

A MIXED METHODS STUDY OF CHILDHOOD FEEDING AND GROWTH
IN SAUDI ARABIA

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A dissertation submitted to the faculty at the University of North Carolina at Chapel Hill in
partial fulfillment of the requirements for the degree of Doctor of Philosophy in the School of
Nursing.

Chapel Hill
2017

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ABSTRACT

Sama Samer Hammad: A Mixed Methods Study of Childhood Feeding and Growth in Saudi Arabia

(Under the direction of Diane C. Berry)

Childhood obesity is on the rise in Saudi Arabia with the latest national prevalence approximately 30% for children (below 18 years) and 9% for preschoolers. The burdens of obesity are numerous from financial cost on society to physical and psychological comorbidities. Maternal views about childhood obesity have not been examined in the Saudi Arabian literature.

This study used a sequential explanatory mixed methods design to examine maternal perceptions about their children's weight, feeding styles, and assessment of their children's eating behaviors in the eastern province of Saudi Arabia. The translation procedure examined the cultural appropriateness and fidelity of the Arabic version of the Child Feeding Questionnaire (CFQ) and Child Eating Behavior Questionnaire (CEBQ). The quantitative phase examined whether Saudi mothers' feeding styles and children's eating behaviors were associated with children's anthropometrics and family socioeconomic factors. The qualitative phase examined maternal perceptions of their children's weight, feeding styles and children's eating behaviors. The mixed phase examined the relationship between children's weight status and maternal perceptions, feeding practices and children's eating behaviors.

The translation procedure underwent six stages, showed acceptable internal consistency, agreement and scale-content validity index scores of the Arabic CFQ and CEBQ. In the quantitative phase, 223 mothers and their preschoolers were recruited from 7 schools in the eastern province. Children's anthropometrics found combined overweight and obesity was

11.8%. Combined overweight and obesity in mothers was 64.3%. Statistical analyses revealed the significant correlates with children's body mass index (BMI) percentiles were perceived *mothers' and children's weight, concern about children's weight and pressure to eat (CFQ)*. From the CEBQ, *enjoyment of food, satiety responsiveness, slowness in eating, and emotional overeating* were significantly correlated with children's BMI percentile.

Themes identified related to maternal feeding styles and attitudes included strategies for food management, discrepant views between parents, and use of electronics during meals. Mothers strategies differed based on their employment status, with employed mothers relying on others to manage some of their children's meals. Discrepant views between parents focused on fathers bringing home sweets for the children despite the mothers' desire to limit such items.

To my parents, Nawal and Samer, thank you for showing me how to do things with love and compassion. To my beautiful siblings, Hammad, Badder, Maiss, Lamma and Maha- May Allah bless you with your aspirations and dreams... I am grateful to be a part of your lives.

In loving memory to my grandmothers,
Sara, who advocated education...
Aisha, who valued family...

In loving memory to my grandfathers,
Abdulaziz, you are a source of motivation...
Suliman, you are a source inspiration...

In loving memory to my uncles, Othman and Osama...

ACKNOWLEDGEMENTS

In the name of Allah (God), the Most Gracious and the Most Merciful- Thank you Allah (God) for giving me the courage, strength, and perseverance to complete my dissertation. My deep gratitude goes out to my chairperson, Dr. Diane Berry, thank you for believing in me. My sincere appreciation goes out to each of my committee members, Drs. Kathleen Knafl, Jennifer Leeman, Eric Hodges and Amanda Thompson. Thank you all for your continuous support and rigorous revisions throughout this journey. Your thoughtfulness is what made this a work of art. Thank you for the Sigma Theta Tau International (small grant) and the Alpha Alpha Chapter of STTI (doctoral grant) for supporting my research.

Thank you to all of the participating mothers and their children. I am forever grateful for your willingness to open up and share your experiences. I have learned so much from you. A warm thank you to the principals, supervisors and teachers for welcoming me to your schools and thank you for working with children in bettering their well-being through education. Thank you to the Ministry of Education for granting me permission to enter schools of the eastern province of Saudi Arabia. I am thankful for the opportunity granted by the Government of Saudi Arabia, Saudi Arabian Cultural Mission (SACM) and the University of Dammam (name changed 2016 to Imam Abdulrahman Bin Faisal University) to pursue my higher education. I aspire to be a social agent of change to improve my community through scholarship, research, and service.

To all my family and friends, thank you for your words of encouragement in moments of hardships. To the many role models in my life, my aunts, uncles and cousins- I am blessed. To my PhD cohort, I am lucky to have worked and studied with you all. Ahrang, Huda, Hyewon,

Louise and Saada- I greatly appreciate the different occasions spent together over meals or simple quality time with friends. To my carrel mates, Anna Lee and Vicky Yeh; our after hour study group gave me that final push to keep writing, revising, editing and re-writing. Thank you for the friendship I will hold it dear to my heart. To my Saudi friends pursuing their education in NC and elsewhere, with our shared experiences - you were like my home far away from home... Thank you for the weekly gatherings, parks outings and all the other fun activities... To my hiking buddies...

To the people in my life on a regular basis, thank you for keeping the connection despite the distance (close and near). To my loving cousin Sara KD, thank you for being there for me when I needed to talk. To J, A, and M- I love that you were part of my journey. To my yoga teacher training (YTT) cohort, I have found more balance through my practice of yoga. Thank you to the Odum Institute, the Information Technology Department at the School of Nursing (Helen Hall and Lee Smith) who helped create all the posters I presented in professional conferences – made beautiful and aesthetically pleasing. I extend my warm regards to the School of Nursing and the Carolina Community, thank you for making my experience worthwhile.

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LIST OF ABBREVIATIONS

AAP	American Academy of Pediatrics
BMI	Body Mass Index
CDC	Centers for Disease Control
CEBQ	Child Eating Behavior Questionnaire \
CFQ	Child Feeding Questionnaire
QL	Qualitative
QN	Quantitative
UK	United Kingdom
UNESCWA	United Nations Economic and Social Commission for Western Asia
US	United States
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

Introduction

Childhood obesity in Saudi Arabia is increasing at an alarming rate. The latest national prevalence of combined overweight, obesity and morbid obesity in children and adolescents aged 5-18 years ranges from 30% to 34%, which is a rise of 26.6% in twenty-five years (Al-Hazzaa, 2007; World Health Organization [WHO], 2011). Despite this dramatic increase, no intervention programs tailored for the Saudi population have been documented (ALNohair, 2014; Elbadawi, Altemani, Alhawiti, & Altuwaylie, 2015). An estimated 31.6% of the Saudi population (31.7 million) are under the age of 20 years old (General Authority for Statistics Kingdom of Saudi Arabia, 2015). The probability of children with obesity growing into adults with obesity is well documented in the literature in other countries (Goldhaber-Fiebert, Rubinfeld, Bhattacharya, Robinson, & Wise, 2013; Graversen, et al., 2014; Sung-Chan, Sung, Zhao, & Brownson, 2013). Intervention in children under the age of five years old is starting to show early promise in preventing obesity in the United States (US; Ogden, Carroll, Kit, & Flegal, 2014). A better understanding of parenting practices, culture, and environmental influences on childhood obesity in different countries is needed to develop efficacious interventions to address this issue successfully (Lofton, Julion, McNaughton, Bergren, & Keim, 2015; Syrad et al., 2015).

Consequences of Overweight and Obesity

Overweight in children is defined as a body mass index (BMI) $\geq 85^{\text{th}}$ percentile to $< 95^{\text{th}}$ percentile and obesity is defined as a BMI $\geq 95^{\text{th}}$ percentile (Centers for Disease Control [CDC], 2015). Consequences of overweight and obesity in children include hypertension,

hyperlipidemia, prediabetes, type 2 diabetes, depression, sleeping, social, physical, and attention problems in school (Al-Agha, Al-Ghamdi, & Halabi, 2016; Shivpuri, Shivpuri, & Sharma, 2012) (See Table 1.1). The earlier a child gains excess weight, the greater their risk of developing diabetes and cardiovascular disease at the beginning of early adulthood (Bass & Eneli, 2015; Sakou et al., 2015).

Table 1.1. Consequences of Childhood Obesity

Systems	Consequences
Physical Functioning	- Impaired cardio-respiratory fitness and performance of motor tasks; increased musculoskeletal pain; decline in muscle strength; inefficiencies in gait and balance (Bass & Eneli, 2015).
Psychosocial Problems	- Poor self-esteem, anxiety, depression, eating disorders, social isolation, social stigma (Shivpuri, Shivpuri, & Sharma, 2012).
Endocrine	- Insulin resistance, type 2 diabetes, early puberty (Shivpuri, Shivpuri, & Sharma, 2012).
Cardiovascular	- High blood pressure, high cholesterol, advanced vascular ages, early onset atherosclerosis (Shivpuri, Shivpuri, & Sharma, 2012).
Pulmonary	- Sleep apnea, asthma, exercise intolerance, disordered breathing during sleeping (Daniels, Jacobson, McCrindle, Eckel, & Sanner, 2009)
Gastrointestinal	- Fatty liver, gallstones, constipation, cirrhosis (Shivpuri, Shivpuri, & Sharma, 2012).
Musculoskeletal	- Musculoskeletal pain, injuries and fractures (Shivpuri, Shivpuri & Sharma, 2012).
Other obesity related diseases	- Metabolic syndrome, nonalcoholic fatty liver disease, polycystic ovary disorder (Bass & Eneli, 2015).

Understanding the Country and Religion of Saudi Arabia

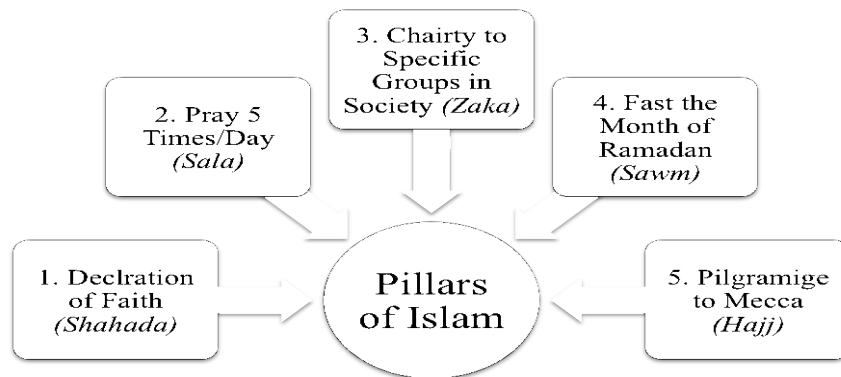
Saudi Arabia is the largest country in the Middle East, with an area of 870,000 square miles (General Authority for Statistics Kingdom of Saudi Arabia, 2015). Compared to the US, which covers 3,794,101 square miles, Saudi would include Texas, California, Montana, New Mexico and Arizona (General Authority for Statistics Kingdom of Saudi Arabia, 2015; US Census Bureau, 2016). Saudi Arabia's total population is 31.5 million (World Bank, 2015) compared to the US, which has a population of 324.4 million (US Census Bureau, 2016). Saudi Arabia is divided into 13 administrative regions (Ministry of Foreign Affairs, 2016). Arabic is the spoken language, and the capital city is Riyadh, located in the mid-region of the country (Figure 1.1).

Figure 1.1. Map of Saudi Arabia



The Mecca Province (western-region) in Saudi Arabia is considered to be the center of the Islamic and Arab world (Gallarotti, Filali, & Yahia, 2013). It is estimated that 2.5 million people from more than 160 countries visit Saudi Arabia annually (Aljouidi, 2013) to perform *Hajj*, one of the five pillars of Islam (Figure 1.2). The five pillars are central to Islam; the Quran, book of Allah (God) and the Sunnah, words of the Prophet – Mohammad provide detailed explanations for any practicing Muslim on the what, where, why, and how these pillars are executed (Edgar, 2002; Zaw, Myat, & Mohd, 2016). Some of the pillars will be discussed later as they affect child nutrition and obesity.

Figure 1.2. The Five Pillars of Islam



Saudi Arabia is an Arab Islamic country with Islam as its religion, and its constitution is the *Quran* (God’s Book), and the *Sunnah*, narrations of the Prophet Mohammed-Peace Be Upon Him (Aldossary, 2008). It is believed in the Islamic world that the *Quran* and *Sunnah* both provide guidance and teachings in all aspects of life. The government system in Saudi Arabia is a monarchy and is passed on to the sons of the founding King Abdul-Aziz Al Saud and their children’s children. After oil had been discovered in 1938, Saudi Arabia developed rapidly (Cleveland & Bunton, 2016a). This rapid socioeconomic growth has contributed to a noticeable impact on education, health and daily life in society (Cleveland & Bunton, 2016b).

Health in Saudi Arabia

It is estimated by 2025, Saudi Arabia's population will grow to approximately 34.2 million and by 2050 to 40.4 million (United Nations Economic and Social Commission for Western Asia [UNESCWA], 2014). However, the population growth rate dropped from 5.98% between 1980 and 1985 to 1.63% between 1995 and 2000 (UNESCWA, 2014). From 2000 to 2005 the population growth increased to 4.07% and then dropped to 1.98% percent by 2010 (UNESCWA, 2014).

Life expectancy has increased in the Saudi population for both genders and is currently 74.7 years for women and 72.5 years for men. Also, the infant and child (< 5 years of age) mortality rate (per 1,000 live births) in both genders fell from 56.2/1,000 between 1980 and 1985 to 11.2/1,000 between 2010 and 2015 (UNESCWA, 2014). Saudi citizens constitute approximately 68% of the total population residing in Saudi Arabia. Of the total population, 5.2% are over the age of 60 years. Currently half (50%) of the population are under the age of 30 years, and 24.5% are under the age of 15 years old (General Authority for Statistics Kingdom of Saudi Arabia, 2015).

Family Context in Saudi Homes

In Muslim countries, such as Saudi Arabia, individuals born Muslim follow the teachings of Islam and the Quran and Sunnah are the books of life. Islamic values and ideals are held in high regard, and basic Islamic prescriptions are closely followed. Given the centrality religion holds in the country, it is imperative to discuss some of the beliefs that individuals follow within the family and society as a whole. Three general, religiously-grounded rules are accepted in the Saudi culture and guide everyday life. These include (1) Family members of a Saudi home are to be raised in the Islamic faith, (2) Saudi as a country aims at strengthening family relationships and provides an environment for the family's optimal growth with the country's resources and

capabilities, and (3) Islamic teachings are instilled in younger generations through education which provides them with the knowledge and skill sets for becoming valuable members of society (International Committee of the Red Cross, 2014).

Family Values within Islam

Life in Saudi society is shaped by many fundamental values but for the purpose of this chapter those most relevant issues that may aid in better understanding: family, parents, children, society and culture and how these complex dynamics interplay within a Saudi home.

Being kind to parents (birr al-walidayn). A core value in the Saudi society, the Arabic word *birr* means kindness and *al-walidayn* means parents. Children are to have the highest respect for their parents, not to raise their voices, or say a word such as: “Ufff,” which is explicitly described in *Quran* (interpretation of the meaning from Abdul-Haleem, 2005) “*You be kind to your parents. If either or both of them reach old age with you, say no word that shows impatience with them, and do not be harsh with them, but speak to them respectfully* [Al Isra: 23 page: 176].”

Mothers’ position in the family. Another core value in the Saudi society, is conveyed through a common story taught early in school and homes: A man came to the Prophet (PBUH) and asked: “*O Messenger of Allaah, who is most deserving of my good company?*” He said: “*Your mother.*” He said: “*Then who?*” He said: “*Your mother.*” He said: “*Then who?*” He said: “*Your mother.*” He said: “*Then who?*” He said: “*Then your father* [Narrated by Abu Hurayrah by al-Bukhaari (5514) and Muslim (4621)] (Islamqa, 2014a).” The emphasis on mothers being those who are the most deserving of ones’ good company three times more than the father, may be due to the differing experiences of mothers including pregnancy, labor, and breastfeeding (Reem, 2012).

A wife's position in the family. Islam honors women as wives where it was narrated that Ayesha (Prophet's wife) said: the Prophet (PBUH) said: *"The best of you are those who are best to their wives, and I am the best of you to my wives.* [Narrated and classed as Hasan by Al-Tirmidhi, 3895] (Islamqa, 2014b)."

A daughter's position in the family. A unique position for daughters within a family is described in another well-known narration of the Prophet (PBUH). *"Whoever has three daughters or three sisters, or two daughters or two sisters, and takes good care of them and fears Allah with regard to them, will enter Paradise.* [Narrated by Ibn Hibbaan in his Saheeh, 2/190] (Islamqa, 2014c)."

