and reiterated findings from the literature regarding challenges involved with the successful recruitment of schools, school-aged children and parents as participants in research projects.

The complexities involved in the school dinner experience have been emphasised within this thesis. It was positive that, in general, participants were aware of what constitutes a healthy and balanced diet for children. It was notable, however, that efforts made by NCC to provide these were understood, appreciated and reflected on in different ways by different stakeholders. It is clear that there would be benefits from developing stronger channels of communication between all of those involved in providing and consuming school meals. For some stakeholders this may require facilitating communication between different groups, but for others this may necessitate the design and implementation of new forms of shared information and experience. If parents and children are given clear and consistent messages on the importance of healthy eating and information on the issues and constraints faced by those responsible for providing school dinners, there may be greater understanding of and support for the school meals service .

Various participants within this thesis noted the relationship between what is eaten in the home and what is eaten at school. School dinners were often mentioned to be different to what the children would get at home. However, this was not necessarily a negative point as it provided an opportunity to encourage the child to try new things. A need for more advice and education for parents on ‘healthy eating’ and what would be acceptable to include in packed lunches was also mentioned as an issue of importance by participants. The media is often used in an attempt to transfer information and education to large numbers of the public in an impactful and immediate way. Parents in Study One reported that the ‘Sugar Smart’ campaign resulted in a raised awareness of sugars intake by children. However, parents were the only stakeholder group in Study Two to mention any form of ‘media’. As this was

a more localised study it highlights that health marketing and media campaigns could use more targeted media such as local newspapers, radio stations, billboards and social media to involve a wider range of stakeholders. Greater involvement could mean increased education and awareness about healthy eating for more stakeholder groups, rather than exclusively parents.

6.2 Strengths and limitations of this research

The strengths of qualitative research stem from the fact that the collected data are based on participants' own insights and ideas and can reveal understanding and description of an individual's personal experiences. The approach provides rich, detailed data which can illustrate how participants independently interpret diverse constructs and situations. Qualitative data collection therefore allows for a unique insight into not just what a participant believes, but how and why they think the way they do.

The issue of data saturation must be considered for both studies within this thesis. As previously mentioned, data saturation is reported to be reached when there are no new emerging ideas from the data, and it is widely recognised to be the 'gold standard' for quality research (Hancock et al., 2016). However, reliance on the concept of data saturation presents various concerns (Roller and Lavrakas, 2015). Firstly, an emphasis on saturation has the potential to overshadow other important considerations in qualitative research design such as data quality (Roller and Lavrakas, 2015). Saunders et al. (2018) propose that data saturation has differing relevance, and a different meaning, depending on the role of theory and the chosen analytic approach and may therefore serve different purposes for different types of research (Saunders et al., 2018). Constantinou et al. (2017) stated that, given the potential for uncertainty about the actual point when data saturation is reached, attention should focus more on providing evidence that sufficient saturation has been reached, compared to the point at which this has occurred (Saunders et al., 2018). It could therefore be argued that the sample of participants collected within the School Food Study was adequate for attaining in-depth views and opinions from participating stakeholders on the school dinner experience. Both studies within this thesis comprise samples which were deemed to be sufficiently diverse, for example, in terms of levels of deprivation, gender, age, area of residence and ethnicity of participants.

In both of the studies within this thesis, participants had voluntarily expressed interest to take part in the research. This may have resulted in the study samples containing more interested, engaged and educated individuals, which may not be representative of the wider population. The reliance on self-reporting and the possibility of social desirability bias must also be considered. When discussing children and their diets, parents in both studies may have preferred to place emphasis on answers which they believed that I as the researcher would expect or want to hear. This could in turn lead to a degree of misreporting or a lack of honest responses.

Despite the limitations noted, the opportunity to give a 'voice' to data collected by using qualitative research is important. It is particularly invaluable in a critical area like childhood nutrition where the input of potential target group members could contribute significantly to the design and effectiveness of future interventions. The inclusion of 'voices' from members of different target groups also highlights the potential for misunderstanding that comes from a lack of clear, ongoing communication between different stakeholders, and serves to help make the case for more inclusive planning, coordination and delivery of services such as schools meals' provision.

As the principal researcher of this thesis, I am a nutritionist and food marketer by background, with a particular interest in the diets and food choice behaviour of children. I have undertaken a number of qualitative research training courses, including two at NatCen in London, on 'An Introduction to Qualitative Research' and 'Analysis of Qualitative Research.' As a result, I have followed the approach taught by NatCen, which has been adapted to suit the nature and aims of qualitative research, providing well-designed and well-conducted research to generate rigorous, well-founded and trustworthy evidence (Ritchie et al., 2014).

Qualitative research is generally more open to influence by the researcher's personal idiosyncrasies and biases. Reflexivity is recommended as a key way to enhance the credibility of qualitative research, by acknowledging the impact of the researcher's views and values (Draper and Swift, 2011). Therefore, I aimed to remain as reflexive as possible throughout the duration of the studies. All data analysis was checked by supervisors to ensure it was analysed fairly and with an open mind.

6.3 Future research recommendations

This research highlights the requirement for a multi-sector approach to reduce Free Sugars intake by children. Complementary strategies from upstream, midstream and downstream levels are needed. Stakeholders must work together to achieve positive changes to the food and drink environment and improvements in purchasing and consumption behaviour. Evaluation must be considered and planned for at the development stage of campaigns or policies (Craig et al., 2008). This is necessary if we are to learn, and achieve best value, from interventions which have been implemented, by assessing how successful they were in achieving their objectives and identifying any barriers to success.

Going forward, mixed methods research should be utilised in this area. Collecting quantitative, as well as qualitative data, could enable examination of whether participants' responses and reported behaviour changes are reflected in their actual nutrient consumption and purchasing behaviours. Mixed methods should also be employed in the school food research setting. This would allow data to be captured on children's food and drink consumption, and the impact their choices have on their diets. Discovering why children choose certain foods and drinks could help inform future school food policies. Possible adjustments could include streamlining choice and availability of particular products, or adding new options to menus.

A larger scale study is needed to examine stakeholder's views on the impact of school food contribution to children's diets. The research within this thesis was confined to Newcastle upon Tyne, and is therefore not necessarily representative of other geographic areas. School dinner menus developed by different local authorities will vary, and it would therefore be interesting to carry out research on a larger scale to assess any similarities and differences between areas in terms of supply or uptake issues or any problems encountered. This would enable the identification of any widespread, shared concerns which could be addressed at a policy level.

The issue of mixed messages was mentioned in both studies within this thesis. In Study One it was reported that when a number of campaigns are launched under the same brand name, for example 'Change4Life', this could lead to the loss or dilution of specific messages from each campaign. An example from this research is that information encouraging a reduced intake of sugars by children was getting mixed up

with messages regarding physical activity. In Study Two, a number of parents reported a feeling of mixed messages in terms of what food was allowed to be included in packed lunches and what was available with school dinners. This primarily revolved around the rule of chocolate and sweets being banned from packed lunches, but puddings, containing chocolate, being available as part of school dinners every day. Future research is also needed to assess children's views on whether the healthy eating messages they are taught in the classroom are consistently reflected in the food and drinks provided to them or not.

Stakeholders involved in this research provided a range of opinions relating to the controversial addition of puddings as part of a school meal. Future research should examine the acceptability of reducing the availability of, or removing completely, sweet puddings from school dinner menus. Views could be sought from all sectors including children, parents, canteen staff and head teachers and the councils who supply the meals. Quantitative research could also provide information on the impact that reducing or removing school puddings could have on the average daily Free Sugars intake of children. Findings from this research could go on to provide parents with accurate information and influence the development of future school food policies and menus.

6.4 Conclusion

There is a need to ensure children's diets are as healthy as possible. Given the range of influences that contribute to their diets and the need for improvement, this will require the development of innovative solutions across a variety of settings. A single approach to achieving positive change is unlikely to be successful. To make a significant and lasting improvement to what children eat at home and at school will involve a wide range of stakeholders sharing information and working together.

Multi-agency efforts are required, and stakeholders including parents, food-manufacturers, retailers, local authorities, government, and children themselves, must be engaged, convinced and motivated to make changes. A diverse range of initiatives ranging from school-based approaches to legislation and policy changes have been suggested, and a key issue revolves around the need to improve the ways in which many groups currently work together. Ensuring children have access to healthy diets is an issue which needs to be raised and given priority across a

number of platforms. There needs to be more well-designed primary evidence to inform what action is most needed and which approaches are likely to be most successful in the future.

It is important to examine how information is shared and communicated between stakeholders. Work is required at both local and national policy levels to utilise information and to plan and implement initiatives to improve children's health through their diets. To achieve this aim there is a need for adequate human and financial resources, and closer working between all sectors involved. Ultimately if information needs are identified, understood, and acted upon, the impacts on the health and well-being of children could be considerable.

Appendix A Change4Life Study ethical approval letter

Professor Paula Moynihan
Institute of Health & Society
School of Dental Sciences

Faculty of Medical Sciences
Newcastle University
The Medical School
Framlington Place
Newcastle upon Tyne
NE2 4HH United Kingdom

FACULTY OF MEDICAL SCIENCES: ETHICS COMMITTEE

Dear Paula

Title: Change4Life Sugars Campaign: impact on the intake of sugars by children aged 5-11 years and identification of barriers and facilitations to reducing consumption
Application No: 01030_3 (Amendment)
Start date to end date: 14 December 2015 to 30 June 2017

On behalf of the Faculty of Medical Sciences Ethics Committee, I am writing to confirm that the ethical aspects of your proposal have been considered and your study has been given ethical approval.

The approval is limited to this project: **01030_3 /2016**. If you wish for a further approval to extend this project, please submit a re-application to the FMS Ethics Committee and this will be considered.

During the course of your research project you may find it necessary to revise your protocol. Substantial changes in methodology, or changes that impact on the interface between the researcher and the participants must be considered by the FMS Ethics Committee, prior to implementation.*

At the close of your research project, please report any adverse events that have occurred and the actions that were taken to the FMS Ethics Committee.*

Best wishes,

Yours sincerely

Kimberley Sutherland
On behalf of Faculty Ethics Committee

cc.
Professor Daniel Nettle, Chair of FMS Ethics Committee
Ms Lois Neal, Assistant Registrar (Research Strategy)

*Please refer to the latest guidance available on the internal Newcastle web-site.

