

A Mixed Methods Exploration of
Maternal Perceptions and
Concerns about Their Young
Child's Weight and Maternal
Feeding Practices in Bradford

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THESIS ABSTRACT

Background: Childhood overweight should be prevented from early childhood. This thesis aims to contribute to the understanding of the factors that influence feeding practices amongst mothers of pre-school children living in Bradford.

Methods: I used an explanatory sequential mixed methods design to explore the perceptions and concerns that mothers have about their child's weight and their feeding practices. For the quantitative strand, data from the Born in Bradford cohort was used to: describe the mothers' perceptions of their child's and own weight, their concerns that their child will become overweight; identify mother and child characteristics associated with inaccurate estimations of the child's weight, concern that the child will become overweight, maternal feeding practices; and explore the relationship between perceptions and concerns and feeding practices. The qualitative strand aimed to add depth and further insight into attitudes that mothers have towards their child's weight, childhood overweight and feeding practices. One-to-one interviews were conducted with mothers, early years workers and health professionals, and analysed using thematic analysis.

Results: Some mothers were unable to estimate their own and their child's weight accurately. Pakistani mothers were more likely to underestimate in comparison to White British mothers. Concerns about childhood overweight seemed to be not as frequent as concerns about low weight. Underestimation of a healthy weight child may lead mothers to seek support, whereas mothers who do not recognise overweight may not seek support. Concerns about overweight and awareness that a child is overweight may not lead mothers to undertake healthier practices if they do not have strategies to undertake these.

Conclusions: Health professionals and early years workers are a key resource to communicate effectively with the mothers about their expectations and concerns about their child's growth and feeding practices and may refer to services that provide advice on how to maintain healthy growth.

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AUTHORS DECLARATION

I declare that this thesis is a presentation of original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

PART I

Introduction to Research
Project, Background, and a
Critical Narrative Review of
the Evidence

Chapter 1 - Introduction to the Research Project and Background

1.1 CHAPTER INTRODUCTION

This chapter aims to provide an introduction to the thesis. In the first section “Introduction to the research project”, I justify why it is important to explore the perception and concerns that mothers of young children living in Bradford have about their pre-school child’s weight as well as their feeding practices. I then outline the aim of the thesis, the research methods that will be used, and how the thesis is structured. In the following section “Background to the Research project” I provide further background information about adequate nutrition during the first years of life. Also, I summarize the evidence about the factors that may be influencing mothers feeding practices and how mothers’ perceptions and concerns about their child’s weight may be related to their feeding practices.

1.2 INTRODUCTION TO THE RESEARCH PROJECT

1.2.1 Thesis Rationale

Preventing malnutrition, including underweight and overweight, in infants and young children and helping them to acquire healthy lifestyles in early childhood are necessary for adequate growth, proper cognitive and behavioural development, and safeguarding of their current and future health (World Health Organization, 2014). In the U.K., around 22% of children are overweight or obese by the time they start school. In the most deprived areas, this percentage is more than twice that of the least deprived areas (Lifestyle Statistics NHS Digital, 2018). These statistics are of concern due to the consequences that childhood overweight has (Gurnani, Birken and Hamilton, 2015). Maternal feeding practices may play an essential role in the development or prevention of childhood obesity during the early years. Therefore, it is important to understand the factors that lead to healthy and unhealthy feeding practices.

In line with studies from other countries (Parry *et al.*, 2008; Towns and D’Auria, 2009; Rietmeijer-Mentink *et al.*, 2013; Lundahl, Kidwell and Nelson, 2014; Tompkins, Seablom and Brock, 2015), a study in the U.K. (Parkinson *et al.*, 2011) which included mothers of school-age children found that some parents struggle to recognize the actual weight status of their children. This is of concern because, according to behaviour change models (Becker *et al.*,

1977; Contento, 2015), mothers' beliefs and concerns about the child's weight may influence their health behaviours, including feeding practices and seeking support or enrolling in healthy lifestyle programmes.

A systematic review found that mothers are more likely to underestimate the weight of their children when they are under the age of six than when they are older (Rietmeijer-Mentink *et al.*, 2013). Studies in other countries or including mothers of older children can give us some idea of who might be more likely to not perceive their child's weight accurately. However, it is possible that these factors vary across settings due to the environmental factors that may shape women's beliefs and consecutive health behaviours. To my knowledge, no recent study in England has assessed whether mothers living in deprived areas are likely to misperceive their very young child's weight, and if they do so, what factors are associated with these inaccurate estimations.

Bradford is among the most deprived areas in England (Department for Communities and local Government, 2015), and 25.3% of the children at reception in 2017/2018 were overweight or obese (Public Health England, 2019). Strategies to contribute to the prevention and management of obesity in Bradford are being put into place (City of Bradford Metropolitan District Council, 2016; Local government association, 2018), as is the implementation of the Health Exercise Nutrition for the Really Young (HENRY) programme (Rudolf *et al.*, 2010). However, there is still the need for more research to help understand the factors influencing mothers' feeding practices, their beliefs around their child's weight and childhood obesity. Knowing this would help to build on the understanding of how the strategies that are being put into place can impact upon the prevention of childhood obesity, and also understand how the community and the families could be helped in the prevention of childhood obesity.

1.2.2 Thesis Aim

This thesis aims to contribute to the understanding of the factors that influence feeding practices amongst mothers of young children living in Bradford. Using mixed methods, this research project explores the perceptions and concerns that mothers of young children have about their child's weight, what factors may contribute to inaccurate estimations and concerns about it, and how mothers feeding practices relate to their beliefs around their children's weight. Specific aims and objectives are presented in the introductory chapters of the quantitative (Part II: Chapter 3) and qualitative (Part III: Chapter 8) strands of this research accordingly.

1.2.3 Research Methodology

This thesis is based on a pragmatic research philosophy (Cherryholmes, 1992; J.W. Creswell, 2014). As a researcher, I am not committed to any one system of philosophy and reality. Instead, the methods, techniques and procedures used were chosen based on which it was considered were the best means to answer the research questions within this project (J.W. Creswell, 2014).

In food-related behaviour research, researchers try to understand how and why individuals or populations act in certain ways. To do so, research in this field has used qualitative, quantitative and mixed methods designs depending on the questions of interest (Dean, Raats and Lähteenmäki, 2015; Zoellner and Harris, 2017). Mixed methods research consists of the integration of qualitative and quantitative methods in a single research project and the integration of the corresponding data at any point of the research (John W. Creswell, 2014). This integration is done so that the outcomes of the different methods are mutually illuminating (Bryman, 2008; Fetters, Curry and Creswell, 2013; Zoellner and Harris, 2017).

This research project uses an explanatory sequential mixed methods research approach which consists of undertaking the quantitative research, analysing the results, and then explaining the findings in more detail using qualitative research. (Bryman, 2008; Fetters, Curry and Creswell, 2013; John W. Creswell, 2014; Dean, Raats and Lähteenmäki, 2015). This mixed methods approach was chosen with the hope that each aspect builds on the other to provide a better understanding of the individual perceptions, psychological influences and social and environmental factors that influence the feeding practices, perceptions and beliefs about their child's weight, of mothers living in Bradford.

The thesis contains four parts. Part I encompasses the background to this project and contains a narrative review of the factors associated with maternal accuracy in estimating their young child's weight. This review of the literature helped to shape the research questions and to identify factors that are worth exploring in the quantitative strand of this research. Part II corresponds to the quantitative strand. This strand describes how mothers living in Bradford perceive their own and their preschool child's weight, and whether they are accurate and/or concerned about it. Also, in this strand, I explored which mother and child characteristics are associated with accuracy and concern that a child will become overweight and if the mothers' perceptions and concerns are associated with their feeding practices. Secondly, the factors associated with maternal accuracy in estimating their own weight and the factors associated with their feeding practices were also explored. Part III of

this thesis uses a qualitative approach to support the understanding of the results obtained in the quantitative strand of this project and to explore the attitudes and beliefs that mothers of children under the age of five living in Bradford have around childhood overweight, their child's weight, and their feeding practices.

The integration of the qualitative and quantitative findings was done at the interpretation level through a contiguous and weaving narrative approach (Fetters, Curry and Creswell, 2013). In other words, the findings of each strand are presented and discussed separately (contiguous approach); however, in Part IV (Chapter 11), findings are pulled together and discussed (weaving approach).

1.3 BACKGROUND TO THE RESEARCH PROJECT

1.3.1 Introduction

This section provides the background of this research project. First, it presents an overview of what is and what is not considered to be good nutrition and growth during the first years of life, and it discusses the importance of preventing childhood obesity in the U.K. from early childhood. Then, an overview of the modifiable and non-modifiable determinants of overweight and obesity is presented. Following this, the factors influencing healthy eating and feeding practices are explored. Considering that mothers' perceptions and concerns about their child's weight may affect their feeding practices, this section also reviews the evidence on relationships between these constructs and the factors that may influence these concerns.

1.3.2 Nutrition and Growth during the First Years of Life: Healthy Growth and the Determinants Influencing Unhealthy Growth

1.3.2.1 The Importance of Healthy Nutrition during the First Years of Life

From birth, children's growth and development is influenced by their genetics and nourishment (Trahms and McKean, 2007). Children will follow their genetically predetermined growth rate if they are not affected by undernutrition, imbalanced nutrient intake, and overnutrition (Trahms and Pipes, 1997). To ensure an adequate nutritional status, the WHO recommends to exclusively breastfeed¹ the infant during the first six months and

¹ **Exclusive breastfeeding:** Providing the infant only breastmilk, which can be either expressed or directly fed from the breast, without any other liquids provided with the exception of medicines, vitamins and minerals (World Health Organization, 2011).

to continue breastfeeding up to the second year or beyond in addition to adequate complementary foods (World Health Organization, 2002). Also, the WHO recommends that infant and young child feeding should be timely², adequate³, safe⁴ and properly fed⁵.

In the U.K., healthy eating guidelines recommend that children between the age of one and four receive a combination of nutritious foods which include recommended servings from the different food groups⁶. Also, the guidelines recommend that children have regular meal patterns of three meals with two to three planned nutritious snacks (Crawley, 2006), and that they receive adequate portion sizes (More and Emmett, 2015). Moreover, children should achieve the recommended guidelines for physical activity⁷ (Department of Health and Social Care, 2011).

A child who does not receive and/or absorb the nutrients (micro and/or macro) to cover their nutritional requirements is at risk of developing protein-energy malnutrition and/or deficiencies of essential vitamins and minerals, such as iron, iodine, vitamin A and zinc (Müller and Krawinkel, 2005; Caulfield *et al.*, 2006). These deficiencies can cause serious conditions such as underweight (stunting or wasting), anaemia, a decrease in immune function, and neurological impairment, among others. Overnutrition, on the other hand, refers to an imbalance of energy when more energy is consumed than is used for metabolic processes and physical activity. This will lead to obesity, which is an abnormal or excessive accumulation of fat, representing a long-term risk for health.

Much research has explored the factors leading to imbalances in nutrient intake and nutrient expenditure. Disease, poor quality of foods consumed, and food availability are only a few examples of the numerous factors that could affect the energy balance of young children (Tershakovec A, 2002; Trahms and McKean, 2007; Gurnani, Birken and Hamilton, 2015). Undernutrition, which is an underlying cause and consequence of poverty, has been a major health burden in developing countries (International Food Policy Research Institute, 2015).

²**Timely:** Introduced when the infant nutritional requirements need it (World Health Organization, 2002).

³ **Adequate:** that allow the infants to cover their nutritional requirements (World Health Organization, 2002).

⁴ **Safe:** hygienically stored and prepared (World Health Organization, 2002).

⁵ **Properly fed:** feeding process will be responsive and consistent to the infant's hunger and satiety cues, psychomotor skills and psychosocial necessities (World Health Organization, 2002).

⁶ **Food groups:** Bread, rice, potatoes, pasta and other starchy foods; fruit and vegetables; milk cheese and yogurt; meat fish eggs; nuts and pulses; foods high in fat and sugar.

⁷ **Recommendations of physical activity:** carers of children under five who are not yet capable to walk should minimise the time they spend being sedentary, and for those who are able to walk should be physically active daily for at least 3 hours spread throughout the day.

Despite a decline in rates of undernutrition in the past two decades, the worldwide problem of malnutrition remains high as overweight and obesity are becoming more frequent among deprived populations of all age groups (Black *et al.*, 2013).

Malnutrition, the scale of the problem

The rapid economic growth, urbanisation, development, and modifications in the food systems of deprived populations have produced changes in the diet and lifestyles of the populace, leading to a nutritional transition. In the most deprived communities, problems of under- and over-nutrition are present in the same geographical areas, and occasionally in the same individual. An example of this is the presence of micronutrient deficiencies, such as iron in overweight children. (Tzioumis and Adair, 2014). Obesity has nearly tripled since 1975 and affects both adults and children (World Health Organization, 2018). Data from the Global Nutrition Report showed that in 2014 there was a combined global obesity and overweight (BMI ≥ 25) rate of 39% for female and 37% for males (International Food Policy Research Institute, 2015). According to data of the World Health Organization, in 2016 41 million children under the age of 5 were overweight or obese (World Health Organization, 2018)

In England, problems of undernutrition are not a major public health concern, but childhood overweight and obesity rank highly on the public health agenda (Swanton, 2008). This is because obesity rates in England are higher for both adults (age 16 or over) and children (age 2 to 15) than they were 20 years ago. Between 1993 and 2014 there was an increase in obesity rates in both men (2%) and women (4%). The Health Survey for England 2014 showed a combined overweight and obesity rate of 65% for men and 58% for women in 2014 (Craig, Fuller and Mindell, 2015). In the case of childhood obesity, the national rates seem to have stabilised in 2007 (Stamatakis, Wardle and Cole, 2010). However, the Health Survey for England 2017 showed that almost a quarter of children were overweight or obese at school entry (Dalrymple, Martyni-Orenowicz and Poston, 2017).

Consequences of childhood obesity

The fact that childhood obesity is present from the early years is of concern as overweight during childhood can lead to obesity in adulthood (Freedman *et al.*, 2005). Moreover, prolonged exposure to obesity leads to metabolic disorders and impacts on blood pressure, cholesterol, triglycerides and insulin resistance, which in turn increase the risk of non-communicable diseases such as type 2 diabetes mellitus (T2DM), cardiovascular diseases and cancer (World Health Organization, 2016).

Excess body weight during childhood has other immediate consequences that will affect the development of the child. Some evidence suggests that overweight children are likely to develop musculoskeletal problems (Paulis *et al.*, 2014), may be unable to metabolize Vitamin D (Vimaleswaran *et al.*, 2013; Pereira-Santos *et al.*, 2015) and iron (Aigner, Feldman and Datz, 2014) which can result in metabolic disorders, and show increased inactivity and fatigue (Afzal *et al.*, 2014; Aigner, Feldman and Datz, 2014). Furthermore, childhood overweight may result in delayed sexual maturation in boys and early sexual maturation in girls (Wang, 2002). Moreover, if obesity is not reversed in young girls, when they reach reproductive age they will be more likely to develop polycystic ovary syndrome infertility, and in case of pregnancy, women will be more likely to suffer from preeclampsia, gestational diabetes, and macrosomia in their offspring (Leddy, Power and Schulkin, 2008; Kulie *et al.*, 2011). There is some evidence that suggests that overweight and obesity also cause mental health problems such as lack of self-esteem (Kaplan and Wadden, 1986) and anxiety (Burke and Storch, 2015). Nonetheless, the vulnerability for weight stigma will vary across sex, age, ethnicity and weight categories (Puhl and Latner, 2007).

The chronic conditions caused by obesity have substantial economic implications that enlarge the income gaps within society. Children living in families falling into the lowest income quartiles have a higher risk of developing childhood obesity than children from more affluent families (El-Sayed, Scarborough and Galea, 2012). The direct expenditures in treatment are not the only economic consequences. Chronic degenerative diseases decrease a person's working capability due to the deterioration of health that they cause. This deterioration will have a negative impact on quality of life, longevity, and disability-free life years, which in turn causes, inter alia, the early retirement of the workers, work absenteeism, and decreases in productivity. (Wang *et al.*, 2011).

The problem of obesity and overweight also have substantial economic implications for national health systems, as the cost of treatment of these diseases caused by obesity and overweight are high. Estimates suggest that the medical costs of people who suffer from obesity are 30% greater than for individuals with a healthy weight (Thorpe *et al.*, 2004). Wang and colleagues developed a simulation model that projected the probable economic consequences in the UK by 2030; it showed an estimated increase of £1.9-2 billion per year in medical costs associated with treatment (Wang *et al.*, 2011). Direct expenditures for the treatment of chronic degenerative diseases included: hospitalisation, drugs, and laboratory tests among many others.

Actions to prevent childhood overweight and obesity

The prompt detection and reversion of any malnutrition during early childhood and infancy is necessary to prevent adverse health outcomes during childhood and adult life. Childhood overweight is of particular concern in the U.K. due to its high prevalence at early ages. Therefore, strategies to prevent it are being put in place. National and local plans to prevent childhood overweight include encouragement of food and drink companies to reduce the calories and sugar in everyday foods consumed by children; reducing the marketing and promotion of unhealthy food and drink, working with local authorities and schools to offer local solutions (Department of Health and Social Care: Global Public Health Directorate: Obesity Food and Nutrition, 2016). An example of the local solutions that are being put in place is the implementation of the Health Exercise Nutrition for the Really Young (HENRY) programme (Rudolf *et al.*, 2010), which aims to “to enhance skills so that community and health professionals are more effective, sensitive and confident when working with parents of very young children around lifestyle change and obesity prevention”.

To be able to prevent malnutrition problems in the early years, it is important to detect unhealthy growth patterns and identify factors associated with childhood overweight. For example, identifying modifiable risk factors of childhood overweight and identifying those at higher risk of it.

1.3.2.2 Assessing Children’s Nutritional Status

From birth and until the child achieves adulthood, children have changes in body proportions, composition and growth rates (Sulkes and Dosa, 2002). The pattern of growth is unique for every individual, and different factors will influence this growth (Cameron, 2008). As a result of the different influences on this process, in order to be able to identify cases of under or over nutrition that put the child’s health and development at risk during the first five years of life, several international and national growth references and growth standards⁸ have been developed (Dinsdale H, Ridler C, 2011)

⁸ **Growth references:** linear growth indicators constructed by modelling growth curves from different populations (Wang and Hsin-Jen, 2012), **Growth standards:** growth patterns derived from healthy and affluent populations with the potential to achieve their optimal growth (Wang and Hsin-Jen, 2012)

The WHO developed the “WHO Child Growth Standards” (WHO Multicentre Growth Reference Study Group, 2006) with a cohort of boys and girls from different ethnicities who were predominantly breastfed for at least four months after birth. Using the anthropometric measurements of the first five years, the WHO developed four growth indicators by sex and age groups. These are weight-for-length/height, weight-for-age, length/height-for-age and body mass index-for-age.

The body mass index (BMI), is a ratio that associates the person’s weight with his or her height or length.

$$BMI = \frac{\text{(weight in kilograms)}}{\text{(Length or height in meters)}^2}$$

This index enables estimates of the prevalence of obesity and overweight across populations as it is an indirect measure of adiposity for adults and children over the age of two. BMI does not necessarily increase with age. Notwithstanding, in the case of children, the optimal level of BMI will vary across ages; therefore percentiles specific to age are used to estimate obesity and overweight across this population (Roy *et al.*, 2016).

Adequate child growth is expected to lie between the -2 and +2 z-scores of the growth indicator (World Health Organization, 2008) (Figure 1.1). Ideally, a child’s growth trajectory should move in parallel or gradually towards the median of reference, which will mean that the infant is maintaining a healthy weight. If a child’s growth trajectory is moving away from the population mean, this will mean that the child might be growing either too slow or too fast in comparison to other children and attention must be paid as they might be at risk of developing underweight or overweight. According to the WHO definition for children over the age of two, a child is considered as underweight if their weight for length or BMI for age is below the – 2 z-score, at risk of overweight if the child is between the 1 z-score and 2 z-score, overweight between 2 z-score and 3 z-score and obese over the 3 z-score (World Health Organization, 2008).

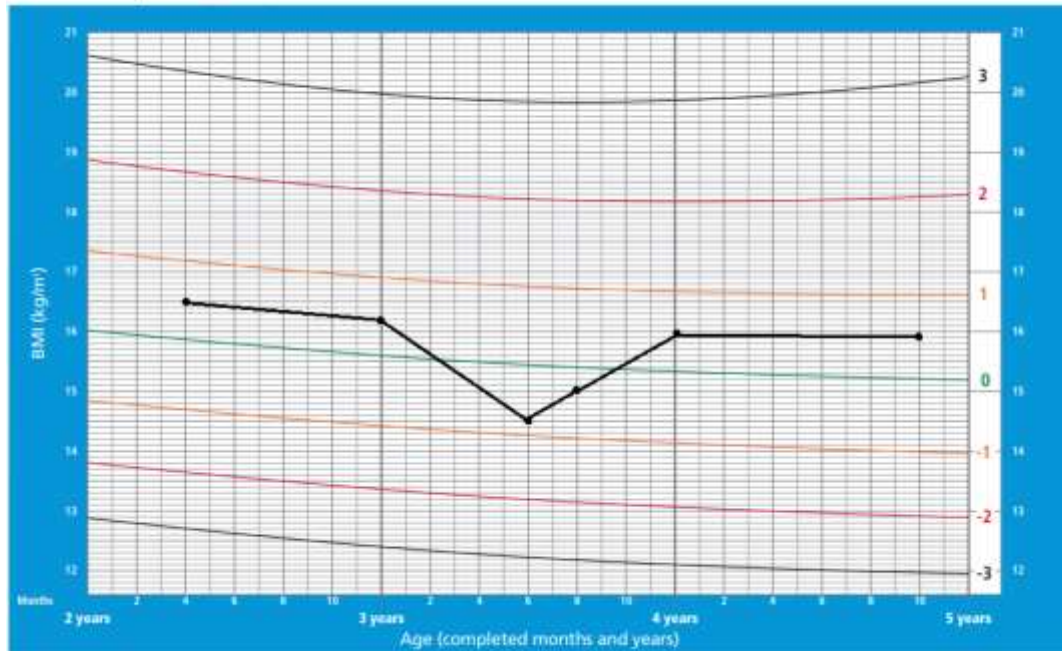
In the case of infants under the age of two, there are no established cut off points that categorise them as overweight or obese (Roy *et al.*, 2016). However, as a consequence of the increased prevalence of obesity and overweight at young ages, predominately weight-for-length followed by BMI for age have been used to track cases of children who are over the expected limits for an adequate growth (de Onis *et al.*, 2012).

A recent study by Roy et al. (2016), revealed that a high BMI for age at two months postpartum was a better predictor of obesity at age two than weight-for-length. In their study, a BMI higher than the 85th percentile (equivalent to 1.04 z-score) and higher 97.7th (equivalent to a Z-score of 2) predicted 31% and 47% of the cases of obesity at age two respectively. These cut off points that Roy and colleagues employed during their study are similar to those established by the WHO to assess the risk of overweight and overweight in children aged 2 or more.

It is essential to take into consideration that anthropometric measurements represent the infant's weight status at the moment of assessment (World Health Organization 2008). Previous and following assessments can give us an idea if the child is following a healthy growth rate. For example, Figure 1.1 and Figure 1.2 are the growth charts of a boy and a girl who up to the fourth year, had BMI z-scores in the normal limits. Both growth charts show variations in the children's growth rates. In Figure 1.1 it can be seen that the boy at the age of three and a half had a steep reduction in his BMI for age, which could be caused by disease, however, by the age of four, his BMI z-score was the same as the one he had before the disease. If we saw the assessments of the girl in Figure 1.2 at the age of four without any prior information, we would not know that the child might be at risk of being overweight by the age of five. Therefore, it is useful to have information about the child's growth to be aware of any health risks for the child.

BMI-for-age BOYS

2 to 5 years (z-scores)

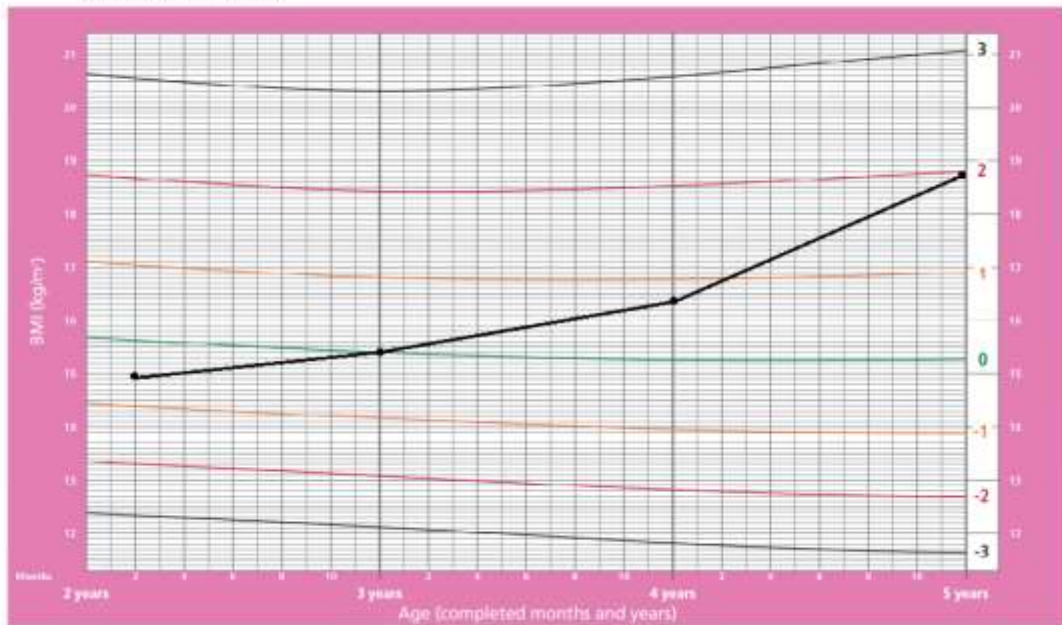


WHO Child Growth Standards

Figure 1.1- Example of a BMI trajectory of a boy

BMI-for-age GIRLS

2 to 5 years (z-scores)



WHO Child Growth Standards

Figure 1.2- Example of a BMI trajectory of a girl

Assessment of the child's growth in the U.K.

The U.K. "Health Visiting Programme" (HVP) (Department of Health, 2015), is a universal health service which looks to improve the health and wellbeing of children under the age of five. The HVP includes elements of the previous Healthy Child Programme, which promoted healthy eating and physical activity to reduce childhood obesity, as well as providing an early recognition of growth disorders and risk factors for obesity (Department of Health, 2009). As part of the HVP, women receive as standard one antenatal visit and four postnatal visits (Birth visit 10-14 days, 6-week check, 1-year review and 2-year review) from a health visitor. The Guidelines of the Healthy Child Programme recommend measuring the child's weight and length and plotting them when there is a concern about the child's growth development. Parents are given a "Child Health Record" or "Red book" (NHS Trust, 2009) which they can use to find information and advice about infant feeding and to monitor their child's growth. The red book also includes information about development across different stages of infancy and early childhood. In the Redbook, it is also recommended that to avoid unnecessary concern the child should not be measured more than once a month between two and six months, once every two months between the six and the twelve months, and once every three months over twelve months (NHS Trust, 2009).

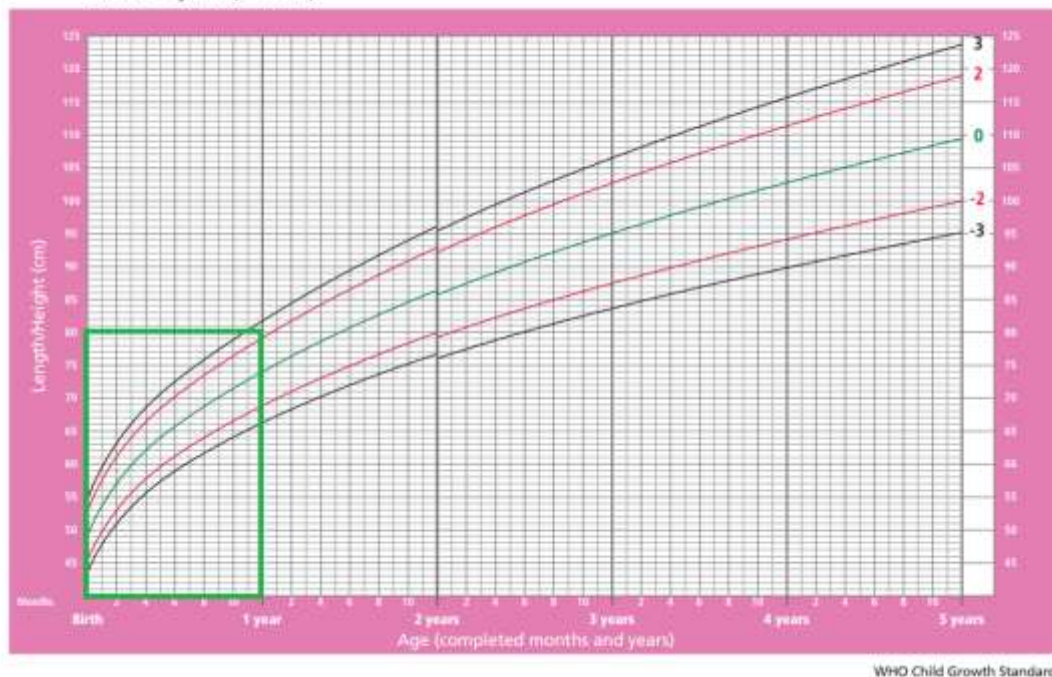
In addition to the health reviews during infancy and early childhood, the U.K. National Child Measurement Programme of England (NCMP) is an approach that was established to support strategies to tackle obesity. The programme was set up in 2005 and measures children of reception class (four and five years old) and year six (ten and eleven years old) (Swanton, 2008).

1.3.2.3 Variations in Growth and Development during the First Years of Life

Growth rate and energy requirements used for metabolic processes and physical activity vary between and within individuals across life (Cameron, 2008). The variations within individuals in growth are more evident during the first years of life and in puberty. For instance, as Figure 1.3 shows that the line that marks the curve of growth rate in length during the first year of life is steeper than at the age of five. This is because growth velocity in the first year of life declines from an average of 20 cm/year in the first few months to 10–12 cm/year by the first year of age. Then, during the second year, the children's growth velocity averages 10–13 cm/year and 7.5–10 cm/year in the third year. From the age of three to puberty, the growth is stable, and children grow in average 5–8 cm/year (Domel Baxter, 2007; Rosenbloom, 2007).

Length/height-for-age GIRLS

Birth to 5 years (z-scores)



WHO Child Growth Standards

Figure 1.3- WHO length for age growth chart for girls.

Variations in the child's body composition are also present. Babies are born with a minimal amount of fat stores; however, during the first year of life, they will feed more and increase their fat stores to ensure growth. This is a biological mechanism designed to provide a buffer in case they are weaned from the breast when a younger sibling is born (Wright, 2015). The rapid increase of fat mass reaches its peak around the sixth month postpartum. Following this, the rate of fat mass growth slows relative to fat-free mass growth, resulting in a decline in percent body fat (Demerath and Fields, 2014).

As can be observed in the growth trajectories of BMI for age (Figure 1.4), during the first week after birth (A), there is a normal decline in BMI. BMI increases and again starts to decline gradually, between six months and two years (B). By the second year postpartum, this BMI will be sustained over time (C).

During the first two years of life, the infant's birth weight will triple, whereas length will increase by 50%. After this, rapid growth continues until puberty, and children will gain around 2 to 3 kg of weight per year (Domel Baxter, 2007).

BMI-for-age BOYS

Birth to 5 years (z-scores)

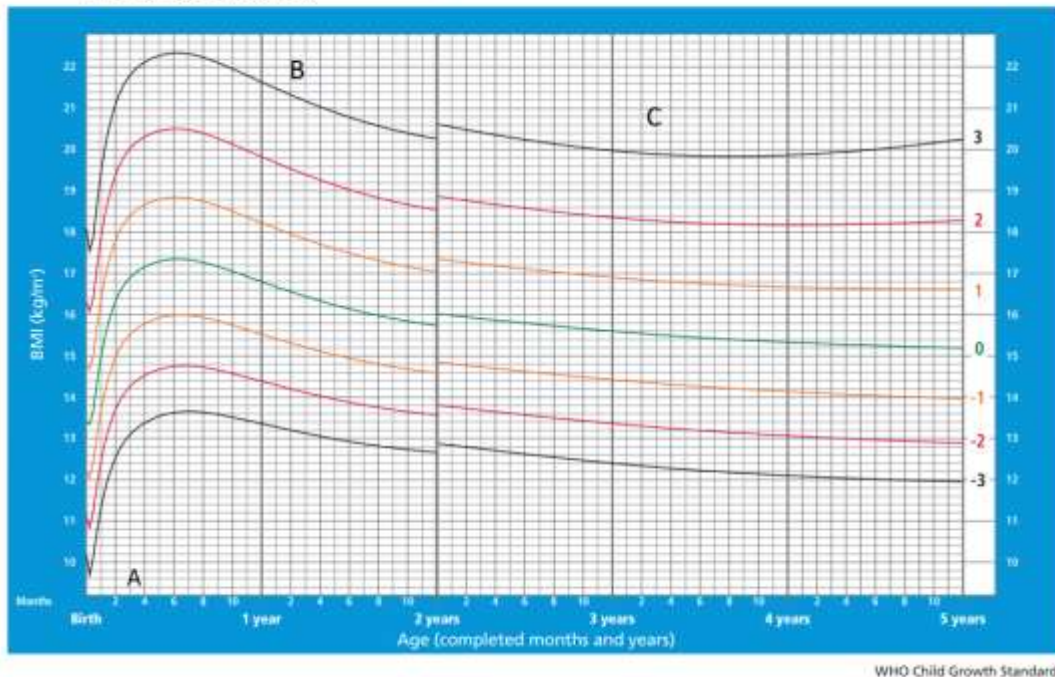


Figure 1.4- WHO BMI for age trajectories from birth to 5 years old.

Variations in growth rates across individuals are evident during the first year of life. Children should follow a channel of physical growth⁹; however, in some cases, the child's growth channel will not be apparent until thirteen months after birth (Trahms and Pipes, 1997). A child who has been born with a low birth length but born to "tall" parents, will catch-up¹⁰, in other words, grow more rapidly than a child who was born larger but with 'shorter genes', who will lag-down¹¹, or grow slower in order to enter their channel of physical growth.

Children's appetite and food preferences also vary between and within children during the first years of life. During the first year, as the growth rate decreases, the energetic cost of growth is diminished (Bier, 2008), as well as the child's appetite (Domel Baxter, 2007). In this period, children are going through the transition from milk to adults' foods, in which they learn about food and eating based on their experiences. Children learn how much and when to eat, their likes and dislikes, and their food culture (Birch, 1998). During these first years, especially around 18 months, children are predisposed to fear or dislike unfamiliar foods (neophobia). This may be a genetic response to prevent mobile children from poisoning

⁹ **Growth channel:** Curve of growth that the child will follow stated as a percentile or z-score on the growth chart

¹⁰ **Catch up growth:** Growth rate increases to genetic potential.

¹¹ **Lag down growth:** Growth rate decreases to genetic potential

(More, 2015). However, neophobia is transitory and will vary among children as some develop it more than others, influenced by their food experience (Birch, 1998).

For parents, these variations in growth and weight within and between children, as well as the changes in their child's appetite, could cause concern about their child's health. Therefore, parents may need to be reassured about the adequate nutritional status of their children and be provided with strategies to provide appropriate food experiences.

1.3.2.4 Infant's Weight and Height Development Can Predict Health Problems

Fairley and colleagues provided evidence of ethnic differences in child's growth (Fairley *et al.*, 2013). In an analysis of data from the Born in Bradford cohort study, they found that Pakistani children born in England gained more length during their first four months postpartum than White British children, and that Pakistani infants gain more weight per month than White British children after nine months of life. Fairley *et al.* (2013) discussed that it is possible that these faster growth rates could be beneficial for their early health, but that attention needs to be paid to longer-term growth trajectories, as accelerated growth trajectories could contribute to a future risk of cardiovascular disease.

Inadequate foetal and postnatal nutrition can result in physiology that will lead to adaptations for energy conservation (Jones-Smith *et al.*, 2013). For example, when a child is ill or not receiving enough nutrition, their growth velocity will decrease. Once the child gets better or nutrients become available, the child's growth velocity will increase in order to allow catch-up growth. Nonetheless, the likelihood that the child returns to his or her growth channel will depend on the duration and severity of the nutritional insult (Cameron, 2008).

Compensatory growth is not always beneficial, some studies have shown that infants who have a rapid growth¹² have a high risk for developing further obesity (Monteiro and Victora, 2005; Druet *et al.*, 2012). Studies have found that individuals who have presented growth retardation are likely to suffer from an adiposity rebound, which has been proposed to be generated by genetic mechanisms of energy conservation that increase the individual's survival capacity. Nevertheless, when individuals are exposed to higher energy supplies, these mechanisms of energy conservation will lead the individual to have a rapid growth

¹² **Rapid growth:** The definition of what a rapid growth varies across studies, yet, a frequently used indicator to define this rapid growth has been $>+0.67$ z-scores in weight for age in two different periods in childhood (Monteiro and Victora, 2005).

trajectory, causing a high accumulation of fat mass and insulin resistance (Dulloo *et al.*, 2006). The mechanisms of these growth alterations are still the subject of research, though it has been established that both low (Fabricius-Bjerre *et al.*, 2011; Sebastiani *et al.*, 2015) and high (Weng *et al.*, 2012) birth weights, as well as rapid growth rates caused by overnutrition or compensatory growth (Druet *et al.*, 2012; Jones-Smith *et al.*, 2013; Ratnasingham *et al.*, 2016), are associated with adverse health outcomes such as childhood obesity and metabolic and cardiovascular complications early in life. Also, it has been proposed that early alterations in body composition, such as accumulation of excess body fat caused by overnutrition, may better predict adverse health outcomes than the child's weight itself (Ratnasingham *et al.*, 2016).

Abnormal growth rates caused by malnutrition pre and postnatally will increase the child's risk of childhood obesity and obesity later in life (Ratnasingham *et al.*, 2016). Additional modifiable and non-modifiable factors are going to play a role in the child's growth and their risk of developing childhood obesity. Understanding these determinants will allow us to create fair conditions for adequate development of the child and prevent obesity and its adverse health outcomes.

1.3.3 Factors Influencing the Development of Obesity

A combination of individual, societal and environmental modifiable and non-modifiable factors can lead to obesity (Vandebroek, Goosens and Clemens, 2007). It is important to understand the different factors that put individuals at risk of obesity to create compelling, affordable, practical, acceptable, safe and equitable strategies to tackle this public health problem (Michie *et al.*, 2014).

A systematic review (Woo Baidal *et al.*, 2016) explored the risk factors for childhood obesity during the first 1000 days of life¹³ and summarised findings using a multilevel framework (Glass and McAtee, 2006). As Figure 1.5 shows, several prenatal and postnatal factors increase the child's risk of developing childhood obesity. Some of these factors, such as genetics or socioeconomic status, cannot be modified or are not easy to modify. Other factors, such as physical activity or nutrient intake, can be addressed with strategies that enable behaviour changes of the individual.

¹³ **First 1000 days:** From conception up to the 24 months of the child's birth.

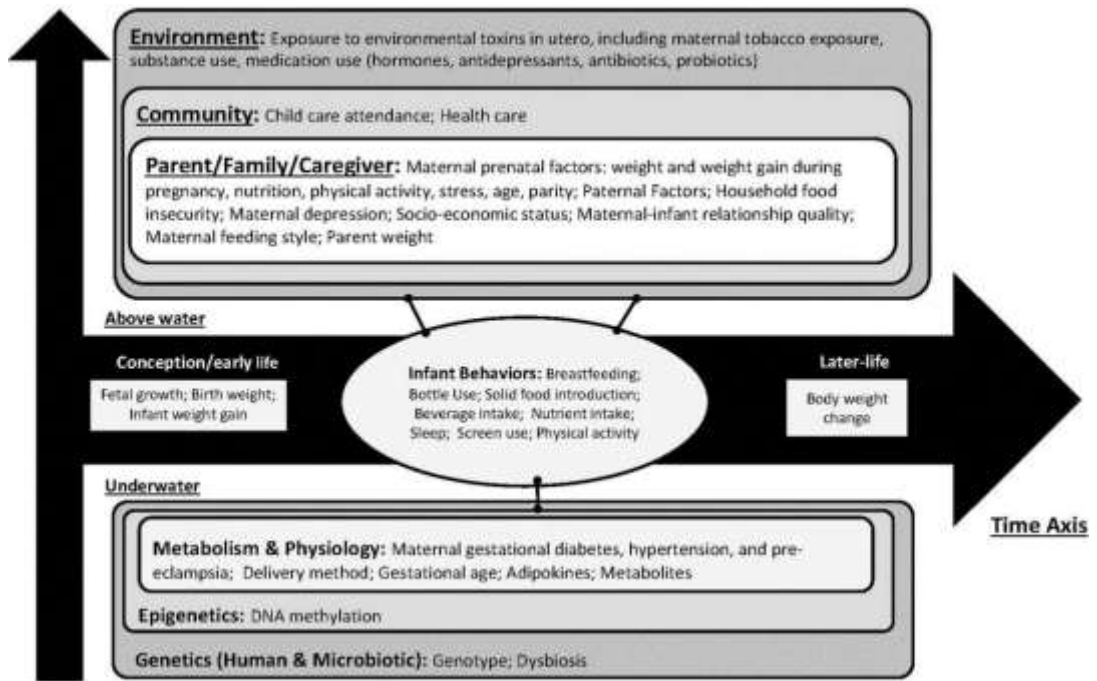


Figure 1.5- Conceptual framework for systematic review of childhood obesity risk factors from conception through age two adapted by Woo Baildal et al. (2016) from Glass and McAtee (2006)

1.3.3.1 Non-modifiable Factors

Accelerated growth rate and low birth weight, poverty (Scantlebury and Moody, 2014), maternal overweight during pregnancy (Weng *et al.*, 2012) maternal education, parity and infant temperament (Wijndaele *et al.*, 2009; Santorelli *et al.*, 2014) are several non-modifiable factors related to childhood obesity. Being aware of the non-modifiable risk factors associated with childhood obesity nevertheless may allow us to identify individuals at higher risk of developing it and target interventions to prevent or reduce the problem.

Overweight and obesity among the lowest household incomes:

People living in the lowest income quartiles have a higher risk of developing obesity and overweight (Scantlebury and Moody, 2014), especially women and children (El-Sayed, Scarborough and Galea, 2012). Findings from three English cohorts found that lower childhood socioeconomic position was associated with higher adult BMI in both genders and that these differences in BMI became larger as age increased (Bann *et al.*, 2017).

Results of the most recent NCMP also showed these inequalities in health between the most and the least deprived areas. Results showed that children who were living in the least affluent areas of England in 2015 were more likely to be overweight or obese in comparison

to those residing in the most affluent areas (Reception year: 12% vs 6%, Year 6: 25% vs 12%) (Niblett, 2016).

Research that has inquired about the causation of these differences in obesity rates by socioeconomic status have found that people living in the most deprived areas have greater accessibility to unhealthy foods than to healthy foods (Cummins and Macintyre, 2006; Fraser *et al.*, 2012) and less access to appropriate spaces to develop physical activity (Ellaway *et al.*, 2007).

Ethnicity

A systematic review (Weng *et al.*, 2012) found no independent association between childhood overweight and ethnicity. However, in the U.K., the National child measuring programme (NCMP) (Niblett, 2016) showed that at reception and year six, the highest prevalence of combined rate of overweight and obesity was in Black or Black British children while the obesity and overweight rates were lowest among Chinese children (Figure 1.6).

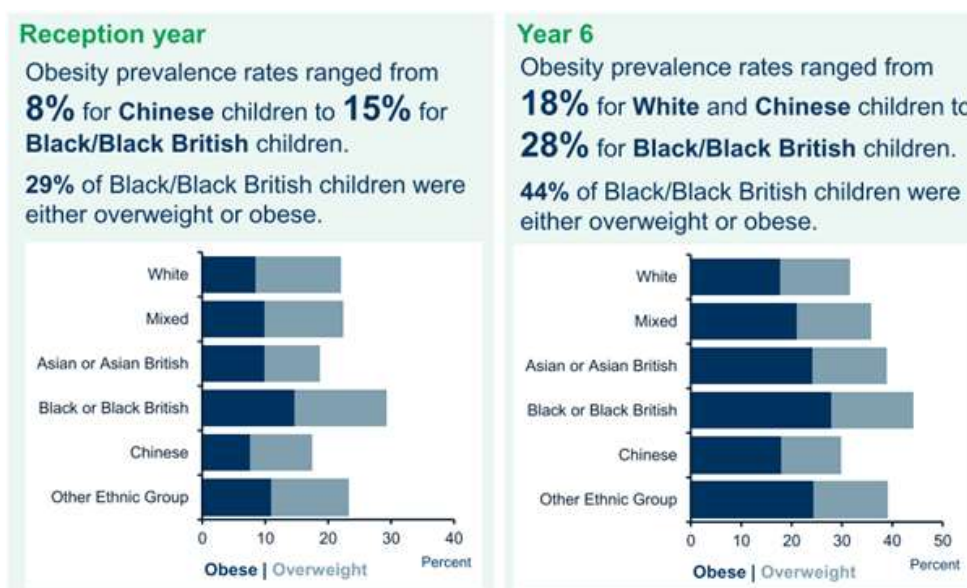


Figure 1.6- Childhood obesity by ethnicity, results from the national child measurement programme 2014/2015

The causes of these ethnic disparities are not easy to establish as several factors could play a role in the development of childhood obesity. First, there is controversy around a potential genetic predisposition to fat accumulation around the abdomen (El-Sayed, Scarborough and Galea, 2011). Also, other authors have attributed rapid growth associated with obesity to a genetic predisposition (Fairley *et al.*, 2013). Moreover, these biological factors are not isolated, and other cultural factors that influence health behaviours of the individuals such

as physical activity and food intake could be causing these ethnic disparities in obesity (El-Sayed, Scarborough and Galea, 2011).

1.3.3.2 Modifiable Factors

Genetics and other biological factors could play a role in the development of childhood obesity. However, environmental and behavioural factors also affect weight. Studies in adults have found that excessive sugar intake, increased portion sizes, and low levels of physical activity have a significant impact on the development of obesity (Bhadoria *et al.*, 2015).

In regards to the behavioural factors that put children at higher risk of developing childhood obesity, it seems the evidence is still inconsistent or insufficient (Woo Baidal *et al.*, 2016). While some evidence suggests that early introduction to solid foods (Pearce, Taylor and Langley-Evans, 2013) and bottle-feeding (Weng *et al.*, 2012) may increase the child's risk of developing childhood obesity, other studies suggest that there might be no such association (Fairley *et al.*, 2015).

Other modifiable factors that have been studied include maternal level of responsiveness while feeding. Studies have found that feeding styles which are low in parental responsiveness are associated with later childhood overweight (Hurley, Cross and Hughes, 2011; Fairley *et al.*, 2015).

Infancy and early childhood are the first window of opportunity to support individuals to adopt health-enhancing behaviours such as adequate dietary patterns. During the transition from milk-feeding to the family diet, the child will develop food preferences and self-regulatory processes of food intake (Birch and Doub, 2014) which will mainly be mediated by the infant's experiences and the environments provided by caregivers (Anzman, Rollins and Birch, 2010). Therefore, the factors that influence parental feeding practices should be identified to promote healthier behaviours.

1.3.4 Factors Influencing Healthy Eating and Feeding Practices

Dietary habits are routines that are semi-automatic responses to situations such as hunger or stress that are acquired and modified through the individuals' life (Contento, 2015). Like any other health behaviour, eating and feeding practices are mediated by a combination of psychosocial and environmental factors such as food preferences, self-regulation, self-efficacy (Brug, Lechner and De Vries, 1995), food availability, and food policies (Larson and

Story, 2009). These mediators, in turn, could be moderated by other factors such as ethnicity and socioeconomic status (Contento, 2015).

The Socioecological Model of Health (SEM) is a framework that has been employed to understand better the factors that influence behaviours by looking at these through different hierarchic domains (DiClemente *et al.*, 2005). Based on the social-ecological model of health, Contento (2015) developed a model which explains the factors influencing food choices (Figure 1.7). The model shows that a combination of intrapersonal and extra personal variables influence food choice. For example, taste, which encompasses food preferences, has a genetic origin; however, the individual perception of a sensitive stimulation caused by a flavour or a texture is learned through repeated exposure and personal and intrapersonal experiences (Contento, 2015).

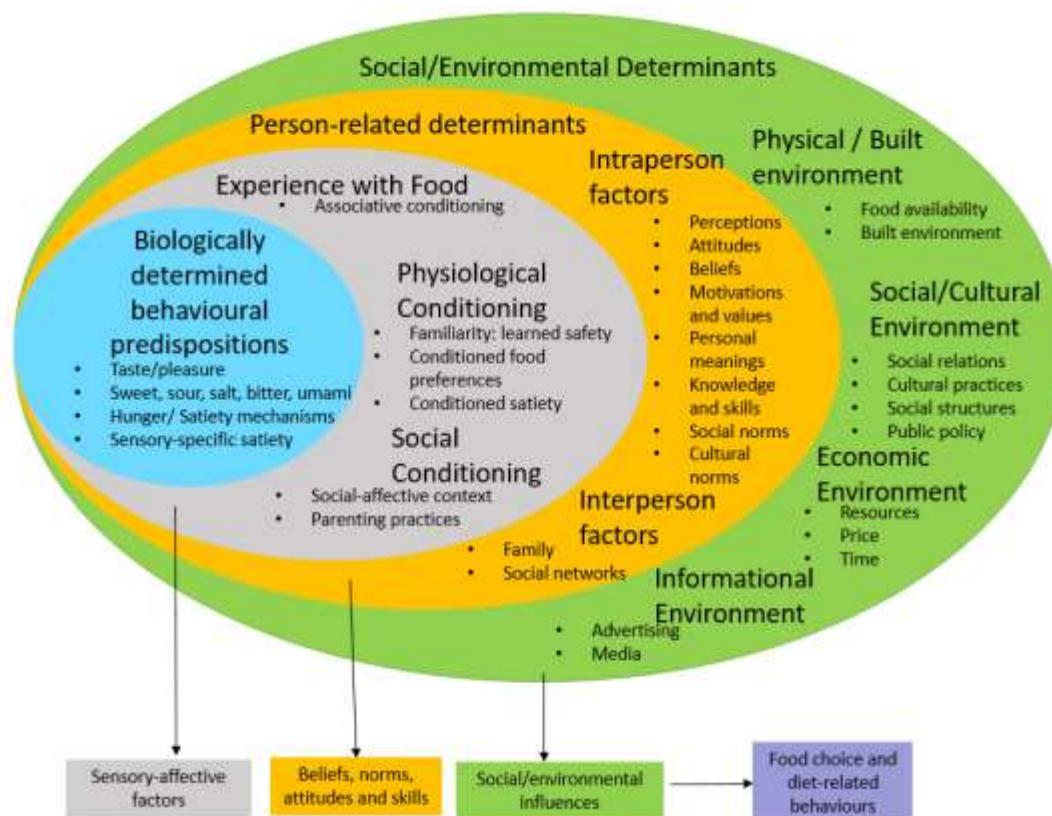


Figure 1.7- Isobel Contento 2016. Social and environmental factors influence food choices and dietary behaviours.

From milk-feeding through the transition to the family diet and the first years of childhood, the child’s eating experiences will be mediated by their caregiver, most often the mother (Scaglioni, Salvioni and Galimberti, 2008).

During mealtimes, the child will receive nutrients needed for growth, but also the experiences from which they learn about their food culture, food preferences and self-regulatory processes (Ventura and Birch, 2008) which are, in turn, strongly associated with the person's food intake (Scaglioni, Salvioni and Galimberti, 2008).

It is possible that the mothers' feeding style may also influence the children's physiological conditioning and intrapersonal factors influencing their food choices and diet-related behaviours later in infancy. For example, longitudinal studies have explored the associations between parental feeding styles (level of responsiveness and demandingness when feeding their child) and consecutive child's BMI. Results have shown that authoritative feeding practices which are characterized by being high in maternal support, involvement, and appropriate control (Hughes *et al.*, 2005), seem to be a protective factor against childhood overweight (Shloim *et al.*, 2015), whereas indulgent feeding styles which are low in parental demandingness and responsiveness have been associated with higher childhood BMI (Fairley *et al.*, 2015).

Infant and young child feeding is a dynamic process which requires reciprocal signalling between the caregiver and the child (Winberg, 2005). During the feeding process, the caregiver has the opportunity to control "what" the child eats, as well as "when" and "how" this process takes place (Ventura and Birch, 2008). It is possible that caregiver behaviour will be influenced by their own sensory, affective factors and caregiver related determinants such as their beliefs and attitudes and their social and environmental factors, as the model (Figure 1.7) of Contento (2015) describes.

Mothers' perception of their own weight might be one of the caregiver intrapersonal factors influencing mothers' feeding practices. For example, one study in the U.S. found that mothers who were overweight and were concerned about their own eating practices had more restrictive behaviours when feeding their five-year-old child (Francis, Hofer and Birch, 2001). It is possible that if mothers perceive a health problem in themselves, they might be likely to take actions to prevent this in their children.

The caregiver's social and environmental factors may also play an essential role in mothers' feeding practices. Some studies have found differences in maternal feeding behaviours such as pressuring the child to eat, emotional feeding, and types of food given, by parent's ethnicity (Hughes *et al.*, 2006; Gray *et al.*, 2010; Blissett and Bennett, 2013; Sahota *et al.*, 2015; Gu *et al.*, 2017; Korani *et al.*, 2018). For example, a study from the Born in Bradford cohort found Pakistani women fed their children more commercial sweet baby meals, fruit,

and sugar-sweetened drinks and water, but less processed meat, than White British women (Sahota et al. 2015). These feeding behaviours could be attributed to their culture, experiences and knowledge around infant feeding, yet it is possible that other factors also explain the differences in these feeding behaviours.

Given that feeding is a dynamic process, the child’s characteristics and behaviour may also play an essential role, as Figure 1.8 shows. The child’s behaviour could directly affect the feeding process, for example, by rejecting or accepting the foods provided by the caregiver. However, the child’s characteristics could also influence the caregiver’s intrapersonal factors that influence the carer’s decisions of “what”, “when” and “how” to offer food.

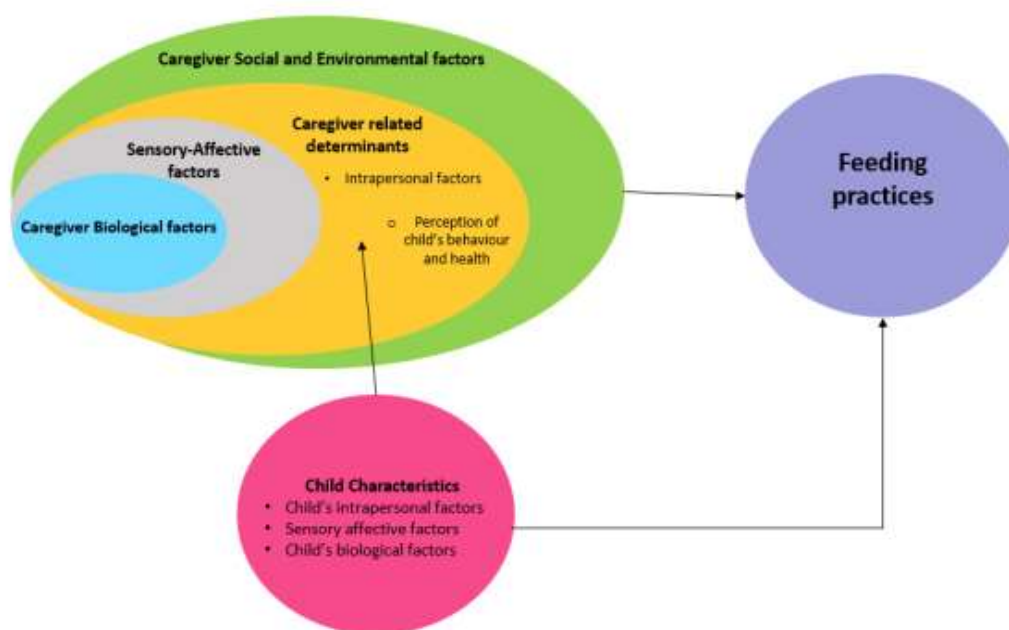


Figure 1.8- Factors influencing mothers’ feeding practices adapted from Isobel Contento (2015)

For instance, some research has found differences in maternal feeding practices by child’s gender in older children (Hughes *et al.*, 2006; Gray *et al.*, 2010; MUSAAD, Donovan and Fiese, 2015). This might be associated with social preferences for body shape by gender.

The child’s eating behaviour might also influence parents’ beliefs about their child’s weight and consequently, their feeding practices. A study in the U.S. found that parents who described their children as fussy eaters were likely to perceive their child’s weight as low (Thompson, Adair and Bentley, 2014). Moreover, parents’ perceptions about their child being a fussy eater have been associated with persuasive and reward feeding practices (Harris *et al.*, 2018) and pressuring feeding practices (Gregory, Paxton and Brozovic, 2010),

whereas concern about child overeating has been associated with more restrictive feeding practices (Dinkevich *et al.*, 2015).

Parental perceptions and concerns about their child's weight may also influence their feeding practices. However, there is an ongoing debate as to whether parental concerns about their child's weight are related to the parent's behaviours to promote a healthy weight in their children. Moreover, there is insufficient evidence to determine if mothers' perception of their young child's weight can influence the mothers' feeding practices.

Findings from studies that investigated the relationship between perception of child's weight and parental feeding practices suggest that an impression of a low weight or concern about it is associated with pressuring the child to eat, more parental control (Webber, Cooke, *et al.*, 2010; Holub and Dolan, 2012; Haines *et al.*, 2018; Harrison *et al.*, 2018), and less restrictive behaviours (May *et al.*, 2007). Moreover, evidence suggests that the perception of a low weight may influence mothers' breastfeeding duration and early weaning. One qualitative study (Redsell *et al.*, 2010) aimed to explore the beliefs that mothers of children 12 months and under had around infant size, growth and feeding. Their findings showed that parental concerns about their child not gaining enough weight were associated with breastfeeding cessation ("*...I stopped breastfeeding cos she wasn't putting on a bit of weight...*") (Redsell *et al.*, 2010). The results obtained by Redsell (2010) are similar to a recent study in Australia which found that maternal perceptions of a low weight on their child were associated with early introduction of solids (Harrison *et al.*, 2018).

Studies have found that parental perception and concern of high body weight has been associated with restrictive dietary behaviours (Francis, Hofer and Birch, 2001; May *et al.*, 2007; Branch *et al.*, 2017; Swyden *et al.*, 2017). Also, a cross-sectional study (Musaad, Donovan and Fiese, 2015) recruited mothers of children between the age of two and five from low-income areas in the U.S. and asked them about their past perceptions of their child's weight when their child was young and 0-5 years old, and their current feeding practices (at the moment of applying the questionnaire). They found that current fatty/sugary food intake was lower among children who were perceived as overweight during the first two years, in comparison to those who were perceived as non-overweight. The authors discussed that it is possible that parents who perceived their child's weight as high during the first years of life, may have decreased the provision of fatty/sugary foods, to prevent or stop the development of overweight in their children, however, because of the cross-sectional nature of their study no causality was established. One study in the U.S. and

another in Australia found that parents that were concerned about their older child's (5-16 years) weight were more likely to report undertaking strategies to prevent obesity such as limit their child's screen time, take actions to improve their child's diet and promote physical activity in their children (Crawford *et al.*, 2006; Moore, Harris and Bradlyn, 2012)

Contrary to the above studies, a qualitative study with mothers of children aged three to five in England found that the promotion or restriction of food intake in their children was mostly influenced by practical and health considerations rather than perceptions around weight (Carnell *et al.*, 2011). Moreover, in a study in the U.S. Branch *et al.*, (2017) found that low-income mothers who had high levels of concerns about future overweight in their child (4 – 8 years) had higher restrictive feeding compared with mothers who reported no concern. However, high levels of concerns about future overweight did not influence family meal practices or food availability. Finally a study conducted in the U.K. which aimed to explore the benefits and harms of providing feedback to parents about their child's (4 – 5 and 10 – 11 years) weight found that after providing feedback about their child's weight, the changes in lifestyle behaviours were minimal suggesting that either parents did not perceive childhood overweight as a health concern hence they did not change their behaviours or parental concerns about their child's weight may not suffice so that parents take actions to improve their child's health (Falconer *et al.*, 2014).

1.3.5 Parental Perceptions and Concerns About their Children's Weight

Mothers' perceptions and concerns about their child's weight may influence their feeding practices. For example, a study (Webber, Hill, *et al.*, 2010) in the U.K. found that mothers whose school age child (7-9 years) had a higher BMI had more restrictive feeding practices and that this association was mediated by their concerns about their child's weight.

Based on the health belief model (Figure 1.9) (Becker *et al.*, 1977), some conditions have to be present so that mothers can take actions to mitigate or prevent the undesired condition (i.e. childhood overweight and underweight). First, mothers need to perceive that their child has a high susceptibility¹⁴ to develop the condition and that the severity¹⁵ of this condition is high. Second, mothers need to appraise the benefits and the efficacy of undertaking behaviours (i.e. feed healthier foods or encourage the child to eat) to prevent it or reverse it. Also, there has to be a perception that it is possible to cope with the elements that involve

¹⁴ **Perception of susceptibility:** Belief of contracting a relevant disease

¹⁵ **Perception of severity:** perception of the seriousness of disease, including emotional arousal and anticipated difficulties of the disease.

developing the preventive behaviours (i.e. having time and knowing how to prepare healthier foods) (Michie *et al.*, 2014). All these perceptions will, in turn, be influenced by other demographic and physiological characteristics (Michie *et al.*, 2014).

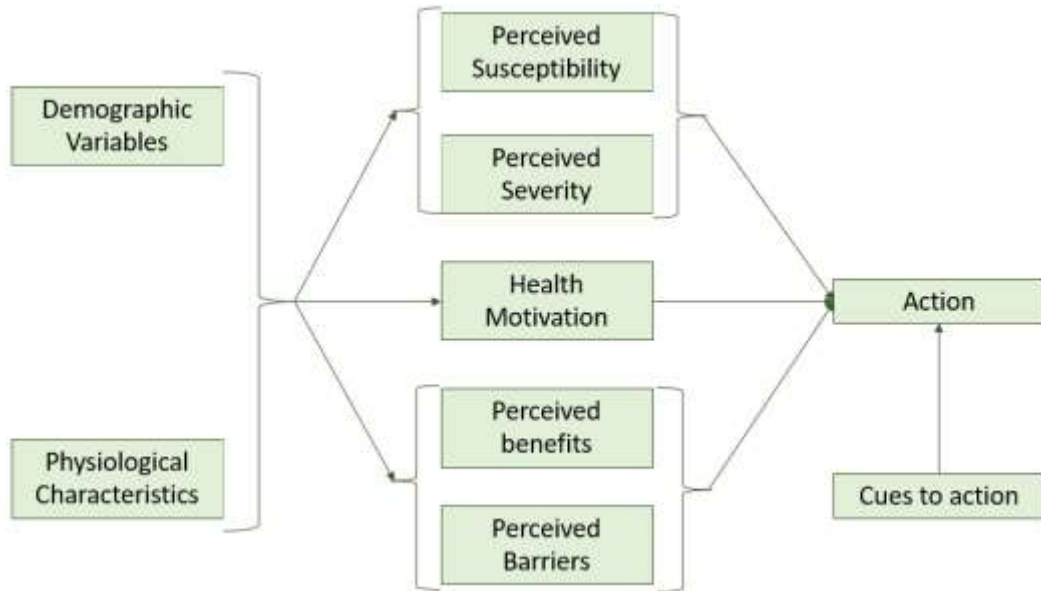


Figure 1.9- The health belief model (Becker *et al.*, 1977)

Some studies have shown associations between parental perception of a high and or low child weight with parental concern about it (Genovesi *et al.*, 2005; Tschamler *et al.*, 2010; Moore, Harris and Bradlyn, 2012; Park *et al.*, 2013; Thompson, Adair and Bentley, 2014; Sylvetsky-Meni *et al.*, 2015). However, evidence suggests that parents are likely to have inaccurate estimations of their children’s weight (Rietmeijer-Mentink *et al.*, 2013; Tompkins, Seablom and Brock, 2015), which could lead to a lack of perceived susceptibility when the risk is present, or to a perception of a high susceptibility when the risk is not present.

Some studies in the U.S. and Canada have found that parents who don’t recognize overweight in their school-age child are less likely to be concerned about their child’s weight and that parents who underestimate a healthy weight are more likely to be concerned about it (Genovesi *et al.*, 2005; Tschamler *et al.*, 2010; Tremblay *et al.*, 2012). As a consequence of these misperceptions, parents might be less likely to take actions to improve their child’s health status if needed or undertake unnecessary actions (i.e. pressure child to eat). For example, a study in the U.K. found that parents who underestimated their child’s weight had children with a lower ‘healthy’ dietary pattern score compared to those whose perception about their child’s weight was consistent with the child’s actual weight status (Almoosawi *et al.*, 2016).

Apart from the accuracy of parental estimations of child weight, parental concerns about child weight are important too. Some studies have reported that some mothers may not perceive their child's weight as a health concern (Towns and D'Auria, 2009; Keenan and Stapleton, 2010; Eli *et al.*, 2014; Syrad *et al.*, 2015). For example, some studies have found that parents may not perceive overweight as a health risk because they believe the child might grow out of being overweight (Towns and D'Auria, 2009).

In addition to the child's actual weight, other factors may play a role in the development of maternal concern about their child's weight. For example, a study in the U.K. found that Afro-Caribbean parents of 3 to 5-year-old children were more likely to be concerned about underweight and overweight, than White British and South Asian mothers (Gu *et al.*, 2017). Other factors that have been identified and that may be associated with parental concern about their child's weight include whether parents attend children's centres (Park *et al.*, 2013), perception of child's eating behaviour (Pesch *et al.*, 2016; Gomes, Barros and Pereira, 2017), feedback from a doctor (Eckstein, 2006; Gomes, Barros and Pereira, 2017), maternal income (Francis, Hofer and Birch, 2001), education (Park *et al.*, 2013), child gender (Campbell *et al.*, 2006; Moore, Harris and Bradlyn, 2012; Gomes, Barros and Pereira, 2017), and child's age (Park *et al.*, 2013).

Findings from the DONALD cohort study in Germany, (Kroke, Strathmann and Günther, 2006) showed that children whose mother perceived their child's weight as low gained more BMI standard deviations than those who were perceived as just right, and that children whose mother perceived their weight as high, lose more BMI standard deviations than those who were perceived as just right. These findings suggest that parents who may have been concerned about their child's weight take actions to prevent health problems. However, it is possible that the presence of these perceptions and concerns does not always lead to parental actions. For example, the KOALA cohort study (Gerards *et al.*, 2012) in the Netherlands, found that children (aged two to nine years old) with higher BMI, were those whose mothers were more likely to accurately perceive their child's weight at the age of five, than those whose mothers underestimated the overweight of their children. These findings suggest that mothers may not have been concerned about their child's weight or that they may have not the elements to develop health behaviours to improve their child's weight.

1.4 CONCLUSIONS

Part I of this thesis aims to provide background information to this thesis. In this chapter, it was described that adequate feeding practices allow children to achieve proper growth and eating habits and prevent specific health problems later in life. Some studies suggest that mothers' perceptions and concerns about their child's growth may influence their feeding practices which in hand may affect the child's health. However, the evidence is insufficient and conflicting. Moreover, mothers may not always perceive their child's weight accurately or be concerned about it.

Using an explanatory sequential mixed-methods approach, this thesis will explore the perceptions and concerns that mothers living in Bradford have about their pre-school child's weight as well as their feeding practices. Part II of this thesis corresponds to the quantitative phase of this thesis which aims to identify mother and child characteristics associated with mothers' misperceptions about their child's weight, concerns about their child will become overweight and mothers' feeding practices. Moreover, Part III of this thesis corresponds to the qualitative phase of this study which aims to add further understanding of the mothers' attitudes and experiences around their child's weight and their feeding practices.

The next chapter (Chapter 2), is a narrative review of the studies looking at maternal accuracy to estimate their child's weight in pre-school children. The narrative review aims to provide up-to-date knowledge about the topic and inform the selection of variables and methods that will be used in Part II of this thesis.

Chapter 2 - A Critical Narrative Review of Studies Investigating the Determinants of Maternal Accuracy in Estimating Their Child's Weight

2.1 CHAPTER INTRODUCTION

This Chapter consists of a narrative review of the studies that have used quantitative methods to explore the perception that mothers of pre-school children have about their child's weight and the accuracy of these perceptions. I first provide the background, aim and methods of this narrative review. I then summarise the literature about the methods used by these studies and the possible factors associated with inaccurate estimations of a pre-school child's weight. This review will support the planning of the quantitative phase of this thesis where I aim to explore the perceptions that mothers living in Bradford have about their child's weight.

2.2 BACKGROUND AND AIM OF THIS NARRATIVE REVIEW

In the previous Chapter, it was described that actions to ensure healthy growth in children have to take place since early childhood. Mothers' perceptions and concerns about their child's weight could be some of the intrapersonal factors that influence the mothers' feeding practices. However, there are a significant number of other studies that have found that parents are likely to make inaccurate judgements about their child's weight (Parry *et al.*, 2008; Doolen, Alpert and Miller, 2009; Rietmeijer-Mentink *et al.*, 2013; Lundahl, Kidwell and Nelson, 2014; Tompkins, Seablom and Brock, 2015).

No study has been identified looking at parental accuracy to estimate their pre-school child's weight in England. However, there is some evidence that suggests that mothers of pre-school children living in England may inaccurately estimate their child's weight. For example, in a study within the British Gateshead Millennium Study (Jones *et al.*, 2011), parents did not favour "official" methods to identify if their 6-8-year-old child was overweight. Instead, they compared their child's weight with other children in the same classroom. This might be an underlying reason why only 30% of the parents within the British Gateshead Millennium Study, recognised that their child was overweight or obese (Parkinson *et al.*, 2011).

A meta-analysis which explored the accuracy that mothers have to estimate their child's weight found that mothers of young children were more likely to underestimate their child's weight than mothers of older children (Rietmeijer-Mentink et al., 2013). As described in Chapter 1, mothers of pre-school children may be likely to underestimate the weight of their children because during the first years children experience variations in growth rates (Cameron, 2008), adapt to the family diet (Birch and Doub, 2014), develop social eating, food preferences, and food neophobia (Addessi *et al.*, 2005). These events could lead to parental concern or inaccurate perceptions of their child's weight.

Understanding which factors lead to inaccurate estimations or a lack of concern for a pre-school child's weight could help us to identify mothers whose child may be at risk of childhood overweight and that are less likely to take actions to ensure a healthy weight in their children.

Previous literature reviews have explored the determinants of women's inaccurate estimations of their child's weight (Parry *et al.*, 2008; Towns and D'Auria, 2009; Lundahl, Kidwell and Nelson, 2014; Tompkins, Seablom and Brock, 2015). These reviews encompass studies of children between the ages of two and eighteen years old. The factors that shape the mothers' beliefs about their child's weight may change across age groups and communities. Therefore, in the quantitative phase of this thesis, I aim to explore if mothers living in Bradford are accurate estimating their child's weight and what factors are associated with inaccurate estimations of a pre-school child's weight.

This Chapter presents a narrative review of quantitative studies exploring the determinants of accuracy in maternal perceptions of their young child's (0-5 years old) weight. This, with the aim of providing up-to-date knowledge of the possible factors that can impact on women's accuracy when estimating their young child's weight. This will allow to inform the selection of variables and methods to be used in the quantitative phase (Part II) of this thesis.

2.3 METHODOLOGY OF THE CRITICAL NARRATIVE REVIEW

This Chapter does not intend to provide a detailed analysis and explanation of the determinants of women's accuracy regarding weight estimation, but rather a descriptive account of the evidence and the factors that have been explored as possible determinants of mothers' misperception about their child's weight. Therefore I considered that a critical narrative review (Sim and Wright, 2000) would suffice for the present purpose.

For this narrative review, no tool will be used to appraise for the quality of the studies. The reason for this is first because it is not intended to exclude studies deemed to be poor of quality. This because a preliminary search showed that there is a small number of studies exploring the perceptions that mothers have about their pre-school child's weight using quantitative methods. Second, because as described above it is not intended to draw any conclusions from the results of the narrative review, but to have an idea of the possible variables that could be explored on the quantitative phase of this thesis. Therefore, and due to the time constraints for this thesis, the studies are only critically appraised within the text.

2.3.1 Data Sources

In order to identify studies on the determinants of the maternal perception of their child's weight during the first five years of life, searches were conducted in OVID Medline (R) (1946 to August 9th, 2016) and Web of Science (1970 to August 20th, 2016) in August 2016. An example of the search strategy is included in Appendix I Table 1. An updated search was conducted using OVID Medline in July 2019, to investigate whether new studies were published. Searches included a combination of the following:

1. perceive, perception
2. accuracy, accurate
3. maternal, mother, parental, parent
4. weight, growth, underweight, overweight, and obesity
5. preschool, child, infant

2.3.2 Study Selection

To be included in the review, studies must have: (1) explored accuracy of parents to estimate their pre-school (aged 5 and under) child's weight using quantitative methods; and (2) have been published between 1946 and July 2019 in the English or Spanish language.

Only quantitative studies were included because as described earlier, this narrative review looks to identify possible factors associated with inaccurate estimations of a pre-school child's weight to inform the quantitative phase of this thesis. A preliminary screening showed that qualitative studies focused on the mothers' experiences and beliefs around their child's weight and eating practices. These qualitative studies were discursive and less obvious of what could be pulled out from these as measurable risk factors of mothers' inaccurate estimations of a child's weight. Therefore, it was decided to focus only on the quantitative studies which would allow the selection of variables on the quantitative phase and consider the qualitative studies for Part III (qualitative phase) of this thesis.

The factors that influence parental perceptions about a child's weight may vary across the child's age (Rietmeijer-Mentink *et al.*, 2013). Therefore, the studies that included parents of older children, although they included parents of younger children were excluded. This would allow focussing only on the possible factors that may influence parents' accuracy to estimate their child's weight when the child is on the pre-school years.

As described above, a preliminary search showed that the number of eligible studies was small. The limited number of studies including children under the age of two could be attributed to the fact that there is no consensus as to how to define overweight/obesity in children of this age group. Due to the small number of potential studies, no other exclusion criteria was considered.

2.3.3 Data Extraction

While 18 studies met the inclusion criteria (Baughcum *et al.*, 2000; Kroke, Strathmann and Günther, 2006; Jimenez-Cruz *et al.*, 2010; Manios *et al.*, 2010; Chaparro *et al.*, 2011; Garrett-Wright, 2011; Hager *et al.*, 2012; Chen *et al.*, 2014; Gerards *et al.*, 2014; Brown *et al.*, 2016; Natale *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Flores-Peña *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017; Queally *et al.*, 2018), only eight included children under the age of two (Kroke, Strathmann and Günther, 2006; Jimenez-Cruz *et al.*, 2010; Hager *et al.*, 2012; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Flores-Peña *et al.*, 2016), and only one included fathers (Gerards *et al.*, 2014). Table 2.1 provides more detailed information about authors, study design, participants, measurements obtained, and the main results of the studies. The results section presents the methods used by the studies as well as the maternal and child characteristics examined in relation to the accuracy of maternal perceptions of their child's weight.

1 Table 2.1 Studies looking at factors associated with mothers' perceptions about their child's weight in children under the age of five

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Baughcum et al., 2000) U.S.A	Cross-sectional WIC	Mother and child dyads N= 622 (23-60 months) Ethnic groups: White 81%, Non-white 19%	Outcomes: Perception of own weight (Do you consider yourself overweight? Yes/No), Perception of child weight (5-level Likert scale— Very Underweight to Very Overweight—collapsed into 3 categories), concerns about child weight (5-level Likert scale—"I am concern my child is overweight right now" & "I am worried my child will become overweight" —collapsed into 2 categories). Mother and Child Characteristics: Mothers' own self-reported height and weight (BMI), children's measured height and weight (CDC growth references), maternal smoking, education level, age, current pregnancy status, and poverty.	Perception of Own Weight: 95% of obese women perceive themselves as overweight. Predictors of Maternal Perception of Own Weight: Among obese mothers, Non-Whites were less likely to be accurate than Whites (89% vs 98%; P= .046), and smokers less accurate than non-smokers (88% vs 98%; P = 0.027). Among healthy-weight mothers, those in higher income group were more likely to overestimate than those in low-income group (36% vs. 25%; P = 0.040). Accuracy: 79% failed to perceive their child as overweight. Predictors of Accuracy: Low maternal education was associated with failure to perceive their child's overweight (OR 6.2; 95% CI: 1.7-22.5) after adjusting for low family income, maternal obesity, age, smoking, child age, race, and gender (Adjusted OR 6.2; 95% confidence interval: 1.7– 22.5).
(Brown et al., 2016) U.S.A	Cross-sectional analysis of data from Greenlight study	Mother and child dyads N= 864 (2 months), N= 563 (12 months) Ethnic groups: 50% hispanic, 27% black, and 16% white.	Outcomes: Perception of own weight ("Do you consider yourself underweight, healthy weight, overweight, or obese?"), perception of child weight at 2, 4, 6, 9, and 12 months ("Right now do you think your child is underweight, healthy weight, or overweight?"), accuracy (underestimation, accurate, and overestimation). Mother and Child Characteristics: anthropometry (WHO weight for length), maternal weight and height self-	Accuracy: healthy-weight children 89%–95%, overweight children accuracy 7%–26% (P < .001 across time points) Predictors of Underestimation: Mothers who were overweight were more likely to underestimate than healthy-weight mothers (OR 2.2; 95% CI 1.2-3.8). Through time period overestimation became less frequent and underestimation became more frequent

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
		Low-income area	reported (BMI), maternal education, income, weight, and lactation information.	(parents more accurate at six months than at 12 months). Not Predictors of Accuracy: income, race, site of recruitment, sex, or parental status at any time period
(Byrne, Magarey and Daniels, 2016) Australia	Cross-sectional NOURISH and SAIDI	Mother and child dyads N= 290 (12– 16 months)	Outcomes: perception of child weight between 12 and 16 months: "Do you think your child is... underweight, healthy weight, somewhat overweight, very overweight or do not know". Accuracy: Underestimation, Accurate, and Overestimation Mother and Child Characteristics: anthropometry (WHO Weight for length z-score), child age, birth weight, gender, maternal BMI, maternal age at child's birth, tertiary education.	Perception of Child's Weight: 83% perceived as healthy weight Accuracy: N=173 accurately estimate healthy weight, N=28 underestimated healthy weight, N=66 underestimated overweight or at risk. Predictors of accuracy: Older mothers had higher odds of underestimating healthy-weight (OR 1.12; 95%CI: 1.03–1.22); mothers with a higher BMI had higher odds of underestimating overweight (OR 1.06; 95% CI 1.01–1.12). No Association with Accuracy: child age, birth weight, child gender, maternal education
(Chaparro et al., 2011) U.S.A	Cross-sectional WIC	Mother and child dyads N= 1,702 (36-60 months)	Outcomes: Maternal perception of her child's weight (Do you consider your child to be overweight, underweight or about right weight for (his) (her) height?). Mother and Child Characteristics: Maternal BMI (self-reported), child's gender, child's birth weight, maternal age, maternal BMI, maternal education, maternal acculturation level, and maternal language preference.	Perception of child's weight: 93.6% thought that their overweight child was about the right weight, while 77.5% of mothers thought they are obese. 92.6% of mothers of not overweight or obese correctly classified their children as being about the right weight. Predictors of accuracy: birthweight (OR 0.805; 95% CI: 0.72–0.90), maternal BMI (OR 0.95; 95% CI: 0.93–0.98) Not predictors of accuracy: Child's gender maternal education, the language of preference, acculturation level, maternal age.

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Chen et al. 2014) China and Australia	Cross-sectional Chinese schools and community organisations.	Mother-child dyads N= 2040 (24-48 months) Ethnic group: Chinese from which 1951 living in China and 89 in Australia	Outcomes: Maternal perception of her own weight (how would you describe your current weight status? underweight, normal weight, overweight or obese) and maternal perception of her child's weight (How would you describe your child's weight at the moment? underweight, normal weight, overweight or obese). Mother and Child Characteristics: Anthropometry (Obesity Task Force (IOTF), maternal age, maternal education, maternal working status, household income, child's age, child's gender.	Accuracy: 35% accurately estimated underweight, 69.2% accurately estimated healthy weight, accurately estimated 10.8% overweight/obesity. Predictors of accuracy: Mother being overweight or obese (p=0.002) Mothers who overestimated own weight (p<0.001) No associations: maternal age, maternal education, maternal working status, household income, child's age, child's gender.
(Cheng et al., 2016) Singapore	Cross-sectional GUSTO cohort	Mother-child dyads N= 1237 (36 months) Ethnic groups: Chinese, Malays and Indians	Outcomes: Maternal perception of her child's weight (verbal: 5 Likert scale very underweight to very overweight, visual description of the toddler silhouette scale). Mother and Child Characteristics: Anthropometry (BMI-for-age Z-scores WHO).	Accuracy: In verbal description, 17.9% underestimated and 11.8% overestimated their child's weight status. In the visual description, 10.4% underestimated and 19.6% overestimated their child's weight status. Factors associated with accurate and inaccurate perceptions: birth order, child and mother' BMI. No associations: type of conception, ethnicity, marital status, mothers' education, child's gender, monthly household income.

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Duarte et al., 2016) Brazil	Cross-sectional Primary Health Care Facilities (PHCF) in a small urban municipality in São Paulo State	Mother and child dyads N=135 (12 to 36 months) First-time mothers	Outcomes: perception (Using 7-image toddler scale), accuracy (inaccurate: perceptions corresponded to two or more images to what they were expected to answer), dissatisfaction with child's weight ("Which picture would you prefer your child to be?); if choosing an image that did not correspond with their child's weight, mother was considered dissatisfied. Mother and Child Characteristics: anthropometry (WHO BMI z-score converted into percentiles), child's age, gender, birth weight, weight status, well-child care attendance, health professional talks about the weight status during the consultation, mothers' age, education, and weight status.	Accuracy: 34.8% inaccuracy; 3.0% overestimated and 31% underestimated. Predictors of Inaccuracy: Child Excess of Weight (OR 4.6; 95% CI 2.0-10.7), underweight (OR 0.9; 95%CI 0.1–9.7) attendance at well-childcare less inaccurate (OR 0.3; 95%CI0.1–0.9). No Predictor of Accuracy: child age, gender, birth weight, maternal age, maternal education. 52% Dissatisfied; 43% desired larger child and 9.6% desired smaller.
(Flores-Peña et al. 2016) Mexico	Cross-sectional	Mother and child dyads N=486 (12 months and under)	Outcomes: Maternal perception of child's weight (Mother chose from pictorial representations the one she felt was more alike to her child and verbal description). Mother and child characteristics: anthropometry (WHO BMI z-score). Maternal BMI, child's gender and age, maternal education, household income.	Accuracy: 20.5% mothers of overweight children accurately estimate the weight of their child. 0% mothers of overweight children accurately estimate the weight of their child. Predictors of inaccuracy: Mothers of older children were more likely to have an accurate estimation of their child's weight (OR=0.090 p < 0,05) No Predictors of Accuracy: Data not reported
(Garrett-Wright, 2011) U.S.A	Cross-sectional South Central Kentucky and a private paediatricians' office	Mother and child dyads N=120 (2–5 years) Well-educated mothers Ethnic groups: 80% Caucasian,	Outcomes: Accuracy (BMI 5-95 centile = adequate (if not, considered as inaccurate), mothers of children who were at risk of overweight were considered accurate if they perceived their child's weight as appropriate). Mother and Child Characteristics: anthropometry (CDCs charts), child gender, parental education level, marital status, employment status, ethnicity, socioeconomic	Accuracy: 30% inaccurate, of which only 4.2% overestimated their child's weight. Predictors of Accurate Perception: health literacy (OR 0.98; 95%CI: 0.97–1.0). No Predictors of Accuracy: gender, child age, parental education, parental self-efficacy, parental concern

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
		3% Hispanic, 12% African American, 4% other	status, parental self-efficacy, concern about child's weight (5-level Likert scale: "concerned" to "unconcerned")	
(Gerards et al., 2014) Netherlands	Longitudinal KOALA cohort	Parent-child dyads N= 904 (5-year-old children)	Outcomes: Parents' perception of their child's weight at the age of 5 (clearly underweight, underweight, healthy weight, overweight, and clearly overweight recoded to three categories). Parent and Child Characteristics: parental BMI, working hours, country of birth, highest level education, mother's age, anthropometric measurements of the child (BMI z-score from the national reference population where: 1.04 underweight, 1.05 to 1.64 healthy weight and 1.65 overweight).	Perception of Child's Weight: 93% of the parents perceived their child's weight as healthy Accuracy: 78% of parents of underweight children overestimated their child's weight, 85% Parents underestimated their child's overweight. Predictors of accurate perception: BMI z-score at 2 years (OR 0.817, P = 0.09) and BMI z-score at 5 years (OR 15.322, P = 0.00) for overweight children and BMI z-score at 2 years (OR 2.780, P = 0.00) and BMI z-score at 5 years (OR 4.458, P = 0.00) for healthy weight children. Accuracy at 5 years was associated with a greater increase in BMI z-score from 5 years to 6, 7, 8, and 9 years, compared to underestimation of the child's weight status.
(Hager et al., 2012) U.S.A	Cross-sectional WIC	Mother and child dyads N= 281 (Child's mean age 20.2 months) Ethnic groups: 70.8% African American	Outcomes: parental perception of child's weight (assessed using silhouettes), accuracy (Responses: 2 or more images away of the actual weight classified Underestimation and Overestimation). Mother and Child Characteristics: anthropometric measurements (weight for length percentiles of the WHO)	Accuracy: 70% inaccurate Satisfaction with weight: 81.7% of mothers of overweight infants were satisfied with their infant's body size. Predictors of accuracy: underweight toddlers (OR 9.37 95% CI, 3.06-28.74) overweight toddlers (OR 0.14, 95%CI: 0.05-0.33), maternal obesity (OR 0.71, 95% CI 0.40-1.27) No Predictors of Accuracy: toddler age, sex, race, marital status, education, or socioeconomic status.