Male figures in a home. Despite all the emphasis in Islam on females' different positions in a home, grandfathers, fathers, sons, brothers also play important roles in family life. Many Muslim homes consider male figures as head of the home (Daneshpour, 1998). It is believed that protection and full maintenance of children are the duty of the father in either marriage or divorce. Regardless of a mothers' financial status, a father is obligated to provide for the children (Islamqa, 2014d). A father's obligations to his children include everything from shelter, schooling, and clothing to food and drink. The level of the father's ability to provide is dependent on his income. This obligation stems from the *Quran* (interpretation of the meaning from Abdul-Haleem, 2005): *"Let the wealthy man spend according to his wealth. But let him whose provision is restricted spend according to what God has given him: God does not burden any soul with more than He has given it— after hardship, God will bring ease* [Al-Talaaq 65:7 page: 379]."

Given the values discussed in the section, being kind to parents, the well-defined positions of different family members (mothers, wives, daughters, males) there is another basic

understanding that many Saudis believe and that is that all people are created equal. Where in the *Quran* it says (interpretation of the meaning from Abdul-Haleem, 2005): “*People, we created you all from a single man and a single woman, and made you into races and tribes so that you should recognize one another* [Al-Hujirat 49:13].” Based on this belief there is no difference between people in regards to their human dignity and the rights and duties they have (Al-Hashimi, 2007).

Changes in Families Observed Over Time in Saudi

The role of mothers in Saudi society does not require that they work outside the home or financially provide for their children with their money unless they choose to do so. Many mothers prioritize family and view themselves as homemakers, a theme that was reinforced by one study examining perceptions of gendered roles in Saudi Arabia (Alyaemni, Theobald, Faragher, Jehan, & Tolhurst, 2013). However, for women and mothers in Saudi Arabia, this traditional role is quickly changing. This changing role (from a housewife to a working mother) is occurring as more mothers are joining the workforce. As reported by the International Labor Organization (2016), currently women occupy half of the government sector jobs in Saudi Arabia. The changing trend in mothers’ work status has also had an impact on fertility rates. Fertility rates fell from 7.02 children per women between 1908 and 1985 to 3.03 children per women between 2005 and 2010 (UNESCWA, 2014). For example, the norm for parents’ of my generation had 8-10 siblings; the norm for my generation has 4-6 siblings; the norm for the current generation is 2-3 children per family (N. Abahussain, personal communication, January 10, 2014).

A Saudi home can be described as a strong family-centered structure (Chookbar, Brodbeck, & House, 2007). Islamic values and teachings shape the ways of knowing and being in a given Saudi home, as it provides the ideal state of being. It is important to understand the

various ways in which the lives of individuals and groups within an Islamic community are guided by prescribed norms grounded in shared social and religious values (Chan-Serafin, Brief, & George, 2013) because this provides a context to understand better a problem that emerges in society.

Cultural Influences in Saudi Arabian Society

Annually people in Saudi Arabia fast the month of Ramadan, the ninth month of the Islamic calendar, to perform the second pillar of Islam (Figure 1.2). Everyone in the country fasts daily from sunrise to sunset for 29 or 30 days. Fasting is the abstinence from food, drink and sexual intercourse (Bakhotmah, 2011). Fasting is believed to be a way to discipline oneself, teach patience and to remind oneself of the poverty and hunger experienced around the world (Islamqa, 2014c). The general rule in fasting is that everyone is expected to fast; however, there are several exceptions to this rule. Children are only expected to start fasting once they reach puberty. Due to this shift in one's daily life during fasting, many aspects of the home environment are altered. As an example, working and operation hours for most, if not all of the shops, restaurants, companies, government agencies are modified during fasting. Sleep patterns also shift especially if Ramadan is during summer months, and children are out of school.

Cultural norms and nutrition in Saudi Arabia provide a foundation to understand the emerging obesity epidemic in children and adults. Table 1.2 provides a brief summary of some of the social norms related to food taught in schools and within Saudi homes.

Table 1.2. Nutrition and Cultural Norms in Saudi Arabia

Norm	Origin
<ul style="list-style-type: none"> • Alcohol is prohibited in Islam 	Taught in the Quran
<ul style="list-style-type: none"> • Pork is prohibited in Islam 	Taught in the Quran
<ul style="list-style-type: none"> • Not to throw yourselves into destruction (<i>general rule in Islam; however it is used when encouraging individuals to not overeat because with overeating, you are increasing the risk of developing diabetes, hypertension, and hyperlipidemia</i>) 	Taught in the Quran
<ul style="list-style-type: none"> • Eating with right hand 	Taught by the Prophet –PBUH–
<ul style="list-style-type: none"> • To eat food what is nearest to you (<i>when you have plenty of dishes to take from whatever you wish, but would be nearest to your reach</i>) 	Taught by the Prophet –PBUH–
<ul style="list-style-type: none"> • When eating a certain meal, not to make the stomach full: A third for food, a third for drink and third for air 	Taught by the Prophet –PBUH–
<ul style="list-style-type: none"> • Not to eat food over food or meal after meal directly 	Taught by an Islamic scholar, Ibn Al-Qayyim.
<ul style="list-style-type: none"> • Starting and ending food by thanking God for his blessing 	Taught by the Prophet –PBUH–

Understanding the Influence of Mothers on their Children

The family is considered the primary influence on a child's physical, psychological and social development (Galvin, Braithwaite, & Bylund, 2015). Mothers, in particular, are the major caretakers of children in Saudi families (Al-Ayed, 2010). A majority of the Saudi Arabian research literature currently documents the problem and prevalence of overweight and obesity in children (ALNohair, 2014). To date, no studies have explored Saudi Arabian mothers' perceptions of their child's health status and weight. Parental perception of a child's weight

status has been widely explored in both developing and developed countries such as Argentina, Australia, Brazil, Canada, Chili, Germany, India, Italy, Kuwait, Mexico, Netherlands, the United Kingdom (UK) and the US (Alrashidi, Shahwan-Akl, Jones, Linda, & James, 2015; Hochdorn et al., 2014; Rietmeijer-Mentink, Paulis, Middelkoop, Bindels, & Wouden, 2013). A common finding among these countries is that parents are often unconcerned and/or unaware that their child is overweight or obese. Bringing increased awareness of childhood obesity to parents is the first step in the prevention of childhood obesity (Hochdorn et al., 2014; Sung-Chan, Sung, Zhao, & Brownson, 2013). Therefore, to understand the complex problem of childhood obesity in Saudi Arabia, mothers' perceptions of normal weight, overweight or obesity in 3-to-6-year-old preschool children was studied. Preschoolers were the focus of this study because the prevalence rate of overweight and obesity is increasing in this age group (Ng, Zaghoul, Ali, Harrison, & Popkin, 2011).

Purpose

The purpose of this study was to examine maternal perspectives of their child's weight status, eating behaviors and maternal feeding styles. The specific aims were to:

Quantitative Phase I

Aim 1: Determine the fidelity and cultural appropriateness of the Arabic translated version of the Child Feeding Questionnaire (CFQ) and the Child Eating Behavior Questionnaire (CEBQ) with a sample of Saudi Arabian mothers of preschool-aged children.

Quantitative Phase II

Aim 2: Determine if Saudi Arabian mothers' child-feeding practices as measured by CFQ and eating behaviors (external eating, emotional eating, speed of eating, interest in eating, satiety responsiveness and food fussiness) as measured by the CEBQ were associated with their children's anthropometrics (weight, height, waist circumference, triceps and subscapular

skinfolds) and selected socioeconomic factors (maternal education, employment status and family income).

Qualitative Phase

Aim 3: Examine maternal perceptions of their child's weight and factors that influence their eating behaviors and maternal feeding styles (qualitative interview).

Quantitative and Qualitative Phase

Aim 4: Examine the relationship between child's weight status and maternal perceptions of child eating behaviors and maternal feeding practices.

Conceptual Framework

The conceptual framework for this study (see Figure 1.3) consisted of maternal feeding styles originally conceptualized by Costanzo and Woody's theory (1985) and child eating behaviors described in the obesity research literature (Birch & Fisher 1998; Bruch, 1964; Gibson & Wardle, 2001; Goldman, Radnitz, & McGrath, 2012; Jahnke & Warschburger, 2008; Marston, London, Cohen, & Cooper, 1977; Schachter & Rodin, 1974; van den Akker, Jansen, Frentz, & Havermans, 2013). Although the two bodies of literature that are guiding this study differ in their approach, they share similar core elements and complement each other. Both focus on understanding the risk of developing childhood obesity. One body of literature looks specifically at the maternal aspects that may lead to childhood weight gain (Birch et al., 2001; Rollins, Loken, Savage, & Birch, 2014), the other looks at the child eating behaviors as assessed by mothers to better understand childhood weight gain (Boutelle et al., 2014; Frankel et al., 2014; Wardle, Guthrie, Sanderson & Rapoport, 2001).

Figure 1.3. Conceptual Framework

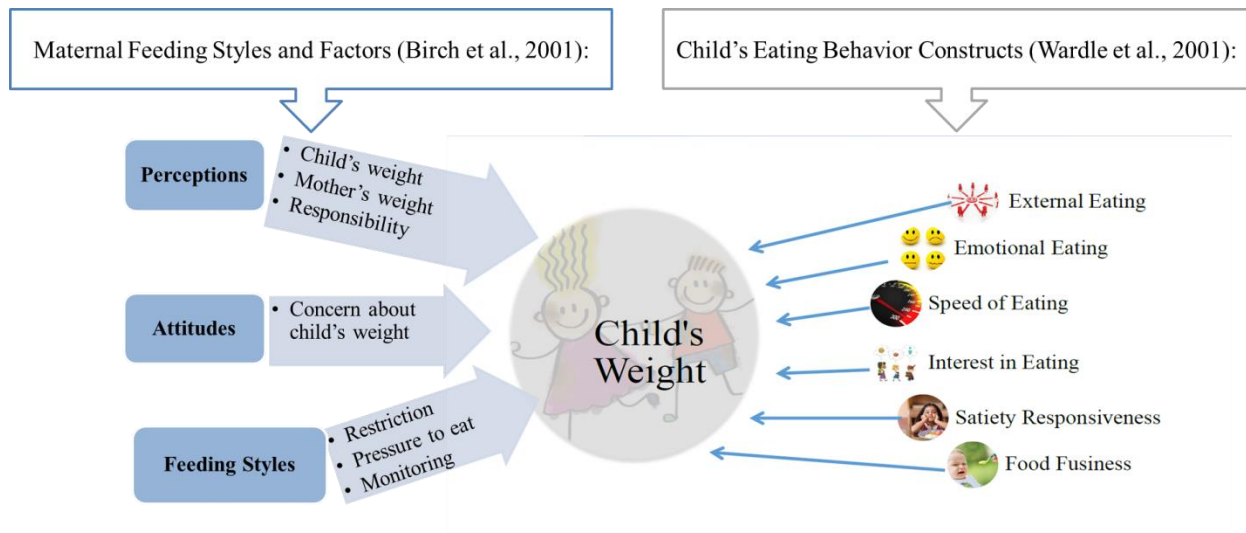


Figure 1.3. Child's Health Conceptualization based on Costanzo & Woody's Theory and Eating Behavior Constructs

In an attempt to operationalize the constructs to allow continuity in future studies of child eating behaviors and allow better comparisons across studies (Hughes et al., 2013), Table 1.3 was developed to structure and define the major constructs of the framework. The constructs and definitions of conceptual framework terms with references were explained.

Table 1.3. Definition of Conceptual Framework Terms

Construct	Definition
- Maternal Perception	Mothers' view and understanding regarding child's weight and her responsibility toward her child (Birch et al., 2001).
• Child's Weight	Mothers' view on her child's weight history and status (Birch et al., 2001).
• Responsibility	Mothers' understanding of her duty towards her child's feeding (Birch et al., 2001).
- Maternal Attitudes	Mothers' view on controlling her child's feeding in regards to restriction and pressure to eat (Birch et al.,

	2001).
- Feeding Styles	Mothers' approach to modify child's eating behavior (Goldman, Radnitz & McGrathe, 2012).
• Restriction to Eat	Mothers' limiting access to specific foods (Goldman et al., 2012) with the intent to improve her child's eating (Birch et al., 2001).
• Monitoring	The extent to which mothers' supervise and oversee their child's eating (Birch et al., 2001).
• Pressure to Eat	Mothers' active attempts to increase her child's healthy food consumption (Goldman et al., 2012).
Child Eating Behavior	A child's patterns in eating.
- External Eating (<i>responsiveness to food cues</i>)	Regular or daily food consumption based on the food being tasteful or not (Wardle et al., 2001).
- Emotional Eating	A response to a negative emotional state by overeating or undereating (Wardle et al., 2001).
- Speed of Eating	Time spent eating a meal as assessed by parents (Wardle et al., 2001).
- Interest in Eating	These include a child's general interest in food, hunger, desire to eat and food enjoyment (Wardle et al., 2001).
- Satiety Responsiveness	One's ability to perceive internal satiety cues and operationally is defined as only eating when hungry and stopping when full (Wardle & Carnell, 2009).
- Food Fussiness	Being highly picky and selective about the variety of foods accepted (Wardle et al., 2001).

Costanzo and Woody's theory (1985) posits that parenting styles constantly change according to the child's development and characteristics. Parenting styles are different from one parent to the other throughout the child's growth and development and from one child to the other within the same family (Costanzo & Woody, 1985). Moreover, Costanzo and Woody

(1985), indicate that parents tend to control their children more when: (1) the parents themselves have problems controlling their own behavior; (2) the parents perceive the child as being at risk for developing behavioral problems; (3) when the parents see that the child lacks regulatory behaviors. Therefore, parents exhibit higher levels of control on child feeding patterns if they are concerned with the child's weight or perceive that the child is at risk of becoming overweight or obese (Anzman, Rollins, & Birch, 2010).

Costanzo and Woody (1985) argued that the higher parental control regarding child's feeding may influence the development of self-control mechanisms of the child based on reaction to appetite (hunger and satiety cues). Some child eating behaviors are believed to develop as a result of parenting. A growing body of literature reports that child eating behaviors may be critical factors in weight status and growth in children (Birch & Fisher, 1998; DiSantis, Hodges, Johnson, & Fisher, 2011). Constructs related to eating behaviors that have been linked to obesity include external and emotional eating, the speed of eating and satiety responsiveness (Kaplan & Kaplan, 1957; Rodin & Slochower, 1976; Stunkard & Wolff, 1956).

External Eating (Responsiveness to Food Cues)

This construct is based on externality theory (Braet & Van Strien, 1997; Schachter & Rodin, 1974). Rodin and Slochower (1976) found that children placed in a food stimulating environment (full of smell, taste and sight cues) led to overeating, which increased weight gain. More recently, an added mechanism of classical conditioning has been suggested to explain the difficulty some individuals have in resisting a stimulating environment because individuals learn to associate a precursor of a particular food with actually eating the food (van den Akker, Jansen, Frentz, & Havermans, 2013). This learned association (between the precursor and the actual food) aids in preparing an individual to eat even without being hungry, through increased salivation and stimulation of a desire to eat (Jansen, Stegerman, Roefs, Nederkoorn, &

Havermans, 2010; Wardle, 1990). Early work suggested that external eating is not only limited to food cues (i.e. sight, taste, and smell) but also covers aspects such as emotionality (Pliner, 1974; Schachter & Roden, 1974).

Emotional Eating

Feeding the child is a common parenting practice used by parents to comfort their child as early as birth with breastfeeding or formula and later in a child's life with solid foods as a way to calm and soothe the child (American Academy of Pediatrics [AAP], 2014). This early parenting practice may lead to the child associating food with a positive emotional state. This construct is based on psychosomatic theory (Braet & Van Strien, 1997; Bruch, 1964). This type of eating can be classified by two states: emotional overeating and emotional undereating (Gibson & Wardle, 2001; Oliver & Wardle, 1999). Some of the different emotions that may trigger a child to resort to food may include feeling bored, insecure, angry, lonely, and happy, depressed, stressed, fatigued and/or frustrated (Harrist, Hubbs-tait, Topham, Shriver, & Page, 2013). One common aspect between the two constructs of *external eating* and *emotional eating* is the child's state of emotional regulation as being either reactivity (meaning a child's negative reaction to the external environment) or inhibition, an internal process where a child's reaction is holding her/his feelings inside (Harrist, Hubbs-Tait, Topham, Shriver, & Page, 2013). The results of one study found that children's emotional reactivity was significantly correlated with both constructs of *emotional eating* and *external eating* (Harrist et al., 2013)

Speed of Eating

Research studies have reported the link between the speed of eating and obesity and found that children who were obese were found to eat faster than children who were not obese (Marston, London, & Cooper, 1977; Waxman & Stunkard, 1980). Marston and colleagues

(1977) found children who were overweight or obese ate more bites per unit of time measured and fewer chews per bite.