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Appendix B Change4Life Study recruitment email

Change4Life Food and Drink Study

Recruitment email

Dear _____

Thank you for previously taking part in the Change4Life Food and Drink studies. I would like to invite you to take part in a telephone interview exploring your thoughts and opinions of the Change4Life Sugar Smart campaign, one year after the campaign was launched.
The interview will last roughly 30-45 minutes, and to thank you for your participation you will receive a **£20 Love2Shop voucher.**

You are under no obligation to participate, but if you would be interested in taking part, please let me know, using the email address: g.e.l.gardner@newcastle.ac.uk

Many thanks!

Grace Gardner

PhD Student
Human Nutrition Research Centre / Institute of Health and Society
Room M1.151, William Leech Building
Newcastle University Medical School
Framlington Place
Newcastle Upon Tyne
NE2 4HH

Appendix C Change4Life Study example topic guide

Sample Change4Life Topic guide

Introduction

- **Who I am and why am I calling**
  Grace Gardner - Researcher at Newcastle University.
  (They will have already have agreed to be interviewed and will be expecting the call)

Explain the study

- **Purpose:** to ask a few questions about the C4L Sugar Smart campaign, what they liked, what they didn't like, did they use the app? If so, how useful was it
- Do they think they have made any changes to their diet/ way of life one year following the campaign?

- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely

- **Voucher:** as a thank you for helping out with the survey, they get a £20 Love2Shop voucher. It will be sent to them in the post in the next few days following the interview.

Start recording

Questions/Topics

Pre - C4L Sugar Smart campaign

- Who lives in your household?
- So the SS launched last year, what was your child's sugar intake like before the campaign?
- Why did you get involved in the study? (child or parent initiating it)?
- What were your initial thoughts of the campaign at the time?

C4L Sugar Smart campaign

- One year on, what do you generally think about the Sugar Smart campaign?
- Did you find it memorable?
- Do you think it is pitched at the right age group (children between 5-11)
- Do you think the campaign was generally successful in getting you and others to buy less sugary foods and drinks?
- Is there anything you did not like about the campaign/ what did not work?
- Did any information or key messages stick with you

Sugar Smart materials and APP

- Do you remember the sugar smart materials (stickers/recipes)- did you use them in your household?
  Who was the main person who used these?

- Did you/your child download the app? What did you think of it?
- What did you think about the sugar being displayed in sugar cubes rather than e.g. grams
- What did you use it for? (general info/ shopping/ cooking/ explanation)
- Any glitches? How do you think it could be improved?

Post campaign

- When would your child normally eat sugar? (Occasion?)
- Do you think your child's sugar intake has decreased since the campaign was launched?
- Has the way you/ your family's shopping, cooking, and eating changed since the campaign? How?
- What has been helpful in making changes to how you shop, cook, and eat?
- Have you found any barriers in reducing your child's sugar intake? Facilitators?

Sugar in the household

- Do you talk more/differently about sugar in your household since the campaign?
- Regarding others around you (friends/extended family) – do you talk about healthy eating/ reducing sugar with them?
- How do you handle reducing sugars when there is more than one child in the household?
- When you are teaching your child about sugar, is it focussed around possible weight gain or dental health more?

- Do you ever worry that your children eat too much sugar?
- What were your thoughts about filling in the INTAKE24 online dietary recalls for your child?

- Have you made any concrete changes? (reiterate what they've said)
- If you had to choose ONE KEY MESSAGE that stuck with you/your child from the campaign, what is it?
- Are there any changes you haven't made yet, but would like to? Why?
- Who do you think is most likely to engage with the campaign?

Sugar in foods

- Do you usually look at the sugars content of foods and drinks before you buy them?
- Would it alter your purchasing choices if a product seemed quite high in sugar?
- What are your thoughts on 'hidden' sugars?
- If you scanned food and drink products with naturally occurring sugars such as fruit, and saw their sugars content looked quite high, would this deter you from giving it to your child?
- Similarly, if you looked at the sugars content in drinks such as unsweetened pure fruit juice, would you be tempted to substitute these with no added sugar/diet carbonated drinks?

General knowledge of sugars

- What are your general thoughts on 'Good sugars' vs 'bad sugars'
- Do you know what the UK recommended maximum intake levels for free sugars are?

(Age … G … Cubes; 4-6 … 19 … 5; 7-10 … 24 … 6; 11+ … 30 … 7)

Other campaigns

- Can you think of any other campaigns which have been in the media regarding sugars?
- What were your thoughts on these?
- Is there anything you think could be done better in the future building on the C4L SS Campaign?

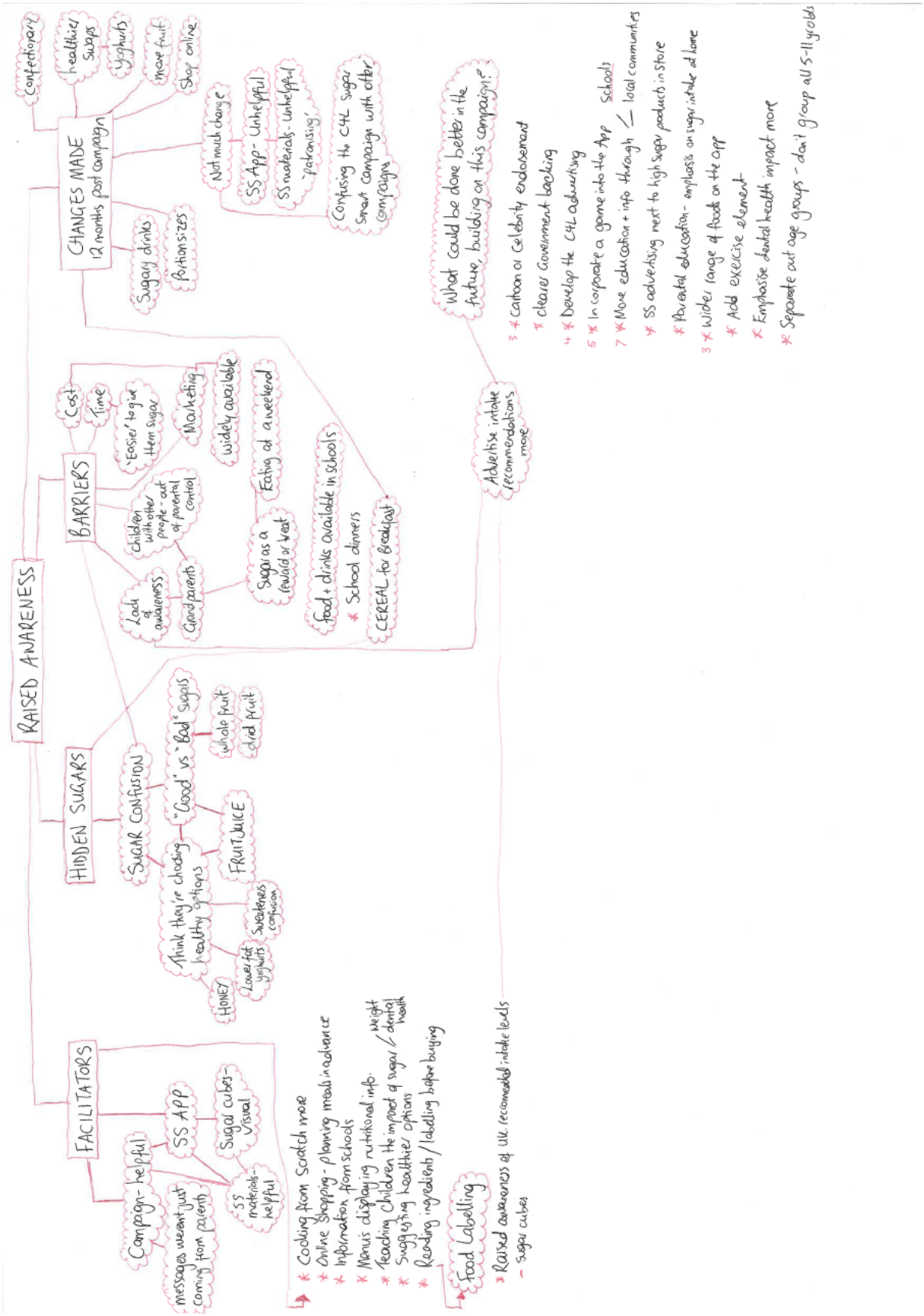
Finishing up:

Is there anything we haven't mentioned that you think is important?

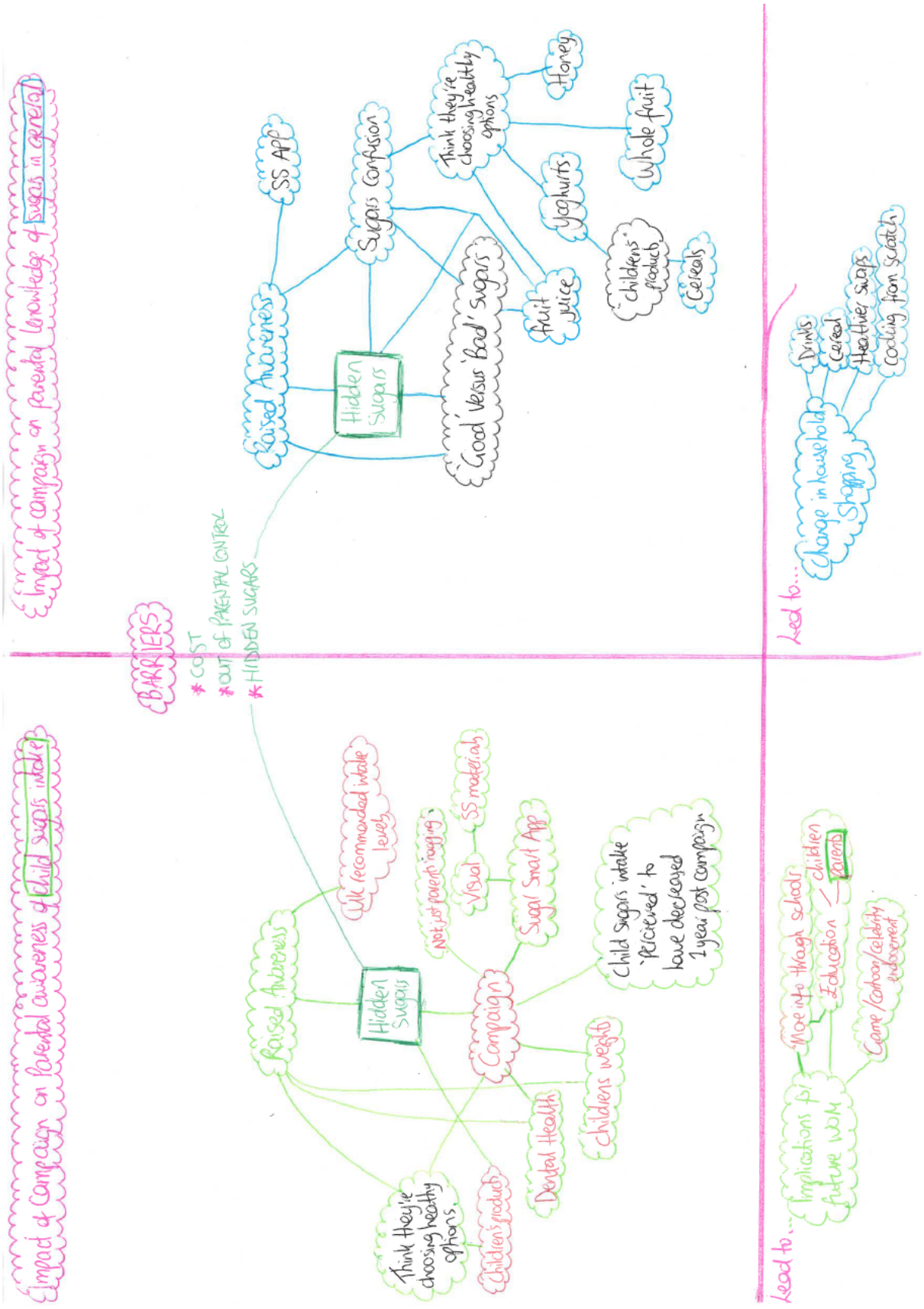
Any questions/queries before we finish? If you think of anything later, feel free to email me.