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Jimenez-Cruz et al., 2010) Mexico	Cross-sectional Healthcare settings of the Institutos Estatales de Salud (IES)	Mother and child dyads N=813 (5 to 24 months)	Outcomes: Underestimation: > 1 z-score BMI percentile not considered overweight or >= -1 z-score BMI considered underweight. Overestimation: -1 z-score BMI was not considered underweight, or <=1 z-score BMI not considered overweight. Mother and Child Characteristics: anthropometry (WHO BMI Z-scores), geographical location	Accuracy: 50% of the women accurately perceived their child's weight; 43% underestimated; and 7% overestimated. Predictors of Underestimating: maternal weight status (OR 1.6; 95%CI 1.07–2.43), income more than US\$600 (OR 1.67; 95% CI: 1.05–2.65), less than 6 years of education vs. more than two years of education (OR 1.22 95% CI 0.89–1.67), migrated to their current state of residence (OR 1.69; 95% CI 1.27–22.26) vs. born in the state of residence No Associations: not reported.
(Kroke, Strathmann and Günther, 2006) Germany	Longitudinal DONALD Study	Mother and child dyads N= 253 children of different age groups (6 months, 12 months, 2 years and 4 years) Sample educational attainment relatively high.	Outcomes: perception of child's weight (Verbal 5-level Likert scale condensed into 3 categories), accuracy (two categories: correctly and incorrectly), effect of perception of child's weight in future health outcomes. Mother and Child Characteristics: anthropometry (German Reference percentile), child gender, maternal education, maternal age, maternal BMI, gestational age, lactation information	Maternal Perception: high: 6 months=17%, 12 months=9%, 2 years=8%, 4 years=12%; low: 6 months=6%, 12 months=9%, 2 years=10%, 4 years=12% Accuracy: underestimation overweight: 6 months=62%, 12 months=57%, 2 years=37%, 4 years=38%; underestimation healthy weight: 6 months=15%, 12 months=27%, 2 years=27%, 4 years=37%. Association consecutive weight gain: Children whose weight was considered to be low gained more BMI-SDS until age 7 compared to children whose weight was considered healthy. Children whose weight was considered high lost more in BMI-SDS until age 7 compared to the children considered to whose weight was considered healthy. Children at age 6 who were above the 85th percentile, maternal misperceptions promoted an unfavourable weight development.

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Manios et al., 2010) Greece	Cross-sectional GENESIS Study	Mother and child dyads N= 2374 (5-years)	<p>Outcomes: maternal perceptions (5-level Likert scale - "I feel my child's weight is much high/much too low"), accuracy (underestimation when overweight, obese, or healthy; perceived as "normal," "lower," or "much lower" respectively).</p> <p>Parental and Child Characteristics: anthropometric measurements (CDC growth charts weight-for-length), gestational size, weight gain, paternal BMI, child dietary history.</p>	<p>Accuracy: 35.9% underestimated the weight of the child.</p> <p>Predictors of Accuracy: adjusting for infant sex, region of residence and parental education: maternal age (OR 1.01; 95% CI: 1.01-1.02), education (OR 0.96; 95%CI: 0.93-0.99), BMI (OR 1.04; 95%CI: 1.02-1.09), energy intake(OR 1.006 ; 95%CI: 1.002-1.011), child being small for gestational age (OR 0.59; 95%CI:0.42-0.83), rapid weight gain(OR 1.53 ; 95%CI: 1.21-1.93), and more than three hours of physical activity (OR 0.72; 95%CI: 0.55-0.96).</p> <p>Non-Predictors of Underestimation: Maternal smoking was not a significant predictor of underestimation.</p>
(Natale et al., 2015) U.S.A	Cross-sectional WIC	Mother and Child dyads N= 1, 105 (2-5-year-old) Multicultural sample of caregivers predominantly low-income and foreign-born	<p>Outcomes: perception of child weight ("Do you consider your child to be overweight, underweight, or about right weight for (his/her) age?"), accuracy (correct or not correct perception).</p> <p>Mother and Child Characteristics: anthropometric Variables (CDC), caregiver age, gender, place of birth, region of birth, weight status, education, food insecurity.</p>	<p>Accuracy: 92% of mothers of overweight or obese children misperceived their child's weight.</p> <p>Predictors of Accuracy: born outside the U.S. (OR 0.65; 95% CI 0.48-0.88), region of Birth South America (OR 0.59, 95% CI: 0.36-0.98), Central America/Mexico (OR 0.59; 95% CI = 0.41-0.85), and Caribbean (OR 0.54; 95% CI: 0.35-0.83), food insecure (OR 1.64, 95% CI: 1.21-2.23).</p> <p>Children between the ages of 3 and 5 were less likely to have their weight accurately perceived in comparison to 2-3-year-old children. 3-4 years (OR 0.43; 95% CI: 0.25-0.74) 4-5 years (OR 0.47; 95% CI: 0.28-0.80), caregivers to overweight (OR 0.005 95%CI: 0.002-0.01) and obese(OR 0.03 95%CI 0.002-0.01) compared to healthy weight</p> <p>Not Predictors of Accuracy: child gender, child's place</p>

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
				of birth, preferred language, birthweight, gestational age, caregiver age, caregiver gender, weight.
(FigueroaPe draza, Sousa, and Alves de Olinda 2017) Brazil	Campina Grande Cohort Day-care centres	Mother and child dyads (2-5 years) N=269	Outcomes: Mothers' perception of their child's weight (explanation what she believed the child's current weight was, with three options of answers in the questionnaire: below weight, within weight or overweight.) Mother and Child Characteristics: anthropometry (WHO BMI Z-scores), child's gender, child's age.	Accuracy: 32.7% were accurate estimating their child's weight. 30.4% of mothers misperceived overweight in their children. Predictors of accuracy: Younger children (24-35 months) more likely to have their weight underestimated than older children (36–59 months). Boys were more likely to have their weight underestimated than girls (p<0.001). Agreement between maternal perception of overweight and the diagnosed nutritional status was higher for older children (36–59 months versus 24–35 months) and for girls.

(Reference) Country	Design/Setting	Participants (Child Age)/ Sample Characteristics	Measurements	Main Results
(Queally et al., 2018) Ireland	Cross-sectional Growing Up in Ireland Study	Mother and child dyads N=9793 (3 years) N= 9001 (5 years)	<p>Outcomes: mother's perception of her child weight at 3 and 5 years old (two categories: healthy weight and overweight and obese), accuracy: (misclassification if: perceive healthy weight when the child was clinically overweight/obese).</p> <p>Mother and Child Characteristics: anthropometry (BMI 1990 UK reference using International Obesity Task Force cut-offs), maternal education, obesity status, age, self-reported health, employment status, place of birth, healthcare access and utilisation, child medical card status, private health insurance, the number of doctor visits.</p>	<p>Accuracy: 22% of the mothers at 3 years and 18% at 5 years failed to accurately identify their child as overweight or obese.</p> <p>Factors Associated with Failure of Mothers to Identify Their Child's Overweight/Obesity: child was a girl (at 3 years: OR 1.25; 95% CI: 1.09-1.42); (at 5 years OR 1.37; 95%CI: 1.17- 1. 59), higher birth weight (at 3 and 5 years: OR 1.00; 95% CI: 1.00-1.00), if mother was overweight (OR: 1.50; 95%CI: 1.28- 1.77), obese (OR: 1.72; 95%CI: 1.43- 2.06) or working (OR:1.25 95%CI: 1.07-1.45 and OR:1.16; 95%CI: 0.98-1.38), degree and postgraduate studies (OR: 0.702; 95% CI: 0.49- .99), Irish (0.818; 95% CI: 0.64- 1.03)</p> <p>No Association with Accuracy: gestation age, lactation, parity, child's health, maternal education private health insurance, household income, maternal age, maternal health, living arrangements, medical card, health visits, area living</p>
(Rosas et al. 2010) Mexico and the U.S.	Cross-sectional	Mother and child dyads (5 years) N= 314 Mothers living in Mexico, N= 60 Mothers living in California	<p>Outcomes: mothers perceptions of a child's weight using visual description.</p> <p>Mothers and child characteristics: child's weight status, place of residence</p>	<p>Factors associated with accuracy: More likely to underestimate with higher BMI (p=0.01), Mothers living in California were more likely to underestimate their child's weight than in Mexico (p=0.01).</p>

2.4 RESULTS

2.4.1 Methodology of the Studies

There is high heterogeneity among the identified studies (Table 2.1) as they differ in their sample population, ways of measuring the perception of a child's weight, how they classify accuracy, and the covariates studied.

Six studies took place in the U.S. (Baughcum *et al.*, 2000; Chaparro *et al.*, 2011; Garrett-Wright, 2011; Hager *et al.*, 2012; Brown *et al.*, 2016; Natale *et al.*, 2016). Some of these included a high proportion of Hispanic (Baughcum *et al.*, 2000; Brown *et al.*, 2016; Natale *et al.*, 2016) and African-American women (Hager *et al.*, 2012). Other studies were conducted in Mexico (Jimenez-Cruz *et al.*, 2010; Flores-Peña *et al.*, 2016), Greece (Manios *et al.*, 2010), Australia (Chen *et al.*, 2014; Byrne, Magarey and Daniels, 2016), China (Chen *et al.*, 2014), Brazil (Duarte *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017), Singapore (Cheng *et al.*, 2016), Ireland (Queally *et al.*, 2018), Germany (Kroke, Strathmann and Günther, 2006), the Netherlands (Gerards *et al.*, 2014).

Women's misperceptions of their child's weight can be either underestimation or overestimation. While some studies distinguish between these two concepts (Jimenez-Cruz *et al.*, 2010; Hager *et al.*, 2012; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016) study by Duarte *et al.* (2016) did not, while some studies (Flores-Peña *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017; Queally *et al.*, 2018) only focused on underestimation. Although some of the studies described overestimation in their sample, none looked at the predictors of maternal overestimation of their child's weight.

To determine maternal accuracy of perceptions of a child's weight, researchers considered two measurements: maternal perception of a child's weight and the actual body size of the child. With regard to the classification of the child's weight, different growth charts and cut-off points were used across studies. Acknowledging that there are no current definitions of overweight for children under the age of two, Brown *et al.* (2016) examined the 95th and 99th percentile cut-off points and their relation to parental accuracy in estimating child weight. Their findings showed that both cut-off points were very similar, and therefore reported only results obtained using the 95th percentile. Results may not be affected much by the selection of cut-off points or growth charts, but certainly the measures used were varied.

Two approaches to measuring women's perception of their child's weight have been used. These are verbal descriptions (Baughcum *et al.*, 2000; Manios *et al.*, 2010; Chen *et al.*, 2014;

Byrne, Magarey and Daniels, 2016; Flores-Peña *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017) and pictorial representations (Rosas *et al.*, 2010; Chaparro *et al.*, 2011; Hager *et al.*, 2012; Cheng *et al.*, 2016; Duarte *et al.*, 2016; Flores-Peña *et al.*, 2016). In the “verbal,” women had to choose among possible responses related to how they perceive their child’s weight or how they would classify their child’s weight (i.e. “I feel my child’s weight is: much too high, high, just right, low, much too low”). In the studies that explored mothers’ perceptions using a pictorial method, mothers were asked to select a sketch that they perceived closely resembled the size of their child.

The method by which perception is measured can have an impact on the accuracy of mothers’ estimation of their children’s weight and the factors influencing it. A study which included mothers of children aged 36 months living in Singapore (Cheng *et al.*, 2016) found that women tended to underestimate their child’s weight to a greater extent in verbal description while they tended to overestimate it by visual description. Similar results have been found in other studies. For example, an excluded study (Vallejo, Cortes-Rodríguez and Colin-Ramirez, 2015) found that Mexican mothers of children between the ages of two and six, whose child had a healthy weight were more likely to underestimate their child’s weight using visual images than they were with verbal descriptions. Additionally, in their study, Vallejo (2015) and colleagues found that mothers of overweight children were more likely to be accurate when using images than when describing their child’s weight verbally. Factors such as the stigma surrounding childhood weight problems may influence mothers’ responses to avoid “labelling” their child as overweight.

2.4.2 Determinants of Inaccurate Perceptions of the Child’s Weight Related to the Child Characteristics

2.4.2.1 Child’s Weight Status

A child’s real weight is the most studied and consistent determinant of mothers’ inaccuracy in estimating their child’s weight. Overall, studies found that mothers have a low sensitivity to recognising weight problems in their children at both extremes (underweight and overweight) while exhibiting a tendency to identify their child as having a healthy weight. In other words, they are more likely to accurately describe their child as having a healthy weight rather than being underweight or overweight. Therefore, children who are overweight or at risk of becoming overweight are more likely to have their weight underestimated in comparison with children with a healthy weight (Baughcum *et al.*, 2000; Jimenez-Cruz *et al.*, 2010; Hager *et al.*, 2012; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016). However,

studies have also found that mothers underestimate and overestimate their child's weight when the child has a healthy weight (Hager *et al.*, 2012).

From the studies that met the inclusion criteria, it can be seen that mothers may underestimate or overestimate the weight of their children. However, overestimation of the weight of a child has been less frequent than underestimation (Jimenez-Cruz *et al.*, 2010; Brown *et al.*, 2016; Duarte *et al.*, 2016). Similar findings were found in the Gateshead Millennium Study, which included mothers of older children (6-8 years) living in England (Jones *et al.*, 2011). A possible reason why overestimation may be less frequent than underestimation could be that mothers monitor more underweight than overweight as a result of being more concerned about underweight than about overweight as some studies have suggested (Pagnini *et al.*, 2007; Redsell *et al.*, 2010). A qualitative study in the U.K. (Redsell *et al.*, 2010), found that there is a preference among mothers for children with bigger body sizes. This study showed a belief held by mothers of children aged 12 months and under living in both affluent and deprived areas in the U.K. that larger children were healthier (Redsell *et al.*, 2010).

Hager *et al.* (2012) explored women's perceptions of their 20 to 26 month-old children's weight on a visual scale. They found that mothers of undernourished children were nearly ten times more likely to have an accurate perception of their child's weight compared to mothers of healthy-weight children. Additionally, compared to mothers with healthy-weight children, mothers of overweight children were 88% more likely to misperceive their child's weight status.

Moreover, in the studies of Duarte *et al.* (2016) and Flores-Pena *et al.* (2016) the parents hold a desire their child was bigger than their child was. These results are similar to an excluded study in which Laraway *et al.* (2010) explored the parent's preferences for weight percentiles. Findings from their study showed that parents were more inclined to believe that growth near the lowest percentiles was "least healthy," expressing less negativity about a child growing near the highest percentiles.

2.4.2.2 Child's Birth Weight, Weight Gain, and Gestational Age

The relation between the child's birth weight, rapid weight gain in infancy, and maternal accuracy in perceptions of child weight have also been investigated, but findings are inconsistent across studies.

The studies of Byrne et al., 2016; Duarte et al., 2016; and Natale et al., 2015 found no association between birth weight and women's assertiveness when describing their young child's weight. However, Queally et al. (2018) and Chaparro et al. (2011) found that mothers of children with higher birth weight were more likely to underestimate their child's weight. As described in Chapter 1, for babies born bigger whose growth slows down, mothers might perceive that their child is not growing as much as other children of the same age, possibly causing maternal underestimation of the child's weight. However, the studies that did not find this link included younger children than the studies by Queally et al. (2018) and Chaparro et al. (2011).

A study in Greece explored whether the weight gain of children (one to five years) was associated with the mothers' accuracy in judging their child's weight (Manios *et al.*, 2010). Their results showed that those children who exhibited "rapid" growth (>+1 z-score difference in weight-for-length from birth to six months of age) were more likely to have their weight underestimated (OR= 1.53 95% CI: 1.21-1.93) than those who exhibited an "average" (-1 to +1 z-score difference in weight-for-length z-scores from birth to six months of age) weight gain.

Natale et al. (2015) was the only study that investigated the relationship between the child's gestational age and correct perception of the child's weight; however, no significant relationship was found between these factors.

2.4.2.3 Child's Age

Some studies explored the child's age as a risk factor of maternal misperception of their child's weight. Results from some of these studies did not find any association between a child's age and the accuracy of mothers' perceptions of their weight (Garrett-Wright, 2011; Hager *et al.*, 2012; Chen *et al.*, 2014; Duarte *et al.*, 2016). Other studies (Baughcum *et al.*, 2000; Flores-Peña *et al.*, 2016; Natale *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017), however, have found variations in the accuracy of mothers' weight perceptions when asked to estimate the weight of children of different ages.

One U.S. study (Brown *et al.*, 2016) looked at parental perceptions of weight for children from two to twelve months of age. Findings of the study showed that underestimation was more frequent when children were older (12 months) than when the children were younger (two or six months).

Unlike the study of Brown et al. (2016) other studies suggested that parents become more accurate estimating their child's weight as their child grows older (Kroke, Strathmann and Günther, 2006; Brown *et al.*, 2016; Flores-Peña *et al.*, 2016; Natale *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017; Queally *et al.*, 2018). Queally et al. (2015) explored the perceptions that mothers living in Ireland had of their child's weight between the ages of three and five years old and found that mothers were more accurate when the child was five.

In a German study Kroke et al. (2006) of maternal perceptions at 6, 12, 24 and 48 months of age, mothers' perceptions became more accurate as age increased (68% at 6 months, 57% at 12 months, 37% at 2 years, and 38% at 4 years). However, this was not a longitudinal study—different children were measured at different ages. Likewise, one US study (Natale *et al.*, 2016) which recruited mothers of children between the ages of two and five found that children between the ages of three and five were less likely to have their weight underestimated than those between the ages of two and three.

Findings of a meta-analysis that included studies with children of all ages found that mothers were more likely to underestimate the weight of 2 to 6-year-old children than of older children (Rietmeijer-Mentink *et al.*, 2013). As Byrne, Magarey and Daniels (2016) hypothesised, more accuracy at older ages could be attributed to the rapid changes in appetite and growth rates during the first years of life.

2.4.2.4 Child's Gender

Some studies explored if mothers' accuracy to estimate their child's weight differed by child's gender (Baughcum *et al.*, 2000; Garrett-Wright, 2011; Hager *et al.*, 2012; Chen *et al.*, 2014; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Flores-Peña *et al.*, 2016; Natale *et al.*, 2016; Figueroa Pedraza, Pereira Da Cunha Sousa and Alves de Olinda, 2017).

The majority of the studies that explored child's gender of risk factor of maternal accuracy to estimate their child's weight found no association between child's gender and a risk of having weight underestimated (Baughcum *et al.*, 2000; Garrett-Wright, 2011; Hager *et al.*, 2012; Chen *et al.*, 2014; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Natale *et al.*, 2016). However, the study of et al. (2018) and Pedraza et al. (2017) found significant associations between the child's gender and maternal accuracy to estimate their child's weight.

The study of Queally et al. (2018) found that Irish mothers of children aged three to five were more likely to underestimate the weight of their daughters than mothers of boys. These results differ from those of Pedraza et al. (2017) who found that mothers of boys were more likely to underestimate the weight of their children than mothers of girls (Pedraza, Sousa, and Olinda 2017).

A possible explanation of why some of these studies found that differences in mothers' accuracy to estimate their child's weight could be attributed to differences in body size ideals among communities. For example, an excluded study (Holub and Dolan, 2012) which explored the body size ideals of U.S. mothers of pre-school children (aged 12-25 months) found that mothers reported thinner body size ideals for girls than for boys.

2.4.2.5 Child's Physical Activity and Food Intake

As described in the previous chapter, some studies have looked at the association between the child's food intake or eating behaviour and parental perception of their child's weight. Studies looking at factors related to mothers' accuracy in describing their child's weight have also explored the relationship between accuracy and health behaviours.

In a sample of 2,374 mothers of children aged one to five living in Greece, Manios et al. (2010) explored the relationship between a child's food intake and physical activity and the mothers' ability to perceive their child's weight accurately. Their results showed that higher energy intake was positively associated with maternal underestimation of their child's weight. Furthermore, Manios et al. (2010) also found that children who were engaged in more than three hours of moderate to vigorous physical activity were less likely to have their weight underestimated than those children with lower levels of physical activity. Similar findings to those of Manios et al. (2010) were found in the Gateshead Millennium Study where results showed that English mothers of older children (6-8-year-old) tended to underestimate their child's weight when they had lower "healthy" dietary pattern scores (Jones *et al.*, 2011).

Because of the design of these studies (Manios *et al.*, 2010; Jones *et al.*, 2011), it is not possible to conclude causation in the relation between maternal underestimation of a child's weight and the child's physical activity and energy intake. However, possible explanations may be that those women who underestimate weight are concerned that their child is not gaining enough weight, which therefore leads them to overfeed the child. In cases where mothers do not perceive that their child is overweight might be due to mothers not being aware that their child is consuming foods with higher energy content. With regards to the

relationship between physical activity and accuracy found in the study of Manios et al. (2010), it is possible that women who recognised that their child's weight was high encouraged their children to engage in more physical activity.

2.4.2.6 Other Child Characteristics

Other characteristics associated with the child that have been studied include whether or not the child was breastfed, has siblings, and their health status as reported by the mother. However, none of these associations has proved statistically significant (Queally *et al.*, 2018).

2.4.3 Determinants of Inaccurate Perceptions of the Child's Weight Related to Maternal Characteristics

2.4.3.1 Maternal Weight and Perception of Own Weight

Results from the Gateshead Millennium Study found that mothers who were overweight were less likely to classify their six to eight-year-old children's weight as high (Parkinson *et al.*, 2011). Studies looking at the perceptions that mothers of pre-school children have about their child's weight have explored the mothers' weight status as a determinant of mothers' accuracy to estimate their child's weight. However, the evidence of these studies is mixed on regarding whether or not the weight status of the mother may influence their accuracy to estimate a child's weight.

In some studies, both BMI (Baughcum *et al.*, 2000) and weight status (Duarte *et al.*, 2016; Natale *et al.*, 2015; Carnell *et al.*, 2005) statistically significant association with the accuracy of maternal estimations of a child's weight status. Whereas in other studies, maternal BMI (Byrne *et al.*, 2016; Manios *et al.*, 2010) and maternal overweight and obesity (Jimenez-Cruz *et al.*, 2010; Hager *et al.*, 2012; Brown *et al.*, 2016; Queally *et al.*, 2018) were positively associated with maternal underestimation of their child's weight.

Contrary to the above studies, Chen *et al.* (2014) found that mothers who were overweight were more likely than mothers with a healthy weight to accurately estimate the weight of their children. Moreover, in their study, they also found that mothers who overestimated their own weight were more likely to identify accurately overweight in their children.

It could be hypothesised that mothers will be more likely to be aware of their child's weight status in cases in which they are also aware of their own weight status. However, Baughcum *et al.* (2000) found that while 98% of mothers who were overweight were able to recognise

their own excess weight, 79% of them failed to accurately discern their child's (23 to 60 months) weight.

The findings of Baughcum et al. (2000) are similar to findings of a study, including mothers of older children (4-10 years). In their study, Genovesi et al. (2005) found that mothers tended to underestimate their child's weight more than their own. Moreover, like in the study of Chen et al. (2014), a significant proportion overestimated their own weight to a greater extent than they did for their child's weight (Genovesi et al., 2005). These women MAY perceive overweight and obesity as a health problem, although they perceive their child as too young to be labelled overweight or hold the belief that overweight does not represent a health concern at young ages, as qualitative studies have found (Eli et al., 2014; Dinkel et al., 2017; Turner et al., 2016).

2.4.3.2 Maternal Age

Most studies found no association between maternal age and underestimation of a child's weight (Baughcum *et al.*, 2000; Chen *et al.*, 2014; Natale *et al.*, 2014; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Queally *et al.*, 2018). However, a study Manios et al. (2010) found that older women were more likely to underestimate their child's weight.

2.4.3.3 Maternal Ethnicity, Acculturation, and Place of Residence

A study (Hodes, Jones and Davies, 1996) in England explored the beliefs that mothers of school-age children had about their child's weight. Results showed that White British mothers believed slimmer girls to be more attractive than did mothers from South Asia, the Mediterranean, the Caribbean, and sub-Saharan Africa. Moreover, in their study, Hodes et al. (1996) found that South Asian mothers had more concerns about their child not gaining weight or growing than White British mothers. No study has explored quantitatively if there are variations in mothers' accuracy to estimate their child's weight in England. However, some more recent qualitative research has found that health professionals believe that having a larger child is a sign of wealth and health in some cultures (Redsell et al. 2013; Middleton and Smyth 2017). These beliefs could lead mothers to have inaccurate estimations of a child's weight.

Evidence from other countries looking at the mothers' accuracy to estimate their pre-school child's weight has explored the association between accurate estimations and ethnicity. From the identified studies, a study in Ireland, by Queally et al. (2018) found that Irish mothers were less likely to underestimate their child's weight than non-Irish mothers.

However, the researchers do not state the background of non-Irish mothers. Moreover, a study by Natale et al. (2015) found that foreign caregivers were less likely to be accurate than those who were born in the U.S., especially among those from South America, Central America/Mexico, and the Caribbean (Natale et al., 2015). Unlike the above studies, a study in Singapore found no association between maternal ethnicity (Chinese, Malay, or Indian) and accuracy in estimating a pre-school child's weight (Cheng *et al.*, 2016). Likewise, other studies in the U.S. have found no significant variations in mothers' accuracy to estimate their child's weight caused by ethnicity or level of acculturation (Baughcum et al., 2000; Hager et al., 2012; Chaparro et al., 2011).

From the identified studies, Chen et al. (2014) and Rosas et al. (2010) explored the place of residence as a possible factor associated with mothers' ability to estimate their child's weight accurately. Chen et al. (2014) found no difference in accuracy to estimate a child's weight between Chinese mothers living in Australia and those who lived in China. However, findings of the study of Rosas et al. (2010) showed that Mexican mothers of 5-year-old children living in California were more likely to underestimate their child's weight than their counterparts living in Mexico. Their study also found that mothers living in California wanted their child to be smaller than their actual size, whereas women in Mexico wanted their child to be bigger (Rosas *et al.*, 2010).

Another study conducted in Mexico showed that mothers who migrated to their current state of residence (within Mexico) were more likely to underestimate their child's weight (Jimenez-Cruz et al., 2010). As Thompspon et al. (2014) discussed it is possible that in areas where there is a higher prevalence of overweight and obesity, parents' perceptions of what is "healthy" change as they form their beliefs by comparing their children to conceptions of what "normal" among their child's peers at the time and place in which they are living (Thompson et al., 2014). For example, Binkin et al. (2013) conducted a study in Italy in which maternal accuracy to perceive the weight of their 8-9-year-old children was compared among areas that were divided according to their prevalence of childhood obesity. Their findings showed that there was less accuracy to perceive child weight in the regions where there was a higher prevalence of childhood obesity (more than 13%) in comparison to areas where the prevalence was lower (less than 8%).

As can be observed from the above literature, maternal ethnicity, acculturation, and place of residence may play a key role in women's beliefs about their child's body size.

2.4.3.4 Socioeconomic Status

Some studies have reported associations between maternal accuracy in estimating child's weight and the socioeconomic status of the mother (Natale et al. 2015; Jimenez-Cruz et al. 2010; Cheng et al. 2016). Jimenez-Cruz et al. (2010) found that the likelihood of underestimating the child's weight increased as household income increased, while a decrease in household income increased the likelihood of overestimating the child's weight. Nevertheless, the study does not report OR or frequencies obtained. However, it does report that women from families with a household income of US\$600 were more likely to underestimate their child's weight than those from households with a lower income. Similarly, Natale et al. (2015) found that Hispanic mothers living in the United States who experienced food insecurity were less likely to underestimate their child's weight than their food-secure counterparts. Natale et al. (2015) suggested that these findings could be attributed to the fact that food-insecure parents may be more conscious to the importance of providing their child with adequate nourishment, making them more aware of their weight status.

Other identified studies (Queally et al., 2018; Hager et al., 2012; Baughcum et al., 2000), differ from the findings of Natale et al. (2015) and Jimenez-Cruz et al. (2010) as they found that maternal accuracy of estimating a child's weight did not differ with regards to mothers' socioeconomic status. Findings from the Gateshead Millennium Study (Jones *et al.*, 2011) in England which included mothers of older children, did not find any difference in mothers' accuracy to estimate their child's weight by socioeconomic status.

The heterogeneity of the measurements that the researchers used to measure accuracy and socioeconomic status could be one of the reasons why there are variations in the results of these studies. Equally, variations could be caused by sociocultural variations across studies.

2.4.3.5 Maternal Education

Studies have found that fewer years of education positively correlate with higher maternal and infant body mass (Jimenez-Cruz et al., 2010; Baughcum et al., 2000; Queally et al., 2018). The association between maternal education and child weight estimation accuracy is inconsistent. Some studies have found no relation (Byrne et al., 2016; Duarte et al., 2016; Garrett-Wright, 2011; Hager et al., 2012), while other studies in the U.S. and Greece have found that mothers with lower education are more likely to underestimate their child's weight (Baughcum et al., 2000; Manios et al., 2010). Similarly to the studies of Baughcum et al. (2000) and Manios et al. (2010), a study in the U.S. found that mothers with lower

education prefer their child to exhibit growth near the highest growth percentiles (Laraway et al., 2010).

2.4.3.6 Health Literacy and Notice from Health Professionals

In the study by Garret-Wright, (2011), parental health literacy, which was measured with a questionnaire on the ability of the patients to read and understand information commonly used in healthcare settings, was a predictor of certainty of parental perception of their preschool child's (2-5 years old) weight (Garrett-Wright, 2011).

Health professionals play a significant role in the construction of parental beliefs about their child's health and growth according to some qualitative studies (Skinner et al., 2008; Hernandez et al., 2010; Thompson et al., 2014). For example, in one qualitative study in the U.S., women reported assessing their child's weight by what was considered to be "normal" for children of their child's age in the community. However, they expressed that they tended to check that their children were of a healthy weight during paediatrician visits (Thompson et al., 2014).

The presence of health professionals' comments about children's weight seems to be essential for women to accurately identify their child's weight status (Falconer et al., 2014; Hernandez et al., 2010; Eckstein, 2006; Rhee et al., 2005; Foster & Hale, 2015). For example, a study in England which investigated the benefits and harms of providing parents with feedback about their child's weight (Falconer et al., 2014) found that mothers of overweight and obese children (aged 4-5 and 10-11 years) were more likely to recognize their child's weight problems after being told about the weight status of their child by a health professional.

Studies looking at mothers' perceptions of their child's weight in younger children have found that neither visits to the doctor (Queally et al., 2018), nor be provided with feedback about the child's weight during the consultation (Duarte et al., 2016), were associated with mothers' ability to estimate their child's weight accurately.

2.4.3.7 Other Determinants

Studies have also explored the effects of women's marital status, parenting self-efficacy, lactation, child's health, private health insurance, maternal health, marital status, and maternal parity. However, none of these factors has been found to be predictors of maternal inability to estimate their child's weight (Queally et al., 2018; Garrett-Wright, 2011; Hager et

al. 2012). Maternal smoking was associated with maternal accuracy to estimate a child's weight in the study of Baughcum et al. (2000) but not in the study of Manios et al. (2010).

Other studies have found that mothers who work are more likely to underestimate their children's weight than those who do not work (Queally et al., 2018), that the first child is less likely to have their weight underestimated (Cheng et al., 2016), and that attendance to childcare decreases the likelihood of underestimation (Duarte et al., 2016).

Lastly, it is worth mentioning that in a study in the U.S. with mothers of school-age children using the data from the National Health and nutrition examination survey, Hansen et al. (2014) found that there was a generational shift regarding what was considered an overweight child. In the first-time period (1988-1994), children who were perceived to be overweight placed around the 84th percentile on the growth charts, whereas children from the second survey (2005-2010) had to be heavier (around the 91st percentile) to be considered by their parents as overweight (Hansen et al., 2014).

2.5 DISCUSSION

This critical narrative review aims to explore the factors associated with mothers' misperceptions of their child's weight for children under the age of five. Focusing on this age is important because, as described in Chapter 1, strategies to prevent childhood overweight must be put in place from early infancy. Moreover, as described at Chapter 1, variations in child growth and development at during the first years might mean mothers are more likely to underestimate their young child's weight and less prone to undertake strategies to ensure a healthy weight.

The narrative review provides an overview of factors that may be associated with mothers' beliefs about their young child's weight. The child's weight status was the most consistent and studied factor associated with inaccurate maternal estimations. For the other mother and child characteristics included in the studies, there are inconsistencies in evidence supporting or refuting the significance of these relationships. Possible reasons for these inconsistencies are: 1) That the studies use different methods to assess maternal perception of a child's weight, as well as different measurements for the covariates of interest; and 2) There were variations across studies regarding the countries where these took place, the ethnic groups investigated, the period in which parents were asked about their beliefs about their child's weight, and the age of the children. Moreover, as it is possible to see from this review, there are variations in the beliefs that mothers have about their child's weight which

depend on the age of the children, the parents' culture, and the country or region in which the parents live, among others. Hence, it might be inappropriate to generalise the results of these studies across settings due to the impact that different environmental factors may have on influencing the mothers' beliefs about adequate body sizes, health, and child growth rates.

The reviewed studies have some limitations. First, some of the variables in some of the studies, for example, maternal weight status, were subject to recall error and/or bias (Baughcum et al., 2000; Brown et al., 2016; Garrett-Wright, 2011). Second, some of the studies had relatively small sample sizes (Byrne et al., 2016; Duarte et al., 2016; MUSAAD et al., 2015) which limited the confidence the researchers had in the precision of their results. Third, the measurements the studies used to explore the child's weight included weight-for-length and BMI, which are not necessarily measurements of body fatness. Lastly, due to the design of the studies, the relationship between the mother's characteristic and the child characteristics cannot be considered as causal.

In England, no research has yet explored mothers' accuracy to perceive their child's weight in young children (<5 years). The Gateshead Millennium Study (Jones *et al.*, 2011; Parkinson *et al.*, 2011; Almoosawi *et al.*, 2016) has explored some of the determinants of accuracy in older children (6-8 years); however, as results of other studies suggest, these findings might not be generalizable to mothers of younger children. Given that mothers' beliefs about their child's weight may be associated with their health behaviours, such as their feeding practices, it is important to first investigate whether mothers of young children living in deprived areas in England are likely to underestimate their child's weight, and if so, which factors are associated with these inaccurate perceptions.

2.6 CONCLUSIONS

No studies were identified exploring the factors associated with the mothers' accuracy to estimate their pre-school child's weight in England. However, studies from other countries provided an understanding of the possible factors associated with inaccurate estimations of a pre-school child's weight.

The child-related characteristics that have been explored as possible risk factors associated with an inaccurate estimation of a child's weight, and that are related to the child are the weight status, child's birth weight, child's age, child's gender, the child's behaviours such as physical activity and food intake. Moreover, some factors that have been explored that are

related to the mother include mothers' weight status, perception of their own weight, ethnicity, age, health literacy, education, marital status, and socioeconomic status.

This chapter gave an insight of the methods that have been used when exploring accuracy to estimate a pre-school child's weight as well as an understanding of the possible risk factors of inaccurate estimations of a pre-school child's weight. Knowing this will inform the selection of methods and variables that will be used in the quantitative phase of this thesis, which aims to explore the factors associated with inaccurate estimations of a pre-school child's weight of mothers living in Bradford.

PART II

Quantitative Analyses of Mothers' Perceptions of, and Concerns About, Their Child's Weight

Chapter 3 - Introduction and Context

3.1 CHAPTER INTRODUCTION

This thesis is divided into four parts. Part I corresponded to the background of this thesis, in which it was described that the carers' feeding practices are essential to ensure an adequate growth and health in their children. Therefore, it is important to understand the modifiable and non-modifiable factors of the mothers' feeding practices to prevent malnutrition problems such as childhood overweight. Based on the socioecological model of food choices and dietary behaviours (Contento, 2015) and the health belief model (Becker *et al.*, 1977) it is possible that the mothers' feeding practices may be influenced by their perceptions and concerns about their child's weight.

Part II of this thesis corresponds to the quantitative phase of this study which looks to explore the perceptions of and concerns that mothers living in Bradford have about their young child's weight, their feeding practices and if the mothers feeding practices are associated to the above intrapersonal factors. Part II of this thesis also looks to explore if mothers living in Bradford make accurate estimations of their child's weight and what mother and child characteristics are associated with this inaccurate estimations. The narrative review undertaken in Chapter 2 included in Part I of this thesis, allowed to identify some of the mother and child characteristics that will be explored as potential determinants of mother misperception of a child's weight in this quantitative phase as well as the methods that could be used to explore the accuracy of their perceptions.

This Chapter aims to provide context to the quantitative phase (Part II) of this thesis. In this Chapter, I first argue why it is necessary to study the accuracy of maternal perceptions of, and concerns about, their preschool child's weight of women living in Bradford. Following this, I introduce the Born in Bradford Cohort and the BiB1000 subsample, which will be the basis of the analyses developed in this quantitative phase. Finally, I describe the sociodemographic and biological characteristics of the sample used in the following quantitative analyses.

3.2 WHY STUDY MATERNAL PERCEPTIONS OF AND CONCERNS ABOUT THEIR PRESCHOOL CHILD'S WEIGHT AMONG WOMEN LIVING IN BRADFORD?

The City of Bradford is an area with high levels of deprivation compared to the rest of the United Kingdom (Department for Communities and local Government, 2015). Moreover, Bradford has a multi-ethnic population; in which nearly 20% of the citizens in Bradford are of Pakistani origin (City of Bradford Metropolitan District Council, 2019). Studies have found that children living in deprived areas are at higher risk of developing childhood obesity than those children living in the most affluent areas; and that South Asian children have a significantly higher risk for obesity compared to Caucasians and other ethnic minority groups (El-Sayed, Scarborough and Galea, 2011, 2012; Niblett, 2016). Hence, it is important that culturally appropriate community interventions are put in place to prevent children from developing childhood obesity. Further research about the roles of socioeconomic, cultural, intrapersonal and physiological factors in mothers' weight-related behaviours in the UK is needed to inform potential interventions against childhood obesity.

As the literature review showed, parents are likely to make inaccurate estimations of their child's weight, especially those parents who have young children (Tompkins, Seablom and Brock, 2015). However, few studies have explored the determinants of this maternal inability to accurately estimate the weight of their preschool children (Byrne, Magarey and Daniels, 2016).

Parents' inaccurate estimations of their infant and young child's weight may matter, because their perception of their child's weight may be linked to subsequent concerns and health-related behaviours (Webber *et al.*, 2010). Inaccurate estimations of their child's weight are particularly of concern in the case of parents of preschool children because during these early years, it is parents and other caregivers who influence the child's eating and physical activity patterns by modelling and controlling the child's exposures to foods and physical activity (Schwartz *et al.*, 2011; Birch and Doub, 2014).

Based on the health belief model (Becker *et al.*, 1977), I hypothesize that parents will initiate actions to improve their child's health if: 1) they see childhood underweight or overweight as a health concern, 2) they perceive their child is at risk of being, or already is underweight or overweight, 3) they appreciate the benefits of recommended health behaviours, and the

barriers to undertake those behaviours are low. Hence, if parents do not perceive a health risk, they would be less likely to take actions to improve their child's health behaviours.

A possible but not the only explanation for inaccuracies may be the normalisation of overweight caused by the increased prevalence of overweight and obesity in the population. For example, Binkin and colleagues found that in areas where there was a large proportion of overweight children, parents were more likely to have inaccurate perceptions of their child's weight (Binkin *et al.*, 2013).

Another factor that could determine whether or not a mother accurately perceives their child's weight is the mothers' lack of understanding of the normal changes in body composition, appetite and nutritional requirements of their child during the first years of life (Trahms and McKean, 2007; Cameron, 2008). It is possible that a lack of knowledge of how much a child should grow, or how much a child should be eating, could lead mothers to worry that their child with a healthy weight is not eating and/or growing sufficiently. Similarly, a child with rapid weight gain, which has been seen to precede childhood overweight (Monteiro and Victora, 2005), might not be of concern to the mothers; nonetheless, there are no studies that directly explore this hypothesis. Studies in the UK, including mothers of older children, suggest that mothers of preschool children could also fail to estimate their young child's weight accurately.

Falconer and colleagues (2014) explored the benefits and harms of providing weight feedback to parents as part of the national school-based weight-screening programme in England. At baseline, they found that parents of 4-5-year-old children underestimated their child's weight (Falconer *et al.*, 2014). Moreover, results from a qualitative study in England showed that mothers from ethnic minority groups have preferences for "bigger" babies (Redsell *et al.*, 2013). These cultural preferences may be related to maternal inability to recognise overweight in their children or be concerned about it.

Given the potential link between parental perceptions and concerns about their child's weight, with parental health behaviours, part II of this thesis aims to explore:

- 1) Chapter 4: How mothers living in Bradford perceive their preschool child's weight and if they are accurate in their estimations. What factors are associated with inaccuracy?
- 2) Chapter 5: If mothers are concerned about their child becoming overweight, are their concerns aligned with their child's actual weight status? What predicts

maternal concerns about their child becoming overweight? Are mothers' perceptions related to their concerns about their child's weight?

- 3) Chapter 6: How do women perceive their own weight, and can they estimate it accurately? Are women's perceptions of own weight associated with: a) the accuracy of their estimation of their child's weight, and b) concerns that their child will become overweight?
- 4) Chapter 7: What mother and child characteristics are associated with mothers' breastfeeding duration and feeding styles, and are mothers' perceptions and concerns about their child's weight associated with these behaviours?

To answer the above research questions, I undertook a secondary data analysis of the BiB1000 subsample (Bryant *et al.*, 2013) of the Born in Bradford (BiB) cohort study (Wright *et al.*, 2016).

3.3 THE BIB1000 SUBSAMPLE OF THE BORN IN BRADFORD COHORT STUDY: STUDY SETTING AND SAMPLE

The Born in Bradford (BiB) cohort study aims to explore the impact that different determinants (genetic, nutritional, environmental and social) have on children's' and mothers' immediate and long-term health and wellbeing (Wright *et al.* 2016).

Participants in the BiB cohort study were recruited in the Bradford Royal Infirmary (BRI) between the years 2007 and 2010. At the time recruitment took place, the BRI was the only maternity unit in the City of Bradford (Wright *et al.*, 2013). Moreover, nearly half (44%) of the births during the time of recruitment were from families of Pakistani origin (Wright *et al.*, 2016).

The cohort is constituted by 12,453 mothers with 13,776 infants. Women were invited to be part of the cohort when they were between weeks 26 and 28 of pregnancy, regardless of parity or whether they had a singleton or multiple pregnancies.

The BiB1000 subsample of the BiB cohort was established with aims to expand knowledge about the predictors and influences of health-related behaviours linked to childhood obesity. The BiB1000 sub-sample comprises 1735 women recruited into the BiB cohort between August 2008 and March 2009 who agreed to participate in detailed follow-ups (at 6, 12, 18, 24 and 36 months postpartum) (Bryant *et al.*, 2015). Measurements taken at the follow-up

visits included anthropometric measurements of both mother and child and questionnaires that investigated sociodemographic and health characteristics.

3.3.1 Inclusion and Exclusion Criteria of the Participants

For the analyses described in Part II, I included data from 1488 mothers and child dyads from the BiB1000 subsample who were of either White British (N=661) or Pakistani (N=827) origin.

Although the BiB1000 subsample recruited women from other ethnicities, the sample size meant that the number of participants in other ethnic groups was too small for analysis, and these groups were excluded. Table 3.1.

Table 3.2- Women's place of birth by maternal ethnicity from the Born in Bradford cohort study

Place of Birth	Ethnicity			
	White British	Pakistani	Other	Total
England	640	340	89	1,069
Northern Ireland	3	0	0	3
Scotland	4	0	0	4
Wales	5	0	1	6
Republic of Ireland	0	0	2	2
Czech Republic	0	0	2	2
Poland	0	0	24	24
Bangladesh	0	0	22	22
India	0	0	33	33
Pakistan	0	479	3	483
Sri Lanka	0	1	0	1
Philippines	0	0	6	6
Don't know	1	0	0	1
Other	8	7	63	78
Total	661	827	245	1733

I also considered the option of examining the Pakistani-origin women in two distinct groups (born inside and outside the U.K.). Fewer than half of the Pakistani women (41.1%) were born in the U.K., and some studies have found that women who migrate have different health outcomes and behaviours than their counterparts with different levels of acculturation (Chaparro *et al.*, 2011; Natale *et al.*, 2015). However, in preliminary analyses, no statistically significant differences were found in the relevant sociodemographic and biological characteristics among the Pakistani immigrants and those born in the U.K., except for women's BMI at 6 months postpartum. Hence, to minimise complexity in the presentation of the findings and maintain sufficient sample size for statistical models, I

decided not to stratify the Pakistani group by migration status. However, the place of birth was used as a covariate in the models.

In the case of twins, data of one child was randomly excluded (White British =9) (Pakistani=19) to ensure independence in the statistical models.

3.4 SOCIODEMOGRAPHIC AND BIOLOGICAL CHARACTERISTICS OF THE SUB-SAMPLE USED FOR THE ANALYSES IN CHAPTERS 4-7

3.4.1 Methods Used to Describe Maternal and Sociodemographic Characteristics

3.4.1.1 Measurements

The sociodemographic and biological characteristics described in Table 3.3 were selected if previous research has studied these as possible factors associated with inaccurate estimation of child weight, and they were available in the BiB1000 dataset.

Table 3.3- Description of the variables of the sociodemographic and biological characteristics used for this set of analysis

Variable	Collection Measure	Categorization / Reduction Approach	Time of Collection
Ethnicity	Mothers' ethnic group (9 categories)	Only Included information of 2 ethnic groups: White British and Pakistani.	Baseline
Place of birth	Mothers' country of birth (17 categories)	2 categories: Inside the U.K. and Outside the U.K.	Baseline
Maternal Education	Mothers' highest educational qualification. (7 categories)	5 categories: <5 GCSE equivalent, 5 GCSE equivalent, A-level, Higher than A-level, Other or unknown	Baseline
Living Arrangements	Living arrangements (4 categories)	4 categories: living with baby father, living with another partner, not living with a partner but in a relation, not living with a partner and not in a relation. Reduced to 2 categories: Living with partner or not living with partner	6 and 24 months postpartum
Food Security	18 item Food Security Core-Module questionnaire (Bickel et al. 2000)	Dichotomised into food secure and food insecure (any food insecurity: without hunger, moderate or severe hunger)	12 months postpartum
Parity	Continuous variable	2 categories: Primiparous or multiparous	Baseline
Mother Age	Mothers' age (Continuous variable)	-	Baseline
Maternal BMI and Weight Status	Calculated from maternal height and weight (continuous variable)	Weight categories based on their BMI according to the World Health Organization. 4 categories: Underweight BMI <18.5, Healthy weight BMI \geq 18.5 and \leq 25, Overweight BMI >25 and \leq 30 and Obese BMI >30	Height: baseline, weight: 6 and 24 postpartum
Maternal Weight Status	Weight categories based on BMI according to the World Health Organization	4 categories: Underweight BMI <18.5, Healthy weight BMI \geq 18.5 and \leq 25, Overweight BMI >25 and \leq 30 and Obese BMI >30.	6 and 24 months postpartum
Child's Gender		2 categories: Male, Female	Birth
Child's Birth Weight	Collected by paediatrician in grams	-	Birth
Child's BMI z-scores and Child's Weight Status	Infant's weight and length converted to BMI z-scores. (continuous variable)	Child's weight status obtained with child's BMI z-scores. Weight status 6 categories: Severely wasted (BMI <-3 z-score), wasted (BMI \geq -3 and <-2), healthy weight (\geq -2 and \leq 1), possible risk of overweight (BMI >1 z-score and \leq 2 z-score), overweight (BMI >2 z-score and \leq 3 z-score) and obese (BMI >3 z-score). Reduced to 4 categories: Underweight, healthy weight, risk of overweight, overweight or obese	6 and 24 months postpartum

Sociodemographic characteristics of the women

Information about the women's ethnicity, age, migration history, parity, and education were obtained from the baseline questionnaire.

Data about women's living arrangements (6, and 24 months postpartum) and food security (12 months postpartum) were gathered from the women in the follow-up questionnaires. To measure food security, the 18 item Food Security Core-Module questionnaire (Bickel *et al.*, 2000) was used. Women were classified as food secure or food insecure (any food insecurity: without hunger, moderate or severe hunger).

Anthropometric Measurements and Their Analysis

Anthropometric measurements were collected from mothers and children. These measurements were taken by trained research administrators. For the women, height was measured at baseline (26-28 weeks of pregnancy), and weight at baseline and 6, 12, 18, 24 and 36 months postpartum.

Women's Body Mass Index (weight in kilograms/ squared height in meters) was calculated and women were classified according to the World Health Organization recommendations (Bailey and Ferro-Luzzi, 1995) as underweight BMI <18.5, healthy weight BMI \geq 18.5 and \leq 25, overweight BMI >25 and \leq 30 and Obese BMI >30.

For the child, anthropometric measurements were collected at birth and 6, 12, 18, 24 and 36 months postpartum, and have been described elsewhere (Fairley *et al.*, 2013).

For these analyses infant's weight status was calculated with the child's age and sex-specific z-scores of Body Mass Index relative to the WHO growth standards, using the STATA macro downloaded from the WHO website: <http://www.who.int/childgrowth/software/en> and children were classified into weight categories.

There are no established definitions for weight status in children under the age of two. However, Roy 2016 and colleagues found that a BMI above the 85th percentile during early childhood was a predictor of obesity at the age of two (Roy *et al.*, 2016). Therefore, at all time points, the child's weight status was classified using the recommended cut off points for children over the age of two. These were the following 6 categories: Severely wasted (BMI <-3 z-score), wasted (BMI \geq -3 and <-2), healthy weight (\geq -2 and \leq 1), possible risk of overweight (BMI >1 z-score and \leq 2 z-score), overweight (BMI >2 z-score and \leq 3 z-score) and obese (BMI >3 z-score) (World Health Organization, 2008).

3.4.1.2 Statistical Analysis Used to Describe Maternal and Sociodemographic and Characteristics of the Sample Used in Part II

Descriptive statistics (proportions for categorical variables and means and standard deviations for continuous variables) for the mother's characteristics (maternal education, living arrangements, place of birth, food security and parity), were explored for the total sample and by ethnic group.

Differences by ethnicity (White British and Pakistani) in the distribution of the characteristics were assessed with Chi-square, Fisher's exact tests and independent t-tests as appropriate. All differences were considered statistically significant at the 0.05 level. Before running the t-tests, variables were examined for the presence of outliers and normality in the distribution.

3.4.2 Description of the Sociodemographic and Biological Characteristics of the Sample

1,488 mother and child dyads were included in these analyses. Of these infants, 661 were born to White British women and 827 to women of Pakistani origin. Among those women of Pakistani origin, 59% (N=487) were born outside the U.K.

With regards to the sociodemographic characteristics of the women, statistically significant differences among Pakistani and White British women were found in maternal living arrangements, place of birth, parity and food security (Table 3.4). Overall, a higher proportion of Pakistani women lived with their partners at 6 and 24 months after birth, and were multiparous, in comparison to their White British counterparts. In comparison to Pakistani women, a higher proportion of the White British women were food insecure at 12 months postpartum. In relation to biological characteristics, Pakistani women had a higher mean age than White British women.

Table 3.4- Sociodemographic characteristics of the sample included in the set of analyses of Part II of this dissertation

			White British	Pakistani	Total	P±
Maternal Education	<5 GCSE equivalent	N (%)	223 (33.74)	310 (37.48)	533 (35.82)	0.001
	5 GCSE equivalent	N (%)	136 (20.57)	211 (25.51)	347 (23.32)	
	A level or higher	N (%)	244 (36.91)	267 (32.29)	511 (34.34)	
	Other/ unknown	N (%)	58 (8.77)	39 (4.72)	97 (6.52)	
Maternal Living arrangements						
at 6 months	Living with a partner	N (%)	390 (79.92)	612 (94.59)	1002 (88.28)	<0.001
	Not living with a partner	N (%)	98 (20.08)	35 (5.41)	133 (11.72)	
at 24 months	Living with partner	N (%)	202 (44.89)	582 (96.20)	784 (74.31)	<0.001
	Not living with partner	N (%)	248 (55.11)	23 (3.8)	271 (25.69)	
Place of birth	U.K.	N (%)	652 (98.79)	341 (41.08)	993 (66.64)	<0.001
	Outside the U.K.	N (%)	8 (1.21)	489 (58.92)	497 (33.36)	
Parity	Primiparous	N (%)	307 (47.6)	250 (30.98)	557 (38.36)	<0.001
	Multiparous	N (%)	338 (52.4)	557 (69.02)	895 (61.64)	
Food Security at 12 months	Food secure	N (%)	394 (81.74)	562 (89.78)	956 (86.28)	<0.001
	Food Insecure	N (%)	88 (18.26)	64 (10.22)	152 (13.72)	
Maternal Age in years at baseline questionnaire		N	660	828	1488	<0.001
		Mean (95% CI)	26.43 (25.96, 26.90)	27.53 (27.18, 27.88)	27.04 (26.76, 27.33)	
Infant's gender	Male	N (%)	319 (48.72)	393 (48.10)	712 (48.40)	0.79
	Female	N (%)	335 (51.22)	424 (51.90)	759 (51.60)	
Infant Mean Age	6 months	N	487	653	1,140	<0.001
		Mean (95% CI)	6.54 (6.48,6.6)	6.73 (6.68,6.79)	6.65 (6.60, 6.79)	
	24 months	N	450	607	1057	0.24
		Mean (95% CI)	25.31 (25.22,25.4)	25.25 (25.17,25.32)	25.27 (25.21, 25.33)	

3.4.2.1 Mothers' Weight Status

Although maternal anthropometrical measurements were taken at all 5 follow-ups of the BiB1000 subsample, in these analyses, only the anthropometrical measurements at 6 and 24 months postpartum were used, as these correspond to the times that the mothers were asked about their perceptions of their own and their child's weight.

The mean BMI of the sample was 26.7 at both time points (6 months: 95% CI (26.43, 27.14), 24 months: 95% CI (26.4, 27.15). White British women had a higher mean BMI than Pakistani women. White British and Pakistani women had similar rates of overweight/obesity. However, a larger proportion of White British women were classified as obese, while Pakistani women are more likely to be overweight than obese (Table 3.4).

Table 3.5- Mothers' BMI and weight category at 6 and 24 months postpartum

			White British	Pakistani	Total	P±
Mothers BMI	6 months	N	471	630	1101	0.015
		Mean (95%CI)	27.29 (26.71,27.87)	26.41 (25.97,26.85)	26.78 (26.43,27.14)	
	24 months	N	404	558	962	0.004
		Mean (95%CI)	27.41 (26.77,28.06)	26.31 (25.87,26.75)	26.77 (26.4,27.15)	
Mothers weight category	6 months	Under-weight N (%)	12 (2.55)	30 (4.76)	42 (3.81)	0.004
		Healthy weight N (%)	203 (43.1)	258 (40.95)	461 (41.87)	
		Over-weight N (%)	113 (23.99)	195 (30.95)	308 (27.97)	
		obese N (%)	143 (30.36)	147 (23.33)	290 (26.34)	
	24 months	Under-weight N (%)	12 (2.97)	23 (4.11)	35 (3.63)	0.016
		Healthy weight N (%)	163 (40.35)	223 (39.89)	386 (40.08)	
		Over-weight N (%)	107 (26.49)	188 (33.63)	295 (30.63)	
		obese N (%)	122 (30.2)	125 (22.36)	247 (25.65)	

3.4.2.2 Children's Weight Status

The growth of the children of the BiB1000 subsample has been described in detail elsewhere (Fairley *et al.*, 2013). Briefly, Fairley and colleagues found that Pakistani children were lighter at birth than white British infants. However, during the first year of life, Pakistani children grew more and gained more weight than white British children. They also found that by the age of 2 years, Pakistani children had similar weight, but were taller than white British children (Fairley *et al.*, 2013).

In the following Chapters in Part II, I explore whether the child's birth weight and weight status at 6 and 24 months of age are associated with mothers' perceptions, concerns and feeding practices. Therefore, it was necessary to describe the birth weight and weight status of the children. As Fairley and colleagues report, at birth, significant differences in mean child weight (Kg) mean were found by ethnicity. White British new-borns (N=654 Mean: 3.3, 95% CI: 3.26, 3.35), had higher mean weight than Pakistani new-borns (N=817 Mean: 3.11, 95% CI: 3.08, 3.15). Analysis of the BMI z-scores of the children at 6 and 24 months showed that White British children had higher mean BMI z-scores than Pakistani children at both time points. As shown in Table 3.5, there were children of both ethnicities who were classified as either underweight or overweight. The number of underweight children decreased between 6 and 24 months, while rates of children at risk of overweight, overweight/obese increased. A substantial minority of Pakistani children were classified as underweight at both time points, while a smaller proportion was classified as overweight or at risk (Figure 3.1).

Table 3.6- Weight status of the children at 6 and 24 months postpartum by ethnicity

			White British	Pakistani	Total	P±	
Child's BMI	6 months	N	472	618	1090	0.001	
		Mean (95% C.I.)	-0.18 (-0.27, -0.09)	-0.78 (-0.88,-0.69)	-0.52 (-.58, -.54)		
	24 months	N	352	405	757	<0.001	
		Mean (95% C.I.)	0.68 (0.57,0.79)	0.38 (0.27,0.49)	0.52 (0.44, 0.59)		
Child's weight category	6 months	Healthy weight	N (%)	407(86.23)	499(80.74)	906(83.12)	<0.001
		Under-weight	N (%)	18(3.81)	86(13.92)	104(9.54)	
		Risk of Over-weight	N (%)	40(8.47)	25(4.05)	65(5.96)	
		Over-weight or Obese	N (%)	7(1.48)	8(1.29)	15(1.38)	
	24 months	Healthy weight	N (%)	220(62.5)	277(68.4)	497(65.65)	0.008
		Under-weight	N (%)	2(0.57)	12(2.96)	14(1.85)	
		Risk of Over-weight	N (%)	103(29.26)	89(21.98)	192(25.36)	
		Over-weight or Obese	N (%)	27(7.67)	27(6.67)	54(7.13)	

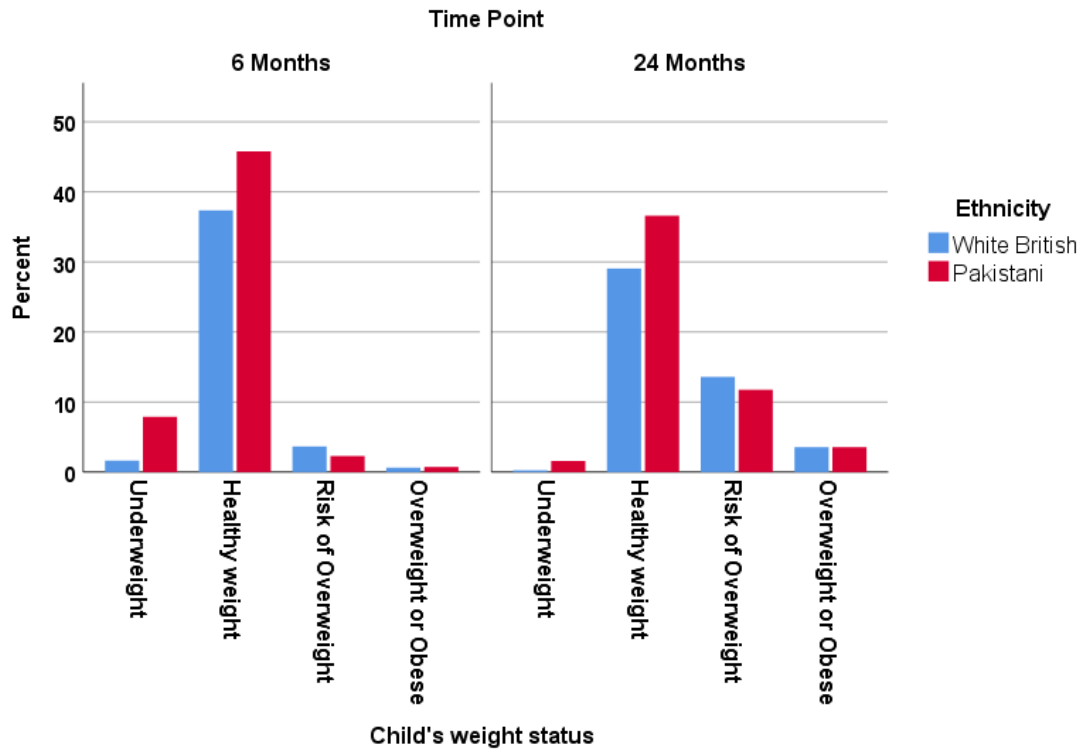


Figure 3.10 Children's weight status at 6 and 24 months postpartum

3.5 CONCLUSIONS

Children living in Bradford have a high risk of developing childhood overweight. Therefore, it is important to identify mother and child characteristics associated with mothers' feeding practices and explore the mothers' perceptions and concerns about their child's weight. This is important to inform potential interventions against childhood obesity in multicultural and deprived areas such as Bradford.

In the following chapters included in Part II of this thesis I use data from 661 White British and 827 Pakistani mothers from the BiB1000 subsample of the BiB cohort to identify mothers and child characteristics associated with: inaccurate estimations of the child's weight (Chapter 4); concern that the child will become overweight (Chapter 5), maternal accuracy to estimate her own weight (Chapter 6) and maternal feeding practices (Chapter 7).

Chapter 4 - How Do Mothers Perceive Their Child's Weight? Are They Accurate? What Predicts Inaccuracy?

4.1 CHAPTER INTRODUCTION

As described in the previous Chapters, the City of Bradford is an area with high levels of deprivation which makes children born in Bradford at higher risk of developing childhood overweight. It is possible that some mothers' may not have an accurate estimation of their child's weight. Therefore, it is important to identify those mothers that may be less likely to initiate actions to ensure a healthy weight in their children.

This chapter presents the methods and results of the secondary data analysis of the multi-ethnic BiB1000 subsample of Born in Bradford (described in Chapter 3), which aims to explore mothers' perceptions of their infant and young children's weight and the accuracy of their perceptions.

The specific objectives of this study were to:

1. Describe maternal perceptions of child weight and the accuracy of these perceptions at 6 and 24 months postpartum.
2. Explore associations of maternal and child characteristics with women's inaccurate perceptions of their child's weight.

This chapter is structured into three sections. The first and second sections describe the women's perception of and accuracy in estimating their child's weight, respectively. Both sections describe the approach used to classify women's perceptions of their children's weight and accuracy. The results of these two sections include both the description of women's perceptions and their accuracy at different time points by ethnicity and actual weight status of the child. The third section presents the methods and results for the analysis of factors related to maternal accuracy/inaccuracy.

4.2 HOW DO WOMEN PERCEIVE THEIR CHILD'S WEIGHT?

4.2.1 Methods and Results

At 6 and 24 months postpartum, women were asked about their perception of their child's weight. Questions were presented to the women in a 5-point Likert-scale format. These questions were:

1. "How do you see the weight of your child?"
2. "How would you classify your child's weight?"
3. "What is your child's weight compared to other children?"
4. "How quickly has your child gained weight compared to other children?"

A preliminary analysis showed high concordance among responses to the above questions (Appendix II, A.II Table 1). Therefore, to reduce complexity, the only item used was "How do you see the weight of your child?" Answers to this question were limited to the following five points on the scale: "much too low", "a little too low", "just right", "a little too high", or "much too high".

In total, 1138 women at 6 months after giving birth and 1056 women at 24 months after giving birth answered the question "How do you see the weight of your child?" At both time points, most of the women perceived their child's weight as "just right." Also, as seen in Figure 4.11, very few mothers perceived their child's weight as either "much too low" or "much too high" at either time point.

At both time points, a higher proportion of women perceived their child's weight as low than perceived it as high. Moreover, the proportion of women who perceived their child's weight as high at 24 months (4.26%), was lower than at 6 months (8.26%) ($p < 0.001$). Conversely, the percentage of those who perceived it as low was higher at 24 months (19.21%) than at 6 months (13.80%).

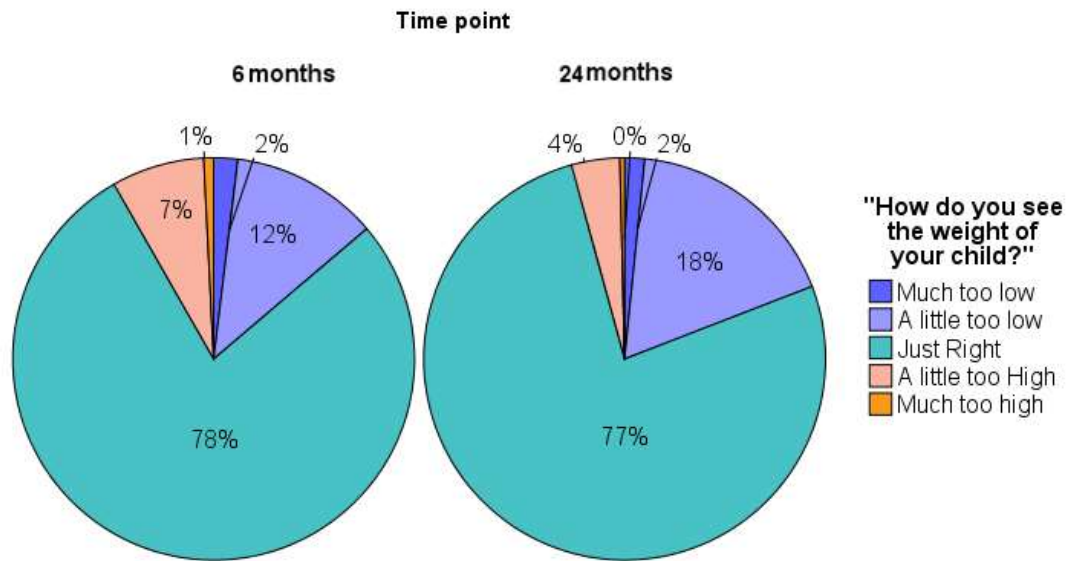


Figure 4.11 - Mothers' perceptions of their child's weight at 6 and 24 months postpartum

4.2.1.1 Mothers' Perceptions of Their Child's Weight by Ethnicity

Differences in mothers' perceptions of their child's weight by ethnic group were assessed. Due to small numbers, I combined the responses of "much too low" and "a little too low" into a single category ("low") and combined "much too high" and "a little too high" into a single category ("high")

As shown in Figure 4.2, at both time points, a higher proportion of White British women perceived their child's weight as "just right" and fewer perceived their child's weight as "low" in comparison with Pakistani mothers (Figure 4.12) (6 months: $p < 0.001$, 24 months: $p < 0.001$) (Appendix II, A.II Table 2 and A.II Table3).

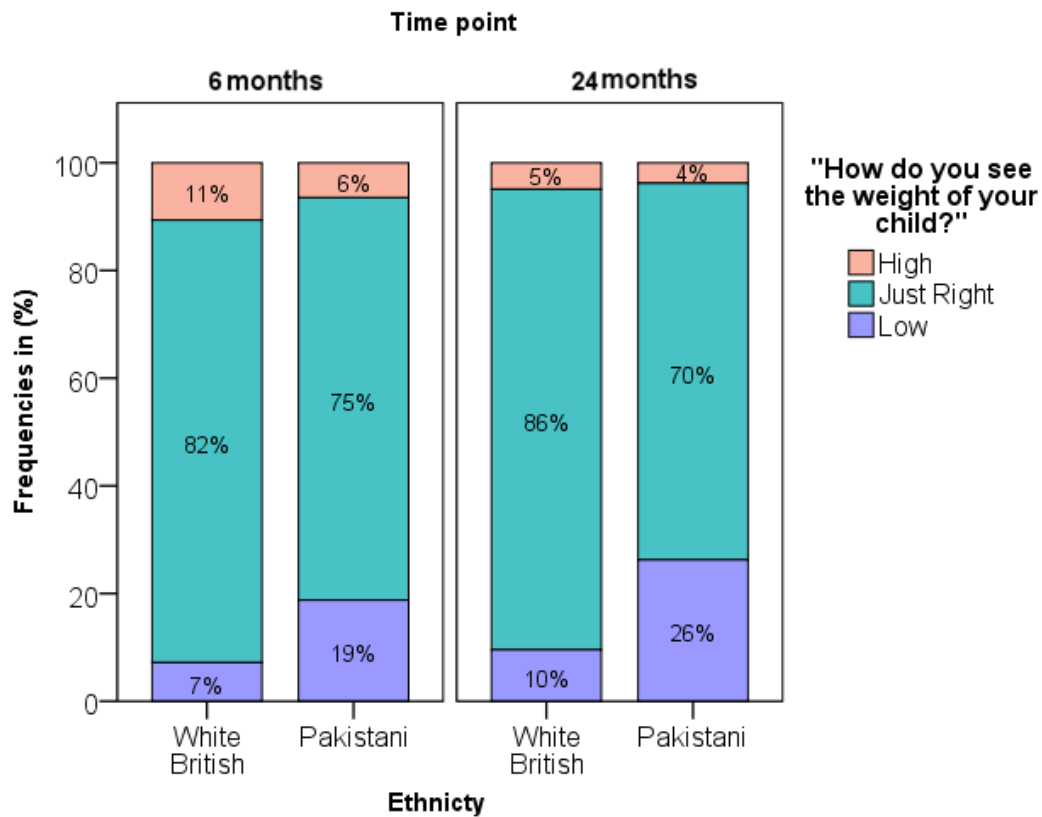


Figure 4.12- Maternal perception of their child's weight by ethnicity at 6 and 24 months postpartum

4.2.1.2 Association Between Mothers' Perception of Their Child's Weight and Child's BMI Z-Scores?

Concordance between the child's BMI z-score based on measured weight and length/height (variable described in Chapter 3) and women's perception of their child's weight (in the five categories described previously in this chapter) was tested with the non-parametric Spearman's rank correlation test.

The assessment of concordance showed a moderate association between these variables at both time points (6 months: $Rho=0.34$ $p<0.001$; 24 months: $Rho=0.33$ $p<0.001$). Figure 4.13 shows that mothers whose children are at the upper and lower end BMI z-score range are likely to perceive their weight low or high, respectively.

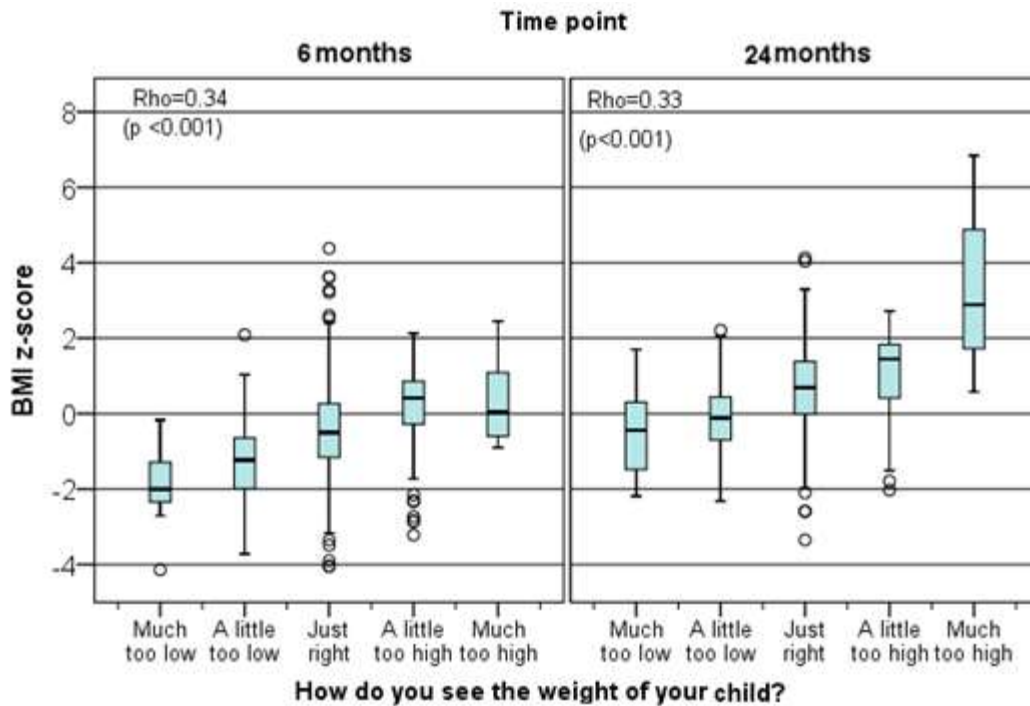


Figure 4.13 - Child's BMI z-scores by responses to women's perception of their child's weight at 6 and 24 months postpartum.

4.3 ARE WOMEN ACCURATE IN ESTIMATING THEIR CHILD'S WEIGHT?

4.3.1 Methods and Results

In the review undertaken in Part I, it was pointed out that a high proportion of the studies that have investigated the associations between numerous variables and women's accuracy in estimating their child's weight have classified accuracy as a binary outcome (accurate/inaccurate).

However, this thesis hypothesises that underestimation (perceiving weight to be lower than the actual weight), and overestimation (perceiving weight to be higher than actual weight) are phenomena which are driven by different factors. Therefore, women's accuracy in estimating their child's weight has initially been classified into five categories: "moderate to severe overestimation", "slight overestimation", "accurate", "slight underestimation", and "moderate to severe underestimation."

To do this, the mothers' perception of their child's weight with the child's actual weight status has been cross-tabulated, as shown in Figure 4.4. When mothers perceived the child's weight one category away from its measured weight category, they were classified as having a "slight" under or overestimation, whereas "moderate to severe" under or overestimation

are recorded when mothers classified their child’s weight two or more categories away from its measured category.

		Child’s Weight Category					
		Severely Wasted	Wasted	Normal	Possible Risk of Over-weight	Over-weight	Obese
BMI z-score		<-3	>=-3 & <-2	=-2 & <1	>=1 & <2	>=2 & <3	>=3
Perception of Child’s Weight	much too low			Moderate/ Severe Underestimation			
	a little too low						
	just right	Moderate/ Severe Overestimation				Slight Underestimation	
	a little too high				Accurate		
	much too high			Slight Overestimation			

Figure 4.14 - Criteria taken to classify maternal accuracy to determine the child’s weight (five categories)

When this approach to classify accuracy was initially designed, one of the challenges was how to classify women who thought that their child’s weight was “just right” when the actual weight status of the child according to the WHO classification (World Health Organization, 2008) was “at risk of overweight”.

Growth references, such as the WHO scheme, classify children as overweight when a child’s BMI z-score is above the +2 z-score. These cut-off points are based on statistical distributions of a population of healthy children rather than in relation to any immediate or future health outcomes of the child (Wang and Hsin-Jen, 2012). However, research by Nader et al. (2006) found that children who are above the 85th percentile of the reference population (equivalent to a 1.04 z-score) are more likely to be overweight later in their childhood.

The BiB1000 dataset contained information about the children’s subscapular and triceps skinfolds, which indicate body fat (World Health Organization, 2003). An ANOVA test with Bonferroni correction was used to look at differences in the child’s subscapular and triceps skinfolds z-scores (obtained with the WHO macro) by BMI weight status. Results showed statistically significant differences in subscapular and triceps skinfold z-scores in children who were “normal weight” compared to those classified as “risk of overweight (mean tricipital skinfold z-score of healthy weight children at 24 months: 0.89 S.D. 1.11; VS tricipital skinfold z-score of children at risk of overweight: 1.66 S.D.1.07) (p <0.001). This suggests that

children who were categorised as “at risk,” have more body fat than children categorised as having a healthy weight status (Appendix II, A.II Table 4 and A.II Table 5).

Visually, it may be difficult to accurately perceive the difference between a healthy-weight child and a child who is at risk of overweight, as shown in Figure 4.15. Nevertheless, given the differences in body fat, women who perceived their child as “just right”, but whose child’s actual weight was classified as “at risk of overweight”, have been classified as slightly underestimating their child’s weight in this research.

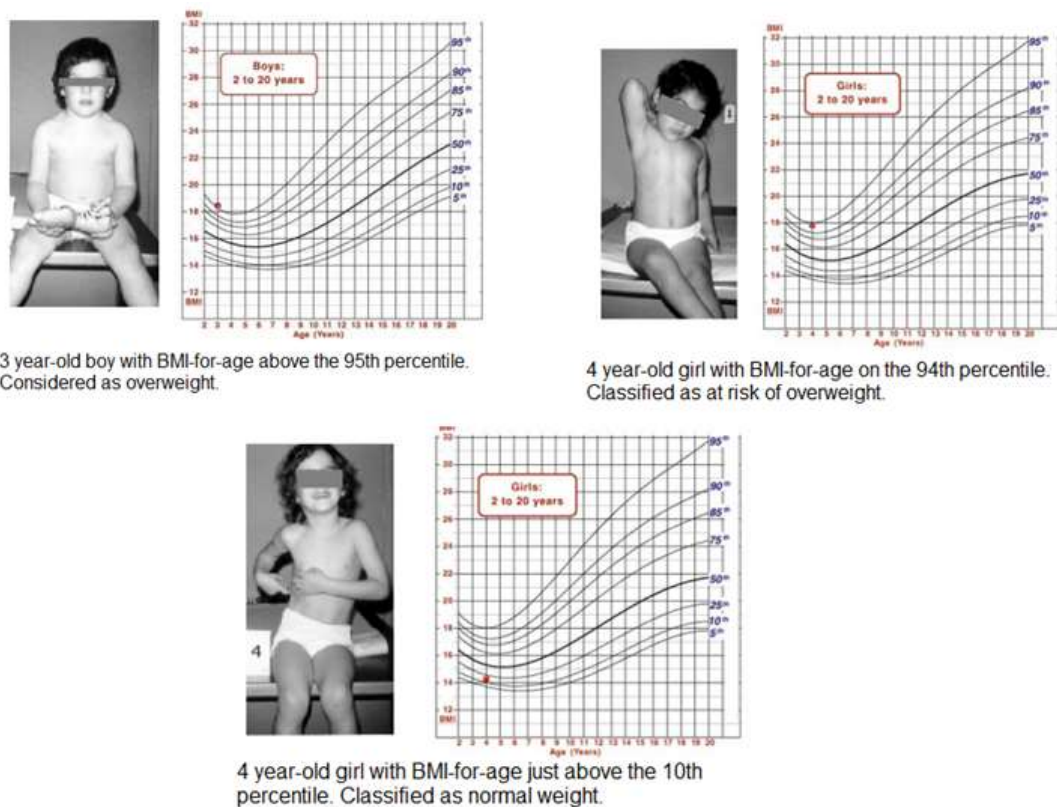


Figure 4.15 - Body images of preschool children with different weight categories. (Centers for Disease Control and Prevention (CDC), no date)

Simple frequencies are used to describe women’s accuracy in estimating their child’s weight at 6 and 24 months postpartum. Differences in accuracy by time point (6 and 24 months), ethnicity (White British and Pakistani), and the weight category of the child are assessed with Chi-square or Fisher’s exact tests, as appropriate. Results are considered to be statistically significant at the 0.05 level.

Among the women who completed the child perception questionnaire, 1085 at 6 months and 757 at 24 months had complete information about their child’s weight and height.

Table 4.1 presents the cross-tabulation used to classify women’s accuracy in estimating their child’s weight at 6 and 24 months postpartum.

Table 4.7 Cross-tabulation of the maternal perception of their child’s weight and the child’s weight status for the classification of Accuracy

		BMI z-score	Child’s Weight Category						Total
			Severely Wasted (<-3)	Wasted (>=-3 & <-2)	Healthy Weight (=-2 & <1)	Possible Risk of Over-weight (>=1 & <2)	Over-weight (>=2 & <3)	Obese (>=3)	
How do you perceive your child’s weight?	6 months	Much too low N (%)	1 (6.25)	9 (10.47)	10 (1.11)	0 (0)	0 (0)	0 (0)	20 (1.84)
		A little too low N (%)	7 (43.75)	23 (26.74)	96 (10.63)	1 (1.54)	1 (10)	0 (0)	128 (11.8)
		Just Right N (%)	7 (43.75)	48 (55.81)	734 (81.28)	46 (70.77)	6 (60)	5 (100)	846 (77.97)
		A little too high N (%)	1 (6.25)	6 (6.98)	57 (6.31)	16 (24.62)	2 (20)	0 (0)	82 (7.56)
		Much too high N (%)	0 (0)	0 (0)	6 (0.66)	2 (3.08)	1 (10)	0 (0)	9 (0.83)
	24 months	Much too low N (%)	0 (0)	3 (23.08)	9 (1.81)	1 (0.52)	0 (0)	0 (0)	13 (1.72)
		A little too low N (%)	0 (0)	6 (46.15)	115 (23.14)	9 (4.69)	2 (4.44)	0 (0)	132 (17.44)
		Just Right N (%)	1 (100)	3 (23.08)	360 (72.43)	171 (89.06)	34 (75.56)	8 (88.89)	577 (76.22)
		A little too high N (%)	0 (0)	1 (7.69)	12 (2.41)	11 (5.73)	7 (15.56)	0 (0)	31 (4.1)
		Much too high N (%)	0 (0)	0 (0)	1 (0.2)	0 (0)	2 (4.44)	1 (11.11)	4 (0.53)

	Moderate/Severe Overestimation
	Slight Overestimation
	Accurate
	Slight Underestimation
	Moderate/Severe Underestimation

Results showed that at 6 months postpartum, 71.45% of the women perceived their child’s weight accurately. However, at 24 months, the number of accurate women decreased to 51.31%. This difference between the 6 and the 24 months postpartum time points was statistically significant ($p < 0.001$) (Figure 4.6).