Interest in Eating

Early observational work comparing obese and non-obese school-age children found no significant difference in enjoyment in food and other responses (i.e. mood, tension) between the two groups (Martson, London, & Cooper, 1977). With children's general interest in eating, it was found that food interest in children was based on their parents' food consumption patterns and children learned eating behaviors by modeling their parents (Birch & Fisher, 1998; Jahnke & Warschburger, 2008).

Satiety Responsiveness

With this construct, it has been suggested that individuals who are obese have less responsiveness to internal cues of satiety, and are overly responsive to the taste and smell of food (external cues) (Schachter & Gross, 1968; Wardle, 2001; Wardle & Carnell, 2009). Hence, with low satiety responsiveness, individuals tend to overeat (Carnell & Wardle, 2007). Birch and Fisher (1998) further examined the association between satiety and individual's feeding preferences and found that an important satiety cue is lacking in high-fat diets. High-fat diets are usually higher in total energy, smaller in energy density and are more palatable. Also, children's early feeding practices (i.e. breastfeeding) may contribute to the protection of later child weight gain through satiety responsiveness. In one study it was found that mothers who breastfed longer duration (3-6 months) were significantly ($P < 0.01$) more attuned to later infant satiety responsiveness cues (when solid food was introduced) than mothers who breastfed a shorter duration (< 3 months) in a diverse sample (DiSantis, Hodges, & Fisher, 2013).

Food Fussiness

This construct emerges in the literature regarding child's eating problems and has been assessed using a list of foods that a child may accept or reject (Taylor, Wernimont, Northstone, & Emmett, 2015; Wardle, Guthrie, Sanderson, & Rapoport, 2001). An important aspect of this construct is that the higher availability and accessibility of certain foods for children is associated with a greater likelihood the child consumed those foods (Birch & Fisher, 1998; Goldman, Radnitz, McGrath, 2012). Therefore, higher availability and accessibility was a strong predictor of school age children's consumption of more fruits and vegetable in one review (Cullen et al., 2001; Goldman, Radnitz, & McGrath, 2012; Hearn et al., 1998).

Constructs and Methodological Issues

The specific behavioral patterns discussed above (speed in eating and interest in food, etc.) are not definite evidence of causality (Hughes et al., 2013; Marston, London, & Cooper, 1976), yet are observed behavior patterns found in children who are obese. The exact relationship is not clearly understood. It is not clear if parenting practices related to food and feeding influence child weight or if child weight status influences food parenting styles or if there is a reciprocal relationship (Rhee et al., 2015). This unclear relationship is believed to be attributed to the designs of the studies conducted, which focused on cross-sectional associations making it difficult to determine causality (Hughes et al., 2013).

Inter-Relationship between Constructs

The constructs of food fussiness, the speed of eating, satiety responses and interest in eating are critical to consider in the early experience and learning of children's food preferences. Mennella and Beauchamp (1993; 1996) found infants exposed to a wide range of flavors (i.e. garlic and vanilla flavors) in mothers' breast milk are more likely to eat that food when introduced to solids. Also noteworthy is Galef and Henderson (1972) and Capretta, Petersik and

Steward's (1975) early work on rat puppies, where they found that rat pups learned to accept a variety of flavors if they were exposed to different flavors early through their mothers' diet. All of these constructs are an important consideration for understanding children's eating behaviors.

Another important consideration is the children's social context and the influence of other people in the child's life. Different caregivers such as fathers, aunts, uncles, grandparents and siblings can influence what the child consumes (Hughes et al., 2013). Influential caregivers are of particular importance when studying Saudi homes and families because of the collectivistic nature of the culture and the strong family-centered life in Saudi homes, where many if not most of the families have weekly or biweekly gatherings of grandparents, parents, siblings, aunts, uncles, children, grandchildren or great-grandchildren.

Summary

This chapter has provided a statement of the problem on childhood obesity in Saudi Arabia, and proposed research aims relevant to the problem. An overview of Saudi Arabia's profile and cultural context with examples of societal and religious norms within the population that pertain to the issues of eating and parenting styles was provided along with a discussion on the study's conceptual framework driven by Costanzo and Woody's theory (1985) and constructs of childhood eating behaviors (external eating, emotional eating, speed in eating, interest in eating, satiety response and food fussiness) as identified in the literature. It is important to note that all the constructs and conceptualizations discussed in this chapter are based on research conducted in different parts of the world, primarily in the US and UK. There is a lack of theory-driven research in Saudi Arabia addressing childhood obesity. Hence, many of the examples were from non-Saudi literature. Moreover, discussions in this chapter also included studies of a broader age range of children than is the focus of the proposed research. With these two considerations, the researcher will be sensitive to cultural issues and aware of child's growth and

development that may influence any stage of the research study. Chapter two and three correspond to the review of the literature and methods section for the dissertation study.

CHAPTER 2: LITERATURE REVIEW

Introduction

Saudi Arabia has become one of the fastest growing economies in the world. In 2003, Saudi Arabia was the 27th largest economy, and in 2014 it became the 19th largest economy in the world (McKinsey Global Institute, 2015). Also, Saudi Arabia's household income rose by 75% from 2004 to 2013 driven by higher public-sector employment and wages (McKinsey Global Institute, 2015). It is estimated that by 2050 that 90% of the Saudi Arabian population will live in cities (Abou-Korin & Al-Shihri, 2015). Increased urbanization and disposable income have increased access to fast food and technology, which have been related to the obesity epidemic in developing and developed countries (Abou-Korin & Al-Shihri, 2015). Of note, in developing countries like Saudi Arabia, childhood obesity has been linked to higher socioeconomic status, and in developed countries like the United States, childhood obesity has been linked to lower socioeconomic status (Abou-Korin & Al-Shihri, 2015). Increased income has also increased the consumption of fast food in Saudi Arabia. Fast food sales in Saudi Arabia reached \$4.5 billion dollars in 2015 (Naeem, 2012). Therefore, fewer meals are being prepared at home in the traditional manner. Also, with increased disposable income many families have hired maids and nannies from outside of Saudi Arabia, who introduce new foods and ways of cooking into the household, thereby decreasing the number of traditional Saudi meals served (McKinsey Global Institute, 2015).

Globally, 43 million children are classified as overweight or obese, and prevalence rates are rising dramatically in both developing and developed countries (de Onis, Blossner, & Borghi,

2010; Ng et al., 2014). The World Health Organization (2011) has estimated that 30% of children in Saudi Arabia are obese. Regarding the latest figures reported for children between the ages of 5 and 18 years in Saudi Arabia, 23.1% were overweight, 9.3% were obese, and 2% were severely obese (El Mouzan et al., 2010). These rates are especially significant because children under the age of 16 years in Saudi Arabia account for 30% to 35% of the total population (Collison et al., 2010; Saudi Arabia Population Clock, 2016). Overweight in children is defined as a body mass index (BMI) $\geq 85^{\text{th}}$ percentile to $< 95^{\text{th}}$ percentile; obesity is defined as a BMI $\geq 95^{\text{th}}$ percentile (Centers for Disease Control [CDC], 2015). Overweight and obesity pose major health risks for children, which include prediabetes, type 2 diabetes, hypertension, hyperlipidemia, sleep apnea, asthma, fatty liver disease, and orthopedic and psychological problems (Flegal et al., 2010; Ornelas, Francica, Wichi, & Maifrino, 2014; Paulis, Silva, Koes, & van Middelkoop, 2014). Psychological consequences include depression, low self-esteem, and poor social interactions (Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014; Shivpuri, Shivpuri, & Sharma, 2012).

Researchers studying obesity in Saudi Arabia and other Arab countries emphasize the magnitude of the problem and its comorbidities in both adults and children (Alhyas, McKay, Balasanthiran, & Majeed, 2011; AlMarzooqi & Nagy, 2011; Badran & Laher, 2012; Mabry, Reeves, Eakin, & Owen, 2010; Ng et al., 2011). However, there is a lack of research on the state of the science on childhood obesity (i.e., birth to 20 years) in Saudi Arabia and the associated dietary and physical activity patterns.

To date, five systematic reviews examined the topic of obesity and its related comorbidities in the Middle East region (Alhyas et al., 2011; AlMarzooqi & Nagy, 2011; Badran & Laher, 2012; Mabry et al., 2010; Ng et al., 2011). Alhyas et al. (2011) looked at the

prevalence of overweight and obesity, hyperglycemia, hypertension, and dyslipidemia among adults in the region of the Cooperation Council for the Arab States of the Gulf region (GCC), which includes Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The authors found that overweight prevalence ranged from 20% to 50%, and obesity ranged from 13% to 50% in adults and was higher in women than in men (Alhyas et al., 2011). Hyperglycemia prevalence ranged from 10% to 20%, but hypertension and dyslipidemia comparisons were difficult to achieve due to limited data and varied definitions of abnormal levels (Alhyas et al., 2011).

A review by Ng et al. (2011), conducted in the same GCC region, also found that obesity rates were higher in women (75% to 88%) than in men (70% to 85%) ranging in age from 30 to 60 years. That study found that obesity in preschoolers was high in Saudi Arabia and Kuwait (8% to 9%). However, children's data were difficult to compare, given the differences in standards used (Ng et al., 2011).

Badran and Laher (2012), studied all of the Arab countries and examined the prevalence of type 2 diabetes and contributing factors. Seven Arabic-speaking countries were described as the "world's leaders of type 2 diabetes prevalence" based on data from the International Diabetes Federation (2015), which included data on both genders aged 20 to 79 years. The prevalence of diabetes in Kuwait was 21.2%, in Lebanon and Qatar 21.2%, in Saudi Arabia 20.0%, in Bahrain 19.8%, in the United Arab Emirates 19.2%, and in Egypt 16.9% (Badran & Laher, 2012). Badran and Laher (2012) attributed the high prevalence rates to the massive economic growth these countries have experienced, population movement to urban areas, and changes in lifestyle habits with a higher consumption of calorie dense foods and lack of physical activity. They

concluded that in all of the Arabic-speaking countries studied, diabetes prevalence ranged from 4% in Somalia to 21% in Kuwait (Badran & Laher, 2012).

Mabry et al. (2010) assessed the prevalence of metabolic syndrome in the GCC region. Prevalence rates of metabolic syndrome in the region ranged from 20.7% to 45.9%; these percentages were 10% to 15% higher than percentages reported in developed countries, such as the US (23.4% for women and 24% for men) and Australia (15.7% for women and 26.4% for men) (Mabry et al., 2010). Factors associated with metabolic syndrome included physical inactivity, age, female gender (prevalence among women ranged from 13.5% to 45.9%), higher income, lower educational attainment, urban residence in Saudi Arabia, and rural residence in the United Arab Emirates (Mabry et al., 2010).

AlMarzooqi and Nagy (2011) examined 22 obesity prevention interventions implemented globally in response to the rising prevalence of obesity. Interventions in school settings were the major focus and were considered most appropriate for changing children's behavior (AlMarzooqi & Nagy, 2011). However, this review did not provide insight into the problem of childhood obesity in Saudi Arabia, because interventions were developed for and tested in other countries.

These five systematic reviews provide information about the issue of obesity in the region but were not specific to the problem in Saudi Arabia. Given the regional and cultural differences between countries even within the Gulf region, it was important to study Saudi Arabia as a single country to changing trends. Therefore, the purpose of this review was to examine documented prevalence rates, nutrition and activity levels, and current overweight and obesity prevention and management programs in Saudi Arabian children 2 to 20 years of age. The specific questions guiding this review were as follows. What are the documented

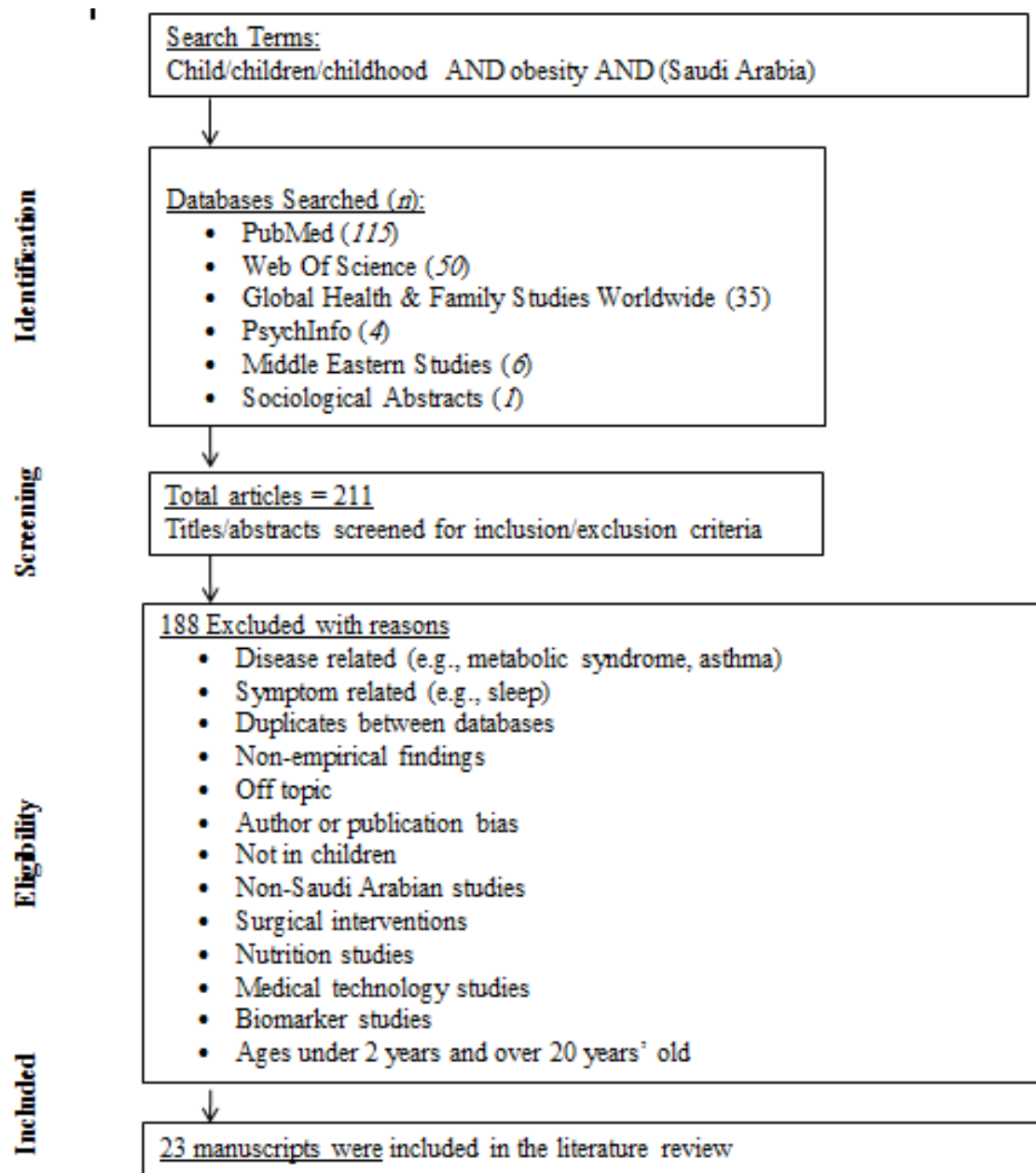
prevalence rates in the different regions in Saudi Arabia? What are the risk factors associated with childhood obesity in Saudi Arabia? What are the lifestyle factors associated with the problem of childhood obesity in Saudi Arabia? What are current intervention programs that address the problem of childhood obesity in Saudi Arabia?

Method

Research focusing on Saudi Arabia, documented prevalence rates, nutrition and physical activity levels and current overweight and obesity prevention and management programs in children were explored. The search was conducted using seven electronic databases: *PubMed*, *Web of Science*, *PsycInfo*, *Global Health*, *Family Studies Worldwide*, *Middle-Eastern Studies* and *Sociological Abstracts* were searched for primary research articles using the following search terms: child* AND obesity AND Saudi Arabia (Figure 2.1). Inclusion criteria included: 1) peer-reviewed studies published in Arabic or English between January 1, 2003, to December 31, 2015; 2) studies that reported on prevalence, characteristics of overweight and/or obesity in children who resided in Saudi Arabia; 3) studies that reported BMI percentile outcomes; and 4) overweight and/or obesity prevention and management programs. Exclusion criteria included: 1) studies that examined specific diseases related to obesity such as metabolic syndrome; 2) studies that described biological or chemical markers of overweight and/or obesity; 3) non-empirical findings such as, letters, conference proceedings, commentaries or case reviews; 4) surgical interventions and medical technology related to obesity and 5) non-Saudi Arabian studies and non-children studies, over the age of 20 years.