Appendix D Change4Life Study manual analysis 1

Appendix E Change4Life Study manual analysis 2



Appendix F Change4Life Study manual analysis 3



Appendix G Change4Life Study manual analysis 4

KEY: PARENT GENDER - CHILD GENDER - CHILD AGE – HOH – ETHNICITY – GEOG

Green	Younger children
Pink	Older children
Red	Low on HOH scale
Blue	Ethnic minorities
Grey	South of England

1. Raised parental awareness of child sugars intake
    a. P3 – F – M – 7 – SKILLED MANUAL – WHITE - SE
    b. P26 – F – M – 8 – SUPERVISOR – BLACK - LONDON
    c. P17 – F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE - SW
2. Raised child awareness of their sugars intake
    a. P20 – F – M – 10 – SUPERVISOR – WHITE - WM
    b. P24 – F – F – 10 – HOUSEWIFE – MIXED - LONDON
3. Sugar smart app as a facilitator of a reduced sugars intake
    a. P26 – F – M – 8 – SUPERVISOR – BLACK - LONDON
    b. P6 – F – F – 10 – SUPERVISOR – WHITE - NW
    c. P17 – F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE - SW
    d. P7 – F – F – 9 – HIGH MANAGERIAL – WHITE - SE
4. Messages weren't just coming from parents
    a. P20 – F – M – 10 – SUPERVISOR – WHITE - WM
    b. P17 – F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE – SW
    c. P2 – F – F – 7 – SUPERVISOR – WHITE – SE
    d. P12 – F – F – 8 – INTERMEDIATE MANAGERIAL – WHITE - SW

5. Raised awareness of hidden sugars
    a. P1– F – M – 9 – UNEMPLOYED – WHITE - NW
    b. P2– F – F – 7 – SUPERVISOR – WHITE – SE
    c. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
    d. P18 – F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
    e. P8 - F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW
    f. P17 – F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE - SW
6. Misleading marketing of children's products
    a. P20– F – M – 10 – SUPERVISOR – WHITE - WM
    b. P25 – F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
    c. P15 – F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
7. Sugars terminology confusion
    a. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
    b. P5 – F – M – 11 – SUPERVISOR – WHITE - SW
8. 'Good' vs 'bad' sugars
    a. P10 – F – F – 10 – SUPERVISOR – WHITE - YORKSHIRE
    b. P22 – F – F – 9 – UNSKILLED – BLACK - LONDON
    c. P21– F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
    d. P9 – F – F – 6 – HIGH MANAGERIAL – WHITE – SOUTH WEST
9. Whole fruit

a. P20– F – M – 10 – SUPERVISOR – WHITE - WM
b. P23 – M – F – 9 – INTERMEDIATE MANAGERIAL – ASIAN - LONDON
c. P14 – F – M – 8 – HOUSEWIFE – WHITE – EAST MIDLANDS
d. P24– F – F – 10 – HOUSEWIFE – MIXED - LONDON
e. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
f. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE – NW

10. Fruit juice
a. P4– M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
b. P25 – F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
c. P9– F – F – 6 – HIGH MANAGERIAL – WHITE – SOUTH WEST
d. P12– F – F – 8 – INTERMEDIATE MANAGERIAL – WHITE - SW
e. P23– M – F – 9 – INTERMEDIATE MANAGERIAL – ASIAN - LONDON
f. P1– F – M – 9 – UNEMPLOYED – WHITE - NW
11. Redeeming of fruit juice
a. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
b. P6– F – F – 10 – SUPERVISOR – WHITE - NW
12. Honey
a. P9– F – F – 6 – HIGH MANAGERIAL – WHITE – SOUTH WEST
b. P17– F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE - SW
c. P3– F – M – 7 – SKILLED MANUAL – WHITE - SE

13. Cost
a. P25– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
b. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
c. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW
14. Out of parental control
a. P27 – F – M – 5 – HOUSEWIFE – ASIAN - LONDON
b. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
c. P1– F – M – 9 – UNEMPLOYED – WHITE - NW
d. P25– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
e. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW
f. P4– M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
g. P19– F – M – 7 – HOUSEWIFE – WHITE – YORKSHIRE
h. P9– F – F – 6 – HIGH MANAGERIAL – WHITE – SOUTH WEST
15. Sugar as a reward or treat
a. P4– M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
b. P23– M – F – 9 – INTERMEDIATE MANAGERIAL – ASIAN - LONDON
c. P16 – F – M – 8 – SUPERVISOR – WHITE - YORKSHIRE
d. P6– F – F – 10 – SUPERVISOR – WHITE - NW
e. P2– F – F – 7 – SUPERVISOR – WHITE – SE
16. Confusing different change4life campaigns
a. P27– F – M – 5 – HOUSEWIFE – ASIAN - LONDON
b. P3 – F – M – 7 – SKILLED MANUAL – WHITE - SE
c. P26– F – M – 8 – SUPERVISOR – BLACK - LONDON
d. P10– F – F – 10 – SUPERVISOR – WHITE - YORKSHIRE
e. P6– F – F – 10 – SUPERVISOR – WHITE - NW

f. P25– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
g. P21– F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
h. P12– F – F – 8 – INTERMEDIATE MANAGERIAL – WHITE – SW

17. Lack of awareness of recommended sugars intake levels
    a. P4– M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
    b. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
    c. P3– F – M – 7 – SKILLED MANUAL – WHITE - SE
    d. P19– F – M – 7 – HOUSEWIFE – WHITE – YORKSHIRE
    e. P16– F – M – 8 – SUPERVISOR – WHITE - YORKSHIRE
    f. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
    g. P14– F – M – 8 – HOUSEWIFE – WHITE – EAST MIDLANDS
    h. P6– F – F – 10 – SUPERVISOR – WHITE - NW
    i. P13 – F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - LONDON
    j. P2– F – F – 7 – SUPERVISOR – WHITE – SE
    k. P12– F – F – 8 – INTERMEDIATE MANAGERIAL – WHITE - SW
    l. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
    m. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW

18. Sugary drinks
    a. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
    b. P23– M – F – 9 – INTERMEDIATE MANAGERIAL – ASIAN - LONDON
    c. P25– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
    d. P21– F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
19. Sugary breakfast cereals
    a. P12– F – F – 8 – INTERMEDIATE MANAGERIAL – WHITE - SW
    b. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
    c. P3– F – M – 7 – SKILLED MANUAL – WHITE - SE
    d. P23– M – F – 9 – INTERMEDIATE MANAGERIAL – ASIAN - LONDON
    e. P14– F – M – 8 – HOUSEWIFE – WHITE – EAST MIDLANDS
20. Healthier swaps
    a. P22– F – F – 9 – UNSKILLED – BLACK - LONDON
    b. P11 – F – M – 7 – SKILLED MANUAL – WHITE - YORKSHIRE
    c. P21 – F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
    d. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
21. Cooking from scratch
    a. P26– F – M – 8 – SUPERVISOR – BLACK - LONDON
    b. P27– F – M – 5 – HOUSEWIFE – ASIAN - LONDON
    c. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
    d. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
    e. P11– F – M – 7 – SKILLED MANUAL – WHITE - YORKSHIRE
    f. P14– F – M – 8 – HOUSEWIFE – WHITE – EAST MIDLANDS

22. Dental health

a. P20– F – M – 10 – SUPERVISOR – WHITE - WM
b. P19 – F – M – 7 – HOUSEWIFE – WHITE – YORKSHIRE
c. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
d. P1– F – M – 9 – UNEMPLOYED – WHITE - NW
e. P24– F – F – 10 – HOUSEWIFE – MIXED - LONDON
f. P13– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED – LONDON

23. Children's weight
a. P20– F – M – 10 – SUPERVISOR – WHITE - WM
b. P19– F – M – 7 – HOUSEWIFE – WHITE – YORKSHIRE
c. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
d. P24– F – F – 10 – HOUSEWIFE – MIXED - LONDON
e. P3– F – M – 7 – SKILLED MANUAL – WHITE - SE

24. Diabetes
a. P21– F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
b. P17– F – F – 7 – INTERMEDIATE MANAGERIAL – WHITE - SW
c. P2– F – F – 7 – SUPERVISOR – WHITE – SE
d. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW

25. More education through schools
a. P4– M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
b. P20– F – M – 10 – SUPERVISOR – WHITE - WM
c. P10– F – F – 10 – SUPERVISOR – WHITE - YORKSHIRE
d. P24– F – F – 10 – HOUSEWIFE – MIXED - LONDON
e. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE

26. Address parental education
a. P4 – M – M – 7 – SUPERVISOR – WHITE – EAST MIDLANDS
b. P14– F – M – 8 – HOUSEWIFE – WHITE – EAST MIDLANDS
c. P25– F – F – 5 – INTERMEDIATE MANAGERIAL – MIXED - YORKSHIRE
d. P8- F – F – 9 – INTERMEDIATE MANAGERIAL – WHITE - NW

27. Development of the sugar smart app
a. P7– F – F – 9 – HIGH MANAGERIAL – WHITE - SE
b. P21– F – F – 5 – HOUSEWIFE – ASIAN – WEST MIDLANDS
c. P1 – F – M – 9 – UNEMPLOYED – WHITE - NW
d. P15– F – M – 10 – INTERMEDIATE MANAGERIAL – WHITE – EAST MIDLANDS
e. P18– F – M – 8 – SKILLED MANUAL – WHITE – EAST ENGLAND
f. P9– F – F – 6 – HIGH MANAGERIAL – WHITE – SOUTH WEST

Appendix H School Food Study ethical approval letter

10 October 2018

Faculty of Medical Sciences
Newcastle University
Medical School
Framlington Place
Newcastle upon Tyne
NE2 4HH

Grace Gardner
School of Dental Sciences

FACULTY OF MEDICAL SCIENCES: ETHICS COMMITTEE

Dear Grace

Title: Examining the impact of Public Health England's Change4Life Sugar Smart campaign on the intake of sugars by children aged 5-11 years old
Application No: 1535/6826/2018
Start date to end date: 01/08/2018 to 31/08/2019

On behalf of the Faculty of Medical Sciences Ethics Committee, I am writing to confirm that the ethical aspects of your proposal have been considered and your study has been given ethical approval.