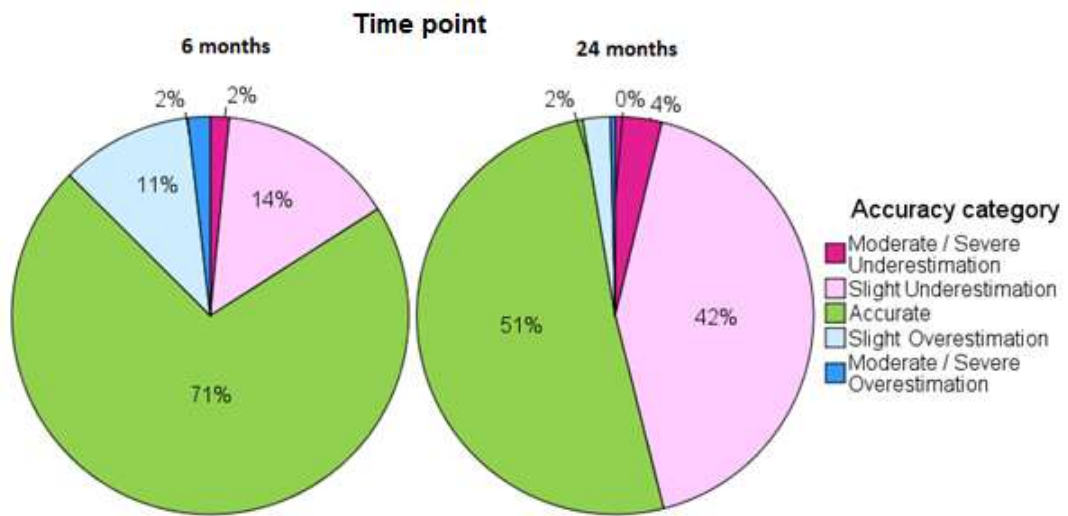


Figure 4.16 - Maternal accuracy to perceive their child's weight at 6 and 24 months postpartum

Furthermore, while at 6 months there were similar levels of over- and underestimation, rates of overestimation decreased substantially at 24 months, while underestimation increased with nearly half of the women (46%) underestimating their child's weight.

615 women and their children had complete data at both time points. In this group, 42% were accurate at both time points. However, among those who were accurate at 6 months, 41% underestimated their child's weight at 24 months.

4.3.1.1 Mothers' Accuracy to Estimate their Child's Weight by Ethnicity

Accuracy varied between ethnic groups; a higher proportion of White British women were accurate, and a lower proportion underestimated their child's weight in comparison with their Pakistani counterparts (6 months: 0.005; 24 months: 0.095) (Figure 4.7).

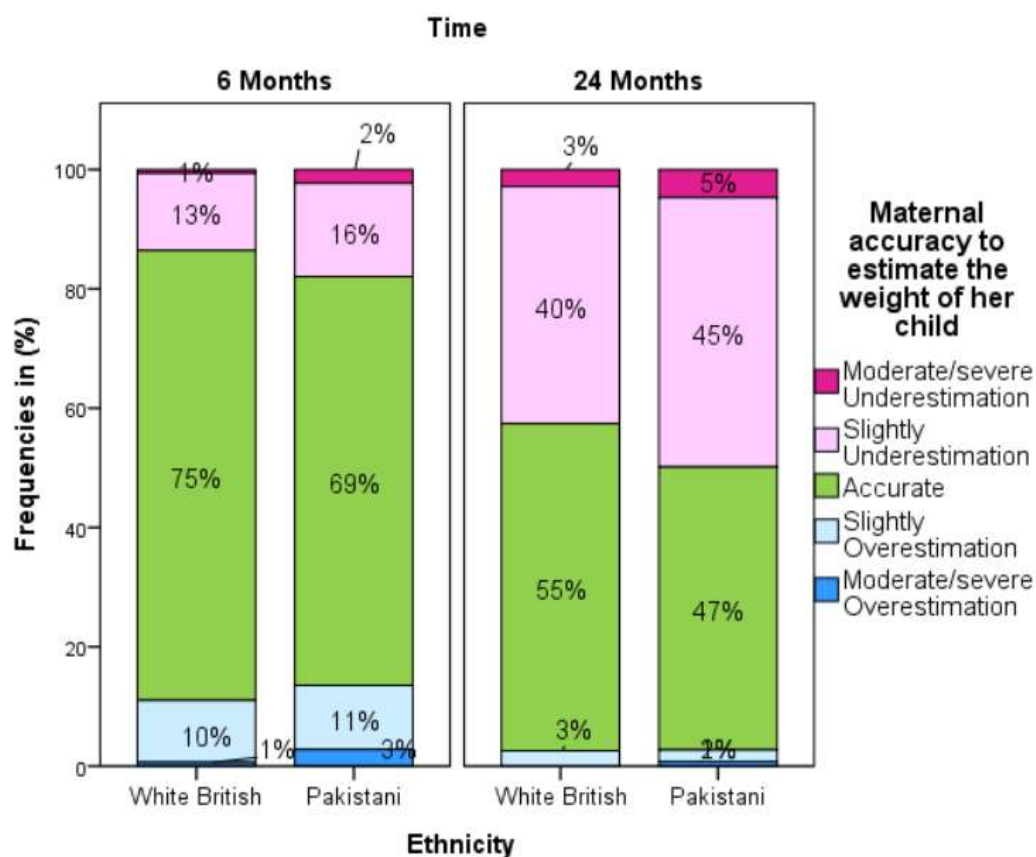


Figure 4.17- Maternal accuracy in estimating their child's weight by ethnicity at 6 and 24 months postpartum

Among women and children who had complete data at both 6 and 24 months, a lower proportion of Pakistani women (35.19%) were consistently accurate in comparison with their White British Counterparts (49.48%) ($p < 0.006$) (Appendix II, A.II Table 6 and A.II 7).

4.3.1.2 Mothers' Accuracy to Estimate their Child's Weight by Child Weight Category

Accuracy was stratified by weight status, with inaccuracy found to be present in all measured weight categories at both time points. Figure 4.8 shows that more than half of the women (68%) with underweight children overestimated their child's weight at 6 months postpartum. By 24 months postpartum, however, incidences of overestimation decreased in this group (36%), while the number of underweight children also decreased. The opposite occurred for underestimation, which increased at 24 months as the number of children found to be "at risk of overweight" and "overweight/obese" rose (Appendix II, A.II Table 8 and A.II Table 9).

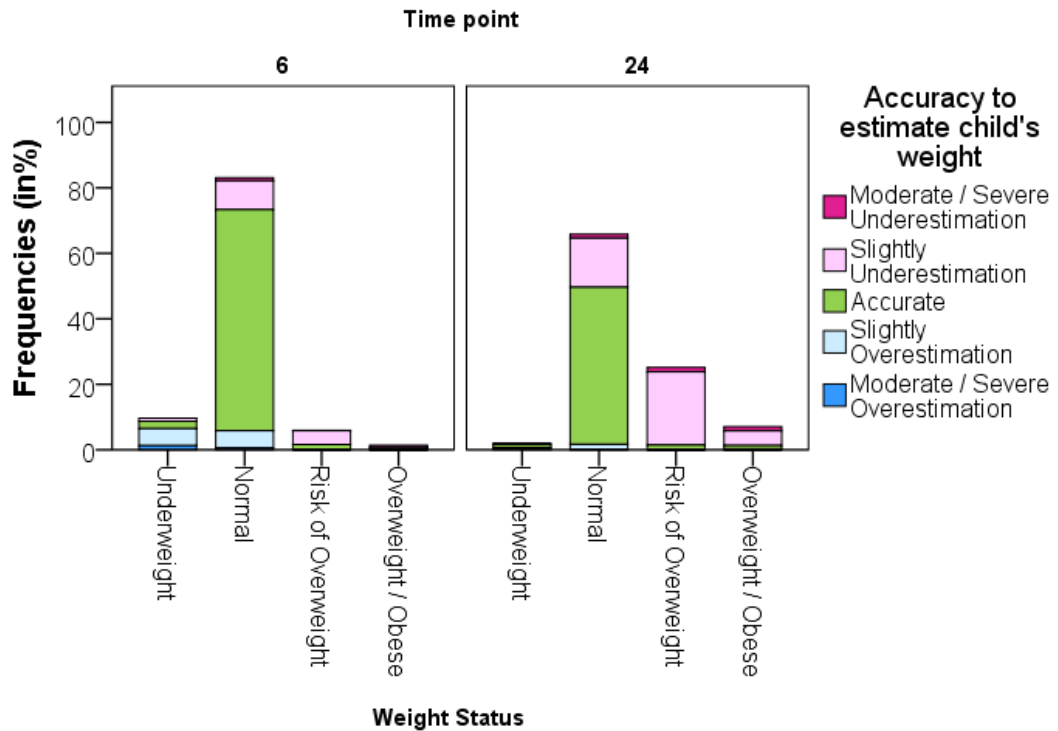


Figure 4.18 - Frequencies of child's weight categories and maternal accuracy in perceiving their child's weight

4.4 WHAT MATERNAL AND CHILD CHARACTERISTICS PREDICT WOMEN'S ACCURACY/INACCURACY IN THE ESTIMATION OF THEIR CHILD'S WEIGHT?

4.4.1 Methods

For these analyses, accuracy was re-classified into 3 rather than 5 categories due to the small number of mothers with "moderate to severe" over- or underestimation of their child's weight Figure 4.9.

		Infant's Weight Category					
		Severely Wasted	Wasted	Healthy Weight	Possible Risk of Overweight	Overweight	Obese
BMI z-score		<-3	>=-3 & <-2	=-2 & <1	>=1 & <2	>=2 & <3	>=3
Perception of Child's Weight	Much too low		Underestimation				
	A little too low						
	Just Right			Accurate			
	A little too high	Overestimation					
	Much too high						

Figure 4.19 - Criteria taken to classify maternal accuracy in determining their child's weight (three categories)

4.4.1.1 Women's and child's biological and sociodemographic characteristics

As described in Chapter 3, the variables assessed as possible determinants of maternal child weight perception accuracy have been selected if they were available in the BiB1000 dataset and previous research suggests that they might be associated with inaccuracy. The variables explored are maternal ethnicity, place of birth, education, living arrangements, food security, parity, age, BMI, and weight status, as well as the child's gender, birth weight, BMI, and weight status.

4.4.1.2 Statistical Analysis

Differences in the distribution of measured accuracy by the women's and child's biological and sociodemographic characteristics were assessed with Chi-square, Fisher's exact tests, and independent t-tests, as appropriate (Appendix II, A.II Table 10).

Following this, bivariate multinomial logistic regression models were estimated. The three-category form of the accuracy variable was the outcome measure and "Accurate Perception" was taken as the reference category. Relative risk ratios and 95% CI were estimated, with alpha set at 0.05 to indicate statistical significance.

Variables that were associated with maternal accuracy at $P \leq 0.2$ in the bivariate models were considered for inclusion in multivariable-adjusted models. Only statistically significant predictors were kept in the models ($p < 0.05$), and the best-fit models are presented.

4.4.2 Results

The unadjusted bivariate models showed that a significant relationship between accuracy and both ethnicity and infants' and women's actual weight status (Table 4.2 and Table 4.3), but not with maternal education, living arrangements, food security, maternal age, parity, and infant sex and birth weight.

Table 4.8- Unadjusted multinomial logistic regression models to estimate predictors of maternal accuracy in estimating their child's weight at 6 months postpartum (Accurate as reference category)

Coefficient (N)	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (1085)	White British	Ref			Ref		
	Pakistani	1.35	(0.93, 1.97)	0.113	1.46	(1.04, 2.04)	0.03
Place of Birth (1085)	Inside the U.K.	Ref			Ref		
	Outside the U.K.	2.16	(0.79, 1.7)	0.435	1.05	(0.74, 1.48)	1.791
Maternal Education (1082)	A Level or Higher	Ref			Ref		
	<5 GCSE	1.08	(0.66, 1.78)	0.765	0.89	(0.56, 1.4)	0.605
	5 GCSE	1.24	(0.8, 1.92)	0.337	1.13	(0.77, 1.66)	0.54
	Other/unknown	1.39	(0.66, 2.93)	0.393	1.17	(0.59, 2.32)	0.661
Living Arrangements (1082)	Living with Partner	Ref			Ref		
	Not living with partner	1.52	(0.91, 2.53)	0.106	0.97	(0.57, 1.64)	0.908
Food Security (886)	Food Secure	Ref			Ref		
	Food insecure	1.04	(0.58, 1.88)	0.888	1.38	(0.82, 2.33)	0.229
Maternal Age (1083)		1	(0.96, 1.03)	0.839	1	(0.97, 1.03)	0.864
Parity (1072)	Primiparous	Ref			Ref		
	Multiparous	1.27	(0.86, 1.87)	0.226	1.14	(0.81, 1.6)	0.467
Child's gender (1085)	Male	Ref			Ref		
	Female	0.82	(0.57, 1.18)	0.28	0.83	(0.59, 1.15)	0.258
Birth Weight (1085)		0.89	(0.64, 1.25)	0.51	0.81	(0.6, 1.1)	0.173
Infant's BMI Z-score at 6 Months (1085)		0.51	(0.42, 0.61)	<0.001	1.32	(1.14, 1.54)	<0.001
Child's Weight Status at 6 Months (1085)	Healthy Weight	Ref			Ref		
	Underweight	33.5	(19.7, 56.96)	<0.001	2.6	(1.18, 5.74)	0.018
	Risk of Overweight	1.46	(0.33, 6.48)	0.621	20.34	(11.13, 37.17)	<0.001
Maternal Weight Status (1061)	Overweight or Obese	5.83	(0.52, 65.13)	0.153	41.55	(9.17, 188.21)	<0.001
	Healthy Weight	Ref			Ref		
Maternal Weight Status (1061)	Underweight	0.76	(0.26, 2.25)	0.622	1.07	(0.4, 2.89)	0.896
	Overweight	0.88	(0.56, 1.39)	0.588	1.87	(1.25, 2.78)	0.002
	Obesity	0.73	(0.45, 1.17)	0.186	1.27	(0.83, 1.94)	0.278
Maternal BMI (1061)		0.98	(0.95, 1.01)	0.259	1.01	(0.98, 1.04)	0.418

Table 4.9- Unadjusted multinomial logistic regression models to estimate predictors of maternal accuracy in estimating their child's weight at 24 months postpartum (Accurate as reference category)

Coefficient (N)	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (757)	White British	Ref			Ref		
	Pakistani	1.23	(0.5, 3.03)	0.655	1.35	(1.01, 1.81)	0.041
Place of Birth (757)	Inside the U.K.	Ref			Ref		
	Outside the U.K.	1.75	(0.7, 4.41)	0.232	1.4	(1.02, 1.91)	0.037
Maternal Education (757)	A Level or Higher	Ref			Ref		
	<5 GCSE	2.48	(0.85, 7.21)	0.096	0.72	(0.48, 1.07)	0.104
	5 GCSE	0.66	(0.18, 2.4)	0.53	0.87	(0.62, 1.22)	0.409
	Other/Unknown	0.85	(0.1, 7.31)	0.879	0.78	(0.42, 1.44)	0.426
Living Arrangements (757)	Living with Partner	Ref			Ref		
	Not Living with Partner	1.4	(0.54, 3.6)	0.486	0.95	(0.68, 1.31)	0.741
Food Security (656)	Food secure	Ref			Ref		
	Food Insecure	1.23	(0.34, 4.45)	0.748	0.86	(0.55, 1.35)	0.504
Maternal Age (756)		0.95	(0.87, 1.03)	0.217	1.01	(0.98, 1.03)	0.573
Parity (747)	Primiparous	Ref			Ref		
	Multiparous	0.71	(0.29, 1.76)	0.458	0.9	(0.66, 1.21)	0.477
Child's Gender (757)	Male	Ref			Ref		
	Female	0.57	(0.23, 1.43)	0.234	0.81	(0.61, 1.09)	0.16
Birth Weight (757)		0.66	(0.3, 1.45)	0.302	1.13	(0.87, 1.47)	0.365
	Infant's BMI Z-score at 24 Months (757)	0.61	(0.39, 0.93)	0.022	2.28	(1.92, 2.71)	<0.001
Child's Weight Status at 24 Months (757)	Healthy Weight	Ref			Ref		
	Underweight	23.1	(6.24, 85.57)	<0.001	1.45	(0.36, 5.9)	0.601
	Risk of Overweight or Obese	6.92	(1.34, 35.88)	0.021	47.77	(25.14, 90.77)	<0.001
Maternal Weight Status (712)	Healthy Weight	Ref			Ref		
	Underweight	1.75	(0.2, 15.28)	0.613	1.04	(0.42, 2.59)	0.931
	Overweight	0.62	(0.16, 2.4)	0.49	1.67	(1.17, 2.39)	0.005
	Obesity	1.52	(0.55, 4.19)	0.414	1.02	(0.7, 1.49)	0.915
Maternal BMI (712)		1.02	(0.95, 1.1)	0.553	0.99	(0.96, 1.01)	0.62

At both time points, Pakistani women were more likely than White British women to underestimate their child's weight. (6 months: RRR1.46; 95% CI: 1.04, 2.04), (24 months: 1.35; 95% CI: 1.01, 1.8).

Child's weight status was explored as a continuous and categorical variable. When it was explored as a categorical variable, results show that weight category was the variable with the greatest explanatory power for determining accuracy. This suggests that mothers exhibit high sensitivity when recognising their child is of a healthy weight, but low specificity when recognising underweight or overweight in their children. At 6 months, mothers of children who were overweight or obese exhibited a higher relative risk of underestimating their child's weight than did mothers of children at risk of overweight when compared to mothers of healthy-weight children. However, this was not the case at 24 months, at which point children at risk of overweight had a higher relative risk to have their weight underestimated than those who were overweight or obese when compared to healthy-weight children. This indicates that at 24 months, the higher the child's BMI z-score is, the more likely the mother is to recognise a child's overweight.

Child BMI z-score was also associated with inaccuracies in maternal perceptions of their child's weight. With each unit increase in the child's weight, mothers were less likely to overestimate their child's weight (6 months: RRR 0.51, 95% CI: 0.42, 0.61; 24 months: RRR 0.61, 95% CI: 0.39, 0.93) and more likely to underestimate it (6 months: RRR 1.3, 95% CI: 1.14, 1.54; 24 months: RRR 2.28, 95% CI: 1.92, 2.71). The reliability of the estimates which explore maternal accuracy in estimating their child's weight by child weight category is low. This is due to the low number of cases per parameter in the models (Garson, 2016) as a result of a low number of children who had their weight overestimated, a low number of children who were overweight or obese at 6 months and underweight at 24 months, and a low number of mothers who were underweight. Therefore, for the adjusted models, this research considers the continuous rather than the categorical variables.

The relationship between women's own weight status and their ability to estimate their child's weight was also explored using continuous (BMI) and categorical variables. Maternal BMI was not associated with maternal accuracy in estimating their child's weight. However, when exploring the associations as categorical variables, those mothers who were overweight were more likely to underestimate their child's weight at 6 and 24 months postpartum than healthy-weight mothers (6 months: RRR 1.87 95%CI: 1.25, 2.78) (24 months: RRR 1.67, 95%CI: 1.17, 2.39).

The mother and child characteristics that were included in the best-fit model to predict maternal accuracy in estimating their child's weight at 6 months were maternal ethnicity, child's birth weight, and child's BMI z-score (Table 4.4). It is worth noting that after adjusting

for these variables, mothers who were overweight were more likely to underestimate their child's weight than healthy-weight mothers (Table 4.5). Lastly, at 24 months, the only significant predictors were BMI z-score and ethnicity.

Table 4.10- Multivariate multinomial logistic regression to predict maternal accuracy to estimate their child's weight at 6 months postpartum including ethnicity, birth weight, infant's BMI z-score (accurate is reference category)

Coefficient	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity	White British	Ref			Ref		
	Pakistani	0.83	(0.55, 1.26)	0.383	1.66	(1.16, 2.37)	0.006
Birth Weight		1.32	(0.91, 1.92)	0.149	0.7	(0.51, 0.97)	0.032
Infant's BMI Z-score at 6 Months		0.47	(0.39, 0.58)	<0.001	1.46	(1.24, 1.72)	<0.001

N=1061 McFadden's R2: 0.060, P value of model: <0.001

Table 4.11- Multivariate multinomial logistic regression to predict maternal accuracy in estimating their child's weight at 6 months postpartum including ethnicity, birth weight, infant's BMI z-score, maternal weight status (Accurate is reference category)

Coefficient	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity	White British	Ref			Ref		
	Pakistani	0.8	(0.53, 1.22)	0.299	1.59	(1.11, 2.29)	0.012
Birth Weight		1.36	(0.93, 1.99)	0.116	0.66	(0.48, 0.92)	0.015
Infant's BMI Z-score at 6 Months		0.46	(0.38, 0.57)	<0.001	1.46	(1.24, 1.71)	<0.001
Maternal Weight Status	Healthy weight	Ref			Ref		
	Under-weight	0.71	(0.23, 2.18)	0.552	0.99	(0.36, 2.74)	0.992
	Over-weight	0.86	(0.54, 1.38)	0.541	1.84	(1.22, 2.77)	0.003
	Obesity	0.79	(0.48, 1.3)	0.348	1.27	(0.82, 1.98)	0.281

N=1061 McFadden's R2: 0.069, P value of model: <0.001

Table 4.12- Multivariate multinomial logistic regression to predict maternal accuracy in estimating their child’s weight at 24 months postpartum (Accurate is reference category)

Coefficient	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity	White British	Ref			Ref		
	Pakistani	0.98	(0.39 ,2.49)	0.964	1.82	(1.32 ,2.52)	<0.001
	Infant's BMI z-score at 24 Months	0.6	(0.39 ,0.94)	0.024	2.41	(2.02 ,2.87)	<0.001

N=757 McFadden’s R2: 0.116, Model BIC: -113.389, P value of model: p<0.001

4.5 CHAPTER DISCUSSION

4.5.1 Summary of Findings and Comparison with Other Literature

This chapter aimed to describe the perceptions that mothers from the BiB1000 subsample had about their child’s weight, the accuracy of these estimations at six and twenty-four months postpartum, and to explore the factors associated with inaccurate maternal estimations of a child’s weight.

Consistent with other studies (Baughcum *et al.*, 2000; Jimenez-Cruz *et al.*, 2010; Manios *et al.*, 2010; Garrett-Wright, 2011; Hager *et al.*, 2012; Gerards *et al.*, 2014; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Natale *et al.*, 2016; Queally *et al.*, 2018), the majority of the mothers perceived that their child’s weight to be “Just Right” at both time points (6 months: 78%, 24 months: 77%) with a high proportion of mothers unable to accurately estimate their child’s weight at both time points (6 months: 29% 24 months: 49%). Overestimation was less frequent than underestimation (underestimation at 6 months: 16%; at 24 months: 46%).

The mothers’ misperceptions about their child’s weight can be attributed to various causes. First, it is possible that the mothers are more concerned about underweight at these time points and so tend to monitor underweight more than overweight (Pagnini *et al.*, 2007; Lampard *et al.*, 2008), which in turn leads to higher underestimation. Other research has suggested that these misperceptions could be a result of normalisation of bigger body sizes due to an increase in rates of childhood overweight (Binkin *et al.*, 2013; Thompson, Adair and Bentley, 2014). Moreover, it is worth mentioning that “slightly” and “moderate to severe” misperceptions may have different causes and impacts on the mother’s health behaviours and the child’s health. However, as the proportion of mothers who moderately

to severely over and underestimated their child's weight was small, it was not possible to explore these categories of misperception separately.

Child BMI z-score was the primary predictor of over and underestimation at both time points. Interestingly, a significantly higher proportion of mothers underestimated their child's weight at 24 months than at 6 months of age ($p < 0.001$). Moreover, although there was a greater proportion of children who were overweight, obese, or at risk at 24 months, the proportion of mothers who underestimated their child's weight at these weight categories was also higher at 24 months postpartum.

Other studies have also found differences in mothers' accuracy to estimate their child's weight by child's age. For example, a study in the U.S. (Brown et al., 2016) also found that mothers were more likely to underestimate their child's weight at 12 months in comparison with the period of the first few months postpartum. Other studies have found that these misperceptions may diminish as the children get older (Kroke, Strathmann and Günther, 2006; Natale *et al.*, 2016; Queally *et al.*, 2018). For example, a study in Ireland found that mothers are more accurate when the child is five years of age in comparison with when the child is three years old (Queally *et al.*, 2018). These differences in maternal accuracy with regards to a child's age could help to support the hypothesis that preschool children are more likely to have their weight underestimated than older children due to rapid changes in the child's growth rates, appetite, and mealtime behaviour in these early years (Byrne, Magarey and Daniels, 2016).

For every unit increase in birth weight, mothers were less likely to underestimate their child's weight at 6 months (RRR 0.7; 95% CI: 0.51, 0.97). However, this association was not significant at 24 months. These results differ from previous studies that have found no relation between birth weight and accuracy, and from other studies that have found that parents are more likely to underestimate their child's weight with every unit increase in a child's weight (Chaparro et al., 2011; Queally et al., 2018). A possible reason why the mothers of children with lower birth weight were more likely to underestimate their child's weight at 6 months in this study could be that they believe that their child is still small for the age when the child may already have caught up growth. Moreover, this misperception possibly is not present anymore at 24 months as health professionals may have reassured the mother that the child's weight is healthy, making her less likely to underestimate. The difference in results between this study and the studies of Chaparro et al. (2011) and Queally et al. (2018) could

be related to the age of the children included in their studies or to the fact that these researchers did not adjust their findings to the actual weight status of the child.

Pakistani mothers were more likely than White British mothers to underestimate their child's weight at both time points (6 months: RRR 1.66, 95% CI: 1.16, 2.37; 24 months: RRR 1.59, 95% CI: 1.11, 2.29). There are some qualitative studies in the U.K. that have found that health professionals perceive that having a larger child is a sign of wealth and health in some cultures (Redsell et al., 2013; Middleton and Smyth, 2017). It is possible that there are some cultural beliefs that could cause Pakistani mothers to underestimate their child's weight to a greater degree when compared with White British mothers.

Maternal BMI nor mother being obese were predictors of maternal accuracy. However, after stratifying the results by child's BMI z-score, maternal ethnicity, and child birth weight, mothers who were overweight were shown to be more likely to underestimate their child's weight in comparison to those of a healthy weight at 6 months postpartum (RRR 1.84, 95%CI: 1.22, 2.77). A study in England which included mothers of older children (6-8 years) (Parkinson et al., 2011) and other studies from other countries with mothers of younger children (Jimenez-Cruz *et al.*, 2010; Manios *et al.*, 2010; Hager *et al.*, 2012; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016), have found that mothers who are overweight or obese are less likely to accurately estimate their child's weight.

Maternal food insecurity, place of birth, education, parity, child's gender, and living arrangements were nor significantly associated with maternal accuracy/inaccuracy in estimating a child's weight. Previous studies in other countries have identified that child being female (Queally *et al.*, 2018), maternal food insecurity (Natale *et al.*, 2016) and lower level of maternal education (Baughcum *et al.*, 2000; Jimenez-Cruz *et al.*, 2010; Queally *et al.*, 2018) are associated with higher odds of maternal underestimation of their child's weight. The variations in the factors associated with maternal accuracy in estimating their child's weight across studies may be attributed to other environmental factors within the research contexts, such as nutrition interventions, the prevalence of overweight, and obesity in the communities, among others.

4.5.2 Strengths and Limitations

Results from this study add to the current evidence which looks at the factors associated with mothers' misperceptions of their child's weight at young ages. To the researcher's knowledge, this is the first study to explore the factors associated with maternal accuracy in estimating their child's weight for mothers of very young children living in England. The

sample of mothers studied has made it possible to explore the perception of Pakistani mothers and White British mothers living in a deprived area in England.

Unlike other studies (Jimenez-Cruz et al., 2010; Garrett-Wright, 2011; Brown et al., 2016; Duarte et al., 2016), the relatively large sample size of this study has allowed the exploration of the factors associated with overestimation of the child's weight. However, apart from the actual child's weight, no other factor was found to be a reliable predictor of maternal overestimation of child weight. From the way the classification of mothers' misperceptions of their child's weight was coded, the majority of these misperceptions were found to be "slight" rather than "moderate to severe" misperceptions. It is possible that the degree to which mothers misperceive a child's weight may have different impacts on the child's subsequent health outcomes as well as on maternal health behaviours. To my knowledge, no other study has sought to explore and measure the degree to which mothers' weight estimations are inaccurate.

This study has some limitations that need to be acknowledged. First, due to the methodology used, results cannot be interpreted as indications of causal relationships. Secondly, this study used the child's BMI to categorise the children's weight status which may not necessarily classify the child's adiposity; also there is no established cut off points of childhood overweight in children under the age of two. However, some research suggests that infants above the +1 z-score have an increased risk of developing childhood overweight (Nader *et al.*, 2006). Lastly, despite the relatively large sample size, it was not possible to explore the factors associated with different degrees of weight misperception, or by the different weight categories of the children.

4.5.3 Research and Practice Implications

Given the high proportion of mothers who underestimated their child's weight (especially those of a South Asian background), further qualitative research should explore the factors leading to these misperceptions. Also, further research should explore if maternal perceptions of child's weight impact on mothers' concerns and health behaviours, as well as whether these misperceptions are likely to have a negative impact on a child's subsequent health outcomes.

It is essential that health professionals remember to assess the children's weight and provide mothers with feedback about their growth, especially for those mothers that are more likely to underestimate their child's weight (e.g. mothers of children of low birth weight, mothers of Pakistani background, and mothers of children aged two). This is important because it is

possible that mothers who underestimate the overweight of their children will be less likely to enrol on programs for obesity prevention. Equally important is that mothers of healthy-weight children are reassured about that their child is exhibiting healthy growth as a means of preventing mothers from developing undue concerns and pressuring children to eat or providing children with high-calorie foods to encourage them to gain weight.

4.6 CONCLUSIONS

This study explored the accuracy of child weight perceptions of mothers living in Bradford. The results showed that in Bradford, a high proportion (6 months: 16%; 24 months: 46%) of the mothers underestimate the weight of their children. Pakistani mothers were more likely than White British mothers to underestimate their child's weight. This results might be helpful to identify those mothers living in Bradford who might be at higher risk of not initiating actions to prevent childhood obesity. However, further research should explore if these misperceptions have an impact on the mothers' concerns, health behaviours such as their feeding practices and a child's subsequent health outcomes. I shall, in the following chapter, inquire into whether or not mothers' living in Bradford are concerned about their pre-school child's weight and the factors associated with concerns that their child will become overweight.

Chapter 5 - Are Mothers Concerned about Their Child's Weight? What Predicts Maternal Concerns that Their Child Will Become Overweight? Are Women's Concerns Associated with Their Perceptions about Their Child's Weight?

5.1 CHAPTER INTRODUCTION

In the previous chapter, mothers' perceptions of, and accuracy in estimating their child's weight using the BiB1000 subsample of Born in Bradford were explored. Results showed that there are mothers in Bradford who inaccurately estimate their child's weight (6 months: 29%, 24 months: 49%).

Some studies have found that mothers may not be concerned about overweight in their children, either because they do not perceive it or because they may not appreciate the severity of it (Tschamler *et al.*, 2010; Redsell *et al.*, 2013; Syrad *et al.*, 2015). Accurate maternal perceptions and concerns about their child's weight may be necessary if these perceptions influence subsequent health behaviours, such as feeding practices (Francis, Hofer and Birch, 2001; Webber *et al.*, 2010; Swyden *et al.*, 2017; Harris *et al.*, 2018) or decisions to join healthy lifestyle programs. Several factors may contribute to whether or not a mother becomes concerned about her child's weight.

It is important to identify mothers who are less likely to be concerned about the risk of overweight and obesity as they may be less likely to request support and take actions to improve their child's health. Therefore, in this chapter, I aim to explore the concerns that mothers living in Bradford have about their pre-school child's weight. This chapter presents the methods and results of a secondary data analysis using the Born in Bradford data described earlier (Chapter 3). The specific objectives of this Chapter are to:

1. Describe maternal concerns related to their child's weight at 6 and 24 months postpartum, and whether these concerns are aligned with the child's actual weight status.

2. Identify which maternal and child characteristics are associated with mothers' concerns that their child will become overweight.
3. Identify whether or not the mothers' perceptions about their child's weight are related to their concerns that their child will become overweight.

5.2 METHODS

5.2.1 Measurements: Concerns about Child Undereating and Not Gaining Weight, and Concerns about a Child Becoming Overweight

The BiB1000 questionnaires administered to mothers at 6 and 24 months postpartum included two questions regarding their feelings about the weight of their children. These were:

1. "I would be concerned if my child was undereating and not gaining weight."
2. "I am worried my child will become overweight."

Possible answers to the above questions from which the mothers were able to choose were: "disagree a lot", "disagree a little", "neither agree nor disagree", "agree a little", and "agree a lot". In order to decrease the complexity, these categories were conflated into two categories: "concerned" and "not concerned". Women who answered "agree a little" and "agree a lot" were classified in the "concerned" category, while the remainder were classified as "not concerned". The combination of the above categories seemed appropriate as the aim was to identify the mother and child characteristics associated with women's concern about their child's weight regardless of the level of concern. Therefore, the conflation of these categories should not have any impact on the results obtained as mothers who agreed a little or agreed a lot might have some level of concern that mothers who disagreed or neither agreed nor disagreed had.

The question that asked about mothers' concerns about their child undereating and not gaining weight was a leading question; in other words, the question subtly points the respondent toward answering in a certain way. The question asks how the mother would feel if the condition was present rather than investigating the actual feelings of the mother regarding their child's weight. Therefore, mothers may choose to "agree" to avoid the risk of being seen as guilty of "bad parenting". For this reason, no further analysis of this question was undertaken. The question that explored mothers' concerns about childhood overweight does ask about the mothers' concern that their child could be at risk of being overweight but

may not reflect the mothers' feelings and concerns about their child's weight status at the time of being questioned. This is the only item included in the BiB1000 questionnaires that offer any understanding of women's feelings about their child's actual weight.

Mothers might be ready to undertake healthier practices if they are worried that their child will become overweight. Therefore, the following step was to explore what mother (maternal ethnicity, place of birth, education, living arrangements, food security, parity, age, BMI and weight status) and child characteristics (child's gender, birth weight, BMI z-score and weight status) are associated with women's concerns. Also, to identify whether their perceptions about their child's weight are associated with their concerns that their child will become overweight.

5.5.2 Data Analysis

First, frequencies of concern/lack of concern about overweight at 6 months (N=1,137) and 24 months (N=1057) were explored across the complete sample and by child's weight category and maternal ethnicity. Differences in maternal concern by time point, child's weight status and ethnicity were explored using Chi-square and Fisher's exact tests, as appropriate.

Two methods were employed to explore the association between women's feelings about their child becoming overweight in relation to their child's actual weight status. The first method was to cross-tabulate maternal concern/lack of concern about their child's weight with the child's actual weight status. The second method was to use a Spearman rank test using the 5-point Likert forms of the responses made to the mothers against the child's BMI z-score.

Secondly, bivariate and multivariate binomial logistic regressions were used to explore the associations between mother and child characteristics and mothers' concerns/lack of concern about overweight. For these models, "Not Concerned" was used as the reference category. Odds ratios (OR) and 95% confidence intervals (CI) were calculated. Adjusted models were tested with those covariates that achieved $p \leq 0.2$ in simple models. Only significant predictors were kept in the models ($p < 0.05$), and best-fit models are presented. Following this, bivariate and adjusted logistic models were developed to explore the association between women's perceptions of their child's weight and their concerns about overweight. Mothers' perceptions of their child's weight were adjusted by the significant predictors of concerns about overweight.

Lastly, using Chi-square and Fisher's exact tests as appropriate, differences in maternal concern by maternal accuracy to estimate their child's weight were explored stratifying by the child weight category.

5.3 RESULTS

5.3.1 Are Women Concerned That Their Child Will Become Overweight?

When women were asked if they were worried that their child would become overweight, a substantial proportion disagreed at both time points (Figure 5.1). A slightly larger proportion of mothers were worried about overweight at 24 months than at 6 months postpartum (6 months: 14.5% vs 24 months 18.0%) ($p < 0.03$). Moreover, among those women who had provided information at both time points about concerns of overweight ($N=876$), only 5.4% were worried at 6 and 24 months postpartum. Among those who were not concerned about overweight at 6 months, 15% had become concerned by 24 months.

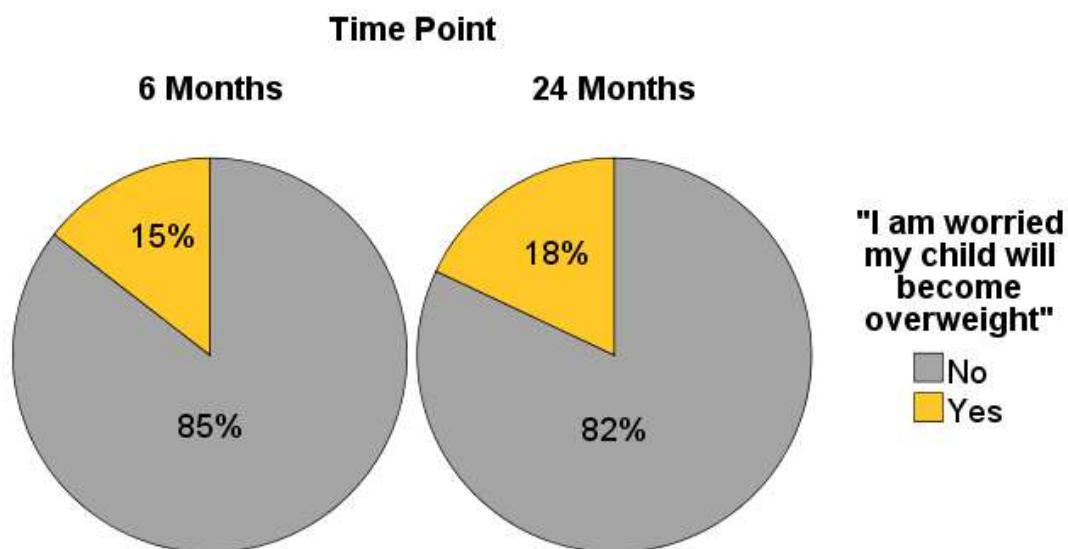


Figure 5.20 - Maternal concerns about overweight at 6 and 24 months postpartum

A lack of concern about overweight was the most common response among all child weight categories (Figure 5.2). Nevertheless, a higher proportion of mothers of overweight children were concerned about their child's weight in comparison with their counterparts who had children in other weight categories (6 months: $p=0.011$; 24 months: $p=0.220$) (Appendix II, A II. Table 11). Despite this, the results of the Spearman correlations showed no linear associations between the child's BMI z-score and mothers' concerns about overweight (Figure 5.3).

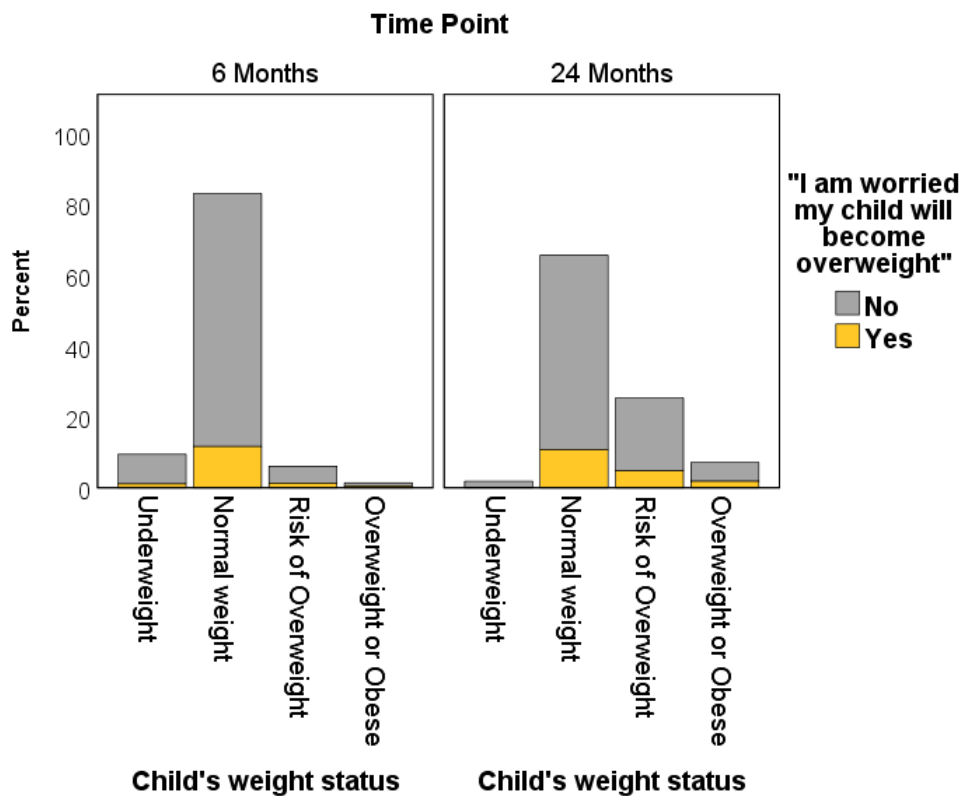


Figure 5.21- Maternal concerns that their child will become overweight by their child's weight category

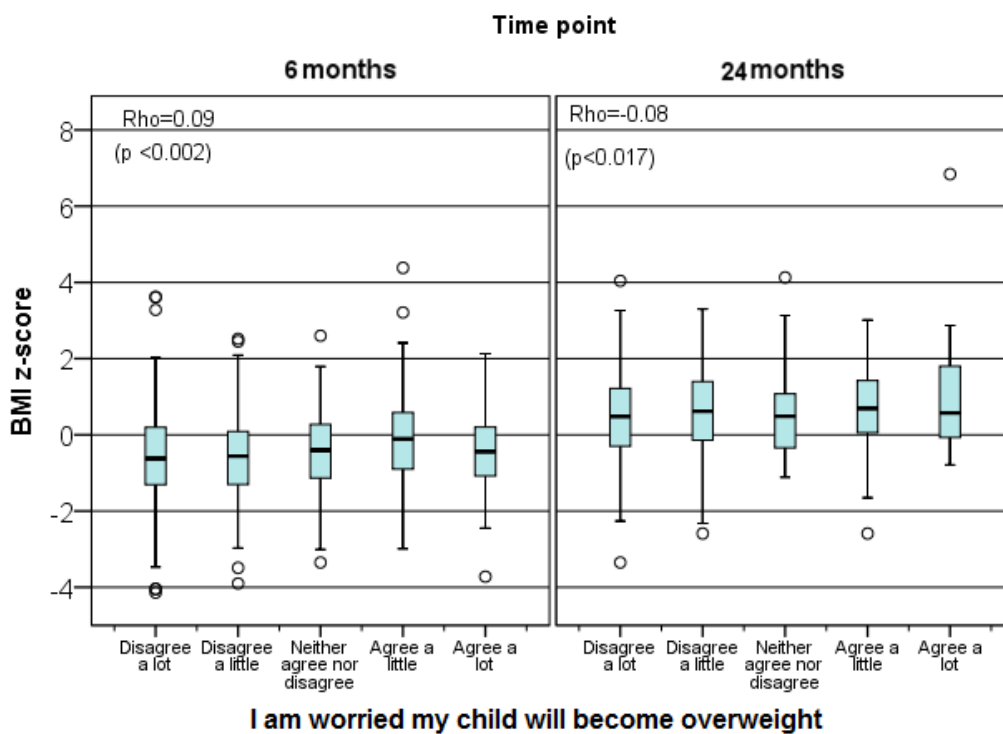


Figure 5.22 - Child's BMI z-score by responses to women's concerns about overweight

Differences in women’s concerns about overweight were present by ethnic group at both time points. A lower proportion of Pakistani mothers were concerned about overweight (Figure 5.4) in comparison to White British mothers (6 months: $p < 0.878$; 24 months: $p < 0.001$).

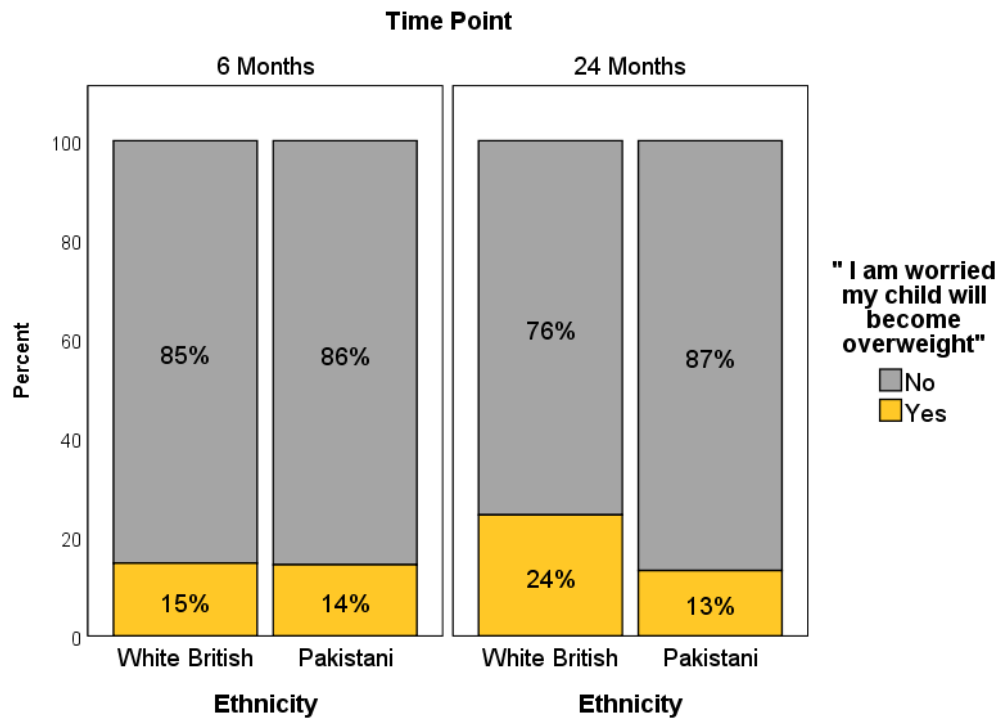


Figure 5.23 - Ethnic differences in maternal concerns about their child becoming overweight at 6 and 24 months postpartum

5.3.2 Which Mother and Child Characteristics are Associated with Mothers’ Concerns That Their Child Will Become Overweight?

Table 5.1 and Table 5.14 presents the results of the bivariate logistic models looking at the relations between mother and child characteristics and maternal concern about overweight in their children. The bivariate logistic models showed significant relations between concerns about overweight and mothers’ parity, maternal weight status, ethnicity, place of birth, living arrangements, age, and child’s weight status, gender, and birth weight.

Table5.13 - Bivariate logistic regression models of the association of women's concerns about overweight in their child and mother and child characteristics at 6 months postpartum (Not concerned was set as reference category)

Coefficient (N)	Category	6 months		
		Odds Ratio	95%CI	P ±
Ethnicity (1130)	White British	Ref		
	Pakistani	0.97	(0.7, 1.36)	0.878
Place of Birth (1130)	Inside the U.K.	Ref		
	Outside the U.K.	1.25	(0.89, 1.76)	0.205
Maternal Education (1127)	A Level or higher	Ref		
	<5 GCSE	1.27	(0.83, 1.95)	0.266
	4 GCSE equivalent	0.98	(0.66, 1.46)	0.908
	Other/ Unknown	0.79	(0.36, 1.73)	0.557
Living arrangements (1127)	Living with a partner	Ref		
	Not living with partner	1.14	(0.69, 1.88)	0.61
Food Insecure (923)	Food Secure	Ref		
	Food insecure	1.2	(0.72, 2)	0.476
Maternal Age (1128)		1	(0.97, 1.03)	0.772
Parity (1113)	Primiparous	Ref		
	Multiparous	0.66	(0.47, 0.92)	0.014
Child's gender (1127)	Male	Ref		
	Female	1.21	(0.87, 1.69)	0.257
Birth Weight (1127)		1.12	(0.83, 1.51)	0.463
Infant's BMI z-score (1078)		1.32	(1.14, 1.54)	<0.001
Child's Weight Status at Corresponding Time Point (1078)	Healthy weight	Ref		
	Underweight	0.81	(0.43, 1.53)	0.525
	Risk of Overweight	1.68	(0.9, 3.12)	0.102
	Overweight or Obese	4.07	(1.43, 11.64)	0.009
Maternal Weight Status (1089)	Healthy weight	Ref		
	Underweight	0.72	(0.25, 2.1)	0.55
	Overweight	1.07	(0.7, 1.65)	0.745
	Obesity	1.69	(1.14, 2.53)	0.01

Table 5.14 - Bivariate logistic regression models of the association of women's concerns about overweight in their child and mother and child characteristics at 24 months postpartum (Not concerned was set as reference category)

Coefficient (N)	Category	24 months		
		Odds Ratio	95%CI	P ±
Ethnicity (1056)	White British	Ref		
	Pakistani	0.47	(0.34, 0.65)	<0.001
Place of Birth (1056)	Inside the U.K.	Ref		
	Outside the U.K.	0.57	(0.4, 0.82)	0.002
Maternal Education (1055)	A Level or higher	Ref		
	<5 GCSE	1.22	(0.81, 1.84)	0.335
	4 GCSE equivalent	0.96	(0.66, 1.41)	0.846
	Other/ Unknown	0.82	(0.4, 1.69)	0.597
Living arrangements (1055)	Living with a partner	Ref		
	Not living with partner	1.82	(1.3, 2.54)	<0.001
Food Insecure (907)	Food Secure	Ref		
	Food insecure	1.23	(0.78, 1.96)	0.373
Maternal Age (1055)		1.04	(1.01, 1.07)	0.009
Parity (1029)	Primiparous	Ref		
	Multiparous	0.8	(0.58, 1.11)	0.174
Child's gender (1044)	Male	Ref		
	Female	1.42	(1.03, 1.96)	0.034
Birth Weight (1044)		1.7	(1.26, 2.29)	<0.001
Infant's BMI z-score (757)		1.28	(1.07, 1.52)	0.006
Child's Weight Status at Corresponding Time Point (757)	Healthy weight	Ref		
	Underweight	0.4	(0.05, 3.06)	0.374
	Risk of Overweight	1.19	(0.77, 1.83)	0.442
	Overweight or Obese	1.8	(0.94, 3.46)	0.079
Maternal Weight Status (962)	Healthy weight	Ref		
	Underweight	0.69	(0.2, 2.35)	0.557
	Overweight	1.66	(1.09, 2.55)	0.019
	Obesity	2.75	(1.81, 4.17)	<0.001

The best-fit models included: at 6 months - maternal place of birth, parity, weight status, and infant's BMI z-score; at 24 months - maternal ethnicity, age, weight status, parity, and child's gender. Results from the adjusted models (Table 5.15 and Table 5.16) showed that mothers who were obese were more likely to be concerned about overweight than mothers with a healthy weight. Maternal parity was also a significant predictor of concern at both time points. Mothers who had more than one child were less likely to be concerned about overweight than first-time mothers. At 6 months, the mothers who were born outside the U.K. were more likely to be concerned about overweight than those who were born in the U.K. Contrary to this, at 24 months, ethnicity was a significant predictor of maternal concern about overweight but not maternal place of birth. Mothers who were of Pakistani origin were less likely to be concerned about overweight than White British mothers. In addition, at 24

months, the odds of being concerned about overweight increased with each year of the mother's age (OR 1.05, 95% CI: 1.06, 2.15). Regarding the child's characteristics, BMI z-score was associated with maternal concern about overweight in their child at 6 months (OR 1.38, 95%, CI: 1.18, 1.61), although this was no longer shown to be the case at 24 months postpartum. Lastly, at 24 months, mothers of girls were more likely to be concerned than mothers of boys (OR 1.51; 95% CI:1.06, 2.15).

Table 5.15 - Adjusted logistic regression models of women's concerns about overweight at 6 months postpartum (Not concerned set as reference category)

Coefficient	Category	Odds Ratio	95%CI	P ±
Place of Birth	Inside the U.K.	Ref		
	Outside the U.K.	1.84	(1.25, 2.69)	0.002
Parity	Primiparous	Ref		
	Multiparous	0.52	(0.36, 0.75)	<0.001
Infant's BMI z-score		1.38	(1.18, 1.61)	<0.001
Maternal Weight Status	Healthy weight	Ref		
	Underweight	0.56	(0.16, 1.93)	0.359
	Overweight	1.04	(0.67, 1.63)	0.852
	Obese	1.77	(1.16, 2.69)	0.008

N= 1042, McFadden's R2: 0.046, P value of model: <0.001

Table 5.16 - Adjusted logistic regression models of women's concerns about overweight at 24 months postpartum (Not concerned set as reference category)

Coefficient	Category	Odds Ratio	95%CI	P ±
Ethnicity	White British	Ref		
	Pakistani	0.43	(0.3, 0.61)	<0.001
Maternal age		1.05	(1.01, 1.08)	0.006
Parity	Primiparous	Ref		
	Multiparous	0.66	(0.45, 0.97)	0.033
Child's Gender	Male	Ref		
	Female	1.51	(1.06, 2.15)	0.024
Maternal Weight Status	Healthy weight	Ref		
	Underweight	1.87	(0.25, 3.01)	1.824
	Overweight	1.83	(1.17, 2.86)	0.008
	Obese	2.85	(1.84, 4.4)	<0.001

N= 937, McFadden's R2: 0.077, P value of model: <0.001

5.3.3 Are Women’s Perceptions of Their Child’s Weight Associated with Their Concerns About Their Child Becoming Overweight?

Results showed that, 1) at 6 months, adjusting for place of birth, parity, infant’s BMI z-score, and maternal weight status, and 2) at 24 months, adjusting for ethnicity, maternal age, parity, child’s gender, and maternal weight status, those mothers who perceived their child’s weight as high were more likely to be concerned that their child would become overweight (Table 5.5).

Table 5.17 - Unadjusted and adjusted logistic regression models examining the associations between women’s perception of their child’s weight and concerns about overweight (Not Concerned set as reference category)

	Perception of Child’s Weight	Unadjusted			Adjusted		
		Odds Ratio	95%CI	P ±	Odds Ratio	95%CI	P ±
Concern Overweight 6 months (N=1,042)*	Healthy weight	Ref			Ref		
	Low	0.64	(0.36, 1.15)	0.135	0.79	(0.43, 1.46)	0.444
	High	2.06	(1.22, 3.48)	0.007	1.9	(1.1, 3.27)	0.022
	Pseudo R	0.0118			0.05		
	Model p	0.005			<0.001		
Concern Overweight 24 months (N=937)**	Healthy weight	Ref			Ref		
	Low	0.75	(0.47, 1.19)	0.225	1.16	(0.71, 1.9)	0.555
	High	2.52	(1.28, 4.96)	0.007	2.97	(1.44, 6.12)	0.003
	Pseudo R	0.0101			0.08		
	Model p	0.0122			<0.001		

*Concern about overweight at 6 months adjusted for the place of birth, parity, infant’s BMI z-score, and maternal weight status

**Concern about overweight at 24 months adjusted for ethnicity, maternal age, parity, child’s gender, and maternal weight status.

Lastly, results from the cross-tabulation between mothers’ accuracy in estimating their child’s weight and concern their child will become overweight showed that a higher proportion of the mothers were concerned about overweight in their children in comparison with the proportion of mothers who underestimated their child’s weight, these differences were significant at 24 months postpartum (Table 5.6).

Table 5.18 - Maternal concerns that their child will become overweight by maternal accuracy on estimating their child's weight, stratified by child's weight category at 6 and 24 months postnatally

	Weight Status of the Child	Concern that Child Will Become Overweight		Over-estimation	Accurate	Under-estimation	Total	P±	
		No	N (%)						
6 Months	Under-weight	No	N (%)	4 (80)	6 (100)	3 (100)	13 (92.86)	0.487	
		Yes	N (%)	1 (20)	0 (0)	0 (0)	1 (7.14)		
	Healthy weight	No	N (%)	47 (75.81)	628 (86.26)	95 (89.62)	770 (85.94)	0.038	
		Yes	N (%)	15 (24.19)	100 (13.74)	11 (10.38)	126 (14.06)		
	Risk of Overweight	No	N (%)	0 (0)	12 (75)	39 (82.98)	51 (78.46)	0.039	
		Yes	N (%)	2 (100)	4 (25)	8 (17.02)	14 (21.54)		
	Over-weight or Obese	No	N (%)	1 (100)	0 (0)	8 (66.67)	9 (60)	0.143	
		Yes	N (%)	0 (0)	2 (100)	4 (33.33)	6 (40)		
	24 Months	Under-weight	No	N (%)	4 (80)	6 (100)	3 (100)	13 (92.86)	0.571
			Yes	N (%)	1 (20)	0 (0)	0 (0)	1 (7.14)	
		Healthy weight	No	N (%)	8 (61.54)	303 (84.17)	105 (84.68)	416 (83.7)	0.09
			Yes	N (%)	5 (38.46)	57 (15.83)	19 (15.32)	81 (16.3)	
Risk of Overweight		No	N (%)	0 (0)	10 (90.91)	146 (80.66)	156 (81.25)	0.353	
		Yes	N (%)	0 (0)	1 (9.09)	35 (19.34)	36 (18.75)		
Over-weight or Obese		No	N (%)	1 (50)	3 (37.5)	36 (81.82)	40 (74.07)	0.013	
		Yes	N (%)	1 (50)	5 (62.5)	8 (18.18)	14 (25.93)		

5.4 DISCUSSION

5.4.1 Summary of Findings and Comparison with the Literature

The purpose of this study was to explore the concerns that mothers living in Bradford have about their child's risk of becoming overweight and to identify some of the determinants of those concerns.

Results from this study showed that a fairly low proportion of mothers (6 months: 14%; 24 months: 18%) were concerned that their child would become overweight. These findings parallel other qualitative studies that have found low concern about childhood overweight among parents (Redsell *et al.*, 2013; Syrad *et al.*, 2015; Branch *et al.*, 2017). This lack of concern could be problematic in cases in which a child is actually overweight, obese, or at risk of becoming so because, based on behaviour change models such as the health belief model (Becker *et al.*, 1977), mothers could be less likely to engage in behaviours to ensure their children maintain a healthy weight.

Child BMI z-score was associated with women's concerns about overweight at 6 months postpartum, but not at 24 months. The lack of association between BMI z-score at 24 months and mothers' concerns about their child becoming overweight, might be linked to the fact that a higher proportion of mothers underestimated their child's weight at 24 months postpartum, as shown in Chapter 4. If mothers do not perceive their child to be at risk, they may not be concerned that he or she will become overweight. However, as in other studies (Baughcum *et al.*, 2000; Genovesi *et al.*, 2005; Moore, Harris, and Bradlyn, 2012; Gomes, Barros, and Pereira, 2017), mothers' perceptions of their child's high weight were associated with concerns that their child would become overweight at both time points after adjusting for mother and child characteristics. At 24 months, a higher proportion of women who were accurate in identifying overweight in their children were likely to be concerned than that of mothers who underestimated. These findings are similar to those of other studies of school-age children in other countries (Lampard *et al.*, 2008; Hernandez, Reesor, and Kabiri, 2017) which have found that parental concerns about their child's weight are associated with less parental underestimation of their child's body size.

As the results show, maternal perception of the child's weight as high can lead to parental concern about childhood overweight. However, it is probable that some mothers' who do not perceive that childhood overweight is a problem that could affect their children are less likely to monitor their child's weight. This could lead mothers to inaccurate estimations of

their child's weight. Some mothers may also appraise a high weight in their children, although they might not see it as a health risk. Instead, they may see it as something positive, as findings from previous studies suggest (Redsell et al., 2013).

Pakistani mothers were less likely to be concerned about their child becoming overweight than White British mothers at 24 months postpartum. These results may not be surprising as it is shown in Chapter 4 that Pakistani mothers are more likely than White British mothers to underestimate their child's weight. Results from the current study differ from those of a recent study in England (Gu et al., 2017), which looked at mothers of three to five-year-old children. Findings from this study showed that Afro-Caribbean and South Asian mothers were more likely to be concerned about overweight than White British mothers (Gu et al., 2017). It is noteworthy that while maternal ethnicity was not a predictor of concerns about overweight at 6 months, place of birth was. Pakistani mothers who were born outside the UK were more likely to be concerned than U.K.-born White British and Pakistani mothers. A possible explanation could be that women who were born outside the community in which the study was conducted may have recently arrived with a perception of overweight as a health problem. As they acculturate to their host community, however, they might have begun to see overweight and obesity as something less severe or normal by 24 months postpartum. However, these are only assumptions given that this analysis did not take into consideration how long women born outside the U.K. have been living in the U.K., their place of origin, or their level of acculturation at 6 and 24 months postpartum.

The mothers who were themselves obese at both time points and overweight at 24 months postpartum were more likely to be concerned about their child becoming overweight than the healthy-weight mothers. These findings similar to those of other studies that have found that parents who are overweight or obese are more likely to be concerned about childhood overweight than healthy-weight parents (Carnell *et al.*, 2005; Peyer *et al.*, 2015; Branch *et al.*, 2017; Hernandez, Reesor and Kabiri, 2017). However, the findings differ to Wen et al. (2010) who found no relation between BMI and maternal concerns despite the results showing that mothers aware of being overweight as more likely to be concerned than those who were not aware (Wen et al., 2010). It is possible that mothers from the current study were aware of their overweight and obesity and the possible health consequences related to it, which led maternal obesity to be associated with maternal concern about a child becoming overweight.

First-time mothers were more likely to be concerned about their child becoming overweight than mothers with more than one child. In comparison with first-time mothers, mothers with more than one child may feel that they have other things to take care of and so childhood overweight is not something they prioritise. This may explain why other studies have also shown mothers with more than one child to be more likely to underestimate their child's weight than first-time mothers (Hernandez, Reesor, and Kabiri, 2017). However, the results from Chapter 4 showed no statistically significant relationship between parity and maternal accuracy in estimating their young child's weight.

Mothers of girls were more likely to be concerned about overweight than those of boys at 24 months. Findings from the current study match prior research that has also found that mothers are less likely to be concerned about overweight in their sons than their daughters (Campbell et al., 2006; Moore, Harris, and Bradlyn, 2012; Gomes, Barros, and Pereira, 2017). The fact that mothers of girls are more likely to be concerned could be caused by the social construction of the feminine body in Western cultures, in which thinness is perceived as "beautiful" (Grogan, 2016). Hence, as previous evidence has shown, mothers are more accurate identifying overweight in girls than in boys (Parkinson *et al.*, 2011; Queally *et al.*, 2018). It is possible that mothers may be more likely to monitor the weight of their children if they are female, which could lead them to be more accurate.

Lastly, older mothers were more likely to be concerned about overweight. Only one study has been identified that looks at this association between maternal concerns about a child's weight and maternal age (Carnell et al., 2005). Results from this study differ from those of Carnell (2005), who found no relation between mothers' concerns about their child's weight and maternal age.

5.4.2 Strengths and Limitations

Results of this study are relatively consistent with other studies that look at the determinants of parental concerns about school-age children. To the researcher's knowledge, this study is the first to explore the determinants of mothers' concerns regarding their child's risk of overweight at 6 months and 24 months postpartum in a large ethnically diverse sample in England. This study has some limitations. First, although the sample was relatively large, there were a small number of mothers who were concerned about their child's weight, as well as a small number of children who did not have a healthy weight. This prevented further exploration of the factors associated with concerns among mothers with weight statuses and mothers from ethnic subgroups. This could have helped to understand if the likelihood of

mothers being concerned about overweight changes depending on the ethnic group and whether the child is male or female. Second, as the study included White British and Pakistani mothers living in Bradford, results cannot be generalised to other ethnic groups living in the area. Likewise, given that the factors that shape parental concern can be social and environmental, the results of this study may not be generalisable to other populations. Third, due to the nature of the questions included in the BiB1000 questionnaire, it was not possible to know if mothers perceived childhood overweight as a health problem in the event that they were currently concerned about their child under-eating and not gaining weight or gaining weight rapidly. Finally, no causal inferences can be made from the results of this study as a result of its cross-sectional design.

5.4.3 Implications for Research and Practice

The results of the current study showed that a low proportion of mothers were concerned that their child would become overweight. Further qualitative research is needed to explore the attitudes of mothers living in Bradford toward childhood overweight and the weight of their children. Moreover, based on the health belief model (Becker et al., 1977), and the socioecological model of eating behaviours (Contento, 2015), it is possible that mothers' concerns about their child becoming overweight are likely to influence their feeding practices. Therefore, further research should explore if these concerns influence mothers' feeding practices and subsequent health outcomes.

Results showed that Pakistani mothers born outside the U.K. were more likely to be concerned about overweight at 6 months postpartum, but that Pakistani mothers, regardless of their place of birth, were less likely to be concerned about overweight at 24 months. Further qualitative research should explore the reasons for these differences in mothers' concerns and their accuracy in estimating their child's weight. Furthermore, it is essential to explore the effect of acculturation on perceptions of childhood obesity in mothers of young children living in ethnically diverse populations in England.

Mothers who were overweight and obese were more likely to be concerned about their child's weight. It is possible that mothers who acknowledge their own overweight will be more likely to perceive overweight as a health risk to their children. Given that some studies (Genovesi *et al.*, 2005; Jeffery, 2005; Wen *et al.*, 2010) have found that mothers are also likely to underestimate their own weight, it is important to identify if mothers living in Bradford are accurate in estimating their own weight. Likewise, it is important to understand

if the perceptions that they have about their own weight are likely to influence their concerns about their child's weight, as well as their mealtime interactions with their child.

In the current study, it was possible to identify some of the determinants of mothers' concerns about their young child's weight. The results obtained could be helpful to health professionals working in Bradford by helping them to identify families that are less likely to engage in activities that promote healthy weight status in their children. For example, health professionals may want to spend more time explaining to young mothers about the importance of providing a healthy diet and positive mealtime experiences to their children in as a means of ensuring a healthy weight.

5.5 CONCLUSIONS

This Chapter inquired on the concerns that mothers' of pre-school children living in Bradford have about their pre-school child's weight. Results showed that at 6 and 24 months postpartum, a low proportion of mothers were concerned that their child would become overweight. Some determinants of mothers concerns about their child becoming overweight were identified. These were maternal ethnicity, place of birth, parity, mothers' age and weight status, and child's gender.

Mothers' who were overweight or obese were more likely than mothers with a healthy weight to be concerned about their child's weight. It is possible that how mothers perceive their own weight and the accuracy to estimate this weight may also be related to whether or not they have an accurate estimation of their child's weight and if they are concern about their child becoming overweight. In the following Chapter, I will explore if mothers of pre-school children living in Bradford are accurate estimating their own weight. I will also identify if their perceptions and accuracy of these perceptions are related to the mothers' concerns about their child's weight and ability to accurately estimate the weight of their children.

Chapter 6 - How do Mothers Perceive Their Weight? Are They Accurate? Is Maternal Perception of Their Own Weight Associated with Their Accuracy in Estimating Their Child's Weight and Their Concerns about It?

6.1 CHAPTER INTRODUCTION

Results from Chapter 5 showed that, as in other studies (Carnell *et al.*, 2005; Genovesi *et al.*, 2005; Campbell *et al.*, 2006), mothers who were overweight or obese were more likely to be concerned that their child would become overweight than those who had a healthy weight. Some studies have found that some parents of 3 to 10-year-old children do not recognise their own weight status (Genovesi *et al.*, 2005; Jeffery, 2005; Wen *et al.*, 2010).

It is possible that those mothers who do not recognise overweight in themselves may not recognise overweight or the risk of it for their child and in turn, be less likely to be concerned about their child becoming overweight (Wen *et al.*, 2010; Peyer *et al.*, 2015). For example, a study in Australia which included women before giving birth or within one month postnatal showed that mothers were less likely to be concerned about their children being overweight or obese when mothers were not aware of their pre-pregnancy overweight or obesity (Wen *et al.*, 2010).

The mothers' lack of recognition of their own weight status could be problematic if mothers are then less likely to initiate actions to favour their own and their child's health. Therefore, this chapter aims to explore the perceptions that mothers have about their own weight and to identify if these beliefs are related to their perceptions and concerns about their child's weight.

Specific objectives of this chapter are to:

1. Describe women's perceptions of their weight and their accuracy in estimating it.
2. Explore which factors are associated with maternal inaccuracy of estimation of their weight.

3. Explore if women's perception of their weight is associated with their concerns about their child's weight.
4. Explore whether or not women's accuracy/inaccuracy in estimating their weight is associated with their accuracy in estimating their child's weight.

6.2 HOW DO MOTHERS DESCRIBE THEIR WEIGHT?

6.2.1 Methods and Results

The BiB1000 questionnaire included two items exploring women's self-perceptions of weight:

1. "How would you classify your weight": Responses in a Likert scale composed of 7 categories, in which women could classify themselves as: "very overweight", "moderately overweight", "slightly overweight", "Just Right", "Slightly Underweight", "Moderately Underweight" and "Very Underweight".
2. A 9-point pictorial scale where women had to choose from a range of illustrated figures the one that they believed best fitted their body shape.

For this analysis, I used only the first question, where maternal self-perception of weight was assessed with the verbal item. Responses to the former question were reduced to three categories: "Underweight", "Just right" and "Overweight". Differences in maternal perception of own weight at 6 and 24 months postpartum, and by ethnicity, were assessed using chi-square tests. Following this, concordance between maternal perception of own weight and BMI at the same time point was assessed using Spearman rank correlation tests.

As seen in Figure 6.1, at both time points, more than half the women perceived themselves as overweight. The proportion of women who perceived themselves as overweight dropped slightly between 6 and 24 months postpartum ($p < 0.009$).

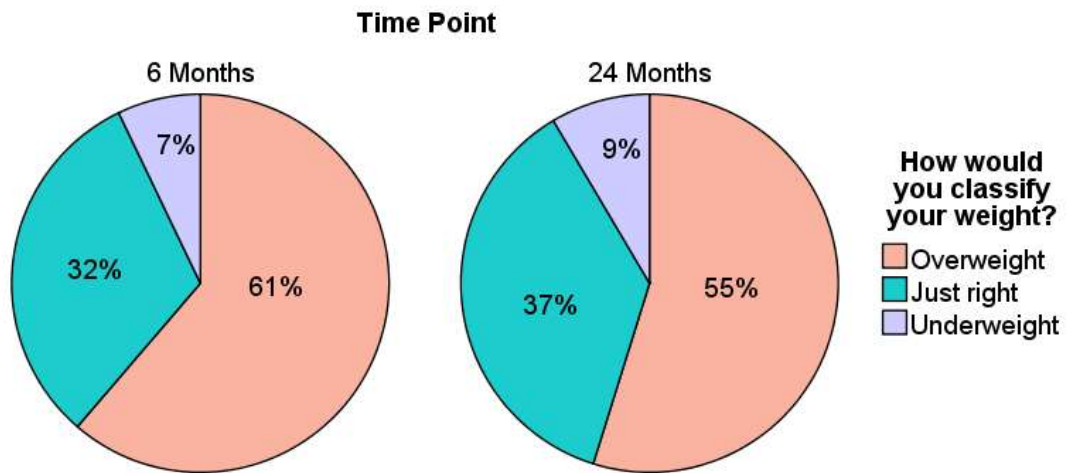


Figure 6.24- Maternal perception of own weight at 6 and 24 months postpartum

Moreover, more White British women perceived themselves as overweight than Pakistani women, but this difference was significant only at 24 months postpartum (6 months: $p=0.170$) (24 months: 0.016) (Figure 6.2).

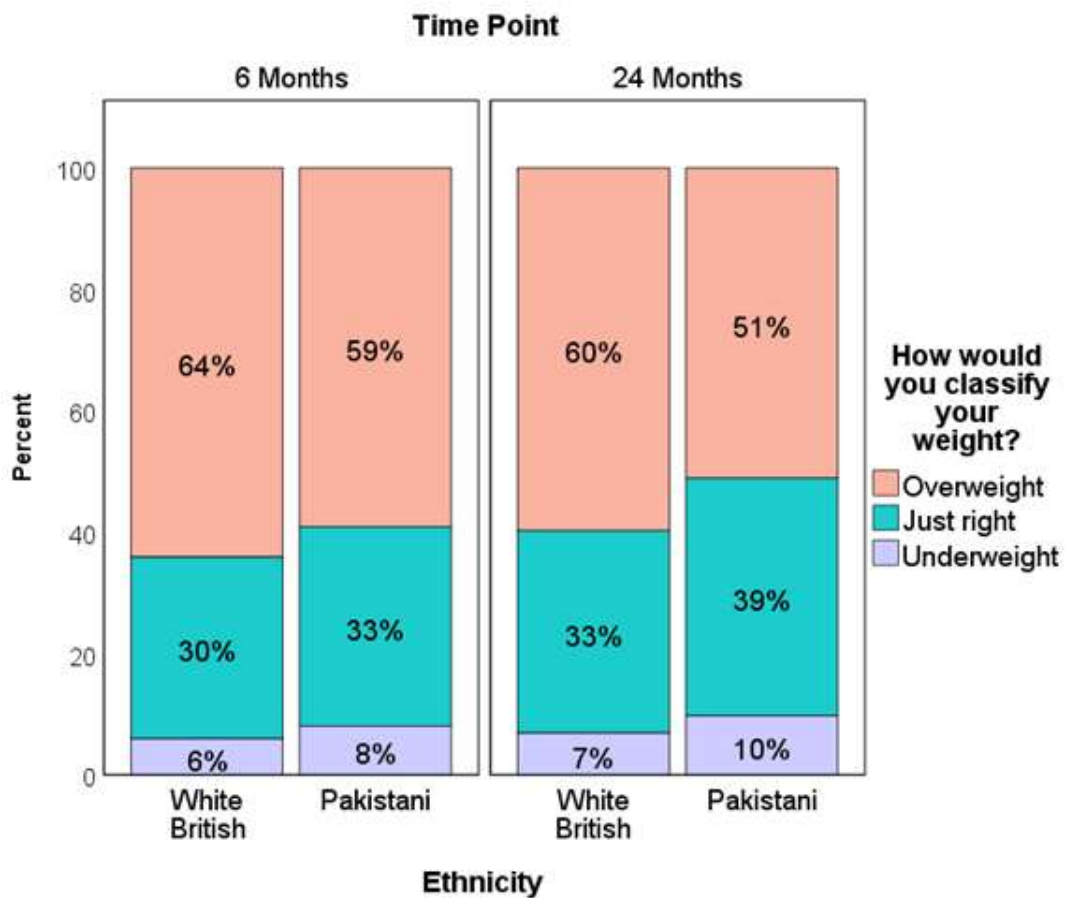


Figure 6.25- Maternal perception of own weight by ethnicity at 6 and 24 months postpartum

6.3 ARE WOMEN ACCURATE IN ESTIMATING THEIR WEIGHT? WHAT PREDICTS MATERNAL ACCURACY IN THE ESTIMATION OF THEIR WEIGHT?

6.3.1 Methods

To assess women's accuracy in estimating their weight, a similar approach was taken to that in Chapter 4 looking at accuracy in estimating their child's weight. Women's perceptions about their weight were cross-tabulated with their actual weight status and were classified into five categories: "Moderate/Severe Overestimation", "Slightly Overestimation", "Accurate", "Slightly Underestimation" and "Moderate/Severe Underestimation". As Table 6.1 shows, if mothers classified their own weight one category away that which would be accurate, they were considered to "slightly" under/overestimate their weight, whereas two or more categories were considered to have a moderate/severe over/underestimation.

Table 6.19- Cross-tabulation between mother's perception of their weight and their actual weight status to estimate maternal accuracy to perceive their own weight at 6 and 24 months postpartum.

			Women's Weight Category			
			Underweight BMI <18.5	Healthy Weight BMI >=18.5 & <25	Overweight BMI >=25 & <30	Obesity BMI >=30
Women's Perception of their Own Weight	6 months	Very Underweight N (%)	5 (11.9)	4 (0.86)	1 (0.33)	4 (1.38)
		Moderately Underweight N (%)	3 (7.14)	6 (1.31)	2 (0.65)	5 (1.73)
		Slightly Underweight N (%)	10 (23.81)	30 (6.54)	9 (2.94)	1 (0.35)
		Just Right N (%)	23 (54.76)	263 (57.42)	59 (19.28)	6 (2.08)
		Slightly Overweight N (%)	1 (2.38)	139 (30.28)	150 (49.02)	76 (26.30)
		Moderately Overweight N (%)	0 (0)	11 (2.40)	50 (16.34)	92 (31.83)
		Very Overweight N (%)	0 (0)	6 (1.31)	35 (11.44)	105 (36.33)
	24 months	Very Underweight N (%)	4 (11.43)	1 (0.26)	1 (0.34)	3 (1.2)
		Moderately Underweight N (%)	5 (14.29)	1 (0.26)	2 (0.67)	4 (1.6)
		Slightly Underweight N (%)	17 (48.57)	31 (8.03)	8 (2.68)	7 (2.8)
		Just Right N (%)	9 (25.71)	257 (66.58)	70(23.81)	15 (6.07)
		Slightly Overweight N (%)	0 (0)	88 (22.80)	159 (54.08)	82 (33.2)
		Moderately Overweight N (%)	0 (0)	5 (1.30)	41 (13.95)	85 (34)
		Very Overweight N (%)	0 (0)	3 (0.78)	13 (4.42)	51 (20.65)
		Moderate/Severe Overestimation				
		Slightly Overestimation				
		Accurate				
		Slightly Underestimation				
		Moderate/Severe Underestimation				

Differences in maternal accuracy in the estimation of their weight were explored by time point and maternal characteristics. Bivariate and multivariable multinomial logistic regressions were used to explore predictors of maternal accuracy; these models used a reduced 3-category variable for maternal accuracy (Overestimation, Underestimation and Accurate). Variables that were included in the adjusted models were those that were $p \leq 0.2$

in the bivariate models. Only significant predictors and best fit models are reported. 'Accurate' was used as the reference category.

6.3.2 Results

There were differences in women's ability to accurately estimate their weight between both time points, with over half of women accurately estimating their weight at both times but greater underestimation among women at 24 months postpartum. ($p < 0.001$) (Figure 6.3).

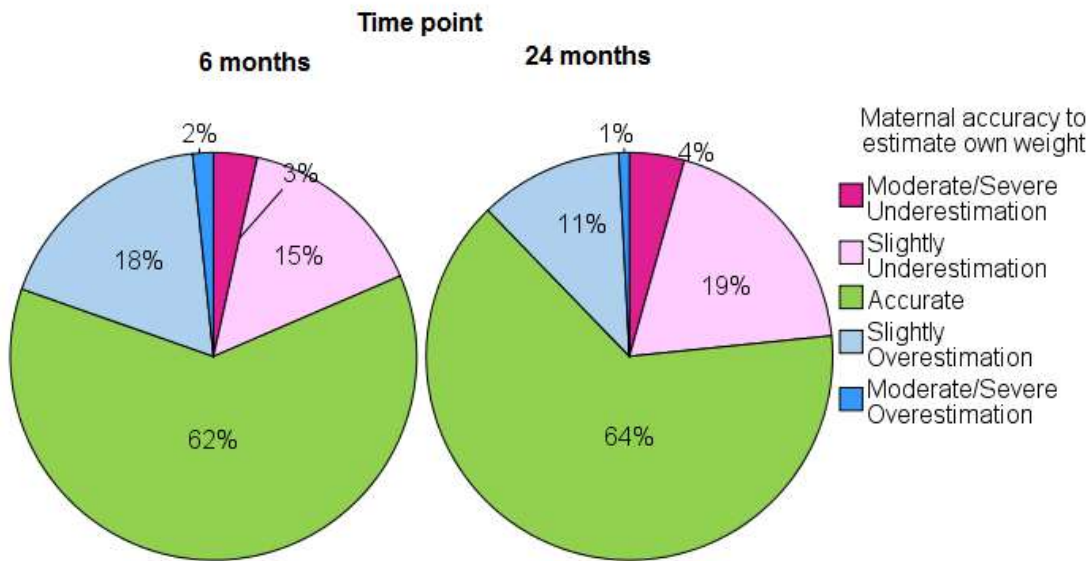


Figure 6.26- Maternal accuracy to estimate their weight

The bivariate models showed that maternal age and food insecurity were not associated with inaccurate estimations of the mothers' weight at any time point (Table 6.2 and Table 6.3). Moreover, maternal BMI was positively associated with underestimation and negatively associated with overestimation at both time points. At 6 months postpartum (Table 6.2), Pakistani mothers were more likely to overestimate their weight than White British mothers. Also, at 6 months postpartum, the mothers with a lower level of education were more likely to have inaccurate estimations of their weight (under and overestimation). At 24 months (Table 6.3), Pakistani mothers were more likely to underestimate their weight than White British mothers. Also, maternal parity and living arrangements were associated with maternal underestimation at this time point.

The significant risk factors for misperception included in the final model (Table 6.4 and Table 6.5) were: at 6 months the women's place of birth, education and BMI; and at 24 months, women's ethnicity, education and BMI.

Table 6.20- Bivariate models of maternal accuracy to estimate their weight at 6 months postpartum (Accurate set as reference category)

Coefficient (N)	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (1095)	White British	Ref			Ref		
	Pakistani	1.4	(1.02, 1.91)	0.037	1.3	(0.94, 1.79)	0.109
Place of Birth (1095)	Inside the U.K.	Ref			Ref		
	Outside the U.K.	1.97	(1.44, 2.71)	<0.001	1.29	(0.93, 1.8)	0.131
Maternal Education (1093)	A Level or Higher	Ref			Ref		
	<5 GCSE	1.63	(1.09, 2.42)	0.016	2.16	(1.41, 3.31)	<0.001
	5 GCSE	0.88	(0.6, 1.28)	0.506	1.71	(1.17, 2.49)	0.006
	Other/unknown	1.2	(0.63, 2.26)	0.581	1.25	(0.61, 2.56)	0.545
Living Arrangements (1092)	Living with Partner	Ref			Ref		
	Not living With Partner	1.22	(0.78, 1.92)	0.381	0.83	(0.49, 1.39)	0.478
Food Security (894)	Food secure	Ref			Ref		
	Food Insecure	0.57	(0.33, 1.01)	0.053	0.77	(0.45, 1.31)	0.328
Maternal Age (1093)		0.99	(0.97, 1.02)	0.97	1	(0.98, 1.03)	0.48
Parity (1079)	Primiparous	Ref			Ref		
	Multiparous	0.79	(0.58, 1.08)	0.142	0.98	(0.71, 1.36)	0.915
Maternal BMI (1095)		0.85	(0.82, 0.88)	<0.001	1.03	(1, 1.06)	0.022

Table 6.21- Bivariate models of maternal accuracy to estimate their weight at 24 months postpartum (Accurate set as reference category)

Coefficient (N)	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (962)	White British	Ref			Ref		
	Pakistani	1.37	(0.92, 2.04)	0.124	1.97	(1.43, 2.73)	<0.001
Place of Birth (962)	Inside the U.K.	Ref			Ref		
	Outside the U.K.	1.44	(0.96, 2.15)	0.079	1.74	(1.27, 2.37)	0.001
Maternal Education (961)	A Level or Higher	Ref			Ref		
	<5 GCSE	0.7	(0.4, 1.21)	0.202	1.85	(1.23, 2.78)	0.003
	5 GCSE	0.77	(0.49, 1.22)	0.274	1.44	(0.99, 2.1)	0.057
	Other/unknown	0.82	(0.35, 1.93)	0.644	1.37	(0.7, 2.69)	0.354
Living Arrangements (961)	Living with Partner	Ref			Ref		
	Not living With Partner	0.74	(0.46, 1.17)	0.193	0.66	(0.46, 0.95)	0.025
Food Security (829)	Food secure	Ref			Ref		
	Food Insecure	0.66	(0.33, 1.32)	0.241	0.88	(0.54, 1.45)	0.624
Maternal Age (961)		0.99	(0.96, 1.03)	0.62	1	(0.97, 1.03)	0.946
Parity (938)	Primiparous	Ref			Ref		
	Multiparous	0.86	(0.57, 1.28)	0.457	1.56	(1.12, 2.19)	0.009
Maternal BMI (962)		0.86	(0.81, 0.9)	<0.001	1.07	(1.04, 1.1)	<0.001

Table 6.22- Adjusted Model of maternal accuracy to estimate their weight at 6 months postpartum. (Accurate set as the reference category). Model's McFadden; s R2: 0.071 p<0.001) (N=1,093)

Coefficient	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Place of Birth	Inside the U.K.	Ref			Ref		
	Outside the U.K.	0.77	(1.27, 2.47)	0.001	1.23	(0.87, 1.73)	-0.765
Maternal Education	A Level or Higher	Ref			Ref		
	<5 GCSE	1.37	(0.9, 2.09)	0.142	2.1	(1.36, 3.23)	0.001
	5 GCSE	0.82	(0.55, 1.21)	0.311	1.71	(1.17, 2.5)	0.006
	Other/unknown	1.46	(0.75, 2.83)	0.268	1.24	(0.6, 2.55)	0.565
Maternal BMI		0.85	(0.82, 0.89)	<0.001	1.03	(1.01, 1.06)	0.014

Table 6.23- Adjusted Model of maternal accuracy to estimate their weight at 24 months postpartum. (Accurate set as the reference category). Model's McFadden's (N= 961)

Coefficient	Category	Overestimation			Underestimation		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity	White British	Ref			Ref		
	Pakistani	1.27	(0.84, 1.93)	0.253	2.25	(1.6, 3.16)	<0.001
Maternal Education	A Level or Higher	Ref			Ref		
	<5 GCSE	0.65	(0.37, 1.15)	0.137	1.74	(1.14, 2.64)	0.009
	5 GCSE	0.76	(0.47, 1.21)	0.248	1.45	(0.99, 2.14)	0.059
	Other/unknown	0.9	(0.37, 2.17)	0.813	1.42	(0.71, 2.86)	0.32
Maternal BMI		0.85	(0.81, 0.9)	<0.001	1.08	(1.05, 1.11)	<0.001

6.4 DO MOTHERS' PERCEPTIONS OF THEIR OWN WEIGHT PREDICT MATERNAL CONCERN ABOUT THEIR CHILD BECOMING OVERWEIGHT?

6.4.1 Methods

Bivariate and multivariable logistic regression models were used, and odds ratios were estimated to assess the association between maternal perceptions of own weight and their concerns that their child will become overweight at 6 and 24 months postpartum. Not Concerned was set as the reference category and Odds Ratios (OR) and CI were estimated. The adjusted models included those variables that were significant predictors of maternal concerns about overweight in Chapter 5 (Mothers' ethnicity, age, parity, BMI, child's gender, BMI z-score).