As summarized in Figure 2.1, 211 manuscripts were reviewed, and 188 manuscripts were excluded, and all duplicates were removed. Any manuscripts using the same dataset in several studies was limited to only one study in this review to avoid author's bias. The remaining manuscripts ($n=23$) were included in the review.

Figure 2.1. Search Strategy for the Review of Literature



A standardized template was used to extract relevant information from reports. Data extracted from each study included: purpose of study, data collection period, design, specific region in Saudi Arabia, sample size, age and gender of children, setting of the study, and variables of interest (BMI percentile, weight, height, and demographic information), data analysis approach, and results addressing the research questions. Two researchers, the PhD student, and the dissertation chairperson, met for biweekly meetings over the course of a semester to discuss the reviewed studies, assessed quality, identified findings and differences in interpretation of key findings, applicability, and quality assessment were resolved during those meeting. An analysis was completed by organizing the reviewed studies into a matrix to facilitate examining common findings. The common findings found included, first, epidemiological findings; second, risk factors and third lifestyle characteristics. A summary of the reviewed articles is in Table 2.1.

Table 2.1. Studies on Childhood Obesity in Saudi Arabia

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
Question One: Epidemiological Features				
Al-Almaie 2005	Determined the prevalence of overweight and obesity using two international standards Cross-sectional Design	N=1,766 Females=61.8% Males=38.2% Age: 3 rd graders (age was not reported)	<i>Instrument:</i> Not applicable Combined overweight and obesity percentages were 29.5% in males and 29 in females No differences between the two references used	Prevalence rates of overweight and obesity compared between genders
Al-Dossary, Sarkis, Hassan, El Regal & Fouda 2010	Examined overweight and obesity prevalence rate of children and adolescents Cross-sectional Design	N=7,056 Private school (n=1,260) Private hospital (n=5,796) Age: 2-18 years	<i>Instrument:</i> Data collection form included age, sex and nationality A 19% prevalence of overweight A 23% prevalence of obesity Males (35.6%) had higher percentage of obesity compared to females (19.2%) Obesity in preschool children of both genders was lower (31%) compared to adolescents (76%)	Prevalence rates of overweight and obesity across childhood ages
Al-Rukban 2003	Determined the prevalence of overweight and obesity Evaluated participants' knowledge, attitude and practice towards obesity Cross-sectional Design	N=894 (all males) Age: 12-20 years	<i>Instruments:</i> Arabic questionnaire was piloted prior to this study (no citation provided). Sections included, socio-demographics, dietary and activity history, obesity knowledge and behavior and medical history Prevalence of overweight was 13.8% Prevalence of obesity was 20.5% Twenty percent of overweight participants did not think they were overweight	Prevalence rates of overweight and obesity in the middle region of Saudi Arabia
Al-Saeed, Al-Dawood, Bukhari & Bahnassy	Determined the prevalence and the socioeconomic risk factors associated with obesity	N=2,239 (all female) Age: 6- 17 years	<i>Instrument:</i> Arabic questionnaire was piloted prior to this study (no citation provided) Prevalence of overweight and obesity were 20% and 11%, respectively	Prevalence rates of overweight and obesity in the eastern region of Saudi Arabia

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
2006	Cross-sectional Design		Overweight was higher among students with father in private work ($P<0.01$) and among students with highly educated mothers ($P=0.008$)	
El Mouzan, Foster, Al Herbish, Al Salloum & Al Omer 2010	Established a national prevalence of overweight and obesity in Saudi children and adolescents. Cross-sectional Design	N= 19,317 Female=49.2% Male=50.8% Ages: 5 - 18 years	<i>Instrument:</i> Not applicable Overall prevalence of overweight, obesity and severe obesity in all age groups was 23.1%, 9.3% and 2%, respectively	Nation-wide study on the prevalence of overweight and obesity
Question Two: Risk Factors				
Al-Shehri et al. 2006	Evaluated the appropriateness of the NCHS growth standards as a measurement for KSA children Aimed at standardizing the growth parameters for KSA children living in high altitude city. Cross-sectional Design	N=13,580 Female=47% Male=53% Ages: 3-18 years	<i>Instrument:</i> Not applicable Utilization of the NCHS growth standard was found to be an unsuitable method of growth measurement for children living in high altitude areas in Saudi Arabia	Risk factors related to puberty
Al-Daghri, Alokail, Al-Attas, Sabico & Kumar 2009	Documented the association of sagittal abdominal diameter (SAD) with obesity measures Cross-sectional Design	N=964 365 prepubertal Female =60% Male=40% 249 pubertal Female=49.8% Male=50.2% 350 postpubertal	<i>Instrument:</i> Not applicable SAD was correlated with indices of obesity regardless of gender Among pubertal males the association was stronger than females	Risk factors between genders in measurements of obesity

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
		Female=43.4% Male=56.6% Ages: 5-17 years		
Al-Hazzaa & Al-Rasheedi 2007	Evaluated levels of adiposity and physical activity Cross-sectional Design	N=224 Female=51.3% Male=48.7% Ages: 3.4 – 6.4 years	<i>Instrument:</i> Questionnaire for parents to estimate television viewing (no citation provided) The obesity prevalence of total sample was 10.8% Gender differences in fat percentages and counted steps per day was significant ($P < .05$)	Risk factors between genders and differences in fat percentage
Al-Rowaily, Al-Mugbel, Al-Shammari & Fayed, 2007	Provided information on nutritional status in schoolchildren Compared it with national and international studies of anthropometric data Cross-sectional Design	N= 6,207 children Ages: 4-8 years	<i>Instrument:</i> Arabic questionnaire developed by authors on demographics (no citation provided) Obesity was found to be 4%, which is less than the national and international references. Children from the Saudi population are generally weigh less in weight and are shorter than American children and seem to be closer to the WHO standards	Risk factors in preschoolers and early elementary
Amr, El-Seedy & Mohamed 2012	Examined BMI distribution among adolescent females Identified the relationship between obesity and symptoms of puberty Cross-sectional Design	N= 200 (all female) Ages: 12 – 20 years	<i>Instruments:</i> Three instruments developed by authors (no citation provided) Mean BMI of obese group was $34.4 \pm 4.9 \text{ kg/m}^2$ There were statistically significant differences between obesity and menstrual irregularity ($P < 0.05$); where 95% of obese females had dysmenorrhea and 90% of healthy weight females had regular menstruation	Risk factors in females
Khalid	Described the	N= 912	<i>Instrument:</i> Arabic questionnaire sections included	Risk factor in high-

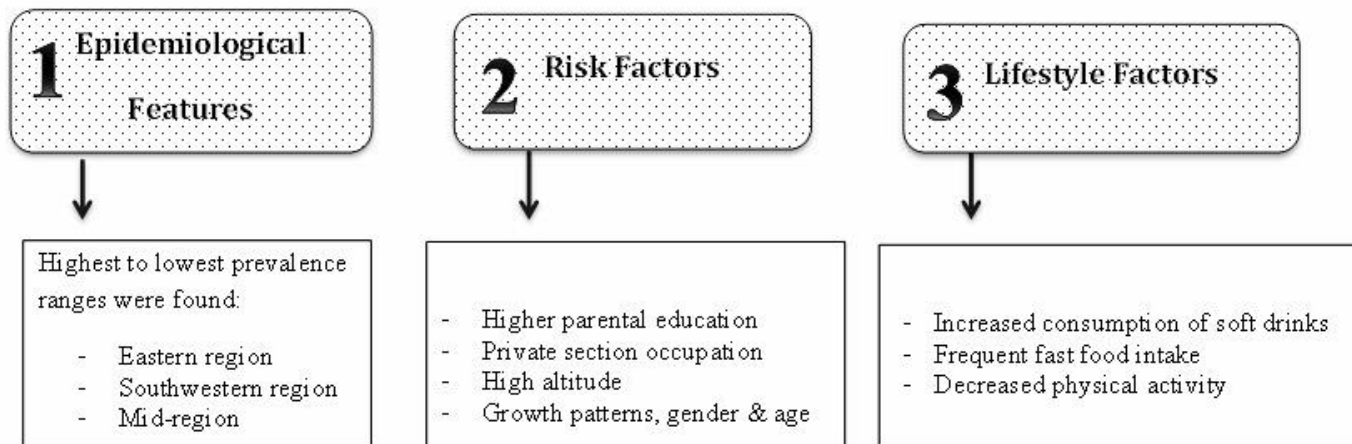
Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
2008	prevalence of overweight and obesity in rural high- and low-altitude areas in KSA Identified specific at-risk groups within these populations Cross-sectional Design	Ages: 6-15 years	family demographics, socio-economic status & dietary patterns (no citation provided) Revealed that moderate-to-high parental income, age ≥ 10 years, female gender, and high-altitude birth and residence were significant independent predictors of childhood overweight and obesity	altitude areas
Al Alwan, Al Fattani & Longford 2013	Explored the influence of parental education and economic status of parents with children who are obese Cross-sectional Design	N= 1,243 Female=56.4% Male=43.6% Ages: 6-16 years	<i>Instrument:</i> Arabic questionnaire was piloted prior to this study (no citation provided) There was a statistically significant association between Saudi children who were overweight or obese and mothers' with a university education ($P<0.01$) and higher family income ($P<0.01$)	Risk factors family socioeconomic status and mothers' education
Amin, Al-Sultan & Ali 2008	Determined possible association between obesity and overweight with dietary habits and socio-demographic differentials among them Cross-sectional Design	N=1,139 (all males) Ages: 10 - 14 years	<i>Instruments:</i> Items from Youth and Adolescent Food Frequency Questionnaire by Rocket et al., (1995) and socio-demographic form Overweight and obesity was found more in urban, older age students, mothers of obese and overweight were less educated and more were working	Risk factor having a working mother and less educated mothers
Alam 2008	Estimated the prevalence of obesity among elementary school female students Identified some obesity-associated risk factors	N=1,072 Ages: 8-12 years	<i>Instrument:</i> Arabic questionnaire tested and validated (no citation provided) Obesity was 14.9% in the students examined A total of 95% living in villas or big houses were obese	Risk factors in high socioeconomic status homes

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
	Cross-sectional Design		Fast food and soft drinks were commonly consumed Daily television viewing was prevalent among 97.5% of obese students	
Question Three: Lifestyle Factors				
Al-Hazaa, Abahussain, Al-Sobayel, Qahwaji & Musaiger 2012	Evaluated the associations between obesity measures and several lifestyle factors Cross-sectional Design	N=2,906 Ages: 14–19 years	<i>Instruments:</i> Arab Teen Lifestyle (ATLS) instrument by Al-Hazaa and Musaiger (2011) Obese males and females were significantly less active than non-obese males and females	Activity levels between obese and non-obese and between genders
Al-Nakeeb, Lyons Collins, AlNuaim, Al-Hazaa, Duncan & Nevill 2012	Explored differences in weight status, obesity and patterns of physical activity (PA) in relation to gender and age from two countries (UK and KSA) Cross-cultural design	N=2,290 Ages: 15-17 years	<i>Instruments:</i> Arab Teen Lifestyle (ATLS) instrument by Al-Hazaa and Musaiger (2011) Percentages of overweight and obesity and levels of PA were statistically different between the youth from the two countries	Activity levels between two countries
Collison, Zaidi, Subhani, Al-Rubeaan, Shoukri & Al-Mohanna 2010	Examined dietary habits in relation to BMI and waist circumference Cross-sectional Design	N=5,033 Ages: 10 - 19 years	<i>Instruments:</i> 7-day food frequency questionnaire previously translated in Arabic (no citation provided) Waist circumference and BMI were positively correlated with sugar-sweetened carbonated beverage intake in boys only Boys had higher obesity rates than girls ($P < 0.001$)	Nutritional factors associated with obesity and anthropometrics
Farghaly, Ghazali,	Evaluate the life style and dietary habits of	N=767	<i>Instruments:</i> Arabic questionnaire describes lifestyle and behavior activities (no citation provided)	Nutritional factors associated with the

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
Al-Wabel, Sadek, & Abbag 2007	school students and the prevalence of some nutritional problems Cross-sectional Design	Ages: 8 – 18 years	Diets were rich in carbohydrates and deficient in fiber. Fast food was consumed 2.0 ± 1.7 times/month Breakfast was a regular meal for 72% of primary students compared to 49% of secondary school students Daily milk intake was only 51.5%	obesity; lifestyle habits (i.e. breakfast)
Mahfouz, Shatoor, Khan, Daffalla, Mostafa & Hassanein 2011	Investigated gender differences in obesity and related behavior among adolescent schoolboys and girls	N=1,249 Ages: 11- 19 years	<i>Instruments:</i> Adolescent Health Survey by Abalkhail et al. (2003) Prevalence of obesity and overweight in the present study was 23.2% for males and 29.4% for females	Differences in lifestyle factors between genders
Al-Ghamdi 2013	Explored the association between television watching and obesity in Saudi children as calculated by BMI Case-control design	N= 397 Female=49.4% Male=50.6% Ages: 9-14 years	<i>Instrument:</i> 20-item Arabic questionnaire developed by authors (no citation provided) Television watching was a reported to be a risk factor for obesity in Saudi children ($P < 0.001$)	Risk factor television viewing
Al- Mohaimeed and colleagues 2015	Compared two measures for obesity classification Cross-sectional Design	N= 874 Ages: 6-10 years	<i>Instrument:</i> Not applicable Major differences were found between the two measures of obesity (BMI versus body percent fat using the Futrex analyzer); agreement score was low in both methods (females= 0.24; males=0.48); the mean BMI was significantly higher in females compared to males ($P<0.0001$)	Differences in two measurement of obesity
Darwish,	Explored lifestyle and	N=300	<i>Instrument:</i> Arabic questionnaire developed by the	Nutritional factors related

Author/ Year	Purpose / Design	Sample/ Age	Instruments/Main Findings	Analysis
Al-Saif, Albahrani & Sabra 2014	dietary behaviors in Saudi preschool children Cross-sectional Design	Female=54.3% Male=45.7% Ages: 1-5 years	authors (no citation provided) Frequent unhealthy food items (i.e. pizza, burgers, biscuits, chocolate, chips and soft drinks) were reported among the studied sample	to overweight and obesity
Al- Muammar, El-Shafie & Feroze 2012	Explored lifestyle and eating patterns and measured BMI Cross-sectional Design	N= 107 (all female) Ages: 12-15 years	<i>Instrument:</i> 36-item Arabic questionnaire (no citation provided) No significant differences were found between BMI category and eating patterns	Eating patterns between different weight categories

Figure 2.2 Findings from the Integrative Literature Review on Childhood Obesity in Saudi Arabia



The studies in Saudi Arabia focused on 1) epidemiological features, which are important to determine differences in prevalence rates from all over the country; 2) risk factors, which facilitated understanding of the growing problem of childhood obesity in Saudi Arabia and to determine target populations for further research; and 3) lifestyle factors, which highlighted areas that warranted more in-depth studies that may aid in designing culturally appropriate interventions.

Descriptive Characteristics of Reviewed Studies

Only one study reported the prevalence of childhood obesity in Saudi Arabia as a whole population (El Mouzan et al., 2010). The remainder of the studies were descriptive cross-sectional designs, except for one that was a cross-cultural comparative study of a city in Saudi Arabia and two cities in the United Kingdom. Overall, the researchers utilized schools as the main site for data collection ($n=17$), followed by a door-to-door approach ($n=3$), both hospitals and schools simultaneously ($n=2$) and a well-baby health clinic ($n=1$). Sample sizes ranged from 107 participants to 19,317. Most studies recruited both female and male children in the study ($n=18$), except three studies that recruited female participants only and two that recruited male participants only. The age of participants varied from 2 to 20 years old in reporting prevalence rates and included the whole trajectory of child growth and development, however, one study examined one specific child developmental stage which was the preschool age (Al-Hazzaa & Al-Rasheedi, 2007).