The approval is limited to this project: **1535/6826/2018**. If you wish for a further approval to extend this project, please submit a re-application to the FMS Ethics Committee and this will be considered.

During the course of your research project you may find it necessary to revise your protocol. Substantial changes in methodology, or changes that impact on the interface between the researcher and the participants must be considered by the FMS Ethics Committee, prior to implementation.*

At the close of your research project, please report any adverse events that have occurred and the actions that were taken to the FMS Ethics Committee.*

Best wishes,

Yours sincerely

M Holbrough

Marjorie Holbrough
On behalf of Faculty Ethics Committee

cc.
Professor Daniel Nettle, Chair of FMS Ethics Committee
Mrs Kay Howes, Research Manager

*Please refer to the latest guidance available on the internal Newcastle web-site.

Appendix I School Food Study head teacher recruitment letter

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

20/11/2019

Dear [HEADTEACHER]

We are writing to invite you to take part in a study led by researchers at Newcastle University.

This study aims to explore thoughts around school food and children's diets. It is widely recognised that school dinners have improved over the years in terms of both health and quality, and it would be interesting to get stakeholder views around the foods and drinks provided to children in primary schools.

We would like to come to your school to carry out a focus group with approximately 10 children, and recruit approximately 10 parents to take part in a separate focus groups. We would also like to invite you as the head teacher, and also the canteen manager of your school, to take part in one-to-one interviews with a researcher from Newcastle University.

From previous research in schools we understand the busy environment of primary schools and would at all times work with you to ensure the minimum inconvenience.

As a thank-you for taking part, each child and parent participant will receive a £10 Love2Shop voucher, and your school will receive £50 in book tokens.

This study will be approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. This committee contains members who are internal to the Faculty, as well as one external member.

Any researchers who will be conducting research in the school environment will be subject to enhanced DBS clearance.

We will be in contact by telephone over the next few days to give you more information, answer any questions you have about the project and hopefully arrange to meet with you to see if you would be interested in becoming involved in the study.

Yours sincerely,

Grace Gardner
PhD Student
Newcastle University
Email: g.e.l.gardner@ncl.ac.uk
Tel: 01912087648

Appendix J School Food Study sample information sheet – parent

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

Newcastle University School Food Study

WHAT'S IT ALL ABOUT?

We are looking for parent volunteers to take part in a focus group to talk about English school foods and children's diets. This study will form part of a larger PhD research project conducted at Newcastle University.

WE NEED VOLUNTEERS TO HELP US

We would like to invite parents of children aged 5-11 years to take part. This will involve participating in a focus group, discussing your thoughts around school dinners, whether your child receives these and what they think about them as well.

Focus groups will take place at your child's school and is expected to last around 45 minutes.

We aim to recruit around 10 parents from your child's school, and participants will be selected on a first come, first served basis. If we end up getting more responses than expected, participants will be randomly selected.

If your child would like to take part in the child focus group, another information sheet has also been attached, for you to read to them if you would like. The researcher will also read the information to them before the focus group starts, to make sure they are happy to take part.

****As a thank-you for taking part you will receive a £10 gift voucher****

There is of course no obligation to take part and you or your child can withdraw from the study at any time with no negative consequences.

The focus group will be electronically recorded, and data collected will only be accessed and used by members of the research team. All information will be anonymised and remain confidential, unless something you say gives me concern for someone's safety in which case I will discuss the matter with the school's head teacher. Data will be stored securely on the university computer system and erased when no longer required.

If you would like to take part please complete the enclosed consent form and return it to your child's teacher by Friday 18th January. You will be contacted in due course to take part.

This study was approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. This committee contains members who are internal to the Faculty, as well as one external member. This study was reviewed by members of the committee, who must provide impartial advice and avoid significant conflicts of interests.

For more information about the study,
please contact Grace Gardner at g.e.l.gardner@newcastle.ac.uk

Appendix K School Food Study sample information sheet – children

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

Newcastle University School Food Study

Would you like to take part in a study about English school food, carried out as part of a PhD project by researchers at Newcastle University?

WE NEED VOLUNTEERS LIKE YOU!

We would like to ask you about your thoughts on school dinners, what you like and might not like about them, and if you would like to change anything about them. Taking part would involve being part of a group discussion at your school, which will last around 45 minutes.

We would like to recruit around 10 children from your school, and participants will be selected on a first come, first served basis. If we end up getting more than expected, participants will be randomly selected.

****As a thank-you for taking part you will receive a £10 gift voucher****

You do not have to take part if you don't want to, and you can withdraw from the study at any time!

What you tell me will be confidential (private) unless something you say gives me concern for yours or another person's safety, in which case I will discuss this with your head teacher

If you would like to take part, please fill out the attached consent form with your parents and bring it back to school by Friday 18th January. We will then be in touch with you about taking part!

This study was approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. This committee contains members who are internal to the Faculty, as well as one external member. This study was reviewed by members of the committee, who must provide impartial advice and avoid significant conflicts of interests.

For more information about the study,
please contact Grace Gardner at g.e.l.gardner@newcastle.ac.uk

Appendix L School Food Study sample information sheet – canteen manager

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

Newcastle University School Food Study

WHAT'S IT ALL ABOUT?

We are writing to invite you to take part in a study led by researchers at Newcastle University, looking at English school foods contribution to children's diets.

This study is part of a larger PhD project at the university, and we would like to invite you as the canteen manager of [SCHOOL] to take part in a one-to-one interview with a member of the study's research team. This interview will cover your thoughts around primary school dinners which are currently being provided to children, and your perceptions on the children's general reactions to receiving these school dinners in [SCHOOL NAME]. The interview will last around 30 minutes.

From previous research in primary schools, we understand the busy environment you work in, and would at all times work with you to ensure minimum inconvenience.

As a thank-you for taking part your school will receive £50 book tokens

There is of course no obligation to take part and you can withdraw from the study at any time with no negative consequences.

Data collected will only be accessed and used by members of the research team. All information will be anonymised and remain confidential, unless something you say gives me concern for someone's safety in which case I will discuss the matter with the school's head teacher. Data will be stored securely on the university computer system and erased when no longer required.

We will be in contact over the next couple of days to give you more information, answer any questions and hopefully arrange to meet with you regarding taking part in this study.

This study was approved by the Faculty of Medical Sciences Research Ethics Committee, part of Newcastle University's Research Ethics Committee. This committee contains members who are internal to the Faculty, as well as one external member. This study was reviewed by members of the committee, who must provide impartial advice and avoid significant conflicts of interests.

For more information about the study,
please contact Grace Gardner at g.e.l.gardner@newcastle.ac.uk

Appendix M School Food Study sample consent form – children

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

NEWCASTLE UNIVERSITY SCHOOL FOOD STUDY

CHILD CONSENT FORM

I have read the information sheet dated **August 2018**, **version 2**, and I am happy to take part in the study discussing my thoughts around school foods and drinks.

Child's name:.....

I have also read the information sheet dated **August 2018**, **version 2**, and I am happy for my child to take part in the study.

Parent/ Guardian name:.....

Address:.....

.....

Postcode:.....

Telephone:.....

Parent email:.....

Child date of birth:.....

School:.....

Form/Class:.....

You do not have to take part of you don't want to, and you can withdraw from the study at any time! What you tell me will be confidential (private) unless something you say gives me concern for yours or another person's safety, in which case I will discuss this with your head teacher

Signature of Child:.....

Signature of Parent:.....

Date:.....

Please return to your teacher by Friday 18th January.
Thank you.

Appendix N School Food Study sample consent form – parents

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

NEWCASTLE UNIVERSITY SCHOOL FOOD STUDY

PARENT CONSENT FORM

I have read the information sheet dated **August 2018**, **version 2**, and I am happy to take part in the study discussing my thoughts around school foods and drinks.

Parent/ Guardian name:.....

Child's name:.....

Address:.....

.....

Postcode:.....

Telephone:.....

Email:.....

Child date of birth:.....

School:.....

Form/Class:.....

Signature of Parent/ Guardian:.....

Date:.....

Please return to your child's teacher by Friday 18th January

We will be in touch with you soon regarding the date and time of the focus group.
Thank you.

Data will be stored securely and will remain confidential, unless something you say gives me concern for someone's safety in which case I will discuss the matter with the school's head teacher.

There is of course no obligation to take part and you can withdraw from the study at any time with no negative consequences.

Appendix O School Food Study sample demographics form – parents

Demographics form

1) Name

.....

2) Gender (please tick)
- Male
- Female

3) How would you describe your current employment status? (please tick)
   - High managerial
   - Intermediate managerial
   - Supervisor/ clerical/ junior managerial
   - Skilled manual
   - Unskilled/ semi-skilled manual
   - Housewife/ husband
   - Unemployed
   - Student
   - Retired

4) Ethnic group (please tick)
   - White British
   - White Irish
   - Any other White background (please write).....

   - Asian or Asian British
   - Black or Black British
   - Chinese
   - Other ethnic group (please write).....

   - Mixed White and Black Caribbean
   - White and Black African
   - White and Asian
   - Any other mixed background (please write).....

   - Not stated (please write).....

   - Prefer not to say

5) Postcode .....

6) Number of children in household.....

7) Age of children in household.....

Appendix P School Food Study sample debriefing sheet

Human Nutrition Research Centre
M1.151 William Leech Building
Medical School
Framlington Place
Newcastle University
Newcastle upon Tyne, NE2 4HH

NEWCASTLE UNIVERSITY SCHOOL FOOD STUDY

Thank you very much for your participation in The School Food Study!