6.4.2 Results

Results (Table 6.6) showed that at 6 and 24 months, after stratifying by ethnicity, child BMI z-score, child's gender and mother parity, women who perceived themselves as either overweight or underweight were more likely to be concerned about overweight in their child than those who perceived their weight as just right. However, after stratifying by the mother and child characteristics (ethnicity, child BMI z-score, child's gender and mother parity) and maternal BMI, only women who perceived themselves as underweight were more likely to be concerned about their child becoming overweight.

Table 6.24- Bivariate and multivariate logistic regression models predicting maternal concerns about their child's weight to maternal perception of their weight (Not Concerned was set as reference category)

	Model 1			Model 2			Model 3		
	OR	(95%CI)	P±	OR	(95%CI)	P±	OR	(95%CI)	P±
Maternal Concern About Overweight at 6 Months (n=1039)									
Perception of Own Weight (Just Right)									
Underweight	2.66	(1.41, 5.01)	0.002	2.91	(1.52, 5.55)	0.001	2.85	(1.49, 5.46)	0.002
Overweight	1.56	(1.04, 2.34)	0.032	1.56	(1.03, 2.36)	0.036	1.23	(0.76, 1.97)	0.401
Pseudo-R2 (Nagelkerke)	0.011			0.044			0.049		
Maternal Concern About Overweight at 24 Months (n=702)									
Perception of Own Weight (Just Right)									
Underweight	2.14	(1.01, 4.52)	0.047	2.37	(1.09, 5.14)	0.03	2.35	(1.07, 5.14)	0.033
Overweight	2.04	(1.29, 3.21)	0.002	1.88	(1.17, 3.01)	0.009	1.25	(0.72, 2.17)	0.429
Pseudo-R2 (Nagelkerke)	0.016			0.072			0.085		

Model 1: Bivariate model

Model 2: Ethnicity, child's BMI z-score, baby sex, mother parity, age

Model 3: Model 2 + Mother BMI

6.5 IS MOTHERS' ACCURACY IN ESTIMATING THEIR OWN WEIGHT ASSOCIATED WITH THEIR ACCURACY IN ESTIMATING THEIR CHILD'S WEIGHT?

6.5.1 Methods and Results

Maternal accuracy in determining their own weight was cross-tabulated with accuracy in determining their child's weight and assessed using chi-squared tests.

Results showed no association between maternal accuracy to estimate own weight with accuracy in estimating child's weight (Table 6.7).

Table 6.25- Cross-tabulation of maternal accuracy to estimate their weight with their accuracy to estimate their child's weight

Accuracy in determining their infant's weight			Accuracy in Determining Own Weight			
			Overestimation	Accurate	Underestimation	P±
6 Months	Overestimation	N (%)	35 (16.67)	73 (11.23)	22 (11.06)	0.117
	Accurate	N (%)	146 (69.52)	475 (73.08)	137 (68.84)	
	Underestimation	N (%)	29 (13.81)	102 (15.69)	40 (20.1)	
24 Months	Overestimation	N (%)	3 (3.57)	10 (2.11)	7 (4.52)	0.399
	Accurate	N (%)	40 (47.62)	236 (49.89)	83 (53.55)	
	Underestimation	N (%)	41 (48.81)	227 (47.99)	65 (41.94)	

6.6 DISCUSSION

6.6.1 Summary of Findings and Comparison with the Literature

6.6.1.1 Mothers' Perception of their Weight and Accuracy to Estimate it

This Chapter described how mothers living in Bradford perceived their own weight and how accurate they are in their estimations. Also, some determinants of women's accuracy were identified, and explored whether mothers' perceptions of their own weight were associated with their beliefs about their child's weight.

Results showed that more than half of the women perceived themselves as overweight and around 60% were accurate estimating it. The fact that about 40% of the women failed to identify their actual weight status is not surprising as other studies have also found that a high proportion of parents fail to estimate their weight (Jeffery, 2005; Campbell *et al.*, 2006; Wen *et al.*, 2010).

In this study, it was interesting to see that at 6 months postpartum, more women were overestimating than underestimating and that at 24 months postpartum, more women were underestimating than overestimating their weight. This difference across time points could be explained by the changes in weight that women experience during pregnancy and the postnatal period, the expectations they have about their post-partum body, and their body satisfaction. It is possible that, as others have argued (Hodgkinson, Smith and Wittkowski, 2014) at 6 months postpartum, women had unrealistic expectations of their postpartum body as a consequence of social pressures for women to return to their pre-pregnancy body shape (Hodgkinson, Smith and Wittkowski, 2014). Hence more women overestimated their weight at this time point. In the postnatal period, healthy breastfeeding women can lose as much as 1 lb/week. (Erick and Shabert, 2008). Data from the U.S. suggest that around 50% of the mothers go back to their pre-conceptual weight by the sixth week after their child's birth postpartum. However, 25% of the women have 5 kg or more of their pre-pregnancy weight one year after birth (National Research Council, 2009). High postpartum weight retention¹⁶ could increase the risk of life-long obesity and cardiovascular disease (Endres et

¹⁶ High postpartum weight retention has been defined as the difference of 5 - 9 kg or more between the maternal weight posterior to the six weeks after childbirth and the pre-pregnancy weight (kg). Excessive weight gain during pregnancy could lead to a high postpartum weight retention (Endres *et al.*, 2015; Bogaerts *et al.*, 2017)

al., 2015; Bogaerts et al., 2017). However, it has also been suggested that poor body satisfaction in the postnatal period could lead to psychological distress (Gjerdingen *et al.*, 2009). The fact that mothers were unable to classify their own weight accurately could suggest the need for more support and balance between weight management advice and supporting body satisfaction as others have argued (Hodgkinson, Smith and Wittkowski, 2014; Christenson *et al.*, 2016)

Pakistani women were more likely to have inaccurate estimations of their weight in comparison to White British women. These findings are similar to those of a previous study in the U.K., that found that in comparison to European women, South Asian women were less likely to acknowledge their excess of weight when women were overweight or obese (Patel *et al.*, 2001).

There are several possible explanations to why Pakistani mothers were more likely to have inaccurate estimations of their weight than White British mothers. These differences could be attributed to cultural norms of body size, beliefs, and traditions. In support of this, some research suggests that among South Asian groups, some women perceive bigger bodies as a sign of good health and wealth (Greenhalgh, Chowdhury and Wood, 2005; Patel *et al.*, 2016). Other research has found that some South Asian women believe that weight gain is inevitable as a consequence of genetics, ageing, childbirth or divine predestination which could make women less attentive to their weight (Ludwig, Cox and Ellahi, 2011; Patel *et al.*, 2016). Additionally, a qualitative study suggests that some South Asian women wearing traditional clothing may not always be aware of their body shape (Ludwig, Cox and Ellahi, 2011).

Although findings from the above studies could help to explain why Pakistani women may underestimate their weight, these may not fully explain why Pakistani women were more likely than White British women to overestimate their weight at 6 months postpartum. Results from a study in Norway showed that South Asian women had a higher relative increase in weight from pre-pregnancy to postpartum compared with Western Europeans (Waage *et al.*, 2016). It is possible that this higher postpartum weight retention could make mothers less aware of their actual weight status. However, from the findings of this study, it is not possible to know whether or not Pakistani mothers had higher postpartum weight retention in comparison to White British mothers.

Results from this study suggest that perceptions of body size also vary within Pakistani women. At 6 months place of birth is a predictor of maternal overestimation of weight over maternal ethnicity. Other studies have also shown differences in women's perceptions of body size within ethnic groups. For example, in a study in the U.K. researchers asked Bangladeshi women to rate body shape images according to what they thought were "healthier" body images. Their results showed that older women and those who have been living in the U.K. for shorter time rated larger figures as healthy (Greenhalgh, Chowdhury and Wood, 2005).

The final models showed that women who had an education level lower than A-level were more likely to underestimate their weight at both time points. These results are not surprising as there are clear associations between education and health literacy (Protheroe *et al.*, 2017). These results reflect the need for reinforcing health literacy among these mothers in order to increase awareness around the problematic of overweight and obesity.

6.6.1.2 Association Between Mothers' Beliefs Around their Own Weight and Their Child's Weight

Maternal accuracy in estimating their own weight was independent of their accuracy to estimate their child's weight. Ideals of body size may change across the different stages of life. Therefore, we should not assume that mothers who are aware of their own weight status are aware of the weight status of their child.

Although maternal accuracy when estimating their own weight was independent of accuracy in estimating child weight, results showed that after stratifying by ethnicity, child BMI z-score, child's gender and mother parity, women who perceived themselves as overweight were more likely to be concerned that their child would become overweight. These findings mirror the findings of a study from the U.S. which found that mothers of school-age children were more likely to be concerned about their child's weight if they perceived themselves as overweight (Peyer *et al.*, 2015). This finding suggests that those women that see themselves as overweight may understand the risk that their child has to become overweight.

After stratifying by maternal BMI, perception of own weight was no longer a significant predictor of concern about overweight. These findings are the result of the correlation between perception of own weight and BMI and suggest that BMI is a better predictor of concern that the child will become overweight than perception of own weight. It is possible

that some mothers with higher BMI are aware that their own weight is high and that this could represent a risk for their child to become overweight, but would report their own weight as “Just Right” when being asked. These results could also mean that some mothers who overestimated their own weight may have perceived their own weight as high, but they do not believe that their excess of weight could predispose their child to become overweight.

6.6.2 Strengths and Limitations

To my knowledge, this is the first study exploring maternal accuracy in estimating their own weight in the first six months postpartum in a bi-ethnic population in England. Also, this study adds to the small number of studies that have explored how mothers’ perception of their own body size relates to their perceptions and concerns about their child’s weight (Peyer *et al.*, 2015). However, owing to the cross-sectional manner of this study, it is not possible to establish causation in these associations. A limitation of this study is that the mothers’ perception of their own and their child’s weight, as well as mothers’ concerns, are subjective measures. Also, although BMI is the most widely accepted measure of obesity in adults, particularly when measured in a population level, it cannot differentiate between fat and muscle (Adab, Pallan and Whincup, 2018). This could have led to some misclassification of the accuracy of some women that took part in this study. However, unlike previous studies that have also explored mothers’ accuracy to estimate their own weight, in this study the weight and height of the mothers was measured and not self-reported (Jeffery, 2005).

Lastly, this study has a large sample size which is broadly representative of the area of Bradford in which it was recruited. However, given that mothers’ beliefs about their own and their child’s weight may be shaped by social and environmental factors these results may not be generalizable to other sites or mothers living in Bradford belonging to other ethnic groups.

6.6.3 Implications for Research and Practice

Results from this study showed that some mothers underestimate and others overestimate their weight at 6 and 24 months postpartum. Weight management advice during the postnatal period seems to be important during the first years postpartum. However, it is important that these messages are given sensitively in order to avoid body image dissatisfaction. There seems to be a need for more education about what women should expect about their body weight during the first years postpartum. However, further research

in Bradford should explore women's expectations and beliefs around their weight and body image in the pre-natal and post-natal period.

Maternal perception of her own weight as high and concern about her child's weight may have a positive impact on the mothers' and the child's health if they are likely to initiate actions to safeguard their own and their child's health (Patel *et al.*, 2001; Haynes *et al.*, 2017). However, others have argued that stigma around overweight and obesity could also lead mothers to unhealthful behaviours, denial and negative health outcomes (Haynes *et al.*, 2017; Robinson, 2017). Therefore, further research in Bradford should explore how these beliefs relate to the mother and child health behaviours and health outcomes.

6.7 CONCLUSIONS

Around 40% percent of the women were unable to identify their own weight accurately. Both over- and underestimation were prevalent, and Pakistani women were less likely to be accurate. Moreover, mothers who accurately perceive their own weight were more likely to be concerned about their child's weight. Results of this study suggest the need for reinforcing messages of weight management and body image in the postnatal period.

Results of this Chapter and those of Chapter 4 and 5 in which results show that a high proportion of mothers were likely to misperceive their child's weight, and that a low proportion of them were concerned that their child will become overweight may be concerning. This is because as described in Chapter 1, based on the health belief model (Becker *et al.*, 1977), and the socioecological model of eating behaviours (Contento, 2015), it is possible that mothers beliefs about their own and their child's weight may influence their health behaviours. Hence, if mothers misperceive their own or their child's weight, they might be less likely to take actions to ensure a healthy weight on their children. In the next Chapter I will inquire if the perceptions and concerns that mothers living in Bradford have about their child's weight are related to their feeding practices.

Chapter 7 - Do Maternal Perceptions and Concerns Influence the Mother's Feeding Practices?

7.1 CHAPTER INTRODUCTION

Results from the previous Chapters showed that around 40% of the mothers of pre-school children misperceive their child's weight. Also, less than 20% of mothers are concerned that their child will become overweight. The mothers' feeding practices may be influenced by their perceptions and concerns about their child's weight.

As described in Part I of this thesis, the caregiver feeding practices are part of a complex system where several biological, intrapersonal, social and environmental factors interact with each other (Figure 7.1). Based on the transtheoretical model of behaviour change (Prochaska and Velicer, 1997), and the health belief model (Becker *et al.*, 1977), it can be assumed that the mother's perceptions of and concerns about their child's weight could motivate behaviour changes in order to improve the child's health. Studies have found that adults and adolescents that recognise their overweight are more likely to have intentions and attempts to lose weight (Robinson and Sutin, 2017). Even so, little is known about how these intrapersonal factors influence mothers' feeding practices and consequent positive health outcomes in the child (Haynes *et al.*, 2017).

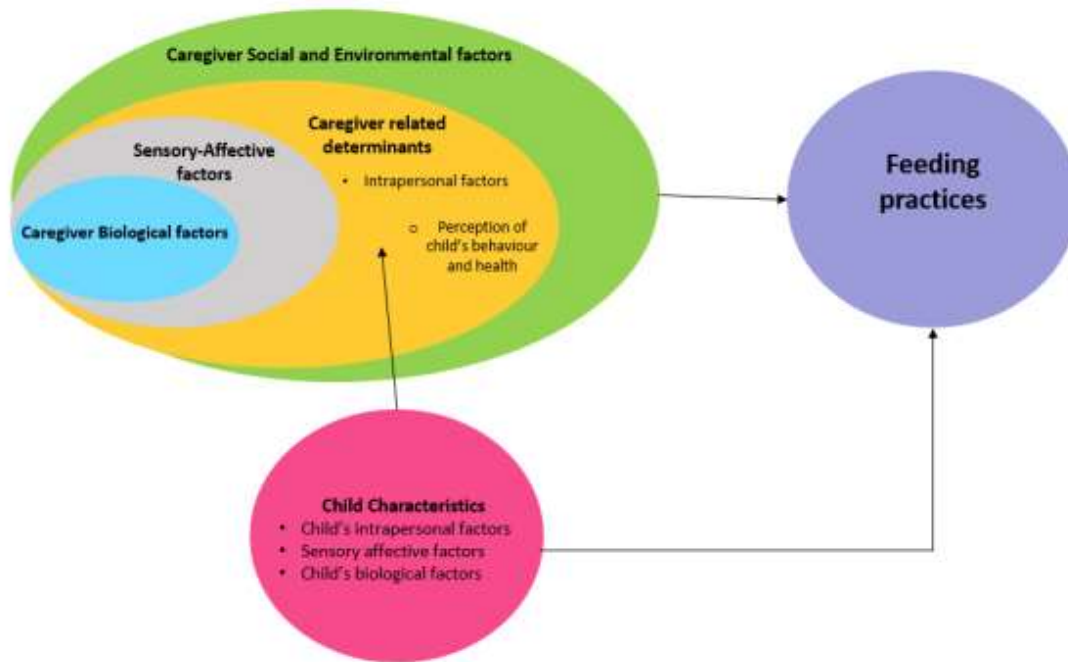


Figure 7.27- Factors influencing mothers' feeding practices adapted from Isobel Contento (2015)

This Chapter aims to identify mother and child characteristics associated with maternal breastfeeding duration and feeding styles of mothers of pre-school children living in Bradford. Also, this chapter aims to the mothers' perceptions of, and concerns about, their pre-school child's weight are associated with the above feeding practices. Specific objectives are to:

- a) Describe exclusive and breastfeeding duration of the BiB1000 subsample and identify mother and child characteristics associated with shorter/longer exclusive or any breastfeeding duration.
- b) Describe women's feeding styles at 6 and 24 months postpartum, and examine which maternal and child characteristics are associated with authoritative and non-authoritative feeding styles
- c) Identify if the mothers' perceptions of, and concerns about, their child's weight are associated with shorter/longer exclusive or any breastfeeding duration and authoritative/non-authoritative feeding styles.

Breastfeeding and feeding styles are different behaviours that may have different determinants and implications. Therefore, I present the background, methods, results and discussion for each of these behaviours in different sections.

7.2 ARE MATERNAL PERCEPTIONS OF, AND CONCERNS ABOUT, THEIR CHILD'S WEIGHT ASSOCIATED WITH BREASTFEEDING PRACTICES?

7.2.1 Background

Breastfeeding initiation and duration rates in the UK are below the WHO recommendations¹⁷ (World Health Organization, 2003). Given the benefits of breastfeeding (Horta and Victora, 2013), it is important to have a good understanding of the modifiable and non-modifiable factors that influence breastfeeding initiation, and duration of exclusive and any breastfeeding.

Breastfeeding intention, self-efficacy and social support have been identified as modifiable intrapersonal factors that influence breastfeeding decisions (Meedya, Fahy and Kable, 2010). Other social and environmental factors also influence these factors. For example, a study nested within the Born in Bradford cohort showed that mothers' intentions to breastfeed varied by maternal ethnicity, level of education, if they were receiving means-tested benefits and their self-efficacy to breastfeed (Cabieses *et al.*, 2014).

Mothers' perception of their child's weight could influence their feeding practices. Results of some studies suggest that how mothers perceive their child's weight and their beliefs of not producing enough milk to allow their child to gain weight properly could lead to discontinuation of breastfeeding (Li *et al.*, 2008; Brown, Raynor and Lee, 2011). For example, a qualitative study in the U.K. found that mothers concerns about their children not growing fast enough and not producing enough milk for the healthy growth of their child resulted in breastfeeding cessation and increased maternal satisfaction about their child's growth (Brown, Raynor and Lee, 2011).

There are a small number of studies that have explored how mothers' perceptions and concerns about their child's weight are associated with the mothers' feeding practices. A recent study in Australia (Harrison *et al.*, 2018) found that mothers' concerns about their child being underweight were associated with an early introduction to solids. A study in the U.S. found that mothers who perceived themselves as overweight during the first years of

¹⁷ WHO recommends exclusive breastfeeding up to 6 months of age and then continuation along with appropriate complementary foods. Results from the last infant feeding survey (McAndrew *et al.*, 2012) showed that only 81% of the women initiated breastfeeding and 55% breastfeed at 6 weeks postpartum.

life were more likely to wean their child earlier (Musaad, Donovan and Fiese, 2015). Lastly, one study in the U.S. found that breastfeeding status was not associated with mothers having inaccurate estimations of their child's weight (Brown *et al.*, 2016).

A previous study in Bradford showed that White British mothers were less likely to initiate breastfeeding and continue any breastfeeding until four months of age in comparison to mothers of other ethnicities (Santorelli *et al.*, 2013). Previous work in the field has explored the determinants of breastfeeding initiation and duration (Dennis, 2001; Meedya, Fahy and Kable, 2010; Kronborg, Foverskov and Væth, 2014). Nonetheless, to my knowledge, no additional studies have reported what other mother and child characteristics and maternal intrapersonal factors (mother perceptions and concerns about their child's weight) are associated with exclusive and any breastfeeding duration of women living in Bradford.

7.2.2 Methods

7.2.2.1 Breastfeeding Measures

The BiB1000 questionnaires asked about breastfeeding initiation (yes or no), continuation at 6, 12, 24 and 36 months (yes or no); and the age when the child stopped breastfeeding, from which the BiB1000 team calculated the duration of breastfeeding (days). The questionnaire also included questions about when the mother first introduced formula, foods (sweetened and savoury) and drinks (sweetened and unsweetened). From these data; I calculated exclusive breastfeeding duration of the women in days.

Exclusive breastfeeding duration was defined as the time for which the mother provided breastmilk without the introduction of any sweetened or unsweetened foods or drinks, including water. Any breastfeeding duration was defined as the period in which the mother provided breastmilk to the child regardless of the introduction of other sweetened or unsweetened foods or drinks, including water.

In the database, some cases have missing data at any of the time points because the participant either did not complete that question or was still breastfeeding when the data was collected. Data were self-reported; therefore, some cases reported different durations of breastfeeding duration each time point. Thus, for the analyses, I considered the first report in each case to decrease possible recall bias.

7.2.2.2 Statistical Analysis

Frequencies of maternal initiation and median duration of exclusive and any breastfeeding duration were calculated for the complete sample.

This section aims to explore the associations between (a) mother and child characteristics (maternal ethnicity, place of birth, age, education, living arrangements weight status and child's sex, child's birth weight and child's BMI z-score at 6 months), and (b) mother intrapersonal factors (maternal perception of her child's weight and worries that their child will become overweight); with exclusive and any breastfeeding duration. The above associations were explored as follows; the median duration of exclusive and any breastfeeding by groups of mother and child characteristics, and mother intrapersonal factors were obtained. Following, a survival time analysis and a log-rank procedure to test differences in exclusive and any breastfeeding duration by the above groups were conducted.

Using Cox regression models, hazard ratios (HR) and 95% CI were estimated for the associations of exclusive and any breastfeeding duration with mother and child characteristics, and mother's intrapersonal factors (unadjusted and adjusted models). Bivariate models were used to explore the associations of exclusive and any breastfeeding duration with mother and child characteristics and the intrapersonal factors. Following this, through manual stepwise analysis, a model was estimated in which only mother and child characteristics (maternal ethnicity, place of birth, age, education, living arrangements, parity, food security, weight status at 6 months postpartum, child's gender) were examined, and significant variables were kept. Following this, I explored the association between exclusive and any breastfeeding duration with child's BMI z-score at 6 months, perceptions of and concerns about the child's weight adjusting for the variables that in the previous model were significantly associated with breastfeeding duration.

Women who did not initiate breastfeeding were included in the analysis; their time breastfeeding was considered as 0.001.

7.2.3 Results

From the 1488 mothers included in this BiB1000-based study, 1,365 provided information about breastfeeding initiation, of whom 74% of them breastfed their child at least once. Information about exclusive breastfeeding and any breastfeeding duration was collected from 1,358 and 1,325 women, respectively.

Among the women who breastfed at least once, the median duration of exclusive breastfeeding was 3 weeks (in days, median: 21, min: 1, max: 185), and 8 weeks (In days, median: 56, min: 1, max: 740) for any breastfeeding. Women who never breastfed were included in the following analyses.

7.2.3.1 What Mother and Child Characteristics are Associated with Exclusive and any Breastfeeding Duration?

The median duration of exclusive and breastfeeding duration by mother and child characteristics can be found in (Appendix II, A. Table 12). Results from the bivariate and multivariate Cox models showing the associations between mother and child characteristics with exclusive and any breastfeeding are presented in Table 7.26 and Table 7.27 respectively. Women's place of birth (inside or outside the U.K.), women's parity, food security and baby sex were not significant predictors of duration of either exclusive or any breastfeeding.

The mother and child characteristics that were associated with duration of exclusive and any breastfeeding were: maternal ethnicity, maternal age, education, and maternal weight status (measured at 6 months). Moreover, maternal living arrangements and child's birth weight were significant predictors of the duration of exclusive breastfeeding but not of any breastfeeding.

Pakistani mothers, older mothers, and mothers with a level of education of A-level or higher were more likely to continue exclusive and any breastfeeding longer. Mothers with obesity were more likely to stop exclusive and any breastfeeding earlier in comparison to healthy-weight mothers.

Mothers who were not living with a partner had a shorter duration of exclusive breastfeeding in comparison to those living with a partner. In the bivariate model, mothers who were not living with a partner were also more likely to stop any breastfeeding earlier. However, this

association was not significant when it was adjusted for maternal ethnicity, maternal age, living arrangements and weight status.

Regarding the child's characteristics, the results of the adjusted model showed that for every unit increase in the child's birth weight (kg) mothers were significantly more likely to continue exclusive breastfeeding for longer (HR:0.85 95% CI: 0.77,0.95), yet this was not the case for any breastfeeding.

Table 7.26- Bivariate and multivariable Cox regression model for predictors of exclusive breastfeeding duration (N=1087)

Coefficient	Category	Model 1			Model 2		
		HR	(95%CI)	p	HR	(95%CI)	p
Maternal ethnicity	White British	Ref			Ref		
	Pakistani	0.88	(0.78, 0.99)	0.032	0.83	(0.73, 0.94)	0.004
Place of Birth	Inside the U.K.	Ref					
	Outside the U.K.	0.89	(0.8, 1)	0.045			
Maternal age in years		0.97	(0.97, 0.99)	<0.001	0.98	(0.97, 0.99)	0.002
Maternal education	A level or higher	Ref			Ref		
	<5 GCSE equivalent	1.42	(1.21, 1.67)	<0.001	1.36	(1.15, 1.61)	<0.001
	5 GCSE equivalent	1.36	(1.19, 1.57)	<0.001	1.25	(1.08, 1.45)	0.003
	Other/unknown	1.25	(0.97, 1.62)	0.082	1.26	(0.98, 1.63)	0.076
Maternal living arrangements	Living with a partner	Ref					
	Not living with a partner	1.44	(1.19, 1.73)	<0.001	1.25	(1.02, 1.51)	0.028
Parity	Single Child	Ref					
	Multiparous	1	(0.89, 1.11)	0.943			
Food security	Food secure						
	Food insecure	1.18	(1, 1.41)	0.055			
Maternal weight status at 6 months	Normal weight	Ref					
	underweight	1.7	(1.23, 2.34)	0.001	1.53	(1.1, 2.12)	0.012
	overweight	1.04	(0.9, 1.2)	0.633	1.08	(0.93, 1.25)	0.326
	obese	1.14	(0.98, 1.32)	0.091	1.21	(1.04, 1.4)	0.015
Child gender	Male						
	Female	1.02	(0.91, 1.13)	0.748			
Birthweight in Kg		0.85	(0.77, 0.95)	0.004	0.86	(0.77, 0.96)	0.009

Model 1: Unadjusted

Model 2: Adjusted for Maternal ethnicity, age, education, living arrangements, maternal weight status and child's birth weight (Model LR chi²=66.28, p<0.001)

Table 7.27- Bivariate and multivariate Cox regression model for predictors of any breastfeeding duration (N=1067)

Coefficient	Category	Model 1			Model 2		
		HR	(95%CI)	p	HR	(95%CI)	p
Maternal ethnicity	White British	Ref			Ref		
	Pakistani	0.76	(0.67, 0.85)	<0.001	0.71	(0.63, 0.81)	<0.001
Place of Birth	Inside the U.K.	Ref			Ref		
	Outside the U.K.	0.77	(0.68, 0.87)	<0.001			
Maternal age in years		0.98	(0.97, 0.99)	<0.001	0.97	(0.96, 0.99)	<0.001
Maternal education	A level or higher	Ref			Ref		
	<5 GCSE equivalent	1.36	(1.16, 1.6)	<0.001	1.39	(1.18, 1.64)	<0.001
	5 GCSE equivalent	1.33	(1.15, 1.54)	<0.001	1.25	(1.08, 1.45)	0.003
	Other/ unknown	1.04	(0.8, 1.34)	0.787	0.98	(0.76, 1.26)	0.86
Maternal living arrangements	Living with a partner	Ref					
	Not living with a partner	1.41	(1.17, 1.7)	<0.001			
Parity	Single Child	Ref					
	Multiparous	0.91	(0.81, 1.04)	0.162			
Food security	Food secure	Ref					
	Food insecure	1.11	(0.91, 1.36)	0.293			
Maternal weight status at 6 months	Normal weight	Ref			Ref		
	underweight	1.45	(1.05, 2.01)	0.024	1.3	(0.93, 1.8)	0.12
	overweight	1.12	(0.97, 1.3)	0.127	1.17	(1, 1.35)	0.044
	obese	1.22	(1.05, 1.42)	0.009	1.26	(1.08, 1.47)	0.003
Child gender	Male	Ref					
	Female	1.04	(0.92, 1.18)	0.521			
Birthweight in Kg		0.93	(0.83, 1.03)	0.176			

Model 1: Unadjusted

Model 2: Adjusted for Maternal ethnicity, age, education, and maternal weight status (Model LR $\chi^2=73.93$, $p<0.001$)

7.2.3.2 Is the Child's Breastfeeding Duration Associated with the Child's BMI Z-Score at 6 Months?

Figure 7.28 and Figure 7.29 show the duration of exclusive and any breastfeeding by child's weight category. Through the first 4 months (120 days) those children who were overweight or at risk of overweight had a slightly longer breastfeeding duration than those who were categorised as underweight or normal weight at 6 months.

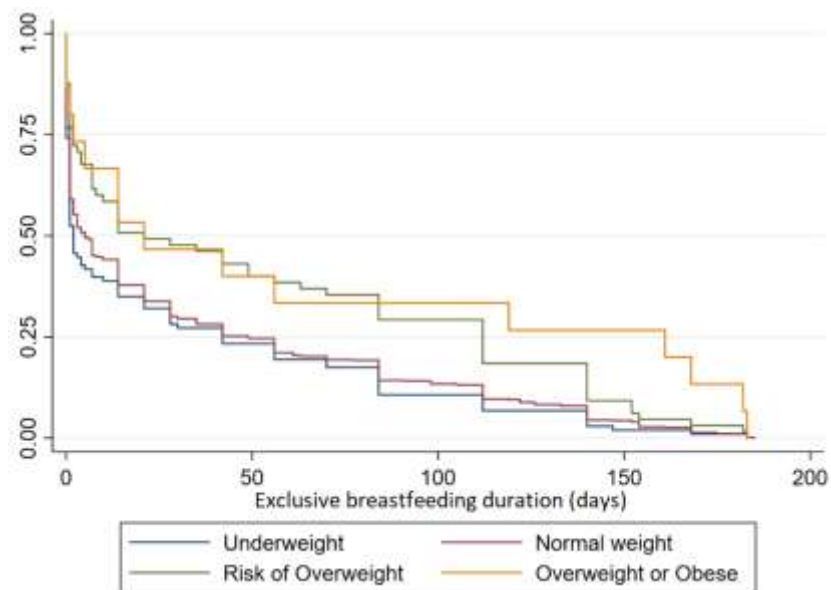


Figure 7.28- Duration of exclusive breastfeeding by child's weight category at 6 months

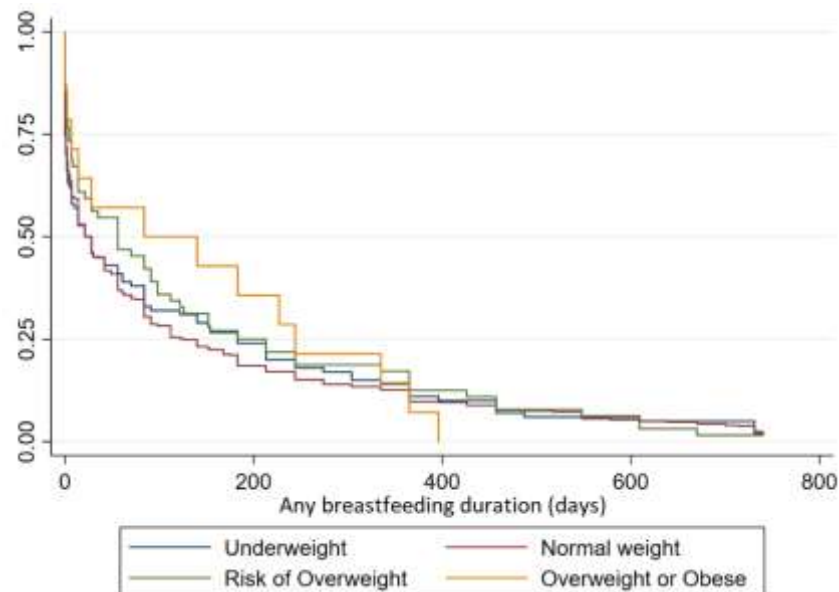


Figure 7.29- Duration of any breastfeeding by child's weight category at 6 months

Results from the Cox regression models of the association between BMI z-score at 6 months and breastfeeding duration are presented in Table 7.28. Mothers whose children had higher BMI z-scores at 6 months tend to have a longer breastfeeding duration (exclusive and any breastfeeding).

Table 7.28- Bivariate and multivariate Cox regression models of the association of Child's BMI z-score at 6 months and duration of exclusive and any breastfeeding duration

	Covariate	HR	(95%CI)	P±
Exclusive breastfeeding duration (N=1054)	BMI z-score at 6 months Unadjusted	0.95	(0.9, 1)	0.034
	Model LR	4.52		
	Model P±	0.0334		
	BMI z-score at 6 months adjusted for (ethnicity, maternal age, education, living arrangements, maternal weight status and birthweight)	0.94	(0.89, 0.99)	0.02
	Model LR	67.25		
	Model P±	<0.001		
Any breastfeeding duration (N=1031)	BMI z-score at 6 months Unadjusted	0.98	(0.92, 1.03)	0.359
	Model LR	0.84		
	Model P±	0.35		
	BMI z-score at 6 months adjusted for (ethnicity, maternal age, education, maternal weight status)	0.94	(0.89, 0.99)	0.021
	Model LR	78.9		
	Model P±	<0.001		

7.2.3.3 Are Maternal Perceptions of Their Child's Weight and Concerns About Their Child Becoming Overweight Associated with Mother's Breastfeeding Duration?

Duration of exclusive and any breastfeeding were explored in relation to the maternal perception of her child's weight and concerns about the child becoming overweight. The median duration of exclusive and any breastfeeding duration are presented in Table 7.29

Table 7.29- Maternal perceptions of and concerns about their child's weight and median duration of exclusive, and any breastfeeding.

		Exclusive breastfeeding duration in days				Any breastfeeding duration in days			
		N	Median	95%CI	P±*	N	Median	95%CI	P±*
How do you see the weight of your child?	Low	157	5	(2 ,14)	0.63	149	28	(21 ,60)	0.19
	Right	887	5	(3 ,7)		862	21	(14 ,28)	
	High	94	7.5	(2 ,27)		93	42	(14 ,84)	
I am worried my child will become overweight	Yes	164	14	(3 ,21)	0.17	162	42	(21 ,70)	0.04
	No	966	5	(3 ,7)		935	21	(14 ,28)	

*P± obtained from the long-rank test

Figure 7.30 and Figure 7.31, present the Kaplan-Meier survival curves of any exclusive and any breastfeeding duration by the mother's concern (yes or no) that their child will become overweight. Mothers that were worried that their child would become overweight were less likely to stop exclusive or any breastfeeding by the third month (100 days) than mothers who were not concerned.



Figure 7.30- Duration of exclusive breastfeeding by maternal concerns about her child becoming overweight

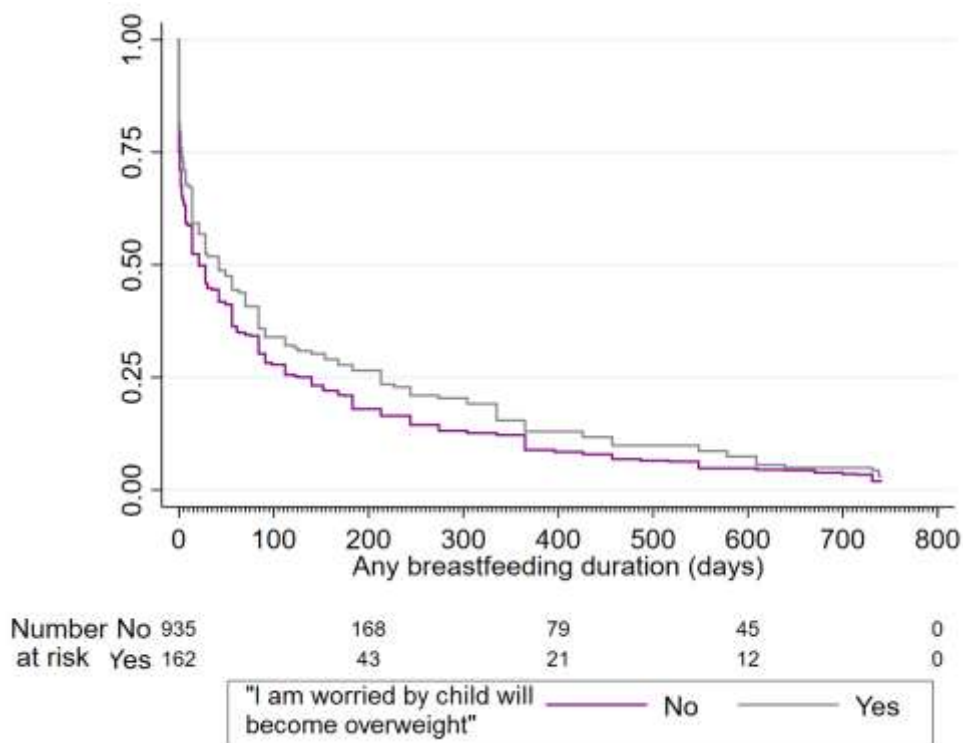


Figure 7.31- Duration of any breastfeeding by maternal concerns about her child becoming overweight

Results from the Cox regression models (Table 7.5 and Table 7.6) showed that women’s perception of their child’s weight was not associated with their breastfeeding duration (exclusive and any breastfeeding), also there was no significant association between women’s concern that their child would become overweight and exclusive breastfeeding duration.

There was a significant association between women’s’ concern that their child will become overweight and any breastfeeding duration (Table 7.6). Mothers who were concerned about overweight were less likely to stop any breastfeeding earlier (HR: 0.79, 95%CI: 0.67, 0.95, p=0.009) in comparison than those that were not concerned.

Table 7.30- Binary and multivariable Cox regression model for associations between mother's perceptions and concerns about their child's weight and exclusive breastfeeding duration

Category		Model 1			Model 2		
		HR	95% CI	P±	HR	95% CI	P±
Perception of child's weight N=1087	Just Right	Ref			Ref		
	Low	1.03	(0.87, 1.23)	0.707	1.04	(0.87, 1.25)	0.666
	High	0.93	(0.75, 1.15)	0.496	0.93	(0.75, 1.16)	0.524
	LR chi2	0.69			66.94		
	Model p	0.71			<0.001		
Concern child will become overweight N=1079	No	Ref			Ref		
	Yes	0.89	(0.75, 1.05)	0.173	0.86	(0.72, 1.01)	0.072
	LR chi2	1.91			66.51		
	Model p	0.17			<0.001		

Model 1: Unadjusted

Model 2: Adjusted for ethnicity, mother education, living arrangements, mother’s weight status at 6 months and child's birth weight.

Table 7.31- Binary and multivariable Cox regression model for associations between mother's perceptions and concerns about their child's weight and any breastfeeding duration

Category		Model 1			Model 2		
		HR	95% CI	P±	HR	95% CI	P±
Perception of child's weight (Just right) N=1064	Just Right	Ref			Ref		
	Low	0.87	(0.73, 1.04)	0.13	0.93	(0.77, 1.11)	0.425
	High	0.89	(0.71, 1.11)	0.302	0.88	(0.7, 1.1)	0.25
	LR chi2	3.09			76.83		
	Model p	0.21			<0.001		
Concern child will become overweight N=1056	No	Ref			Ref		
	Yes	0.84	(0.71, 1)	0.048	0.79	(0.67, 0.95)	0.009
	LR chi2	4.07			80.28		
	Model p	0.04			<0.001		

Model 1: Unadjusted

Model 2: Adjusted for ethnicity, mother education, mother weight status at 6 months.

7.2.4 Discussion

7.2.4.1 Summary of Findings and Comparison with the Literature

Prior work within the Born in Bradford cohort has described mothers' breastfeeding initiation, the frequency of mothers breastfeeding up to 4 months, and differences in these infant feeding behaviours by ethnic group (Santorelli *et al.*, 2013, 2014). Results showed that most of the women stop breastfeeding before 4 months. These results are of concern because a large proportion of mothers in Bradford do not adhere to the WHO recommendations of infant feeding (World Health Organization, 2003). Also, findings from Santorelli *et al.* (2013, 2014) showed that more Pakistani mothers breastfed in comparison to White British mothers. The present study aimed to explore if the duration of exclusive and any breastfeeding duration was associated with other mother and child characteristics as well as mothers perceptions and concerns about their child's weight.

Results showed that White British mothers; younger mothers; mothers with a level of education lower than A-level; and who were obese were more likely to have shorter exclusive and any breastfeeding duration (Amir and Donath, 2007; Thulier and Mercer, 2009). The results mirror those results obtained by Santorelli *et al.*, (2013) and are consistent with other studies that have found that mothers who have lower levels of education, are younger and have higher BMI are more likely to breastfeed for a shorter duration (Dennis, 2001; Amir and Donath, 2007). The results of this study may not be surprising as previous research has found that mothers' prenatal intentions to breastfeed may be associated with breastfeeding initiation and duration (Donath and Amir, 2007), and previous work in Bradford showed that mothers who intended to bottle feed were less educated, White British and younger (Cabieses *et al.*, 2014).

Results from the Cox regression models indicate that for every unit increase in child's birth weight and BMI z-score at 6 months, mothers were more likely to have a longer breastfeeding duration. Kramer and colleagues conducted a longitudinal study in which they found that between the age of 2 and 6 months, children that had lower weight for age z-scores were more likely to be weaned or discontinued from exclusive breastfeeding (Kramer *et al.*, 2011). Their results suggest that a smaller sized child may have influenced the mother's breastfeeding duration. Given the methodology of the present study, it was not possible to know the weight or BMI z-scores of the children when the mother stopped

breastfeeding, however, the association between birth weight and BMI z-score at 6 months with exclusive and any breastfeeding suggest similar findings to those of Kramer and colleagues.

The mothers' perceptions of their child's weight at 6 months were not associated with exclusive or any breastfeeding duration. These results differ from a previous study in the U.S. that found that mothers who perceived their child's weight as high during the first two years of life were more likely to have shorter breastfeeding duration (Musaad, Donovan and Fiese, 2015). Musaad and et al. (2015) attributed their results to either parental beliefs about feeding habits or that mothers who bottle-fed accurately perceive a higher weight in their children. It has been argued that bottle-fed children are more likely to have a higher weight gain in comparison to breastfed children (Dewey, 1998; Kramer *et al.*, 2002; Ventura, 2016). However, the cause-and-effect relation, as well as the direction of the association between feeding type (breast milk or formula milk) and child's growth has been subject to debate because infant feeding and growth are processes that can affect each other (Kramer *et al.*, 2011). A previous study in Bradford suggests that there may be no association between feeding type and the child's weight gain at the age of three (Fairley *et al.*, 2015). It is possible that in the present study there was no significant association between mothers' perception about their child's weight as high and breastfeeding duration because bottle-fed children were no more likely to have a higher weight. Therefore, mothers did not perceive their child's weight as high. Also, it is possible that in comparison to the study of Musaad and et al., (2015), a greater proportion of mothers in this sample underestimated their child's weight.

Finally, mothers concern that their child would become overweight was associated with breastfeeding duration. The fact that concern about overweight was associated with a slightly longer duration of breastfeeding could be attributed to the fact that mothers who are concerned about overweight may be more "nutrition-conscious", and hence breastfeed for longer.

7.2.4.2 Strengths and Limitations

To my knowledge, this is one of the small numbers of studies that have looked at the association between mothers' breastfeeding duration and mothers' perceptions about their child's weight and concerns that their child will become overweight. A limitation of this study

is that infant feeding data were self-reported, which could have led to possible misclassification and recall bias. Also, mothers' perceptions of their child's weight and concerns about it may not reflect the perceptions and concerns that women had about their child's weight when they stopped breastfeeding hence it was not possible to be sure if mothers' perceptions and concerns about their child's weight can influence their feeding behaviours.

7.2.4.3 Implications for Research and Practice

The short mean duration of exclusive breastfeeding of women living in Bradford highlights the importance of providing advice and support to women who may be less likely to follow recommendations of infant feeding. Professionals promoting breastfeeding in Bradford may find results of this study helpful in targeting populations interventions and support to women less likely to follow recommendations (i.e. White British mothers, younger mothers, less educated and who are obese).

7.3 ARE MATERNAL PERCEPTIONS OF, AND CONCERNS ABOUT, CHILD WEIGHT ASSOCIATED WITH FEEDING STYLES?

7.3.1 Background

Hughes and colleagues (2005) developed a questionnaire to classify parent feeding strategies into four categories of parenting styles based on the level of parental demandingness and responsiveness during mealtime. These categories are authoritative, authoritarian, indulgent and uninvolved (Hughes *et al.*, 2005).

Authoritative feeding behaviours have been defined as those high in maternal support, involvement, and appropriate control (Hughes *et al.*, 2005), while authoritarian, indulgent and uninvolved feeding styles are more unhealthy practices (Kiefner-Burmeister *et al.*, 2016). A parent who has an authoritative feeding style respects the child's food choices; however, sets a structure and boundaries around mealtime. Those who are authoritarian use strict monitoring, restrictive and power-assertive behaviours during mealtime. The indulgent feeding style is characterised by warmth and acceptance but with a lack of monitoring of the child's behaviour. Lastly, an uninvolved feeding style exhibits a lack of control and parental involvement with the child during mealtime

Longitudinal studies have found that uninvolved, indulgent, and authoritarian feeding styles predicted higher childhood BMI, whereas authoritative behaviours have been seen as protective against childhood overweight (Shloim *et al.*, 2015). A study within the BiB1000 subsample assessed early life modifiable risk factors for childhood obesity at the age of three years. Results showed that at 36 months postpartum, children whose mother had an indulgent feeding style at 24 months had a higher BMI than those children whose mother had an authoritative feeding style (Fairley *et al.*, 2015).

To my knowledge, there is only one study looking at associations between maternal perception and concerns about their child's weight with parental feeding styles (Flores-Peña *et al.*, 2017). Though, as previously described in Chapter 1, some studies have assessed feeding strategies such as parental control, pressure to eat and restrictive behaviours when feeding the child, which are solely authoritarian feeding practices (Hughes *et al.*, 2005). Findings of the above studies (May *et al.*, 2007; Webber *et al.*, 2010; Holub and Dolan, 2012; Haines *et al.*, 2018) suggest an association between authoritarian feeding practices (i.e. control and demand) and the mothers' perceptions and concerns about the child's weight. However, little is known how these perceptions and concerns are related to other feeding patterns (i.e. authoritative, indulgent and uninvolved).

Flores-Peña and colleagues (2017) explored the association between the four categories of feeding styles and the perception that Mexican mothers had about their child's weight. The researchers found that mothers who perceived their child as overweight or obese were more likely to have uninvolved feeding styles (Flores-Peña *et al.*, 2017). These findings are of concern because it may be inferred that the mothers' perception of her child's overweight does not increase maternal responsiveness and demandingness when feeding the child. However, the results may not be generalizable to the context of Bradford.

7.3.2 Methods

7.3.2.1 Maternal Feeding Styles Measures

The BiB1000 questionnaires included the Caregiver's Feeding Styles Questionnaire (CFSQ) at 6 and 24 months postpartum (Hughes *et al.* 2012). The CFSQ is a 19 item questionnaire, which classifies maternal feeding styles into four categories based on the dimensions of maternal demandingness (control demands and supervision) and responsiveness (parent centred, or child-centred) when feeding their child (Figure 7.6).

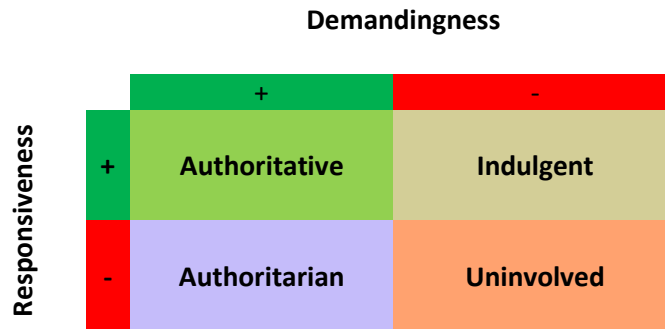


Figure 7.32- Classification of maternal feeding styles

To classify mothers into these four categories of feeding styles, a demandingness score is obtained by calculating the mean of all the 19 items of the questionnaire from which answers are presented to the women in a 5 Likert scale. Moreover, the responsiveness score is the mean of the 7 questions related to child-centred behaviours, divided by the demandingness score.

Hughes and colleagues established cut off points to categorise high demandingness (>2.80) and responsiveness (>1.16). Nevertheless, the researchers recommend that in the case of sufficient sample size, the sample medians of demandingness and responsiveness can be used as cut-off points, avoiding issues of validity arising from the fact that the original cut-off points were obtained from low-income minority groups living in the US (Hughes *et al.*, 2012).

For this analysis, I obtained responsiveness and demandingness scores for each woman and deleted those cases that had one or more missing items. Women were classified into their correspondent feeding style using the sample medians of responsiveness and demandingness as cut off points for low or high responsiveness and demandingness (Table 7.7)

Table 7.32- Cut off points to classify women with high responsiveness and demandingness

Time Point	High Responsiveness	High Demandingness
6 months	>1.15	>2.37
24 months	>1.23	>2.58

7.3.2.2 Statistical Analysis

Maternal feeding styles were described by mother and child characteristics (Appendix II, A.II Table 13 and A.II Table 14). Following this, bivariate and multivariate multinomial logistic regression models were used to examine the associations between maternal feeding styles with mother and child characteristics, maternal perception of their child's weight, and concern that their child will become overweight. Authoritative feeding styles have been described as a preventive factor for childhood obesity. Therefore, this feeding style was set as the reference category. Relative risk ratios (RRR) and 95% CI were calculated, and $p < 0.05$ were considered as significant.

The multivariate models looking at the association between feeding styles and mothers' perceptions and concerns about their child's weight were adjusted as follows; the first models stratified the above mother intrapersonal factors by maternal ethnicity only, whereas the second group of models stratified the above intrapersonal factors by the mother and child characteristics that were significant predictors of feeding styles.

7.3.3 Results

7.3.3.1 What Mother and Child Characteristics are Associated with Authoritative and Non-Authoritative Feeding Styles Among Mothers Living in Bradford?

At 6 months 987 women, and at 24 months 1045 women, completed the CFSQ. At both time points, the most common feeding styles were indulgent and authoritarian, and the least frequent was authoritative (Figure 7.7). Among Pakistani mothers, the most common feeding style was authoritarian, while indulgent was the most frequent among White British mothers. Differences in feeding styles by ethnicity were significant (6 months: $p < 0.001$; 24 months: $p < 0.001$) (Figure 7.8).

Frequencies of maternal feeding styles at 24 months differ slightly from those reported by (Fairley *et al.*, 2015) as the BiB1000 sample used is slightly different as they restricted their analysis to singleton births only while, as described in Chapter 3, I included mothers who had multiple births, but I excluded measurements of one of the children.

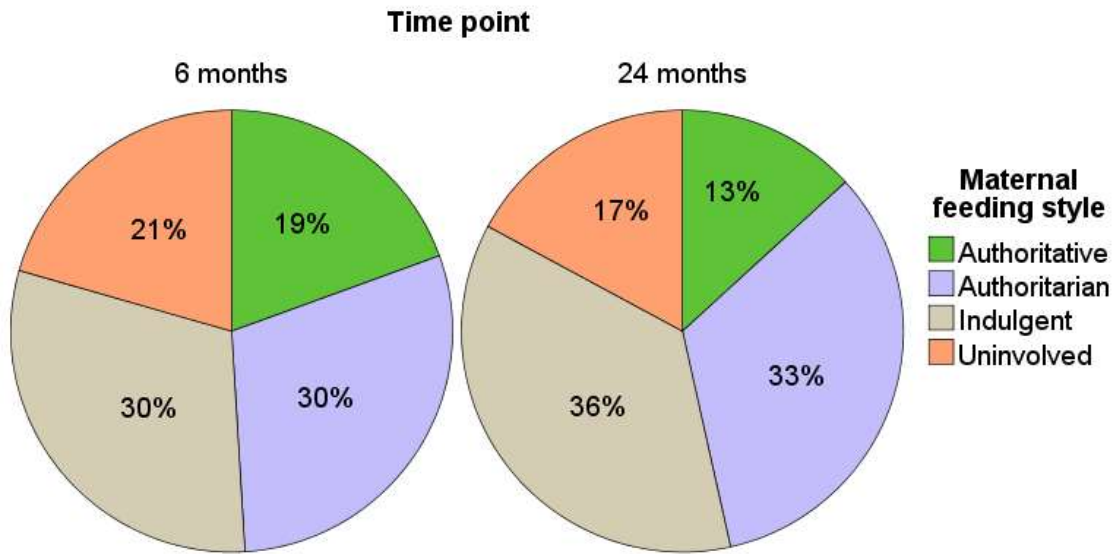


Figure 7.33- Maternal feeding styles at 6 and 24 months postpartum

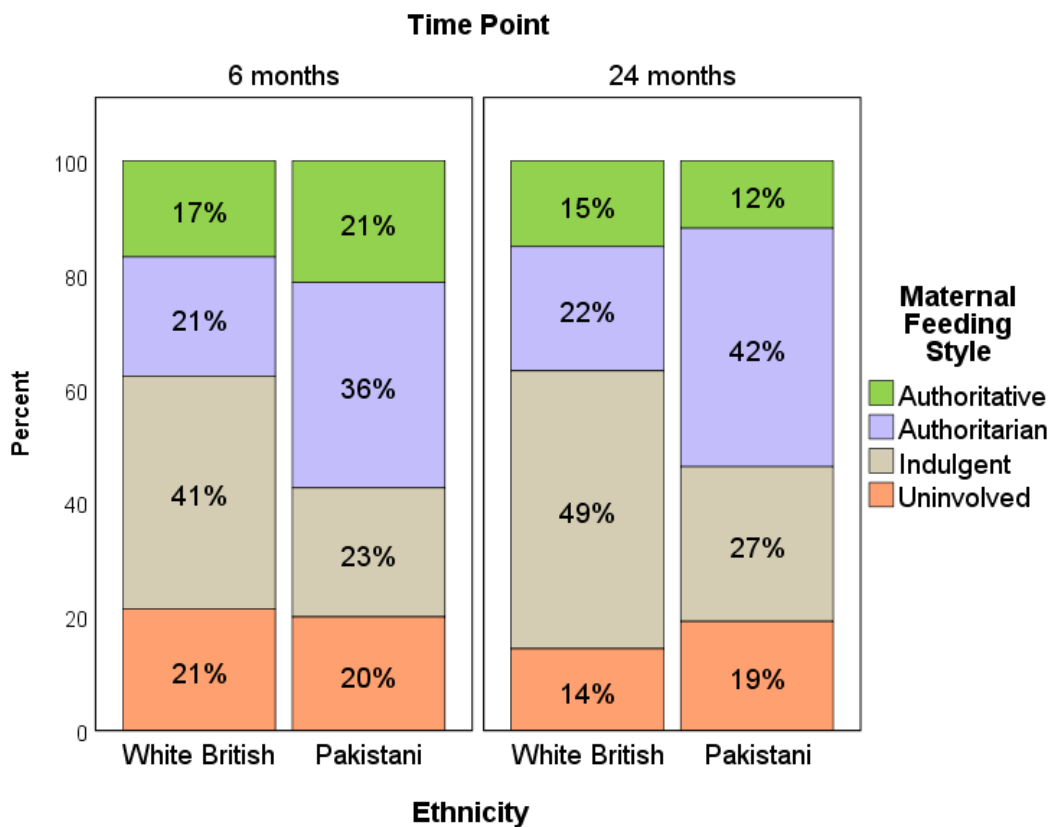


Figure 7.34- Maternal feeding styles by maternal ethnicity at 6 and 24 months postpartum

The bivariate multinomial logistic regression models which looked at the associations between feeding styles and mother and child characteristics showed that in comparison to White British mothers, Pakistani mothers were more likely to have authoritarian (RRR 2.44 95%CI: 1.62, 3.67, $p < 0.001$) and uninvolved (RRR 1.7, 95% CI: 1.08, 2.67, $p = 0.022$) feeding styles than authoritative. Significant differences were also found by, place of birth, age, parity, maternal weight status, maternal education, maternal parity, maternal weight status, child's birth weight birthweight and BMI z-score were all associated with the maternal feeding styles. No associations were found for maternal living arrangements and food insecurity (Appendix II, A.II Table 15 and A.II Table 16)

Given the significant differences in maternal feeding styles and mother and child characteristics by maternal ethnicity, associations with mother and child characteristics were explored whilst adjusting for maternal ethnicity.

Results of the multinomial logistic regression models of the relation between mother and child characteristics with feeding styles adjusting for maternal ethnicity at 6 and 24 months postpartum are presented in Table 7.8 and Table 7.9. The adjusted models showed that only birth weight and maternal weight status at 6 months, and maternal age and child's BMI z-score at 24 months were predictors of maternal feeding styles. Mothers who were overweight at 6 months, and older mothers at 24 months, were less likely to have an authoritarian feeding style than authoritative. It should be noted that sample sizes for some cells were very small, for example, there were fewer than 10 underweight women with an authoritative or an uninvolved feeding style, which does not comply with the assumptions of multinomial logistic regression. Moreover, mothers with children with higher birth weight (Kg), were less likely to have uninvolved feeding styles than authoritative (RRR 0.65, 95% CI 0.45, 0.95). In contrast, at 24 months, for every unit increase in child's BMI z-score, mothers were more likely to have an indulgent (RRR 1.29, 95% CI: 1.04, 1.59) or uninvolved (RRR 1.34 95% 1.05, 1.7) feeding style than authoritative.

Table7.33- Relative risk ratios and 95% CI for maternal feeding styles for each mother and child characteristics at 6 months postpartum Multinomial logistic regression models adjusted for maternal ethnicity. (Authoritative feeding style set as reference category)

Coefficient (N)	Category	Authoritarian			Indulgent			Uninvolved		
		OR	(95%CI)	p	OR	(95%CI)	p	OR	(95%CI)	p
Place of Birth (987)	Inside the U.K.	Ref			Ref			Ref		
	Outside the U.K.	0.96	(0.61, 1.51)	0.867	0.84	(0.51, 1.37)	0.484	0.83	(0.5, 1.38)	0.468
Maternal Age (987)		1	(0.97, 1.03)	0.984	1.01	(0.98, 1.05)	0.424	0.97	(0.94, 1.01)	0.116
Maternal Education (985)	A level or higher	Ref			Ref			Ref		
	<5 GCSE	1.04	(0.64, 1.69)	0.867	0.72	(0.44, 1.19)	0.2	1.3	(0.77, 2.18)	0.325
	5 GCSE	1.19	(0.77, 1.83)	0.441	0.99	(0.65, 1.53)	0.979	1.33	(0.83, 2.13)	0.243
	Other/ unknown	1.49	(0.66, 3.37)	0.338	0.81	(0.34, 1.91)	0.627	1.31	(0.53, 3.23)	0.56
Living Arrangements (986)	Living with a partner	Ref			Ref			Ref		
	Not living with partner	0.95	(0.52, 1.75)	0.868	0.95	(0.53, 1.7)	0.861	0.76	(0.5, 1.14)	0.181
Parity (973)	Single child	Ref			Ref			Ref		
	Multiparous	0.91	(0.62, 1.35)	0.642	0.75	(0.51, 1.1)	0.143	0.73	(0.48, 1.1)	0.133
Food Security (805)	Food secure	Ref			Ref			Ref		
	Food insecure	1.14	(0.62, 2.08)	0.668	0.77	(0.42, 1.43)	0.412	0.91	(0.47, 1.76)	0.778
Maternal BMI (953)		0.98	(0.95, 1.01)	0.129	0.98	(0.95, 1.01)	0.258	0.99	(0.96, 1.02)	0.48
Maternal weight status (953)	Normal	Ref			Ref			Ref		
	Underweight	0.89	(0.34, 2.33)	0.808	0.84	(0.3, 2.38)	0.744	1.32	(0.46, 3.76)	0.602
	Overweight	0.53	(0.34, 0.83)	0.005	0.69	(0.44, 1.09)	0.111	0.93	(0.57, 1.51)	0.757
	Obesity	0.73	(0.46, 1.17)	0.191	0.87	(0.55, 1.39)	0.569	1.07	(0.64, 1.79)	0.788
Infant's sex (985)	Male	Ref			Ref			Ref		
	Female	0.9	(0.63, 1.3)	0.578	0.74	(0.52, 1.07)	0.115	1.04	(0.7, 1.55)	0.836
Birthweight (985)		0.73	(0.52, 1.04)	0.079	0.8	(0.57, 1.14)	0.217	0.65	(0.45, 0.95)	0.025
Infant's BMI z-score at6months (943)		0.88	(0.75, 1.05)	0.156	0.92	(0.77, 1.09)	0.334	0.86	(0.72, 1.04)	0.122

Table 7.34- Relative risk ratios and 95% CI for maternal feeding styles for each mother and child characteristics at 24 months postpartum. Multinomial logistic regression models adjusted for maternal ethnicity (Authoritative feeding style set as reference category)

Coefficient (N)	Category	Authoritarian			Indulgent			Uninvolved		
		OR	(95%CI)	p	OR	(95%CI)	p	OR	(95%CI)	p
Place of Birth (1045)	Inside the U.K.	Ref			Ref			Ref		
	Outside the U.K.	0.76	(0.45, 1.29)	0.318	1.03	(0.59, 1.79)	0.921	1.52	(0.83, 2.79)	0.174
Maternal Age (1044)		0.96	(0.92, 0.99)	0.016	1	(0.97, 1.04)	0.883	1.02	(0.98, 1.06)	0.353
Maternal Education (1044)	A level or higher	Ref			Ref			Ref		
	<5 GCSE	1.1	(0.62, 1.96)	0.748	1.46	(0.84, 2.56)	0.182	1.84	(0.99, 3.44)	0.055
	5 GCSE	1	(0.63, 1.59)	0.987	0.86	(0.55, 1.37)	0.536	1.15	(0.67, 1.95)	0.613
	Other/ unknown	0.76	(0.36, 1.6)	0.464	0.48	(0.22, 1.02)	0.056	0.62	(0.24, 1.55)	0.303
Living Arrangements (1044)	Living with a partner	Ref			Ref			Ref		
	Not living with partner	1.57	(0.89, 2.79)	0.122	0.99	(0.59, 1.66)	0.96	1.12	(0.6, 2.11)	0.723
Parity (1018)	Single child	Ref			Ref			Ref		
	Multiparous	0.83	(0.55, 1.26)	0.383	1.3	(0.86, 1.97)	0.207	1.61	(0.99, 2.62)	0.054
Food Security (900)	Food secure	Ref			Ref			Ref		
	Food insecure	1.03	(0.55, 1.95)	0.923	1.05	(0.57, 1.94)	0.875	1.1	(0.55, 2.22)	0.786
Maternal BMI (952)		0.97	(0.93, 1)	0.081	0.99	(0.96, 1.03)	0.695	0.98	(0.95, 1.02)	0.451
Maternal weight status (952)	Normal	Ref			Ref			Ref		
	Underweight	5.53	(0.71, 42.95)	0.102	3.64	(0.45, 29.21)	0.224	4.11	(0.48, 35.38)	0.198
	Overweight	0.8	(0.48, 1.32)	0.386	0.98	(0.6, 1.61)	0.934	0.91	(0.52, 1.6)	0.752
	Obesity	0.8	(0.47, 1.36)	0.411	1.05	(0.63, 1.76)	0.858	0.92	(0.51, 1.66)	0.775
Infant's sex (1033)	Male	Ref			Ref			Ref		
	Female	0.98	(0.66, 1.46)	0.911	1.07	(0.72, 1.58)	0.75	1.37	(0.87, 2.15)	0.169
Birthweight (1033)		0.85	(0.58, 1.23)	0.382	1	(0.69, 1.44)	0.993	1.28	(0.84, 1.96)	0.247
Infant's BMI z-score at 24 months (749)		1.2	(0.97, 1.48)	0.098	1.29	(1.04, 1.59)	0.018	1.34	(1.05, 1.7)	0.019

7.3.3.2 Are Women's Perceptions of, and Concerns About, their Child's Weight Associated with their Feeding Styles?

Results from the bivariate and multivariate multinomial logistic regression assessing the association between maternal perceptions and concerns with their feeding styles at 6 and 24 months are presented in Table 7.10 and Table 7.11.

The results obtained suggest that maternal perception of a high weight was not associated with any particular feeding style. At 6 months, adjusting for maternal ethnicity, those mothers who perceived their child's weight as low were more likely to have an uninvolved feeding style (low in responsiveness and demandingness) (RRR 1.91, 95%CI: 1.07, 3.41) in comparison to those who perceived their child's weight as "Just right". In contrast, at 24 months, adjusting for maternal ethnicity, those mothers who perceived their child's weight as low, were more likely to have an authoritative feeding style than indulgent (RRR 0.47 95% CI: 0.26,0.86). However, this was not significant after controlling for maternal weight status and child's birth weight.

Table 7.35- Multinomial logistic regression models of the relation of maternal feeding styles with maternal perceptions and concerns about their child's weight at 6 months postpartum. (Authoritative feeding behaviour set as reference category).

			Model 1			Model 2			Model 3		
			OR	(95%CI)	p	OR	(95%CI)	p	OR	(95%CI)	p
Maternal perception of their child's weight (Just right as reference category) (N=951)	Authoritarian	Just Right	Ref			Ref			Ref		
		Low	1.27	(0.73, 2.22)	0.396	1.21	(0.69, 2.13)	0.496	1.17	(0.66, 2.07)	0.594
		High	0.81	(0.42, 1.53)	0.513	0.83	(0.44, 1.59)	0.584	0.86	(0.45, 1.66)	0.657
	Indulgent	Just Right	Ref			Ref			Ref		
		Low	0.89	(0.49, 1.59)	0.687	1.06	(0.59, 1.93)	0.84	1.03	(0.56, 1.89)	0.915
		High	0.79	(0.42, 1.5)	0.48	0.71	(0.37, 1.36)	0.303	0.74	(0.38, 1.41)	0.354
	Uninvolved	Just Right	Ref			Ref			Ref		
		Low	1.76	(0.99, 3.13)	0.053	1.91	(1.07, 3.41)	0.029	1.78	(0.98, 3.21)	0.057
		High	0.64	(0.3, 1.38)	0.257	0.61	(0.29, 1.31)	0.207	0.65	(0.3, 1.4)	0.272
Model Prob > chi2			0.1424			<0.001			<0.001		
Model Pseudo R3			0.0037			0.0215			0.0276		
Maternal concerns about Overweight in their child (Not concerned reference category) (N=947)	Authoritarian	Not Concerned	Ref			Ref			Ref		
		Concerned	0.74	(0.45, 1.22)	0.239	0.74	(0.45, 1.23)	0.249	0.74	(0.45, 1.23)	0.242
	Indulgent	Not Concerned	Ref			Ref			Ref		
		Concerned	0.65	(0.39, 1.08)	0.099	0.64	(0.38, 1.07)	0.09	0.63	(0.37, 1.06)	0.081
	Uninvolved	Not Concerned	Ref			Ref			Ref		
		Concerned	0.64	(0.36, 1.13)	0.126	0.64	(0.36, 1.13)	0.122	0.62	(0.35, 1.1)	0.105
Model Prob > chi2			<0.0013			<0.001			<0.001		
Model Pseudo R3			0.343			0.018			0.025		

Model 1: Unadjusted

Model 2: Adjusted by maternal ethnicity

Model 3: Adjusted by maternal ethnicity, weight status and birthweight

Table 7.36- Table Multinomial logistic regression models of the relation of maternal feeding styles with maternal perceptions and concerns about their child's weight at 24 months postpartum. (Authoritative feeding behaviour set as reference category).

			Model 1			Model 2			Model 3		
			OR	(95%CI)	p	OR	(95%CI)	p	OR	(95%CI)	p
Maternal perception of their child's weight (Just right as reference category) (N=748)	Authoritarian	Just Right	Ref			Ref			Ref		
		Low	1.14	(0.67, 1.94)	0.634	0.9	(0.52, 1.56)	0.702	1	(0.56, 1.78)	0.994
		High	0.78	(0.25, 2.39)	0.658	0.75	(0.24, 2.34)	0.618	0.66	(0.21, 2.08)	0.479
	Indulgent	Just Right	Ref			Ref			Ref		
		Low	0.43	(0.24, 0.78)	0.005	0.47	(0.26, 0.86)	0.014	0.54	(0.29, 1.01)	0.055
		High	1.22	(0.44, 3.42)	0.703	1.24	(0.44, 3.47)	0.687	1.11	(0.39, 3.16)	0.841
	Uninvolved	Just Right	Ref			Ref			Ref		
		Low	0.77	(0.41, 1.47)	0.428	0.68	(0.35, 1.31)	0.252	0.87	(0.43, 1.73)	0.684
		High	0.67	(0.17, 2.59)	0.562	0.66	(0.17, 2.55)	0.546	0.57	(0.15, 2.25)	0.425
	Model Prob > chi1			0.001			<0.001			<0.001	
Model Pseudo R2			0.0109			0.04			0.054		
Maternal concerns about Overweight in their child (Not concerned reference category) (N=748)	Authoritarian	Not Concerned	Ref			Ref			Ref		
		Concerned	0.92	(0.51, 1.67)	0.782	1.14	(0.62, 2.1)	0.673	1.19	(0.64, 2.21)	0.585
	Indulgent	Not Concerned	Ref			Ref			Ref		
		Concerned	1.18	(0.66, 2.1)	0.582	1.08	(0.6, 1.95)	0.795	1.03	(0.57, 1.86)	0.927
	Uninvolved	Not Concerned	Ref			Ref			Ref		
		Concerned	0.83	(0.41, 1.67)	0.596	0.91	(0.44, 1.85)	0.786	0.83	(0.4, 1.71)	0.612
	Model Prob > chi1			0.59			<0.001			<0.001	
	Model Pseudo R2			0.001			0.035			0.05	

Model 1: Unadjusted

Model 2: Adjusted by maternal ethnicity

Model 3: Adjusted by maternal ethnicity, maternal age and child's BMI z-score

7.3.4 Discussion

7.3.4.1 Summary of Findings and Comparison with the Literature

Given the potential benefits of authoritative feeding styles (Hurley, Cross and Hughes, 2011; Fairley *et al.*, 2015); I examined how mother's feeding styles are related to mother and child characteristics as well as to the mothers' perceptions of their child's weight, and concerns that their child will become overweight.

Authoritative feeding styles were infrequent among White British and Pakistani mothers. The most common feeding style among Pakistani mothers was authoritarian, whereas the most frequent feeding style among White British mothers was indulgent. Results from this study support those of previous studies in England that have found differences in mothers' feeding practices by ethnic groups such as pressure to eat and emotional feeding (Wright *et al.*, 2016; Gu *et al.*, 2017; Korani *et al.*, 2018). For example, a study with mothers of 5-11-year-old children found that mothers from South Asian backgrounds were more likely than White British mothers to pressure their children to eat (Korani *et al.*, 2018), a behaviour associated with authoritarian parenting (Collins, Duncanson, and Burrows 2014).

After adjusting for maternal ethnicity, results of this study showed that at 6 months postpartum mothers of children with lower birth weight were more likely to have an uninvolved (low on parental demandingness and responsiveness) feeding style. These results are surprising as one might expect that mothers of children with lower birthweights would undertake more responsive and demanding behaviours to enable their children to catch up in growth. However, these mothers may have perceived their child was growing, making them less concerned about their child's weight; hence more uninvolved when feeding. However, in this study, it was not possible to measure if the mothers were concerned or not about their child becoming underweight.

At 6 months postpartum, mothers who were overweight were more likely to have authoritative feeding styles than authoritarian. In a previous study in Bradford, Wilson (2011) undertook a mealtime observation and applied the CFSQ questionnaire to a small sample of mothers. The results obtained by Wilson (2011) showed that mothers who were obese were more likely to have indulgent feeding styles, whereas normal-weight mothers were most likely to have authoritarian feeding practices. However, such associations were not observed in the mealtime interactions undertaken (Wilson, 2011). It is possible that in the present study, mothers who were overweight were more likely to have authoritative feeding styles than authoritarian, as a way to prevent childhood overweight as a consequence of perceiving

their own weight as high. However, this association did not remain significant for mothers who were obese or for mothers who were concerned that their child would become overweight. Therefore, it may also be possible that this association between feeding practices and the mothers' overweight represent random variation around a true null association between mothers' weight status and their feeding styles.

Results of this study suggest that mothers' perceptions of their child's weight were not associated with the mothers' feeding styles. Although the unadjusted models showed a significant association between the perception of low weight and certain feeding styles (uninvolved and indulgent), these results did not remain significant in the adjusted models. Results of this study differ to one study in Mexico (Flores-Peña *et al.*, 2017) which suggests that mothers of overweight children may perceive their child's weight as high but do not take actions to improve their child's weight, as they found a significant association between mothers' perception of their child's weight as high and uninvolved feeding practices.

Finally, the results of this study showed that at 24 months, those children whose BMI z-score was higher were more likely to have parents with a lower level of demandingness (indulgent and uninvolved). Given that maternal perception of a child's weight as high and concern about the child becoming overweight were not associated with any feeding styles, the association between the child's weight and mothers' feeding style may be a consequence of the effect of feeding style on the child's weight. This result is not surprising as results from a previous study in Bradford and other high-income countries have found an association between non-authoritative feeding styles and subsequent weight gain (Hurley, Cross and Hughes, 2011; Fairley *et al.*, 2015).

7.3.4.2 Strengths and Limitations

This study is one of a small number of studies that have looked at the association between mothers' perceptions of their child's weight using the CFSQ questionnaire (Flores-Peña *et al.*, 2017). Showing that mothers' perceptions and concerns about their child's weight are not associated with mothers' feeding styles is important, as it suggests that perceiving one's child's weight as high and/or being concerned about the child becoming overweight is insufficient to lead parents to increase parental responsiveness and demandingness at mealtime.

The primary limitation of this study is that data from the CFSQ questionnaire and mothers' perceptions and concerns about their child's weight were self-reported. Although the sample size was relatively large in comparison to other studies, it was not big enough to allow

comparison of mothers' feeding styles by subgroups, for example comparing mothers who were accurate and inaccurate in their estimation of their child's weight.

7.3.4.3 Implications for Research and Practice

Authoritarian and Indulgent feeding practices were the most frequent feeding styles among Pakistani and White British mothers, respectively. Authoritative feeding styles, which may have positive effects on the child's weight (Shloim *et al.*, 2015), were less frequent. Mothers who were concerned about their child's weight were no more likely to have authoritative feeding styles. Mothers may not be aware of good feeding practices that enable their children to have healthier eating practices. Results of this study reflect the importance of providing mothers with strategies so that they can undertake more authoritative feeding styles.

Future research should explore if mothers' perceptions and concerns about their child's weight are likely to influence other health behaviours such as energy intake and encouraging the physical activity of the child.

7.4 CONCLUSIONS

In this Chapter, it was possible to identify some of the social factors associated with longer breastfeeding duration and maternal feeding styles. The results showed that mothers who were concerned that their child would become overweight were more likely to have longer breastfeeding duration, which could be attributed to better health literacy. Also, maternal feeding styles were not associated with either perception of their child's weight nor concern that their child will become overweight. These results suggest that mothers may not be aware of how to implement more authoritative feeding practices to allow a healthy weight in their children. Further research should explore if the mother's perceptions and concerns about their child's weight are likely to influence other weight-related behaviours such as energy intake and physical activity.

Findings of this study may help health professionals to target and tailor programs focused on promoting healthy feeding practices among mothers of young children living in Bradford. The main strength of this study is that it was able to explore the associations between these feeding behaviours and maternal perceptions of their child's weight and concerns that their child will become overweight. These associations have been explored by a small number of studies.

This Chapter is the last one of this quantitative phase of this thesis. Further qualitative studies may help to better understand the results obtained in this set of quantitative studies. The following Part III of this thesis corresponds to the qualitative phase, which aims to support the understanding of the results obtained in this phase. Also, it aims to increase understating of the attitudes and beliefs that mothers of pre-school children living in Bradford have around childhood overweight, their child's weight and their feeding practices. The next Chapter corresponds to the introductory Chapter of the qualitative phase of this thesis.

PART III

Beliefs and Attitudes towards
the Child's Weight and Feeding
Practices: Interviews with
Early Years Workers, Health
Professionals and Mothers of
Young Children Living in
Bradford

Chapter 8 - Interviews with Early Years Workers, Health Professionals and Mothers Living in Bradford: Rationale, Methods and Analytic Plan

8.1 CHAPTER INTRODUCTION

Part II of this research project explored if the mothers of young children living in Bradford make accurate estimations of their children's weight; and what mother and child characteristics relate to inaccurate estimations of the children's weight.

The findings obtained were similar to those of other studies that have found that it is not uncommon that mothers underestimate the healthy weight and overweight of their children (Rietmeijer-Mentink *et al.*, 2013; Lundahl, Kidwell and Nelson, 2014). The analyses showed that the major proportion of the mothers underestimated their child's weight when the child was 24 months compared to when the child was 6 months old. The statistically significant predictors of inaccurate estimations of the child's weight were the child's birth weight, child's weight status at the moment of the questionnaire and being from Pakistani ethnicity. Other factors that were assessed such as mother's age, food security, the highest level of education, parity, living arrangements and child's sex, were not associated with the mother's ability to accurately estimate a child's weight.

Some authors have suggested that a possible cause for parental misperceptions of their child's weight could be the normalisation of overweight resulting from the high prevalence of this (Binkin *et al.*, 2013; Robinson, 2017). However, this hypothesis does not fully allow us to understand why Pakistani mothers living in Bradford were less likely to be accurate in comparison to White British mothers.

Is it necessary that mothers have an accurate perception of their child's weight? Based on the transtheoretical model of behaviour change (Prochaska and Velicer, 1997) and the health belief model (Becker *et al.*, 1977), it has been inferred that those mothers who do not recognise the risk of overweight in their children; and do not perceive obesity as a health concern are less likely to initiate actions to improve their child's lifestyles (Rhee *et al.*, 2005). On the other extreme, it is possible that the mothers who perceive underweight or are concerned about a low weight could change their feeding practices to increase their child's weight. However, there are inconsistencies as to whether the mothers' health behaviours

and consecutive health outcomes of the child are highly influenced by the mothers' perceptions and concerns about their child's weight (Robinson, 2017).

To develop further information on whether or not the mothers' perceptions about their child's weight could influence their child's health, the quantitative phase of this project explored if the mother's perceptions were aligned with their concerns about their child's weight (Chapter 5); and if these perceptions and concerns were related to the mother's feeding practices (Chapter 6). The results showed that the proportion of women who were concerned about childhood overweight was small, yet, the mothers who perceived the weight of their child as high were prone to be concerned about childhood overweight. Moreover, those mothers who were concerned about their child becoming overweight were more likely to have longer breastfeeding duration. These associations between concern about childhood overweight and breastfeeding duration could suggest that these mothers may be more "health-conscious", but it could also be that these mothers who were concerned about their child becoming overweight decided to keep breastfeeding to reduce the risk of their child of developing childhood obesity. Moreover, there were no statistically significant associations between the mothers' concerns about their children's weight and the mothers' feeding styles. This result suggests that the mothers may not be more likely to change their feeding styles despite being concerned about their child's weight, or that they are not aware of adequate feeding strategies to improve their child's health, which make mothers less likely to have more authoritative behaviours (Rudolf, 2009).

Part III of this dissertation present the qualitative strand of this thesis project which aims to support the understanding of the results obtained in Part II of this thesis, and to increase understating of the attitudes and beliefs that mothers of pre-school children living in Bradford have around childhood overweight, their child's weight and their feeding practices. This Chapter provides the rationale and aim for this qualitative strand and describes the methodology and analytic plan. Results and discussion for the interviews with the early years workers are presented in Chapter 9 and for the mothers in Chapter 10.

8.2 RATIONALE AND AIM

This thesis using a quantitative approach has explored how some variables related to the mother and child characteristics (i.e. ethnicity, food security, child's weight, child gender) relate to the mothers' beliefs about the weight of their child and their feeding practices. However, it was not possible to establish the causality of the results. Even though the results of Chapter 7 showed that feeding styles were not associated with the mothers' perceptions

and concerns about their child's weight, the possibility that the mothers' beliefs around their child's weight could influence other weight related behaviours and subsequent health outcomes should not be discarded. It is important to understand why some mothers are more likely to have an inaccurate estimation of their child's weight and what causes concern or lack of concern about their child's weight. Knowing this could allow for the development of appropriate health messages and interventions.

Part III of this thesis looks to develop an in-depth understanding of the attitudes and beliefs that mothers of young children living in Bradford have around their child's weight, childhood overweight and young child feeding practices. To do so, a qualitative research approach was considered appropriate because unlike other methods; qualitative research provides a valuable view of the individuals' experiences and views allowing us to understand how and why individuals act in certain ways (Sofaer, 1999; Dean, Raats and Lähteenmäki, 2015; Zoellner and Harris, 2017).

The interviews with the mothers could provide detailed information about their experiences when feeding their children and their feelings about their child's weight and health. However, given that childhood obesity is a complex problem with many drivers which require efforts from a whole range of disciplines at different levels (Vandebroeck, Goosens and Clemens, 2007); it is also important to explore the views of other key interest groups who may work along with the mothers towards the prevention of childhood obesity.

Health professionals such as the health visitors, nursery nurses and family nurses, have a prime position in identification and prevention of health problems such as childhood obesity. This is because their daily work involves assessing the young children's growth and development and offering parents support to care for the wellbeing of their children. This support may include advice on feeding practices, physical activity and explaining to parents the causes and consequences of obesity in adults and children (Public Health England, 2018). Their role makes them likely to have a deep understanding of the factors that may put children in Bradford at risk of developing childhood overweight; but also, they might recognise what are the mothers' attitudes towards childhood overweight and the beliefs that they have around their children's weight and young children's feeding practices. Moreover, they can give us an understating of some of the challenges and enablers that health professionals may face when providing support to mothers.

Staff from children's centres offer day-care and family support. Probably, these professionals and especially those trained to deliver healthy lifestyle programmes which take place at

these sites have conversations with mothers regarding healthy lifestyle issues (Willis *et al.*, 2012). This makes them likely to understand the local context, cultural norms and challenges surrounding childhood overweight, as well the beliefs of the community around weight and infant feeding. Interviewing them could give the researcher the first glance of the mothers' attitudes towards their child's health, but also, they can provide an understanding of the challenges when encouraging healthy lifestyles in the community.