Quality Assessment

Quality was assessed by examining the reviewed studies on issues that were of concern and any missing reported information; no standardized quality assessment tool was used. Of concern, many of the studies did not clearly report on the institutional review board (IRB) approval process. Five studies did not report any IRB approval. Only two studies reported the

assent process for children enrolled in the study. Within the context of Saudi Arabian culture, this might be explained by one of the underlying viewpoints about children and that is a child is responsible for decisions when they reach the age of puberty. This viewpoint is based on the Prophet's saying: *The pen [responsibility] is lifted from three: the one who is asleep until he wakes up; the child until he attains puberty; and the insane person until he regains* (Mohammed, 2014). The duration of the study period was often not reported. Many of the studies ($n=9$) did not report the duration of data collection or study period (Al-Almaie, 2005; Al-Nakeeb et al., 2012; Al-Shehri et al., 2006; Amin, Al-Sultan, & Ali, 2008; El Mouzan et al., 2010; Khalid, 2008; Mahfouz et al., 2011; Washi & Ageib, 2010). The remaining studies ($n=14$) reported the duration of data collection, which varied from 2 months to 2 years. There was a noticeable gap in a few studies ($n=2$) between when the data were collected (2000 and 2002) and the publication of the manuscript (2007 and 2008 respectively) [Collison et al., 2010; Taha, 2008]. Also, a detailed description of sampling techniques was often inadequate. Several did not provide sufficient detail and an explanation of the sample selection and techniques (Al-Daghri et al., 2010; Al-Shehri et al., 2006; El Mouzan et al., 2010). A clear explanation of how the researchers described their sample selection is one quality sought in assessing the internal validity of studies (Center for Reviews and Dissemination, 2009). None of the reviewed studies had a theoretical or conceptual framework.

Determining Childhood Overweight and Obesity

A variety of cut-off points and references were used in the studies to define overweight and obesity in Saudi Arabian children. Several studies ($n = 6$) used the WHO (1995) criteria (Al Almaie, 2005; Al-Mohaimeed, Ahmed, Khadiga, Ismail, & Nazmus, 2015; Al-Rowaily, Al-Mugbel, Al-Shammari, & Fayed, 2007; Al-Rukban, 2003; Farghaly, Ghazali, Al-Wabel, Sadek, & Abbag, 2007; Khalid, 2008). However, two of those studies also used another reference for

comparison. One used the CDC criteria reported by Kuczmarski et al. (2002), and the other used the international criteria of Cole, Bellizzi, Flegal, and Dietz (2000) (Al Almaie, 2005; Al-Rowaily et al., 2007). The other most commonly used reference ($n = 6$) was Cole et al. (2000) (Alam, 2008; Al-Ghamdi, 2013; Al-Hazzaa, Abahussain, Al-Nakeeb et al., 2012; Al-Sobayel, Qahwaji, & Musaiger, 2012; Amin, Al-Sultan, & Ali, 2008; Collison et al., 2010). Four studies used the CDC criteria of Kuczmarski et al. (2002) (Al-Dossary, Sarkis, Hassan, El Regal, & Fouda, 2010; Al-Rowaily et al., 2007; Al-Saeed, Al-Dawood, Bukhari, & Bahnassy, 2006; Al-Shehri et al., 2006).

Other references used included the CDC (2015), Lohman (1992), and WHO (2005; 2007) criteria (Al Alwan, Al Fattani, & Longford, 2013; Al-Hazzaa & Al-Rasheedi, 2007; Mahfouz et al., 2011; Washi & Ageib, 2010). Two studies did not reference any standards used (Al-Muammar, El-Shafie, & Feroze, 2014; Amr, El-Saidy, & Mohamed, 2012).

Findings

The 23 articles reviewed identified answered our research questions and found in the body of literature: (1) epidemiological features, (2) risk factors, and (3) lifestyle factors (Figure 2.1). In answering the fourth research question, there were no intervention studies currently documented in the Saudi literature on childhood obesity. From the data, it was clear that a lack of theoretical and/or conceptual frameworks existed in the study of childhood obesity in Saudi Arabia.

Epidemiological Features

The studies reviewed ($n = 23$) regarding overweight and obesity reported the highest prevalence in the eastern region of Saudi Arabia (19% to 35.6%), followed by the southwestern region (23.2% to 29.4%), the middle region of the country (13.8% to 20.5%), and the western region (10.8%). Studies showed that the range of overweight and obesity were greater in males

(19.3% and 35.6%) than in females (11.8% and 19.2%) in Khobar city (Al Almaie, 2005; Al Alwan et al., 2013; Al-Dossary et al., 2010). Also, Al Alwan et al. (2013) reported that in Riyadh, males were more overweight than females (OR for women compared to men= 0.6; $P < 0.01$).

Risk Factors

Parental education and occupation. Several studies found some mixed results regarding parental education and occupation. Some found that in cities in the eastern and middle regions of the country, obesity was associated with mothers having a higher level of education compared to mothers with a lower level of education; additionally mothers who worked outside the home were associated with obesity (Al Alwan et al., 2013; Alam, 2008; Amin et al., 2008; Khalid, 2008).

Perceptions of overweight and obesity. Moreover, parental assessment of their child's weight has not been explored in Saudi Arabia; however, one of the reviewed studies partially assessed children's perceptions of their weight status. The majority of the children were not aware of where they were on the spectrum of being normal, overweight, or obese (Al-Rukban, 2003).

High altitude and urbanization. Two studies addressed the association of high altitude with childhood obesity, and their findings were consistent with literature from France showing a positive association between high altitude and childhood obesity (Al-Shehri et al., 2006; Khalid, 2008; Leal & Chaix, 2011). However, in the US, the relationship between high altitude and childhood obesity has been found to be negative (Voss, Allison, Webber, Otto, & Clark, 2014). Although the relationships found in Saudi Arabia and the US are dissimilar, one Saudi researcher compared children ($n = 13,580$) aged 3 to 18 years of both genders (females = 6,387; males =

7,193) in the southwestern region of Saudi Arabia living in high altitude areas (i.e., 3,100 meters above sea level) using the 2002 CDC growth standard to assess the appropriateness of the sample. The author used the National Center for Health Statistics (NCHS) standard because no national standard for Saudi children's growth was available (Al-Shehri et al., 2006). The author found the NCHS growth standard was an unsuitable method for growth measurement for Saudi Arabian children living in high altitude areas (Al-Shehri et al., 2006). Comparing Saudi children with French children regarding growth standards at high altitudes might be more appropriate because both countries share higher rates of obesity in high-altitude areas than the US.

Urbanization was another risk factor reported in the studies reviewed (Al-Mohaimed et al., 2015; Alam, 2008; Amin et al., 2008). Studies in Saudi Arabia found that most (86% to 95%) of the obese sample lived in villas or big houses and resided in affluent areas (Alam, 2008; Al-Muammar et al., 2014). In less urban areas, such as Abha in the southwest region, Khalid (2008) reported that independent predictors of childhood overweight and obesity included moderate to high parental income (3.2 [95% CI, 1.6–2.6]), age less than or equal to ten years (2.6 [95% CI, 1.8–3.8]), female gender (2.0 [95% CI, 1.6–2.9]), and high-altitude birth and residence (1.8 [95% CI, 1.3–2.6]).

Lifestyle Factors

Dietary patterns and physical activity are sometimes referred to as two contributors to obesity (Salvy & Bowker, 2014). All the reviewed studies described dietary patterns or physical activity as stand-alone factors, without relating them to larger contexts and influences in the child's life (such as family and peers). Specific factors that influenced childhood obesity that were either protective and these included frequency of breakfast, fruit and vegetable consumption and reported times of physical activity; whereas others that were reported as risk to

childhood obesity and these included frequency of skipping breakfast, consumption of sugar-sweetened beverages, sweet and candy consumption, and higher levels of television watching (Alam, 2008; Amin et al., 2008; Al-Hazzaa et al., 2012).

Lifestyle factors provide some specifics on the growing problem of childhood obesity in Saudi Arabia. However, cultural differences may vary from one region to another in Saudi society. For example, this review found differing eating patterns among children living in Abha (rural) and Jeddah (urban). One study in Abha found that 72% of children ($n = 767$) aged 8 to 18 years reported frequent consumption of breakfast, and only 28% reported skipping breakfast (Farghaly et al., 2007). In contrast, a study in Jeddah found missing breakfast among more than half (54%) of the sample ($n = 239$) of children aged 13 to 18 years (Washi & Ageib, 2010). Unhealthier eating (i.e. burgers, pizza, sugary drinks) were also reported in more urban (e.g., Dammam) areas than in less urban (e.g., Qatif) areas of the eastern region (Darwish et al., 2014). These findings could aid in designing programs suited for different regions of the country.

Discussion

The studies in this review make it clear that childhood obesity is a rising problem in Saudi Arabia. The eastern region of Saudi Arabia was found to have the highest percentages (19% to 35.6%) of overweight and obesity in children than the other regions of the country (Al Almaie, 2005; Al-Dossary et al., 2010; Al-Saeed, Al-Dawood, Bukhari, & Bahnassy, 2007). Kuwait, one of the GCC countries, is a four hour drive from Khobar city (in the eastern region of Saudi Arabia), and both have repeatedly been reported as having among the highest prevalence rates of preschool-age obesity, at 8% to 9%, compared to a global average of 6.7% (Badran & Laher, 2012; de Onis et al., 2010; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011).

Risk factors associated with childhood obesity in Saudi Arabia include higher levels of parental education, parental occupation, and high altitude. Globally, He, James, Merli, and Zheng (2014) suggest a pathway linking socioeconomic status with overweight and obesity could be strongly influenced by a country's economic level and urbanization. For example, overweight and obesity are highly prevalent among low socioeconomic families in developed countries (Jones-Smith, Gordon-Larsen, Siddiqi, & Popkin, 2011; Martinson, McLanahan, & Brooks-Gunn, 2014). Conversely, that does not hold true for Saudi Arabia, as childhood overweight and obesity is more commonly reported among higher socioeconomic families (Gigante, Victora, Matijasevich, Horta, & Barros, 2013; Ng et al., 2011). Closely monitoring these trends with proper surveillance is important as these countries move into further development, because the burden of obesity may shift to another segment of society.

Lifestyle factors associated with obesity include high consumption of soft drinks, frequent fast food intake, and adoption of a sedentary lifestyle with decreased physical activity. Moreover, Saudi Arabia has experienced tremendous economic growth over the past few decades (Badran & Laher, 2012), which has contributed to these lifestyle changes. With this dramatic increase in wealth, a majority of the population has easy access to migrant workers in the home as domestic workers, such as cooks, maids, and drivers (Alyaemni, Theobald, Faragher, Jehan, & Tolhurst, 2013; Badran & Laher, 2012). This may contribute to a more sedentary lifestyle, as family members rely on paid workers to complete household tasks that in the past would have been completed by children. Additionally, the economic development and wide distribution of fast food have led to easy access and more frequent dining out.

None of the 23 studies was based on a conceptual framework when studying childhood obesity in Saudi Arabia, though theory provides links between research findings and practice,

and well-defined constructs allow better interpretations and comparisons between studies (Glanz, Rimer, & Viswanath, 2008; Munn-Giddings & Winter, 2013). There is also need to study childhood obesity in Saudi Arabia from a qualitative perspective since qualitative research approaches are critical for the development of complex interventions (O’Cathain et al., 2014). Nurse researchers are in a unique position to contribute to the body of literature through further investigations, due to their diverse roles in the clinical and community settings.

Limitations and Strengths

This review was limited to literature that was published in English because Arabic literature was not found. Methodologically, many of the studies lacked detailed descriptions of recruitment and detailed sampling techniques, while other studies did not include the child assent process. These may indicate methodological issues to be aware of in future studies conducted in Saudi Arabia. Finally, comparison across studies was challenging, due to the variety of growth charts and standards found in the studies reviewed. Another well-documented review of studies completed in the Middle East also reported that using a variety of growth charts makes it difficult to compare across studies (Ng et al., 2011). Moreover, non-matching age groups of children made comparisons between studies challenging. Preschool-age children in Saudi Arabia are of particular interest for understanding the high prevalence rates of overweight and obesity due to the higher rates compared to the global average. Clearly, there is a critical need for prevention and early intervention to reduce the burden and consequences of childhood obesity. This integrative review provides useful information on epidemiological features, risk factors, and lifestyle characteristics related to childhood obesity in Saudi Arabia. Table 2.2 summarizes findings and lists research gaps in the area of childhood obesity in Saudi Arabia. Academics and clinicians may contribute their clinical expertise to influence policymakers to further study this topic. This is the first review of the literature specifically examining childhood overweight and

obesity in Saudi Arabia. The need for action was well documented, and the need for future intervention was clearly evident.

Table 2.2. Summary of Literature Review and Research Gaps in Saudi Arabia

Key Findings	<ul style="list-style-type: none"> - Overweight and obesity are rising at alarming rates. - Preschool obesity rates are high compared to other nations. - Overweight and obesity are high among women. - Major results found in the literature include epidemiological features, risk and lifestyle factors. - A call for national campaigns to raise awareness has been documented in the literature.
Gaps	<ul style="list-style-type: none"> - No childhood obesity prevention or management interventions have been published. - Maternal perceptions about their child's weight status have not been explored. - Maternal knowledge about disease risks linked to childhood obesity is missing. - Maternal feeding styles and child eating behaviors have yet to be explored. - Maternal beliefs about child's nutrition are also missing.

Summary

This review of the literature found three findings on epidemiological features, risk factors, and lifestyle characteristics. Prevalence studies in Saudi Arabia have reported the magnitude of the problem, yet authors often conclude with recommendations on initiating intervention programs (Al-Dossary et al., 2010; Farghaly et al., 2007; Mahfouz et al., 2011). One important observation with the Saudi literature in childhood obesity was the lack of theoretical or conceptual frameworks in any of the reviewed manuscripts. In future studies, it is important to include a theoretical framework for the population to be studied (Berge & Everts, 2011).

The highest prevalence of overweight and obesity from the reviewed articles ($n=23$) was found in the eastern region (19–35.6%), followed by the southwestern region (23.2-29.4%), and

then the middle region of the country (13.8-20.5%), and the western region (10.8%). Risk factors for overweight and obesity in children found high parental education and occupation, altitude, growth patterns, gender, and age. Lifestyle factors associated with obesity in the population included the increased consumption of soft drinks, frequent fast food intake, and the adoption of a sedentary life with decreased physical activity.

This review provides much-needed insight into a growing public health concern in Saudi Arabia. Understanding the problem of childhood obesity will be crucial to developing interventions. An important factor before developing interventions is exploring mothers' awareness of the problem (Berge & Everts, 2011; Mosli et al., 2015). Mothers play a critical role in their child's adoption of dietary and physical activity patterns on a daily basis. A deeper exploration into mothers' understanding of obesity and the comorbidities of obesity can be the first step in creating change in families (Mareno, 2014). Studies conducted in many countries, such as the US, UK, Australia, Italy, Mexico, and Kuwait, have shown that parents misperceive the child's weight status as normal, when the child is actually overweight (Al-Qaoud et al., 2010; Doolen, Alpert, & Miller, 2009; Rodríguez-Oliveros et al., 2011; Thompson, Adair, & Bentley, 2014). However, in Saudi Arabia, studies exploring whether mothers identify children with a weight issue or see that childhood obesity is an issue of concern are lacking. The issue of exploring parental perceptions may start in the clinical or the community setting where nurses may use evidence-based approaches, such as motivational interview techniques, to not only promote healthy behavioral change but also to start the conversation with families and their children.

CHAPTER 3: METHODS

Introduction

Childhood obesity in Saudi Arabia is rising at an alarming rate. It is particularly higher among preschoolers (aged 3 to 6 years) approximately 8 - 9% compared to the global average of 6.7% and other nations in Asia (4.9%), East Africa (6.7%) and Latin America (6.9%) (Badran & Laher, 2012; de Onis, Blossner, & Borghi, 2010; Ng, Zaghoul, Ali, Harrison, & Popkin, 2011). The probability of overweight or obese children remaining overweight or obese is high (Goldhaber-Fiebert, Rubinfeld, Bhattacharya, Robinson, & Wise, 2013; Graversen et al., 2014). The majority of research conducted on overweight and obesity in Saudi children has been epidemiological and demonstrated the prevalence of the problem; however, no research to date has been conducted on mothers' perceptions of their children's health (Alam, 2008; Al-Dossary, Sarkis, Hassan, El Regal, & Fouda, 2010; Farghaly, Ghazali, Al-Wabel, Sadek, & Abbag, 2007). Also, no studies to date have documented attitudes and beliefs about their children's feeding practices or if mothers were concerned if their children were overweight or obese in Saudi Arabia. This gap is significant due to the high influence mothers have on their children at this early stage in life.