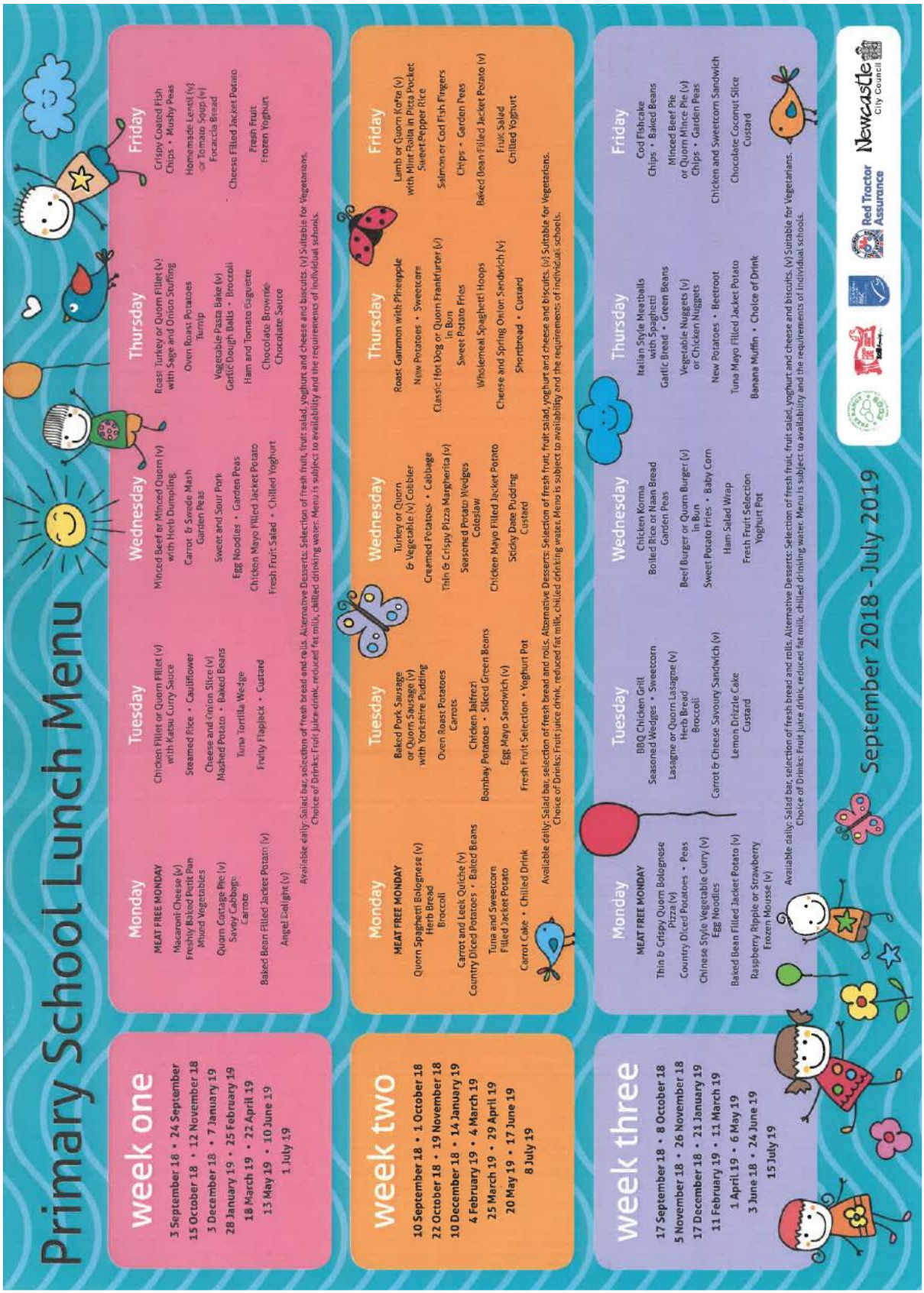
This study was carried out to explore thoughts around food provided to children in primary schools.

The data we have collected from this study will remain confidential and will go on to influence future research projects.

Please find enclosed your £10 Love2Shop voucher as a thank you for your participation. If you have any questions or would like more information on the study, please do not hesitate to contact Grace Gardner at Newcastle University at g.e.l.gardner@newcastle.ac.uk

Thank you again for your participation!

Appendix Q School Food Study - Primary school dinner menu



Appendix R School Food Study sample topic guide – children

Sample Topic guide - Children

Introduction

- **Who I am and why am I here**
  Grace Gardner – PhD student and researcher at Newcastle University.

Explain the study

- **Purpose:** to ask a few questions about their thoughts around the school food and drinks they get in schools, what they like, what they don't like etc
- If you could make any changes, would you?

- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely

- **Voucher:** as a thank you for helping out with the survey, they get a £10 Love2Shop voucher. It will be provided along with a debriefing sheet, directly following the interview.

Start recording

Scene-setting and introductions

- Please go around and say your name and how old you are and what year you are in
- Both researchers introduce themselves – 'role of the moderator – taking notes'
- This is a project on what everyone thinks about the food and drink given out in schools in Newcastle
- Ground rules: only one person speaks at the same time, if you have something you want to say put your hand up; there are no right or wrong answers – this is not a test we just want to know what your thoughts are; we will be in here for about another 40 minutes, but if you want to leave at any time just put your hand up and let me know, and CM will take you outside

Ice breaker

- **If you were trapped on a dessert island in the middle of the ocean, and you could only choose 3 things to have there with you – what would these be and why?** (GG to start and then go round group)

Questions/Topics

1) Do you get school dinners? **Show menus** (go round and ask children by name)
2) What do you normally get on an average day? – what did you get today? Talk me through what you all get
3) What do you think about school dinners?
4) Is there anything you really like about school dinners? (What is your favourite part?)
5) Is there anything you really don't like about school dinners?
6) Do you think school dinners are 'healthy'? Which parts are healthy and which parts aren't healthy?
7) If you were in charge for the day and you could change anything about school dinners, what would this be and why?
8) Are school dinners similar to what you would be having to eat and drink at home?
9) Is there anything you would get at school that you would never get at home?
10) Do any of your friends take packed lunches? – do you sit separately or together?
11) If you could pack your own packed school lunch and have anything you want, what would you pack?
12) Drinks – what do you get in school? Milk/water/juice? Enough choice? Would you like something different – what would you have instead?

Finishing up (10 minutes before the end):

Okay so to finish up, is there **anything we haven't mentioned** that you think is important? Any **questions/queries before we finish**?

Appendix S School Food Study sample topic guide – parents

Sample Topic guide - Parents

Introduction

- **Who I am and why am I here**
  Grace Gardner – PhD student and researcher at Newcastle University.

Explain the study

- **Purpose:** to ask a few questions about their thoughts around the school food and drinks provided to children, what they like, what they don't like etc
- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely
- **Voucher:** as a thank you for helping out with the survey, they get a £10 Love2Shop voucher. It will be provided along with a debriefing sheet, directly following the interview.

Start recording

- Please go round and say your name, how many kids you have and how old they are
- This is a research project on stakeholders views around school food provision to children in schools in Newcastle upon Tyne

Questions/Topics

1) Do your children get school dinners – if so why, and if not – why not
2) Do you choose from the menu with your children what they will have or do they choose themselves?
3) If they take pack lunches, what would you normally pack? How do these compare to school dinners?
4) Do your children ever talk about what their friends are getting in their pack lunches?
5) What are your thoughts on the current school dinners provided to children of primary school age – both food and drinks (show menus)
6) How do school dinners compare to what you choose to give your children at home?
7) Do you think that school dinners introduce any new foods/flavours to your children?
8) What do you think about the theme days?
9) How do these compare to your knowledge of school dinners from the past, for example perhaps when you were at school?
10) What do you think of the make-up of the school meal as a whole?
11) What do you think about this menu being on a 12-month loop, rather than by season?
12) Do you think if this make-up changed at all, would it affect uptake of school dinners?
13) Do your children speak about school dinners in a positive, negative or neutral way?
14) Is there anything in particular which they say they like about school dinners? – what choice is their favourite to choose?
15) Is there anything in particular which they say they dislike about school dinners? – what choices would they never choose?
16) Do you consider school dinners to be 'healthy' – why? Which parts? Which parts aren't?
17) If you could change anything about school dinners, what would this be and why?

Finishing up (10 minutes before the end):

Okay to finish up, is there anything we haven't mentioned about school dinners that you think is important?

Appendix T School Food Study sample topic guide – canteen staff

Sample Topic guide – Canteen staff

Introduction

- **Who I am and why am I here**
  Grace Gardner – PhD student and researcher at Newcastle University.

Explain the study

- **Purpose:** to ask a few questions about their thoughts around the school food and drinks provided to children, what they like, what they don't like etc; if you could make any changes, would you?
- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely
- **Voucher:** as a thank you for helping out with the survey, the school will receive a £50 voucher following the completion of all focus groups and interviews.

Start recording

Scene-setting and introductions

- This is a research project on stakeholders' views around school food provision to children in schools in Newcastle upon Tyne
- If you could start off by telling me a bit about yourself e.g. how long have you been working in schools – have you seen any changes over the years?

Questions/Topics

1) What are your thoughts on the current school dinners provided to children of primary school age?
2) How do these compare to your knowledge of school dinners from the past, for example perhaps when you were at school?
3) What do you think of the menu provided by Newcastle city council?
4) What do you think about days like 'meat-free Mondays'?
5) How do you think school dinners compare to pack lunches that the children bring in?
6) Based on your experience of seeing the children getting their school dinners first-hand, what are your general thoughts about how the food is received by the children?
7) Do you hear children speak about school dinners in a positive, negative or neutral way?
8) Is there anything in particular you hear them say they say they like about school dinners?
9) Is there anything in particular which YOU like about school dinners?
10) Is there anything in particular which you hear the children say they dislike about school dinners?
11) Is there anything in particular which YOU don't like about school dinner?
12) Do you consider school dinners to be 'healthy' – if so why; if not – why not?
13) If given the option, what sort of foods and drinks do the majority of the children go for?
14) If you could change anything about school dinners, what would this be any why?
15) Do you ever have parents contacting you with questions or queries about school dinners?
16) Do you ever get requests off the children for something that is not on the menu that day?
17) Do you think the possibility of changing the school dinner layout might affect the uptake of school dinners – in terms of what is expected and what is delivered?
18) What are the negatives and positives of any change in school dinners?

Finishing up (10 minutes before the end):

Okay so to finish up, is there **anything we haven't mentioned** that you think is important?