In the U.K. some studies have explored the experiences that health professionals and early year workers have had when supporting parents with infant and young child feeding (Brown, Raynor and Lee, 2011; Redsell *et al.*, 2013; Hogg *et al.*, 2015; McSweeney *et al.*, 2016; Middleton and Smyth, 2017). Moreover, some studies have explored the parents beliefs concerning their infant and young child's size (Redsell *et al.*, 2010; Bentley *et al.*, 2017) and feeding practices (Redsell *et al.*, 2010; Brown, Raynor and Lee, 2011; Carnell *et al.*, 2011; Twamley *et al.*, 2011; Goldthorpe, Ali and Calam, 2018). Only a small number of these studies have included the perspective of both professionals and mothers (Brown, Raynor and Lee, 2011; Hogg *et al.*, 2015; McSweeney *et al.*, 2016), or included the views of minority groups living in deprived areas of England (Goldthorpe, Ali and Calam, 2018). The beliefs and attitudes of the mothers and professionals from the above studies may be similar to those of the mothers and professionals living and working in Bradford. However, the results of those studies should not be generalizable to the context of the present study as the local contexts from the other studies could be different from that of Bradford (Leung, 2015).

This qualitative strand aims to support the understanding of the results obtained in the quantitative phase of this thesis and to expand the comprehension of the attitudes and beliefs that mothers of children under the age of five living in Bradford have around childhood overweight, their child's weight and their feeding practices. To achieve this, this study intended to interview three groups of people: staff from children's centres (early years workers) trained to deliver a healthy lifestyle programme; health professionals working with parents of children aged five and under; and mothers. Health professionals and early years workers have constant contact with mothers and are likely to initiate conversations with the mothers about their child's health and advice about adequate feeding practices. Therefore, a secondary aim of this qualitative strand is to explore the beliefs and experiences of these professionals when they have conversations with the mothers about their child's weight, and they provide advice about feeding practices.

8.3 METHODOLOGY

8.3.1 Study Design

This qualitative research with face-to-face semi-structured interviews follows an opportunistic purposive sampling strategy (Green and Thorogood, 2014). It is purposive in the sense that mothers and spokespersons of nutrition and health working with mothers of young children were purposefully selected (Creswell and Poth, 2018) to understand the different factors influencing the mothers' perceptions and concerns about their child's health from an individual and an external point of view. Understanding their beliefs and experiences would allow having a broader view of the potential opportunities and challenges in the matter of prevention strategies of childhood overweight. It is opportunistic because the advantage was taken of familiar situations to recruit subjects in the study given the limited time and resources available for this study (Riemer, 1977). The recruitment and interviews were conducted by the main researcher.

8.3.2 Study Setting

The study took place in the Bradford district (described in Chapter 3) between June and December 2017. The recruitment of the early years workers, the mothers and some health professionals was supported by members of the Born in Bradford, Better Start Bradford Innovation Hub, Better Start Bradford, and their partners.

Better start Bradford is a community-led partnership programme which was allocated a Big Lottery Fund to implement multiple early life interventions (antenatal and postnatal) in multicultural and deprived areas of the Bradford district; with the aim to improve outcomes of social and emotional development; communication and language development; and nutrition and obesity of the area (Dickerson *et al.*, 2016).

The interventions delivered by Better Start Bradford include antenatal and postnatal support, and healthy lifestyle and parenting programmes. The Healthy lifestyle programmes delivered by Better Start Bradford adds to the support that families receive from health professionals offering a space where parents living in the Better Start Bradford area can have conversations with trained early years workers about their beliefs and concerns surrounding their lifestyles, and where parents can obtain skills to improve their health.

8.3.3 Participants, Context and Recruitment

This qualitative phase aims to explore the point of view of three key groups: Early years workers trained as facilitators of a health promotion programme, mothers and health professionals.

Data saturation, which refers to continue sampling until fresh data no longer provides new insights or reveal new properties, is the gold standard for purposive sampling (Creswell and Poth, 2018). The number of interviews needed to achieve data saturation varies across studies depending on each study circumstances (i.e. aim, sample, etc.) Therefore, to inform research protocols and budget needed for studies, researchers have suggested recruiting 20 to 30 individuals to develop a well-saturated theory (Creswell and Poth, 2018).

The heterogeneity among the three groups examined meant that saturation would probably not be achieved with a total sample of 30 individuals. However, given the limited time and resources for developing the study, the intention was to interview eight to fifteen participants per subject group or until data saturation appeared (per group of a subject group) if it was the case. This approximate number seemed reasonable as a previous study using thematic analysis documented the degree of data saturation and variability finding that that data saturation occurred within the first twelve interviews (Guest, Bunce and Johnson, 2006).

In what follows the recruitment and characteristics of the subject groups included in this study will be described. During the recruitment, invitations and information sheets were given to the three groups of participants. The invitations included information about the study aims, reasons why they were invited to participate, and the researcher's email address in case the participant wanted further information about the study or wanted to participate. The information sheets had detail information about the aim of the study, the process of the interviews (i.e. the length of the interview and that voice records were going to be taken). Also, it informed the participants that their participation was voluntary and that no monetary rewards were going to be given for their participation, their right to withdraw the study at any time during the first month after the development of this interview, and details of confidentiality and anonymity.

8.3.3.1 Early Years Workers Trained as Facilitators of a Healthy Lifestyle Programme Working at Bradford

The early years workers trained as facilitators of the “Health Exercise Nutrition for the Really Young” programme (HENRY) programme¹⁸ were the first participants to be interviewed. The early years workers trained as HENRY facilitators are practitioners, nurses; children centre workers and anyone who works with families of children younger than five, who have received a two-day core training and a two-day group facilitation training aiming to provide them with the knowledge, skills and confidence to promote healthy lifestyles for the family (HENRY, 2017).

The decision to include this group and for these to be the first to be interviewed was made because they were an easy group to approach, and whose interviews would allow the main researcher to increase their familiarity with context and population.

8.3.3.1.1 Inclusion and Exclusion Criteria

To be included, early years workers had to be trained to deliver the HENRY programme and had delivered the programme at least once in Bradford. Early years workers were excluded if they did not meet the inclusion criteria and had not delivered the HENRY programme in Bradford for a period of time of two years or more prior to when the interviews took place.

8.3.3.1.2 Recruitment Strategy

The HENRY coordinator of Better start Bradford served as the gatekeeper (John W. Creswell, 2014) of the early years workers trained as facilitators of the HENRY programme. The gatekeeper was contacted through email, which was obtained from the website of HENRY. The email contained information about the researcher and the study; as well as the invitations and information sheets that would be given to the early years workers.

¹⁸ HENRY is an eight-week programme which has been previously applied and evaluated in the U.K. context (Willis *et al.*, 2016), intends to: increase parental confidence to make changes in the family lifestyle, develop authoritative parenting styles, modelling healthy lifestyles, improve family eating practices, reduce sedentary behaviour and increase emotional wellbeing among the child and family. It is delivered in a group or one-to-one format and is open to all parents with one or more 0-5-year-old child. Yet, the programme is informally targeted so socially disadvantaged families giving the location of the children’s centres where the programmes take place.

The gatekeeper provided the researcher with a list of the names and email addresses of the people who were trained to deliver the HENRY programme in Bradford. Following this, invitations (Appendix, A. III Object 1) and information sheets (Appendix, A. III Object 2) were sent electronically to the early years workers.

8.3.3.2 Health Professionals Working in Bradford with Mothers of Children Aged Five and Under.

In England, the Health visiting services are offered to mothers and their children aged five and under¹⁹ (Public Health England, 2018). The health visiting team are in charge of providing the healthy Child programme, which offers families “screening, immunisation, health and development reviews, supplemented by advice around health, wellbeing and parenting” (Department of Health, 2009).

As part of the universal service, parents/carers receive six mandated reviews²⁰ in the family home, GP surgery, baby clinic or children's centre. Moreover, if the mothers have any concerns, carers can also contact health visitors or general practitioners in the local baby clinics (National Health Service England, 2017). When this study was planned, it was intended to interview only the health visiting team. This decision was taken because the health visiting team is in charge of undertaking the above health reviews, making them more likely to detect a risk of overweight. Also, the health visiting team are the most consulted health professionals when parents look for advice about infant and young child feeding (Bentley et al., 2017). However, they were not an easy group to recruit given their workload; therefore, the invitation was extended to family nurses²¹

¹⁹ These services are free for the families and are based on four levels of intervention: Community, Universal, Universal Plus, and Universal partnership plus

²⁰ Antenatal health visit (28 weeks of pregnancy), new baby review (10 to 14 days of the birth), 6-8 week review, 9 to one year developmental review, 2-2 ½ year developmental review.

²¹ The family nurses are staff of the family nurse partnership which is a more intense health visiting programme (National Unit, 2018). It is offered nationally to first time teenage mothers. In Bradford, Better Start Bradford extended this programme so that first time mothers aged 20 to 24 could also benefit from this programme (Better Start Bradford, 2018).

Both members of the health visiting team and family nurses are in a unique position to talk with the mothers about their concerns about their child's health and receive advice from health professionals to prevent health problems such as childhood overweight.

8.3.3.2.1 Inclusion and Exclusion Criteria

Professionals were eligible for inclusion if they: 1) worked in Bradford as health visitors or family nurses, 2) their work consisted of providing support and advice to families and their children from birth to five years. Professionals were excluded if they did not meet with any of the above criteria and have not worked as health visitors or family nurses for a period of more than two years.

8.3.3.2.2 Recruitment Strategy

The health professionals working in Bradford were recruited through an opportunistic and a snowball strategy (Creswell and Poth, 2018). A member of the staff of Better Start Bradford served as initial gatekeeper to contact Health Visitors. The gatekeeper was contacted through email; the email contained information about the study; and the invitation (Appendix, A. III Object 3) and information sheets (Appendix, A. III Object 4) that were going to be given to the health professionals.

The gatekeeper gave the invitations and information sheets and the researcher's email address to some health visitors and family nurses so that they could contact the researcher in case of interest to participate. Two health professionals contacted the researcher and invited their colleagues to take part in this study who also contacted the researcher electronically. The invitation to the study and the participant's information were sent electronically to the health professionals that made contact. When the interest to take part continued a time and place for the interview was set according to the professionals' needs.

8.3.3.3 Mothers

It was intended to interview mothers of different ethnicities living in Bradford to reflect the ethnic diversity of Bradford. Recruitment was also not limited to parity of the mother.

8.3.3.3.1 Inclusion and Exclusion Criteria

Mothers were included if they were: 1) living in Bradford, 2) mothers of at least one child aged five or under. Women who were not at least 18 years old, able to speak English, and otherwise met with all the above inclusion criteria were excluded from the study.

8.3.3.3.2 Recruitment Strategy

Recruiting mothers of very young children can be challenging as feeding and sleeping schedules, sick child and family members, transportation and work can impact negatively on the recruitment (Daniels *et al.*, 2012). Additionally, ethical considerations needed to be considered when determining the setting of the interviews (e.g. that neither the interviewer nor the interviewee felt uncomfortable or at risk)

An opportunistic approach was used to recruit the mothers (Creswell and Poth, 2018). Many of the programme interventions included in Better Start Bradford are delivered in the children's centres of the area. This partnership between children's centres and Better Start Bradford made it an excellent opportunity to recruit the mothers.

Members of staff of the children's centres served as the gatekeepers to contact the mothers. The gatekeepers were contacted electronically to request for support. The email sent to the gatekeepers contained information about the research, invitations (Appendix, A. III Object 5) and participant information sheets (Appendix, A. III Object 6).

Gatekeepers consented to recruit the mothers during some of the sessions delivered in the children's centres. During the agreed sessions, the main researcher spoke with the mothers and invited them to take part in the study. Invitations and information sheets were given to them.

If the mothers agreed to participate, time and place for these interviews were set. There was no need to collect personal details of the participants. However, in case it was needed, phone number or email address would have been securely stored and deleted after the interview took place.

8.3.4 Interview Design and Content

All the interviews conducted for this project were conducted face-to-face and were semi-structured. A topic guide was produced for each one of the three subject groups to be interviewed (Appendix, A. III Object 7, A. II Object 8, A. II Object 9). The topic guides were informed by the research question; the results obtained in the previous chapters; and the literature. Additionally, the interviews with the early years workers helped to inform the topic guides used in the interviews with the health professionals and the mothers. The topic guides were reviewed by one of the supervisors of this project who is experienced in qualitative research.

The topic guides that were used with the health professionals and the mothers were piloted with a health visitor from Sheffield and a mother of a young child from York, and appropriate amendments to the topic guides were made. The topic guides used with the early years workers were not piloted as the researcher could not contact any health professional with similar characteristics to those of the early years workers that were going to be interviewed. However, amendments were made to the topic guides after the initial three interviews. The supervisor of this project reviewed the topic guides after the changes were made. The pilot interviews were not included in the analysis.

The interviews took place at the time and place that were more convenient for the participants. These places were the Bradford Institute of Health Research, programme venues and clinics located in Bradford.

Interviews for the three groups were designed to be 45-minute-long, and with the prior consent of the interviewees, interviews were audio-recorded. Notes were taken as a way of support during the development of the interviews. In the case of the mothers, a brief questionnaire (Appendix, A. II Object 10) was applied to collect socio-demographic characteristics.

8.3.5 Ethical Considerations

Ethical approval was granted by the Chair, Health Sciences Research Governance Committee of the University of York. As shown in Appendix, A. II Object 11, when ethical approval was requested; I first only requested to interview early years workers and then asked for an amendment to interview health professionals and mothers. Since the inception of this study, my porpoise was to interview early years workers, health professionals and mothers. Yet, I took this decision because this was a group to which I had easier access. Doing this would allow me to start interviewing participants while having more time to plan the recruitment of mothers and health professionals.

Prior to the interview and during the recruitment, participants received oral and written information about the study, and written consent was obtained.

Conversations about overweight, talking about their family eating, and parenting practices may cause discomfort among some mothers. The main researcher has experience in sensitively approaching health and nutrition topics; yet, during the recruitment and in the information sheet, participants were told that these topics would rise during the interviews.

All participants were told that they were not obliged to answer all the questions, to stop the interview at any time if needed and that they were able to withdraw the study during the first month after the development of the interview. This right was constrained to one month because no identifying details were including in the transcripts of interviews. Thus, after voice records were deleted, it would not have been possible to identify participants data.

In the information sheets, participants were told that given the methodology of the recruitment (for example, being contacted with support of a gatekeeper), anonymity was not fully guaranteed. However, they were told that measures were taken to protect their anonymity and ensure their confidentiality. To do so, all interviews were recorded on a password protected electronic device, and audios were securely stored in the University of York system before transcription. As stated above, no personal identifiers were added to any recordings or codes. Also, audio files were deleted after these were transcribed. For publications and the development of this dissertation, no data was published that allowed the identification of the participants.

For the development of the interviews, the researcher followed the Bradford Teaching Hospitals lone worker policy; the interviews were not done in any place in which the participant or the researcher felt uncomfortable or at risk.

8.4 ANALYTIC PLAN

The qualitative analytic method used to interpret data obtained from the interviews with the early years workers, the health professionals and the mothers was thematic analysis with an inductive, semantic, contextualist approach (Braun and Clarke, 2006). The data of each sample group was analysed separately following the same analytic process.

8.4.1 Why Thematic Analysis?

Thematic analysis is a qualitative analytic method which is widely used and considered as one of the most accessible approaches to analyse qualitative data. This is because it is theoretically-flexible, which means that it is not tied to any specific theoretical or epistemological orientation; instead, it can be located within different theoretical frameworks. The thematic analysis consists of identifying themes and patterns within the dataset which are relevant to inform the research question (Braun and Clarke, 2006; Clarke and Braun, 2013; Nowell *et al.*, 2017).

There are different approaches to undertake thematic analysis (Joffe and Yardley, 2004; Braun and Clarke, 2006; Fereday and Muir-Cochrane, 2006; Nowell *et al.*, 2017). However, one of the most frequently used in recent years is the approach developed by Clarke and Braun (2006). The popularity of this approach is because it has a very clear step-by-step guide so that researchers can undertake thematic analysis in a replicable, transparent and consistent methodology.

The above characteristics made thematic analysis the best approach to analyse the data of this research considering that an analytic method which was easy to learn was required, given that the researcher was new to qualitative research. Also, the thematic analysis complemented the pragmatic approach of the thesis, the flexibility of this approach gave the freedom to choose the best method in which themes were going to be identified so that these could reflect the interviewees' experiences, perceptions as well as their social and environmental context.

According to Braun and Clarke (2006) before starting the analysis of the data the researcher can decide the approach that will be used to identify the data, the level of analysis in which this will be identified, and the epistemological umbrella under which the research is being conceptualised.

Data can be identified with two approaches, which are inductive and deductive. In the inductive framework, the themes will be strongly linked to the data and ideas in it without trying to link it to a specific framework or the questions asked to the participants. On the other hand, the deductive approach provides a more theoretical orientation to the data; the analysis targets particular questions and aspects of interest. (Braun and Clarke, 2006). For this research, a data-driven approach (inductive) was more suitable because this would allow a broader view of the elements that might not have been explored in the literature review and the quantitative phase of this research. However, it is important to acknowledge that it was not possible to separate the researcher's theoretical preconceptions when looking at the data.

There are two levels of coding in thematic analysis, which are semantic and latent (Braun and Clarke, 2006). The semantic approach captures the surface meaning of what the participant directly communicated and explicitly meant, whereas the latent codes capture the assumptions and the underlying ideas of what was said. For the research, it was not intended to have a deep level of interpretation of what the interviewee referred to. This because, the researcher was alien to the culture, which meant that any implicit

interpretation that could have been made, may not have reflected what the participant meant; second, this research was looking to understand the participants' experiences and beliefs and not their feelings towards these. Therefore, the approach that was mainly used was semantic. However, latent codes were also considered if underlying ideas were obvious and captured concepts relevant to the research question.

Moreover, Clarke and Braun (2006) described that thematic analysis can be performed under the realist, contextualist and constructionist paradigms. In brief, the realist approach focuses on the interviewee's motivations, experiences and meaning in a direct way, whereas the social constructionist paradigm does not focus on the individual's motivations or psychologies, but instead focus on theorize how these meanings and experiences are socially produced and reproduced. This analysis was done under the umbrella of the contextualist approach, which sits between the poles of realism and social constructionism. This paradigm best suited this analysis because it was intended to explore the individual beliefs, experiences, and meanings, of the participants, but also know how the social context impacted on those meanings (Clarke and Braun, 2013).

8.4.2 Analysis

This study followed the step-by-step guide for thematic analysis by Braun and Clarke (2006) (Figure 8.1). In what follows the actions taken for each phase will be described.

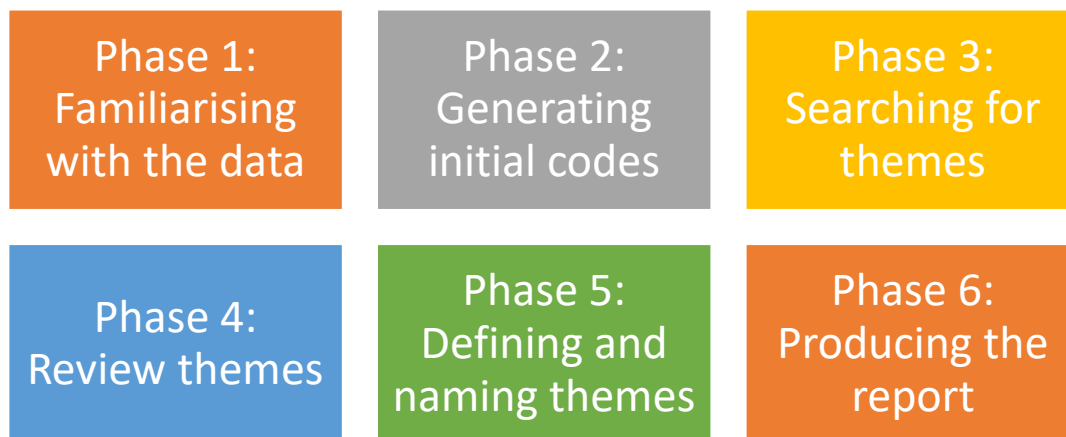


Figure 8.35- Phases of thematic analysis by Braun and Clarke 2006

8.4.2.1 Phase 1: Familiarization with the Data and Transcriptions

This step consisted of getting familiarised with the data. The main researcher collected the data, and after conducting the interviews, the main researcher listened to the audios to get familiarised with these. Familiarisation continued as the researcher generated verbatim transcripts manually using the audios and an electronic text processor. Transcripts were

reviewed against the recordings to check for accuracy. One of the audios with the early years workers was accidentally deleted when the interview finished; field notes taken during the interview, and from the main researcher's recollection were used in the analysis. After reviewing the accuracy of the transcripts, each transcript was actively read and meaningful information to the data was manually highlighted and an initial list of ideas was generated.

8.4.2.2 Phase 2 and 3: Generating Initial Codes and Themes

Then transcripts were exported to Nvivo and an iterative and cyclical approach of re-reading the transcripts, refining codes, and re-coding was undertaken. As described earlier this codes captured mainly semantic meanings.

Patterns across the codes that captured key ideas were clustered together and sorted into initial themes and sub-themes.

A senior qualitative researcher read and coded independently 25% of the transcripts and researchers met to discuss the codes and themes. Disagreements in the coding were discussed until consensus was reached. Disagreements in the coding were related to how codes were named. Example of these disagreements and how these were solved can be found in Appendix A.II Object 12

8.4.2.3 Phase 4 and 5: Reviewing Themes and Defining Themes

Candidate themes and sub-themes were iteratively reviewed and refined and later discussed with the supervisor of this research. A 'thematic map' was created to help the visualisation of how themes fit together and relate to each other, to be able to understand the "overall story of the data". Theme names were 'refined' to capture the 'essence' of each theme. A brief description of what the theme captures was written for each theme and sub-theme. Theme names and the 'thematic map' were also reviewed and discussed with the supervisor of this project.

8.4.2.4 Phase 6: Producing the Report

Data extracts that best reflected the themes and sub-themes were chosen to produce the report. To report the methodology and results of this qualitative phase, the main researcher used the 32-item checklist of the Consolidated Criteria for Reporting Qualitative Research (COREQ). (Tong, Sainsbury and Craig, 2007)

8.5 REFLEXIVITY

In qualitative research, it is not possible to separate the impact that the researcher has throughout some aspects of the research process. Therefore, to undertake good qualitative research, there is a requirement that the researcher attempts to minimise the biases that the researcher brings to the data collection, analysis and presentation of the data by paying attention and making explicit how the researcher may have influenced these processes (Clarke and Braun, 2013). Reflexivity is this process in which the researcher critically examines his or her impact on the different phases of the study. Therefore, I will now discuss my role within the context of this research and how my preconceptions, motivations and prior knowledge and interaction with participants in the following two chapters may have influenced the findings and presentation of these (Creswell and Poth, 2018).

For this research, I conducted interviews with early years workers, the health professionals and the mothers. I am a single Mexican female who lives outside the area of Bradford, have no children and had no previous link to any of the participants. Thus, as a researcher, I had an outsider (Clarke and Braun, 2013) or an explicit third party position in this research (Carling, Erdal and Ezzati, 2014). In other words, I was not part of the groups I interviewed nor shared cultural identity with them. However, my affiliation with the well-known Born in Bradford project gave me a privileged position. This group allowed me to get in touch with the gatekeepers, which gave me access to the health professionals, early years workers and mothers. It is possible that without the support of the Born in Bradford Better Start research group I may not have gained access to these individuals.

My outsider position may have influenced my data collection, especially in the case of the interviews with the mothers. Some researchers (Corbin Dwyer and Buckle, 2018) have previously discussed that insider researchers may have a higher level of trust among the participants. Hence, it is possible that if I had shared the same identity and experiential base as the interviewees, they may have been more open during the interviews, and more likely to accept to take part on this study. Despite this, I felt that presenting myself as a Mexican PhD student allowed me to get the attention of some of the participants who were curious and interested in helping me to undertake my research.

I felt related to the early years workers and health professionals because I am a nutritionist who has worked promoting healthy lifestyles among families of low and high-income households in Mexico. Despite that the context of Mexico is not directly similar to that of Bradford, the levels of adult and childhood obesity in Mexico are among the highest in the

world and the factors influencing this problematic are wide (OECD, 2017). Therefore, I was able to relate to some of the experiences of mothers and professionals. My previous experiences and knowledge could have influenced the questions I asked the professionals and the mothers as well as the interpretation of the results. However I tried to put apart my preconceptions, and given my outsider role it is also possible that I managed to perceive, describe, and interpret with a broader perspective the experiences of the mothers and professionals rather than focusing on my personal experiences in comparison to if I was an insider researcher (Corbin Dwyer and Buckle, 2018).

The fact that I was researching health and nutrition could also influence how the professionals and the mothers presented themselves to me. The childhood obesity plan for action (HM Government, 2016) in the U.K., invites health professionals and early years settings to work with the families to prevent childhood obesity. Hence, participants may be more aware of the consequences of obesity than they were in the past; therefore, they presented themselves with more “acceptable” behaviours.

Although I am experienced in qualitative interviews, I had never before interviewed anyone in my non-native language. The fact that I am not a native English speaker and that there was environmental noise when doing some of the interviews affected the communication between myself and the interviewees. For example, I can recall that I occasionally had problems understanding what the interviewee was expressing and occasionally, the interviewees were not able to understand my questions. However, to mitigate this, I would rephrase my question or rectify what the participant was saying. In addition, some of the interviews were interrupted by other people, which made it difficult to maintain concentration during the interview. However, when there was an interruption, I wrote down what the participant or I was talking about in order to return to the topic we were discussing. Even so, it is possible that these problems in communication affected the depth of the interviews I undertook.

8.6 CONCLUSIONS

Following a pragmatic research philosophy (Cherryholmes, 1992; J.W. Creswell, 2014), Part III of this thesis uses qualitative research to add depth and further insight around the attitudes that mothers of young children living in Bradford have around their child’s weight, childhood overweight and young child feeding practices. One-to-one interviews with early years workers, health professionals and mothers working and living in Bradford were undertaken. The methods used to analyse data obtained from the interviews was thematic

analysis. In the following Chapters of this Part III of this thesis, the results obtained from the interviews with the professionals (Chapter 9) and the mothers (Chapter 10) are presented and discussed.

Chapter 9 - Beliefs and Attitudes Surrounding a Child's Weight and Feeding Practices: Interviews with Early Years Workers and Health Professionals: Results and Discussion

9.1 CHAPTER INTRODUCTION

Previous results obtained in the quantitative strand of this thesis showed that a high proportion of mothers living in Bradford were likely to underestimate their children's weight, that a low proportion of them were concerned about childhood overweight and obesity, and that there were inconsistencies in the relation between these mothers' perceptions and concerns about their feeding practices.

This chapter presents the results of the one-to-one semi-structured interviews that were undertaken with early years workers and health professionals who work with mothers of pre-school children (0-5 years) living in Bradford, U.K.

Using thematic analysis as a method for data analysis, this study aims to explore the perspectives that these professionals have about the mothers' attitudes, beliefs, and behaviours surrounding their child's weight, childhood obesity, and their feeding practices.

This chapter also examines the experiences and practices that early years workers and health professionals hold in relation to addressing topics about children's weight and adequate feeding practices with the mothers. Similarities and differences between the professionals' viewpoints are discussed.

This chapter is structured as follows. I first present the results, which include the participant characteristics and recruitment sites, coding framework and themes. I then discuss the results, and a brief conclusion is added at the end of the chapter.

9.2 RESULTS

9.2.1 Participant Characteristics and Recruitment Sites

Semi-structured interviews were conducted with nine early years workers (see Figure 9.36) and eight health professionals (Figure 9.37) who work with families with pre-school children

aged five and under living in Bradford, UK. The interviews took place between June and December 2017 in private rooms at a variety of locations including the Bradford Institute for Health Research, children’s centres, clinics, and other office premises. Interviews ranged in length from twenty to fifty minutes.

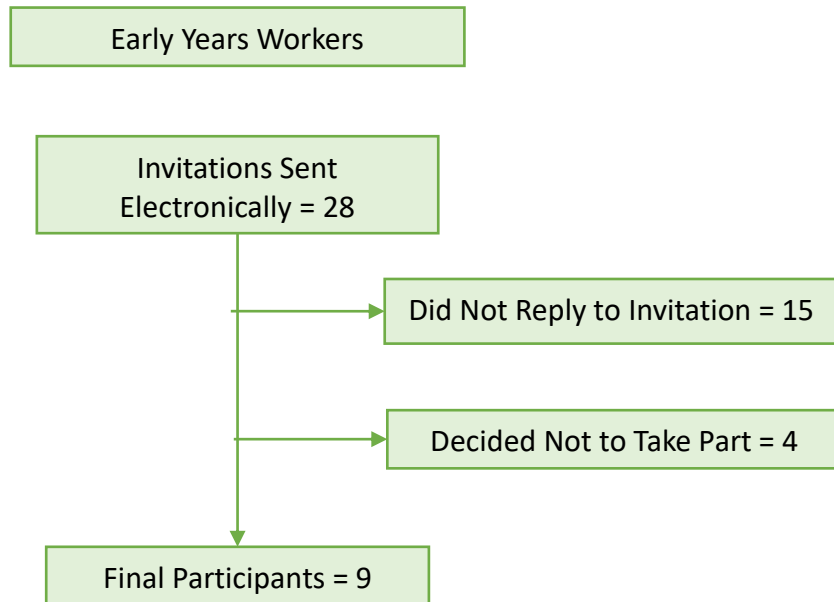


Figure 9.36- Flow chart of excluded/included early years workers trained as HENRY facilitators

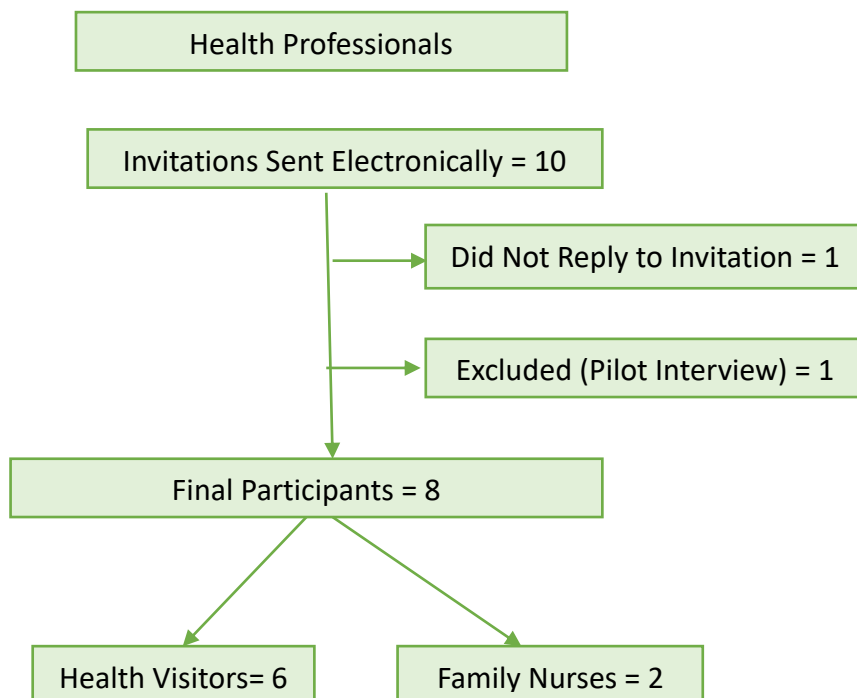


Figure 9.37 - Flow Chart of excluded/Included health professionals working with pre-school children in Bradford

Of the seventeen professionals interviewed, fifteen were female and two male. Twelve were from a White British ethnic background, four South Asian, and one from another ethnic background.

The early years workers had between five and twenty years of experience working with families of pre-school children in Bradford. All of them were trained as facilitators of a programme aimed at encouraging healthy eating (the HENRY programme) and have delivered the programme between one and eight times.

The health professionals were six health visitors and two-family nurses with between two and fifteen years of experience working with families of pre-school children in Bradford. When the interviews took place, the health visitors interviewed were in charge of conducting the health visits that take place during the antenatal period and until the children were six-weeks-old. In addition, all of them hold regular clinics where they saw families with children aged five and under. The family nurses interviewed provide services to first-time mothers aged twenty-four and under during pregnancy and until the children are two-years-old.

9.2.2 Coding Framework

The coding of the interviews with the early years workers and the health professionals was undertaken independently. However, there were many similarities between the codes resulted from the thematic analysis of the interviews with the early years workers and health professionals. Therefore, the coding frameworks were combined, reviewed, and are presented together. The combination of the codes did not have any implications on the results reported in this chapter because codes and subthemes that differed between health professionals and early years workers were kept and any differences between these two groups are highlighted.

Themes and sub-themes generated during the analysis were organised into four core topics, which are listed in Figure 9.38.



Figure 9.38 - Core topics generated from interviews with health professionals and early years workers working with families with pre-school children living in Bradford.

9.2.3 Beliefs Surrounding Health and Weight Problems in Bradford

Figure 9.4 shows the main themes and subthemes obtained from the thematic analysis included in the topic “Beliefs Surrounding Health and Weight Problems in Bradford”. This topic reflects how the professionals make sense of pre-school children’s health and weight, and their perception of weight problems of children living in Bradford.

The main themes contained in this topic are: “A holistic view of health”, “Creating a judgement about a child’s health and weight”, and “Weight problems at young ages in Bradford”.

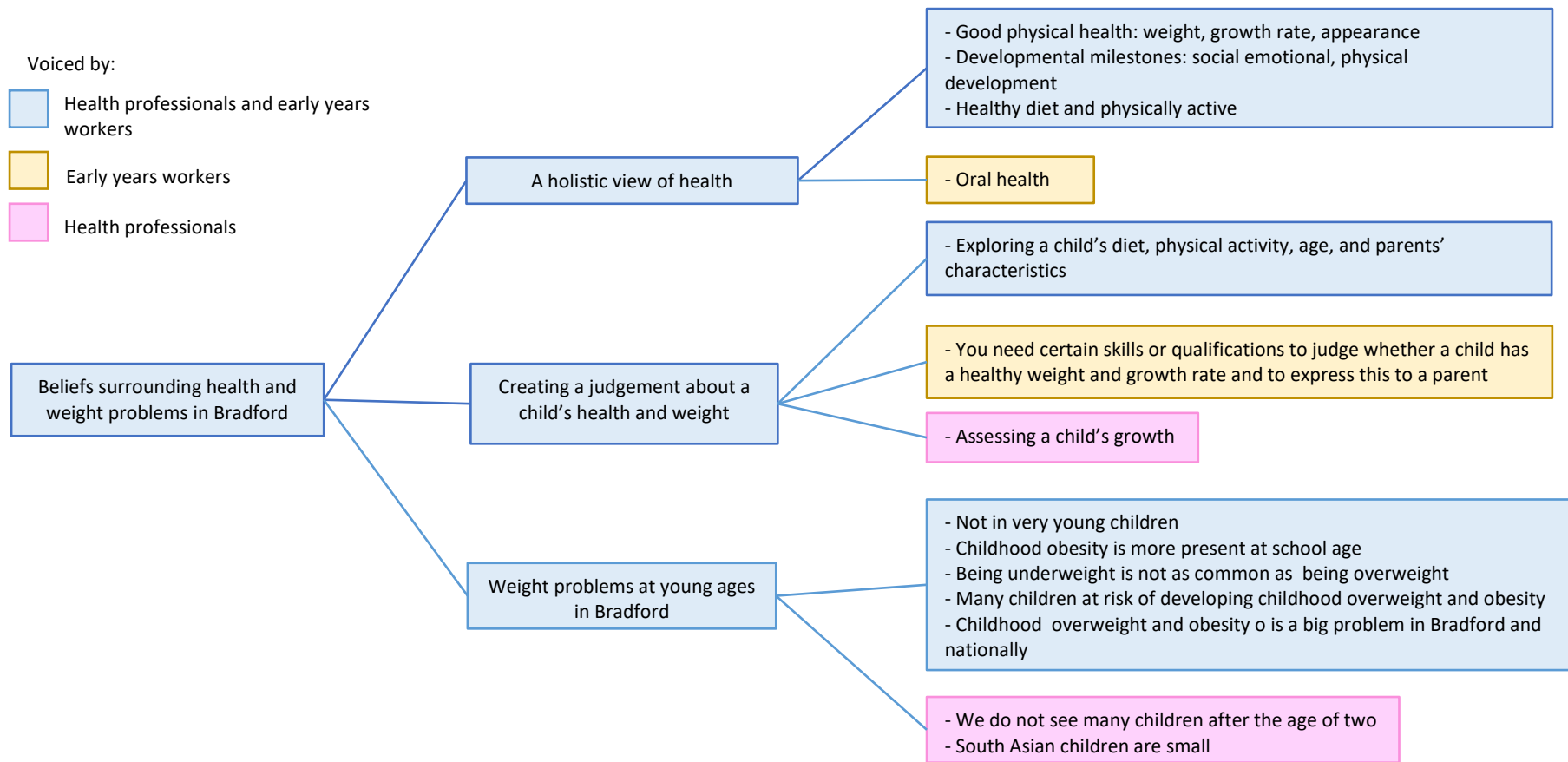


Figure 9.39- Coding tree showing the main themes and subthemes of the topic "Beliefs Surrounding Health and Weight Problems in Bradford."

9.2.3.1 A Holistic View of Health

Both health professionals and early years workers demonstrated a holistic view of health. For them, it was important that children have good physical health, encompassing ideas regarding what constitutes a “healthy-looking child”, and a healthy weight and growth rate. Moreover, both groups directly or indirectly alluded to early developmental milestones, referring to the need for a good social, emotional, and physical development according to a child’s age. Both groups of professionals identified the importance of physical activity, a healthy diet, and mental health (e.g. being happy) in relation to overall concepts of health.

“A little bit of smiling and talking or responding to parents or people.... So, they are not just sat down and not doing anything. They have healthy looking so if young children, in our area some already lost some of their teeth or things like that.... The weight is in proportion to how old they are.” (Early Years Worker 2)

“A healthy child would be happy, content, should not be overweight, should be able to manage physically, depends what age obviously, if it is a child you expect them to have no problems with their mobility, talk while, have good social skills, so physically emotional, social skills and have a good relationship with the caregivers.” (Health Visitor 5)

9.2.3.2 Creating a Judgement About a Child’s Health and Weight

This theme captures how health professionals and early years workers collect information about the children to construct an opinion about their growth and weight development.

According to both groups of professionals, a visual assessment of the child’s weight could give them an idea of whether or not a child has a healthy weight. However, all of them mentioned that there was a need to know more about the children to make a judgement (e.g. child’s genetic background, measurements, physical activity, and diet) than could be achieved by just performing a visual assessment. This is because other factors such as genetics or age can influence how a child looks in comparison to other children, making it difficult to make an accurate judgement about the child’s growth.

“Sometimes we think, “oh yeah, that child because he might be more plumped than the others, oh yeah that child is definitely overweight”. But it could be a child who is three years old who

may just look full, but then, you'll need to look at the characteristics of the parents as well, the genes.” (Early Years Worker 8)

Both groups of professionals expressed that they would observe children's behaviours (i.e. physical activity and eating) and ask the mother about her feeding practices before making any conclusions about the child's health.

“We may ask the parent, “oh how is your child's eating habits” and things like that... if they attend to any of our settings... we could do observations at snack time just the child have a snack, or they do one more snack, are they satisfied with the snack... we wouldn't just straight away judge, just because a child is skinny. If they are overweight, you may just sort of ask them oh how are your children physically active...” (Early Years Worker 6)

Some early years workers expressed that they are not always able to tell if a child is healthy due to the fact that they do not possess some skills that the health professionals have.

“We just see the red books to be honest, as you know a parent, if there is any concern then sometimes, we might see it, but we don't have that, its health visitor's mainly. Because health visitors sometimes they make a referral they are quite putting things in the referral this child is undernourished or overweight.” (Early Years Worker 3)

Assessing a Child's Growth

In addition to the exploration of the child's diet and physical activity, the use of growth charts to identify adequate or inadequate weight in the children seems to be indispensable for the health professionals.

“It is better to do based on proper BMI, is helpful. I mean, you can sometimes tell, if you think a child is, can be like that probably. And outside of a normal BMI, if they look quite chunky.” (Health Visitor 2)

The health visitors and family nurses have contact with the mothers when they perform the healthcare visits and when mothers take their children to the clinics. This contact offers an opportunity for health professionals to assess a child's growth. However, health professionals expressed that they do not assess the children's growth in every contact they

have with them. Some health professionals stated the belief in the need to be careful not to measure the child too much to avoid generating parental anxiety or depression.

*“If you measure too much, you generate parental anxiety, parental depression, or also all sorts of other implications.”
(Family Nurse 2)*

Instead, the growth assessments are done at parents’ request, if it has been a long time since the last assessment, or if the professionals are concerned about the child’s growth and wellbeing (i.e. child not being well-cared for, the mother struggling to feed, changes in the behaviour of the child, the child having a lower weight in previous assessments than would be expected, or if the child is visually overweight or underweight).

*“I could say if there are concerns about a child weight, we will ask them to come back to the clinic. Is it was very concerning we would be following up and saying you know, why don’t you come to the clinic, you know, if they were quite, quite overweight.”
(Health Visitor 5)*

Despite the fact that children are under the care of the health visitors until school entry, health professionals expressed that they do not see many children between the ages of two and five because parents do not often bring them to the clinic at that age. In particular, health professionals mentioned that the mothers who are more experienced and have no concerns about the child not gaining weight or eating did not usually take their children to the clinics to have their growth assessed. A small number of health professionals expressed that there is a gap in which the children’s risk of overweight could go undetected between the growth assessment performed in the health visit at age two and the first time a child’s growth is assessed at school.

“It could be that obesity begins after two years at it might not be picked up until the age of five when they start school because we don’t contact, unless the family bring the child in.” (Health Visitor 4)

Two health professionals expressed that it would be challenging to assess the weight of all the children after the age of two because of the capacity of the services. Hence, they felt it was a parental responsibility to take children to the clinic if they are concerned that their children are overweight or underweight.

“They are still under your care when they go to school, but you actually don’t have any contact at all... you could weight them at two, and they could be absolutely fine, but by the time they are weighted in school he could potentially be almost five, and there could be issues between then, but it is kind like now, left in the parents to be taking them to doctors or taking them into the baby clinic to say I’m concerned that my child is underweight, or overweight. Because now our service is having to focus on vulnerable families as opposed to universal at that age just because there are so many vulnerable families that we have to concentrate on and actually wouldn’t get around all the children if we were just doing general weight visits at that stage.” (Health visitor 6)

One health visitor felt that there is no point in assessing a child’s growth if strategies to support the mother are not put in place.

It would be great to measure but if you are not going to do anything with that information, if you are not going to help that mum to help that child, why weigh? You are just going to find out what is happening to the population which I suppose is a good thing if you settle well twenty per cent of the population that four years old are overweight, so we need to do something about it, so using it as a population measure to say we need some resources, but that doesn’t always seem to be happening, and that doesn’t seem to be happening at the moment, things are being cut rather than, so you probably find worst. (Family Nurse 2)

9.2.3.3 Weight Problems at Pre-school Ages in Bradford

Underweight and overweight in very young children were perceived as infrequent occurrences in Bradford by health professionals and early years workers. However, both groups of professionals expressed that, although very young children (aged two and under) who are overweight are not frequently seen, many of the children they work with are at risk of developing obesity later in childhood as a consequence of poor lifestyle practices.

“Probably, once they are at school age, I think. It is not so common. But they might be having a lot of unhealthy eating practices, so they might be eating a lot of crisps and chocolate, and they might be drinking lots and lots of milk. So, I think that

the potential for that for them to put on weight then you can see later on if it is not addressed.” (Health Visitor 5)

Two health professionals expressed that they have seen cases in which children had an accelerated growth rate between the ages of one and two years-old, a risk factor of childhood obesity. One them believed that during the first months of life, children from South Asian cultures tend to be smaller because they are being breastfed, but perceived that some of these children would catch up in growth between the ages of one and two years-old.

“Pakistani, Asian culture babies tend to be quite petite, quite small, particularly because a lot of them are breastfed, so they sort of, the early weaning and obesity thing, doesn’t really seem to manifest, and, but yes occasionally, I have seen that a child raising through the centiles you know from the fiftieth to the ninety-nine kind of thing. Uhm, between one and two years, yeah.” (Family nurse 2)

Both groups of professionals believed that childhood overweight and obesity is more frequent in school-age children. One early years worker thought that obesity becomes a problem between the ages of three and five years-old, as children start eating more unhealthy foods.

“I don’t see many babies, you know when they are babies, I don’t see many chubby like overweight babies, I see more like older children...when they start eating takeaways more and then eating more homemade food yeah, school-age... I’ve seen children when they are one year old, they look a little bit chubby, but then, because they are crawling and then they start walking, they born out, and they are being more active, so then there is no problem, you see them like they might be healthy, but mostly I would say over three, five.” (Early Years Worker 3)

A small number of health professionals believed that they do not see many cases of very young children who are overweight due to intervention before weight gain becomes a health issue.

“It is not something we’ve seen a lot (overweight). I mean there would be an one or two in the whole programme if you look at BMI, and all that, but for me, personally it is not something that

I've seen a lot because, I suppose if you do keep an eye on their weights and measures and we talk about what was a healthy child and if I thought that a child was looking overweight or if I saw a child was looking underweight, I would probably would say: would you mind if I weigh them?" (Family Nurse 1)

Some health professionals also stated that another reason why they do not receive many cases of children who are overweight or at risk to be due to the fact that it is not common for parents to bring children to the clinic after the age of two years-old.

"I can remember seen two boys aged three and a half and five, but they, they were four and a half, but they stuck in my mind. But generally, I would say two and a half but then we don't see too many children after two and a half. So, unless they are on a child protection plan or unless we see them because we are seeing the younger siblings, we don't see them that many, if mums don't bring them to clinic that into clinic we don't see them, so, because our assessments are generally done until two and two a half that's when I see them." (Health Visitor 3)

9.2.4 Perceptions of Mothers' Attitudes Toward Their Child's Health and Feeding Practices

The Topic, "Perceptions of Mothers' Attitudes Toward Their Child's Health and Feeding Practices" (Figure 9.5), is constituted by the main themes: "My child is fine", "Preference for bigger babies" and "Mothers are not always aware of adequate feeding practices". These themes capture what the early years workers and health professionals perceive are the beliefs and practices of the mothers regarding their child's weight and own feeding practices.

Before presenting their views, it is necessary to mention that throughout the interviews, many of the professionals stressed an awareness of differences among patients, and that their views represent generalisations based on personal professional experience that may not be true for every mother living in Bradford.

"I think it is, depending on the parent, each parent is different, they recognize it and then it's ok, but most of the parents they like chubby babies, or they think my baby is chubby and looks nice and so he can it as much as they want." (Early Years Worker 3)

"Each family is different, and they are going to react differently according to their needs and what you are actually working with them for." (Early Years Worker 4)

"It is quite a difficult question because it is not specific because every family is different." (Health Visitor 4)

"It is an individual, so I think, I think in a sense, you've got to treat people as individuals, and not think oh well it is usually this." (Family Nurse 1).

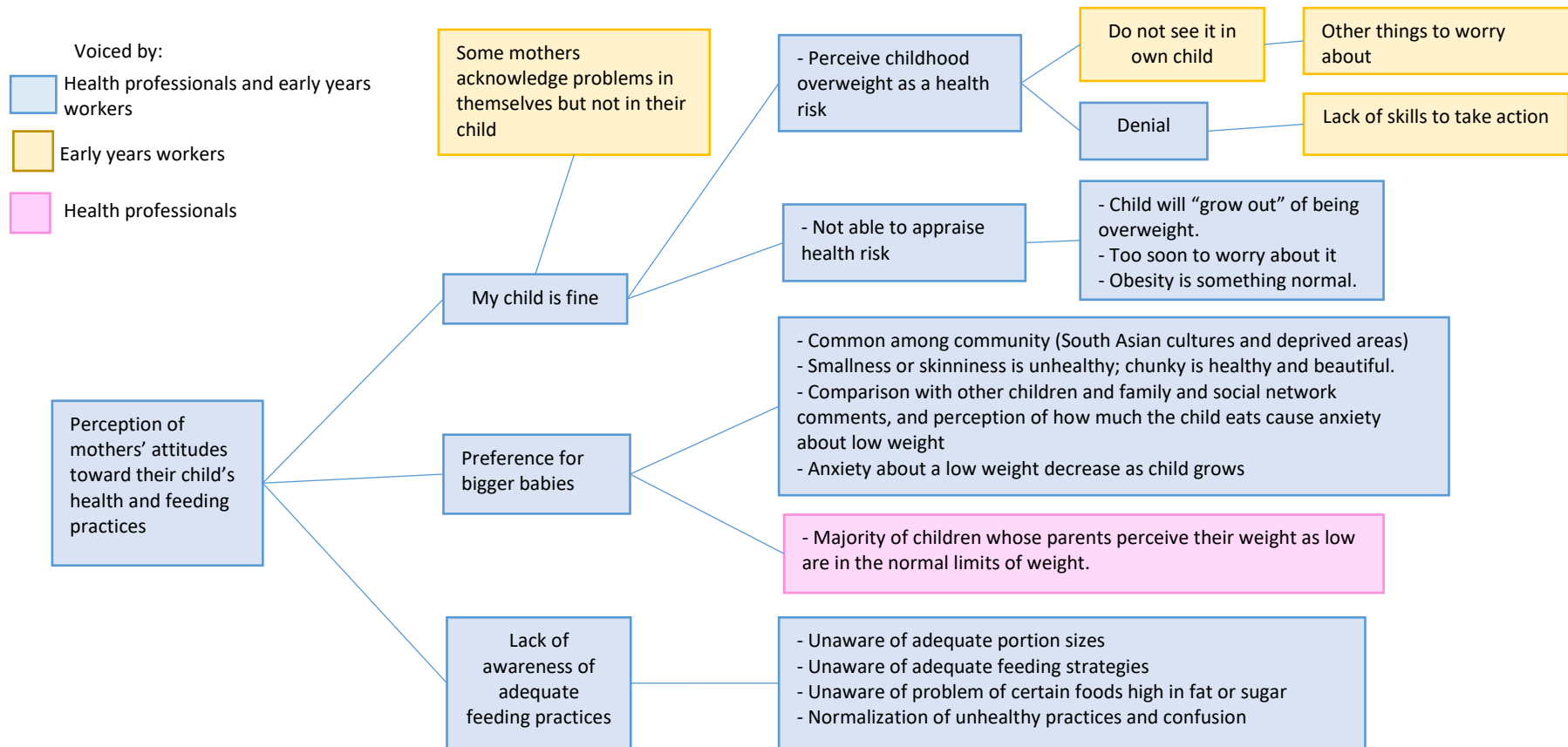


Figure 9.40- Coding tree showing main subthemes of the theme “Perception of mothers’ attitudes toward child’s weight and mother feeding practices” of the topic “Perception of mothers’ attitudes toward their child’s health and feeding practices.”

9.2.4.1 “My Child is Fine”

All the interviewees expressed that the majority of the mothers with whom they have worked do not consider that childhood obesity is a health threat for their children. Furthermore, a few early years workers have noticed that some mothers are worried about their own unhealthy weight or behaviours and verbalise it, but rarely express any concern about an unhealthy diet or a high weight in their children.

“A lot of parents especially when you talk about diet and nutrition for themselves is a great thing. “Oh great! yeah I need exercise classes, I need to do more walking, or I need to eat healthy”. But generally, they feel that their children are eating healthy.” (Early Years Worker 6)

According to what the professionals expressed, some mothers understand that overweight is a health problem, but that they do not identify themselves or their children with the health risk, even if a weight problem is present. Health professionals believed that these mothers might not appraise unhealthy behaviours or excess weight, or that they are in denial.

“I think parents, and I would say eighty per cent are, are in complete denial that the child is overweight. I can only remember one mum saying to me, do you think they are overweight, and apparently, they were, but that’s one mum from how many I see that has said.” (Health Visitor 3)

One health professional and one early years worker believed that this ‘denial’ could be a consequence of the mothers’ lack of skills or confidence in their ability to improve their child’s condition.

“I think parents want the best for their child, but they don’t always recognise that their child is particularly overweight. I mean people tell them though, they get to know that through schools, they have been certainly told that, and I think sometimes people don’t know how to change that though, they don’t know how to change that, they don’t know what to do.” (Early Years Worker 5)

Health professionals and early year workers also believe that some mothers are aware that they have an excess of weight or that the behaviour is not the most adequate, but that they don’t identify the risk or severity of the unhealthy practice or unhealthy weight.

“I am thinking in one mum that I worked with who she would describe her son as a bit chunky, but she said, oh he will grow out of it. And he’s brother or nephews or cousin or whatever is like

that and he grew out of it. So, she kind of was always aware, but then perhaps she was not as concerned about what the issue might be.” (Early Years Worker 9)

For example, many health visitors and health professionals stated that some mothers have expressed a belief their child will “shed the pounds” when they start going to school and become more physically active.

“I think that a lot of education is needed around. Because sometimes you may talk to parents about your child is at risk of obesity, and they may say “oh they’ll grow out of it”. That can be a comment; they will grow out of it as they get older. You know, when they start going to school and running around in the playgroup etcetera.” (Health Visitor 4)

Two health professionals and one early years worker believed that it might be difficult for some mothers to appraise the implications of their unhealthy behaviour given that the weight gain and associated health consequences are not immediate.

“I suppose, the teenage brain, really think for today as much as, it is a bit like smoking, well I am going to smoke, I hope that never happens to me, well actually, the question is, is that out, to think about the child as well, “oh well that might be fat but that’s never gonna happen to him”, so it is, I think that it is an interesting question, for me thinking about how much do they take in which we are saying and computed to think what are the implications are for their child later on.” (Family Nurse 2)

One health professional and one early years worker believed that some mothers were not concerned about their child’s weight as a result of a normalisation of obesity in their communities. For example, one early years worker said that South Asian women do not care if they look overweight or obese in comparison to White British women, demonstrating an assertion that South Asian women see being overweight as something normal, and therefore, not something that would make them worried. A health visitor also suggested that some mothers perceive being overweight as something normal, attributing such beliefs to possible cultural factors or personal experiences.

“Some parents may not see it to be able to be an issue. Yeah, not everybody will, you know, you can come with a concern, and some parents may, you know they may say you know, I was like that as a child, so you know it is normal they think it is normal, and it is

about addressing that. Could be cultural could be, personal experience cultural experience.” (Health Visitor 4)

Lastly, two early years workers believed that mothers might not realise the risk of childhood overweight and obesity to their children because they have other things to worry about that overweight might not be seen as a problem for them.

“I think they underestimate (the weight of the child), I think sometimes it is not on the top of the list, it is not the most important thing to worry about. I think, the things to talk about, they have a lot of things going on their lives, and it might be that the parent itself, there’s, they just let themselves go, and the infant, they come because of problems they are going through, and the same with the children. (Early Years Workers 2)

9.2.4.2 Preference for Bigger Babies

Many health professionals and early years workers believed that some of the mothers living in Bradford have a preference for “bigger babies”. Some of these professionals expressed a belief that these preferences were common among families from South Asian cultures.

“I think the Asian community if I, just because this, they like chubby babies, they think oh yeah chubby babies looks nice and cute than skinny babies they are not attractive and they just like culturally they like chubby babies.” (Early Years Worker 3)

As opposed to the opinions some early years workers and health professionals, one health professional believed that the preference for bigger babies was not exclusive to South Asian cultures, but rather was a common characteristic of families living in deprived areas.

“I’ve worked all over Britain, and this area reminds me of (city) because there is a lot of poverty, there are also a lot of ethnic minority families as well, and I’ve noticed from, people from quite, you know from quite deprived backgrounds, they give a big emphasis on having a big, round, chunky chubby baby and it seems to represent nurture to them. And it seems to represent, you know, maybe prove that we are doing all right for our child, so it’s all this concept of a chunky baby as we’ve done good.” (Family Nurse 2)

Both groups of professionals asserted that children who are “chunky” or “chubby” tend to be perceived as healthy and beautiful, whereas children who are “skinny” or “small” are seen as unhealthy. According to one professional, this may result in parental anxiety when the child has a low weight and lack of concern when a child is overweight.

“We have a lot of anxieties about underweight, “-are they putting weight on, are they putting weight on? -Yes, they are putting weight on, uhm, yeah, it’s gradual, but they are following the centile lovely”... but then the children that they are overweight, “Oh they are just a bit cuddly” “ Just cuddly he will be alright, he’ll burn it off”, you know, they are very defensive of a child who is overweight, whereas the underweight children or not underweight, or the ones who are slower to weight gain, there is a lot of anxiety from parents around that, but there is no anxiety about the child who is overweight.” (Health visitor 3)

According to the health professionals, the weight of children whose parents are concerned about their children being underweight falls within the healthy weight limits in the majority of the cases. Some health professionals and early years workers believed that these concerns are provoked by the comments that mothers receive from members of their family and other people in the community, the comparisons that mothers make between their child and other children, and how much their child eats.

“People would make comments about extended family saying like “oh they are not fine, or you know, “they are not feeding them enough, they are a bit skinny, they need a little bit of weight on them, you know” I’ve heard that a few of times.” (Health Visitor1)

“A lot of families tend to sometimes say ok, my child is not drinking as much milk, or I think my child looks a bit too weak compared to another baby who I saw at the baby clinic. It’s that comparison that what we found through consultation with our families to what they do is tend to do is compare their child to another baby.” (Early Years Worker 6)

One early years worker and one family nurse believed that this preference for bigger babies or “anxiety” about a child having a low weight is present only during the first months of life and then it diminishes as the child becomes older. One of them expressed the opinion that mothers tend to place more importance on height than weight as a child becomes older.

“The main thing is in the first nought to six months, that mums are, what do they weight, what do they weight, and then as the child gets towards the year, there is less concerned and then after a year they are really as not as concerned at all as about weight and height, more, more concerned about height, you know that their weight, they can be parents are, how tall they are, how tall they are, and I do notice the emphasis seems to change about a year on to height, rather than weight.” (Family Nurse 2)

“Parents say they do like to see a chunky baby; they like to see, you know, a baby that they’ve got chunky legs because they look cute and cuddly and things. But is it, they like that when they are babies, but I think now, and they do like to see the babies eat because they like to see they are happy, and it makes them happy when they see the children eat.” (Early Years worker 4)

9.2.4.3 Lack of Awareness of Adequate Feeding Practices

Many early years workers and health professionals believe that mothers are not always aware of adequate feeding strategies and do not perceive there is a problem with some of their practices which are considered unhealthy by health professionals.

“Parents want the best for their children, and they don’t mean for their child to be underweight or overweight, it’s just their lack of understanding and pressures that they receive from family members.” (Health Visitor 3)

For example, early years workers and health professionals believed that mothers are not aware of appropriate portion sizes for young children; a fact which results in an unnecessary concern that a child is not eating enough, often causing mothers to overfeed their children.

“...parents come, and they think that their children aren’t eating enough... we talk about portion sizes, and we look at the well plate, and we show that the sizes of the plate that they should be using. And then, when we do that you see that parents actually are sitting back and saying to themselves, I actually feed my child too much.” (Early Years Worker 4)

Likewise, they find some mothers are unsure about how many times they need to expose their children to food for them to accept it, do not practice parental modelling of healthy eating habits, and do not have mealtime structures. Some health professionals and early years workers believed that mothers who are not able to adequately feed their children perceive them as fussy eaters and compensate for the meals that the child misses or does not eat to prevent the child becoming hungry.

“I think is educating parents, they’ll say “I tried this, I gave them that food, but no, they don’t want carrots, so I don’t give carrots”... when we say to them “how many times did you offer it?” You know, they’ll just say “once or twice, but then didn’t like it, so we respect it, and we leave it on that”. When we talk about twenty attempts at least before a child takes that food, they say “really?” And then they say alright, you know, “is it one go?” No,

no it's not in one go, just keep on offering it." (Early Years Worker 6)

"They fill them up with milk they'll say he missed this meal, will give him some more milk, or they'll give them some crisps, or you know yoghurts... with the Asian families, anything that has got milk on it is healthy... they might give them milk overnight... I think every opportunity they will try to make up for the fact that they are not eating." (Health Visitor 5)

In addition to this lack of knowledge of adequate feeding strategies and portion sizes, a few health professionals and early years workers expressed a belief that mothers do not see a problem in overfeeding their children with milk or giving the child certain foods or drinks which are high in fat or sugar.

"Possibly, um, I think that a lot of people, what they eat traditionally so Asian families, so a lot of the food they eat would have a lot of oil, so I think some people are unaware that this much oil, you know, six spoons of oil in your curry is actually not very good for you, and not very good for your children." (Early years worker 1)

Interviewees said that some mothers do not perceive unhealthy practices as such because these nutritional habits have been transferred generationally or are commonly practised in their community.

"If they got somebody living with them, let's say the mother in law, and they say, oh well I give you this when you were young... and I didn't make you any harm and that kind of thing, or to see other children around that they are all eating the same thing, why does my child need to eat anything different." (Health Visitor 5)

"Some cultures believe that milk, full-fat milk is a very, which is an important part of the diet, but that that takes precedence of food. So, they would still give children a night feed at two years, three years old, of milk, they would still give them milk in a bottle, so it is only that it has too many calories but is bad for the teeth. But also, all the cultures give a lot of Coca-Cola to drink, a lot of-of fizzy pops and juices, a lot of sweets and they don't see that that's a problem." (Health Visitor 3)

Moreover, a few professionals mentioned that parents receive information from several sources, such as the internet and supermarkets, which could lead mothers to confusion about what constitutes a healthy diet and undesirable feeding practices.

“Why in supermarkets are we selling food for four to six months olds - don’t get that, you know, I don’t get that. When the department of the world health organization they clearly state that we should be weaning at six months, you know why that is still allowed?” (Health Visitor 2)

“What can be difficult is, you know, when they have too much of this mobile apps, and you know, and they go “oh yeah some said that you can have this, you know, that’s fine” you know, “oh I’ve been giving honey to my baby when they are having a bit of tummy upset”. We have to remind them about the bacteria in the honey and how it’s not acceptable.” (Early Years Worker 6)

Two health professionals alluded to a belief that changes in nutritional guidelines and dietary advice can also create confusion among parents about appropriate dietary habits.

“Things around dietary advice for adults is changing constantly, one minute this, one minute this, one minute, and actually is all over the place, so I think it is really hard for people, out there, to actually have confidence of what’s been said.” (Family Nurse 1)

9.2.5 Factors Influencing Mother’s Health Behaviours

This topic captures the beliefs of early years workers and health professionals regarding factors influencing mothers’ health behaviours, especially their feeding practices. Figure 9.6 shows the themes and subthemes that constitute the topic.

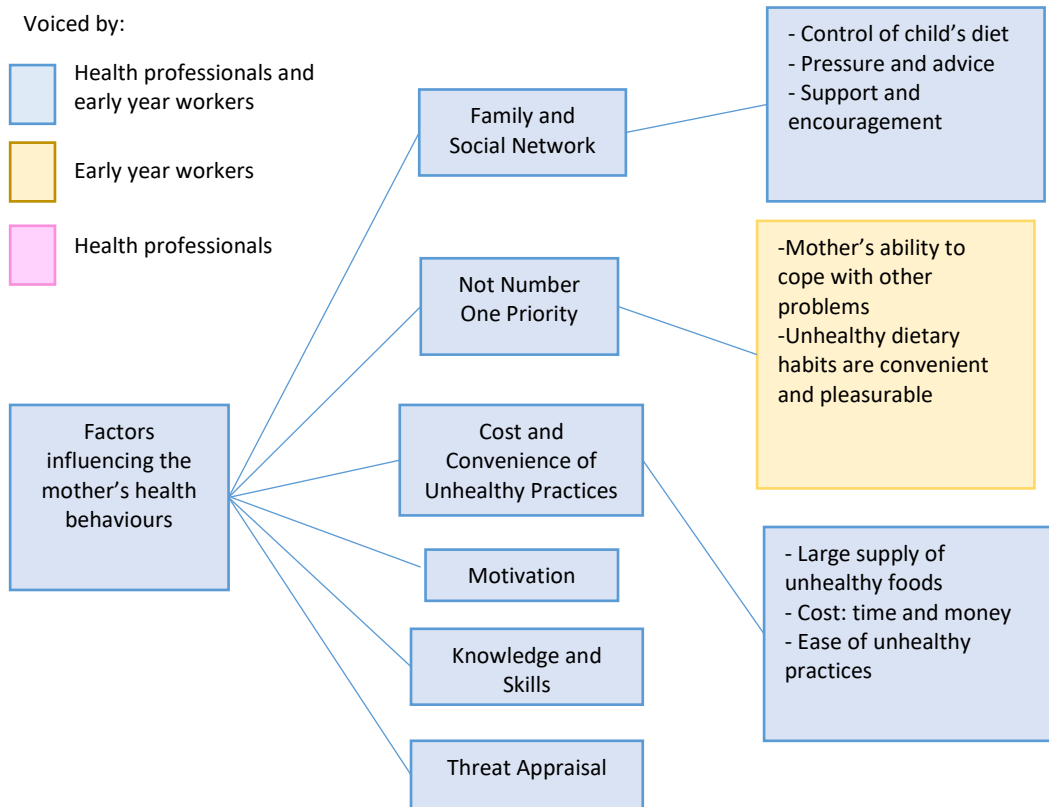


Figure 9.41- Coding tree showing main subthemes of the theme “Factors influencing action” of the Topic: Perception of mother’s attitudes towards child’s weight and mother’s feeding practices

9.2.5.1 Family and Social Network

The mother's family and social network were believed to have both positive and negative influences on the mother's feeding practices, health behaviours, and the child's eating practices.

As described earlier, the professionals indicated that the mothers tended to adopt practices from their family and culture (i.e. cook with high quantities of oil, consume high volumes of milk, etc.) which were perceived as unhealthy by the professionals. In addition to this, the professionals believed that mothers receive pressure from their family and social network in relation to how to feed and care for their children.

"Pressure from family to do things in a certain way because their mum did that way, so the pressure to wean at twelve weeks, the pressure to, uhm, you know, stay on baby foods because that's what the family says that she has to do." (Family Nurse 2)

"I think is because parents are in such a sort of situation where they think, ok if they don't finish their food, uh, you know, food on their plate, then it's going to look that I am a bad parent, I haven't given them enough food. I think parents get into that kind of habit in which they'll think they are going to get judged" (Early Years Worker 6)

Moreover, the health professionals and early years workers recognised that, despite the fact that some mothers may understand that eating certain foods is unhealthy, it can sometimes be difficult for them to prevent their children from consuming these, as occasionally they are not the ones buying or preparing them since other members of the family are often responsible for giving the child "unhealthy" foods.

"Often you see families that live with their extended family... and it is very hard for some parents, or some mums, especially mums to say no, I don't want that for my child, they are living in a house that's not theirs." (Health Visitor 3)

According to the professionals, the mother's family and social network can also have a positive effect on the mothers' health behaviours as a result of the support and encouragement that the mothers receive from friends and family. Some of the professionals cited the positive impact this network has on increasing the mothers' confidence and self-efficacy when feeding and taking care of their children.

“Asian families they do tend to breastfeed more, and they got the support because that’s what their mums have done. I think a lot of the white English girls are the ones that maybe are more of a challenge because their families don’t, is about the self-esteem and confidence because I don’t often think that they really got the good support networks, a lot of our, a lot of our Asian they got a lot more of a family around them.” (Family Nurse 1)

“She didn’t have support from her partner although he was around, so she was doing all herself. So, a lot of other major issues are going on their life, and this child is definitely overweight she knew that that the child was but changing that way of feeding her the chocolate bars was hard to deal.”(Early Years Worker 1)

9.2.5.2 Not Number One Priority

Some professionals described how mothers that are facing other problems in their lives tend to be less concerned about health matters or following recommended health guidelines. These external issues can take precedence over a child’s weight status and eating behaviours.

“A lot of the families that we do work with, have lots of other issues going on, and I suppose this where does this sit on the list of priorities, you know someone is on a domestic violence relationship... they might be feeding that child to keep the child quiet so that the partner doesn’t kick off.” (Health Visitor 7)

According to some early years workers, when mothers are facing other personal problems, unhealthy feeding practices are likely to be more a convenient and pleasurable option.

“There was a domestic issue... So, the food was something that was nice in her life, but actually, through the course, she realised food is alright, but maybe finding something else what makes me feel in a good way... She was under pressure. She didn’t make time to cook properly... so she would just cook fast food.” (Early Years Worker 7)

According to a few interviewees, mothers tend to form health habits for themselves and their families depending on their ability to cope with other problems.

“Well I think, I think people, most of the people do make some changes, it just depends on how much, how many they can deal with in a one time, and how difficult it is for that change to take place.” (Early Years Worker 1)

9.2.5.3 Cost and Convenience of Unhealthy Practices

The price of food, a mother's lack of time, food availability, and the ease of unhealthy feeding practices were some of the barriers that the professionals expressed were 'weighted against' healthier family lifestyles.

*"I think it is about what they can buy, all that is offered in the supermarket... people don't have as many cooking skills as they used to do. So, they are going for the fast option, the process foods... it is easy to put something in the oven or open a tin."
(Health Visitor 5)*

The interviewees note an abundant supply of unhealthy foods offered in supermarkets and food locals at very low costs in Bradford which lead mothers to choose these foods over healthier options.

*"There is a lot of takeaways, and a lot of them very cheap... it is convenient for parents, to go and get a burger and chips for 99 pence rather than going to the supermarket and get some fruits."
(Early Years Worker 2)*

Additionally, some of the professionals believe that it can be problematic to access "fresh" foods and a "healthy" diet for mothers who struggle financially.

*"I think that financially as well, some of our families' access to food banks, so it's difficult for them to go and buy the foods that we recommend. So, it's easy to feed the child lots of white bread, pasta and nothing else because that's what they have available to them."
(Health Visitor 3)*

Health professionals expressed that mothers often mention not having time to undertake recommended health practices. One early years worker said that, contrary to what she would have expected, she found that mothers frequently refer to a lack of time as a more significant barrier to eating healthier than the cost of fruit and vegetables. Based on what two early years workers remarked, this perceived lack of time sometimes has to do with the fact that some mothers have to care for other children and family members.

*"It might be that there are other things going on in their life, so if they've got a number of children at all different ages and stages and they just find that time is a massive factor... they just got they stick with their old habits because it is easier."
(Early Years Worker 1)*

9.2.5.4 Knowledge and Skills

The professionals believed that mothers are not always aware that their feeding practices are not the most adequate, and that some mothers do not know how to make changes to improve their child's health. According to some professionals, this lack of knowledge and skills to help them take actions can result in denial and a lack of motivation to make changes on the part of the mother.

"I think she just finds it was too hard to make a difference; she just felt a lot overwhelmed by how she would do it. I think it depends on the parent." (Early Years Worker 9)

"I'd say that children at school age, primary school children are big and overweight, and I think that's due to the lack of education and acknowledging the information out there that's there for the parents, that I think is the lack of not knowing really for the parents." (Early Years Worker 4)

For example, many health professionals and early years workers believed that some mothers lacked the necessary skills to cook healthy food.

"There is a lot of, lack of cooking skills, and you know there is a lot of cheap and easy going on... Home cook food is easier and healthy option, but not everyone, people find home cook food can be an expensive experience if they don't know about or are not aware of how they can easily budget". (Health Visitor 6)

According to some early years workers, acquiring the knowledge and skills in groups such as HENRY helps mothers to recognise that some of their practices are not conducive to raising healthy children (e.g. overfeeding their child). Acquiring this knowledge allows mothers to make changes in the strategies they use to feed their children.

"She used to chase her child with the food every day, but she stopped chasing, she sat down and fed her on the table, and the child comes to her, so that was a big positive change." (Early Years Worker 3)

"She was amazed that the fact that all the child eat would be chicken nuggets and come week five and six she was actually sitting and making their own meals, she was, the child was helping mum to prepare, and she was sitting and eat a full Sunday dinner. And it is on those weeks, that I find that you see the light bulb moments, the parents open up and say this is change and it

has changed because we did this, this, and this.” (Early Years Worker 4)

9.2.5.5 Threat Appraisal

According to some early years workers and health professionals, some mothers who acknowledge that their child’s weight is low or the child is at risk of becoming overweight take actions to improve their child’s health. These actions tend to include requesting support and reassurance from the health professionals, joining healthy lifestyle programmes such as HENRY, and making changes to their feeding practices (e.g. stopping breastfeeding).

“They can see that if they continue going on the path that they are having at the moment, there is going to be a problem. So, they came themselves and referred themselves to put the changes in place to start going down the healthier route.” (Early Years Worker 4)

““The babies are not chubby enough”, “they look too scrawny” you know, which then, you know, can put pressure in breastfeeding mums to bottle, you know, top up and a lot of that kind of stuff.” (Health Visitor 2).

According to early years workers, the factors that may influence the mothers’ appraisal of an unhealthy weight include previous experience, health professionals’ observation, and comments from family members and members of the community.

“Sometimes is a bit of learning from the go “oh yeah we did do some mistakes”, “we have older children”, you know, “they are overweight” or “they are very lazy”, “they are not as active” and all that. And then with the younger children, they want to make a difference.” (Early Years Worker 6)

9.2.5.6 Motivation

A few early years workers referred to motivation as an important factor that would cause mothers to change their behaviour. They described how some mothers are very committed to make changes for themselves and their child, while others are not motivated. One early years worker expressed that parents of young children are particularly receptive and keen to learn.

“But I think parents are quite receptive at that age. And they want to get it right, so I think they are very keen to sort of learning. Whereas when the children are maybe slightly older, they think oh well I know what I’m doing now.” (Early Years Worker 9)

9.2.6 Supporting Families

The topic “Supporting families” captures the experiences of health professionals and early years while working with the mothers living in Bradford. Two main sub-themes surrounding health professionals and early years workers offering support were identified: “Offering support: Challenges and Opportunities” (Figure 9.42) and “Raising Issues About a Child's Health” (Figure 9.43).

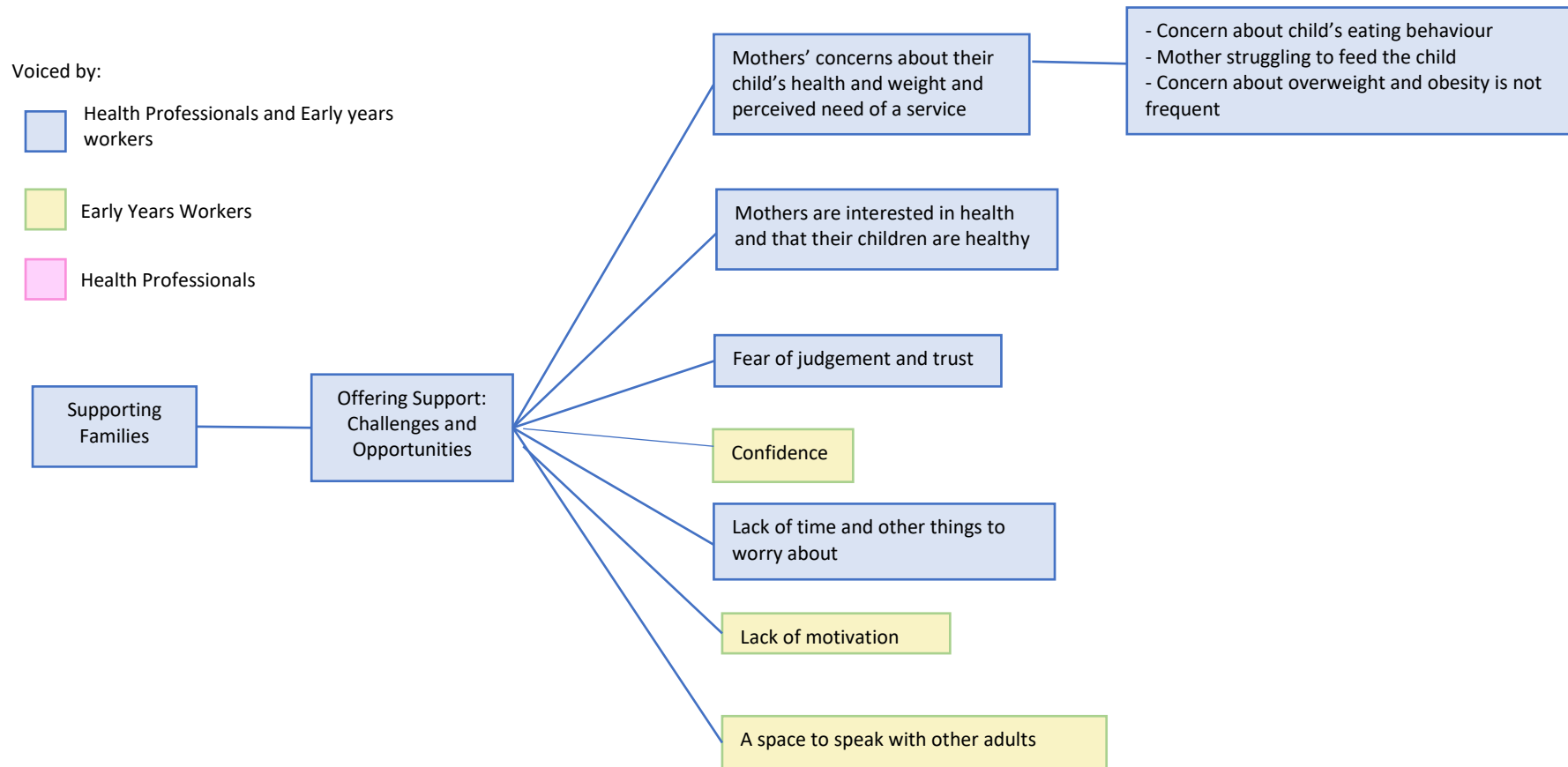


Figure 9.42 - Coding tree showing main subthemes of the theme “Offering Support: Challenges and Opportunities” of the topic “Supporting Families”

9.2.6.1 Offering Support: Challenges and Opportunities

This theme is constituted by seven subthemes which reflect some of the perceived challenges and opportunities that early years workers and health professionals face when they offer their services to the mothers.

Mothers' Concerns About Their Child's Health and Weight and Perceived Need of Services

Health professionals and early years workers describe how mothers engage with services when they are concerned about the child's weight or because they are struggling to feed their children due to the child's behaviour (e.g. fussy eating) or medical reasons (e.g. gastrointestinal problems).

"Recently we had a mum with a very young baby, and the baby wasn't putting on weight, and the mum just needed a bit of confidence and a bit of support around that. Or we have another one where the baby has been fed through a tube. And yeah, sometimes we get weather something is going on, they might not be not necessarily just because of weight, but it's a healthy lifestyle issue." (Early Years Worker 9)

According to the health professionals, the mothers that are concerned about their children not eating enough or gaining enough weight will take their children to the clinics seeking support to improve their child's health. On the other hand, health professionals believe that mothers do not often take their children to the clinics because they do not recognise there is a problem or are in denial in cases when the risk of obesity is present.

"You know, I don't see it that many (children who are at risk of overweight), because they (mothers) don't see it as a problem, they don't bring them to clinic to say, "I have a concern that they are overweight you see, you know they wouldn't be bringing them." (Health Visitor 6)

Similarly, to the health professionals, two early years workers describe how mothers who do not see overweight and obesity as a health problem or are in denial will not enrol in the programme or will not make any changes throughout it.

"Worst case scenario that you just never get that first visit. But you know that there are issues, but the family are not ready to, even if they do, they come for the sake of social care have told them that you have attended, I'm worried about your child. They

attend because they have to. But there's nothing going on." (Early Years Worker 8)

A few early years workers expressed how some mothers have claimed that they do not need the programme when it is offered to them because they already know what to do, or that previous experiences in other programmes did not work well for them.

Mothers are interested in health-related topics and that their children are healthy. Health professionals and early years workers described how mothers appear very interested in their child's health, especially during the first two years of life, which makes them more receptive to the services offered by the professionals. For example, one of the health professionals expressed that, despite the assessment of the child's growth by the health visitors is offered but not mandatory, the first year is an exciting time to see how a child is growing for the mothers, making them more likely to seek out a health assessment for their child.

"Generally, it is quite an exciting time to see how much the baby has grown, you know, but if parents, you know decline, the option, then that's an informed choice to do." (Health Visitor 4)

Both health professionals and early years workers expressed that there are mothers that go to the baby clinics and the HENRY groups who are not necessarily concerned about their child's health. Instead, they are looking for some advice and reassurance that their parenting practices are correct, and their child is following a healthy pathway.

One health professional described how some mothers go to the drop-in clinics to check their child's growth on a regular basis.

"Quite often, we get quite a few mums that come with no concerns, and they just want to see how the baby is growing, so we quite often have quite a few mums that come in a regular basis. You know once a month, once a couple of months to get the baby weighed. And that's just for their, for their knowledge." (Health Visitor 4)

Early years workers said that some mothers join healthy lifestyle groups because they are interested in learning and receiving information about health and nutrition. They observed that some parents like to talk about diet and nutrition, especially they liked to talk about their own eating habits and health and that these mother are very interested in teaching and establishing healthy lifestyles to their children from the very beginning.

“Anything you mention about diet and nutrition they are interested. And then when we talk about it, this is what the program has, it could be that the child is quite physically active, they come to the groups across the cluster, but that what they are interested in is eating habits and then the long terms eating habits.” (Early Years Worker 6)

Motivation

A few early years workers observed that the mothers who join the groups are those who are generally already motivated to make some health behaviour changes to improve their own and family's health.

“I would say that the people that come to Henry are people who are interested more probably, in what's going on with their families at home, and food, and activity and things like that. They recognize it, and they need some more information, so probably people that are more aware of what is going on, and you know there are good and bad things they might be giving to the children or not.” (Early Years Worker 1)

However, they also expressed the belief that some mothers are more motivated than others to put things into action. For example, one early years workers believed that it might be challenging to support mothers that have been referred and are attending the programme “just for the sake of being there”.

“So, it's a different case there, but mainly with HENRY, we have to be careful where the referral is coming from. Is good if it comes from health visitors, and also social care workers, but sometimes its source of how it's promoted and marketed, and you get the right engagement, you just don't get bums on seats. Because in some cases you may just get a bum on a seat.” (Early Years Worker 6)

Fear of Judgement and Trust

Some health visitors perceive that some mothers are ‘worried about authority figures’, which makes them less likely to seek and accept support from the health visitors.

“We are not welcomed sometimes, culturally in some cultures I think they feel that we are more social services, so they are quite anxious when we first go and visit... so it is important for us to explain exactly who we are and what our role is, and, we do ask a lot of questions... I would say generally we are well received, but

we do come across the odd view that they are not happy.” (Health Visitor 3)

Similarly, one early years worker observed that mothers who are going through other personal problems might not engage with programmes such as HENRY because they fear that other services such as social care could get involved.

“They might not want it, there might be something about me as a practitioner, or a general fear with services, especially, you know if they’ve heard that, you know, social care will get involved, they might fear if they start engaging with one thing then that might lead on something else.” (Early Years Worker 1)

Some early years workers also described how some mothers believe that they will be judged by the professionals or by other parents about the way they take care of their children. A couple of early years workers think that these feelings are especially present when mothers are facing other personal issues or have been referred by a health professional or social services.

“I think, at the beginning when they are coming, especially if they are being referred in from a health professional, if we’ve, we haven’t had the time to get in touch with the parents and introduce ourselves and go to a one visit, when they are coming to the group, they fill that they are going to be judged for been there.” (Early Years Worker 4)

One early years worker expressed that there are occasions when mothers are referred to their programmes by other professionals at a point when they are not entirely aware of what the programme entails, which can make them feel nervous or confused. For some early year workers, it is important to have support from the health visitors when early years workers have the first contact with the mothers, for one of them this is important as she feels that the trust that the mothers have in health visitors is transferred to the early year workers.

“We try to go out to meet the family with the person who is referred in; we find that’s really helpful because, for one thing, it’s so to make sure that the health visitor or whoever it was seeing what we are trying to do. But they can see that we are working together, so that transfers with a relationship of trust and sometimes if the parent isn’t shown why they’ve been referred then the referral can make that clear. Because otherwise in the past if we are gone out not been a joined, then the parent might be like oh “why, why are you trying to say my child is fat” “why

*you've come out and seen me?" Such it makes it a lot easier."
(Early Years Worker 9)*

Health professionals and early years workers expressed how, during the first contact they have with the mothers, they need to clarify the reasons why their services are being offered and that they are not there to judge. In this way, health professionals and early years help mothers gain trust in the services. Despite the fact that health professionals and early years workers felt that they were able to build this relationship of trust in many cases, they described how mothers are occasionally dishonest with them; an aspect which makes it difficult for them to provide the necessary support.