A factor associated with the increasing prevalence of childhood obesity in Saudi Arabia includes families from high socioeconomic status (Alam, 2008; Amin, Al-Sultan, & Ali, 2008; Collison et al., 2010). It is imperative to understand the socioeconomic status and its association with overweight and obesity in different cultures to better understand the emerging problem (Jones-Smith, Gordon-Larsen, Siddiqi, & Popkin, 2011). Results of associative analyses

between socioeconomic status and childhood obesity in Saudi Arabia have been mixed. Childhood obesity has been found to be more prevalent when mothers were more highly educated and lived in large villas or homes (Alam, 2008; Al-Saeed, Al-Dawood, Bukhari, & Bahnassy, 2006). Others have found childhood obesity was more prevalent with working mothers who had less education (Amin, et al., 2008). However, in comparing global trends of obesity with socioeconomic factors in developing countries, such as Saudi Arabia, overweight and obesity were more prevalent among families with higher socioeconomic status (Alam, 2008; Ng, et al., 2011). Conversely, an inverse relationship has been documented between obesity and socioeconomic status in other developed countries (i.e. UK and US) where obesity tends to increase as socioeconomic status decreases (Gigante, Victora, Matijasevich, Horta, & Barros, 2013; Smith, Craig, Raja, McNeill, & Turner, 2013). In Saudi Arabia, there is a gap in knowledge regarding the relationship among mothers' perspectives of their children's weight status, children's eating behaviors, maternal feeding practices, and socioeconomic status.

This chapter describes the procedures used in this mixed methods study that explored Saudi Arabian maternal feeding styles and child eating patterns as they related to their children's weight status and families socioeconomic status. This chapter details the research aims, philosophical assumptions, data collection procedures and analysis strategies of the study.

Aims

The purpose of this study was to examine maternal perspectives of their children's weight status, eating behaviors and maternal feeding styles. The specific aims were to:

Quantitative Phase I

Aim 1: Determine the fidelity and cultural appropriateness of the Arabic translated version of the Child Feeding Questionnaire (CFQ) and the Child Eating Behavior Questionnaire (CEBQ) with a sample of Saudi Arabian mothers of preschool-aged children.

Quantitative Phase II

Aim 2: Determine if Saudi Arabian mothers' child-feeding practices as measured by CFQ and eating behaviors (external eating, emotional eating, speed of eating, interest in eating, satiety responsiveness and food fussiness) as measured by the CEBQ were associated with their children's anthropometrics (weight, height, waist circumference, triceps and subscapular skinfolds) and selected socioeconomic factors (maternal education, employment status and family income).

Qualitative Phase

Aim 3: Examine maternal perceptions of their children's weight and factors that influence their eating behaviors and maternal feeding styles (qualitative interview).

Mixed Phase (Quantitative and Qualitative)

Aim 4: Examine the relationship between children's weight status and maternal perceptions of child eating behaviors and maternal feeding practices.

Philosophical Assumptions

Cultural aspects in any given ethnic group define their attitudes, beliefs, and practices towards health, which is an implied assumption in research (Chakrabarti & Abbott, 2012). Saudi Arabia is considered a developing nation. Since the 1980's, the Saudi population has increased its consumption of high calorie and high fat food and have adopted a more sedentary lifestyle, which has contributed to a dramatic increase in overweight and obesity in both children and adults (Popkin, 2010). This study focused on mother-child dyads in Saudi Arabian homes to better understand childhood overweight and obesity. Costanzo and Woody's theory (1985) of maternal feeding styles (restriction, monitoring and pressure to eat) along with seven constructs on child eating behaviors (external eating, emotional eating, speed of eating, interest in eating, satiety responsiveness, and food fussiness) helped inform this study (Boutelle et al., 2014;

Frankel et al., 2014; Wardle, Guthrie, et al., 2001). Exploring maternal perceptions, attitudes and beliefs regarding children's weight status and feeding patterns as explained by Costanzo and Woody's (1985) theory provided a framework for explaining maternal feeding styles and their links to obesity (Birch, et al., 2001; Rollins, Loken, Savage, & Birch, 2014). The seven constructs of child eating behaviors provided a way to understand child eating styles and their links to obesity (Birch & Fisher, 1998; Bruch, 1964; Gibson & Wardle, 2001; Jahnke & Warschburger, 2008; Marston, London, Cohen, & Cooper, 1977; Schachter & Rodin, 1974; van den Akker, Jansen, Frentz, & Havermans, 2013; Wardle, Sanderson, Leigh Gibson, & Rapoport, 2001).

There has been a discussion in the literature regarding the conceptualization, operationalization, and dimensionality of various aspects of parenting (parenting styles, feeding styles, food parenting practices and maternal feeding styles) and childhood obesity (Boutelle et al., 2014; Frankel et al., 2014; Hughes et al., 2013). *Parenting styles* are based on parents' beliefs on how their children should be raised and constitute the interactions between parents and children in a variety of contexts including expressions of such things as warmth, acceptance, and approval (Hughes et al., 2013). *Feeding styles* are the specific domain parenting behaviors related to eating entail and describe the child-parent interaction in food-related contexts (Hughes, et al., 2013). *Food parenting practices* are described as the explicit behaviors or techniques carried out by a parent to modify and/or alter children's food preferences and diet (Hughes, et al., 2013). In this study, the term *maternal feeding styles* was used to encompass both *feeding styles* and *food parenting practices*, but the analysis of this study focused on feeding styles only. Also, maternal behaviors and practices toward children's eating, an exploration of maternal beliefs and attitudes that are specific to child feeding were examined. Maternal feeding styles were

compromised of maternal perceived responsibility, perceived children's weight, and concern about children's weight, monitoring, restriction and/or pressuring children to eat or not eat too much.

Design

The proposed study used a three-phase, descriptive, explanatory sequential mixed methods design in a new population (mothers) and a new setting (home) (Clark & Creswell, 2011). The term explanatory sequential mixed methods indicates that the quantitative phase came before the qualitative phase and this type of design is called explanatory because the qualitative helps 'explain' the quantitative phase (Clark & Creswell, 2011; Ivankova, Creswell, & Stick, 2006).

The purpose of this study was to explore and examine Saudi Arabian mothers' perspectives of their children's weight, feeding styles and children's eating behaviors. The quantitative data collection included self-report data from mothers on their demographic characteristics, two questionnaires: the CFQ (Birch et al., 2001) and the CEBQ (Wardle et al., 2001) and measures of children's anthropometric status (weight, height, waist circumference, triceps and subscapular skinfolds). The qualitative data came from the collection of a semi-structured interview with mothers. In the mixed phase, the quantitative and qualitative research findings were integrated (Ivankova, et al., 2006).

Four key decisions were made when conducting this mixed methods study to examine how quantitative and qualitative phases related to each other. These included the level of interaction of the phases, the relative priority of the phases, the timing of the phases and the procedures for integrating the data (Clark & Creswell, 2011). Figure 3.1 below illustrates the defining characteristics of the study design. The *level of interaction* was interactive and occurred during interpretation of the results. The results of the qualitative interviews provided richness

and a deeper understanding of the relationships identified in the quantitative analysis (Clark & Creswell, 2011; Greene, 2007). The *priority* of approach was important to understanding the problem (Clark & Creswell, 2011); although the quantitative data was a complete sample (n=223) and reached significance, and the qualitative data may not have reached theoretical saturation, but the value it added to the study was as important as the quantitative. The *timing* of the two stages of the study was sequential. Both stages of the study were implemented in two distinct stages starting with collecting and analyzing the quantitative data followed by collecting and analyzing the qualitative data (Clark & Creswell, 2011). The *procedure for mixing* occurred after the separate analysis of each data set (Clark & Creswell, 2011).

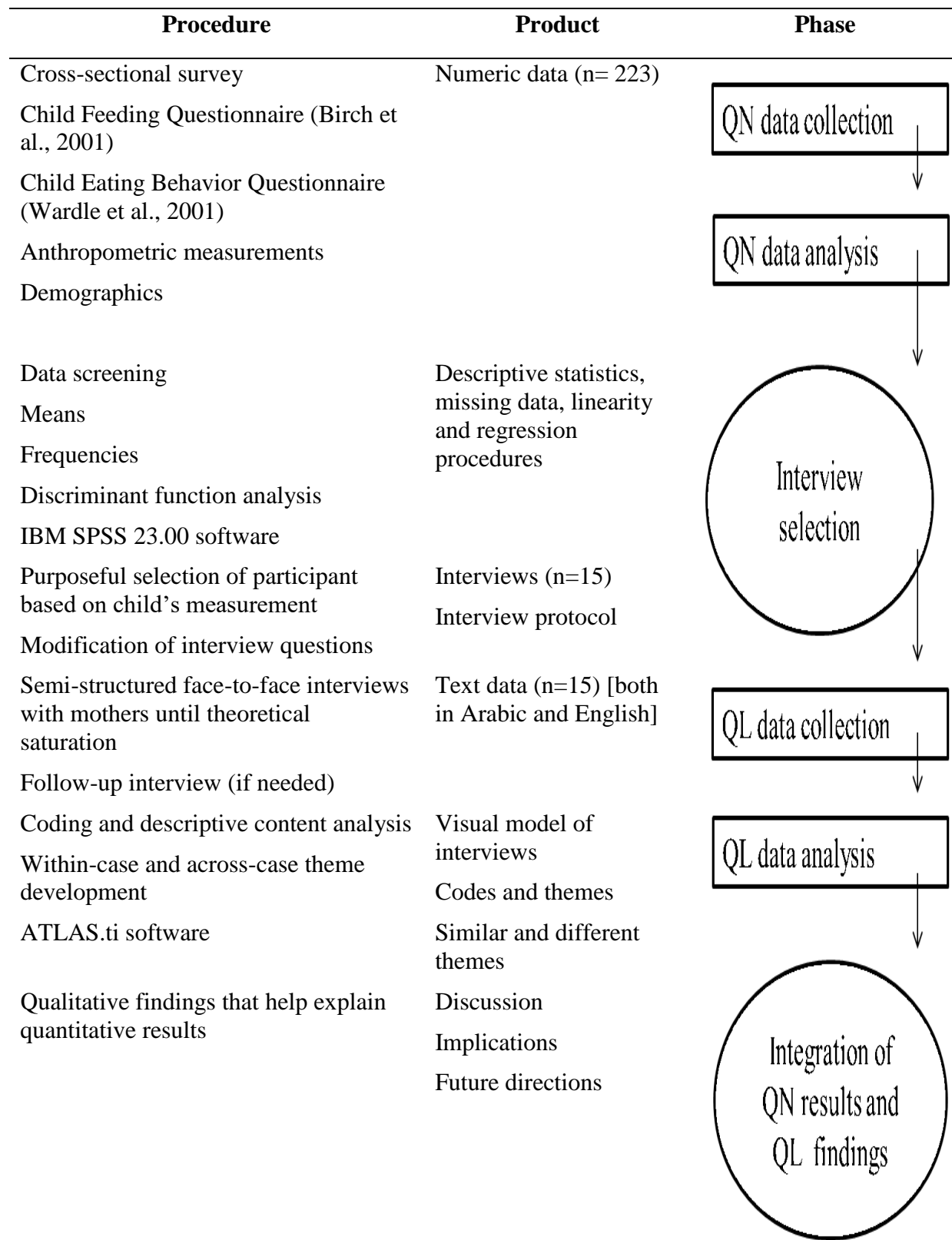
Institutional Review Board

Approval for this study was obtained from the Institutional Review Board (IRB) at the University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, US and the University of Dammam in Saudi Arabia (recently renamed to Imam Bin Abdulrahman Bin Faisal University). Letters of support (Appendix A) were obtained from the administration of the Ministry of Education in the Eastern Province of Saudi Arabia.

The consent process for the quantitative and qualitative phases was completed during the survey questionnaire. After the quantitative phase was complete, the researchers asked mothers that had expressed interest in the interviews, if they still wanted to participate in the interviews.

The participants were assigned unique numeric codes, and all data were de-identified. In the second phase, the participants selected for semi-structured interviews were assigned imaginary names, to keep all responses confidential. All data were kept in the researcher's office in locked file cabinets behind a locked door, and all computers were password protected. Only the researcher and the dissertation committee members had access to the data.

Figure 3.1. Defining Characteristics of the Proposed Study



Notes: QN= Quantitative; QL= Qualitative

Settings

The setting for this study was purposefully selected because of the high rate of childhood obesity. It was determined that the prevalence of childhood obesity in the eastern region of Saudi Arabia was found to be among the highest (19% to 35%) compared to other regions of the country (Al-Almaie, 2005; Al-Dossary, et al., 2010; Al-Saeed, et al., 2006). Moreover, preschoolers also had higher levels of overweight and obesity (Badran & Laher, 2012; Ng, et al., 2011). In the eastern region, there are 101 private preschools, and 37 of them are located in Khobar city; there are 77 government preschools, and 15 of them are located in Khobar (General Directorate of Education, 2014a, 2014b). The sites for this study included government and private preschools to be inclusive of different socioeconomic backgrounds, maternal education, occupation and working status and thus striving for maximum variation within Khobar. The preschools were all within driving distance from each other.

The preschool sites in the eastern province (7 schools) were approached and included, Al-Faisaliah preschool (private), King Fahd University of Petroleum and Minerals (KFUPM) preschool (private), Kids Garden preschool (private), Shining Star schools (private), Khobar 3rd (government), Golden Belt schools (private), and Dhahran 1st (government). Preschools were chosen secondary to the target population for the study, and they have frequently been used for studying children in Saudi Arabia (Al-Almaie, 2005; Al-Dossary, et al., 2010; Al-Nakeeb et al., 2012; Al-Rukban, 2003; Al-Saeed, et al., 2006). One school that initially showed a willingness to participate later decided not to participate and canceled at the last minute.

Sample

Quantitative Phase

Inclusion criteria included mothers with a preschool child between the ages of 3 to 6 years of age (United Nations Educational Scientific and Cultural Organization, 2010),

underweight, normal weight, overweight or obese according to the Center for Disease Control and Prevention (CDC, 2015) guidelines and the mother was able to read, write and understand Arabic. Exclusion criteria included mothers with a developmentally disabled child or the mother was unable to read, write or understand Arabic.

The sample size for the quantitative aim was calculated to establish model fit for regression with one predictor variable (child adiposity using skinfold measures). A power analysis using the Statistics Calculator version 3.0 beta indicated that a total sample size of 54 mother-child dyad would be needed to detect a medium effect size ($f^2 = .15$) with a statistical power of 0.8 using regression tests at an alpha significance level of .05 (Soper, 2014).

Qualitative Phase

Mothers selected for the interview were based on whether they answered ‘yes’ to be interviewed in the quantitative phase. From the mothers who agreed to the interview, they were then purposefully selected based on children’s BMI percentile, gender, school type and mothers’ working status because the researcher’s goal was to seek a maximally diverse group of mothers. The criterion of interest was derived from the literature and focused on children who were at-risk for overweight and obesity (Collins, et al., 2007; Mook-Kanamori et al., 2013). The sample included underweight, normal weight, overweight and obese children for the purpose of delving into a deeper understanding of cultural issues around nutrition and child eating behaviors. A total of fifteen mothers were interviewed.

The sample size for the qualitative aim was initially focused on conducting approximately thirty semi-structured interviews or reaching theoretical saturation. However, Dr. Berry, the researcher’s dissertation chair, in frequent communication with the researcher, requested that the researcher stop traveling outside her home to conduct interviews secondary to the increased violence in that area of the county due to extremist factions using car bombs,

thereby ensuring the researcher's personal safety. Therefore, fifteen semi-structured interviews were completed.

Recruitment Strategies

Initially, the sample for the quantitative phase was recruited using a convenience sampling technique at two preschools using flyers and setting up a table and meeting mothers' before and after school when they dropped off or picked up their children from school. However, this was not successful in recruiting participants, because mothers' were busy and did not have time to talk about the study or rarely accompanied their children to school. Principals of the school were then approached, and they added the study to groups on WhatsApp and assisted in scheduling times to come to the school to meet with mothers' to do a presentation about the study. Before the presentations, the school teachers' distributed a packet which included a copy of the flyer with contact information for any questions, a demographic data sheet, and copies of the questionnaires for the children to take home. If interested the mothers' would read and sign the consent and fill out the demographic data sheet and questionnaires and send them back to the school in a sealed envelope or attend a presentation. Appointments were then made with the school administration to measure anthropometric data on the consented children. IRB modifications were sought with each change made throughout the research study.

For the qualitative phase, mothers' who voiced an interest were invited to be interviewed based on their children being underweight, normal weight, overweight or obese. The selection criteria used purposeful sampling. Mothers' were selected from the quantitative phase based on children's BMI percentile, gender, school type, and mothers' working status. The participants of the qualitative phase were recruited from the same convenience sample after the quantitative phase was completed.

Measurements and Procedures

The measurement and data collection procedures are outlined in Table 3.1 below.