Appendix U School Food Study sample topic guide – head teachers

Sample Topic guide – Head teacher

Introduction

- **Who I am and why am I here**
  Grace Gardner – PhD student and researcher at Newcastle University.

Explain the study

- **Purpose:** to ask a few questions about their thoughts around the school food and drinks provided to children, what they like, what they don't like etc; if you could make any changes, would you?
- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely
- **Voucher:** as a thank you for helping out with the survey, the school will receive a £50 voucher following the completion of all focus groups and interviews.

Start recording

Scene-setting and introductions

- This is a research project on stakeholders' views around school food provision to children in schools in Newcastle upon Tyne
- If you could **start off by telling me a bit about yourself** e.g. how long have you been working in schools

Questions/Topics

1) What are your thoughts on the current school dinners provided to children of primary school age?
2) What are the drinks on offer in this school? (**show menus**)
3) How do these compare to your knowledge of school dinners from the past, for example perhaps when you were at school
4) Based on your experience of seeing the children getting their school dinners' first-hand, what are your general thoughts about how the food is received by the children?
5) Do the children who take pack lunches sit with those who are having school dinners, or separately?
6) Do you hear children speak about school dinners in a positive, negative or neutral way?
7) Is there anything in particular you hear them say they say they like about school dinners?
8) Is there anything in particular which YOU like about school dinners?
9) Is there anything in particular which you hear the children say they dislike about school dinners?
10) Is there anything in particular which YOU don't like about school dinner?
11) Do you consider school dinners to be 'healthy' – if so why; if not – why not
12) If you could change anything about school dinners, what would this be and why?
13) Do you ever have parents contacting you with questions or queries about school dinners?
14) Do you think the possibility of changing the school dinner layout might affect the uptake of school dinners – in terms of what is expected and what is delivered?
15) What are the negatives and positives of any change in school dinners?

Finishing up (10 minutes before the end):

Okay so to finish up, is there **anything we haven't mentioned** that you think is important?
Any **questions/queries before we finish**? If you think of anything later, feel free to **email me**.

Appendix V School Food Study sample topic guide – Newcastle City Council

Sample Topic guide – Newcastle City Council

Introduction

- **Who I am and why am I here**
  Grace Gardner – PhD student and researcher at Newcastle University.

Explain the study

- **Purpose:** to ask a few questions about their thoughts around the school food and drinks provided to children, what they like, what they don't like etc; if you could make any changes, would you?
- **Anonymity:** tell them the conversation will be recorded if it is okay with them but nothing they say can be traced back/ will be used in connection with their name. The information will be stored safely
- **Voucher:** as a thank you for helping out with the survey

Start recording

Scene-setting and introductions

- This is a research project on stakeholders' views around school food provision to children in schools in Newcastle upon Tyne
- If you could start off by telling me a bit about yourself e.g. how long have you been working in the area you're in – have you seen any changes over the years?

Questions/Topics

1) What are your thoughts on school dinners provided to children of primary school age?
2) What do you think of the current menu?
3) How do these compare to your knowledge of school dinners from the past, for example perhaps when you were at school?
4) What do you think about days like 'meat-free Mondays'?
5) How do you think school dinners would compare to pack lunches?

6) Is there anything in particular which you LIKE about school dinners?
7) Is there anything in particular which you DON'T LIKE about school dinner?

8) Do you consider school dinners to be 'healthy' – if so why; if not – why not?
9) If given the option, what sort of foods and drinks do the majority of the children go for?

10) If you could change anything about school dinners, what would this be any why?

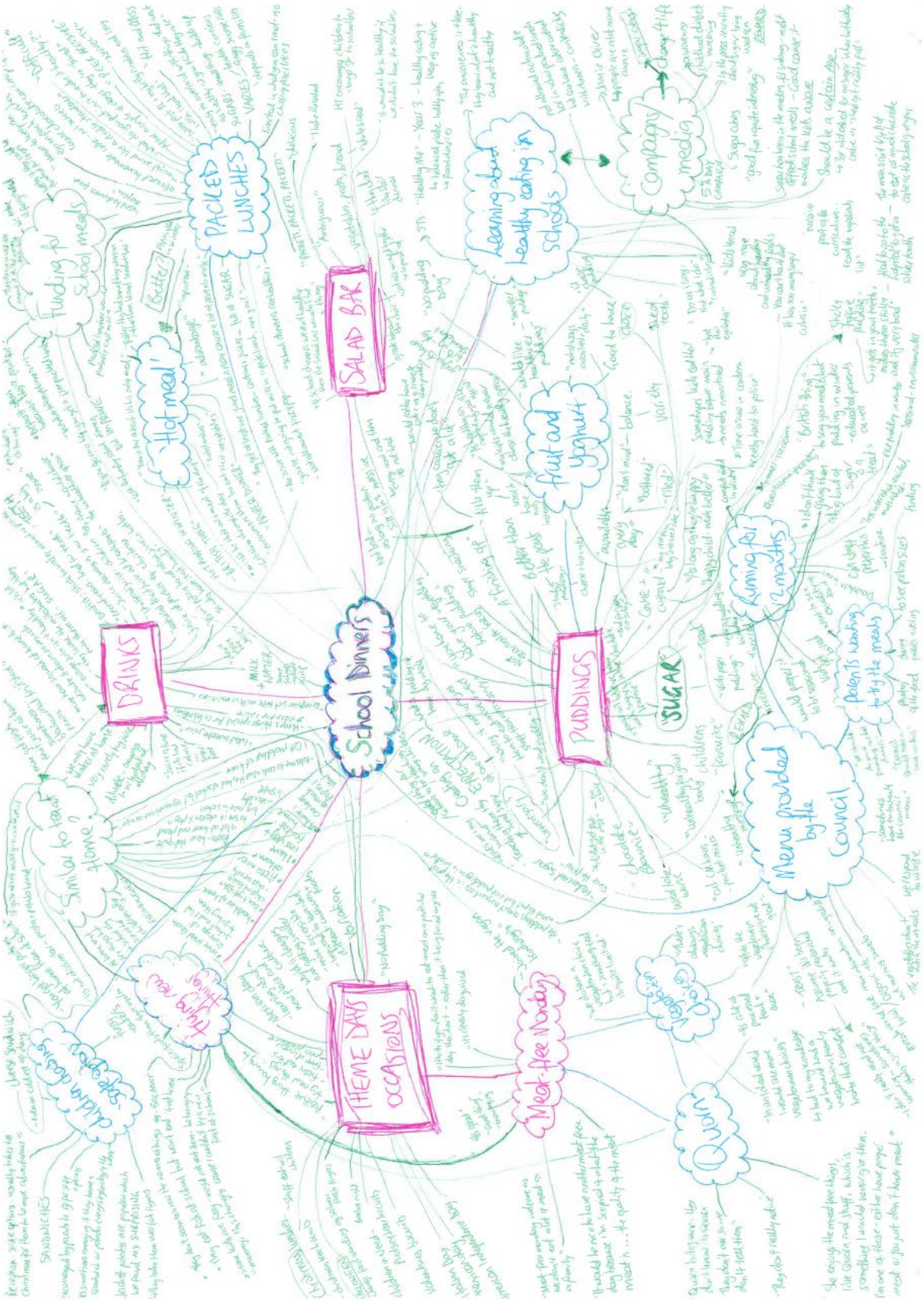
11) Do you ever have members of the public contacting you with questions or queries about school dinners, for example where the food is being sourced from which is provided to the children?

12) Do you think the possibility of changing the school dinner layout might affect the uptake of school dinners – in terms of what is expected and what is delivered?
13) What are the negatives and positives of any change in school dinners – do you think these would be acceptable, but also accepted?

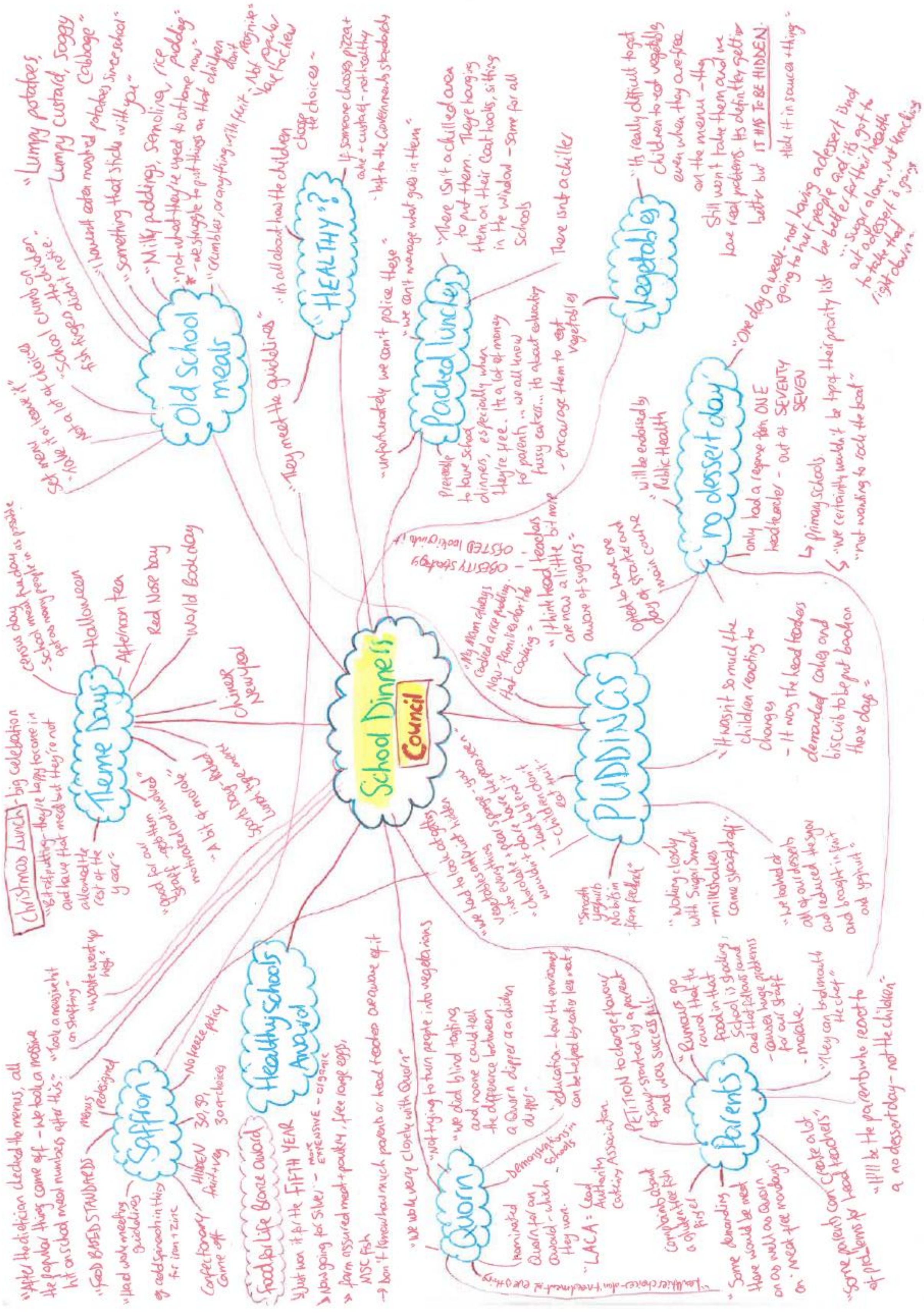
Finishing up (10 minutes before the end):

Okay so to finish up, is there **anything we haven't mentioned** that you think is important?