"I don't think they are always honest with us about what's actually happening, so we can't actually get to the bottom of things. I don't know if that is because they are ashamed, or they are eating more than they should be doing, so we, it can be difficult that way. They don't always own up, to what's happening. Maybe they are going to tell us. Don't know, but uhm, yeah, it depends on them, lots of things really." (Health Visitor 5)

A few professionals stated a belief that building a relationship of trust with mothers is an integral part of keeping mothers engaged with their services. However, one health professional and one early years worker described how this trust can take a long time to be built.

"But then, once they see that all the other parents are there for the same reasons, they seem to let the barriers down a little bit, but it does take a lot bit of building on, does that, so that's why I say, we get to weeks five and six and there's when you can see that barriers start to slowly fall." (Early Years Worker 4)

"We do have, what it is called a very low attrition rate, so we don't lose people, because the whole premise of what we do is about relationship building and attachment, between us and the mum, so, the first six months, are about trying to get the attachment with that parent rock solid, so that they use us as a resource later, and it works" (Family Nurse 2)

Lastly, one of the health professionals expressed the difficulties that using interpreters can cause when attempting to build trust with mothers.

"Yeah, I think it is harder to build relationships when you are going through an interpreter, I think that's harder, I definitely do, and although I have done it numerous times, successfully, but it is

definitely a barrier. And there are cultural differences that cause barriers as well yeah.” (Health Visitor 6)

Confidence

Two early years workers believed that the peer-support that the mothers receive from other mothers is an essential element of the HENRY groups which encourages mothers to remain in the programme and provides them with the self-confidence they need to make changes. One early years worker, however, described how this group format does not work for every mother.

Lack of Time and Other Concerns

According to a few early years workers, it is difficult for some mothers to engage in an eight-week healthy lifestyle programme because other activities and circumstances can take precedence. Some of these activities include work, caring for other members of the family, housework, doctor’s appointments, and also other activities which early years workers perceive are less important, or that could be done at different times (e.g. going shopping).

“They’ve said, well I have to go and get shoes or whatever, you know, you could do that another day, ... It’s not seen as the most important thing even though is a lot of resources in it and its free, and its brilliant for a lifestyle change. Or they might have a doctor’s appointment, they have a poorly child, legitimate when it’s a poorly child then they don’t come for two weeks, and or they might just going somewhere else...” (Early Years Worker 1)

In the case of the health professionals, a family nurse described how contact is sometimes lost when mothers go back to their routines or if the mothers are facing other personal problems. However, she mentioned that given the characteristics of the service they could try to overcome those obstacles and re-engage mothers in the service.

“Sometimes the challenges are that they go back to college, or that they got a job, but we work around that, usually, the the time that we lose clients, for a very little period of time, and we usually re-engage them again, is if there are major crisis going on in their lives, domestic violence, major family problems, if there are drugs and alcohol and has been a relapse, or whatever, but their, their life is becoming increasingly chaotic, but we chase them all over Bradford, we knock on doors, we knock on families doors, we, because small caseloads, the whole point of us is to not lose

engagement with these families that's why our service will sit up, to maintain that engagement, no matter what." (Family Nurse 2)

Health visitors also spoke about other obstacles that may be stopping mothers from going to the well-baby clinics to receive support when they need it. For example, one health visitor observed that some mothers find it challenging to go to the clinics because women from some cultures are not allowed to go out by themselves in some families. However, she mentioned that that is not always the case and the service can be flexible and support these women.

"Some parents don't mind coming into the clinics, some parents find it more difficult, depending on whether they've got people that are restricting them from coming out... or there might rely on transport, for others that's not a problem, and sometimes the dad would come as well as the mums. So, if there were some particular issues going on, whether if it is hard to come out, then I might do a visit at home, but we can't do that too many times because our service is very stretch." (Health Visitor 5)

A Space to Speak with Other Adults

Two early years workers described how the HENRY group offers a space where parents can leave their houses and talk with other adults, which provides an opportunity for them to receive support from professionals.

"And it is time for them, so it's time for them when they are not with the children. I think that's quite an important thing for some people. So, even though they've come to baby massage they might come to play and stay, their children are still with them. In a Henry course or something like family links, you come and sit with other adults. And it is the possible the first time." (Early Years Worker 1)

"It might be only two hours in a week that you don't have your children with you." (Early Years Worker 2)

9.2.6.2 Talking About Childhood Obesity

This theme encompasses the health professionals' experiences and practices when they have conversations with the mothers about their child's weight and childhood obesity. Four subthemes constitute this theme, as laid out in Figure 9.43.

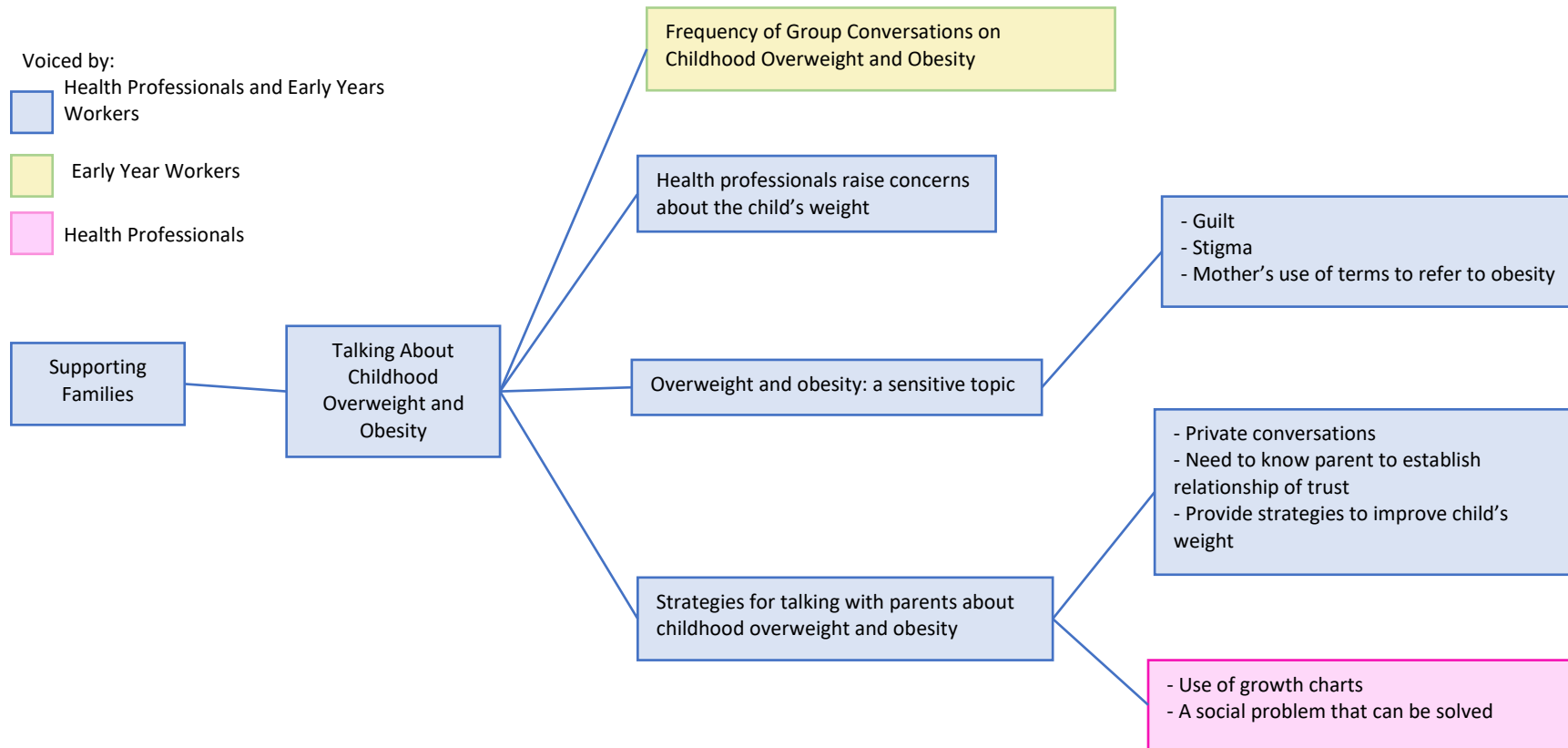


Figure 9.43 - Coding tree showing main subthemes of the theme “Raising Issues About Child's Health: Challenges and Strategies to Overcome Them” of the topic “Supporting Families”.

Frequency of Group Conversations on Childhood Overweight and Obesity (Early Years Workers)

Two early years workers observed that discussions about childhood obesity and mothers expressing concerns about overweight in their child were not frequent during the HENRY group sessions. They described how conversations in the programme are generally about healthy lifestyles and that the only time the topic of childhood overweight is if a parent brings it up.

“I wouldn’t say that conversations evoke much around children being overweight, no, not unless there is a specific need, or a specific family has come with that. But I think that in the group sessions it doesn’t work like that. Although there might be children that are overweight. It could be all the children; it is hard to say that really... I wouldn’t say that the conversations are predominantly about being overweight no, is more about a healthy lifestyle and making small steps to change it I think that’s all.” (Early Years Worker 1)

One early years worker believed that one of the reasons that parents generally do not like to talk about childhood overweight and obesity might be because they do not feel confident or comfortable with the topic.

“They don’t talk about overweight, they might talk about underweight, yeah, does are more comfortable talking when they have, feel that the child is not eating, so I feel like that they notice that the child is overweight, so maybe they don’t want to talk too much because they don’t feel confident or comfortable.” (Early Years Worker 3)

Not all the early years workers shared these views. Two of them relating how mothers do speak about childhood overweight in a group setting and that they do verbalise when they or their children require a lifestyle change to be healthier. These early years workers believed that the “openness” and “non-judgemental” format of the groups allows mothers to have these conversations.

“We do, we do have quite often have conversations about it, about overweight... It might be a quite sensitive issue for a mum, somebody saying that your child might be overweight or something like that. But they’ve been quite open to it, we have a very nice group at this time, and they’ve been quite open, and

they say yeah, I notice that my child needs to do some more exercise or doing more activity.” (Early Years Worker 7)

Health Professionals Raise Concerns About the Child’s Weight

The vast majority of the early years workers expressed that they had never had to raise any concerns about a child’s weight status with a mother. One of them explained how she wouldn’t directly talk about the weight of the child. Instead, she expressed that she would explore the mother’s feeding practices and invite them to go to the groups.

Early years workers noted that it is the responsibility of health professionals to raise concerns with the mothers about risks to their children’s health and believed that those mothers who are referred to the groups because their child is overweight or at risk are already aware of the risk of overweight . Therefore, they do not perceive a need to talk about a child’s excess weight.

“The parent is clear if it is a weight issue that’s why they have been referred in, but as said... they don’t have to have a weight issue to come into a one to one programme. So, it’s not always going to be a conversation we have. But yeah, the parent is usually clear that that’s the reason why they are there if it is that the child is overweight.” (Early Years Worker 9)

Health professionals stated that they tend to assess the children’s growth if they or the mothers were concerned that the child was at risk of being either underweight or overweight. In those cases in which the children are overweight, they described how they would raise their concerns, give advice on infant feeding, or refer mothers to a dietitian or groups such as HENRY. If the child measured within the healthy weight range, they tend to reassure the mother that her child’s weight is healthy. From the interviews with the health professionals, it can be concluded that some of the health professionals felt confident when raising issues about the weight of a child.

“I don’t feel uncomfortable addressing it (having conversations with the parents about the child’s weight) because that’s part of our role and what we are trained for, but obesity is one of the key, key indicators. It is part of our everyday role, and identifying that, addressing that. It can be an issue when parents, when you’ve gone through, you know you addressed that, you talk with a parent and they still don’t see that there is a problem or a

concern. That can be difficult, but I certainly I don't feel uncomfortable." (Health Visitor 4)

However, the health professionals felt that it could occasionally be challenging to talk about a health problem when parents do not perceive the issue as a threat to their child's health. They also stated that it can take time for mothers to understand that their child is not underweight when the child's weight is healthy.

"I don't know if they do take it on board properly, because, like in this morning and she said he was a fussy eater, she thought he had lost weight, and actually he gained weight, and you'd expected to be really shocked, to be like you know how come he is not eating anything... She didn't seem relieved that he wasn't underweight. So, it is almost like she didn't believe me of what I was telling her, I was showing her the chart, and I kind of had to talk quite a lot about, you know, maybe her idea of the portion was an adult portion and not a little child portion. So, I think she took it on board eventually, but it did take a bit of time." (Health Visitor 5)

Overweight and Obesity: A Sensitive Topic

Both health professionals and early years workers believed that raising concerns about a child's health with a parent needs to be done in a "tactful" way to prevent mothers from becoming upset, feeling judged or guilty. According to the professionals, these negative feelings can result in mothers rejecting the support from the early years workers or health professionals, and "putting up" the barriers to making changes.

"Parents or carers could be quiet, could be quite taken [aback?] by that. And it's quite upsetting, and that's where they pull the barriers and the walls, they don't want to know, they don't want the interventions, whereas if it is the approach in a sensitive way, I think it would be, we would get a different response." (Early Years Worker 4)

Two interviewees referred to the national child measurement programme and explained that some mothers can get upset when they receive letters from school informing them that their child is overweight. They expressed a belief that this might not be the best means of notifying a parent about their child's weight problem. One of them stated the opinion that this information should be conveyed personally and that parents should receive extra information when they told that their child is overweight.

*"I know that sometimes schools can sometimes tell them, tell a parent that their child is overweight and that can be quite upsetting for a parent. I think there are ways and means of talking about it, it is a sensitive subject to some people, about weight."
(Early Years Worker 4)*

"I have people coming into clinic saying (angry voice) "that health visitor said that my child was obese", and you think oh right, ok, just have a think about that, tell me a little bit a thing about more let's have a look of what is happening, is about how you talk to people about things, you know, if somebody said to me you are obese I would feel a bit (groups) ok I am a big girl, I should be able to take it, but actually, it is not you are not addressing a problem, it's about how, how you address and how you use communication to address it in a sensitive way and understanding what it means to that parent as well, but, it is really not nice, and someone comes in, and they are really hacked off with the way that somebody has told them their child is obese." (Family Nurse 1)

Despite perceiving childhood overweight and obesity as a sensitive topic, some health professionals expressed feeling comfortable when raising the issue with the parents. However, despite recognizing it as part of their job and receiving training to do so, they still reported finding it difficult when parents do not perceive obesity as a health concern.

"It can be difficult if the parent perceives it not to be an issue. Um, but I don't feel uncomfortable addressing it because that's part of our role and what we are trained for, but obesity is one of the key, key indicators. It is part of our everyday role, and identifying that, addressing that. It can be an issue when parents, when you've gone through, you know you addressed that, you talk with a parent and they still don't see that there is a problem or a concern. That can be difficult, but I certainly I don't feel uncomfortable." (Health Visitor 4)

Guilt

A few health professionals and early years workers believed that it could be quite difficult for a mother to hear that their child is overweight because they might feel that they are doing something wrong as parents. One of them expressed an awareness that parents could feel shocked in cases where they are not conscious that there is a problem.

"Parents may be a little bit shocked, that might not realise that there was a concerned, so it is in your approach to that. I think it is a sensitive issue, yeah. Because to say to somebody your child is

at risk of obesity it can be quite upsetting if you think if you weren't aware of that issue. And it could be quite upsetting to say to somebody, well actually the current approach isn't appropriate, you need to do this, this and this." (Health Visitor 4)

Stigma

A few health professionals believed that mothers' negative conceptions of obesity might also be a consequence of stigmatisation of cases of obesity in adults and children.

"You don't want them to feel judged, I don't want them to not let me in the door again, and because of the cultural associations about being overweight, it is such a stigma, and I think that stigma is translated into any age, you know that been overweight it is a difficult, there are sometimes in life where there are difficult conversations to have and people being overweight it is just one of them, I think." (Family Nurse 2)

Mother's Use of Terms to Refer to Obesity

Two health professionals expressed concerns that parents may not feel comfortable with the word "obese". One early years worker noted that during conversations that take place as part of an intervention, parents would avoid using the medical terms "overweight" or "obesity", and instead use other terms such as "a bit on a big side", "a bit chubby", or "chunky".

"I think it is something that it is as a society we probably still haven't come to terms with, the word "obesity", which it is interesting is a bit like twenty years ago, the big C, what's the big C, cancer, now everybody says cancer, it is part of what we do, everybody was frightened of the big C, you die from that, and it is very like we got a fear of obesity, and why is that, why is all that about, but like I said is it about, is it something we are trying to get there, to talk about more, we still haven't got there yet, and social media has a big thing to play, but, yeah, hmm I don't know." (Family nurse 1)

Strategies for Talking with Parents About Childhood Obesity

Private Conversations

Some early years workers and health professionals believed that sensitive conversations to raise concerns about a child's risk of overweight have to be done personally and in a private environment.

Early years workers expressed that the format of the HENRY groups makes it impossible to have conversations with the mothers about their child's weight status or risk of obesity. However, two of them claimed that conducting conversations about childhood overweight and obesity is easier in a group as the group environment allows them to generalise and avoid talking about a specific child.

In the case of the health professionals, one health visitor expressed that it is sometimes impossible to raise the issue in the clinics as other parents might be present when the growth assessment of the child is made. However, she explained she would proceed by booking an appointment with the mother and discussing it at her home in such cases.

“You’ve got to be mindful that it is a sensitive issue and if you are saying if you identify that the child is at risk of obesity, or is obese, to say that out loud in the presence of another family may be quite difficult. It may be quite difficult for some parents to hear. But also, if it is the next-door neighbour do they necessarily is personal information don’t want their neighbour knowing that... in the clinic is that, two families can come in at any one time, so could be that if that if, that is issue and is the neighbour who is step behind them then they might not necessary want to discuss that in an open environment, in which case I would make an appointment to follow it up in a different day.” (Health Visitor 4)

Need to Know the Parent to Establish a Relationship of Trust

As expressed in the theme “offering support: challenges and opportunities”, knowing the parent and establishing a relationship of trust are essential for the professionals to be able to support families to prevent or overcome health issues.

Some interviewees stressed the importance of knowing the parents when they need to have sensitive conversations due to uncertainty about how mothers are going to react.

“Yeah, certainly, is more difficult to bring the subject like this with somebody that you don’t know, and because you don’t know how they are going to receive you, and quite often you know in a way they say ok, ok, and you know they might take your advice on board, but what I always say at birth visits is, or even antenatal visits is, I’m not here to tell you how to bring your child up. I’m here to advise you, and the only time that I will tell you if it is something that it is putting the child at risk. You know, so they

can, I can tell them, but they don't actually have to follow what I'm saying." (Health Visitor 6)

Use of Growth Charts and Exploring Parental Knowledge, Beliefs, and Practices

All the health professionals reported using growth charts when trying to explain to the mothers that their child has a growth problem, including obesity or the risk of becoming overweight. For the health professionals, the use of growth charts is useful because they allow parents to visualize their child's weight problem.

*"I say... that is interesting he is going above the two centiles; you know what that means? And ok, "I don't know he is putting a lot of weight", yeah, he is putting quite a bit of weight, and I would say that scenario specific scenario, but you can see this happened and what we are going to do is monitor that, because if he put much weight on, uhm do you know what that means? You know? "So, it would be fat", and yeah, what are the other words if you heard people use. So, it is actually getting them to see well there is obese, obese is a big thing now, isn't it? If you can get somebody to say that word that's great, they've introduced it for you."
(Family Nurse 2)*

Many health professionals described how they would avoid being direct with the parent by saying that the child is overweight or at risk, and instead, would explore the mother's knowledge, beliefs and health practices, and offer solutions.

"I wouldn't just say, based on this chart your child is at risk of overweight without informing it with information wise. So, I would say according to this chart, you know this suggests that your child is at risk of becoming overweight, but we'd explore with parents, so it could be, we could help tackle this by, do this, and if this food is offered. And you know, offering. So, it is not about of saying, we would, I'm trying to think of the words. We would direct it, but we would also offer evidence to help support the family and addressing that. Does that make sense?" (Health Visitor 4)

For example, a couple of health professionals expressed that they would first explore the reasons why the child might be gaining more weight than would be expected at their age and then invite the mother to think about the long-term consequences of childhood overweight and obesity.

"I would look back at the child's weight and say, look it was there, and we would expect, this is normal, what we would expect, but look what's happened, can you, and then I'll say to the parent, can

you think why, they've just suddenly they just jump up, so much weight because they put quite a lot of weight. I'll say yes, they are very healthy, you know, you are doing a great job, but can you think why they've gone up. And I would start there, and then generally, I will keep on going and say, it's, we, we wouldn't want to be seen a child jump up, so quickly so fast. And then I would start to talk about how childhood obesity starts very young and how it often when a child is obese, it impacts later on in life because they are learning things young that stay with along their life. That's coming up completely wrong, you know, but that's why a child, I mean, so I would say we've got to tackle it now, and then I would just ask them what they are giving the child, I would look at portion sizes, I've got to talk about the size of the child's stomach and related to the size of the hand." (Health Visitor 3)

Many of them pointed out that their experience tells them that it is more helpful to explore the mother's beliefs and habits and use them as the basis to recommend lifestyle changes rather than dictating a plan to families.

"Some people, you know would say, this is the base thing to do, this is what you should do, so why you don't do it, showing pictures or, it is not the way that way I work, and I don't really think, the evidence suggests that just through the health information that people is going to make a difference." (Family Nurse 2)

For example, a health professional described how she would approach the subject carefully by exploring what the child likes to eat rather than directly asking the mother what she feeds the child, before exploring what the mother thinks about healthier options and presenting her with examples of healthier options:

"I would say things like, oh what does he like eating for breakfast, rather than what you are giving for breakfast ... so they would say, "oh he loves this, and he loves that". And then I would say, oh that sounds really nice, but have you tried Weetabix? and they'll say, "oh can they try Weetabix? " And I'll say yeah that's really, that would be really good for them, a really good breakfast... you've got to go just going carefully rather than, well, what you need to do is, you know, because that's not going to work." (Health Visitor 3)

A Social Problem that Can Be Solved

Lastly, one of the health professionals believed that when communicating the idea that their child is at risk of becoming overweight with parents, it is essential to let the mother know that childhood obesity is a common problem that can be prevented or reversed in a number of simple ways.

“I think explaining that it is a society problem, that actually there is lots of children you know, there is a lot of children who, who fall outside and the normal range you know... its lots of families who struggle with this, so it kind of makes it less that they are not single there so much. So, explain that it is quite a common problem, but one that they can do something about as well. So, you know to put on the positive side, that you know that there is something that can be done about this.” (Health Visitor 2)

9.3 DISCUSSION

This study aimed to support and expand on the understanding of the quantitative strand of this dissertation by exploring the beliefs that early years workers and health professionals have about the mothers’ attitudes and beliefs about their child’s weight, childhood obesity, and their feeding practices. This study also aimed to inquire into the experiences and practices of health professionals when confronted with the challenge of having conversations with the mothers about their child’s weight and feeding practices and supporting them as they make changes.

9.3.1 Summary of Findings and Comparison with Existing Literature

9.3.1.1 Beliefs Surrounding Health and Weight Problems in Bradford

Health professionals and early years workers had a holistic view of health. They also believed that there is a need for more than just a visual assessment to judge if a child exhibits a healthy growth. Early years workers perceived that they did not have the skills and knowledge to determine whether a child is growing healthily or not. Nonetheless, through looking at the parents and exploring what the child eats, they are able to gain a good indication of a child’s health. Health professionals believed that it was better to assess the growth of the child using growth charts. The fact that health professionals recognise the need of a valid tool to assess a child’s weight is important, as previous studies have found that health professionals tend to visually underestimate the weight of children (Smith, Gately and Rudolf, 2008; Bocca *et al.*, 2016).

Health professionals reported not performing a child weight assessment in every contact they have with a child. Instead, they tend to do it in the event of a parental request, if it has been a long time since the last assessment, or if they are concerned about a child's weight. As previous studies have shown (O'Donnell, Foskett-Tharby and Gill, 2017; Redsell *et al.*, 2017), some health professionals believed that they need to be careful of not measuring the child too frequently to avoid generating parental anxiety.

The early years workers and health professionals interviewed acknowledged that obesity is a serious problem in Bradford. However, they perceive it to be a problem which is more frequently present in school-age children and not in very young children (Edmunds, Mulley and Rudolf, 2007; Redsell *et al.*, 2013). The National Child Measurement Programme (Lifestyle Statistics NHS Digital, 2018) showed that in 2017-2018 in Bradford, 23% of the children were overweight or obese at school entry, evidence that the risk of childhood overweight is often present from an early age.

The perceptions of the early years workers and health professionals that took part in this study were similar to those of the health professionals that participated in a study in England in which they expressed that overweight and obesity in very young children is not prevalent, but that many children are exposed to unhealthy feeding practices (Edmunds, Mulley and Rudolf, 2007; Redsell *et al.*, 2011, 2013). In this study, the professionals perceived that many of the children they have worked with are at potential risk of becoming overweight due to leading poor lifestyles.

9.3.1.2 Perception of Mothers' Attitudes Toward Their Child's Health and Feeding Practices

Like other studies carried out in England, health professionals and early years workers perceived that there is a preference for bigger children among South Asian cultures (Redsell *et al.*, 2013; Middleton and Smyth, 2017). Health professionals from a study that took place in the U.K. (Middleton and Smyth, 2017) perceived that this preference for bigger children was not only exclusive to South Asian cultures, but also to mothers from countries with lower socioeconomic level in which food shortages are experienced.

The professionals of this study believed that bigger children are perceived by mothers of South Asian cultures as healthier and more beautiful when compared to children with lower weight, who tend to be seen as unhealthy. Other studies have also found that health professionals perceive that bigger children are seen by mothers as a sign of wealth and successful parenting (Redsell *et al.*, 2013), and that thinner children represent to some

mothers a sign of neglect and bad parenting abilities (Middleton and Smyth, 2017). Some of the professionals who participated in this study perceived that preferences for bigger body sizes amongst mothers only hold true when children are young.

Based on what health professionals and early years workers expressed, this preference for bigger children and the comments they receive from their family and their social network can cause parents concern about their child's health, and consequently, can lead mothers to change their feeding practices and/or make them seek advice and reassurance from health professionals.

Health professionals and early years workers perceived it to be more common to see a mother who is concerned about the low weight of their child than a mother who is worried about their child being at risk of becoming overweight. As in other studies (Bradbury *et al.*, 2018), the professionals perceived that some mothers would not recognise obesity in their children or accept that they have a weight problem.

Some early years workers believed that obesity is not something that worries mothers since it has been normalised within their communities. These views are similar to those of health professionals from another study in England where mothers were seen to underestimate the weight of their children as a consequence of the growing issue of societal obesity (Middleton and Smyth, 2017).

Some health professionals in this study believe that mothers are not concerned about childhood obesity because weight gain and the consequences of unhealthy eating practices are not immediate. Additionally, some professionals thought that mothers would not accept that their child is overweight or at risk because they lack the skills to improve their child's condition, making them less likely to seek support. This is of concern because, as other studies have found, health professionals observe that mothers who are concerned about their children becoming overweight are more likely to seek advice and follow recommendations than those who do not recognize overweight and obesity as a health concern. (Turner, Owen and Watson, 2016; Bradbury *et al.*, 2018).

The support that health professionals and early years workers offer might be needed because, as other studies have found (Redsell *et al.*, 2011, 2013; Middleton and Smyth, 2017), the professionals interviewed perceived that mothers are not informed about nutrition and adequate feeding practices. In particular, they observed that mothers do not know the proper portion sizes for a child, lack cooking skills, and lack strategies to deal with

their child's behaviour at mealtime. Health professionals and early years workers believed that this lack of knowledge and skills can lead mothers to overfeed their children and feed them with foods with a high fat and sugar content.

9.3.1.3 Factors Influencing the Mother's Health Behaviours

The health professionals believed that some of the factors that influence the mother's weight-related behaviour are their family and social network, not perceiving a child's needs for a healthy diet as a number one priority, the low cost and convenience of unhealthy practices, not seeing overweight and obesity as a health threat, and a lack of knowledge, skills, and motivation.

The professionals believed that South Asian mothers and those from other minority groups in particular have a strong influence of their families on how they feed their child. According to the professionals, mothers often receive comments from their family members that can exacerbate concern about their children not eating enough or not gaining enough weight. These views are shared by other health professionals that participated in previous studies in England (Klein *et al.*, 2010; Redsell *et al.*, 2011, 2013; Middleton and Smyth, 2017).

Moreover, some studies have found that the family of the mothers, especially relatives from older generations, would diminish the credibility of health professionals or would take precedence over the health professionals' advice (Klein *et al.*, 2010; Redsell *et al.*, 2011, 2013; Van Bekkum and Hilton, 2013; Middleton and Smyth, 2017). In this study, none of the health professionals expressed that mothers prioritising family advice over their own. Nonetheless, some health professionals and early years workers believe that some mothers may not control what is eaten at home which could prevent mothers from following the professionals' recommendations.

Similar to other studies (Van Bekkum and Hilton, 2013), the professionals perceive that mothers receive messages from other sources, such as the internet and food industry, which can confuse them, leading them to practices which they perceive not to be ideal.

Some professionals attributed the poor lifestyles of families to the ready access to takeaway outlets in Bradford. A previous study carried out in Bradford found that 95% of the participants lived within 500 metres of a fast food outlet, although a ready availability of other types of food shops which give the mothers the possibility to have access to healthier options for their families was noted (Fraser *et al.*, 2012). The professionals shared the views of the health professionals from a previous study in England (Redsell *et al.*, 2013) in which it

was believed that mothers would consume these foods because they are a cheap, quick, and easy option.

Health professionals and early years workers perceived that, as a consequence of the financial and personal problems experienced by some of the families in Bradford, mothers are more likely to feed their children “cheap and easy” options, less likely to follow the professional’s advice, and tend not to ask for support. This is not the first study in England to find that professionals observe a mother’s economic, emotional, and personal circumstances take precedence over their child’s need for a healthy diet (Redsell *et al.*, 2011, 2013; Turner, Owen and Watson, 2016). In a study by Redsell *et al.* (2011), health professionals often support parents’ decisions not to follow dietary guidelines due to sympathy with the parents’ situations. In this study, early years workers and some health professionals recognised the positive impact of some small changes that mothers going through difficult situations made as a result of their support.

9.3.1.4 Supporting Families

The health professionals interviewed felt that it was their responsibility to assess the children’s growth, raise concerns when necessary, give mothers strategies to improve their feeding practices, and refer mothers to dietitians or groups such as the HENRY programme if needed. Despite this, however, some health professionals perceived a lack of time to assess the weight of the children every time they had contact with the mother. Nonetheless, they stated that they followed up cases if they were concerned and had no time to discuss the weight of the child with the mother.

A previous study carried out in the U.K. (Redsell *et al.*, 2013) found that a few health professionals felt confident in their practices of confronting parents about their child’s weight. Unlike that study, this study has found that health professionals felt that they have the knowledge and confidence to have conversations about childhood obesity with parents. As previous studies have identified (Walker *et al.*, 2007; Redsell *et al.*, 2011, 2013; Larsen, Ledderer and Jarbøl, 2015; Johnson *et al.*, 2018), the health professionals and early years workers acknowledged that conversations about the child’s weight, especially childhood obesity is a sensitive topic. The professionals stated the belief that approaching the issue of childhood obesity with mothers whose children are overweight or obese risks damaging their eroding trust with the parents, and can result in them feeling judged or guilty.

There is uncertainty surrounding the impact that being straightforward with the parents about their child’s weight can cause. It has been argued that stigma attached to being

labelled “overweight” could have a negative impact on the psychological well-being of the person contributing to a worsening of dietary habits (Robinson, 2017). Despite the potential emotional impact of such a conversation, a study (Bentley *et al.*, 2017) found that for parents perceive that the early identification of a future risk of obesity as something positive, although they believe that the communication of these risks needs to be done in a non-judgemental way.

As in the study of Johnson *et al.* (2018), this study found that the majority of health professionals and early years workers understand the importance of having this non-judgemental communication with the parents. The professionals expressed that the conversations that they have with parents are done carefully and subtly. Some professionals expressed that they would not directly tell the parents that the child is overweight. Instead, they tended to use the growth charts to explore the reasons why the child may have gained more weight than expected with the mother to help them understand the problem. One health professional explained that mothers are less likely to feel judged or overwhelmed when dealt with in this way.

Moreover, health professionals and early years workers believed that having these sensitive conversations with parents necessitates the building of a relationship of trust. However, according to the accounts of some of the health professionals interviewed, it often takes time to build up this trust. Other studies in the U.S. and Canada have also identified the importance of the relationship of trust between health professionals and mothers, finding that mothers are open to discussing personal and sensitive issues (Jack, DiCenso and Lohfeld, 2005), and are more likely to follow professionals’ advice when they trust them (Sheppard, 2004).

Despite the above challenges, early infancy was seen by the professionals as a time when mothers are very interested in their child’s health. This could be an opportunity to influence healthy practices. A variety of factors were identified which influenced whether or not mothers were likely to access support. These included mothers’ concern about their children’s weight, behaviour, or health, mothers’ interest in health-related topics, motivation to make changes to improve their family’s health, mothers’ fear of judgement and authority figures, and a lack of time or confidence to go to the support groups.

Lastly, health professionals reported not routinely seeing the children after the age of two, with some health professionals believing that it is the parent’s responsibility to take their child to the clinic if they feel there is a problem. Nonetheless, it is possible that parents with

children at risk of becoming overweight or already suffering from overweight and obesity might not be accessing services as a consequence of the challenges raised earlier and the fact that mothers are not able to identify the need for support.

9.3.2 Strengths and Limitations

This study gives a first glance at the perspective of professionals regarding the behaviour and attitudes of mothers in relation to their child's weight, childhood obesity, and feeding practices, which will be explored later in this thesis.

To the researcher's knowledge, this is the first study exploring the views that health professionals and early year workers working in Bradford have around the mother's attitudes about their child's weight and feeding practices. Additionally, this study adds to the small number of previous studies that have taken place in England that have explored the health professional's experiences when providing support to mothers in relation to their young child's weight (Edmunds, Mulley and Rudolf, 2007; Redsell *et al.*, 2011, 2013), and feeding practices (Middleton and Smyth, 2017) in other regions in England. Further, the researcher found only one study has explored the views of early years workers in relation to mothers' perceptions of weight and healthy eating (McSweeney *et al.*, 2016). Identifying their understanding is necessary because, as service providers, they are likely to have conversations with the mothers about their feeding practices and other weight-related practices. Moreover, given their role, both early years workers and health professionals should ensure that those who need lifestyle and weight management programmes are aware that such services are available to them and are informed about how to enrol (NICE, 2015).

As in other studies, health professionals were a difficult group to recruit (Redsell *et al.*, 2011; Johnson *et al.*, 2018). Due to the small sample size and the context in which the interviewed professionals work, it is possible that the results might not be generalizable to other regions in England. Additionally, the majority of the professionals in the sample worked mainly with South Asian families. This means that the results might not hold true for the behaviours and beliefs among non-South Asian families living in Bradford.

It is essential to consider the possibility that the health professionals and early years workers that took part in this study were interested in the topic or were more confident when providing support to mothers about childhood overweight. Findings could not reflect the point of view of all health visitors working in Bradford.

9.3.3. Implications

9.3.3.1 Practice Implications

As in previous studies in the U.K. (McSweeney *et al.*, 2016), the health professionals and early years workers identified some of the challenges that mothers face to ensure their children maintain a healthy weight which included social and cultural influences, personal problems, a lack of knowledge on nutrition, and a lack of skills to undertake healthier behaviour. This shows the importance of programmes such as the health visiting programme and HENRY in supporting mothers in the prevention of childhood obesity from an early age.

Health professionals and early years workers perceive that mothers are concerned that their children are healthy – a factor that could help to keep mothers engaged with the services. The health professionals and early years workers also identified some of the challenges in providing support to mothers. These challenges included: mothers not perceiving childhood overweight and obesity as a health concern, a lack of time or motivation, the fear of judgement, and a lack of trust. This shows the need for providing support in a variety of formats which are culturally tailored to address some of the barriers earlier identified.

The professionals recognised that mothers rarely take their children to the clinic because they are not concerned about their children being overweight or unhealthy eating practices, especially between the age of two and the time a child starts school. This could suggest that it is possible that those children at risk of becoming overweight or those already overweight are not identified on time, with support not being provided for the mothers who need it. A possible solution would be to have another health visit between the ages of two and four or assessing a child's weight every time health professionals have contact with the child. In case of concern, health professionals should guide the mothers to the services offered within Bradford. Nonetheless, some challenges to doing this may arise. For example, health professionals described a lack of time and resources to do child weight assessments. Also, as health professionals from other studies have suggested (O'Donnell, Foskett-Tharby and Gill, 2017) professional feedback could be taken negatively by mothers in cases where the weight of the child is not the main reason for the mother taking her child to the clinic. Moreover, as described earlier, the effects that providing feedback about the weight of their children could cause in the overall health of the mother and child is not entirely clear. Still, we need to consider that the opportunity to raise concerns and offer support to the parents could be missed without these assessments.

Having conversations about a child's weight was perceived as a sensitive topic to raise with mothers due to the risk of them feeling judged and reluctant to make behaviour changes as a consequence. There is a need to equip professionals with the necessary skills for them to feel confident when raising concerns about a child's weight with its mother.

In addition, efforts are needed to decrease the stigma surrounding childhood obesity so that health professionals can feel more confident about having conversations about weight problems with mothers, and mothers are less likely to feel judged and feel more confident when requesting for support.

9.3.3.2 Research Implications

This study explores only the experiences that health visitors and nursery nurses have when holding conversations with the mothers about their child's weight. Further research should examine the beliefs and practices that other health professionals hold (e.g. general practitioners, nursery nurses, and dietitians). Moreover, there is a need for exploring how communication between health professionals, early years workers, and mothers can be optimised. Particular attention should be focused on how these conversations can be approached in a non-judgemental manner, while at the same time pushing the mother to identify the need to take action to prevent childhood obesity.

Given the stigma surrounding childhood obesity, there is a need to look at the effect that providing feedback to the mothers about the child's weight may have on their own and their child's wellbeing, and especially its impact on a child's consecutive weight and the mother and child's mental health.

Lastly, it is important to explore whether a mother's beliefs and practices are congruent with those perceived by health professionals and early years workers. Doing this can help us to identify whether health professionals understand the needs and challenges that mothers living in Bradford have to ensure their children maintain a healthy weight.

9.4 CONCLUSIONS

The interviews with the health professionals and early years workers gave a first glance of the beliefs and practices that mothers of pre-school children living in Bradford have about their child's weight, childhood overweight and obesity, and their feeding practices.

Health professionals and early years workers perceived that despite not seeing many pre-school children that are overweight, many children living in Bradford are at risk of overweight

due to their mother's unhealthy feeding practices. Health professionals perceived that mothers not always recognise that their child is overweight or at risk. This was identified as a barrier to offering support to mothers so that they can ensure a healthy weight on their children.

Some of the potential barriers that mothers face to developing healthier behaviour and the challenges to accessing support to improve their child's weight were identified from the professional's interviews. Also, as other studies have shown, health professionals perceived that mothers from South Asian cultures had a preference for bigger young children, and that having conversations with the mothers about the child's risk of becoming overweight should be done sensitively.

Further research should explore whether the perceptions of the professionals correspond to the mothers' beliefs and practices. The following Chapter presents the results of the interviews with mothers of pre-school children living in Bradford.

Chapter 10 - Mothers' Beliefs and Attitudes towards Their Child's Weight and Feeding Practices - Interviews with Mothers of Young Children: Results and Discussion

10.1 INTRODUCTION

The previous Chapter presented the results from the interviews with the early years workers and health professionals working with mothers and their pre-school children in Bradford. In it was possible to identify some of the factors they believe may influence the mothers' health behaviours and their beliefs about their child's growth.

This chapter presents the results of the interviews that were conducted with a multi-ethnic sample of mothers of children under the age of five and who lived in Bradford. This research seeks to expand the comprehension of the factors that influence mothers' perceptions and concerns about their child's weight and their feeding practices as well as their beliefs surrounding them.

Fourteen mothers agreed to take part in semi-structured interviews. As described in Chapter 8, the transcripts were analysed using thematic analysis. Three core topics with their respective main themes were generated during the analysis of these interviews. These topics are: "Mothers' Beliefs Surrounding Health, Health Behaviours, and Weight", "Challenges and Opportunities for Healthier Lifestyles", and "Sources of Advice and Support for Mothers". This Chapter will first present the participant characteristics and recruitment rates, before presenting each of the core topics in turn. Following the results the discussion and conclusion of the Chapter are presented.

10.2 RESULTS

10.2.1 Participant Characteristics and Recruitment Sites

Recruitment and interviews took place between November and December 2017 at children's centres and in one community venue in the City of Bradford, U.K. As described in Chapter 8, after having consent from the gatekeepers, mothers with at least one child under the age of five received a printed and verbal invitation with further details of this research project,

during regular activities (i.e. stay and play groups) within the recruitment sites. From the forty-four mothers that were invited, fourteen mothers agreed to participate in the semi-structured interviews (Figure 10.1). The majority of the participants preferred to be interviewed at the time and place where the activities were taking place. Hence, during the majority of the interviews, the facilitators of the activities, other parents, and some children, including the mothers' own children, were present in the same room. Only two interviews were conducted in private rooms with the mother only.

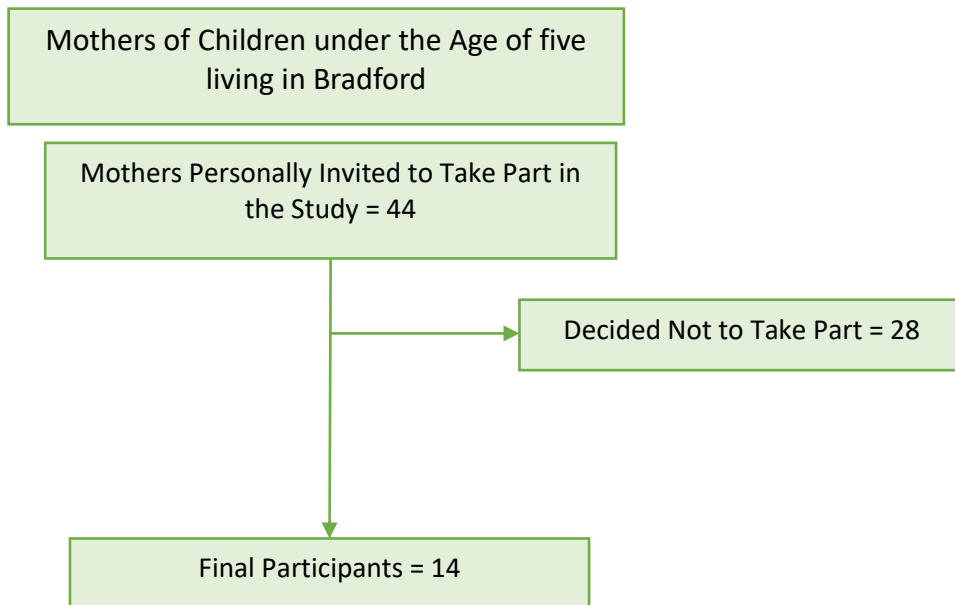


Figure 10.44 - Flow chart of include/excluded mothers of children aged five or under living in Bradford

Table 10.1 shows the characteristics of the fourteen interviewees. The mothers' ages ranged between twenty-one and forty years old, and they had between one and six children. Four mothers preferred not to give information about their weight or height. It was not possible to determine the weight status of the children as mothers were not able to recall the height and weight of their children.

Participant Characteristics	N=14
Ethnicity	
White British	5
Pakistani	6
Other	3
Place of Birth	
Bradford	6
Outside Bradford but in the U.K.	5
Outside the U.K.	3
Age	
24 and under	1
25 - 35	10
36 or older	3
Weight Status	
Healthy weight	6
Overweight	3
Obesity	1
No data	4
Partner Status	
Partner (living together)	13
No partner	1
Parity	
First-time mother	2
Two children	4
More than two children	8
Youngest Child Age	
One year or under	7
Two to five years	8
Sex of Youngest Child	
Boy	5
Girl	9

Table 10.37 - Characteristics of mothers recruited to the study

10.2.2 Coding Framework

The analysis of the data yielded the three core topics presented in Figure 10.45. These core topics have their corresponding themes and subthemes.



Figure 10.45 - Core topics generated from interviews with mothers of pre-school children living in Bradford.

10.2.3 Mothers' Beliefs Surrounding Health, Health Behaviours, and Weight

This core topic concentrates on the mothers' beliefs surrounding health, health behaviours, and weight. As seen in Table 10.3, this topic constitutes three main themes: "A Holistic View of Health: Mother's Perception of Her Own and Her Child's Health", "Weight", and "Health Behaviours: Beliefs and Practices". These themes will be presented in turn.

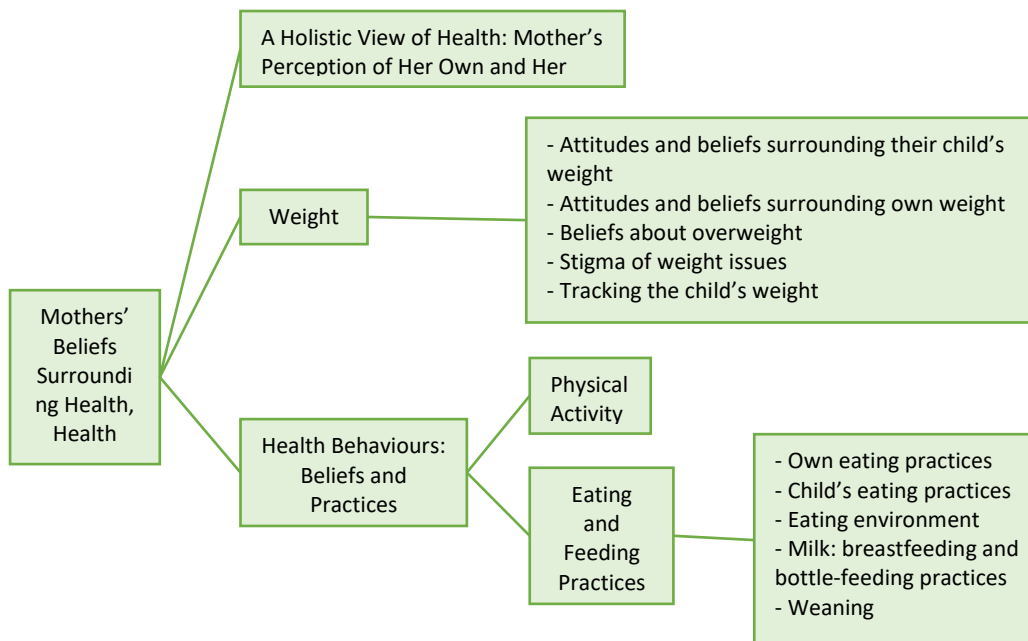


Figure 10.46- Coding Framework of core topic: Mothers' Beliefs Surrounding Health, Health Behaviours, and Weight

10.2.3.1 A Holistic View of Health: Mothers' Perceptions of Their Own and Their Child's Health

For the mothers, health primarily meant healthy eating practices and healthy weight. However, they also reported happiness, physical appearance, the absence of disease, high energy levels, and physical activity as important aspects of health.

There was a general belief among the mothers that their children were healthy. The majority of the interviewees thought this because they perceived that they were eating healthily, were active, had energy, and were of a healthy weight. Additionally, some mothers considered their children to be healthy because they had good emotional health (i.e. the child is happy) and do not often suffer from illness.

"They are quite healthy; they do not stay sick for a long time. Um, they eat quite healthy, so they'll eat fruit and things like that, and

they get excited at school, and they get excited when they play as well.” (Mother 13)

Some mothers described themselves as “health-conscious” and feeling healthy, while others thought they were not as healthy as they would like to be. These mothers felt that they needed to increase their physical activity, improve their diet, and rest more.

“I guess I’m trying to be healthy, but not as I would like to be. I don’t have time for exercise right now, but I would like to do some exercise. I think that’s the main thing.” (Mother 3)

The majority of the women were unsatisfied with their weight. Only one mother expressed that there was nothing she believed she could change or do to be “healthier”, as she was already taking actions to improve her health.

Interviewer: *“Is there anything you could do to improve your health?”*

Mother 1: *“No, because I am already, I am already doing it right now. My eating habits, I have changed them recently, due to illness, and due to just wanting to lose a bit of weight. So that’s changed recently. We are having a lot more less fats on the food, everything we make anyway is fresh, but I always used to use too much fat, too much sugar, so now I’ve learned to moderate, and get it there.”*

Further detail on mothers’ attitudes toward their own and their child’s weight and eating practices are described in the themes: “Weight” and “Health Behaviours: Beliefs and Practices”.

10.2.3.2 Weight

As seen in Figure 10.4, this theme is constituted by four subthemes which concentrate the beliefs that mothers have around overweight, the mothers’ beliefs around their own weight; the mothers’ beliefs and experiences around their child’s weight and assessing their child’s growth; and their beliefs around weight stigma in Bradford.

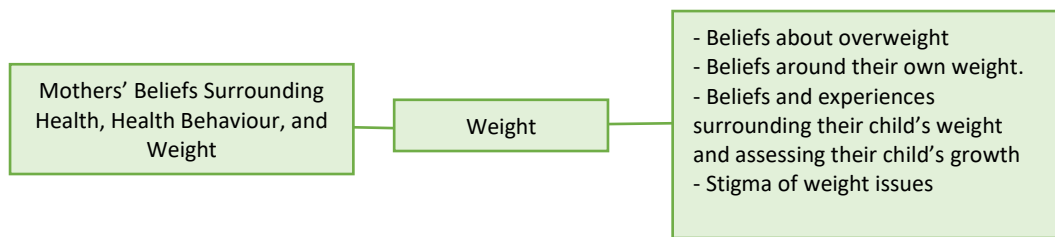


Figure 10.47 - Coding Framework of the main theme: Weight, from the core topic: Mothers' Beliefs Surrounding Health, Health Behaviours, and Weight

Beliefs about Overweight

All the mothers considered childhood obesity to be a health concern and expressed that they would be concerned if their child was overweight. A small number of mothers expressed that it is not uncommon for them to see children who are overweight in Bradford.

***"I always see the chunky children, so to me, that looks normal. That they are chubby, some children that I see, and I think "Oh my goodness, I would be so concerned if my child was that fat." Sorry, I cannot say that, you know what I mean, because some kids, for their ages are a bit too big, to me that's a concern."
(Mother 4)***

There was a general understanding that unhealthy diets and a lack of physical activity cause obesity, while nearly half of the mothers thought that children can become overweight or be at risk of becoming overweight as soon as they start eating unhealthy foods. A couple of mothers expressed a belief that the high availability of unhealthy foods in Bradford put children at risk of developing overweight.

"No little is fine, but then they get, when they know how to eat and everything, then they'll choose most of the time, nowadays mostly fast food, like from takeaways, and the chocolate intake, and sweets and sugary stuff." (Mother 9)

A small number of mothers believed that there are medical conditions and genetics that cause overweight even if a person leads a healthy lifestyle.

"Sometimes people get themselves in that situation, but sometimes there is an underlying medical condition, and they can't help the way they are." (Mother 7)

Some mothers felt it to be their responsibility to prevent overweight in their children by giving them healthy diets and encouraging them to do physical activity. Other mothers observed that there are parents that do not encourage their children to eat healthily because

they are lazy, they want to “spoil their children”, or because it is easier to avoid arguing with their children by ceding to their demands for unhealthy foods.

“People takeout food, you know they use takeout food. Pizzas and that’s what kids like as well, is easy to not have an argument at mealtime and just order a pizza, so I kind of understand why children can get overweight. They think that spoiling the children, so they want to give them this kind of foods, which is not healthy, but they don’t see it in that way.” (Mother 5)

The majority of the mothers were aware of some of the consequences of being overweight. Two mothers were not able to mention any of the consequences; however, they knew that obesity has health implications because they had been told by their health visitor and heard news reports describing the negative effects obesity has on health. Moreover, two mothers believed that being overweight was a health problem only if it is excessive or caused by unhealthy lifestyles.

“You can have health consequences. As long as it is not excessive, then, you know.” (Mother 1)

Mothers reported problems associated with childhood obesity; for example, the risk of developing diabetes and being overweight in adulthood, the risk of developing coronary heart disease, and musculoskeletal and respiratory disorders. A couple of mothers were also aware that childhood overweight could affect the emotional health of the child as a consequence of being bullied at school.

A small number of mothers believed that being overweight affects children’s ability to be physically active because children who are overweight lack energy and the ability to move as a result of the excess weight.

“They obviously become lazy, they wouldn’t do anything if they are overweight. It’s harder for them to be active if they are overweight, I think.” (Mother 11)

Attitudes and Beliefs Surrounding Own Weight

The majority of the mothers said that they wanted to lose weight, while two of them expressed feeling uncomfortable with their actual weight. Two mothers perceived that they had gained weight since they had become mothers and believed that this was a consequence of pregnancy or stopping breastfeeding.

“I think I put some weight on after I stopped breastfeeding her, I put on a lot of weight. I don’t know, I feel uncomfortable, so I really want to go back to my healthy weight.” (Mother 11)

On the contrary, two mothers believed that their weight was low as a consequence of not having time to eat and being very active while taking care of their children. Only two mothers were satisfied with their current weight. One of these mothers mentioned that she had been classed as overweight by health professionals, yet she described feeling healthy enough because she was already implementing actions to improve her health. Hence, she felt that her overweight was not a problem for her health.

“I have been classed as overweight, but I was healthy, so it wasn’t overweight to me.” (Mother 1)

Beliefs and Experiences Surrounding Their Child’s Weight and Assessing Their Child’s Growth

The majority of the mothers did not know their youngest child’s height and/or weight. Many of the mothers reported that the last time their child had had their weight assessed was the last time they saw the health visitor. Despite some mothers having taken their child to the clinic for other reasons, they reported that health professionals had not assessed the weight of the children on many other occasions that they had visited the clinic. This meant that many children who were three years old had not had their weight assessed in the past twelve months. The majority of the mothers believed that their children had a healthy weight and height at the time of the interview. None of the mothers thought that their child was overweight at the moment of the interview or had been overweight in the past, and none of them said that health professionals had told them that their child was overweight or at risk. On the other hand, half of the mothers felt that their child’s weight was low at the time of the interview or had been in the past. Nonetheless, only a couple of them were ever told by a health professional that their child’s weight was low.

The mothers that perceived that their child’s weight was healthy at the time of the interview believed so because they had previously been told that their children did not look underweight or overweight by a health visitor and because their children were growing out of clothes and eating healthily.

“She looks fine; she is growing, she is, you know, above average, and, her weight seems fine. They are growing out of clothes; they are getting bigger.” (Mother 14)

Despite the fact that none of the mothers believed that their children were overweight, a small number of mothers would refer to one of their children as “chunky” or “chubby”. For example, one mother said that she would call her five-year-old girl “chunky” as she was heavier in comparison to her eight-year-old son. Similarly, to this mother, a couple of mothers expressed that their eldest children were “chunky”. Still, these mothers considered their children’s weight to be healthy.

“She (youngest child) is a little chunkier, but she is not overweight. I call her my chunky one because (eldest boy) is skinny; he is really skinny and bony.” (Mother 10)

A couple of mothers believed that it is normal for very young children or babies to be “big” or “chubby” and that these children will “grow out of it” when they start walking and teething.

“They burn that energy when they grow when they start walking and stuff. I think they lose that weight when they are teething, they lose that weight when they are walking, yeah because he was quite healthy, and like chubby, and then I wouldn’t consider him as overweight because once he was walking and teething, he lost all that weight.” (Mother 11)

One non-South Asian mother believed that parents would never perceive their young children to be overweight because they are babies and supposed to get bigger. She added that parents would not perceive overweight until a child is three or four-years-old.

“From other mums I have met, I felt like when the child is young, such as him, you know, there is no perception of the child is fat, nobody ever thinks that, or overweight, no, nobody ever thinks that, no, or underweight, because they are a baby. When they are getting bigger, it is actually a good thing, you know. But when they get through like three years old, four years old, the child is getting quite overweight, at three or at four then it becomes a concerning thing. To go at that age where a parent should know what a child should be fed, so they are not just getting milk, breast milk they are getting food like everybody else so if the three or a four-year-old is getting overweight then it is a concerning time, but here, I feel like he is a baby he is supposed to get fat. So, I know he is good.” (Mother 8)

Some of the factors that made the mothers concerned about their child having a low weight were medical conditions; beliefs that the child would not get enough nutrition through

breastfeeding or foods; comparisons with other children; and family comments about the child's weight. For example, a child suffered from reflux which negatively impacted on its weight. The mother of this child received support from a health professional, and after the child got better from the reflux, the mother no longer felt concerned.

“When the reflux was bad, I was concerned that she wasn't gaining as much (weight). I expected it to be more than she was, because she was vomiting a lot, and she didn't put on weight as quickly when she was like four, five months old. Like I said, she started the weaning, she's been absolutely fine. I've got no issues.” (Mother 12)

A small number of mothers that breastfed felt that their children were not gaining enough nutrition from their breastmilk. However, the health visitor reassured them that their children exhibited healthy growth.

“I was concerned about her because she was so small, and she was thin because I was breastfeeding, so she wasn't feeling so well, so I was concerned that she was not gaining weight. She, you know she was looking very small, but when they weighed her, they said “Oh, that is why she doesn't look like as plump because she is breastfeeding, and breastfed kids don't get really gain mass as such.” They are healthy on the inside, but they kept an eye on her they said she is fine, but that was, I was worried about her when she was a baby, but yeah, she was OK.” (Mother 4)

Many of the South Asian mothers described how they would receive comments from their family (e.g. parents and parents-in-law) and members of their community about the weight of their children. According to the mothers, people told them their children looked “small”, “slim”, or “skinny” and not as “big”, “heavy”, “chubby”, or “chunky” as other children (i.e. mothers' older children). Some mothers expressed that these comments made them have doubts about the health of their child, if their child was eating enough, or whether they were caring for their child properly.

“She wasn't unhealthy; it was just her weight was nothing compared to what his (older brother) weight was, it was a weird thing for me because I used to think he is quite healthy and chubby how come she is not. They (parents) were the ones who were raising the concern in me, they said: “oh she is not as healthy as him, is she not feeding properly?” You know, things like that. But then, I wouldn't let it stress me out because I know that that's

not the case, she is fine. She is healthy; it's just how her body is, she doesn't have to be the same as him." (Mother 11)

A small number of South Asian mothers perceived that a "big" or "heavy" young child is seen as "healthy" and "strong" in their community. However, based on what the mothers expressed, none of them reported sharing this belief at the moment of the interview.

"They (people from the community) think that it is a good thing that their kids are big and fat and strong. I think they think fat is strong, that's what it is, they think that a skinny child or a normal size child can't be strong and healthy. They think that the bigger the child, the healthier they are. But it is not always the case, you know, just because they are big and chubby it doesn't mean that they are healthy, they might be the ones who are getting the colds and flus every time." (Mother 4)

A couple of South Asian mothers wished their child "ate more" and reported attempting to make their child eat more. However, the children showed signs of fullness (e.g. turned around or started playing) which made mothers stop pressuring them to eat.

"I am concerned about my son not eating enough. He is at the right height and weight, but that's just the way he is, he is just tall and slim. At first, I did though, oh my gosh he is not getting enough food down him, but he doesn't seem, like he is hungry or tired, or you know, there's something wrong with him. I was literally running around the house after him going "eat this, eat this". My husband said, the more you do that, the more he is going to think it is just a game and run around. So, I just leave him, I cut the food, and then I leave him. If he doesn't want it, he carries on playing, so that's what I do, that's how I learned, if he is hungry, he'll eat, if he is not, leave him." (Mother 7)

Some of the factors that reduced or stopped mothers' concerns about their child's weight were getting reassurance from the health professional that the child presents a healthy weight; children recovering or gaining control over a health condition that may have affected eating or weight; the perception that a child is eating healthily; an understanding that every child's growth and development is different; and perceiving their children to be strong, happy, and active.

"...my children are slim-built, especially my boy. I look at him, and he looks very skinny. So, I always got that worry that, you know, he is not, I know he was eating, and that he has been fed. I think I did used to feel from my in-laws. When I was younger, my mum

said I was like that, the same as my son. She used to have the same problem; not the problem but, neighbours and friends said the same things to my mum, "Look at her; she hasn't been fed?" But you know the health visitor would say according to his height, and his weight, he is fine he is just a lean baby, tall boy, and that's his metabolism, and he is fine, so I was happy with that." (Mother 6)

"She could eat a bit more; she doesn't, you know the doctors haven't said she is underweight or anything. I don't know if other mothers do it, but I look to other children, as well, and you know, I've seen children that are thinner than her, but you know, their parents don't seem concerned, so I just think that it's children, they just grow and develop at a different rate. You know, if they are not happy, if they are not playing, if they are always sick, then you know, they are unhealthy, because sometimes you can get children who are like you know, chubby, lots of weight, then they are not playing, or they are always ill." (Mother 3)

Assessing the Child's Weight

Many mothers said that they had taken their children to the clinic to have their weight assessed at least once when the child was younger. Mothers would take their children to the clinic because they were concerned that the child was underweight or were looking for reassurance that their child was growing healthily.

"I went a few times apart from those, but mainly in the first twelve weeks to see if she was gaining properly, but then after that, I think it was not that much." (Mother 14)

"When they were babies, we used to go once a month and check the weight. You want to know that you are doing it right. Especially when they are little, there's, you know you want that reassurance that they are growing and that they are healthy, so that's the reason, why we'll go." (Mother 13)

At the moment of the interview, half of the mothers felt that their child did not need to have his or her weight assessed. They believed that their children were healthy, and they were well-cared-for, and hence, that there was no need for doing the assessment. However, they said that they would take them to the clinic if they were invited or were concerned about their child's health (e.g. child would stop eating, start losing weight, the child was poorly, or there were changes in child behaviour).

“They started going to nursery... I’ve never had the belief of really take them unless there was an issue. So, I’ve never taken them to the health visitor, only when they were small. When they were using nappies, I guess. I feel myself that he was underweight or overweight or any kind of issue... then I would probably take him, you know, and speak with the health visitor.” (Mother 5)

A few mothers felt that they needed to go to the clinic to have their child’s weight and height assessed as it had been a long time since they had last done it. One of these mothers was a mother of a six-month-old child who wanted to see how her child was growing.

“I am not up to date with his measurements. I can see he is growing, and he is getting bigger and bigger, but I want to know what is his weight, what is his height, because I thought, like, he is tall, you know for a six month baby he is pretty tall, his dad is really tall, and he is really tall, so I feel that he is going to take after his dad height, I just want to keep up to date. It’s not about the health visitor; it’s just about me as parent. He is my first baby.” (Mother 8)

A small number of mothers said that they would occasionally measure the height or weight of their children as a matter of habit and nostalgia. A couple of these mothers considered it necessary to assess the height and weight of their children once in a while. The mother of a six-month child said that she would be tracking her child’s weight less often as she believes that in older children it is easier to identify if there is a problem.

“I think that once he becomes a toddler it is so much easier to tell how a toddler is; you know you see how they are eating, the sports they play, the activities, because obviously at that age they are strong enough to do activities, they are strong enough, you know to feed themselves, you know, obviously the food you are giving them and the things they are doing.” (Mother 8)

Only one mother expressed that she considered it necessary to track her children’s weight once in a while to prevent childhood overweight.

“To buy the clothes and just to see how she is growing, because I don’t want them to be overweight. My eldest is slightly overweight; she is a bit chubby. So that’s made me now think of this too, and make sure that they are healthy to start with. So, I every so often get them weighed, measured, just to see if they are growing in the right sort of line.” (Mother 7)

The barriers that mothers believe prevent them from assessing their child's height and weight included a lack of time to take their children to the clinic, forgetting to do it, and not being able to take them if the child falls asleep.

"I might do, because I might take my daughter, to get her checked again. I might do, but sometimes it comes out of my head. I forgot which date. I am just checking the book. Yeah, I might take them again, just to check their height and weight." (Mother 11)

Stigma of Weight Issues

A small number of mothers believed that people making comments about their children's weight can make them feel that they are bad parents.

"It's like you can't win. If they are overweight, they say, "Oh, look, you know, your child is overweight; they need to lose weight." If they are too skinny, they are like, "Oh, look, your child is too skinny. Feed your kid." (Mother 7)

For example, a couple of mothers who perceived their child's weight as low expressed that they have received comments from other people in the community questioning whether they care properly for their children. These mothers felt the comments to be hurtful or judgemental. However, these mothers claimed that they had learned not to pay attention to such comments.

"I think people do judge; they judge you as a parent according to how chubby your child is. If your child is skinny, they think you are a bad parent, or you are struggling financially. You are not feeding your children, that's another thing. That's another thing that says to me, that they had said to me, "Oh, your husband doesn't earn enough to feed your children?" It's like a sarcastic, a lot, that you know that people make that." (Mother 4)

"They want to pull me down; you are not looking after your children properly; they just want me to feel bad. It does worry me a bit because you know then I think... "Maybe I haven't seen it (low weight)... maybe there is something wrong with my child." Sometimes it does worry me, but I think I am learning how not to be so worried, and not listen to them so much." (Mother 3)

A few mothers believed that they could also be judged if their child was overweight. A couple of these women acknowledged that they have judged other parents and thought that they might not be caring enough for their children's health. A couple of mothers expressed that

they would not judge other parents if their child was overweight as they know that childhood overweight can be caused by genetic factors or a medical condition and is not necessarily a result of the parent not prioritising their child's health.

"It depends on the, why the overweight if the child eats healthy, it's not the child's fault, it's not the parent's fault. You can see children who are overweight, but people judge and assume straight away that they are having all of this stuff, when in fact it's not, it's medically and genetics, so you can't judge that "Oh, this child is overweight." You don't know why they are overweight, so I don't judge." (Mother 1)

A small number of mothers expressed that school-age children can get stigmatised for their weight and be bullied. One of the mothers expressed that her eight-year-old child is bullied at school and has suffered negative health effects as a result.

"They call her fat, so she gets really upset about that. Her friends who are a bit chubby, they get bullied. Also, it is a group of children who are constantly bullying the bit chubby kids. It's affecting her because she comes home and said awful things, you know, like, you know she comes home and say that she wishes she was dead." (Mother 7)

10.2.3.3 Health Behaviours: Beliefs and Practices

As can be seen in Figure 10.48, this theme encompasses the mothers' beliefs surrounding her own and her child's physical activity and eating practices. Although this research did not initially aim to explore mothers' beliefs about physical activity, this was a topic that some mothers touched on throughout the interviews.

The Subtheme "Eating and Feeding Practices: Beliefs and Practices" covers five areas: Child's eating practices; Mothers' eating practices; Eating environment, Milk: breastfeeding and bottle feeding; and Weaning.

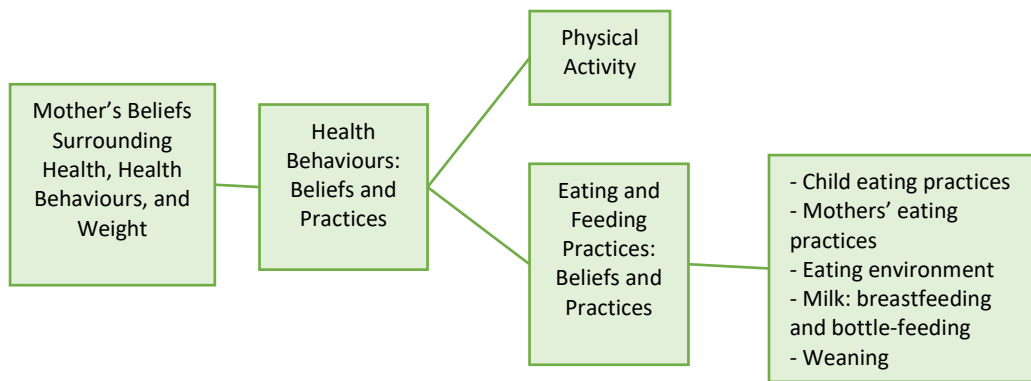


Figure 10.48 - Coding Framework of the main theme: Health Behaviours: Beliefs and Practice, from the core topic: Mothers' Beliefs Surrounding Health, Health Behaviours, and Weight

Physical Activity: Beliefs and Practices

Several mothers considered “physical activity” to be a necessary factor in good health. Half of the mothers believed that their children are very active because they are always “playing and jumping around”. Only one of the mothers mentioned that she would take her children to do some extra physical activity (swimming), and one other described how she was doing her best to keep her children active.

Some mothers believed that they were active enough, while a few others stated a desire to increase their own physical activity. Some mothers felt active enough due to the high levels of energy they expend in the daily care of their children. Some mothers also expressed the belief that walking everywhere was a good means of keeping themselves active. One of these mothers, however, believed that she needed to increase her physical activity as walking might not be enough to help her to lose weight.

“I do walk a lot, but maybe that walking is already so used to it, my body is so used to it is maybe not affecting it. So, change in my routine of exercise.” (Mother 11)

Two White British and one African mother stated that they do exercise (e.g. running or jogging). The barriers that mothers perceived to exercise were health problems (i.e. back problems), the weather, and a lack of time or support from their community network.

“Um, well, I used to run. I used to go running, but obviously I don't do it now because it's cold.” (Mother 14)

Eating and Feeding Practices: Beliefs and Practices

The majority of the mothers believed that eating healthily was an important factor in staying healthy. The most often mentioned dietary behaviours that mothers considered “healthy”

were eating a “balanced and varied diet”; consuming “home-cooked”, “fresh” foods, and “fruits and vegetables”.

Furthermore, the majority of the mothers expressed that consuming “takeaways”, “processed and frozen foods”, “sugary beverages” and “junk food” were unhealthy eating practices. Some mothers considered maintaining adequate portion sizes to be important in maintaining good health. In addition, some mothers believed that skipping meals was an unhealthy practice.

Beliefs About Own Eating Practices

Among mothers, there were different opinions about their own eating practices; some mothers felt their diet was healthy enough, whereas others were aware that their eating practices were not ideal.

The majority of the mothers expressed that they would have the same meals as their children at dinnertime. Only one said that she would have different food than that which she gave to her children due to her own food allergies. Another mother stated a preference for eating takeaways due to her perception that they were easier and more convenient. For lunchtime, some mothers described eating the same food as their children. Others described eating different food because their children would have lunch at school or nursery, or because they felt they had no time to eat. Hence, some described a tendency to skip meals or eat snacks (e.g. biscuits) instead of eating a healthy lunch. The mothers who perceived that their diets were unhealthy said that they did not include enough fruits and vegetables in their diets, while others perceived a need to cut down junk food (e.g. consume less fizzy drinks and sweets) or stop skipping meals despite believing their diet to be healthy.

“Not as healthy as they could be. I don’t include five a day, as I probably should do. I do try to include green, greens, or veggies in almost all evening meals. Sometimes, I just put mushy peas on it instead, yeah.” (Mother 10)

“Um, it depends what kind of day I’m having if I’ve got time to eat or not, so I know if I pre-plan what I’m having, then I would probably eat more healthy. With me, it’s on the day, but I might not have breakfast or lunch or whatever. I do tend to miss meal times, which isn’t helping me because I run out of energy at the end of the day, but I know it can be healthier, like you know, I don’t know, not having fizzy drinks, or candies, or some chocolate or something. But I know it can be healthier. (Mother 7)

Some of the mothers considered their diets to be healthy because they do not have “junk” food and cook all of their meals instead of having takeaways. Some mothers claimed to be careful about what they eat, while two expressed that they cooked with less oil or sugar in comparison to what they did in the past.

A small number of mothers expressed that they were engaged or had a desire to engage in certain practices (e.g. stop or consume a DETOX diet, drink green juices or herbal teas) with the intention of benefiting their health. This shows a willingness among the mothers to make behavioural changes to improve their health, but also confusion about the health benefits of some products, possibly advertised as “healthy”, but lacking the scientific support to back their claims up.

“Well, I am trying to, like, monitor food as well. What I am trying to do, I did try and find out if I can go in any kind of weight watchers or something where I can get some additional help. I haven’t got to it yet, but yeah, I am trying to do, like, detox and stuff.” (Mother 11)

Beliefs about Their Child’s Eating Practices

The majority of the mothers perceived their children’s diet to be healthy, and many mothers expressed that they try their best to give their children a healthy diet even if they did not perceive their own to be healthy.

“I snack a lot because I miss out the breakfast and then I just end up eating chocolate, or crisps or, biscuits, so I do not make the right choices for my own self, but for the kids, I make sure they got the right food if that makes sense.” (Mother 5)

Home-Cooked Foods

Many mothers described that they would often cook from scratch due to a belief that it is healthier.

“I cook. I have one child in home, just two persons. I am cooking every day, I am trying to cooking healthy and good for stomach, for everything, healthy food.” (Mother 15)

However, some mothers felt that this required substantial time and planning. Some claimed to receive support from members of their family (e.g. older children and partner) to prepare these home-cooked meals. Some mothers expressed having some strategies to make cooking quicker; for example, buying things halfway cooked (i.e. mashed potatoes) or freezing pre-cooked foods. Others, however, consumed ready-made and frozen foods when

not having enough time to prepare meals. Consuming frozen foods was perceived as an unhealthy practice by a few mothers. Two described how they would eat them more infrequently or in a healthier way (i.e. heated in the oven rather than fried).

“If really don’t have anything to cook, or if I don’t have time, so I quickly, you know that’s quick, but generally, I try to cook all their meals. And if I do give them fish and chips, I usually put them on the oven rather than fried.” (Mother 3)

Balanced and Varied Meals

Mothers believed that it is important to cook balanced and varied meals. A few South Asian mothers believed that their children should have different foods at each mealtime. A couple of mothers expressed a belief that giving their children varied meals would keep them interested in food and prevent them from becoming picky eaters.

“When I was little I would mostly live on milk. I don’t know what kind of food they were feeding us, but yeah, so, I didn’t want that for them. I am glad that they are, they get to get all these different tastes. That’s why maybe they are not picky with food. But if they were just given milk all the time, then they would probably just go on to be picky.” (Mother 11)

Traditional Foods

Some mothers from South-Eastern Europe and South Asian backgrounds felt they needed to expose their children to their traditional foods (e.g. chapattis, curry, lentils, and rice dishes) but also Western foods (e.g. toast, sandwiches, pastries, lasagne, and pasta). Many South Asian mothers gave their children Western foods at lunchtime and traditional foods at dinnertime. One Pakistani mother believed that her cultures traditional eating practices are not the healthiest and described how she would try to give to her children the “healthy” side of it.

“They are still with the, with what they used to eat there, all the fat and things, they are still having all of that. So, less spice, like a slice of spice, but not a lot. Less salt, less oil, and things, the healthier side of it; I would do that. But I don’t and plus they do milk and stuff and powder milk, and I don’t give that stuff to my kids, and I will always get in trouble “You shouldn’t be giving them fresh milk”, but I rather give them my own.” (Mother 4)

Fresh Foods

Mothers stated their attempts to include “fresh fruit” and vegetables in their children’s diet due to a recognition that they constitute an important element of a healthy diet. However, when mothers were asked to describe their daily meals, it did not seem that they would include these foods in all their meals, especially at breakfast, when some of them explained that their child would eat cereals and toast. One of the mothers said that she believed that her child would not meet the “five-a-day recommendation”, yet she still expressed the belief that her children eat healthily.

“He does have fruit. He does have veg. I mean he might not have five a day, but he does get a good range of it. He does get a range of two to three a day.” (Mother 10).

Fussy Eating

Several mothers claimed that their children did not like eating vegetables. The mothers had different responses to their child’s refusal of foods. A few of them would use demand strategies (i.e. encourage the child to eat more vegetables before being allowed to eat foods they like) to feed vegetables to their children or would “hide” the vegetables in the dishes.

“She’ll be a bit more picky, and she don’t like vegetables. It has always been a battle of trying to give her healthy stuff as well. She tends to just to eat just one thing that is on the plate so, like, she’ll just like eat the potato or she’ll just eat the meat, and then doesn’t want the rest... We normally would see what she eats and then we’ll see if... let’s say if you have so much more, then you can have the pudding, or try to give her like an amount to eat, but yeah, more of a challenge.” (Mother 13)

“Sometimes I enjoy so much, but vegs my child don’t like it too much, but I mix in the mixer so no see.” (Mother 15)

One of the mothers said that she understood that children may change their mind about whether or not they like a particular food and would therefore still expose her children to the foods they do not like. One mother said that she would give them foods she knows they are going to eat, while another reported not pressuring her child to eat foods the child does not like.

“The three-year-old won’t eat any veg. Even if I mash it up and put it in a mash, she knows... I put it on a plate, every time she has a dinner, because we think, “If I keep doing it, she might start eating it.” Because they go through an age anyway when they really

don't like food and the other day, they love it, so they change their mind all the time, the children don't they?" (Mother 14)

Junk Food

Mothers said that they did not give takeaway food to their children because of a fear that they are unhealthy. However, despite a recognition of the unhealthy properties of sweets, chocolates, crisps, and sugary beverages, a few mothers were more permissive when giving these foods in comparison to takeaways.

Mother 6: "I never introduced any junk food to them. They don't like junk food; the only thing that they will eat is a burger. I do give them a treat here and there, and I think before they were quite bad with the sweets and stuff. With coke, they, I don't drink it, but they used to have it at their grandma's house every weekend... Chocolates, he (older son) will have it occasionally, and with my daughter (three-year-old child), I am trying to get the crisps, she is really into crisps, so she can eat two packages, so I'm trying to not to give them too many crisps, you know."

Interviewer: "Do you think your children are healthier in comparison to other children in the community?"

Mother 6: "Yeah"

Interviewer: "Why?"

Mother 6: "A lot of children in the community, are, you know, I can't really say much about them, but I know that my children they don't eat a lot of takeouts, and takeouts are something that is, you know, a lot eaten."

Some mothers described how they would give these snacks and beverages to their children in small quantities, while a small number of mothers expressed that they would use these as a reward. For some mothers, it was difficult not to give junk food to their young children as other members of the family (e.g. grandparents or siblings) would eat them too and give them to their child.

"Sometimes I give them a package of crisps as well. Or like a small chocolate, small size one, and then sometimes if they are good, I give them a treat, like a small chocolate or something. Yeah, I take one from the package, I don't give them the whole big one, or I buy them, you know, the kiddie's small size one."(Mother 3)

Portion Size

Some of the mothers understood that the amount of food that their child needs vary depending on their age and size. A couple of mothers expressed a desire for their children to eat more. One of these mothers said that she tried to feed her child more despite her child not showing an interest in eating more. This mother received reassurance from the health professional that her child was healthy and decided to cease pressuring her child to eat more than what she would usually eat.

“The little one, she could eat a bit more, I guess that’s her, yeah, she doesn’t, you know the doctors haven’t said she is underweight or anything, so I think, and I think another thing is that, I think, I don’t know if other mothers do it, but I look to other children, as well, and you know, I’ve seen children that are thinner than her but you know, their parents don’t seem concerned, so I just, that it’s children, they just grow and develop at different rate.” (Mother 3)

One mother felt that her children ate more than they should. This mother expressed that she would try to ensure that her children get the “healthy” side of the meal before allowing them to eat other foods. This mother also said that she made changes in the proportion of vegetables and meat she gave to her child after joining a healthy eating course.

“I would say they eat, I think, a little bit more of what they should maybe, but it is only because they like food, I guess. But I always make sure that they have the vegetable side of it, so they can’t have another slice of whatever it is. I give big portions, I used to give, I mean, they ate it all, but I think it was more meat portion, I had less vegs on the plate, and more meat, so it makes sense to cut the meat down a bit and put more veggies.” (Mother 5)

Eating Environment

For several mothers, mealtimes, and especially dinnertime or teatime, is a moment that they enjoy as family time. Many mothers expressed that there are occasions when mealtimes can be challenging and stressful due to struggles with their children’s behaviour (e.g. child playing or talking while eating, taking too much time to eat, or being fussy eaters).

“It’s a nightmare because, children, one day they don’t like stuff, then they do, then they mess about, and then they are constantly talking, and I always think mealtime is when you all sit down and you eat your dinner, and they get up on the chairs, just like all kids do.” (Mother 14)

To overcome these challenges, some mothers reported applying some strategies that prevent their children from experiencing sensations of fullness and hunger and learn to appreciate foods in the company of others. For example, one mother described how she would run after her child to make him eat, while two other mothers reported spoon-feeding their children to make the process of eating quicker and less messy. Another mother reported her children eating breakfast on the way to school.

Having support from their family (e.g. older children and partner) when feeding younger children made mealtimes easier and more enjoyable for some mothers. However, this support was not available for all the mothers. Some mothers felt that mealtime was easier now that their child is more independent in comparison to when they were younger.

“I do and try to feed him what we are having, but he is really difficult, sometimes he refuses to eat, like today he is hardly, but he is not feeling well It just depends on his mood, but if whatever I cook for the family, I give him that, when we sit together as a family, I find that he does it properly then, but because it’s just us three at home, during the daytime is a bit more difficult.” (Mother 7)

Milk: Breastfeeding and Bottle-Feeding Practices

Two mothers reported bottle-feeding their children, one mix feeding hers, while the rest said that they only gave breastmilk to their children. Mothers expressed a preference for breastfeeding due to an awareness of some of the benefits that it provides to them and their children. Two South Asian mothers perceived that older generations held the opinion that bottle-feeding children is healthier than breastfeeding, although they did not share this belief.

“I breastfed, and a lot of parents think that, I don’t know, older generations maybe, that, you know, bottle-fed is far better because it is a full fat milk... They don’t understand the benefits of breastfeeding, you know, the babies look more bulky and chunky, with the breastfed babies... I think probably every child is different... My sister’s child, he, you know, he was breastfed, and he was bigger... There is so much benefits to breastfeed, and she had a lot, both of my children had less trips to the doctors, and good immune system, there was so much good stuff.” (Mother 6)

Breastfeeding was not easy for some mothers due to struggles with pain, a child’s medical conditions (e.g. child reflux and child not eating during the first days in hospital), or the fact

that the mother was taking medication. Two mothers expressed they felt bad emotionally after not being able to breastfeed an elder child and had thus tried it again with their youngest child. On the other hand, one mother had decided to bottle-feed her youngest child because her previous experiences had been painful.

“It was very difficult; my first child was overdue, he was late ten days. I couldn’t breastfeed him because they were taking him away from me all the time and stuff, and I was really emotional, and so I tried, and every time he wouldn’t feed properly, and I will get upset, and cry and things. I had the second one, and I thought, “I’m gonna, you know, not like the last time, I’m going to do this, it is going to happen.”” (Mother 4)

“Because I tried breastfeeding with my other two, and I only managed two weeks, and it was really painful, so when she was born, I didn’t even give her any breast milk; she was straight on the bottle. Therefore, I just don’t want to go that again, it is really painful, and it’s really hard, so I said no.” (Mother 7)

In contrast, the majority of the mothers perceived breastfeeding as an easy task, with one mother who bottle-fed citing the benefit of being able to share the task of feeding her child with other people.

“When I was pregnant, I thought on breastfeed, but because I have older children, and it’s quite a busy house, I just felt better to bottle feed, because other people can help you, and that was decision together.” (Mother 14)

Weaning

The children were between fourteen weeks and six months when the mothers began the weaning process. Nearly half of the mothers started weaning when their child was six months old. Some mothers said that they decided to start the process following the guidelines or a health professional’s advice. For example, one mother weaned a few weeks before her child turned six months old because her child had reflux, and her health professional believed that introducing foods could improve the child’s condition.

“I weaned at six months with my first daughter, but with (youngest child), we started a couple of weeks early just to see if it would help with the reflux, which it did. Once we started introducing solid foods, her reflux was settled. (Mother 12)

A small number of mothers said they started weaning after their child showed signs that they were ready to eat (e.g. showing interest in foods, seeming hungrier, and being able to stay in a sitting position). Some mothers believed that introducing foods to their child earlier than six months would help them sleep better during the night.

“It used to be that they weaned early, so people kept saying that they will sleep better if you feed them with food earlier. So, my younger daughter, we gave her some taste, but it didn’t make a difference. She didn’t sleep any better.” (Mother 13)

The first foods that mothers said they gave to their children included baby cereal, fruit, yoghurts, and vegetables, with a small number feeding them jars of baby food. Among the mothers, there were different perceptions about jars of baby food; some mothers stated the belief that it was always better to give their children home-cooked purees and fruit rather than jars of food, whereas others thought that jars of food to be safe and good for their children, as they believe they need to meet regulations in order to be sold.