Table 3.1. Data Collection Procedures

Summarized Aim	Method	Data source	Data Type	Sampling
<u>Aim 1:</u> Fidelity of CFQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001)	1. Translation, synthesis and back translation 2. Expert committee 3. Focus group of mothers' via cognitive interviewing and pilot testing	1. Independent translators and back-translators 2. Expert childhood obesity researchers 3. Mothers' of children interviewed 4. Mothers' of preschoolers piloted	QN + QL	n=2 ; 2 n=3 n=5 n=10 Convenience sample from the community
<u>Aim 2:</u> Association between maternal feeding practices and children's eating behavior in relation to children's weight status and socioeconomic status of families	Survey through regression procedures	Mothers' filled out the CFQ by Birch et al., (2001) and the CEBQ by Wardle et al., (2001) Children's anthropometrics	QN	n=223 Convenience sample from preschools
<u>Aim 3:</u> Interviews based on children's anthropometrics and mothers' interest	Semi-structured Interviews	Mothers	QL	n=15 cases Purposeful sample selected from QN sample
<u>Aim 4:</u> Relationship between maternal feeding practices and child eating behaviors as they relate to the child's weight status	Combined Aims 2 and 3	Survey + Maternal case studies	QN + QL	All samples

QN=quantitative data; QL=qualitative data

The setting for the quantitative data collection was in a private room in the preschools,

and the setting for the qualitative data collection was in the mother's home in a quiet area, one mother requested to be interviewed in her office at work, and one mother requested the interview to be outside her home and the researcher invited her to her home. Anthropometric data were collected in the same order for all participants and included height, weight, waist circumference and triceps and subscapular skinfolds.

Quantitative Data Collection

The quantitative phase consisted of two parts (Aims 1 and 2): First, translation of the CFQ and CEBQ and assessing the fidelity and cultural appropriateness and second, determining the relationship between maternal feeding practices, child eating, child weight status and, socioeconomic status of families. Data collection for all phases of the study started in May 2015 and ended in August 2016, which was similar to other documented work in Saudi Arabia that varied in duration from two months to one year (Alam, 2008; Al-Dossary, et al., 2010; Al-Hazzaa & Al-Rasheedi, 2007; Amr, El-Seedy, & Mohamed, 2012).

Data collection of the first quantitative phase consisted of documents being translated, back-translated and a cultural relevance assessment of the CFQ (Birch, et al., 2001) and CEBQ (Wardle, Guthrie, et al., 2001) was conducted. Data collection of the second quantitative phase was immediately after completion of phase one. All locations had private rooms with the same stadiometer to measure height and scale to measure weight, which ensured accuracy across sites. Data collection of the qualitative phase occurred immediately after the second quantitative phase and took approximately four months.

Questionnaires

The researcher obtained permission to translate and back-translate the CFQ (Birch, et al., 2001) and the CEBQ (Wardle, Guthrie, et al., 2001) into Arabic (L. Birch, personal communication, March 31, 2014; M. Heinrich, personal communication, February 28, 2014).

Please see Appendices B and C. A table (Appendix D) was assembled to allow comparisons between the CFQ (Birch, et al., 2001) and the CEBQ (Wardle, Guthrie, et al., 2001) questionnaires. Criteria for comparisons were adapted from main components of instruments and included instrument format, the number of items, alpha coefficients, printed layout, instructions to subjects, wording and structuring of items and response format (Pett, Lackey, & Sullivan, 2003).

The CFQ (2001) was initially tested in a sample of non-Hispanic White mothers and a small sample of Hispanic mothers. The questionnaire was then adapted to the African American community (Anderson, Hughes, Fisher, & Nicklas, 2005). Outside the US the CFQ has been adapted in Australia, Canada, Malaysia and Turkey (He & Evans, 2007; Mohd Nasir et al., 2012; Polat & Erci, 2010; Rodgers et al., 2013).

The CEBQ (Wardle, Guthrie, et al., 2001) was initially tested on mothers from the UK with no information provided on their ethnic background. The CEBQ (Wardle, Guthrie, et al., 2001) was adapted and tested in Chile and the Netherlands (Santos et al., 2011; Sleddens, Kremers, & Thijs, 2008). Test-retest reliability of the questionnaires was established for this proposed study.

The Child Feeding Questionnaire (CFQ) was developed by Johnson and Birch (1994) in the US as part of a larger study that examined children's ability to self-regulate food intake in relation to parental and children's anthropometric data. The earlier version of the CFQ was based on Costanzo and Woody's theory (1985) on maternal feeding styles and designed to investigate maternal control in relation to children's food intake. To date, the CFQ has undergone three stages of development (Birch, 2004). The first version of the CFQ was briefly mentioned in the study by Johnson and Birch (1994). The second stage was an unpublished

report acquired by L. Birch (personal communication, March 31, 2014). The third stage is the most commonly cited and used version and was used for this study (Birch et al., 2001).

The latest version of the CFQ is a 31-item Likert scale questionnaire (Birch et al., 2001). The CFQ consists of seven factors including perceived parent weight, perceived responsibility, perceived child weight, concern about child weight, restriction, pressure to eat and monitoring. Higher scores indicate more controlling maternal feeding practices yielding obesity proneness (Birch et al., 2001). The original internal consistency of the seven factors included, perceived parent weight ($\alpha = 0.72$ for mothers and 0.69 for fathers), perceived responsibility ($\alpha = 0.67$ for mothers and 0.70 for fathers), perceived child weight ($\alpha = 0.82$ for mothers and 0.84 for fathers), concern about child weight ($\alpha = 0.74$ for mothers and 0.77 for fathers), restriction ($\alpha = 0.77$ for mothers and 0.66 for fathers), pressure to eat ($\alpha = 0.68$ for mothers and 0.67 for fathers) and monitoring ($\alpha = 0.86$ for both mothers and fathers). Alpha coefficients for the total scale ranged from 0.70 to 0.92 (Birch et al., 2001). The CFQ has been documented as being a valid and reliable instrument (Birch, et al., 2001; Polat & Erci, 2010; Rodgers et al., 2013). The CFQ has been translated and adapted in many populations around the world, including Australia, Canada, Malaysia and Turkey (He & Evans, 2007; Mohd Nasir et al., 2012; Polat & Erci, 2010; Rodgers, et al., 2013).

The CFQ (Birch, et al., 2001) was tested in three samples of predominately White mothers living in central Pennsylvania and Denver, Colorado. Anderson and colleagues (2005) examined the cross-cultural equivalence of parental beliefs, attitudes and practices in regards to child feeding using the CFQ (Birch et al., 2001) with African American and Hispanic parents. Structural equational modeling found that the Hispanic sample was more reliable than the African American sample and found particular problems with the perceived child weight and

restriction factors and then, as a result, modified the scale to five-factors (Anderson, et al., 2005). A lack of cultural sensitivity in current measures that focus on highly controlling parental practices regarding food was noted (Hughes, et al., 2013).

The Child Eating Behavior Questionnaire (CEBQ) developed by Wardle and colleagues (2001) in the UK is 35-item Likert parent report questionnaire with eight dimensions that measures children's behaviors in eating. The CEBQ (Wardle et al., 2001) assesses eating styles in children within the scale, and these include food responsiveness, enjoyment of food, emotional over/undereating, desire to drink, satiety responsiveness, slowness in eating, and fussiness. Dimensions of the CEBQ are based on literature on eating behavior and weight (Braet & Van Strien, 1997; Bruch, 1964; DiSantis, Hodges, & Fisher, 2013; Wardle, Guthrie, et al., 2001; Waxman & Stunkard, 1980). The original items showed high internal consistency and test-retest reliability (Wardle, Guthrie, et al., 2001). Carnell and Wardle (2007) later validated three dimensions of the CEBQ (food responsiveness, enjoyment of food and satiety responsiveness) against four aspects of eating addressed in other behavioral eating measures (eating without hunger, caloric compensation, eating rate and energy intake). In contrast to the CFQ (Birch et al., 2001), which had three stages of development and did not undergo test-retest reliability (Birch, et al., 2001; Birch, Johnson, Grimm-Thomas, & Fisher, 2004), the CEBQ has maintained one version since its development with slight modifications through administration on three different samples (Wardle, Guthrie, et al., 2001). The CEBQ has been adapted by investigators in Chile and the Netherlands (Santos, et al., 2011; Sleddens, et al., 2008).

The CEBQ (Wardle, Guthrie, et al., 2001) has been shown to be valid and reliable (Haycraft, Farrow, Meyer, Powell, & Blissett, 2011; Jaddoe et al., 2010; Webber, Hill, Saxton, Van Jaarsveld, & Wardle, 2009). Internal reliability ranged from 0.74 to 0.91 on the 8-subcales

and these included, food responsiveness ($\alpha = 0.80$), emotional overeating ($\alpha = 0.79$), undereating ($\alpha = 0.74$), enjoyment of food ($\alpha = 0.91$), desire to drink ($\alpha = 0.89$), satiety responsiveness ($\alpha = 0.74$), slowness in eating ($\alpha = 0.74$) and food fussiness ($\alpha = 0.91$) (Wardle, Guthrie, et al., 2001). A higher score indicates a higher rate of the particular eating behavior measured by the subscale (Haycraft, et al., 2011; Wardle, Guthrie, et al., 2001). Test-retest reliability of the CEBQ (Wardle, Guthrie, et al., 2001) was achieved with a sample of parents ($n = 160$) who filled out the CEBQ twice two weeks apart (Wardle et al., 2001). Wardle and colleagues (2001) found no significant differences in gender distribution, age, or scores when comparing the first and second questionnaires (Wardle et al., 2001). However, missing from Wardle's report were the characteristics of the sample, including the age of the child (Pett et al., 2003). Behavioral experiments of the three CEBQ subscales (satiety responsiveness, food responsiveness, and enjoyment of food) with behavioral measures (eating without hunger, caloric compensation, eating rate and energy intake at a meal) were valid with 56% of the variance explained in satiety responsiveness, 33% of the variance explained in food responsiveness and 40% of the variance explained in enjoyment of food (Carnell & Wardle, 2007). The authors of the CEBQ reported that the sample was diverse, however, did not provide specific information on sample characteristic (Wardle, Guthrie, et al., 2001). The authors also used the term parent, however, did not specify whether they were mothers or fathers or both.

The CFQ by Birch et al., (2001) and the CEBQ (Wardle, Guthrie, et al., 2001) have been adapted and widely used internationally in Turkey, Malaysia, Chile and Netherlands (Mohd Nasir, et al., 2012; Polat & Erci, 2010; Santos, et al., 2011; Sleddens et al., 2014; Sleddens, et al., 2008). An Arabic translated version did not exist before the current study. With formal Arabic being one of the six official languages internationally and with the global spread of childhood

obesity, exploring maternal beliefs, practices, and attitudes towards their child's feeding may be key in providing new information to the body of literature (United Nations, 2014b; World Health Organization, 2014).

Translation of Instruments

Language is one of the first entryways into a culture (Chen & Boore, 2010). Since data were being collected in the native language of the respondents, measures had to be translated into Arabic. The goal of translating a tool is to ensure equivalence between both scales, including the original and the translated versions (Streiner & Norman, 2008). Translation of instruments occurred in the first quantitative phase and was based on five equivalence points. First, *conceptual equivalence* was established, which determined non-existent or non-relevant concepts for the population for whom the scale is translated. This was achieved through (a) reviewing the ethnographic and anthropologic literature on the studied population, (b) interviews with mothers, and (c) consultation with a broad range of experts on the topic of childhood obesity. Second, *item equivalence* was conducted through the translation, synthesis and back-translation procedure and cognitive interviews; which examined item relevance and acceptability with the consideration that because of cultural differences some of the items may be taboo or offensive. None of the items were taboo or offensive, but a few items from the CFQ and CEBQ were reworded and modified after cognitive interviews. Third, *semantic equivalence* was conducted during the translation and back-translation by the translators and was defined as the meaning people attached to certain items. For example, one culture may understand 'feeling blue' as being sad, whereas another culture may not attach that feeling to the color blue and would not understand that item. None of the items in the questionnaires held any cultural meaning that differed. Fourth, *operational equivalence* was achieved by determining the most culturally appropriate way to administer the measure, and this was during the expert committee review and

cognitive interviews with mothers. Finally, *measurement equivalence* was assessed by comparing the reliability and validity of the English and Arabic versions of the scales (Streiner & Norman, 2008). These item equivalences helped guide the translation procedure below. For every step in the translation, some of the equivalences were either assessed or determined. For example, the translators had a guide on what to look for during the translation.

Translation of Interviews

The translation of interviews followed the translation process described by Chen and Boor (2010) and included the following steps. First, interviews were transcribed verbatim in the original Arabic language and initial content analysis was conducted. Second, an independent bilingual translator was recruited by the researcher to translate content from the Arabic transcription to English content. The CFQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001) questionnaires were translated as follows.

First Quantitative Stage: Fidelity and Translation of CFQ and CEBQ

This aim was achieved using six-stage approach (Beaton, Bombardier, Guillemin, & Ferraz, 2007; Willis, 2005).

Stage I (translation). The CBQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001) were translated independently from the original English form to formal Arabic at a sixth-grade literacy level by two expert translators hired for the study who are credentialed in both English and Arabic.

Stage II (synthesis). This stage included both translators and a third person that was added to the team and served as a mediator in discussion and synthesis of one common translated version to be used in the study. In both Stages I and II the translation team reviewed the equivalence considerations discussed above and was informed about the studied constructs and concepts of the study.

Stage III (back-translation). This stage was necessary for establishing content validity. A minimum of two back translated versions were required. This was conducted by two new independent translators with English being their primary language and they were not informed of the studied concepts nor did they have a medical background to avoid information bias. The first and second back translations were sent to the dissertation committee members for approval.

Stage IV (expert committee). Both translation one and two were then reviewed by an expert panel with five members who were active in childhood obesity research in Saudi Arabia or were from Saudi Arabia. They were invited to evaluate the content of the synthesized translated version of the CFQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001) to examine them for clarity and content validity (Beaton, et al., 2007; Streiner & Norman, 2008). The researcher informed the expert panel about the different concepts and measures as understood and conceptualized by the researcher. The panel was asked to report and describe any issues for each item with a recommended resolution in a write-up report (Beaton et al., 2007).

Stage V (cognitive interviewing). After obtaining access to recruitment site areas, a sample of five to 10 mothers from the preschools were invited to pilot test the questionnaire and participate in a focus group based on cognitive interviewing to assess for understanding and cultural appropriateness of the questionnaire and to detect problems before the questionnaire was administered (Abubakar, Dimitrova, Adams, Jordanov, & Stefenel, 2013; Izumi, Vandermause, & Benavides-Vaello, 2013; Willis, 2005).

Stage VI (test-retest reliability). A sample of 30 mothers with children ages 3 to 6 years from the recruitment sites were asked to fill out the CFQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001) questionnaires. The questionnaires were pilot tested, and the researcher assessed the time needed to fill out the questionnaires and noted any questions that arose over

two to 14 days. Alpha coefficients of these 30 questionnaires were then compared with the original questionnaires (Streiner & Norman, 2008).

Children's Anthropometrics

Children's anthropometrics consisted of a measured height, weight, calculation of BMI percentile, waist circumference, and triceps and subscapular skinfolds (CDC, 2015). The researcher was trained by the committee chair and completed inter-rater reliability testing before measuring the children. All children were measured with their mother present in a private room.

Height. The researcher measured all children in normal clothing (school uniforms made of cotton; all jackets or sweaters were removed) without shoes, using a stadiometer calibrated to the nearest 0.1 centimeters twice and averaged.

Weight. The researcher measured all children in normal clothing without shoes in a private room using a Seca digital scale (Made in Germany) calibrated to the nearest 0.1 kilograms twice and averaged.

Body mass index percentiles (BMI percentiles). BMI percentile were calculated twice via computer by entering the child's weight, height, birthday, measurement date and gender using the metric version (CDC, 2014). Underweight was defined as having a BMI below the 5th percentile; normal weight was defined as having a BMI between the 5th percentile and < 85th percentile; overweight was defined as having a BMI \geq 85th percentile to < 95th percentile; and obesity was defined as having a BMI \geq 95th percentile (CDC, 2015).

Waist circumference. Waist circumferences may provide a better understanding of the relationship between overweight and obesity and the risk of disease (National Health and Nutrition Examination Survey, 2004). Waist circumference was measured using a Gulick measuring tape by Novel products Inc. Rockton, IL (Novel, 2001). In a private room with the

mother present assisting the researcher, the children were asked to stand up straight on both feet, lower the pants to the hips and pull up the shirt just above the umbilicus. The researcher stood in front of the participant and palpated the right side of the hip to locate the right ilium. Using a nonpermanent marker, the researcher drew a horizontal line just above the uppermost lateral border of the right ilium at the mid-axillary line of the body. Standing on the participant's right side, the researcher then placed the measuring tape around the trunk in a horizontal plane at the level marked on the right side of the trunk. The mother was asked to stand on the participant's left side and hold the tape secure on the nonpermanent mark. The researcher made sure that the tape was parallel to the floor. The measurement was made at the end of normal expiration and was measured to the nearest 0.1 centimeters. The researcher measured waist circumference three times and then computed an average (National Health and Nutrition Examination Survey, 2004).