Appendix W School Food Study manual analysis 1



Appendix X School Food Study manual analysis 2



Appendix Y School Food Study manual analysis 3

Encourages children to try new things

- One of the difficult areas - trying to get something children from other countries/cultures can eat
- "This is a real, real problem for us"
- we've tried recipes given by parents
- "A lot of children from Asian culture don't eat potatoes - that's where we struggle with potato products - a lot ends up in the waste
- we've tried different things eg. rice with a casserole - "that felt quite alien"
- The difficulty is trying to get some of our Asian children to enjoy what they're eating
- Some are very wary about what meat is Halal. We go to a local Halal butcher/meat supplier

Getting parents to try the school food

- "We invite parents in to have a meal - what they identified was it was their child that was the problem" (soup incident)
- "They thought the meals were lovely" - "well worth the exercise"
- "we have what we call a Road Show - so parents evenings + new intakes etc:
  - ↳ marketing table/board - all the info, copies of menus, nutritional standards, school food standards, little samples of the meals to show portion sizes.
  - ↳ the chefs, assistant chefs, etc are there and talk to the parents are reassure them about what we do"
  - ↳ info example "instead of having a packed lunch you could potentially save £390 a year"

Schools can make changes

- last year 43 out of 67 primaries made changes to the menus - Across the board
- E.g. "wanted mashed potato - not boiled"
  "Some was definitley "I want a biscuit on" "I want cake + custard every day""
- Those who chose not to have a Meat-free Monday don't have it - but they will be having a meat-free day in the new menus - because I'm not identifying them as a meat-free day"

Testing the menu with children

- "we've got a little evaluation sheet"
  - Student council eg. 2 children from each age group at break time
- E.g. trialled fish goujons + a piece of fish - they were the same product but preferred the goujons.
  "very little salmon gets eaten - its a powerful taste for little ones"

Appendix Z School Food Study manual analysis 4

Newcastle City Council

- **Old School meals**
  - Take it or leave it. Less choices.
  - Rice pudding. Not what they're used to at home now
  - Struggle to put things on that kids don't recognise

- **"Healthy?"** "They meet the guidelines"
  - it all about the choice they choose" } to the Government's standards
  - pizza + cake + custard = not healthy }

- **Packed lunches** - Can't police these
  - Isn't a chilled area to put them
  - ↳ preferable to have school dinners especially when they're free

- **Vegetables** - encourage them to eat vegetables
  - really difficult to get children to eat vegetables
  - "HAS TO BE HIDDEN" - hide in sauces etc. Real problem

- **'no dessert day'** 'one day a week' better for health
  - will take sugar right down. Only 1/77 schools replied "not wanting to rock the boat" ↳ not to put their pictures

- **Healthy Schools award** Food4Life Bronze Award
  - Have bronze. Going for Silver. More expensive. Organic. Farm assured meat + poultry. Not sure how aware parents and head teachers are about it.

- **Saffron** - food based standards. Menus redesigned.
  - Hard work. HIDDEN fruit + veg.
  - confectionary came off - dietician - things came afford
  - there was then a massive hit on school meal numbers.

- **Puddings** - fruit hidden into puddings. Pears in choc cake.
  - working closely with Sugar Smart Milkshakes off
  - "children don't eat fruit" "reduced the sugar in our desserts"
  - "wasn't so much the children resisting - head teachers demanded. cakes + biscuits to be put back on those days" OFSTED looks now.

- **Parents** - rumours go round that school food is bad
  - huge problems for staff morale. "bad mouth the chef"
  - Some demanding meat be put on - not meat free mondays
  - Some parents create a lot of problems for head teachers
  - Petitions eg change flavour of soup - was successful.

- **Quorn** - work very closely with Quorn - Education.
  - healthier choices, don't need meat with everything
  - Demonstrations in schools + blind taste testing - can't tell the difference
  - ~~not trying to turn people into vegetarians~~

- **Theme Days** - Census school meal fun day - get as many people involved as possible
  - Christmas lunch
  - "bit off putting - they're happy to come in and have that meal but aren't allowed to the rest of the year"
  - "Good for staff - morale - involved

- **Encourages children to try new**
  - difficult area - real real problem - getting children from different cultures/countries things to eat
  - Asian children - don't eat potato products. Halal vs to things
  - Some are very wary about what meat is halal
  - we go to a local Halal butcher

- **Getting parents to try meals**
  - "Road show" at parents evenings where they can try the meals. " marketing table with info
  - eg. lunches at school could save £390 a year
  - "they thought the meals were lovely"

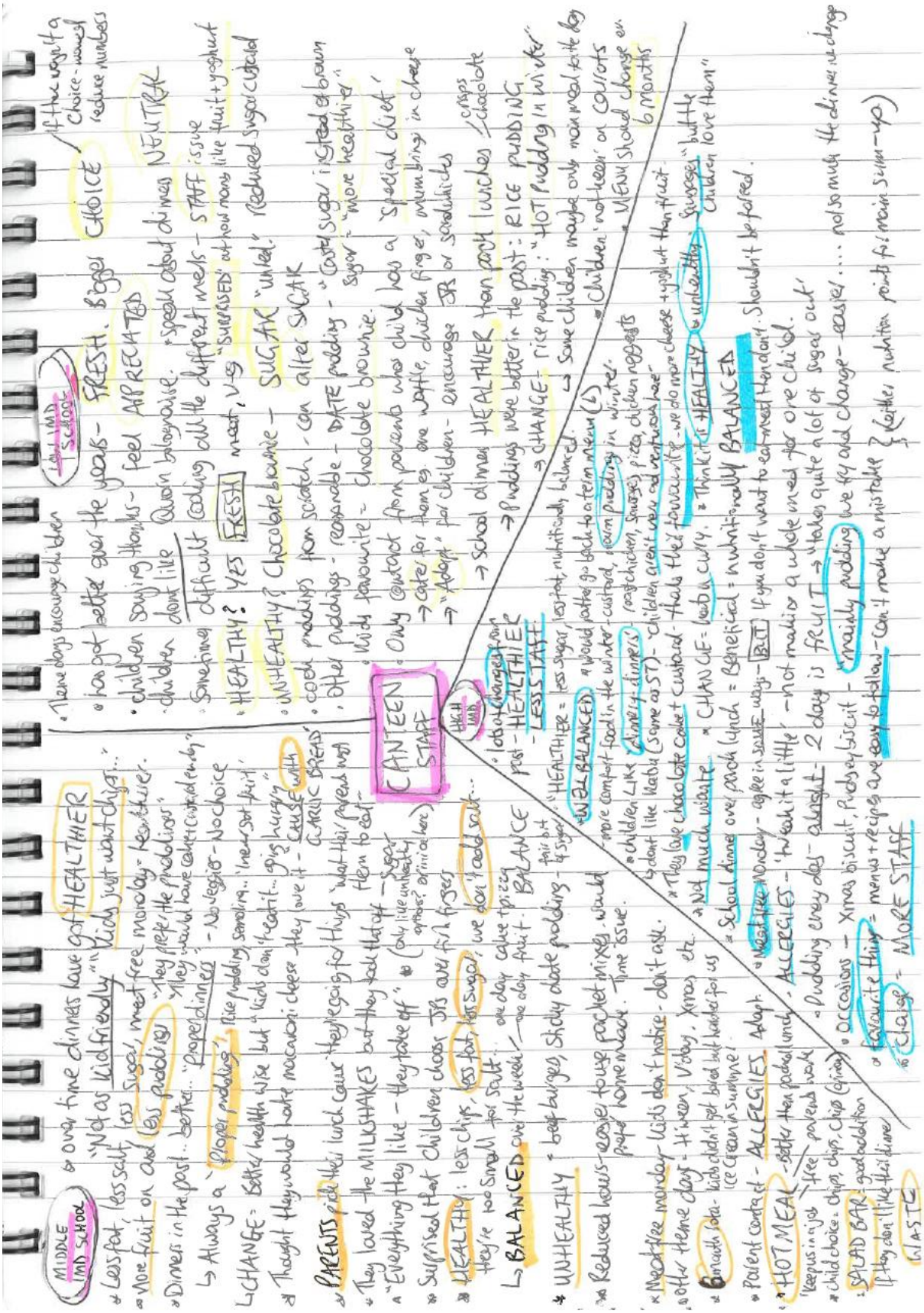
- **School can make changes**
  - Last year 43 out of 67 primaries made changes to the menus - Across the board
  - eg. "mashed not baked potatoes" "cake + custard ev. day"
  - Didn't have meat free monday.