“We did sometimes give them the same that we were eating and, like an apple with a little bit of a cinnamon stick or anything so anything that was fruity, natural, or from a baby food jar because they are quite, they have to put them on the shelves to feed them to a baby, they have to meet regulations, so I kind of relied on the “that’s safe” thing, on that. Like that’s safe, I don’t know what the word is.” (Mother 10)

10.2.4 Challenges and Opportunities for Healthier Lifestyles

This core topic concentrates on the opportunities and challenges that mothers face with regards to leading healthier lifestyles. The subthemes that constitute this theme are presented in Figure 10.6.

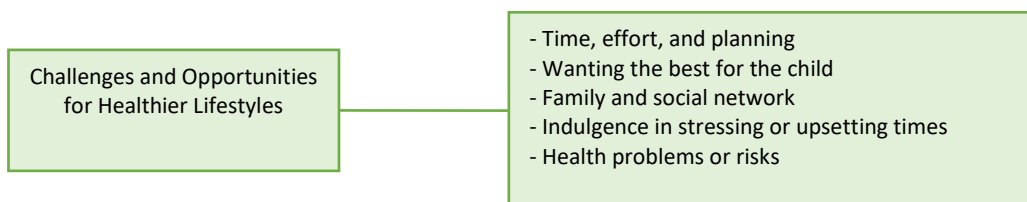


Figure 10. 49 - Coding Framework of the main theme Challenges and Opportunities for Healthier Lifestyles, from the core topic: Mothers’ Beliefs Surrounding Health, Health Behaviours, and Weight

10.2.4.1 Time, Effort, and Planning

One of the most challenges mentioned that mothers believed they need to overcome to develop healthier behaviours (for themselves and their children) related to the perceived cost in time and effort. Some mothers were ready to dedicate time and effort to ensure their children are healthy but would not always do it for themselves. Some mothers reported spending most of their time caring for their children, which left them with no time to exercise or sit down for family meals. One mother described changing her behaviours once she felt her children had become more independent:

“I used to find it quite stressful... now she is quite independent, so she will sit down now, and she can feed herself, and then, so we tend to have, what I do is, we, we have it together, so I am sat down with them, I am eating as well, so I am not only feeding her, she is independent. So, it’s nice, I enjoy it now. You know we do, we do tend to eat together.” (Mother 6)

A few mothers felt that healthy eating practices (e.g. including more vegetables in meals and not skipping meals) required time but also planning. However, two mothers saw this as achievable.

“It is just our routine; it’s just trying up different things, it is easy, we just need to put it in practice, have a routine. No, it is only twenty minutes, twenty minutes. It’s not a lot, but you know, you have to plan, plan out your day; it is much better like that, but with the little children, it is a bit difficult, it is a bit difficult because you have to give them most of the time.” (Mother 9)

10.2.4.2 Wanting the Best for the Child

Some mothers expressed a desire to try their best to ensure their child has good health and proper nutrition. A couple of mothers expressed the belief that they were making an effort to prepare their children home-cooked meals rather than giving them takeaways or jars of food. Also, some mothers described choosing to breastfeed because they know this was the best for their children.

“I know as a mother that I’m trying my best, you know. I could be lazy and give them fish and chips all the time, but I don’t, so I know I’m trying to do the best thing for my children, even if that means that I’m not eating, you know, so I’m doing the best for them.” (Mother 3)

One first-time mother expressed how, before having her baby, she did not care about her weight. However, after having her baby, she wanted to lose weight to be able to play around with her child.

“Before having a baby, you know, my weight, um, it didn’t bother... I didn’t have anything to... to compare or to look forward, you know, getting pregnant you get fatter and fatter and fatter. I feel like I am going to do everything I can, I am going to exercise, I know that I have to you know to get myself fit. Even not just for me but for my child because, he is going to... as he grows... he is going to need to go to the park; he is going to need to play around. I can’t be a mum that just can’t even run with them or rest every second, you know. It made me even want to be fit.”
(Mother 8)

10.2.4.3 Family and Social Network

The mothers’ family and social network (e.g. colleagues and friends) influenced both positively and negatively on their children’s eating practices. According to the mothers, their family and social networks give them advice and support, and influence the mother and child food environment. For example, a small number of mothers said that their partners and work colleagues bring unhealthy foods home or to work, which adds extra temptation to eat unhealthily.

“I think sometimes it is that at work we don’t kind of support each other, you know. The staff, we always bring unhealthy stuff from outside, so, if I need to stop saying no, to that.” (Mother 6)

Also, a couple of mothers expressed that their family offered unhealthy foods to their children and the difficulty they experience in preventing their children from eating these foods. In cases like this, mothers claimed to be considering reducing the meetings with their family to reduce or avoid their children’s exposure to unhealthy foods.

“I need to cut down on some of the junk food I eat. My husband eats more of a... he likes eating his junk food. I feel they (the children)... actually they are fine. They eat healthy when they are with me, but when I go with my family... they get a lot of distractions from other kind of foods which are not healthy. So, I would be really glad if everyone else was aware of the food and things they are eating. Because obviously, I cannot stop them. They see it and they want it, and then it’s hard for them to not have it. I would like to probably minimise the meetings with my

family all the time, so they don't get that. Once in a while is OK, but not all the time." (Mother 11)

Conversely, some mothers felt their families were a positive influence on their health behaviours. For example, some mothers reported that their family and friends would encourage them to breastfeed or support them during mealtimes. Another mother, on the other hand, felt that not having the support of her family was a barrier to her exercising more.

"Is the time, the children... I'm on my own, I can't leave my children with anybody, so I can't go to the gym... I think if I had the support, I could say I'll leave my child with my mum, and then I'll go to the gym, that sort of thing. I think those are the barriers really. I think it makes it a big difference if you have support network." (Mother 3)

10.2.4.4 Indulgence in Stressful or Upsetting Times

A small number of the mothers expressed that they consume "unhealthy foods" as a response to negative feelings (e.g. being upset or stressed).

"I don't think it could be difficult; it's just the case of, it is easier to, you know have a glass of coke, you know, have a chocolate bar or something, you know, when you are getting a bit upset." (Mother 7)

10.2.5 Sources of Advice and Support for Mothers

This core topic covered the mothers' beliefs about the sources of advice they access to get information about parenting, including their child's health and feeding practices. As shown in Figure 10.50, the main sources of advice were health professionals, family and friends, online resources and support groups and parenting programmes.

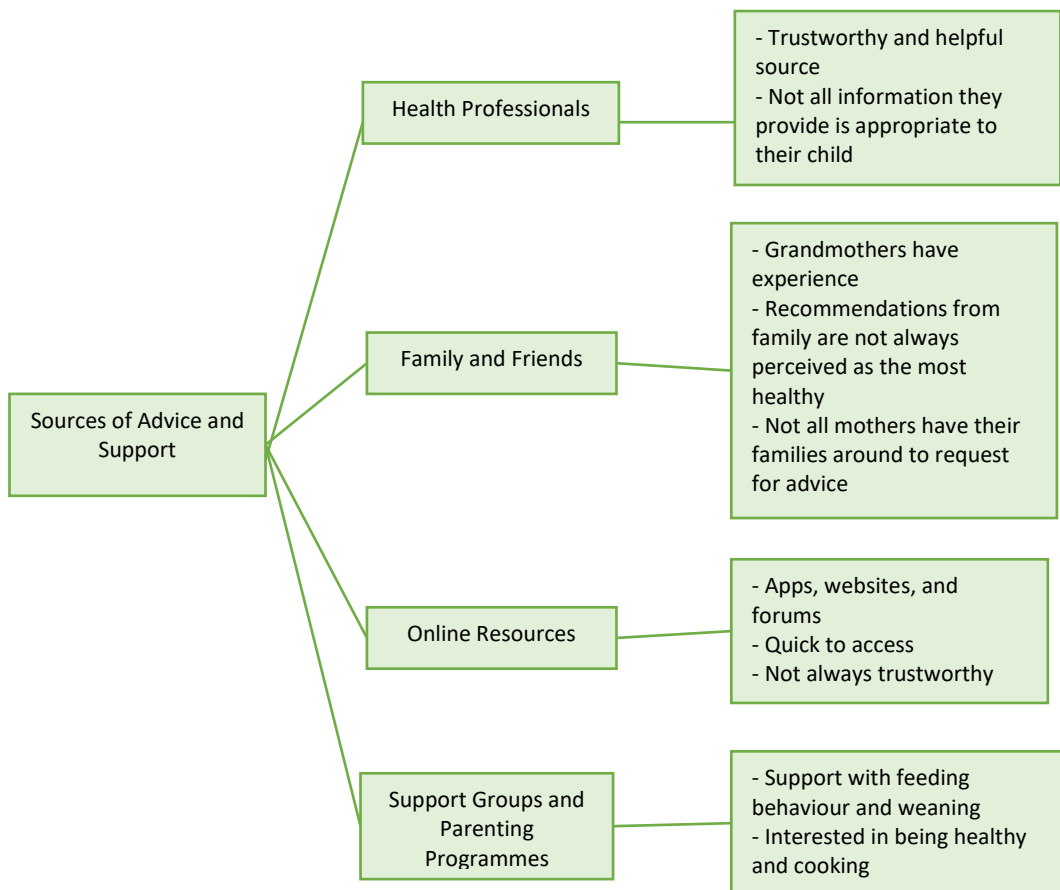


Figure 10.50 - Coding Framework of core topic: Sources of Advice and Support for Mothers

10.2.5.1 Health Professionals

The majority of the mothers expressed that they would seek their health visitor's advice if they were concerned or needed reassurance about their child's health and growth. Many mothers expressed that they would also seek reassurance and advice from health professionals regarding how to feed their children. Health visitors were the most trusted source of information among some of the women, with some mothers describing the support and information that they received from the professionals (i.e. food planners) as very helpful and easy to understand.

“Really easy to follow information, and if there was something I didn't understand, I could always ring her (the health visitor) and one of their team will tell you what to do.” (Mother 4)

Despite the fact that the health professionals were the most trusted source of advice, a small number of mothers felt that the professional's recommendations were not always suited to their child's needs, particularly in relation to timing of weaning. For example, one mother felt her child was ready to eat before the time advised by guidelines and health professionals.

“I fed her the whole bowl without a single drop coming back out of her mouth, so I thought, well, even though you are fourteen weeks, I am not listening to the health visitor; you are ready to eat.” (Mother 10)

One mother felt that there were no sources of information that she could completely trust, and she perceived that even health professionals could give inadequate advice. This mother expressed that she had previously received unhelpful advice from a health professional regarding what she could and could not feed her child and felt that recommendations were constantly changing.

“...got told that she had to have melted butters, and melted cheese into her food... she didn't need that because she was lactose intolerant. This stuff was what was making her poorly. So, even if from medical... you can still get the wrong information... You can't always make the right choice, because there is always gonna be something different.” (Mother 1)

10.2.5.2 Family and Friends

Family (e.g. mothers, mothers-in-law, and sisters-in-law) or friends were a source of support and advice regarding what mothers should feed their child.

A small number of mothers received support from their own mothers and trusted the advice that they gave them. One mother expressed that she would rely on her mother's advice due to her prior experience of caring for children.

“I didn't have a clue of what to do, and my mum was someone who helped me at various stages because when it was weaning time, my mum would say, “Right, try this try that...” My mum knows best; my mum had like five kids, so she knows what she is talking about.” (Mother 7)

The trust in the older generations was not shared by all the mothers. Some mothers believed that the advice (e.g. information about when and what foods introduce first) that they would receive was not up-to-date or appropriate, and hence, would not follow recommendations. For example, some mothers perceived that they feed their own children better than how their mothers used to feed them.

“I probably feed my child better than my mum fed us, but because we always cook... and they didn't so much when we were younger.” (Mother 14).

Some South Asian mothers also believed that the feeding practices in their culture were not the most appropriate. For example, some of the mothers mentioned that they were fed with milk or foods that were too “heavy” or “spicy” for children.

“I did, asked family, but in our culture, they seem on to the hard food... That’s a bit too much, like heavy foods for a little baby at three months. So, I didn’t use to get the family involved in bringing up the children. I still don’t... I don’t give that stuff to my kids, and I will always get in trouble...” (Mother 7)

Mothers who expressed not being able to ask for advice from their families given personal circumstances (i.e. not having their family around), reported obtaining support from friends and partners.

“I have one friend, in (name of a city), because I lived two years in her house and looking after me because I go in her house when pregnant... and helping me to explain what is best for my child, everything help, like my mum.” (Mother 15)

“There is not really much of a family, so it’s me trying to find out my own way and just try to read as much as I can... Whatever he (her partner) knows, you know he will share it with me, and if I know, I will share with him. And he normally makes a joke that the internet is the third parent. Anything that we don’t know, we just look it up on the internet, you know.” (Mother 8)

10.2.5.3 Online resources

Several mothers mentioned that they often use online resources to look for information about weaning and recipes for food to give to their children. Mothers who did not rely on their family's advice reported doing a lot of research online.

“I’ve done quite a lot of research. I was reading online and stuff... what was the best to give, because obviously, my mum, my parents, didn’t really know... So, I was checking online what kind of healthy options...things like that.” (Mother 11)

The mothers believed that there were several resources available online that they could use. They said that they would use Google, the NHS website, forums, YouTube channels, and apps.

“This forum called new mums something net mums’ network. It is a very good website, NHS the one, the mothers have a discussion

about... they try different snacks, different options. I think that's quite useful." (Mother 6)

The mothers perceived online resources as convenient due to the ease and rapidity of accessing them. However, they also expressed concerns that not all the information available online is trustworthy or suitable for their children's needs. For example, one mother expressed that she would combine information from different apps and websites and find a "balance" of what she believed was good for her child.

"I just read different apps around and obviously combine them together and find the balance between that. Obviously, the right ones for him, because not all the information of what I am reading is right for him... I collect little bits of information on each app." (Mother 8)

One mother reported only visiting sites that she trusted and asking her health professional in cases of which she was not sure.

"I only go into sites that I trust really, and if there is any advice in there, then I just take it. If I was not sure about anything, I would just go and ask my health visitor." (Mother 12)

10.2.5.4 Support Groups and Programmes

Some mothers were aware of the programmes that are available in Bradford to improve their own and their child's health. The groups that mothers knew were available and had joined included HENRY, weaning support groups, and Weight Watchers.

The reasons why mothers would join parenting support groups such as weaning support groups and HENRY included: wanting advice about weaning, advice regarding their child's behaviour, information about portion sizes and how to be healthy, ideas on what to cook, and reassurance that their feeding and parental practices were right. The majority of the mothers who joined these groups were first-time mothers at the moment of signing up.

"I just... it had to do with the behaviour of the child because with him, I sometimes have issues with food. To sit down and eat... sometimes he does refuse to eat, but then I wanted to try out maybe some different approaches to food, different ideas, so that's why I was doing the Henry course. So obviously, he's got more choices, I guess. With food-wise. Yeah." (Mother 5)

“When I had my first daughter, I did. I went like to weaning sessions and things to learn a bit more about... sort of what things to introduce and when to introduce them.”(Mother 11)

10.3 DISCUSSION

This study aimed to explore the attitudes that mothers have around their feeding practices and their pre-school child’s weight and eating practices. Three core topics yielded from the analysis: Mothers’ Beliefs Surrounding Health, Health Behaviours, and Weight; Challenges and Opportunities for Healthier Lifestyles, and Sources of Advice and Support for Mothers.

10.3.1 Summary and Comparison with Other Literature

10.3.1.1 Mothers’ Beliefs Surrounding Health, Health Behaviours, and Weight

Mothers’ Perception of Severity and Children’s Susceptibility to Weight-Related Problems

The mothers had a holistic view of health and believed that their child was healthy because they had healthy lifestyles, was content, and did not look overweight or underweight. However, none of the mothers knew the weight and height of their children, precluding the possibility of verifying the weight status of the children.

Results suggested that mothers that participated in this study had some level of awareness of the severity of childhood overweight. The mothers were able to recall some of the consequences of childhood overweight, although despite this, a small number of women appeared confused or were not completely aware of these. The mothers perceived childhood overweight to be a health problem which can affect children as soon as they start engaging in unhealthy eating practices. These results differ slightly from those of other studies conducted in England, in which mothers perceived the weight of a child to be less important than their lifestyles and happiness (Syrad *et al.*, 2015) or that childhood overweight is more of a health concern for older children (Keenan and Stapleton, 2010; Syrad *et al.*, 2015; Wright *et al.*, 2016). This is supported by a previous study conducted in Bradford (Wright *et al.*, 2016), in which mothers did not appraise overweight as a health risk for young children as they believed young children tend to grow out of being overweight.

Like a previous study in the U.S. despite the fact that mothers believed that young children can be overweight, none of the mothers were concerned about their child being overweight or at risk of becoming overweight or had been concerned about this in the past (Dinkel *et al.*, 2017). On the contrary, as in other studies (Pagnini *et al.*, 2007; Keenan and Stapleton, 2010;

Pocock *et al.*, 2010; Mazarello Paes, Ong and Lakshman, 2015; Bentley *et al.*, 2017), some mothers experienced concerns about their children having a low weight being underweight. Some of the factors that led to these concerns were medical conditions; beliefs that the child would not get enough nutrition through breastmilk or foods; comparisons with other children; and family comments about the child's weight.

Research has suggested that there are preferences for bigger children among mothers from low socioeconomic backgrounds, overweight or obese mothers, and from minority groups (Redsell *et al.*, 2010; Southwell and Fox, 2011). According to these studies, for mothers, bigger children are understood as an indication of health, wealth, and good parenting. The early years workers that were interviewed earlier expressed that these preferences are common among South Asian cultures. However, mothers in the current study did not ascribe to this belief, although it may be that this perception is true for older generations in their cultures. As in a previous study (Dinkel *et al.*, 2017), the South Asian mothers received comments from older generations that their children were not big enough or as "healthy" as other children. According to them, these comments made them doubt the health of their child and even attempt to feed their children more. Despite this, these concerns seemed not to prevail among the women for long periods. Some mothers reported ceasing to be concerned about their child's weight after understanding that every child's growth and development is different. It is possible that such a generational change in mothers' attitudes about their child's weight could be linked to the mothers' acculturation and acclimatisation to a culture in which there is an increased awareness of body shape and size and in which bigger sizes are attributed negative connotations (Flint, 2015); to the information that mothers' may receive from media, health professionals, and children's centres; and the reassurance that the mothers receive from the health professionals regarding their children's weight.

The majority of the mothers reported having their child's growth assessed when their child was younger as a matter of reassurance that they were healthy. However, mothers with older children believed it to be unnecessary to have their child's weight assessed when the child looked healthy, and they had no concerns about their health. On the contrary, a few mothers would have their child's growth occasionally assessed as a matter of habit, prevention, or nostalgia. In the previous chapter, it is described how some health professionals reported that mothers would rarely take their children to the clinic after the age of two if they have no concerns about their child's health. As perceived by some health professionals, this could represent a time in which childhood overweight or the risk of

childhood overweight could go undetected if parents do not perceive a health risk themselves.

The methods that mothers used to judge whether or not their child is healthy were similar to those from mothers from other studies. Mothers tended to assume that their child had a healthy growth rate because they had been told so in the past by a health professional; they noticed that their child is growing out of clothes (Pagnini *et al.*, 2007); they have healthy lifestyles (Syra *et al.*, 2015), and they do not look overweight or underweight in comparison to other children (Jain *et al.*, 2001; Lupton, 2011; Syra *et al.*, 2015; Nnyanzi *et al.*, 2016). However, it is possible that these indicators can lead to mothers not perceiving that their child is overweight, or at risk or susceptible to health consequences associated with overweight. For example, mothers in other studies (Nnyanzi *et al.*, 2016; Gainsbury and Dowling, 2018) had been reluctant to accept that their child is overweight after being told so by a health professional based on an assertion that they do not look as obese as “other children”, or because they believe they lead healthier lifestyles. It is possible that mothers will be less likely to acknowledge their child’s susceptibility to becoming overweight or having health problems in the future if they compare their children with children who have a greater degree of obesity or if they do not realise that their lifestyles are poor.

Responsibility and Shame

As found in other studies in England (Harden and Dickson, 2015; Bentley *et al.*, 2017; Roscoe, James and Duncan, 2017) and other countries (Pagnini *et al.*, 2007; Eli *et al.*, 2014), the mothers felt it was their responsibility to provide children with a healthy diet and encourage them to be physically active to ensure a healthy weight status and development. Despite the fact that these feelings might be positive and lead mothers to want to do the best for their children, it is also possible that these feelings can also cause negative feelings of guilt about bad parenting and fears of being judged for not meeting the ideals of a good mother (Lupton, 2011). For example, one mother expressed experiencing negative feelings after not being able to breastfeed one of her children, while others expressed that they would feel bad if their child was overweight.

In the previous chapter, the early years workers and health professionals expressed that conversations approaching the issue of a children’s weight can be challenging due to a risk that their parents could feel judged or upset. These findings are not surprising, as other studies have also reported that parents may have negative feelings about being told that their child is overweight (Redsell *et al.*, 2010; Southwell and Fox, 2011; Eli *et al.*, 2014; Black

et al., 2015; Bentley *et al.*, 2017). Some mothers believed that “other” parents give their children unhealthy foods because they are “lazy”, want to spoil their children, do not want to argue with the child, or want to keep their child quiet, suggesting that these mothers believe that “other” people do not take care of their children or that it is the parent’s fault. Despite this, some mothers claimed not to judge other parents, as they think other people do, when a child is underweight or overweight. It is possible that the mothers’ sense of responsibility for keeping their child healthy and the stigma attached to childhood obesity (Flint, 2015) can exacerbate these negative feelings of guilt about being a bad parent and fear of being judged for being a bad parent (Keenan and Stapleton, 2010; Redsell *et al.*, 2010; Bentley *et al.*, 2017).

Lack of Knowledge and Skills

The mothers had some knowledge of some of the elements that constitute a healthy diet, often referring to the importance of having a balanced and varied diet, which includes fruits and vegetables, as well as showing an awareness of the risks of consuming diets high in sugar and fat. However, some mothers seemed to know less about healthy food-related behaviours. For example, some mothers reported struggling with their child’s behaviour and fussy eating, situations which caused stress for some mothers. Like in other studies, the mothers would respond differently to these “mealtime challenges”, including hiding vegetables from the dish (Rylatt and Cartwright, 2016), pressuring their child to eat (Carnell *et al.*, 2011), yielding to their child’s food preferences, using rewards or treats (Harden and Dickson, 2015; Rylatt and Cartwright, 2016; Goldthorpe, Ali and Calam, 2018), and continuing to expose their children to undesired foods. While some studies suggest that some of these practices increase the acceptance of foods (Caton *et al.*, 2013) and increase vegetable intake (Blatt, Roe and Rolls, 2011), other methods have been associated with obesity (Fairley *et al.*, 2015) and unhealthy behaviours (Fedewa and Davis, 2015).

Like in other studies (Withall, Jago and Cross, 2009; McSweeney *et al.*, 2016), mothers presented high optimistic bias in favour of their child’s and own health behaviours. For example, mothers would claim their children had a healthy diet, but some of these diets they described seemed to be unwholesome and deficient (for example consuming frozen pizzas and chicken nuggets). Also, some mothers claimed to be physically active, but their described physical activity did not seem to meet U.K. physical activity guidelines (Department of Health, 2011). Other studies in the U.K. support this, finding that mothers tend to overestimate the quality of their child’s diet (Kourlaba *et al.*, 2009; Dallacker, Hertwig and Mata, 2018) and physical activity (Kesten *et al.*, 2015).

This contradiction between mothers' beliefs about the importance of healthy behaviours and doing adequate exercise and theirs and their child's actual dietary and physical activity behaviours could be a consequence of their attempt to present themselves as health-conscious or as good parents to the interviewers. However, it is possible that mothers may overestimate their child's physical activity and quality of their diet as a consequence of comparing their child with other children or to a lack of knowledge or a misunderstanding of dietary and physical activity recommendations.

Lastly, as in the study conducted in the U.K. (Harden and Dickson, 2015), several mothers described themselves as not as healthy as their children. It seemed that some mothers did not put the same effort towards caring for their own health as for their child's. There is some research that parental modelling can have both detrimental and beneficial outcomes for the child depending on the copied behaviours (Natale *et al.*, 2014; Blissett *et al.*, 2015; Mazarello Paes, Ong and Lakshman, 2015; Palfreyman, Haycraft and Meyer, 2015). However, during the interviews, none of the mothers talked about being a positive role model for their child in the areas of diet or exercise as mothers from other studies have recognised (Hayter *et al.*, 2015; Goldthorpe, Ali and Calam, 2018).

These results suggest that current national campaigns promoting healthy lifestyles (<https://www.nhs.uk/start4life/>) (<https://www.nhs.uk/change4life>) and other commissioned programmes (Department of Health, 2009) might be creating an awareness of the importance of being physically active and having a healthy diet that includes fruits and vegetables. However, there seems to be a lack of knowledge of healthful food-related behaviours such as adequate feeding styles, and role-modelling. It seems that mothers need more support to be able to positively respond to their child's behaviour at mealtimes and also to overcome barriers they face to undertaking recommended behaviours.

10.3.1.2 Challenges and Opportunities for Healthier Lifestyles

Like in other studies (Withall, Jago and Cross, 2009; Pocock *et al.*, 2010; Hayter *et al.*, 2015), mothers experienced the feeling of being restricted in the amount of time they need to care for their young children and subscribed to the belief that behaviours they considered healthy, such as cooking from scratch, required time and planning. The health professionals and early years workers previously interviewed also felt that time and the economic cost of healthier behaviours was a challenge for the mothers. Other studies have found mothers believe that exercising, eating healthily, and introducing a child to new foods (Withall, Jago and Cross, 2009; Redsell *et al.*, 2010; Harden and Dickson, 2015; Mazarello Paes, Ong and

Lakshman, 2015) can be expensive. However, none of the mothers that participated in this study referred to the economic cost of healthier behaviours as a challenge.

Like the early years workers and health professionals described in the previous chapter, the mothers perceived that their family and social networks influence their feeding practices and their child's eating behaviours both positively and negatively. As in other studies, the mothers felt that fathers and grandparents can sabotage their efforts to provide a healthy diet by giving their children unhealthy foods (Pocock *et al.*, 2010; Southwell and Fox, 2011; Hayter *et al.*, 2015; Mazarello Paes, Ong and Lakshman, 2015; Eli *et al.*, 2016; Rylatt and Cartwright, 2016; Norton and Raciti, 2017; Goldthorpe, Ali and Calam, 2018). Despite this, they reported that members of the family can provide useful advice and support (Mazarello Paes, Ong and Lakshman, 2015).

The early years workers interviewed previously believed that a mother's motivation is a factor that influences their likelihood of undertaking positive changes to their health behaviours. The mothers in this study are similar to those in another study (Pagnini *et al.*, 2007) in that they expressed a desire to try their best to give their children adequate nutrition, suggesting a high motivation among the mothers to provide healthy lifestyles for their children.

The early years workers and health professionals perceived that the mothers' lack of knowledge and skills was a barrier to making healthier lifestyle choices. Mothers from another study in the U.K. have also expressed a lack of knowledge regarding how to prepare healthier meals (Redsell *et al.*, 2011). In this study, none of the mothers believed that a lack of knowledge or skills kept them away from pursuing healthier behaviours. However, given the contradictory opinions that some mothers had, and the misunderstandings related to some topics related to health and nutrition, it is possible that some mothers might not be aware of some of the changes that they need to make to achieve healthier lifestyles.

10.3.1.3 Mothers' Sources of Advice and Support

As in other studies, the mothers tend to receive advice regarding infant and young child feeding from different sources, such as health professionals, their social network, and online resources (Falconer *et al.*, 2014; Harden and Dickson, 2015; Wright *et al.*, 2016; Middleton and Smyth, 2017).

Some studies have found that health professionals' advice is not always accepted by parents, especially when they feel they are being judged (Harden and Dickson, 2015; Goldthorpe, Ali

and Calam, 2018). In this study, the most trusted sources of advice were the health professionals, although mothers expressed a reluctance to follow their advice if they felt these recommendations did not suit the needs of their child. Likewise, some mothers reported an unwillingness to follow the advice of older generations due to a perception that their practices are outdated and unsuitable to their child.

When referring to online resources, the mothers reported using the NHS website as well as other non-governmental sources. Other studies have found that these online resources can cause confusion among mothers about adequate feeding practices (Pocock *et al.*, 2010; Goldthorpe, Ali and Calam, 2018).

Finally, none of the mothers identified nurseries as sources of information and advice in the same way that the mothers from other studies in the U.K. have (Lloyd-Williams *et al.*, 2011). However, some mothers were aware of some of the support groups that were available to them at children's centres, and some of them joined these services.

10.3.2 Strengths and Limitations

Although new mothers are a difficult group to recruit as a consequence of their busy lifestyles, for this study, it was possible to interview mothers of different cultural and ethnic backgrounds living in Bradford. Their views and experiences can be triangulated with those of the health professionals and early years workers to provide a better understanding of how to support mothers to prevent childhood obesity in Bradford.

This study adds to the literature on the subject of mothers' perceptions and behaviours surrounding their child's weight and feeding practices in the U.K. However, caution needs to be taken when generalising these findings to other sites outside of Bradford or to mothers from non-White British or Pakistani groups.

This research has some limitations. First, given that this study used a convenience sample of mothers taken from those that attend children's centres, it is possible that these mothers had more complete knowledge of nutrition in comparison with those who do not go to the children centres. Also, the number of mothers who did not want to take part in this study was high, and it is not possible to know if mothers who agreed to take part shared the same views and experiences as those who refused.

Second, as other people were present in the same room where the interviews took place, mothers may have been less willing to talk openly about their beliefs and practices and more likely to speak about more "socially desirable behaviours".

10.3.3 Implications

10.3.3.1 Practice Implications

The mothers had some level of understanding of the severity of childhood obesity, were aware of the importance of leading healthy lifestyles and exhibited some knowledge of the components that constitute a healthy diet. However, they had a lower level of understanding on how to put this knowledge into practise as well as what constitutes healthful feeding behaviours. Therefore, campaigns which focus on promoting healthy lifestyles in early years such as *start4life* (<https://www.nhs.uk/start4life>) should also promote the importance of healthful feeding behaviours such as parental modelling.

Parenting and healthy lifestyle programmes have been shown to increase parental self-efficacy (Barlow *et al.*, 2010) and confidence, improve family lifestyles, and increase fruit and vegetable intake (Willis *et al.*, 2016). However, if parents fail to recognise the need to change some of their habits, they could be less likely to request support. Therefore, identifying those at risk and inviting them to these programmes is deemed necessary.

Mothers might lose contact with health professionals if they are not concerned about their child's health. The role of the early years workers puts them in a privileged position to be able to identify those at risk of overweight and obesity. Therefore, special provisions should be made so that these professionals can advise parents on feeding practices and encourage them to seek for support if and when needed.

The stigma around overweight and the mothers' feelings of responsibility for their child's health could be a barrier to early year workers and health professionals as they look to approach parents regarding their child's weight and feeding practices. These results show the importance of offering early year workers, health professionals, and students in the health-related areas the opportunities to build skills and confidence on how to communicate effectively and gain the trust of families. (Thompson *et al.*, 2017) and (Chadwick and Croker, 2015) provide some guidelines to support professionals in conducting conversations about weight management with families.

Similar to other studies, this study suggests that fathers and other members of the family have a significant influence on a child's feeding practices (Eli *et al.*, 2016; Walsh *et al.*, 2016; Chacko *et al.*, 2018). Despite this, there seems to be a low participation of fathers and other members of the family, such as grandparents, in interventions aiming to promote healthy lifestyles and preventing obesity in pre-school children (Berge and Everts, 2011; Davison *et*

al., 2018; Freeland-Graves, B Jacobvitz and Sachdev, 2018). Therefore, there is a need for early year interventions promoting healthy lifestyles to encourage the participation of these groups as a means of fostering a healthier environment for the child.

Other researchers have argued (Saguy and Gruys, 2010; Patterson, 2013), that the media misrepresents overweight and obesity by using images of extreme obesity and overeating. It is possible that this projection of obesity may be influencing mothers in a way that leads them to disassociate from their unhealthy practices and their children's risk of overweight and obesity. Therefore, it is necessary to work as a society to decrease the stigma around childhood obesity and show a more realistic picture of the overweight and obesity problem.

10.3.3.1 Research Implications

Although there are some guidelines (Chadwick and Croker, 2015; Thompson *et al.*, 2017) that look to support professionals when conducting conversations about weight management with mothers, it seems that there is still a lack of rigorous empirical evaluations of good communication approaches, especially in multi-ethnic settings in the U.K. (McPherson *et al.*, 2017). Further research should focus on the impact of these approaches on the mothers' feelings, perceptions of the child's susceptibility to overweight and the severity of the childhood obesity problem, and their intentions to improve their lifestyles.

Early years professionals provide mothers with advice regarding health behaviours and point out health risks to mothers. However, little is known about how mothers react to the professionals' advice (Lloyd-Williams *et al.*, 2011; McSweeney *et al.*, 2016). Therefore, further research should explore how the mothers of young children respond to receiving information from these groups and how to give these professionals the confidence, strategies, and knowledge with which to offer effective support.

This research had included the views of mothers living in Bradford, mainly of South Asian and White British backgrounds. Despite mothers belonging to other ethnic groups and those born outside the U.K. being included in this study, further research should explore the beliefs and practices of mothers from other ethnic backgrounds, and the effect that acculturation may have on their beliefs and practices.

This research did not set out to explore mothers' beliefs about physical activity. However, among the mothers there seems to be confusion about what recommended levels of physical activity for them and their children are. Further research should explore the mothers' beliefs and behaviours related to physical activity and the challenges they and their children face to

leading active lifestyles in Bradford which employs both qualitative and validated measures of physical activity.

Given that this research suggests that mothers may present with a high optimistic bias in favour of their own health behaviours, researchers may want to consider using validated tools to recall health behaviours in addition to interviews when conducting research into mothers' beliefs and feeding practices to allow the understanding of the interactions among these two factors.

During the interviews, the mothers were not able to recall their child's height and weight. Therefore, in further studies, researchers should consider not relying on maternal recall about their child's height and weight and use valid assessment tools to measure these if they require information about the weight status of the mother and their children.

10.4 CONCLUSIONS

This study explored the beliefs and practices of mothers of children under the age of five living in Bradford surrounding their child's weight and health behaviours. Findings of this Chapter showed that the mothers believed their children presented with healthy weight and led lifestyles. The mothers believed that their children eat enough fruits and vegetables, home-cooked foods, and eat junk food in small quantities. Yet, results also suggest that some mothers were not aware of adequate feeding strategies and seemed to overestimate the quality of their child's diet as well as their physical activity.

The interviews also suggest that generally, the mothers perceived childhood overweight as a health concern, although none of them was concerned that their child was at risk. Moreover, despite interviews with professionals and the mothers suggest that it is being widely accepted that South Asian cultures have a preference for bigger babies, the current study indicates that this may only be amongst older generations.

The mothers mentioned some of the perceived barriers and enablers to being healthier. Like the health professionals and early years workers, some mothers perceived a lack of time and effort and family and social network as factors that influence health behaviours. The early years workers and health professionals perceived that the high cost of foods, child nutrition not number being the number one priority, and a lack of knowledge and skills as other barriers to the mothers developing healthier behaviours. Although none of these factors was mentioned by the mothers, it is possible that some mothers are not aware of the need to change certain behaviours. Mothers' sources of advice and support include health

professionals, family, and the internet. Health professionals should communicate in an effective way to prevent mothers from experiencing feelings of guilt.

The mothers might not perceive their child's susceptibility to develop childhood overweight, and this could make them less likely to request support. Therefore, it is important to identify at-risk individuals and offer them strategies to prevent health-related problems.

Further research should explore how recommended health communication approaches may impact on the susceptibility and severity of childhood obesity and how they may be exploited to improve the lifestyles of at-risk mothers and children.

This is the last Chapter of the qualitative phase (Part III) of this thesis. Following the mixed methods approach of this thesis, in the following Chapter I will integrate and discuss the results obtained in the quantitative and qualitative phase of this thesis. In the next Chapter, I will also discuss the implications for future research and practice as well as its strengths and limitations of this research project.

PART IV

Discussion and Conclusions

Chapter 11 – Discussion and Conclusions

11.1 CHAPTER INTRODUCTION

This Chapter aims to pull together and discuss Part I, Part II and Part III of this thesis, which aims to contribute to the understanding of the factors that may influence healthy infant feeding practices amongst mothers living in Bradford.

Taking a pragmatic approach, I used quantitative and qualitative methods to explore the perceptions and concerns that mothers of pre-school children (under 5 years) have about their child's weight, and what factors contribute to inaccurate estimations of the child's weight and concerns around the child's weight; and if these perceptions and concerns are likely to influence the mothers' feeding practices. I also explored the attitudes and beliefs that mothers of pre-school children living in Bradford have around childhood overweight, and the experiences that professionals working with these mothers have when having conversations with the mothers about their child's weight and the mothers' feeding practices.

Part I of this thesis (Chapter 1 and Chapter 2) provided the background for this research. Chapter 1 emphasised the importance of providing adequate nutrition from early childhood. Considering that in England one in four children are overweight or obese (Dalrymple, Martyni-Orenowicz and Poston, 2017), the factors that may contribute to childhood obesity and unhealthy feeding practices were reviewed. Based on the health belief model (Becker *et al.*, 1977), as well as other frameworks such as the socioecological model of food choices and dietary behaviours (Contento, 2015), I hypothesised that the perceptions and concerns that mothers have about their child's weight could influence their feeding practices. Studies have found that some mothers are unable to accurately estimate their child's weight (Parry *et al.*, 2008; Towns and D'Auria, 2009; Lundahl, Kidwell and Nelson, 2014; Tompkins, Seablom and Brock, 2015). In Chapter 2 a critical narrative review of the studies looking at the factors associated with inaccurate maternal estimations of their child's weight at young ages was undertaken. The review showed that only a small number of studies have explored the determinants of maternal accuracy in estimating their child's weight in mothers of pre-school children. None of these studies explored the accuracy of mothers when estimating the weight of their children under the age of two in England. The review uncovered some of the factors that have been associated with mothers' inaccurate estimations about their child's weight. Knowing which factors had been studied as potential determinants of maternal

inaccuracy when estimating a child's weight informed the selection of variables used in Part II of this thesis.

Part II presented the quantitative strand of this research (Chapter 3—Chapter 7). Chapter 4 and Chapter 5 aimed to describe the mothers' perceptions and concerns about their children's weight and to identify factors associated with inaccurate estimations and concerns that the child will become overweight. The results in Chapter 5 suggested that mothers' perceptions of their own weight may influence their concerns about their children's weight. Therefore, in Chapter 6 the women's perception and accuracy in estimating their own weight were described and the factors associated with their accuracy in estimating their own weight were explored. Additionally, the associations between the mother's perception of their own weight and their concerns that their child will become overweight were examined, and whether their accuracy when estimating their own weight was related to their accuracy in estimating their child's weight. Lastly, in Chapter 7 the associations between mothers' breastfeeding duration and feeding styles and their perceptions and concerns about their children's weight were explored. The relation between these feeding practices and mother and child characteristics were examined.

The qualitative component (Part III) of this thesis aims to add depth and further insight into the attitudes that mothers of pre-school children living in Bradford have around their child's weight, childhood overweight and feeding practices. Early years workers, health professionals and mothers of pre-school children living in Bradford were interviewed. The interviews with the professionals (Chapter 9) and the mothers (Chapter 10) gave a broad view of the factors influencing mothers' behaviours and attitudes that mothers have around their child's weight and feeding practices. Additionally, the interviews with the professionals allowed for a discussion of some of the challenges that professionals face when encouraging healthy lifestyles with the mothers.

The narrative review and the results of the quantitative and qualitative studies have been discussed in turn. In this chapter, the main results of the quantitative and qualitative studies of this research project and the evidence from previous studies are drawn together and discussed. Following this, the strengths and limitations of this research project are acknowledged, and recommendations for practice and future research are made. Final conclusions are made at the end of this Chapter

11.2 SUMMARY OF FINDINGS

11.2.1 How Do Mothers Perceive their Child's Weight and What Could Be Contributing to Inaccurate Estimations?

Results of this thesis suggest that in Bradford, most mothers perceive their child as having a healthy weight and that perceptions that their pre-school child's weight is too high are infrequent. Results from the quantitative strand (Chapter 4) showed that the majority of the mothers perceived that their child's weight was "Just Right" at both time periods (6 months: 78%, 24 months: 77%) and that there was a substantial proportion of mothers perceiving their child's weight as low (6 months: 14% 24 months: 20%). The findings of the qualitative strand were similar, as all the interviewed mothers believed that their child's weight was healthy. However, it was not possible to verify if the child's weight was healthy as none of the mothers knew the actual weight and height of their children. Health professionals and early years workers believed that it is infrequent to see pre-school children who were already overweight or obese. However, they believed that childhood overweight was a serious problem and that many children are at risk of overweight due to unhealthy eating practices.

According to the WHO standards (World Health Organization, 2008), 7% of the children included in the quantitative strand of this project were overweight or obese at the age of two, and 25% of the children were at risk of overweight. In 2017/2019 25% of the children in Bradford were overweight or obese at school entry (Public Health England, 2019). Considering that the development of overweight and obesity is a gradual process, this means that, although at the age of two the prevalence of overweight and obesity is not as high as it is at school entry, as the health professionals and early years workers mentioned, many children are at risk of becoming overweight by the age of five.

Evidence within this thesis suggests that some mothers in Bradford are unable to accurately estimate their pre-school child's weight. The results from the quantitative strand (Chapter 4) showed 29% at 6 months postpartum and 49% at 24 months postpartum misclassified their child's weight. These results are consistent with the small number of studies examining the accuracy of mothers in classifying the weight of their children aged five and under (Baughcum *et al.*, 2000; Jimenez-Cruz *et al.*, 2010; Manios *et al.*, 2010; Garrett-Wright, 2011; Hager *et al.*, 2012; Brown *et al.*, 2016; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016; Natale *et al.*, 2016; Queally *et al.*, 2018). As previous studies have shown, (Jimenez-Cruz *et al.*, 2010; Brown *et al.*, 2016; Duarte *et al.*, 2016; Harrison *et al.*, 2018) underestimation (6 months:16%; 24 months: 46%) was the most common form of misperception of the child's

weight, while overestimation was less frequent (6 months: 13% 24 months: 2%). Results from the interviews with the early years workers and health professionals (Chapter 9) showed that some professionals have noticed that some parents underestimate their child's weight – they are not aware when their child's weight is high, or they believe their child has a low weight when the weight of the child is healthy.

Given that mothers' overestimation of their child's weight was infrequent, it could be assumed that mothers would infrequently overestimate their own weight and be more likely to underestimate it. However, in Chapter 6, it was interesting to see that the mothers' overestimation of their own weight was less infrequent (6 months: 20%, 24 months: 12%) and that the proportion of mothers who underestimated their own weight was lower in comparison to the proportion of mothers that underestimated their child's weight (6 months: 18%, 24 months: 23%). During the interviews, one mother expressed: *"When your child is chubby, they think it is a good thing, but if as an adult you are chubby that's a bad thing, so it kind of flips around doesn't it?"*. The results reflect how the ideals of body size may change across the different stages of life.

The study presented in Chapter 4 tested whether some characteristics of the mother (ethnicity, place of birth, education, living arrangements, food security, parity, weight status) and the child (child's gender, birth weight, weight status) were related to inaccurate maternal estimations of their child's weight at 6 and 24 months postpartum. The results showed that a child's BMI z-score, maternal ethnicity, and place of birth were related to the mothers' misperceptions of their pre-school child's weight.

The child's BMI z-score was statistically significantly associated with overestimation and underestimation of the child's weight at both time points. With every point increase in the child's weight, mothers were less likely to overestimate and more likely to underestimate their child's weight at both time points. The child's BMI z-score was the only characteristic that was tested, which predicted overestimation of the child's weight. Previous studies looking at underestimation of the child's weight in pre-school children have also found that a high weight in the child is the main predictor of maternal inability to accurately estimate the weight of their child (Baughcum *et al.*, 2000; Jimenez-Cruz *et al.*, 2010; Hager *et al.*, 2012; Byrne, Magarey and Daniels, 2016; Duarte *et al.*, 2016).

Pakistani mothers were more likely than White British mothers to underestimate their child's weight at both time points. No identified study has explored ethnic differences in mothers' accuracy to estimate their pre-school child's weight in England. However, differences in

accuracy by maternal ethnicity have been identified in other countries. For example, one study in Ireland found that Irish mothers were less likely to underestimate their child's weight between the ages of three and five years old than non-Irish mothers (Queally *et al.*, 2018). During the interviews with some health professionals, early years workers, and mothers of South Asian cultures it was possible to appraise the role of cultural ideals of child body size in contributing to maternal accuracy, leading to substantial underestimation amongst Pakistani mothers; this will be discussed in more detail later in this chapter.

Finally, adjusting by maternal ethnicity and child's BMI z-score, with every unit increase in child's birth weight, children were less likely to have their weight underestimated at 6 months postnatally. Findings differ to previous studies that have found no association between birth weight and child's BMI z-score, and that underestimation increases as birth weight increases (Chaparro *et al.*, 2011; Queally *et al.*, 2018). Results of the present research project suggest that children who may have been born with lower birth weight may have caught up in growth and mothers may not be aware of this.

Based on the findings of both the qualitative and quantitative results and the literature review, some possible explanations to what may contribute to inaccurate maternal estimations of child's weight are suggested in what follows.

11.2.1.1 Cultural Perceptions of Body Size

Results of this thesis suggest that cultural understandings of body image may influence the mothers' accuracy in estimating their child's weight. As mentioned previously, Pakistani mothers were more likely to underestimate the weight of their children than White British mothers. During the interviews, health and early years professionals expressed the belief that in South Asian cultures there was a preference for young children to be bigger, as this is perceived as a sign of "health" and "beauty". These findings are similar to those of a recent study in England in which professionals believed that Black, Asian and minority ethnic families viewed overweight and obese babies as healthier and more desirable (Middleton and Smyth, 2017).

From the interviews with the mothers, only Pakistani mothers described that there being a preference for bigger children in their community. Pakistani mothers described receiving comments from their family that their children were not as "big" and "healthy" as other children. However, although these comments may have caused concern among some of these mothers, it seems that most of the interviewed mothers were not particularly attached to the idea that a bigger child was a sign of wealth, health and beauty.

A previous study in England with primarily White British mothers found that a preference for bigger children was stronger among previous generations and among mothers who were overweight or obese (Redsell *et al.*, 2010). Some have argued that, as a result of the obesity epidemic, there has been a change in perception of how children are seen, a “big baby” who was previously seen as “healthy” and “bonny” is now being reconceptualised as “unhealthy”, “obese” and even “lazy” and “gluttonous” (Redsell *et al.*, 2010; Phelan *et al.*, 2015; Jarvie, 2016). The fact that Pakistani mothers did not seem to be strongly attached to the idea that a bigger child was a sign of wealth, health and beauty suggest that this community might be reconceptualising their ideals of body size in young children, perhaps due to acculturation or public health and media messages around childhood obesity.

11.2.1.2 Mothers Awareness of What a Healthy Weight at Very Young Ages Looks Like and Reassurance that the Child Has a Healthy Weight.

Although cultural perceptions of body size may lead to maternal underestimation of their child’s weight, this may not be the only cause as 42% of the White British mothers also underestimated their child’s weight.

As described in Chapter 1, lack of knowledge of what healthy body sizes look like, especially at the age of two, could be leading mothers to underestimate their very young child’s weight. During the first years of life children will experience changes in their growth rate, body composition and appetite (Birch, 1998; Trahms and McKean, 2007; Demerath and Fields, 2014; Wright, 2015). For example, around 6 months of age, the growth rate of fat mass slows relative to the growth of the fat-free mass, which results in a reduction of body fat percentage (Demerath and Fields, 2014). This lack of awareness of what can be considered healthy growth could explain why the results of Chapter 4 showed that at 6 months a smaller proportion of mothers underestimated their child’s weight in comparison to those that overestimated at 24 months. Results obtained in Chapter 4 differ to studies that have found that mothers are less likely to underestimate the weight of their child as the child grows older (Aparício *et al.*, 2013; Brown *et al.*, 2016; Natale *et al.*, 2016; Queally *et al.*, 2018). For example, Queally *et al.* (2018) found that mothers were more likely to underestimate their child’s weight at the age of three than at the age of five. The difference in the results between this study and the study of Queally may be attributed to the age of the children. From the age of three to puberty, growth is stable (Rosenbloom, 2007). Therefore, it is possible that these mothers’ beliefs that their child’s weight is low decreases as the child’s growth rate stabilises.

Lack of knowledge of healthy body sizes in very young children perhaps explains why mothers compare the growth of their child to other children, as the health professionals and parents in this and other studies have described (Jain *et al.*, 2001; Lupton, 2011; Syrad *et al.*, 2015; Nnyanzi *et al.*, 2016). However, this unvalidated method could lead mothers to underestimate their child's weight if mothers appraise that their child is not as "chunky" as other children. As others have argued (Jain *et al.*, 2001; Lupton, 2011; Syrad *et al.*, 2015; Nnyanzi *et al.*, 2016; Robinson, 2017) these comparisons could lead to a recalibration of what is considered as "normal" as a consequence of the increased rates of childhood overweight (Binkin *et al.*, 2013; Hansen *et al.*, 2014) and the exaggerated presentation of childhood overweight and obesity in the media (Saguy and Gruys, 2010; Patterson, 2013). Therefore, these comparisons might cause mothers to believe that their child's weight is low or not a risk for a health problem, as findings of the qualitative part of this study and other studies suggest (Gainsbury and Dowling, 2018).

Health professionals' comments about children's weight status may help mothers to have more accurate estimations of their child's weight (Rhee *et al.*, 2005; Eckstein, 2006; Hernandez, Cheng and Serwint, 2010; Falconer *et al.*, 2014; Foster and Hale, 2015). In the quantitative strand of this project, it was not possible to explore if the mothers who underestimated their child's weight had previously received any feedback from a health professional. However, some mothers may not have been reassured about the healthy weight of their children or their risk of overweight and obesity. Results from the qualitative strand of this study and a previous study in Australia (Rossiter *et al.*, 2018) suggest that parents take their children to well-baby clinics less frequently as they grow older, as they don't have so many worries about their child's health as when they were infants. There may be a gap in which overweight can easily go undetected, especially between the ages of two and school entry, when the child's weight is then routinely assessed²².

The health professionals said they would assess the child if they were concerned about their weight or if there had been a long time since the last time the weight of the child was assessed. It would be problematic if professionals assessed children's weight only when they were concerned about it. First, some cases of childhood overweight could go undetected, as

²² In the U.K. the children have four mandated postnatal contacts (Birth visit (10-14 days), 6 week check, 1 year review and 2 year review) where they are usually but not definitely weighed (Department of Health, 2009). In addition to these contacts mothers are invited to health clinics to have their baby weighed, receive advice and engage with other activities until school entrance, where children have their weight assessed again as part of the National Child Measurement Programme (Public Health England, 2018).

some research has found that professionals are also likely to underestimate the weight of children visually (Smith, Gately and Rudolf, 2008; Bocca *et al.*, 2016). Second, mothers of normal weight children need to be reassured that their child has a healthy growth. Therefore, health professionals must make regular assessments of the child's weight. However, as a previous study in England showed, it is possible that some health professionals such as general practitioners may not discuss the weight of the child, as they feel it is inappropriate if it is not the primary reason for consultation (O'Donnell, Foskett-Tharby and Gill, 2017). In comparison to the study of O'Donnell (2017), none of the health professionals (family nurses and health visitors) I interviewed felt that it was not appropriate to assess the weight of the child, possibly because they may identify this as part of their role.

11.2.1.3 Reluctance to Label the Child with a Negative Connotation and Denial

Evidence from this thesis and previous studies in England (Redsell *et al.*, 2010; Eli *et al.*, 2014; Jarvie, 2016; Gainsbury and Dowling, 2018) suggest that there is a problem of stigmatisation of childhood overweight in England. Evidence of the stigma could be reflected in the way it can be challenging for some professionals to have direct discussions about childhood overweight with the parents, or in the assertions that some mothers made about children being bullied at school as a result of being overweight and other parents being judged on the way they feed their children.

As others have argued (Holub and Dolan, 2012; Robinson and Sutin, 2016; Gainsbury and Dowling, 2018; Queally *et al.*, 2018), it is possible that some mothers who were themselves overweight or obese or who had an overweight child underestimated their own and/or their child's weight as a way of protecting themselves from negative stereotypes. This may be why, although the majority of the mothers of overweight children perceived their child's weight as "just right", maternal concern that their child will become overweight was positively associated with the child's BMI z-score at 6 months postnatally and with maternal BMI. Similar results have been previously reported in another study in the U.K. where parents showed concern about their child's weight despite not acknowledging their 3-5-year-old child as being overweight (Carnell *et al.*, 2005).

Mothers may be more likely to acknowledge unhealthy behaviours or an unhealthy weight in themselves than in their children. During the interviews with the mothers (Chapter 10), some mothers described their own behaviours as not as good as they would like them to be and acknowledged that they were overweight. However, all of them perceived that their child's behaviours and weight were healthy. As others have argued (Jarvie, 2016), the

mothers' "biologic-moral-responsibility" for the welfare of their children might make mothers more likely to deny overweight in their children to repudiate their culpability and protect their identity as "good mothers". These maternal attitudes are a challenge for health professionals offering support to families, as mothers could deny unhealthy practices or feel judged or offended.

11.2.2 Maternal Concerns about Their Child's Weight

How mothers perceive their child's weight and their accuracy in estimating their child's weight may be necessary if these perceptions are related to the mothers' concerns about their child's weight, the mothers' feeding practices and their child's consecutive health outcomes. One of the aims of this thesis was to explore if the mothers of pre-school children living in Bradford have concerns about their child's weight, and what factors may be related to these concerns.

11.2.2.1 Concerns about Low Weight, and Undereating

The underestimation of a healthy weight in children may be problematic if mothers become concerned about their child's health and put in place unhealthy feeding practices that reduce the child's responsiveness to hunger and satiety cues, such as pressuring the child to eat (Webber *et al.*, 2010). Given that results of Chapter 4 showed that some mothers perceived their child's weight as low, I had hoped to explore whether women in the BiB1000 study were concerned that their child was not gaining enough weight or had a low weight. However, the question inquiring about the mothers' feelings about low weight did not allow further exploration because, as described in Chapter 5, the question subtly pointed the respondent toward answering in a certain way. Despite this limitation, the qualitative strand of this study gave an insight into how some mothers in Bradford felt about their child's weight.

Results of the qualitative strand showed that, as in a previous study in England (Redsell *et al.*, 2013), the health professionals and early year workers believed that mothers were often concerned about their child not eating enough or having a low weight and that this was more common than worries about overweight. These attitudes were confirmed during the interviews with the mothers, as some had previously expressed concerns about their child being underweight, and none of them was concerned that their child was or could become overweight.

Based on what the health professionals, early year workers and mothers expressed, it appears that the causes of mothers' worries about low weight are related to the child having medical problems, not knowing about appropriate portion sizes, perception that the child is

a picky eater and family commenting that the child's weight is low. However, according to the mothers, it seemed that these concerns were alleviated after receiving reassurance from a health professional that the weight of their child was healthy. Further discussion of how mothers concerns about their child's weight relate to their health behaviours will be discussed later in this Chapter.

Although the results of the qualitative work suggest that the mothers often have unnecessary concerns about low weight, this may not be problematic as mothers seek reassurance from health professionals.

11.2.2.2 Mothers' Perception of Overweight as a Health Risk

Although the proportion of mothers who were concerned that their child would become overweight was small, results obtained in this thesis suggest that mothers do see childhood overweight as a health problem. The results of the quantitative strand support this as the mothers who perceived their own (Chapter 6) and their child's weight as high (Chapter 5) were more likely to be concerned that their child will become overweight than those who perceived their own or their child's weight as "Just Right". Moreover, the results of the qualitative strand (Chapter 10) revealed that mothers were aware that overweight is a health problem that can affect children from early childhood and were able to name some of its consequences. These concerns reflect public health messages about the severity of childhood overweight, and may mean that beliefs are changing regarding believing that "bigger is healthier" and that "children will grow out of being overweight" as health professionals and other studies have reported as common (Jones *et al.*, 2011; Southwell and Fox, 2011; Syrad *et al.*, 2015).

Although mothers may recognise childhood overweight as a health problem, results suggest that some mothers are not aware that their child is overweight or could be at risk; hence it is not something they would worry about. For example, results of Chapter 5 showed that a statistically significant greater proportion of mothers of overweight children who were accurately estimating their child's weight were likely to be concerned that their child will become overweight than mothers of overweight children who underestimated. Results from the qualitative strand suggested that, as in other studies, mothers were not always aware that their feeding practices were unhealthy, and mothers seemed to overestimate the quality of their child's diet (Kourlaba *et al.*, 2009; Kesten *et al.*, 2015; Dallacker, Hertwig and Mata, 2018) and physical activity (Kesten *et al.*, 2015). The fact that mothers are not aware

that their feeding practices are not optimal or are aware that their child's weight is high could be a problem because this could make them less likely to request support.

It was possible to identify some of the factors related to mothers' concerns that their child will become overweight. At 6 months, mothers were less likely to be concerned that their child will become overweight if they were born inside the U.K. and had multiple children. At 24 months mothers were less likely to be concerned that their child will become overweight if they were Pakistani, had multiple children, a younger age, and a male child. Few studies have looked at the predictors of parental concerns about their child's weight. Similarly to the findings of this thesis, other studies have found significant differences in maternal concern about child weight by the child's gender (Campbell *et al.*, 2006; Moore, Harris and Bradlyn, 2012; Gomes, Barros and Pereira, 2017). Unlike this study, a previous study in Lisbon (Gomes, Barros and Pereira, 2017) found no association between mothers' age and their concerns about overweight. These differences in maternal concern about their child's weight by maternal ethnicity, place of birth, child's gender or maternal age were not reflected in the qualitative strand. However, during the interviews with health professionals and mothers, it was possible to identify some factors that made mothers more or less likely to be concerned about their child's weight. For example, previous experiences with other children can have both positive and negative influences on mothers' concerns about their child becoming overweight. According to the health professionals, for some mothers' other personal problems make mothers less concerned about childhood overweight as those issues take precedence over a child's weight status and eating behaviours. Also, as some studies have found, parents perceive overweight as a distant problem with non-immediate consequences, hence it is a low priority in the hierarchy of health-relevant risks for their children (Backett-Milburn *et al.*, 2006).

11.2.3 Factors Influencing Feeding Practices of Mothers Living in Bradford

11.2.3.1 Are the mothers' perceptions of, and concerns about, their child's weight associated with their feeding practices?

The socioecological model of food choices and dietary behaviours developed by Contento (2016) proposes that among other factors; the person's perceptions, beliefs, attitudes and motivations are part of the intrapersonal factors that influence their food choices and dietary behaviours. Given that feeding is a dynamic process which requires reciprocal signalling between the caregiver and the child (Winberg, 2005), it is possible that the child's characteristics and how the caregiver appraises this will influence the carer's feeding

practices. The health belief model (Becker *et al.*, 1977) takes into consideration that the persons' feelings of personal vulnerability to a health problem and the severity of it may lead to a change of behaviour if the person perceives beneficial to change their behaviour, feel confident of changing their behaviour and can overcome the obstacles to overcome recommended health behaviours. Based on the socioecological model of food choices and dietary behaviours and the health belief model, I hypothesised that if the mother perceives that their child is underweight or overweight, this may influence her feeding practices (Figure 11.1).

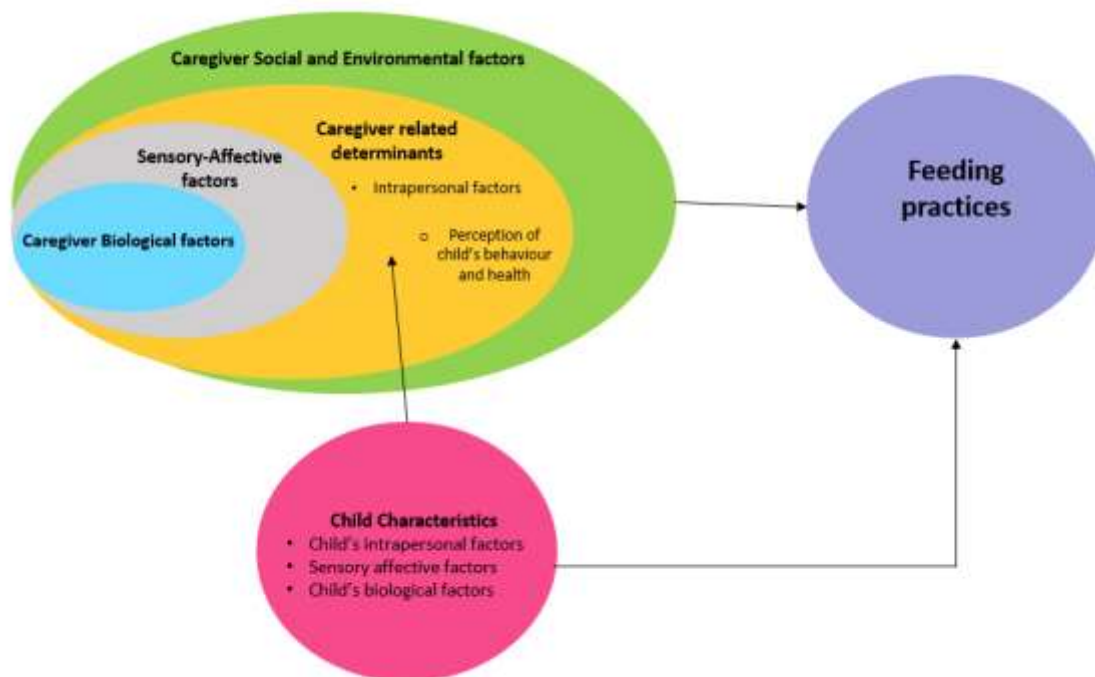


Figure 11.51 Factors influencing mothers' feeding practices adapted from Isobel Contento (2015)

Evidence about how mothers' beliefs about their child's weight influence their feeding practices is inconsistent and insufficient. Despite that there is some research looking at how mother's perceptions and concerns related to feeding practices, most of the research has focused on authoritarian behaviours (i.e. control and restrictive behaviours) and very little on other feeding practices such as non-authoritarian feeding styles, breastfeeding duration, early weaning, child's energy intake and healthier food availability at home.

Results of some studies reveal that perception or concern of a low body weight in the child are related to behaviours of control, pressure to eat and less restrictive behaviours (May *et al.*, 2007; Webber *et al.*, 2010; Holub and Dolan, 2012; Branch *et al.*, 2017; Haines *et al.*, 2018; Harrison *et al.*, 2018), whereas concerns about overweight have been associated with more restrictive dietary behaviours (Francis, Hofer and Birch, 2001; May *et al.*, 2007; Branch

et al., 2017; Swyden *et al.*, 2017). A recent cross-sectional study in Australia and some qualitative work in Wales suggest that perception of a low weight may be associated with cessation of breastfeeding and early introduction to solids (Brown, Raynor and Lee, 2011; Harrison *et al.*, 2018). Some studies in the U.S. and Australia have reported that parents who were concerned about their older child's (5-16 years) weight were more likely to report undertaking strategies to prevent overweight (Crawford *et al.*, 2006; Moore, Harris and Bradlyn, 2012). However, a study in the U.K. found that parents made minimal changes in lifestyle behaviours after being told their child was overweight or obese (4 – 5 and 10 – 11 years).

Findings of the qualitative phase of this thesis suggest that mothers' perception of their child's weight could be some of the caregiver related determinants of feeding practices proposed in the adapted model (Figure 1.1). The interviews with the professionals (Chapter 9) showed that some of them believed that mothers would undertake certain behaviours (i.e. give big amounts of milk or change from breastfeeding to formula) as a consequence of perceiving their child as not gaining enough weight or eating enough. During the interviews with the mothers (Chapter 10), two mothers mentioned trying to pressure their child to eat as a consequence of being concerned that their child had a low weight or was not eating enough. However, according to these mothers, these behaviours not persisted after being reassured that their child had a healthy weight. These findings suggest that as the health belief model proposes, the mothers may have perceived their child was at risk of having a low weight; hence, they took actions to prevent it. Nonetheless, by being reassured that their child had a healthy weight, the perceived susceptibility about their child having a low weight decreased; making them stop undertaking compensatory feeding behaviours.

Results of the qualitative phase suggest that mothers' beliefs about their child's weight could influence their feeding practices, but this was not reflected in the quantitative phase. Results of the quantitative phase (Chapter 7) showed that the mothers' perceptions of a low weight were not associated with the mothers' feeding styles or duration of exclusive or any breastfeeding duration. Findings of Chapter 7 suggest that although mothers may perceive their child's weight as low this may not be causing them enough concern to change their feeding styles or breastfeeding duration. Which suggests that despite that some mothers perceive their child's weight as low they may not perceive this low weight as a severe problem. However, further research should explore if mothers perception of their child's weight as low could influence other feeding practices such as energy intake of the child or early weaning.

The results of Chapter 7 showed that neither perception of their child's weight as high nor concern that the child will become overweight was associated with longer exclusive breastfeeding duration. However, the mothers that were concerned that their child would become overweight did breastfeed non-exclusively for longer. It is possible that the mothers who breastfed for longer were more "health-conscious". Nevertheless, it is also possible that mothers decided to breastfeed for longer because some campaigns (Figure 2) that promote breastfeeding have delivered messages that breastfeeding for longer may have protective benefits against obesity later in life (Public Health England and UNICEF UK, 2016). However, in interviews, none of the mothers mentioned choosing to breastfeed as a reason to prevent childhood obesity; they chose to breastfeed because they knew it was the best for their baby.

Mothers who perceived their child's weight as high or were concerned that their child would become overweight were no more likely than others to have authoritative feeding practices rather than authoritarian, indulgent or uninvolved feeding styles. Mothers whose child had a higher BMI z-score were more likely to have uninvolved and indulgent feeding practices than authoritative. These results are not surprising as a previous study using the BiB1000 subsample showed that at the age of three, children whose mothers had indulgent feeding styles at the age of two were more likely to have higher BMI z-scores (Fairley *et al.*, 2015). The results obtained in the study of Chapter 7 differ from a previous study that found that mothers who perceived their child's weight as high were more likely to have uninvolved feeding practices (Flores-Peña *et al.*, 2017). Results of the study of Flores-Pena (2017) suggest that despite mothers accurately perceiving their child's weight as high; they do not take actions to improve their child's weight. Results of this and other studies reflect how important authoritative feeding patterns are to ensure a healthy child weight. (Fairley *et al.*, 2015; Shloim *et al.*, 2015).

Results of this thesis suggest that the mothers' beliefs about a child's weight could influence their health behaviours. However other intrapersonal (e.g. lack of knowledge of how to undertake authoritative feeding) social and environmental factors as Contento (2016) and Figure 1.1 proposes, may also have a more significant impact on the mothers' health behaviours and feeding practices than how mothers' perceive their child's weight and whether or not they are concerned about it.

11.2.3.2 Other factors influencing mothers' feeding practices

According to the professionals and the mothers, some of the factors influencing the mothers' feeding practices and child's diet were the mothers' motivation, family and social network,

cost and convenience of unhealthy foods and lack of relevant knowledge or skills to undertake healthier practices.

The professionals believed that motivation to undertake healthier behaviours; another intrapersonal factor that could influence the mothers' feeding practices varied amongst mothers. However, they believed that mothers wanted the best for their child. Findings from the interviews with the mothers are similar to the findings of a recent qualitative study in England, which explored the experiences that parents of pre-school age children (under 5 years) had when feeding their children (Goldthorpe, Ali and Calam, 2018). Findings from both studies suggest that mothers of pre-school children living in ethnically diverse and deprived areas of England present good intentions to provide a healthy diet to their children. However, as discussed in Chapter 9 and Chapter 10, some mothers face some barriers to undertake the recommended behaviours. Therefore, perceiving the child's weight as high may not be enough for making mothers improve their child's diet.

Contento (2016) proposed that a person's social and environmental factors play an essential role in a person's food choices. In this thesis, it was possible to identify some of these social and environmental influencing the mothers' feeding practices. Similarly to previous studies (Withall, Jago and Cross, 2009; Pocock *et al.*, 2010; Redsell *et al.*, 2010; Harden and Dickson, 2015; Hayter *et al.*, 2015; Paes, Ong and Lakshman, 2015), the mothers and the professionals believed that the mothers' family and social network influenced the mothers' feeding practices and the child's diet. However, the family (especially the grandparents of the child) and social network could impact positively and negatively on their children's eating practices as they give advice and support and influence the mother and child food environment. Also, both groups perceived the lower cost and convenience (economic and time) of unhealthier practices were a barrier for healthier lifestyles.

Lastly, the early years workers and health professionals believed that lack of knowledge and skills was a barrier that mothers have to make healthier lifestyle choices. None of the mothers mentioned that a lack of knowledge or skills kept them away from pursuing healthier feeding practices. However, the results of this thesis suggest that some mothers may not be aware of some of the changes that they need to make to achieve healthier lifestyles. For example, results of Chapter 7 showed that despite some mothers' concern that their child will become overweight, they were not more likely to undertake authoritative feeding practices. This suggests that mothers may not have been aware of how to undertake these. Also results of Chapter 10 suggest that like in other studies (Withall, Jago and Cross,

2009; McSweeney et al., 2016) some mothers presented high optimistic bias in favour of their child's eating practices as they claim their children had a healthy diet, but some of the diets they described seemed to be unwholesome and deficient. Some mothers may not be aware that these practices are not the most appropriate.

11.3 RESEARCH STRENGTHS AND LIMITATIONS

The studies of the quantitative and qualitative strands of this thesis have increased knowledge in the area of prevention of childhood obesity and have helped to fill gaps in the literature on the matter of maternal perception of their child's weight, concerns about the child's weight and mothers' feeding practices. However, these studies are not without limitations, and acknowledging these can assist future research in this area. Specific strengths and limitations of each of the studies undertaken in this research project have already been presented in the discussion section of each of the studies that were undertaken.

In brief, the main strength of the quantitative strand is that these studies relate to the large bi-ethnic sample size of mothers of pre-school children, which allows generalisability in the context of Bradford. However, findings may not be generalizable for non-white British or non-Pakistani mothers. The results of the quantitative strand add to the small number of studies that have explored, in mothers of very young children, the determinants of maternal accuracy to estimate their child's weight, the determinants of concern that their child will become overweight and how the mothers' perceptions of their child's weight relate to the mothers' breastfeeding duration and feeding styles. The main limitations of the quantitative strand relate to the cross-sectional design of the studies that were undertaken, which did not allow inference of causality. Moreover, although the sample size was relatively big, it was not enough to allow further analyses of the associations by subgroups of weight categories or maternal accuracy to estimate their child's weight.

The main strength of the qualitative strand is that, although the health professionals and mothers of pre-school children are difficult groups to recruit as a consequence of their time limitations (Redsell *et al.*, 2011; Daniels *et al.*, 2012; Johnson *et al.*, 2018), it was possible to pull together perceptions from health professionals, early year workers and mothers working and living in Bradford. Also, in the qualitative strand, it was possible to explore the experiences of mothers of different cultural and ethnic backgrounds living in Bradford, and research on some of these groups has been lacking (Goldthorpe, Ali and Calam, 2018).

Limitations of the qualitative strand relate to the generalisability of the findings beyond the context of the study sites.

The main strength of this research project is the use of mixed methods research as the quantitative and qualitative strands were combined so that the weaknesses of one research approach were compensated by the strengths of the other (Bryman, 2008; Fetters, Curry and Creswell, 2013; Zoellner and Harris, 2017). For example, the relatively large sample used to explore how mothers perceived their child's weight and if they were concerned about their child's weight could be generalised to White British and Pakistani women living in deprived areas of England that share the ethnic background of Bradford. The results showed that some mothers underestimated their child's weight in Bradford and that Pakistani mothers are more likely than White British mothers to misperceive their child's weight. Although the results of the qualitative strand might not be generalizable (Smith, 2018), they provided a more detailed description of the mothers' experiences and beliefs about their child's weight, giving a deeper understanding of possible reasons for these misperceptions.

A second strength of this study is that both qualitative and quantitative strands used data from mothers of children living in a multicultural area with high levels of deprivation (Department for Communities and local Government, 2015), which makes children born in Bradford at higher risk of developing childhood obesity (Niblett, 2016). The results of this thesis add to the evidence on the prevention of childhood overweight, which looks to reduce economic and ethnic disparities in obesity.

The main limitation of this thesis project relates to the timing at which data collection took place. The data in BiB1000 was collected from mothers and their children born between October 2008 and May 2009 (Wright *et al.*, 2013), whereas the data collected during the qualitative strand took place between June and December 2017. The possibility that mothers' beliefs around their child's weight and feeding practices may have changed cannot be discarded, especially because efforts to prevent childhood overweight are being put in place (Department of Health and Social Care: Global Public Health Directorate: Obesity Food and Nutrition, 2016). For example, the implementation of the HENRY programme (Rudolf *et al.*, 2010) and the extension of the Family Nurse Partnership Programme (Better Start Bradford, 2018).

11.4 IMPLICATIONS FOR POLICY MAKING AND PRACTICE

The findings of this thesis reinforce the importance of implementing programmes such as the health visiting programme and the National Child Measurement Programme, which offer parents feedback about their child's growth. These programs may help to reduce unnecessary concern about low weight in healthy-weight children and allow parents to recognise unhealthy growth trajectories (Falconer *et al.*, 2014).

Having an accurate perception of their child's weight and perceiving childhood overweight as a health concern may not be sufficient to lead children to have a healthier weight if mothers have a low awareness of how to undertake healthier lifestyles. Therefore, this research supports the need for ongoing programmes such as HENRY (Willis *et al.*, 2016) that have been shown to lead to positive changes in the family's eating behaviours and physical activity. Some barriers that professionals identify to providing support to mothers are lack of time or motivation, the fear of judgement, and a lack of trust. This shows the need for providing support in a variety of formats which are culturally tailored to address some of the barriers identified by the professionals. Such programmes should offer advice on how to have more authoritative feeding practices at mealtime, model good food-related habits, and how to overcome barriers that prevent the undertaking of healthier behaviours, for example, time-efficient food preparation strategies at low cost, or how to encourage the participation of family members to foster a healthier environment for the child.

During the interviews, it was noted that mothers might lose contact with health professionals if they are not concerned about their child's health. This could represent a gap between the last health visit (2 years) and school entrance (5 years) in which overweight or risk of it could go undetected. Given that early years workers have more constant contact with parents, they must be provided with the necessary tools and skills to be able to discuss with the mothers their expectations and concerns about their child's growth, the child's diet and referral to services that provide advice on how to maintain healthy growth. Moreover, health professionals should consider checking weight status and providing mothers with feedback about their child's growth when there has been a long time since the child had their growth assessed. This is important especially in those cases where mothers may be more likely to underestimate their child's weight (e.g. mothers of children of low birth weight, Pakistani mothers) or less likely to be concerned about their child becoming overweight (e.g. young mothers, with more than one child, mothers of boys).

Results of this thesis emphasise the need to reduce the social stigma around childhood obesity, which may be leading mothers to have negative feelings of guilt when being offered or requesting support. In practice, health professionals and early year workers need to have the confidence to communicate effectively and gain the trust of families. Therefore, these professionals must be offered opportunities to build these skills and are provided with guidelines to support conversations about weight management with families (Chadwick and Croker, 2015; Thompson *et al.*, 2017).

11.5 DIRECTIONS FOR FUTURE RESEARCH

There are some current guidelines (Chadwick and Croker, 2015; Thompson *et al.*, 2017) that aim to support professionals when conducting conversations about weight management with mothers. However, it seems that there is still a lack of rigorous empirical evaluations of good communication approaches, especially in multi-ethnic settings in the U.K. (McPherson *et al.*, 2017). Therefore, further research should explore how these approaches impact on the mothers' feelings, perceptions of the child's susceptibility to and severity of childhood obesity, the mothers' intentions to improve their lifestyles as well as the mother and child's mental health and weight gain.

Lastly, results from Chapter 5 showed that Pakistani mothers born outside the U.K. were more likely to be concerned about overweight at 6 months postpartum, but that Pakistani mothers, regardless of their place of birth, were less likely to be concerned about overweight at 24 months. These findings reflect a possible influence of acculturation that it was not possible to test due to lack of data. Further research should explore how different levels of acculturation may impact on the mothers' beliefs and concerns about their child's weight, feeding practices, their ability and willingness to communicate and engage with the health providers and other services focused on promoting healthy weight in children.

11.6 CONCLUSION

Childhood obesity is a health problem which needs to be prevented since early childhood. Some studies have found that mothers may be likely to underestimate the weight of their children. However, no research have previously explored the perceptions and concerns that mothers of pre-school children living in Bradford have about their child's weight. Exploring if mothers living in Bradford misperceive their pre-school child's weight is important because children born in Bradford, an area of a high level of deprivation, are at higher risk of developing childhood obesity. Based on the health belief model and the socioecological model, it could be assumed that mothers who misperceived their child's weight are less likely to take actions to improve their child's weight.

Using a mixed-methods approach, this thesis explored the perceptions and concerns that mothers of pre-school children living in Bradford have about their child's weight, if these perceptions are aligned to the child's weight status, and how these intrapersonal factors relate to the mothers' feeding practices.

Findings from this thesis indicate that similar to previous studies looking at mothers' accuracy in estimating their child's weight, some mothers living in Bradford misperceived their pre-school child's weight and that underestimation was the most frequent type of misperception. Results showed that Pakistani mothers were more likely than White British mothers to underestimate their child's weight, however some White British mothers also misperceived the weight of their children.

Although the causes of mothers' misperception of their child's weight remain unclear, it is possible that cultural perceptions of body size, mothers lack of awareness of what is considered as healthy growth, and the mother's reluctance to label the child with a negative connotation may be leading mothers to underestimate their child's weight when they are asked to describe it.

While mothers who underestimate the healthy weight of their child are likely to receive reassurance from health professionals, the mothers who do not appraise the risk of overweight in their children may be less inclined to request support. This could mean that attention for the prevention of childhood obesity may not be done on time.

An accurate perception of the child's weight seems to be necessary to reduce unnecessary concern or encourage mothers to take actions when needed. However, the evidence presented in this thesis suggests that being aware that childhood overweight is a health

concern and being accurate may not be enough to lead mothers to undertake healthier feeding practices if they are not aware of how to overcome the barriers to action or are not aware of the recommended feeding practices that enable their children to maintain a healthy weight.

Mothers of pre-school children, especially those whose children are at higher risk of developing childhood obesity, should be offered with the knowledge and skills that will allow them to undertake healthy feeding practices and overcome the barriers for the recommended behaviours. The early years workers and health professionals seem to be in a prime position to offer mothers this support. Therefore, early years workers and health professionals should be provided with opportunities to develop skills that allow them to communicate effectively with the mothers about the mothers' beliefs, expectations and concerns about their pre-school child's growth, and their feeding practices. Moreover, they should be able to refer to services that provide advice on how to maintain healthy growth in young children. These services should be delivered in various formats to reduce the some of the identified barriers that mothers have to attend to these (i.e. lack of time or trust).

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Appendices

APPENDIX I

A.I Table 1. Example of a search strategy in Ovid MEDLINE(R) 1946 to March 28, 2019. Search was limited to August 2016 when the search was conducted.

	Searches	Number of Hits
1	perception.mp. or exp Visual Perception/ or exp Perception/ or exp Weight Perception/	478901
2	perceive\$.mp.	163562
3	1 or 2	597566
4	accura\$.mp.	586112
5	exp Maternal Nutritional Physiological Phenomena/ or maternal.mp.	264203
6	mother\$.mp. or exp Mothers/	198756
7	weight.mp. or exp "Weights and Measures"/	1147854
8	exp Body Image/ or exp Obesity/ or obes\$.mp.	299348
9	growth.mp.	1632586
10	overweight\$.mp. or exp Body Weight/ or exp Overweight/	447149
11	child\$.mp. or exp Child, Preschool/ or exp Child Health/ or exp Child/ or exp Child Nutrition Disorders/	2169889
12	infant.mp. or exp Infant Health/ or exp Infant/ or exp Infant, Newborn/	1126612
13	5 or 6	388303
14	7 or 8 or 9 or 10	2827918
15	11 or 12	2629228
16	3 and 13 and 14 and 15	1656
17	limit 16 to yr="1946 - 2016"	1468

\$=truncation; exp = exploded; mp= multi-purpose set of fields.

APPENDIX II

A.II Table 1- Cross-tabulation looking at concordance among questions about the mothers perceptions about their child's weight.