- **Testing menu with Children**
  - "Student council · 2 children from each age group." Evaluation sheet.
  - Eg. trialled fish goujons against a precog fish

Appendix AA School Food Study manual analysis 5

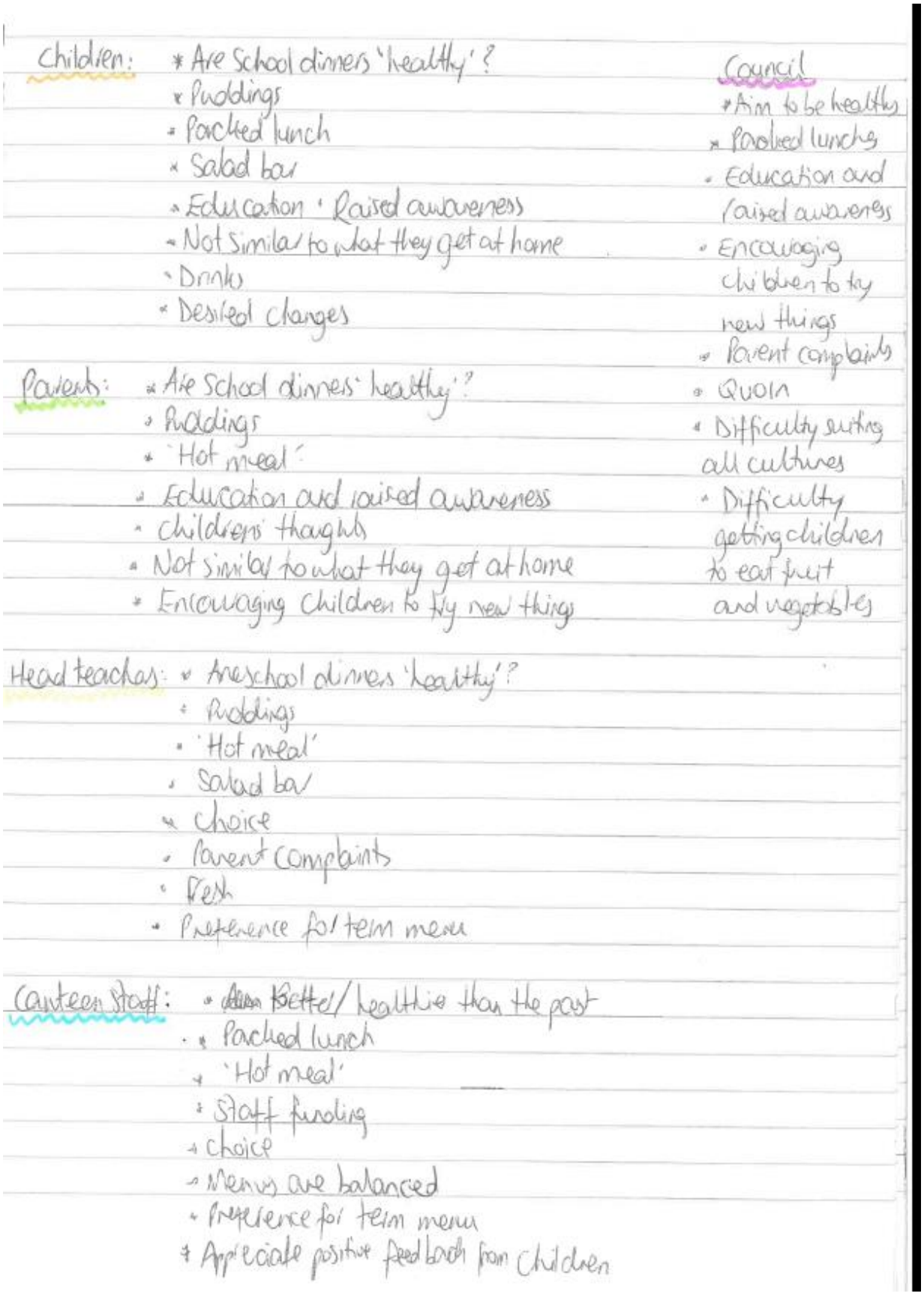
Appendix BB School Food Study manual analysis 6

Appendix CC School Food Study manual analysis 7



Appendix DD School Food Study manual analysis 8

Appendix EE School Food Study manual analysis 9



Children:
* Are School dinners 'healthy'?
* Puddings
* Packed lunch
* Salad bar
* Education + Raised awareness
* Not similar to what they get at home
* Drinks
* Desired changes

Parents:
* Are School dinners 'healthy'?
* Puddings
* 'Hot meal'
* Education and raised awareness
* Childrens' thoughts
* Not similar to what they get at home
* Encouraging children to try new things

Head teachers:
* Are school dinners 'healthy'?
* Puddings
* 'Hot meal'
* Salad bar
* choice
* Parent complaints
* Fresh
* Preference for term menu

Canteen Staff:
* Better/healthier than the past
* Packed lunch
* 'Hot meal'
* Staff funding
* choice
* Menus are balanced
* Preference for term menu
* Appreciate positive feedback from children

Council
* Aim to be healthy
* Packed lunches
* Education and raised awareness
* Encouraging children to try new things
* Parent complaints
* Quorn
* Difficulty suiting all cultures
* Difficulty getting children to eat fruit and vegetables

Appendix FF List of oral presentations, poster presentations and courses attended

Grace Gardner – presentations to date

Oral presentations

- October 2019: '3 Minute Thesis' Human Nutrition Research Centre 25th Anniversary Celebration Conference
- September 2019: '3 Minute Thesis' Centre for Oral Health Research Annual Research Day
- September 2018: '3 Minute Thesis' Centre for Oral Health Research Annual Research Day
- October 2017: 'Impact of health marketing on the intake of sugars by children' North East Postgraduate Conference
- August 2017: 'Impact of health marketing on the intake of sugars by children' Rank Prize Funds mini symposium on 'Carbohydrates and Health' in Grasemere, Lake District
- June 2017: 'Sugar Smart - can children's sugars intake Change4life?' Institute for Health and Society Postgraduate Conference
- May 2017: 'Sugar Smart - can children's sugars intake Change4life?' Centre for Oral Health Research Annual Research Day
- February 2017: 'Sugars intake by children: PhD protocol' to the Centre for Oral Health Research

Poster presentations

- October 2019: Human Nutrition Research Centre 25th Anniversary Celebration Conference
- September 2019 Centre for Oral Health Research Annual Research Day
- September 2019: Public Health England Annual Conference, University of Warwick
- June 2019: 'Impact of Change4Life Campaign on Child Sugars Intake: Qualitative Findings' at the International Association for Dental Research conference, Vancouver
- October 2018: Human Nutrition Research Centre Annual Research Day
- September 2018: Centre for Oral Health Research Annual Research Day
- July 2018: Nutrition Society Summer Conference in Leeds

Courses attended to date

- NatCen, London - Introduction to Qualitative Research
- NatCen, London - Analysis of Qualitative Data
- 2-day Qualitative interviewing course at Newcastle university – June 2017
- Nutrition society statistics course in London – March 2018

Appendix GG Copy of poster presented at the International Association for Dental Research, June 2019

Presenter:
Grace Gardner

Newcastle University
UK | Malaysia | Singapore

Impact of Change4Life Campaign on Child Sugars Intake: Qualitative Findings

G. Gardner[1], R. D. Holmes[1], P. Moynihan[2]
[1]Centre for Oral Health Research, Newcastle University, U.K, [2]Faculty of Health and Medical Sciences, The University of Adelaide, Australia
Email: g.e.l.gardner@newcastle.ac.uk

Background:

- Free Sugars intake is contributing to the pandemic of childhood obesity and high prevalence of dental caries worldwide [1]
- Public Health England (PHE) launched the national health marketing campaign Change4Life 'Sugar Smart' in 2016, as part of their broad range of measures to combat a high Free Sugars intake in the U.K.

Aims:

To evaluate the impact of the 'Sugar Smart' campaign on:

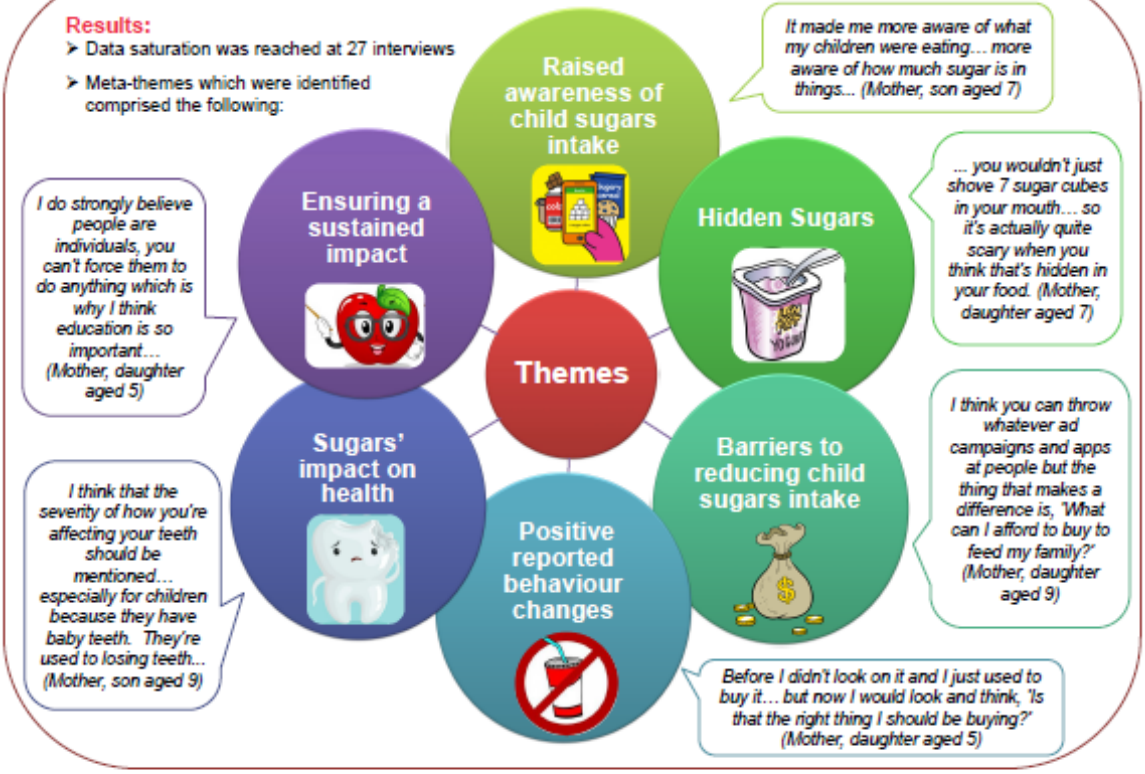
1. Parental awareness of dietary sugars one-year post campaign
2. Parental perception of any impact on their child's sugars intake one-year post-campaign

Methods:

- A purposive sub-sample of participants were contacted to take part in this research
- Participants included parents of children aged 5-11 years, from a range of ethnicities, socioeconomic classes and geographical locations across England
- One-to-one semi-structured telephone interviews were conducted, digitally recorded, transcribed verbatim, and thematically coded using NVivo 11.0
- The Framework Method data analysis approach was employed [2]

Results:

- Data saturation was reached at 27 interviews
- Meta-themes which were identified comprised the following:



Conclusions:

- One-year post-campaign, parents perceived the 'Sugar Smart' health marketing campaign as **helpful in raising awareness** of the general and oral health impacts of Free Sugars
- The majority of parents perceived their child's sugars intake to have decreased one-year post-campaign, and the findings suggest the approach generated a **parental desire for changing their child's sugars intake**
- Future health marketing campaigns should employ an **integrated approach, involving all stakeholders** to increase their impact and sustainability

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