		6 Months				24 months			
		Question 1	Question 2	Question 3	Question 4	Question 1	Question 2	Question 3	Question 4
Question 1	Rho	1				1			
	N	1097				1053			
	P±								
Question 2	Rho	0.5715	1			0.6343	1		
	N	1097	1097			1053	1053		
	P±	<0.001				<0.001			
Question 3	Rho	0.425	0.4258	1		0.4769	0.485	1	
	N	1097	1097	1097		1053	1053	1053	
	P±	<0.001	<0.001			<0.001	<0.001		
Question 4	Rho	0.4296	0.3757	0.6143	1	0.4326	0.4554	0.6198	1
	N	1097	1097	1097	1097	1053	1053	1053	1053
	P±	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	

Question 1. How do you see the weight of your child

Question 2. How would you classify your child's weight

Question 3. What is your child's weight compared to other children

Question 4. How quickly has your child gained weight compared to other children

A.II Table 2- Mothers' perception of their child's weight at 6 and 24 months by mothers' ethnicity

				White British	Pakistani	Total	P ±
Women's perception of their child's weight	6 months	low	N (%)	35 (7.17)	122 (18.77)	157 (13.8)	<0.001
		right	N (%)	401 (82.17)	486 (74.77)	887 (77.94)	
		high	N (%)	52 (10.66)	42 (6.46)	94 (8.26)	
	24 months	low	N (%)	43 (9.56)	159 (26.24)	202 (19.13)	<0.001
		right	N (%)	385 (85.56)	424 (69.97)	809 (76.61)	
		high	N (%)	22 (4.89)	23 (3.8)	45 (4.26)	

A.II Table 3- Women's perception of their child's weight by weight status of the child

					White British	Pakistani	Total	P ±
Women's perception of their child's weight	6 months	Underweight	low	N (%)	5 (27.78)	35 (41.67)	40 (39.22)	0.138
			right	N (%)	13 (72.22)	42 (50)	55 (53.92)	
			high	N (%)	0 (0)	7 (8.33)	7 (6.86)	
		Normal	low	N (%)	28 (6.88)	78 (15.73)	106 (11.74)	<0.001
			right	N (%)	341 (83.78)	393 (79.23)	734 (81.28)	
			high	N (%)	38 (9.34)	25 (5.04)	63 (6.98)	
		At Risk of Overweight	low	N (%)	0 (0)	1 (4)	1 (1.54)	0.627
			right	N (%)	29 (72.5)	17 (68)	46 (70.77)	
			high	N (%)	11 (27.5)	7 (28)	18 (27.69)	
	Overweight or obese	low	N (%)	1 (14.29)	0 (0)	1 (6.67)	1	
		right	N (%)	5 (71.43)	6 (75)	11 (73.33)		
		high	N (%)	1 (14.29)	2 (25)	3 (20)		
	24 months	Underweight	low	N (%)	0 (0)	9 (75)	9 (64.29)	0.095
			right	N (%)	2 (100)	2 (16.67)	4 (28.57)	
			high	N (%)	0 (0)	1 (8.33)	1 (7.14)	
		Normal weight	low	N (%)	32 (14.55)	92 (33.21)	124 (24.95)	<0.001
			right	N (%)	182 (82.73)	178 (64.26)	360 (72.43)	
			high	N (%)	6 (2.73)	7 (2.53)	13 (2.62)	
At Risk of Overweight		low	N (%)	4 (3.88)	6 (6.74)	10 (5.21)	0.608	
		right	N (%)	92 (89.32)	79 (88.76)	171 (89.06)		
		high	N (%)	7 (6.8)	4 (4.49)	11 (5.73)		
Overweight or obese		low	N (%)	1 (3.7)	1 (3.7)	2 (3.7)	1	
		right	N (%)	21 (77.78)	21 (77.78)	42 (77.78)		
		high	N (%)	5 (18.52)	5 (18.52)	10 (18.52)		

A.II Table 4- Subscapular and Tricipital mean z-score means by weight category of the child

		6 months		24 months	
		N	Mean (S.D.)	N	Mean (S.D.)
Underweight	Subscapular	95	-0.31 (1.29)	9	-0.81 (1.45)
	Tricipital	95	0.85 (1.38)	10	0.94 (1.13)
Normal weight	Subscapular	821	0.57 (1.19)	296	-0.05 (1)
	Tricipital	827	1.55 (1.38)	335	0.89 (1.11)
Risk of overweight	Subscapular	58	1.67 (1.02)	112	1.01 (1.14)
	Tricipital	57	2.06 (1.33)	134	1.66 (1.07)
Overweight or obese	Subscapular	12	1.76 (1.25)	35	1.39 (1.21)
	Tricipital	12	2.35 (1.38)	40	2.22 (1.2)

A.II Table 5- Comparison of tricipital and bicipital skin-folds by weight status of the child (Bonferroni)

Row mean P±		6 months			24 months		
		Under-weight	Normal Weight	Risk of Over-weight	Under-weight	Normal Weight	Risk of Over-weight
Tricipital Skinfold	Normal	0.7			-0.04		
		<0.001			1		
	Risk of Overweight	1.21	0.51		0.72	0.77	
		<0.001	0.04		0.29	<0.001	
	Overweight/Obese	1.49	0.79	0.28	1.28	1.32	0.56
		0.003	0.29	1	0.01	<0.001	0.03
Subscapular skinfold	Normal	0.88			0.76		
		<0.001			0.21		
	Risk of Overweight	1.97	1.1		1.81	1.05	
		<0.001	<0.001		<0.001	<0.001	
	Overweight/Obese	2.06	1.19	0.09	2.2	1.44	0.38
		<0.001	0	1	<0.001	<0.001	0.38

A.II Table 6- Cross-tabulation of maternal accuracy to estimate their child's weight at 6 months with that at 24 months postpartum

		Maternal accuracy to estimate their child's weight at 24 months			
		Overestimation	Accurate	Underestimation	Total
Maternal accuracy to estimate their child's weight at 6 months	Overestimation	3	31	35	69
	Accurate	11	258	192	461
	Underestimation	3	24	58	85

A.II Table 7- Changes in maternal accuracy to estimate their child's weight from 6 to 24 months postpartum

		White British	Pakistani	Total
Accurate	N (%)	144 (49.48)	114 (35.19)	258 (41.95)
Got worse (Accurate to Under or Overestimation)	N (%)	89 (30.58)	114 (35.19)	203 (33.01)
Got better (Under or overestimation to Accurate)	N (%)	19 (6.53)	36 (11.11)	55 (8.94)
Consistent Inaccurate	N (%)	24 (8.25)	37 (11.42)	61 (9.92)
One category to another	N (%)	15 (5.15)	23 (7.1)	38 (6.18)

A.II Table 8- Ethnic differences in maternal accuracy to perceive child's weight stratifying by child's weight status at 6 months postpartum

			White British	Pakistani	Total	P ±	
6 months	Underweight	Moderate Overestimation	N (%)	2 (11.11)	12 (14.29)	14 (13.73)	0.67
		Slightly Overestimation	N (%)	12 (66.67)	43 (51.19)	55 (53.92)	
		Accurate	N (%)	3 (16.67)	21 (25)	24 (23.53)	
		Slightly Underestimation	N (%)	1 (5.56)	8 (9.52)	9 (8.82)	
		Moderate/Severe Underestimation	N (%)	0 (0)	0 (0)	0 (0)	
	Normal	Moderate Overestimation	N (%)	1 (0.25)	5 (1.01)	6 (0.66)	<0.001
		Slightly Overestimation	N (%)	37 (9.09)	20 (4.03)	57 (6.31)	
		Accurate	N (%)	341 (83.78)	393 (79.23)	734 (81.28)	
		Slightly Underestimation	N (%)	28 (6.88)	68 (13.71)	96 (10.63)	
		Moderate/Severe Underestimation	N (%)	0 (0)	10 (2.02)	10 (1.11)	
	Risk of overweight	Moderate Overestimation	N (%)	0 (0)	0 (0)	0 (0)	0.146
		Slightly Overestimation	N (%)	0 (0)	2 (8)	2 (3.08)	
		Accurate	N (%)	11 (27.5)	5 (20)	16 (24.62)	
		Slightly Underestimation	N (%)	29 (72.5)	17 (68)	46 (70.77)	
		Moderate/Severe Underestimation	N (%)	0 (0)	1 (4)	1 (1.54)	
	Overweight or Obese	Moderate Overestimation	N (%)	0 (0)	0 (0)	0 (0)	1
		Slightly Overestimation	N (%)	0 (0)	1 (12.5)	1 (6.67)	
		Accurate	N (%)	1 (14.29)	1 (12.5)	2 (13.33)	
		Slightly Underestimation	N (%)	3 (42.86)	3 (37.5)	6 (40)	
		Moderate/Severe Underestimation	N (%)	3 (42.86)	3 (37.5)	6 (40)	

A.II Table 9- Ethnic differences in maternal accuracy to perceive child's weight stratifying by child's weight status at 24 months postpartum

			White British	Pakistani	Total	P ±	
24 months	Underweight	Moderate Overestimation	N (%)	0 (0)	2 (16.67)	2 (14.29)	0.067
		Slightly Overestimation	N (%)	2 (100)	1 (8.33)	3 (21.43)	
		Accurate	N (%)	0 (0)	6 (50)	6 (42.86)	
		Slightly Underestimation	N (%)	0 (0)	3 (25)	3 (21.43)	
		Moderate/Severe Underestimation	N (%)	0 (0)	0 (0)	0 (0)	
	Normal	Moderate Overestimation	N (%)	0 (0)	1 (0.36)	1 (0.2)	<0.001
		Slightly Overestimation	N (%)	6 (2.73)	6 (2.17)	12 (2.41)	
		Accurate	N (%)	182 (82.73)	178 (64.26)	360 (72.43)	
		Slightly Underestimation	N (%)	29 (13.18)	86 (31.05)	115 (23.14)	
		Moderate/Severe Underestimation	N (%)	3 (1.36)	6 (2.17)	9 (1.81)	
	Risk of overweight	Moderate Overestimation	N (%)	0 (0)	0 (0)	0 (0)	0.608
		Slightly Overestimation	N (%)	0 (0)	0 (0)	0 (0)	
		Accurate	N (%)	7 (6.8)	4 (4.49)	11 (5.73)	
		Slightly Underestimation	N (%)	92 (89.32)	79 (88.76)	171 (89.06)	
		Moderate/Severe Underestimation	N (%)	4 (3.88)	6 (6.74)	10 (5.21)	
	Overweight or Obese	Moderate Overestimation	N (%)	0 (0)	0 (0)	0 (0)	0.617
		Slightly Overestimation	N (%)	1 (3.7)	1 (3.7)	2 (3.7)	
		Accurate	N (%)	4 (14.81)	4 (14.81)	8 (14.81)	
		Slightly Underestimation	N (%)	19 (70.37)	15 (55.56)	34 (62.96)	
		Moderate/Severe Underestimation	N (%)	3 (11.11)	7 (25.93)	10 (18.52)	

A.II Table 10 -Assessment of differences in the distribution of accuracy by mother and child biological and sociodemographic characteristics

			6 months				24 months			
			Overestimation	Accurate	Underestimation	P±	Overestimation	Accurate	Underestimation	P±
Women's Age at baseline		N	135	774	174		20	385	351	
		Mean (S.D.)	27.24 (5.96)	27.35 (5.61)	27.27 (5.19)	0.97	25.6 (5.27)	27.15 (5.56)	27.38 (5.42)	0.35
Women's Place of birth	Inside the UK	N (%)	86 (63.7)	521 (67.14)	115 (66.09)	0.73	12 (60)	279 (72.47)	230 (65.34)	0.078
	Outside the UK	N (%)	49 (36.3)	255 (32.86)	59 (33.91)		8 (40)	106 (27.53)	122 (34.66)	
Education	A level or higher	N (%)	47 (35.34)	306 (39.48)	67 (38.51)	0.889	6 (30)	137 (35.58)	143 (40.63)	0.098
	<5 GCSE equivalent	N (%)	29 (21.8)	175 (22.58)	34 (19.54)		9 (45)	83 (21.56)	62 (17.61)	
	5 GCSE equivalent	N (%)	47 (35.34)	247 (31.87)	61 (35.06)		4 (20)	138 (35.84)	125 (35.51)	
	Other/ unknown	N (%)	10 (7.52)	47 (6.06)	12 (6.9)		1 (5)	27 (7.01)	22 (6.25)	
Living arrangements	Living with partner	N (%)	113 (83.7)	687 (88.65)	153 (88.95)	0.244	13 (65)	278 (72.21)	258 (73.3)	0.707
	Not living with partner	N (%)	22 (16.3)	88 (11.35)	19 (11.05)		7 (35)	107 (27.79)	94 (26.7)	
Parity	Primiparous	N (%)	46 (34.85)	311 (40.44)	64 (37.43)	0.413	9 (45)	140 (36.75)	136 (39.31)	0.634
	Multiparous	N (%)	86 (65.15)	458 (59.56)	107 (62.57)		11 (55)	241 (63.25)	210 (60.69)	
Household Food security	Food secure	N (%)	101 (87.07)	562 (87.54)	107 (83.59)	0.481	14 (82.35)	288 (85.21)	262 (87.04)	0.728
	Food insecure	N (%)	15 (12.93)	80 (12.46)	21 (16.41)		3 (17.65)	50 (14.79)	39 (12.96)	
Maternal weight status	underweight	N (%)	4 (3.05)	27 (3.56)	5 (2.92)	0.049	1 (5)	11 (3.06)	9 (2.7)	0.048
	normal	N (%)	64 (48.85)	329 (43.35)	57 (33.33)		8 (40)	154 (42.9)	121 (36.34)	
	overweight	N (%)	34 (25.95)	198 (26.09)	64 (37.43)		3 (15)	93 (25.91)	122 (36.64)	
	obese	N (%)	29 (22.14)	205 (27.01)	45 (26.32)		8 (40)	101 (28.13)	81 (24.32)	
Women's BMI		N	131	759	171		20	359	333	
		Mean (S.D.)	26.16 (5.56)	26.79 (6.02)	27.21 (5.97)	0.997	27.87 (8.34)	27.02 (6.1)	26.8 (5.42)	0.685
Baby sex	Male	N (%)	71 (52.59)	369 (47.55)	91 (52.3)	0.34	12 (60)	178 (46.23)	181 (51.42)	0.226
	Female	N (%)	64 (47.41)	407 (52.45)	83 (47.7)		8 (40)	207 (53.77)	171 (48.58)	
birthweight		N	135	776	174		20	385	352	
		Mean (S.D.)	3.19 (0.6)	3.22 (0.53)	3.16 (0.59)	0.48	3.09 (0.47)	3.22 (0.5)	3.26 (0.61)	0.41

A.II Table 11- Assessment of differences in the distribution of accuracy by mother and child biological and sociodemographic characteristics

			Concern about Overweight		
			Not Concerned	Concerned	P±
6 months	Underweight	N(%)	90 (88.24)	12 (11.76)	0.011
	Normal weight	N(%)	770 (85.94)	126 (14.06)	
	Risk of Overweight	N(%)	51 (78.46)	14 (21.54)	
	Overweight or Obese	N(%)	9 (60)	6 (40)	
24 months	Underweight	N(%)	13 (92.86)	1 (7.14)	0.22
	Normal weight	N(%)	416 (83.7)	81 (16.3)	
	Risk of Overweight	N(%)	156 (81.25)	36 (18.75)	
	Overweight or Obese	N(%)	40 (74.07)	14 (25.93)	

A.II Table 12- Median duration of exclusive and any breastfeeding by mother and child characteristics

		Exclusive breastfeeding duration				Any breastfeeding duration			
		N	Median	95%CI	P±*	N	Median	95%CI	P±*
Maternal ethnicity	White British	589	2	(1 ,4)	<0.001	586	7	(4 ,14)	<0.001
	Pakistani	769	7	(7 ,14)		739	30	(28 ,42)	
Place of birth	Inside the UK	895	4	(3 ,7)	0.03	879	14	(7 ,14)	<0.001
	Outside the UK	463	7	(3 ,14)		446	42	(28 ,56)	
Mother's age	<=24 years	479	4	(2 ,7)	<0.001	471	14	(7 ,14)	<0.001
	> 24 years	879	6	(3 ,7)		854	28	(21 ,42)	
Maternal education	A level or higher	498	14	(14 ,28)	<0.001	479	56	(42 ,63)	<0.001
	<5 GCSE equivalent	311	1	(1 ,3)		307	7	(3 ,14)	
	5 GCSE equivalent	462	2	(1 ,4)		453	14	(7 ,14)	
	Other/ unknown	84	4	(1 ,14)		84	21	(7 ,42)	
Maternal living arrangements	Living with partner	1002	7	(5 ,10)	<0.001	969	28	(28 ,42)	<0.001
	Not living with partner	133	1	(1 ,2)		132	2.5	(1 ,7)	
Parity	Primiparous	509	7	(3 ,14)	0.94	496	14	(14 ,28)	0.05
	Multiparous	820	4	(2 ,7)		801	21	(14 ,28)	
Food security	Food secure	955	7	(4 ,7)	0.03	936	24.5	(14 ,28)	0.27
	Food insecure	152	2	(1 ,7)		150	14	(4 ,28)	
Mother's weight status at 6 months	underweight	42	0	(0 ,1)	<0.001	42	1	(0.0001 ,21)	0.01
	normal	461	9	(4 ,14)		449	30	(28 ,56)	
	overweight	308	7	(3 ,14)		296	30	(21 ,56)	
	obese	290	2.5	(1 ,6)		283	14	(7 ,28)	
Baby sex	Male	657	7	(3 ,7)	0.72	637	21	(14 ,28)	0.68
	Female	689	4	(2 ,7)		676	14	(14 ,28)	
Child's weight category at 6 months	Underweight	104	2	(1 ,7)	<0.001	100	24.5	(7 ,61)	0.65
	Normal weight	906	5	(3 ,7)		880	28	(14 ,28)	
	Risk of Overweight	65	21	(7 ,63)		64	56	(14 ,98)	
	Overweight or Obese	15	21	(2 ,161)		14	112	(2 ,335)	

P±* Obtained from log rant tests

A.II Table 13- Maternal feeding styles at 6 months postpartum by mother and child characteristics

			Authoritative	Authoritarian	Indulgent	Uninvolved	P ±
Maternal Ethnicity	White British	N (%)	71 (16.86)	88 (20.9)	172 (40.86)	90 (21.38)	<0.001
	Pakistani	N (%)	121 (21.38)	204 (36.04)	128 (22.61)	113 (19.96)	
Maternal Age at baseline		N	192	292	300	203	0.092
		Mean (S.D.)	27.0 (24.0, 31.0)	27.0 (24.0, 31.0)	27.0 (23.0, 32.0)	26.0 (22.0, 30.0)	
Maternal Place of birth	Inside the UK	N (%)	117 (18.06)	168 (25.93)	225 (34.72)	138 (21.3)	<0.001
	Outside the UK	N (%)	75 (22.12)	124 (36.58)	75 (22.12)	65 (19.17)	
Education	A level or higher	N (%)	76 (20.21)	106 (28.19)	127 (33.78)	67 (17.82)	0.667
	<5 GCSE equivalent	N (%)	45 (20.93)	66 (30.7)	53 (24.65)	51 (23.72)	
	5 GCSE equivalent	N (%)	61 (18.1)	100 (29.67)	104 (30.86)	72 (21.36)	
	Other/ unknown	N (%)	10 (17.54)	20 (35.09)	15 (26.32)	12 (21.05)	
Living arrangements at correspondent time	Living with partner	N (%)	171 (19.66)	263 (30.23)	261 (30)	175 (20.11)	0.447
	Not living with partner	N (%)	21 (18.1)	28 (24.14)	39 (33.62)	28 (24.14)	
Parity	Primiparous	N (%)	62 (16.94)	98 (26.78)	124 (33.88)	82 (22.4)	0.081
	Multiparous	N (%)	127 (20.92)	190 (31.3)	172 (28.34)	118 (19.44)	
Household Food security	Food secure	N (%)	134 (19.09)	203 (28.92)	218 (31.05)	147 (20.94)	0.905
	Food insecure	N (%)	20 (19.42)	33 (32.04)	29 (28.16)	21 (20.39)	
Maternal BMI at correspondent time period, mean (SD)		N	192	292	300	203	0.12
		Mean (S.D.)	26.0 (23.3, 30.3)	24.8 (21.9, 29.9)	25.3 (22.5, 30.7)	26.3 (22.1, 30.3)	
Maternal weight status	underweight	N (%)	7 (18.42)	13 (34.21)	9 (23.68)	9 (23.68)	0.214
	normal	N (%)	68 (17.17)	135 (34.09)	123 (31.06)	70 (17.68)	
	overweight	N (%)	63 (23.86)	67 (25.38)	75 (28.41)	59 (22.35)	
	obese	N (%)	49 (19.22)	70 (27.45)	81 (31.76)	55 (21.57)	
Baby sex	Male	N (%)	90 (18.4)	144 (29.45)	162 (33.13)	93 (19.02)	0.236
	Female	N (%)	102 (20.56)	147 (29.64)	137 (27.62)	110 (22.18)	
birthweight		N	192	292	300	203	0.033
		Mean (S.D.)	3.2 (3.0, 3.6)	3.2 (2.8, 3.5)	3.3 (2.9, 3.6)	3.2 (2.8, 3.6)	
Child's BMI z-score		N	192	292	300	203	0.11
		Mean (S.D.)	-0.4 (-1.2, 0.3)	-0.6 (-1.4, 0.2)	-0.5 (-1.1, 0.3)	-0.5 (-1.4, 0.4)	
Child's weight status	Underweight	N (%)	17 (19.1)	28 (31.46)	21 (23.6)	23 (25.84)	0.193
	Normal weight	N (%)	143 (18.29)	237 (30.31)	239 (30.56)	163 (20.84)	
	Risk of Overweight	N (%)	15 (25.42)	13 (22.03)	22 (37.29)	9 (15.25)	
	Overweight or Obese	N (%)	5 (38.46)	4 (30.77)	4 (30.77)	0 (0)	

A.II Table 14- Maternal feeding styles at 24 months postpartum by mother and child characteristics

			Authoritative	Authoritarian	Indulgent	Uninvolved	P ±
Maternal Ethnicity	White British	N (%)	67 (15.06)	97 (21.8)	217 (48.76)	64 (14.38)	<0.001
	Pakistani	N (%)	71 (11.83)	251 (41.83)	163 (27.17)	115 (19.17)	
Maternal Age at baseline		N	138	348	380	179	0.006
		Mean (S.D.)	27.0 (23.0, 31.0)	26.0 (23.0, 30.0)	27.0 (23.0, 31.0)	28.0 (24.0, 32.0)	
Maternal Place of birth	Inside the UK	N (%)	94 (13.84)	211 (31.08)	277 (40.8)	97 (14.29)	<0.001
	Outside the UK	N (%)	44 (12.02)	137 (37.43)	103 (28.14)	82 (22.4)	
Education	A level or higher	N (%)	51 (13.32)	131 (34.2)	144 (37.6)	57 (14.88)	0.208
	<5 GCSE equivalent	N (%)	23 (9.87)	69 (29.61)	92 (39.48)	49 (21.03)	
	5 GCSE equivalent	N (%)	50 (13.85)	124 (34.35)	124 (34.35)	63 (17.45)	
	Other/ unknown	N (%)	14 (20.9)	24 (35.82)	20 (29.85)	9 (13.43)	
Living arrangements at correspondent time	Living with partner	N (%)	101 (12.98)	275 (35.35)	263 (33.8)	139 (17.87)	0.014
	Not living with partner	N (%)	37 (13.91)	73 (27.44)	117 (43.98)	39 (14.66)	
Parity	Primiparous	N (%)	55 (14.67)	137 (36.53)	134 (35.73)	49 (13.07)	0.029
	Multiparous	N (%)	81 (12.6)	200 (31.1)	235 (36.55)	127 (19.75)	
Household Food security	Food secure	N (%)	100 (12.92)	259 (33.46)	282 (36.43)	133 (17.18)	0.879
	Food insecure	N (%)	16 (12.7)	38 (30.16)	50 (39.68)	22 (17.46)	
Maternal BMI at correspondent time period, mean (SD)		N	138	348	380	179	0.054
		Mean (S.D.)	26.3 (23.5, 30.7)	25.4 (21.9, 29.2)	26.5 (22.5, 30.6)	25.7 (23.0, 29.9)	
Maternal weight status	underweight	N (%)	1 (2.94)	17 (50)	10 (29.41)	6 (17.65)	0.408
	normal	N (%)	47 (12.34)	136 (35.7)	132 (34.65)	66 (17.32)	
	overweight	N (%)	39 (13.36)	96 (32.88)	105 (35.96)	52 (17.81)	
	obese	N (%)	33 (13.47)	72 (29.39)	99 (40.41)	41 (16.73)	
Baby sex	Male	N (%)	68 (13.74)	172 (34.75)	180 (36.36)	75 (15.15)	0.316
	Female	N (%)	69 (12.83)	170 (31.6)	195 (36.25)	104 (19.33)	
birthweight		N	138	348	380	179	0.008
		Mean (S.D.)	3.2 (2.9, 3.5)	3.1 (2.8, 3.5)	3.3 (2.9, 3.6)	3.2 (2.9, 3.6)	
Child's BMI z-score		N	138	348	380	179	0.036
		Mean (S.D.)	0.4 (-0.3, 0.9)	0.4 (-0.3, 1.2)	0.6 (-0.1, 1.5)	0.7 (0.0, 1.4)	
Child's weight status	Underweight	N (%)	1 (7.14)	6 (42.86)	5 (35.71)	2 (14.29)	0.075
	Normal weight	N (%)	83 (16.84)	175 (35.5)	159 (32.25)	76 (15.42)	
	Risk of Overweight	N (%)	22 (11.7)	62 (32.98)	74 (39.36)	30 (15.96)	
	Overweight or Obese	N (%)	2 (3.7)	14 (25.93)	26 (48.15)	12 (22.22)	

A.II Table 15- Relative risk ratios and 95% CI for maternal feeding styles for each mother and child characteristics at 6 months postpartum from binary multinomial logistic regression models (Unadjusted models)

Coefficient (N)	Category	Authoritarian			Indulgent			Uninvolved		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (987)	White British	Ref			Ref			Ref		
	Pakistani	1.36	(0.93, 2)	0.117	0.44	(0.3, 0.63)	<0.001	0.74	(0.49, 1.1)	0.137
Place of Birth (987)	Inside the U.K.	Ref			Ref			Ref		
	Outside the U.K.	1.15	(0.79, 1.67)	0.457	0.52	(0.35, 0.77)	0.001	0.73	(0.49, 1.11)	0.144
Maternal Age (986)		1	(0.97, 1.03)	0.957	1.01	(0.98, 1.04)	0.533	0.97	(0.94, 1.01)	0.098
Maternal Education (985)	A level or higher	Ref			Ref			Ref		
	<5 GCSE	1.05	(0.65, 1.7)	0.837	0.7	(0.43, 1.15)	0.16	1.29	(0.77, 2.16)	0.342
	5 GCSE	1.18	(0.76, 1.81)	0.465	1.02	(0.67, 1.56)	0.926	1.34	(0.83, 2.15)	0.227
	Other/ unknown	1.43	(0.64, 3.24)	0.386	0.9	(0.38, 2.1)	0.803	1.36	(0.55, 3.35)	0.502
Living Arrangements (986)	Living with partner	Ref			Ref			Ref		
	Not living with partner	0.87	(0.48, 1.58)	0.64	1.22	(0.69, 2.14)	0.496	1.3	(0.71, 2.38)	0.39
Parity (973)	Single child	Ref			Ref			Ref		
	Multiparous	0.95	(0.64, 1.4)	0.782	0.68	(0.46, 0.99)	0.045	0.7	(0.46, 1.06)	0.095
Food Security (805)	Food secure	Ref			Ref			Ref		
	Food insecure	1.09	(0.6, 1.98)	0.779	0.89	(0.48, 1.64)	0.711	0.96	(0.5, 1.84)	0.896
Maternal BMI (953)		0.97	(0.95, 1.01)	0.103	0.99	(0.96, 1.02)	0.444	0.99	(0.96, 1.02)	0.56
Maternal weight status (953)	Normal	Ref			Ref			Ref		
	Underweight	0.94	(0.36, 2.45)	0.892	0.71	(0.25, 1.99)	0.516	1.25	(0.44, 3.54)	0.676
	Overweight	0.54	(0.34, 0.84)	0.007	0.66	(0.42, 1.03)	0.067	0.91	(0.56, 1.48)	0.704
	Obesity	0.72	(0.45, 1.15)	0.167	0.91	(0.58, 1.45)	0.703	1.09	(0.66, 1.81)	0.739
Infant's sex (985)	Male	Ref			Ref			Ref		
	Female	0.9	(0.63, 1.3)	0.574	0.75	(0.52, 1.07)	0.114	1.04	(0.7, 1.55)	0.832
Birthweight (985)		0.71	(0.51, 1)	0.051	0.92	(0.66, 1.29)	0.629	0.69	(0.48, 1)	0.049
Infant's BMI z-score at 6 months (943)		0.86	(0.73, 1.02)	0.078	1.01	(0.86, 1.19)	0.887	0.9	(0.75, 1.08)	0.258

A.II Table 16- Relative risk ratios and 95% CI for maternal feeding styles for each mother and child characteristics at 24 months postpartum from binary multinomial logistic regression models (Unadjusted models)

Coefficient (N)	Category	Authoritarian			Indulgent			Uninvolved		
		Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±	Relative Risk Ratio	95%CI	P ±
Ethnicity (1045)	White British	Ref			Ref			Ref		
	Pakistani	2.44	(1.62, 3.67)	<0.001	0.71	(0.48, 1.05)	0.084	1.7	(1.08, 2.67)	0.022
Place of Birth (1045)	Inside the U.K.	Ref			Ref			Ref		
	Outside the U.K.	1.39	(0.91, 2.11)	0.125	0.79	(0.52, 1.21)	0.287	1.81	(1.14, 2.87)	0.012
Maternal Age (1044)		0.96	(0.93, 1)	0.036	1	(0.97, 1.04)	0.951	1.02	(0.98, 1.06)	0.304
Maternal Education (1044)	A level or higher	Ref			Ref			Ref		
	<5 GCSE	1.17	(0.66, 2.07)	0.595	1.42	(0.81, 2.47)	0.221	1.91	(1.02, 3.55)	0.042
	5 GCSE	0.97	(0.61, 1.53)	0.881	0.88	(0.56, 1.39)	0.579	1.13	(0.66, 1.91)	0.657
	Other/ unknown	0.67	(0.32, 1.39)	0.28	0.51	(0.24, 1.08)	0.077	0.58	(0.23, 1.44)	0.238
Living Arrangements (1044)	Living with partner	Ref			Ref			Ref		
	Not living with partner	0.72	(0.46, 1.14)	0.167	1.21	(0.79, 1.88)	0.382	0.77	(0.46, 1.29)	0.313
Parity (1018)	Single child	Ref			Ref			Ref		
	Multiparous	0.99	(0.66, 1.49)	0.966	1.19	(0.8, 1.78)	0.396	1.76	(1.09, 2.83)	0.02
Food Security (900)	Food secure	Ref			Ref			Ref		
	Food insecure	0.92	(0.49, 1.72)	0.787	1.11	(0.6, 2.03)	0.74	1.03	(0.52, 2.07)	0.925
Maternal BMI (952)		0.96	(0.93, 1)	0.038	1	(0.96, 1.03)	0.788	0.98	(0.94, 1.02)	0.339
Maternal weight status (952)	Normal	Ref			Ref			Ref		
	Underweight	5.87	(0.76, 45.36)	0.09	3.56	(0.44, 28.57)	0.232	4.27	(0.5, 36.67)	0.185
	Overweight	0.85	(0.52, 1.4)	0.525	0.96	(0.58, 1.57)	0.867	0.95	(0.54, 1.66)	0.856
	Obesity	0.75	(0.44, 1.28)	0.295	1.07	(0.64, 1.79)	0.802	0.88	(0.49, 1.6)	0.685
Infant's sex (1033)	Male	Ref			Ref			Ref		
	Female	0.97	(0.66, 1.45)	0.897	1.07	(0.72, 1.58)	0.743	1.37	(0.87, 2.14)	0.171
Birthweight (1033)		0.74	(0.51, 1.07)	0.104	1.07	(0.74, 1.54)	0.717	1.15	(0.76, 1.74)	0.502
Infant's BMI z-score at 24 months (749)		1.12	(0.91, 1.37)	0.284	1.31	(1.07, 1.62)	0.01	1.29	(1.02, 1.64)	0.036

APPENDIX III

A.II Object 1- Invitations to participate (Early years workers)



Invitation to participate in the study: Can We Talk About Children's weight?

To whom it may concern:

My name is Marena Ceballos Rasgado, and I am a PhD. student at the University of York, working with the Born in Bradford Better Start Innovation Hub. As part of my research project, I am investigating mothers' perceptions, attitudes and behaviours regarding their infant's weight and body size, and the strategies needed to tackle any misperceptions and consequent lack of action.

As you are a facilitator of a programme that aims to prevent childhood overweight/obesity, I am interested to know about the experiences you have had in working with parents towards the prevention of childhood overweight. Because of that, I would like to invite you to contribute to this research by giving me the opportunity to interview you.

The interview would be expected to last 45 minutes, and this could take place at the venue where your programme is delivered, or at the Bradford Institute of Health Research at the Bradford Royal Infirmary, whichever of the above is more convenient.

Lastly, if you decide to participate, you should know that the interviews will be audio recorded and that notes might be taken, but that your confidentiality/anonymity and any information you share will be protected; and that you will be able to withdraw from this project at any time you want.

Your participation could help to build knowledge on how health professionals like you could have a better communication with families when talking about overweight in childhood, to ensure families get the right help when they need it. A summary of our findings will be sent to you, as well as any research outputs produced from this project.

Please feel free to contact me if you wish to participate and/or would like more information about this research project. We would be very grateful for your support.

Best regards,

Marena Ceballos Rasgado

Email: mcr519@york.ac.uk

A.II Object 2 Participants information sheet (Early years workers)

UNIVERSITY *of* York

The Department of Health Sciences

Let's talk about childhood overweight!

Participant Information Sheet

Dear participant,

Thank you for your interest in volunteering in this research project titled: **Let's talk about childhood overweight!**

What is the purpose of this study?

This study aims to understand the point of view about childhood overweight as well as the experiences that programme facilitators like you have had with parents during the provision of the interventions designed to decrease overweight and obesity in the city of Bradford.

Who is doing the study?

My name is **Marena Ceballos Rasgado** and I am a PhD. student in the department of Health Sciences at the University of York, and I am conducting this research as part of my dissertation requirements under the supervision of Prof Kate Pickett and Dr Rosie McEachan. This study is also linked to Born in Bradford and the Better Start Innovation Hub.

Who is being asked to participate? Or why have I been asked to participate?

You have been invited to participate because you are a programme facilitator of the interventions targeting childhood overweight from the Born in Bradford Better Start program. Therefore your participation would be highly valuable.

Do I have to take part?

Participation in this study is entirely voluntary.

What will be involved if I take part in this study?

If you agree to contribute in this study, your participation will consist in a face to face interview that will last **45 minutes**.

What are the advantages/benefits and disadvantages/risks of taking part?

You will not be paid by your participation. Yet, you would be able to contribute to fulfil current gaps in our understanding on the social determinants of childhood overweight.

Can I withdraw from the study at any time?

Despite that there are no anticipated risks associated with your participation in this project, it is important that you know that you have the right to stop the session or discontinue your participation at any time. All data obtained from the interviews will be securely stored in the Network of the University of York. Please note that if you decide to withdraw your participation after this interview, you can let the researcher know during the first month after the development of this interview. In case of withdraw, all the information that you provided will be deleted and will not be included in the results of this project.

Will the information I give be kept confidential?

- Yes, please note that an audio tape will be recorded during this interview and a transcript will be produced. Also the interviewer might take notes during this interview. The above will be securely stored and during the length of this project, and destroyed at the end of it. The above transcript will be analysed by **Marena**

Date: 12/04/2017

Version: One

Ceballos Rasgado, and access to the interview will be limited to **Prof Kate Pickett, Dr Rosie McEachan** and researchers that might collaborate in this project. Every measure will be taken to ensure your confidentiality. Anonymity cannot be fully guaranteed due to small number of people that are been interviewed.

What will happen to the results of the study?

Results from this project will contribute to the dissertation of **Marena Ceballos Rasgado**; and possible publications will be published in research journals and conferences. Words might be quoted directly in the reports resulted from this project, however, your confidentiality will be protected. Your name or possible identifiers of your person will not be used on the reports made from this project.

Who has reviewed this study?

The **Research Governance Committee of the Department of Health Sciences, University of York**, reviewed and approved this research project

Who do I contact in the event of a complaint?

Supervisors of this project are:

Professor Kate Pickett: kate.pickett@york.ac.uk

Doctor Rosie McEachan: rosie.mceachan@bthft.nhs.uk

If you still have concerns, please contact: patrick.doherty@york.ac.uk

If you agree to participate, please sign the following consent form, and keep a copy of this document. Please note that you are able to contact Marena Ceballos Rasgado at mcr519@york.ac.uk, for further questions you may have regarding to this project after your participation.

Thank you for taking the time to read this information sheet.

Date: 12/04/2017

Version: One

UNIVERSITY of York
The Department of Health Sciences

Participant Consent Form

Title of Study:

Let's talk about childhood overweight!	Please confirm agreement to the statements by putting your initials in the boxes below
I have read and understood the participant information sheet Date: 12/04/2017 Version: One	
I have had the opportunity to ask questions and discuss this study	
I have received satisfactory answers to all of my questions	
I have received enough information about the study	
I understand my participation in the study is voluntary and that I am free to withdraw from the study:- 1 Up to four weeks post-interview 2 Without having to give a reason for withdrawing 3 My data will be securely managed and disposed	
I understand that my interview will be audio-recorded	
I understand that any information I provide, including personal details, will be kept confidential, stored securely and only accessed by those carrying out the study.	
I understand that any information I give may be included in published documents but all information will be anonymised.	
I agree to take part in this study	
Participant Signature	Date
Name of Participant	
Researcher Signature	Date
Name of Researcher	

Date: 12/04/17
Version: One

A.II Object 3- Invitations to participate (Health professionals)



Invitation to participate in the study: Can We Talk About Children's overweight?

Dear Health Professional:

My name is Marena Ceballos Rasgado, and I am a PhD. student at the University of York, working with the Born in Bradford Better Start Innovation Hub. As part of my research project, I am investigating mothers' perceptions, attitudes and behaviours regarding their infant's body size and feeding practices, and the strategies needed to tackle any misperceptions and consequent lack of action.

As you are a Health Professional who has worked with families with young children in Bradford for at least three months, I am interested in the experiences you have had when talking with parents about their child's health and feeding practices. Because of that, I would like to invite you to contribute to this research by giving me the opportunity to interview you.

The interview would be expected to last 45 minutes, and this could take place at your clinic, or at the Bradford Institute of Health Research at the Bradford Royal Infirmary, whichever of the above is more convenient for you.

Lastly, if you decide to participate, you should know that the interviews will be audio recorded and that notes might be taken, but that your confidentiality/anonymity and any information you share will be protected; and that you will be able to withdraw from this project at any time you want.

Your participation could help to build knowledge on how health professionals like you could have a better communication with families when talking about overweight in childhood, to ensure families get the right help when they need it. A summary of our findings will be sent to you, as well as any research outputs produced from this project.

Please feel free to contact me if you wish to participate and/or would like more information about this research project. We would be very grateful for your support.

Best regards,

Marena Ceballos Rasgado

Email: mcr519@york.ac.uk

A.II Object 4- Participants information sheet (Health professionals)

UNIVERSITY *of York*
The Department of Health Sciences

Can we talk about children's health?

Participants Information Sheet (Health Visitors, Family Nurses and Nursery Nurses)

Dear participant,

Thank you for your interest in volunteering in this research project titled: **Can we talk about children's health?**

What is the purpose of this study?

This study aims to understand the experiences that health professionals working with families of young children in Bradford have had when talking with parents about their child's weight and feeding practices. We are interested in your experiences, despite that you'll be asked about your day to day work, please note that you will **NOT** be assessed or judged about your work.

Who is doing the study?

My name is **Marena Ceballos Rasgado** and I am a PhD. student in the department of Health Sciences at the University of York, and I am conducting this research as part of my dissertation requirements under the supervision of Prof Kate Pickett and Dr Rosie McEachan. This study is also linked to Born in Bradford and the Better Start Innovation Hub.

Who is being asked to participate? Or why have I been asked to participate?

You have been invited to participate because you are a Health Visitor who has been working in Bradford for at least three months. Therefore your participation would be highly valuable.

Do I have to take part?

Participation in this study is entirely voluntary.

What will be involved if I take part in this study?

If you agree to contribute in this study, your participation will consist in a face to face interview that will last **45 minutes**.

What are the advantages/benefits and disadvantages/risks of taking part?

You will not be paid by your participation. Yet, you would be able to contribute to fulfil current gaps in our understanding on the social determinants of childhood overweight.

Can I withdraw from the study at any time?

Despite that there are no anticipated risks associated with your participation in this project, it is important that you know that you have the right to stop the session or discontinue your participation at any time. All data obtained from the interviews will be securely stored in the Network of the University of York. Please note that if you decide to withdraw your participation after this interview, you can let the researcher know during the first month after the development of this interview. In case of withdraw, all the information that you provided will be deleted and will not be included in the results of this project.

Will the information I give be kept confidential?

Yes, please note that an audio tape will be recorded during this interview and a transcript will be produced. Also the interviewer might take notes during this interview. The above will be securely stored and during the length of this project, and destroyed at the end of it. The above transcript will be analysed by **Marena Ceballos Rasgado**, and access to the interview will be limited to **Prof Kate Pickett, Dr Rosie McEachan** and researchers that might collaborate in this project. Anonymity cannot be fully guaranteed due to the methodology of recruitment that this study follows. Nevertheless, every measure will be taken to ensure your confidentiality.

Date: 28/11/2017

Version: Four

What will happen to the results of the study?

Results from this project will contribute to the dissertation of **Marena Ceballos Rasgado**; and possible publications will be published in research journals and conferences. Words might be quoted directly in the reports resulted from this project, however, your confidentiality will be protected. Your name or possible identifiers of your person will not be used on the reports made from this project.

Who has reviewed this study?

The **Research Governance Committee of the Department of Health Sciences, University of York**, reviewed and approved this research project

Who do I contact in the event of a complaint?

Supervisors of this project are:

Professor Kate Pickett: kate.pickett@york.ac.uk

Doctor Rosie McEachan: rosie.mceachan@bthft.nhs.uk

If you still have concerns, please contact: patrick.doherty@york.ac.uk

If you agree to participate, please sign the following consent form, and keep a copy of this document. Please note that you are able to contact Marena Ceballos Rasgado at mcr519@york.ac.uk, for further questions you may have regarding to this project after your participation.

Thank you for taking the time to read this information sheet.

Date: 28/11/2017

Version: Four

Participant Consent Form

Title of Study:

Let's talk about childhood overweight!	Please confirm agreement to the statements by putting your initials in the boxes below
I have read and understood the participant information sheet Date: 28/11/2017 Version: Four	
I have had the opportunity to ask questions and discuss this study	
I have received satisfactory answers to all of my questions	
I have received enough information about the study	
I understand my participation in the study is voluntary and that I am free to withdraw from the study:- 1 Up to four weeks post-interview 2 Without having to give a reason for withdrawing 3 My data will be securely managed and disposed	
I understand that my interview will be audio-recorded	
I understand that any information I provide, including personal details, will be kept confidential, stored securely and only accessed by those carrying out the study.	
I understand that any information I give may be included in published documents but all information will be anonymised.	
I agree to take part in this study	
Participant Signature	Date
Name of Participant	
Researcher Signature	Date
Name of Researcher	

Date 28/11/2017
Version: Four

A.II Object 5- Invitations to participate (Mothers)

UNIVERSITY *of* York
The Department of Health Sciences

Invitation to participate in the study: Can We Talk about Children's health?

To whom it may concern:

My name is Marena Ceballos Rasgado, and I am a PhD. student at the University of York, working with the Born in Bradford Better Start Innovation Hub. My research project looks to understand mothers' perceptions, attitudes and behaviours regarding their infant's body size and feeding practices.

I would like to have a 45 minute interview with you and talk about, your beliefs and practices when feeding your child, as well your beliefs and experiences around your child's health and growth.

Lastly, if you decide to be interviewed, you should know that the interviews will be audio recorded and that notes might be taken, but that your privacy and any information you share will be protected; and that you will be able to stop your participation in this project at any time you want.

Your participation could help to build knowledge on how health professionals could have a better communication with families when talking about their child's health. A summary of our findings will be sent to you.

Please feel free to contact me if you wish to participate and/or would like more information about this research project. We would be very grateful for your support.

Best regards,

Marena Ceballos Rasgado

Email: mcr519@york.ac.uk

A.II Object 6- Participants information sheet (Mothers)

UNIVERSITY *of York*
The Department of Health Sciences

Can we talk about children's health?

Participants Information Sheet (Mothers)

Dear participant,

Thank you for your interest in volunteering in this research project titled: Can we talk about children's health?

What is the purpose of this study?

This project aims to understand how mums like you become aware of health problems in their children, as well as the beliefs about child's growth and feeding practices.

Who is doing the study?

My name is Marena Ceballos Rasgado and I am a PhD. student in the department of Health Sciences at the University of York, and I am doing this project as part of my dissertation requirements. My project is being supervised by Prof Kate Pickett and Dr Rosie McEachan. This study is also linked to Born in Bradford and the Better Start Innovation Hub.

Who is being asked to participate? Or why have I been asked to participate?

You have been invited because you are mother to one or more children under the age of five, living in Bradford. Therefore, your participation would be highly valuable.

Do I have to take part?

Your participation is entirely voluntary.

What will be involved if I take part in this study?

If you agree to take part, Marena Ceballos and you will have a 45 minutes face to face interview.

What are the advantages/benefits and disadvantages/risks of taking part?

You will not be paid to participate. Please note that during this interview, topics about your child's health and family eating practices will be discussed. You have the right to stop your participation or not answer a question if it causes you discomfort. Your participation will help us understand how to prevent health problems since early childhood.

Can I withdraw from the study at any time?

Your participation will not put you at any risk. But if you feel uncomfortable or unsafe you have the right to stop the interview or discontinue your participation at any time. All the information obtained from the interviews will be securely stored in the Network of the University of York. If you decide to stop your participation after this interview, you can let Marena Ceballos know during the first month after the interview took place. If that is the case, all the information that you gave us during the interview will be deleted and will not be included in the results of this project.

Will the information I give be kept confidential?

Yes, Marena Ceballos will record an audio from this interview, and will write out these audios. The above will be safely stored during the length of this project, and destroyed at the end of it. Access to the information obtained will be limited to Marena Ceballos Rasgado, her supervisors Prof Kate Pickett, Dr Rosie McEachan and people that might collaborate in this project. Every measure will be taken to ensure your confidentiality and anonymity.

What will happen to the results of the study?

Date: 14/08/2017

Version: Two

Results from this project will contribute to the dissertation of **Marena Ceballos Rasgado**; and possible publications in journals and conferences. Words might be quoted directly in the reports resulted from this project, however, your confidentiality will be protected. Your name or possible identifiers of your person will **NOT** be used on the reports made from this project.

Who has reviewed this study?

The **Research Governance Committee of the Department of Health Sciences, University of York**, reviewed and approved this research project

Who do I contact in the event of a complaint?

Supervisors of this project are:

Professor Kate Pickett: kate.pickett@york.ac.uk

Doctor Rosie McEachan: rosie.mceachan@bthft.nhs.uk

If you still have concerns, please contact: patrick.doherty@york.ac.uk

If you agree to participate, please sign the following consent form, and keep a copy of this document. Please note that you are able to contact Marena Ceballos Rasgado at mcr519@york.ac.uk, for further questions you may have regarding to this project after your participation.

Thank you for taking the time to read this information sheet.

Date: 14/08/2017

Version: Two

UNIVERSITY *of* York
The Department of Health Sciences

Participant Consent Form

Title of Study:

Let's talk about childhood overweight!	Please confirm agreement to the statements by putting your initials in the boxes below
I have read and understood the participant information sheet Date: 14/08/2017 Version:2	
I have had the opportunity to ask questions and discuss this study	
I have received satisfactory answers to all of my questions	
I have received enough information about the study	
I understand my participation in the study is voluntary and that I am free to withdraw from the study:- 1 Up to four weeks post-interview 2 Without having to give a reason for withdrawing 3 My data will be securely managed and deleted	
I understand that my interview will be audio-recorded	
I understand that any information I provide, including personal details, will be kept confidential, stored securely and only accessed by those carrying out the study.	
I understand that any information I give may be included in published documents but all information will be anonymised.	
I agree to take part in this study	
Participant Signature	Date
Name of Participant	
Researcher Signature	Date
Name of Researcher	

Date: 14/08/17
Version: Two

A.II Object 7- Topic guide for interviews (Early Years Workers)

TOPIC GUIDE: CAN WE TALK ABOUT CHILDREN'S WEIGHT?

INTRODUCTION:

- Introduce myself and give a brief explanation of the aim of the research, as well as the reason why the interviewee was invited to participate.
- Thank the participant for agreeing to be interviewed.
- Give the interviewee the consent form to read and sign.
- Verify consent form is signed, give copy to interviewee
- Ask the participant if he or she has any questions.

TOPICS TO BE COVERED DURING THIS INTERVIEW:

1. **Attitudes that programme facilitators have towards childhood obesity**
 - a. Identifying childhood weight problems, their vulnerability and severity.
 - For you what are the characteristics of a healthy child?
 - How would you know that a child is growing well and has a healthy development?
 - How would you identify a child that is not gaining enough or gaining too much weight/height?
 - Do you find it easy to identify a child who is at risk of overweight or obesity just by seeing them?
 - How common do you think growth problems are in children here in Bradford?
 - How common do you think childhood overweight/obesity is in children under the age of five?
 - Do you think there is a critical age in which a child has a higher risk to become overweight or obese?
 - How easy or difficult do you think it is to prevent and/or reverse weight problems in young children?
 2. **Facilitator's perceived attitudes of the parents towards the programme and the childhood obesity?**
 - a. Context
 - Could you briefly describe what your duties in the programme are?
 - Who are the most and least common service users? (i.e. ethnicity, the age of the children)
 - From what parents have expressed, what are the main reasons why they attend the programme sessions? (Differences by culture, weight status of the child, etc.?)
 - Are there many parents of children who have weight problems coming to the programme?
 - b. Users concerns and perceptions about their child's weight and height development.

- From what parents have expressed, what do you think their main concerns are about their child's health? (Have they mentioned anything about child's weight and height development and nutrition? Are there differences by culture, weight status of the child, etc.?)
- How often during the sessions are topics about weight and height development approached? Who starts these conversations?
- Think about the last session in which you talked about childhood overweight, can you remember what you talked about and what were the comments that arose? (Differences by culture, weight status of the child, etc.?)
- Do you think that parents perceive overweight as a health concern? Who are those who are the least and most worried? (Differences by culture, weight status of the child, etc.?)
 - Do you think there are any cultural factors that may influence the parents' perceived vulnerability of their child to suffer from body size issues?
- In general, do you think that parents are aware of their child's weight status?
 - Do you think parents tend to underestimate or overestimate their child's weight?
- Among parents who have children at risk of overweight or who are overweight, have they expressed their concern about their child's weight? (Differences in culture?)

c. Talking about the child's weight problems with parents

- Among parents who have been referred to the programme because their child is at risk of overweight or is actually overweight, has anyone expressed any thoughts about this? (I.e. did they show concern? Where they surprised? Did they disagree?)
- In general, how easy or difficult do you find it to talk with parents about child's weight problems? (Differences by culture, weight status of the child, etc.?)
- Thinking about your best and worst experiences that you have had when talking about weight with parents, what happened?
- From your point of view, what makes it easier to talk about weight problems with parents? (Differences by culture, weight status of the child, etc.?)
- From your point of view, what makes it more difficult talk about weight problems with parents? (Differences by culture, weight status of the child, etc.?)

3. Engagement with the programme and behaviours

- On average how many people come to each of the sessions? Are they constant in their attendance?
- Who are those that are the least and the most constant? What do you think makes them engage with the programme or not? (Any differences among user's and child's characteristics?)
- Do you feel that the sessions have caused any change in the parents? (I.e. knowledge, behaviours, attitudes. Any differences among user's and child's characteristics?)
- From your point of view, what are the factors that may influence parents to follow the recommendations given in the programme? (Any differences among user's and child's characteristics?)
- From your point of view, what are the factors that impede parents from following the recommendations given in the programme? What do parents mention as challenges to engaging with behaviour change strategies? (Any differences among user's and child's characteristics?)

- Have you perceived that there are any other cultural factors that we haven't discussed already, that may influence how parents may perceive their child's weight or the way in which they feed their children?

ENDING THE INTERVIEW:

- Ask the interviewee if there is anything else that he or she would like to add to the topics that were previously discussed.
- Finish the interview and thank the participant for their participation.

A.II Object 8- Topic guide for interviews (Health Professionals)

Topic Guide: Can we talk about children's overweight?

Interview with Health Visitors and family nurses

Introduction:	
	<ul style="list-style-type: none"> Introduce myself and give a brief explanation of the aim of the research, as well as the reason why the interviewee was invited to participate
	<ul style="list-style-type: none"> Thank the participant for agreeing to be interviewed
	<ul style="list-style-type: none"> Give the interviewee the consent form to read and sign
	<ul style="list-style-type: none"> Ask the participant if he/she has any questions
	<ul style="list-style-type: none"> Verify consent form is signed, give copy to interviewee
	<ul style="list-style-type: none"> Start recording

<p>Things to remember:</p> <p>3rd visit 6-8 weeks: visit at home in addition to GP medical visit (may weigh and review general health).</p> <p>4th visit 9-12 months: home or local clinic (assess and discuss child's physical health and development. This includes lots of things, such as child's diet, dental health and safety issues. As part of the visit, health visitor may weigh and measure your child and discuss their immunisations.</p> <p>5th visit: 2 to 2 ½ years: health visitor or nursery nurse, home, local clinic or children's centre.</p>

Topics to be covered during this interview:

1. Health Visitor's Role: Context of their job

<ul style="list-style-type: none"> Could you please put me into context about Health Visits in Bradford? Where do usually health visits take place? And what influence where these visits take place?
--

2. Establishing contact with parents

<ul style="list-style-type: none"> Do you perceive any difficulties in the process when establishing the Health Visit? (ex. not been able to contact parents, language?) Have you find any characteristics of the parents or the child who makes them less or more prone to get access to this Health Visits? (for example age of the child?) Is anyone controlling that everyone is getting the visit when it's needed?

3. Health Visit: process

- Is it always the same visitor giving the Health Visits, do you think this influence on how the health visit is delivered? (for example: building trust within the families?)
- Does anything changes on how the Health Visit is delivered depending where it takes place (nursery, house clinic?) How?
- Could you briefly tell me what you do in a health visit? Are there any difficulties when giving them, for example lack of time or resources?

4. Health Visit: Weighting the child

- When do you weight and measure the child? Are there any visits in which you wouldn't do it?
- Have you find any difficulties when measuring children at home or clinic?
- How would you know that the child has a healthy weight/ at risk of overweight / overweight underweight?
- Do you find it easy to identify risk of overweight by looking at the child?
- Is it easy to monitor the child's growth and child's development? Are there any factors that make it difficult to track child's weight and height development?
- How common do you see in a day to day basis parents with children at risk of overweight/overweight/obese? Is there an age in which you could say more children could be at risk of overweight? Any ethnicity in which you see more children who are overweight?

5. Talking with parents about their child's weight

- How often do you give feedback to parents about the child's weight? Are there any occasions in which you wouldn't be giving feedback?
- How do you give this message to the parents about their child's weight? Direct or indirect way? Why you do it that way?
- How easy or difficult do you find it to provide parents with feedback about their child's weight? What makes it easier or more difficult?
- How do you feel when talking with parents about their child's weight? Why?
- Can you remember in which you felt uncomfortable when talking about the child's weight? What happened? How did you cope with it?
- What makes it difficult/easy for you to talk with a parent about their child's weight? Can you think about an example? What happened?

5.1 Parent's response to the feedback about their child's weight

	<ul style="list-style-type: none"> • What is parent's response after receiving feedback about their child's growth? Do they take it well or wrong? Do they acknowledge it and take it on board? What is more frequent? • What factors do you find play a role in how parents will take on board or not the feedback that health visitors provide?
	<ul style="list-style-type: none"> • Do you think parents understand what an adequate growth and weight development means? Why? <ul style="list-style-type: none"> • Have you seen cases in which parents underestimate or overestimate their child's weight? How often is this? Any difference by ethnicity? • Why do you think these misperceptions could be? • Have you seen if this misperceptions influence how concern mums are about their child's health and the way they feed their child? Differences in ethnicity?

6. After visit

	<ul style="list-style-type: none"> • What happens after the visit? Do you get to see the parents again? • What happens with parents who are told that their child is underweight, risk of overweight or obese? • What is your perspective, do you think parents see overweight as a health concern in children? Are there differences by ethnicity? Why do you think this is?
	<ul style="list-style-type: none"> • How often do you recommend parents to track their child's weight? Why? • Do you measure children again? Is it easy to monitor children after parents are been told that their child is at risk of overweight or underweight? • Do parents come back to get their child measured, apart from the health visits? For underweight and overweight? • How often do you think young children should be measured? Do you think there is a gap or a critical point in which the child should get assessed or measured?

7. Recommendations

<ul style="list-style-type: none">• Do you make recommendations about feeding practices to parents? Have you ever had difficulties delivering these recommendations? Why?• What's the immediate feedback you receive from parents after you provide this information? Any differences by ethnicity?• What do you think are the factors that make parents to follow or not the recommendations?• Can you think about any other barrier when delivering health visits with parents and providing information about growth and nutrition? For example language?

Finish Interview

- Ask the interviewee if there is anything else that he or she would like to add to the topics that were previously discussed.
 - Stop and save interview

Thank the participant for their participation.

A.II Object 9- Topic guide for interviews (Mothers)

Topic Guide: Can we talk about children's health?

Interview with Mothers

Introduction:	
	<ul style="list-style-type: none"> Introduce myself and give a brief explanation of the aim of the research, as well as the reason why the interviewee was invited to participate
	<ul style="list-style-type: none"> Give the interviewee the information sheet to read and sign and ask if there are any questions.
	<ul style="list-style-type: none"> Thank the participant for agreeing to be interviewed

a) Eating practices

	<ul style="list-style-type: none"> Can you tell me a little bit about your eating practices? For example, how many meals you have per day, who prepares the food? What do you usually eat?
	<ul style="list-style-type: none"> Who feeds the child? What does the child eat?
	<ul style="list-style-type: none"> How do you feel at meal time? Do you enjoy it? Do you find it easy or challenging?
	<ul style="list-style-type: none"> How do you feel about your eating habits? How would you describe them? Do you consider them healthy? Why?
	<ul style="list-style-type: none"> Do you consider your child's eating habits healthy? Why?
	<ul style="list-style-type: none"> Have you ever search for advice about how to feed your young child? Why? Where?

b) Last experience with health professional

	<ul style="list-style-type: none"> Describe last time you saw a health professional (doctor, health visitor nurse) regarding your child's health? How old was the child? Who did you see? What was the reason of the visit?
	<ul style="list-style-type: none"> Was your child measured? Can you remember when was the last time your child was measured by a health professional? What happened? Did you receive feedback about your child's weight and height? What did the health professional say? (If not ask when was the last time this happened?) Do you think the information you received was clear? Why? How did you feel about the feedback about the health professional? Why?
	<ul style="list-style-type: none"> Have you ever taken your child to get her/his weight measured in the clinic? Why? How often? How was it when your child was younger?
	<ul style="list-style-type: none"> Have you ever taken your child to the clinic because you are concerned that your child is not gaining weight or gaining too much weight? Why? Have you ever taken your child to the clinic because you are concerned that your child is not eating enough or eating too much? Why?

	<ul style="list-style-type: none"> •
	<ul style="list-style-type: none"> • Has anyone made you comments about your child's weight or eating practices? i.e. husband, teacher, mother in law, etc.
	Who else is involved in caring for your child's health?
	Do you speak about your child's health with other people?
	<ul style="list-style-type: none"> • During the last time you visit your doctor did your nurse, doctor or health visitor gave you advice about infant feeding? Have they ever given you advice about infant feeding? • Was the information provided clear? • Why? What do you think was good and what made it harder to trust or understand? • Did you spoke about the recommendations that the health visitor gave you with someone? With who? Why?
	<ul style="list-style-type: none"> • Have you asked anyone else for advise on how to feed your child? Why? • Were the recommendations they gave you easy to follow? Did you follow them?
	c) Other sources of information:
	<ul style="list-style-type: none"> • Have you received information about how to feed your child from any other sources? • Did you follow recommendations?

d) Women's perceptions and beliefs about Health

	<ul style="list-style-type: none"> • For you what are the characteristics of a healthy person? • For you what are the characteristics of a healthy child?
	<ul style="list-style-type: none"> • Do you consider yourself healthy at this moment? Why? How do you know? • How do you feel about this? • Is there anything you currently do to maintain yourself healthy? Why? • Is there anything you think you could do to improve your health? Is it easy or difficult to do?
	<ul style="list-style-type: none"> • Do you think your child at this moment is healthy? Why do you think it's healthy? • How do you know? • How do you feel about this? Why? • Is there anything you currently do to maintain your child healthy? Why? • Is there anything you think you could do to improve your child's health? Is it easy or difficult to do?
	• Do you think your child has a healthy weight at the moment? How do you know that?
	• (Have you ever had concerns about your child not gaining or gaining too much weight? Why?) (repeated?)
	<ul style="list-style-type: none"> • Do you see overweight as a health problem? Why? • Do you know consequences? How do you know that?
	<ul style="list-style-type: none"> • Do you think overweight is a health problem for children? Why? • Since which age do you think overweight could be a weight problem?

	<ul style="list-style-type: none"> • Do you know any child who is underweight or overweight? • How do you know they are? • Do you know any children with a weight problem under the age of five? • How do you know they are?
--	--

e) Other information channels:

	<ul style="list-style-type: none"> • Are there any other people or sources that you use when you look for advice about your child's health • What have you used? • Can you remember any time you recurred to this and what were your concerns? • What do you think about the feedback obtained in this place? • Was it helpful? • Did you follow recommendations?
	<ul style="list-style-type: none"> • Can you remember any time when you looked for advice about your child's health and the information you received was not helpful? • What were you looking for? • Why the feedback was or not helpful? • What did you do after?
	<ul style="list-style-type: none"> • Have you received or been offered from any other sources, information about infant feeding or healthy lifestyles? • Where? What? What do you think? Was it helpful? Why?

Finish Interview

	<ul style="list-style-type: none"> • Ask the interviewee if there is anything else that he or she would like to add to the topics that were previously discussed.
	<ul style="list-style-type: none"> • Stop and save interview
	<ul style="list-style-type: none"> • Fulfil the questionnaire of mother and child characteristics
	<ul style="list-style-type: none"> • Finish the interview and thank the participant for their participation.

Questions for women in case were not born in the U.K.:

- Experience with access to the health services? Language difficulties?
- Difficulties to feed the child? Access to foods? Able to adapt to new foods?

Do you speak about your child's health with other people?

A.II Object 10- Questionnaire applied to mothers

Questionnaire for mothers of children under the age of five

1. Identifying Information				
1.1 Date interview took place:		1.2 Interview no:		
2. Mother Characteristics				
2.1 Age:		2.3 Place of Birth:		
2.4 Ethnicity:				
2.5 Do you know your weight and height: Yes No Prefer not to answer				
2.6 Weight:		2.7 Height:		
3. Parity				
3.1 How many children do you have:		3.2 How many children do you have under the age of five?		
3.3 Age of child:				
Child 1		Child 2:		
Child 3:		Child 4:		
4. Child's weight and height:				
4.1 Do you know your child's weight and height?	Date of last measurement:	Weight last measurement:	Height last measurement:	Person who last measured the child:
Child 1: YES NO				
Child 2: YES NO				
Child 3: YES NO				
Child 4: YES NO				

A.II Object 11- Ethics application

UNIVERSITY *of York*
The Department of Health Sciences

RESEARCH GOVERNANCE COMMITTEE

SUBMISSION FORM

Please refer to the Guidance Notes at the end for help with filling in this form.

Please complete the following check-list before submitting the completed form:

- I have completed all relevant sections of the Submission Form having read the 'Guidance Notes'.
- I have signed my Submission Form.
- [Student submissions only] My Supervisor(s) have read and signed my Submission Form
- I have attached all supporting documents (information sheet, consent form, etc.) to my Submission Form.
- I agree to inform the HSRGC of any major changes to my research. |

GENERAL INFORMATION

1. Please give the full title of your study, and provide a short title for reference.

Full title	Let's talk about childhood overweight: Attitudes towards childhood obesity in the city of Bradford.
Short title	Can we talk about children's weight?

2. If you are an academic member of staff, please provide the following details about yourself.

Name and title	
Post	
Institution (including address if other than Health Sciences)	
Email and telephone number	

3. If you are a research student, please provide the following details.

Your name and title	Marena Ceballos Rasgado
Name and level of course/degree	PhD student.
Institution (including address if other than Health Sciences)	Department of Health Sciences, University of York
Email and telephone number	Email: mcr519@york.ac.uk Telephone: 07542884123
Name and email address of supervisor(s)	Prof Kate Pickett: kate.pickett@york.ac.uk Dr Rosie McEachan: rosie.mceachan@bthft.nhs.uk

4. Please briefly describe the specific expertise, including experience and training, you and your research team will bring to the study.

<p>During my undergrad studies in Nutrition and Food Science, my MSc in Nutrition, Physical Activity and Public Health, and during my PhD studies in the Health Sciences department at the University of York, I have taken research methods modules. I have also acquired research experience conducting focus groups and interviews with vulnerable groups in Mexico at the National Institute of Public Health and the Haciendas Foundation of the Mayan World. For my master's dissertation I developed primary research with quantitative methods. I also conducted interviews while working as a nutritional advisor in hospitals, a fitness club and private consultancy in Mexico. I have always gained informed consent from participants, and safely managed the information to protect the confidentiality and information that I have acquired.</p>

5. If the research is funded, please provide the following details.

Name of funding body	CONACYT Mexico studentship
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Duration of the grant	Three years
Describe any influence the funding body has on the conduct or dissemination of the research	The funding has no influence on the conduct or dissemination of this research.

6. If the research is to be reviewed by an ethics committee other than HSRGC, please provide details.

N/A

THE PROJECT

7. Explain the aims, objectives and scientific justification of the research, in a maximum of 200 words, and in language comprehensible to a layperson.

In the UK one in five children at Reception Year are overweight or obese. Therefore, prevention needs to begin early in life.

A statistical analysis by this researcher of N=976 mothers in the Born in Bradford (BiB) cohort revealed that many mothers did not accurately perceive their child's body size. Women of Pakistani origin were more likely to have an inaccurate perception than their White British counterparts. When women were concerned about weight, the majority reported concerns about underweight (85%), rather than overweight (18%) despite the fact that 32% of the children were overweight or at risk of being so.

This is of concern because the absence of perceived vulnerability to a health issue (i.e. childhood overweight) might make women less prone to engage with behaviour change programmes to prevent childhood overweight.

Better Start Bradford (BSB) is a programme to improve health outcomes through intervention projects. It includes interventions aiming to reduce childhood overweight.

This project looks to address research gaps in understanding parents' attitudes towards childhood overweight in Bradford. The aim is to understand how health professionals can better communicate with parents to encourage behaviours which aim to achieve a healthy weight in children.

8. Please provide a brief summary of the research design/method, in a maximum of 200 words, and in language comprehensible to a layperson.

Methodology: Five to eight 45 minute semi-structured interviews with the facilitators of interventions included in BSB. Interviews will be audio recorded, and notes might be taken, notes and audios will be transcribed and analysed.

The interviews will take place in the programme venues located in the city of Bradford or in the Bradford Institute of Health Research, whichever is more suitable for the interviewee.

Research questions:

1. What are the perceived barriers and enablers to address topics about child overweight and obesity and adequate nutrition with parents?
2. What do program facilitators think are the attitudes that parents have towards childhood overweight/obesity?
3. What do program facilitators think could be done to engage parents more in the prevention of child overweight/obesity?

9. Please outline any patient and public involvement (PPI) in the study.

Born in Bradford hosts a range of channels to obtain genuine patient and public involvement. Two

groups: the Born in Bradford parent governor group, and the Better Start Bradford Community Research Advisory Group meet every three months to review progress of Born in Bradford Studies, input into study design, help to analyse and interpret emerging findings, and help to set research priorities. BiB hosts regular community engagement events targeted at families across Bradford to provide a forum for discussion with local communities about research. BiB hosts regular health practitioner meetings and ensures that these individuals are represented on study steering groups, along with members of the public. Finally BiB has an active social media presence, used to disseminate findings via Facebook, Twitter (@bibresearch @bibbsparents), and YouTube

10. If the study requires statistical analysis, please explain your statistical methods.

N/A

11. For qualitative studies, please outline your method of analysis.

The sampling design will be opportunistic as there are few eligible interviewees (programme facilitators of the interventions included in Better Start Bradford). Data will be analysed using a Thematic content analysis approach (Ryan & Bernard 2003).

- I will familiarize myself with the data by transcribing recordings taken from the interviews, reading and developing descriptive summaries of each interview.
- I will identify possible themes and codes from these interviews and will review them with my supervisors and agree on final codes. (The software Mendeley might be used to support this).
- I will organize and refine the codes and themes agreed. (The software Nvivo might be used to support this).

RECRUITING PARTICIPANTS

12. Please explain how research participants will be (a) identified (b) approached and (c) recruited.

This research project will use a convenience sample of programme facilitators of Better Start Bradford interventions.

Potential participants will be (a) identified and (b) contacted with the help of the programme coordinator of the interventions of Better Start Bradford and with the support of BiB. (c) Potential participants will be sent a letter inviting them to participate in this study by e-mail. The letter will contain information about the research, reasons why they have been invited, and the potential duration of the interview. This invitation letter will also inform the participant that if they wish to participate or if they have further questions regarding the study they can contact the researcher through the same media they were approached. This letter will be followed by a telephone call to discuss whether they are interested in participating, and to discuss any queries the participant might have.

If an invitee decides to participate, the researcher will arrange a convenient date, time and location for the interview. The day of the interview, the participant will be reminded of the aims of the study and their right to withdraw from the study during the first month after the interview. This right is constrained to one month because no identifiers will be linked to the information provided and, after transcribing, analysing the information, and deleting voice records, it will not be possible to delete participant-specific data from the already analysed information. Participants will be provided with an informed consent of participation sheet, and asked to sign it. The researcher will retain the

signed copy, and a copy will be given to the participant for him/her to keep.

13. If participants are to receive incentives to take part in the study, or reimbursement of expenses, please give details and rationale.

No incentives will be given to the participants.

14. If your study includes participants from vulnerable groups, please provide details and rationale.

N/A

15. Please explain any arrangements for participants who do not understand English well.

As participants are service providers for the above-mentioned programmes, they are expected to have a good working use of English.

ETHICAL ISSUES

16. Please clarify and justify potential harms to participants.

Talking about obesity could potentially cause discomfort or embarrassment among some people. However, as participants are prevention practitioners in this area it is expected that they will be experienced in talking about overweight and obesity with other professionals and with parents, therefore, we feel it is unlikely that any issues will arise.

17. If your study is likely to elicit information requiring disclosure – such as incidental medical findings, evidence of professional misconduct or neglect, or criminal behaviour – please explain how you will proceed.

Participants are members of staff of the above-mentioned programmes and it is improbable that such issues will occur. Otherwise, support will be sought from the supervisors of this project.

18. Please explain and justify any deception of participants required by the study.

N/A

19. Please describe any potential benefits to participants.

The participants will be able to contribute to current research gaps in their field of expertise. Findings will be shared with participants in the form of a brief written report sent to them directly by email and via the general dissemination of findings through BiB knowledge exchange activities.

20. Please clarify and justify potential harms to researchers.

As I am an experienced researcher and practitioner in this area, themes to be discussed are unlikely to cause me any distress or discomfort. Interviews will be conducted in a range of settings where interventions are delivered (for example Children's Centres) across Bradford, in addition to the Bradford Institute for Health Research. I will travel to interviews alone. I will follow Bradford Teaching Hospitals lone worker policy. In the case of needing assistance, I will contact any of my supervisors, who will know in advance the dates, hours and places that the interviews will be held. After delivering the interviews, they will be informed about any issues that arise from the above.

21. Please provide details of any conflicts of interest created by the research and explain how they will be resolved.

There are no conflicts of interests created by this research.

22. Please provide details of any personal material benefits researchers will receive for undertaking this study, including personal payment over and above their normal salary.

None

23. Please describe any other ethical problems you think the proposed study raises, explaining what steps you will take to address them.

No other ethical problems are expected.

DATA MANAGEMENT

24. Please explain what, where, and for how long, data will be stored.

Interviews will be recorded on an electronic device and stored in a password protected folder on the University of York system before transcription. Field notes may also be taken by the researcher; these will be typed up and stored in a password protected file. No personal identifiers will be added to any of the recordings or notes. Audio files will be deleted after they have been transcribed.

25. Please explain the process by which data will be transferred.

Data will be transcribed into an electronic document using the University Network. Access to the transcripts will be given only to this researcher's supervisors and their academic colleagues that may contribute to the development of this project. Any publications arising from this project will protect the anonymity of the participants of this project. Data management will comply with the Data Protection Act and the University of York Health Sciences' policies for data management.

26. Please explain the measures in place to ensure data confidentiality, such as encryption and anonymising of data.

All the transcripts will be under password and encrypted. These will be stored in the Network of the University of York. No personal identifiers will be added to the data. Also, all the consent forms will be kept under key in a locker provided by the University of York in the RCSS building.

27. Please state that will have access to data generated by the study.

Prof Kate Pickett, Dr Rosie McEachan, myself, and academics that may contribute to this project with the permission of my supervisors, eg, members of the Thesis Advisory Panel.

28. Please state who will act as custodian of data generated by the study.

Prof Kate Pickett

DISSEMINATION

29. Please explain how you plan to disseminate your results.

Results from the transcriptions will be used within my PhD dissertation, and presented in journals and conferences with the approval of my supervisors. With the permission of BiB, results may be disseminated through their networks and communications channels.

30. If results will be made available to participants and the communities from which they are drawn, please explain how.

A written summary of the results and recommendations of this project will be emailed to the participants in this study. A copy of this summary will also be given to Better Start Bradford programme coordinators.

INDEMNITY

31. Please confirm the indemnity arrangements for your study.

Standard University of York indemnity arrangement	Yes
Other indemnity arrangement	N/A

Your signature:



Supervisor(s)' Signature:



References:

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Amendment for the research project (August 2017)

Let's talk about childhood overweight: Attitudes towards childhood obesity in the city of Bradford.

Can we talk about children's weight?

The rationale for change:

This project applied and received ethics approval from the Health Sciences Research Governance from the University of York in May 2017. The research aims to address research gaps in understanding parent's attitudes towards childhood overweight. The need of this study is a result of a previous secondary analysis of the Born in Bradford (BiB) cohort, which showed that mothers were likely to have inaccurate perceptions about their young child's weight. Therefore, for the first part of this qualitative project, this researcher aimed to understand the perceived attitudes of parents towards their child's weight and feeding practices from the perspective of facilitators who work with parents on interventions aimed to reduce childhood overweight and obesity amongst children under 5 years of age. Initial field work has been completed, and the findings have pointed to the difficulties of a) accurately identifying weight of children, b) raising this as an issue with parents c) parents making lifestyle changes in the context of competing priorities and life circumstances, and d) the role of health visitors in communicating with parents about children's weight. In addition interviews with facilitators highlighted the difficulties of establishing conversations with parents about their child's weight because they are not health professionals

The interviews have given us useful information which we now wish to triangulate with perspectives of parents and health visitors. We wish to submit an amendment which will allow us to interview these two new groups . These groups are 1) mothers of children under the age of five and 2) Health visitors who have worked in Bradford. Including these two groups will allow us to have a broader understanding of parents' beliefs around their child's weight and eating practices, and the factors influencing these.

Key changes are as follows:

- A) Change title to: Let's talk about childhood health: Attitudes towards childhood obesity in the city of Bradford.
Can we talk about children's health?
- B) Add a new group of participants to interview who are: Mothers with at least one child under the age of five.
 - a. The researcher plans to undertake twelve to sixteen 45 minute interviews. These interviews will be audio recorded, and notes might be taken. Additionally, a questionnaire at the end of each interview inquiring on the

mother and child characteristics will be applied. This questionnaire will be applied to all the mothers and will be filled by the interviewer. The interviewee will be told that she has the right to answer or not questions asked. Notes, audios and information contained in questionnaires will be transcribed and analysed.

- b. Research questions that will be explored are:
 - i. Which are the methods and channels in which parents become aware of weight problems and feeding practices for their children?
 - ii. Which are the parents' beliefs and attitudes surrounding child's weight development, childhood overweight and feeding practices during the first years of life?
 - iii. Are there any differences in women's attitudes towards child's feeding and weight development by ethnicity?
- c. Methods of analysis will follow the same undertaken for the previous interviews with the facilitators.
- d. Potential participants will be (a) identified and (b) contacted with the support of the facilitators of the Henry programme who work at Children's centres and Day Nurseries across the Bradford district. The researcher will also ask for support from children's centres that host toddler and play groups in Bradford.
- e. Potential participants will be given a consent form to read and sign the day of the interview before this takes place.
- f. No incentives will be given to the participants.
- g. Interviews can only be carried out in English or Spanish, which are languages in which the interviewer is fluent in. Therefore, when participants are approached, they will be asked if they feel confident to be interviewed in any of the above languages. Otherwise, they will have to be excluded from the study.
- h. Talking about obesity could potentially cause discomfort or embarrassment among some people. Nevertheless, the interviewer has experience in approaching health and nutrition topics in a sensitive way. Parents will be informed during the recruitment and information sheet that, topics about their family eating practices and their experiences and beliefs about health will be explored. Additionally, participants at the beginning of the interview will be told that they are allowed to withdraw the study at any time they want. In the case of unforeseen circumstances, the interviewer will let know the interviewee that is not obliged to answer and will remind them they can withdraw the study if they wish so.
- i. Potential harms to researcher: Interviews will take place wherever is more convenient for the interviewee. The interviewer will ask support from the nurseries, and toddler groups to develop the interviews in one of their rooms. Interviews could also take place in the Bradford Institute for Health Research, or any other place that the interviewee suggests. I will check in and out from my interviews with my supervisors, and I will follow Bradford Teaching Hospitals lone worker policy. In the case of needing assistance, I will contact any of my supervisors, who will know in advance the dates, hours and places that the interviews will be held. After delivering the interviews, they will be informed about any issues that arise from the above.

- C) Add a second new group of participants to interview who are: Health Visitors who have worked as Health Visitors in Bradford.
- a. The researcher plans to undertake nine to twelve 45 minute interviews.
 - b. Research questions that will be explored are:
 - i. What are the health visitors' perceived barriers and enablers to address topics about childhood overweight and obesity and adequate feeding practices with parents?
 - ii. What do health visitors think are the attitudes that parents have towards childhood overweight/obesity and healthy feeding practices?
 - iii. How could health visitors be supported to improve their communication with parents when talking about infant feeding practices and child's weight?
 - c. Methods of analysis will follow the same undertaken for the previous interviews with the facilitators.
 - d. Participants will be recruited using a snowball sampling approach. We will initially identify participants and relevant networks using key contacts within the Better Start Bradford programme (with whom this PhD is aligned). We will send an email invitation and follow-up with a phone call. We will ask health visitors who have participated to put us in contact with other possible research participants.
 - e. Health Visitors will be asked about their work experiences. Therefore feelings of judgement about their work could rise. To prevent this, the interviewer will clearly explain the aims of this research and will let know the Health Visitors that their work will not be assessed or judged. Health Visitors are members of staff of the NHS and health professionals. Therefore, it is improbable to have incidental findings of professional misconduct. Otherwise, support will be sought from the supervisors of this project.
 - f. Participants at the beginning of the interview will be told that they are allowed to withdraw the study at any time they want. Additionally, in the case of unforeseen circumstances, the interviewer will let know the interviewee that is not obliged to answer and will remind them they can withdraw the study if they wish so.
 - g. Interviews will take place at the Bradford Institute for Health Research or at the Health Visitor's clinic, wherever is more convenient for the interviewee. The interviewer will check in and out from my interviews with the project supervisors, and will follow Bradford Teaching Hospitals lone worker policy. In the case of needing assistance, will contact any of my supervisors, who will know in advance the dates, hours and places that the interviews will be held. After delivering the interviews, they will be informed about any issues that arise from the above.

Amendment for the research project (November 2017)

Let's talk about childhood overweight: Attitudes towards childhood obesity in the city of Bradford.

Can we talk about children's weight?

The rationale for change:

This research aims to address research gaps in understanding parent's attitudes towards childhood overweight. This project applied for ethics approval in May 2017, and an amendment in August 2017. The amendment of August 2017 asked for permission to include mothers and health visitors to have a broader understanding of the beliefs that parents of children under five years, have around their child's weight and eating practices, and the factors influencing these.

Since the approval of the amendment, six interviews with health visitors have been undertaken. From these interviews, we could see that health visitors pay visit to the mothers up to the eight weeks after the child was born, after that it is the family nurses and nursery nurses the ones who support mothers until the child is 5 years old. Because of that, we wish to submit an amendment which could allow us to interview nursery nurses and family nurses, to have a better view of the health professional's perspectives.

The key change is as follows:

- A) The change will be done to the section C) of the amendment of August 2017.
 - a. The second group of participants to interview are: Health Visitors, Nursery nurses and/or Family nurses who have worked with families of children under the age of five in Bradford.
 - b. Methodology and recruitment for nursery nurses or family nurses will follow the same to that of health visitors.
 - c. The number of interviews aimed to undertake will remain the same. Therefore, this researcher aims to undertake 4 to 6 interviews with either nursery nurses and/or family nurses.



**DEPARTMENT OF
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Dr Stephen Holland
Chair, Health Sciences Research
Governance Committee
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16 May 2017

Marena Ceballos Rasgado
PhD Candidate
Department of Health Sciences
University of York
YO10 5DD

Dear Marena

Can we talk about children's weight?

Thank you for submitting your project to the HSRGC. Your study was considered at the meeting on Monday 15 May.

The committee's decision was to approve the project, with the following feedback:

- The current title of the project doesn't reflect that only the views of professionals will be elicited; the committee suggest that you consider changing the title to capture this.
- **Participant Information Sheet**

Will the information I give be kept confidential?

Add that, though every measure will be taken to try to ensure confidentiality, anonymity cannot be fully guaranteed due to the small sample size.

Who do I contact in the event of a complaint?

Add that, if you still have concerns, contact patrick.doherty@york.ac.uk.

Can I withdraw from the study at any time?

Clarify what will happen to any data collected prior to withdrawal (note that it's permissible to retain data on withdrawn participants, provided that is made clear on the Information Sheet).

The committee is happy for you to take up these feedback points in supervision, but if you have any queries about this decision, or make substantial amendments to the study, please contact me.

Yours sincerely



Stephen Holland
Chair: HSRGC

cc. *Prof Kate Pickett*
Dr Rosie McEachan



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24 August 2017

Marena Ceballos Rasgado
PhD Candidate
Department of Health Sciences
University of York
YO10 5DD

Dear Marena

Let's talk about childhood overweight: Attitudes towards childhood obesity in the city of Bradford

Thank you for your emails of 2 and 18 August explaining the substantial amendment you intend to make to your study. Since the project has been approved by the HSRGC – on 16 May 2017 – I can consider the amendment under Chair's Action.

I am happy to approve the amendment, but would draw attention to some concerns which you should discuss further with your supervisors.

- You intend to conduct 45-minute interviews with mothers of children under 5 years old on a topic which might be very sensitive to them. You acknowledge this in the summary of the amendment you sent me – at B) g. – and I appreciate the points you make there about your experience, and reiterating to participants that the interview can be stopped at any time. But more could be done to alert potential recruits to the possibility that they will be upset by discussing their child's eating, weight, family meals, etc. In particular, you should signal that the interviews may be unsettling in the Information Sheet under the section, 'What are the advantages/benefits and disadvantages/risks of taking part?' Please take this up with your supervisors who can advise further as to how to ameliorate distress on the part of participants.

- B) d. of the summary of the amendment mentions that 'women may also be directly approached outside nurseries across Bradford with the previous consent of the nurseries' staff'. It is unclear what this refers to, so I would reiterate that it is usual and best practice not to approach potential recruits directly, but via a third party (such as, 'facilitators of the Henry programme', for example).
- It is unclear as to when the interviewee will sign the consent form: according to the Information Sheet, it will be signed after reading the Information Sheet; but the introduction in the topic guide states: 'Give the interviewee the consent form to read and sign'. You should clarify when the consent form will be read and signed.
- B) a. of the summary of the amendment mentions 'a questionnaire at the beginning of each interview ...'. It is unclear what this refers to; please clarify with your supervisors whether you intend to administer a questionnaire and, if so, what it will cover and how potential participants will be made aware of it.

I am happy for you to take up these feedback points in supervision, but if you have any queries about this decision, or make further substantial amendments to the study, please contact me.

Yours sincerely



Stephen Holland
Chair: HSRGC

cc. *Prof Kate Pickett*
Dr Rosie McEachan



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30 November 2017

Marena Ceballos Rasgado
PhD Candidate
Department of Health Sciences
University of York
YO10 5DD

Dear Marena

Let's talk about childhood overweight: Attitudes towards childhood obesity in the city of Bradford

Thank you for your email of 28 November, including study documentation, explaining the further amendment to your study.

I am happy to approve the amendment to the study by Chair's Action. The inclusion of nursery nurses and/or family nurses in the study is well motivated, and you will be using the methods of recruitment already approved by the HSRGC.

If you have any queries about this decision, or make further substantial amendments to the study, please contact me.

Yours sincerely

A handwritten signature in purple ink that reads "S. Holland".

Stephen Holland
Chair: HSRGC

cc: [Prof Kate Pickett](#)
[Dr Rosie McEachan](#)

A.II Object 12- Example of coding disagreements

Exemplar quote	First coding of main researcher	First coding of senior researcher	Agreed Final Code
<p><i>Mom was feeding the child but she was always putting screen in front of him to feed, it wasn't unhealthy but mom would have the worries like if he doesn't eat this much portion that she was making, is gonna be unhealthy, is going to lose weight (Early year worker 3)</i></p>	<p>Child is not eating enough</p>	<p>Think need to eat whole portion</p>	<p>Unaware of adequate portion sizes</p>
<p><i>We plot them in the chart, we just not, plot them in the chart and then I show this to the parents and say, you know, you can see from last time this is where your child's growth was and this is where your child's weight your child is, and this is good because, or this is a risk because, so you would use the charts as a visual aid to help inform the discussion. So generally is quite easy to introduce because you've got the evidence there to show parents, and it is quite easy for them to actually, to just, once they understand the charts work, it is easy to show parents that yes, is quite easy to inform. (Health Visitor 4)</i></p>	<p>Strategies to talk about health related topics with the parents</p>	<p>Measurement charts used to branch the issue</p>	<p>Strategies for talking with parents about childhood overweight and obesity: use of growth charts</p>
<p><i>He is like a stick he is like a pencil, everything that he can eat anything and he will never put on weight, same with XXX she is a little chunkier, but she is not overweight, I call her my chunky one because she jack is skinny, he is really skinny and bonny, and she, with her, she is a bit more normal, well he's got a normal weight to her, well he is got a normal weight he is like a brick, but yeah, I just call her my chunky one even though she is not chunky. (Mother 10)</i></p>	<p>My child is skinny / Chunky doesn't mean is overweight</p>	<p>Mothers beliefs surrounding her child's weight</p>	<p>Attitudes and beliefs surrounding their child's weight</p>