Triceps and subscapular skinfolds. Skinfolds may provide a better understanding of the relationship between overweight and obesity and the risk of disease (National Health and Nutrition Examination Survey, 2004). Using a Lange skinfold caliper on the right side of the body, the triceps skinfold was measured midpoint between the acromion and olecranon process and determined using a measuring tape with the elbow bent at a 90-degree angle. The subscapular skinfold measurement was taken by standing behind the child facing their right shoulder the exact location was determined by moving diagonally 1 centimeter behind the inferior angle of the scapula (National Health and Nutrition Examination Survey, 2004). The skinfold measurements were taken to the nearest of 0.1 millimeters (National Health and Nutrition Examination Survey, 2004). The researcher measured both the triceps and subscapular skin folds three times and then computed an average (National Health and Nutrition Examination Survey, 2004).

Demographic Data

Information was collected from the mother about the mother's and child's health and history, including birth weight and length, gestational age at birth, duration of exclusive breastfeeding, time of solid food introduction, maternal and child age, mother's self-reported height and weight, child's height and weight, preferred meals and drinks and number of children in the household. Socioeconomic status was assessed by examining mothers' and fathers' type of work, education level, income range and family residence area (Appendix E).

Qualitative Data Collection

An interview guide (Appendix F) was piloted the previous year on a convenient sample and was revised after that and revised once again by the chairperson before the interviews were started. Adhering to guidelines for conducting qualitative interviews (Creswell, 2013; Garrett-Wright, 2011; Miles, Huberman, & Saldaña, 2014; Sosa, 2012; Yin, 2014) and using the interview guide described above, the investigator completed reflective notes summarizing her impression of the overall quality of the interview and factors that might have contributed to interview quality (i.e. interruptions). The interview tapes (digital voice recorder) and backed-up (by iPhone recorder) were sent to a bilingual professional to be translated into English and transcribed immediately after the interview with a return turnaround time of no more than 48-hours. These transcripts also included the researcher's dissertation chairperson for review and feedback before the next interview.

Data Analysis

Data analysis for the study occurred in three phases: First, analysis of the quantitative data; second, analysis of the follow-up qualitative data; third, the integration of the two sets of results (Clark & Creswell, 2011).

Quantitative Data Analysis

Data were entered and analyzed using IBM SPSS version 23.0, and the data was inspected visually, and normality was assessed. Descriptive statistics for all the main variables were generated, including the mean, standard deviation and frequency distribution and normality of distribution (Howell, 2012).

Both questionnaires (CFQ and CEBQ) include a 5-point Likert scales with higher scores indicating a higher propensity toward obesity in children (Birch, et al., 2001; Wardle, Guthrie, et al., 2001). Five items on the CEBQ were reverse coded, and all recoded variables were transformed into a new variable to preserve the original data entry (Pett et al., 2003).

After data collection was complete, correlation coefficient procedures were assessed on the dependent variable children's adiposity as measured by the children's BMI percentile and the independent variables (factors of the CFQ, CEBQ and socioeconomic status of the family). First correlations were assessed with the CFQ (Birch, et al., 2001) factors and these included children's adiposity and perceived maternal responsibility, perceived child weight, concern about child weight, maternal restriction, pressure to eat and monitoring. Correlation coefficients were conducted on the CEBQ (Wardle, Guthrie, et al., 2001) factors and these included children's adiposity and external eating, emotional eating, the speed of eating, interest in eating, satiety responsiveness and food fussiness and children's adiposity and families socioeconomic status. These correlations were used to estimate correlations and to assess multicollinearity for the following regression procedures (Allison, 1999). The aim of these correlations was to have the dependent variable correlate with the independent variables, but to also display the minimal correlation with each other (Howell, 2012). Regression testing followed and was used to assess the relationships between the dependent variables (children's adiposity) and the independent

variables (factors of the CFQ, CEBQ and socioeconomic status of the family) (Coladarci, Cobb, Minium, & Clarke, 2011).

Qualitative Data Analysis

Miles and colleagues (2014) recommend that data analysis is concurrent with data collection. Therefore, data analysis was an iterative process with the researcher and dissertation chairperson. For example, upon transcribing and translating the first interview, it was sent to the dissertation chairperson with the researcher's notes for review. The chairperson made suggestions on how to elicit more information in the next interview. The transcripts of the interviews included the researcher's memos and thoughts in the margins. The researcher kept track of memos on Atlas.ti (version 7.5.17), and a qualitative codebook was developed as themes started to emerge. Qualitative data analysis was categorized into, immersion (familiarized with the data), condensation (codes and coding), display (inspection of selected codes, examined relationships) and drawing and verifying conclusions (Miles, et al., 2014).

Data immersion. Data immersion included the process of the researcher familiarizing herself with the data (Greene, 2007; Robert Wood Johnson Foundation, 2008; Sidani, Guruge, Miranda, Ford-Gilboe, & Varcoe, 2010). During this process, the researcher listened to recorded interviews, post-interview personal reflection recordings, read the interview transcripts in both Arabic and English, and reviewed contextual notes she had made following the interviews (Greene, 2007). This process of immersion stimulated ideas about data analysis (Harris et al., 2009).

Data condensation. The process of selecting, simplifying, abstracting, focusing and transforming the data to appear fuller and condensed was attempted to make the data *stronger* (Miles et al., 2014). The steps taken to develop the code included the following. The researcher initially had all the comments on the word document and then imported all the data to the

analysis program Atlas.ti (version 7.5.17). Interviews were considered the context for the qualitative phase and reflection from the researcher and reflected as a form of objectivity (Maxwell, 2013). The themes were identified based on a review of selected codes that revolved around the interview questions (maternal perceptions, maternal feeding styles, and child eating behaviors). These selected codes reflected the content of the codes and the different ways they were manifested across subjects.

Steps taken to ensure consistent application of the codes included, a systematic process of generating a codebook that provided definitions for what the mothers were saying, it also ensured organization of the data and facilitated agreement/disagreement as new codes were added (Creswell, 2013). A codebook was maintained throughout the qualitative phase of the study to trace the data and coding schemes undertaken. This process was critical because it allowed the researcher to start analysis during data collection and aided in a more focused fieldwork experience and served as a basis for cross-case analysis for multiple interviews through allowing common themes to emerge (Miles, et al., 2014).

Data condensing allowed for analysis and synthesis through write-up of notes and memos. This process continued as interviews were added to the study and new understanding emerged from the data. The analysis program Atlas.ti (version 7.5.17) was useful in organizing the data and allowed for enhanced comparisons between interviews and allowed for new themes to emerge through the analysis between different interviews.

Data analysis was guided by the study aims that were primarily descriptive in nature and were predetermined categories that were based on Costanzo and Woody's theory (1985) and childhood eating behavior constructs. The categories included maternal feeding attitudes and beliefs, maternal feeding practices, child eating behaviors, perceptions of child's weight status

and family influences. Some of the codes were specified from the conceptual framework (eating without hunger; perceptions of children's weight status) and others were grounded from the actual data (i.e. father's role; use of technology during mealtime).

Data display. Upon translation and transcription of each semi-structured interview into text, the textual data from both the Arabic and English versions were displayed in word processing software (Microsoft® Office for Mac 2011 version 14.13.15) and were double-spaced with 1-inch margins for notes and coding. After that, all interviews were displayed in the analysis program Atlas.ti (version 7.5.17) to enhance the visual aspect of the data. The program allowed the researcher to see commonalities and differences between the mothers and allowed justified conclusions (Miles, Huberman, & Saldaña, 2014).

Drawing and verifying conclusions. Final conclusions and verification was completed after a few drafts of organizing and writing and re-writing the analysis piece altogether. Along with feedback from the chairperson and two committee meetings, it became clearer as the verifications were assessed by eliciting questions and receiving feedback from the research committee members.

Standards for the Quality of Conclusions

This section followed recommendations for appraising the qualitative phase findings and conclusions with a description of standards that were used for this study (Miles et al., 2014). This section included efforts to enhance the quality, objectivity, confirmability, reliability, dependability, auditability, internal and external validity, credibility, authenticity, transferability and goodness of fit, utilization, application, and action orientation.

Efforts to Enhance Quality

A guided checklist provided by Elo et al. (2014) to enhance the trustworthiness of content analysis was used for each interview. This checklist documented the phases and *sub-phases* of

the directed content analysis process and included the preparation phase (*data collection method, sampling strategy, selecting the unit of analysis*), the organization phase (*categorization and abstraction, interpretation and representativeness*) and the reporting phase (*reporting results and reporting analysis process*).

Examples of sample questions from the proposed checklist for each phase included: the preparation phase (i.e. who are the best informants for my study?), the organization phase (i.e. how do I ensure that the data accurately represent the information that the participants provided?), and the reporting phase (i.e. how well do the categories cover the data?). The full checklist is provided in Appendix G.

Objectivity and Confirmability

Objectivity or sometimes termed as “external reliability” aimed to provide an unbiased stance during execution of the research study (Miles et al., 2014). The researcher explicitly attempted to be self-aware of personal assumptions, values and biases and affective states and how this would influence the study (Miles et al., 2014). This was achieved through documenting daily field notes on thoughts, feelings, reactions and impressions of each study phase (prior, during and after). Fielding and Fielding (1986) were the first to use different methods to confirm each method (Maxwell, 2013). For example, the CFQ (Birch et al., 2001) examined maternal perceptions of her child’s weight status and during the interviews, mothers were asked about her child’s weight status, which was used to confirm the mother’s perceptions. Both forms of data were considered self-report (the questionnaire and interviews), however, the time, setting and context differed and provided additional insight into mothers perceptions. Moreover, another aim of using triangulation was to minimize and counterbalance the deficiency of a single method, therefore enhancing interpretation of the findings (Thurmond, 2001).

Reliability, Dependability, and Auditability

This section addressed the process of reliability, dependability, and auditability of the proposed study (Miles et al., 2014). Reliability is concerned with the extent to which the findings of the study could be replicated (Merriam, 1995). Yin (2014) recommended two techniques to ensure reliability. First, use a study protocol, which was used in this study. In this study, selected interviews were part of the overall research project. Thus, the protocol developed was organized to include all phases of the study (Quantitative and Qualitative phases of the study) and not just interviews. The study protocol ensured that procedures for data collection and analysis were consistent and standardized with all participants. The researcher developed a qualitative codebook, which was created as soon as the interviews started and this included interview comments as the interviews progressed (Knafl, 2014; Yin, 2014). Moreover, the researcher collected the data, which made the researcher's role explicit and enhanced inter-rater reliability.

Dependability is defined as the stability of data over time and different situations and asks if the results of a given study are consistent with the data collected (Elo et al., 2014; Merriam, 1995). The researcher sought to understand the world from the viewpoints of the participants in the study (Merriam, 1995). In the study, dependability was achieved by triangulation through the use of multiple data and examination on whether quantitative data supported or refuted qualitative data. The chairperson supported the data quality check and reviewed the data (Miles et al., 2014).

Auditability determines whether the research design of the study is defensible and truthful (Whitt, 1991). In this study, this was achieved through the development of an audit trail. Also, the chairperson and dissertation committee were involved from the design of the study to execution of the study and supported transparency of methods (Miles et al., 2014). Moreover,

the chairperson was actively involved in the data quality check to detect any bias that may have occurred from the researcher (Maxwell, 2013; Northcote, 2012; Smyth, 2008).

Internal Validity, Credibility, and Authenticity

These issues are concerned with quality and accuracy (Miles et al., 2014). Internal validity is concerned with how the findings of a study are harmonious or congruent with reality (Merriam, 1995). This may be better understood with how reality is viewed. The quantitative researcher views reality as fixed and stable from a positivist perspective, whereas, a qualitative researcher views reality as constructed and interpreted (Merriam, 1995). Descriptions of analysis and findings which were meaningful, context-rich and thick were used. Finally, explanation building was sought in the data analysis of each interview, where the findings were well linked to the constructs of the study and the theoretical framework (Miles et al., 2014; Yin, 2014).

The credibility examined whether the findings of the study could be trusted and were confirmable, valid or reliable (Denzin, 2009). In this study, the researcher provided contextual details and richness as a basis for checking in with assumptions and biases, questioning and theorizing (Smyth, 2008). Credibility of the translation procedure was ensured through specifically describing the process and justifying the recruitment of the pre-test sample (Acquadro et al., 2008).

Authenticity refers the degree at which the researcher fairly and truly showed the variety of the participants' realities (Elo et al., 2014; Lincoln & Guba, 1985). In this study, authenticity was achieved through immersion in the data and the field by interacting with participants to understand others perspectives in their contexts (Gilgun, 2006; Leavy, 2014). Internal consistency of findings was improved by the quantitative and qualitative data being from the same participants providing multiple data drawn from several sources (questionnaires, semi-

structured interviews and child anthropometric data), another validity approach referred to as triangulation (Creswell & Clark, 2014).

External Validity, Transferability, and Goodness of Fit

External validity is the degree in which researchers may conclude that the results apply to a larger population, typically a concern in survey research (Clark & Creswell, 2011). The purpose of the research study was not to generalize the results; thus this would limit generalizability and comparisons between different groups. In this study, external validity was achieved by explicit sample description and characteristics provided along with a ‘thick’ description (Geertz, 1973; Miles et al., 2014).

Transferability is where the researcher provided sufficient information for the reader to assess whether the findings were deemed meaningful in other relevant situations (Koshar, 2014). In this study, this was achieved by the researcher providing a detailed description of the characteristics of the sample, settings, and processes to allow adequate comparisons with other samples. The researcher scrutinized the analysis for specific contexts, where data from data sources were different or similar and assessed the generalizability of the process. The researcher provided thick descriptions of the findings, which allowed assessment of potential transferability in other relevant settings (Miles, et al., 2014; Smyth, 2008).

The Goodness of Fit or Fittingness is defined as the extent to which there is congruence between context A and context B. For example, if context A and context B are adequately congruent, then the findings may be applicable in other contexts (Lincoln & Guba, 2000). The understanding of goodness of fit about how research studies are executed provides a strong basis for conducting a critical literature review and then using findings from the literature review to design research studies (Northcote, 2012). Goodness of Fit was achieved in this study by the decisions on study design that were based on previous research in childhood obesity in Saudi

Arabia. The findings were also congruent with, connected to, and confirmatory to the theory guiding the proposed study and constructs of childhood obesity proneness.

Utilization, Application and Action Orientation

Dissemination included the following: (1) conferences, with either poster presentation or podium presentation, (2) publications focused on the following: a review of the literature, psychometrics on the Arabic versions of the questionnaires, and the main findings of the study and (3) report to recruitment sites upon request.

Summary

The first phase was dedicated to the translation procedure of both questionnaires (CFQ by Birch et al., [2001], CEBQ by Wardle et al., [2001]) and assessed its cultural relevance. During the second phase, the data from the CFQ (Birch, et al., 2001) and CEBQ (Wardle, Guthrie, et al., 2001) aided in exploratory hypotheses examining the relationships between mother's perceived responsibility in child feeding and control in child feeding and eating styles and behaviors.

Finally, the qualitative phase was dedicated to conducting qualitative semi-structured interviews to further explain the outcomes from the second quantitative phase (Yin, 2014). The rationale for mixing both types of data was to provide a more comprehensive understanding of childhood obesity in Saudi Arabia.

CHAPTER 4: RESULTS

Introduction

This chapter includes five segments. First, the study aims; second, the translation procedure; third, the quantitative phase; fourth, the qualitative phase; and fifth, the chapter summary. All references to the questionnaires used including the Child Feeding Questionnaire (CFQ) [Birch et al., 2001] and the Child Eating Behavior Questionnaire (CEBQ) [Wardle et al., 2001] pertain to the Arabic versions of the CFQ and CEBQ unless otherwise stated.

Aims

The primary purpose of this study was to explore the fidelity and cultural appropriateness of the CFQ and CEBQ. The secondary purpose of this study was to examine Saudi Arabian mothers' perspectives of their preschooler's weight status, feeding styles and children's eating behaviors in relation to their children's actual weight status and adiposity (weight, height, waist circumference, triceps and subscapular skinfolds) and family socioeconomic status (maternal and paternal education, maternal and paternal employment type and status, residential area and family annual income).

Translation Procedure Findings

Background

The aim of this phase was to assess the fidelity and cultural appropriateness of the CFQ (Birch et al., 2001) and CEBQ (Wardle et al., 2001) in a Saudi Arabian sample through six stages of translation, which included translation, synthesis, back-translation, expert committee review, cognitive interviews, pilot testing and reliability testing.

The CFQ (Birch et al., 2001), a 31-item self-report questionnaire, measures maternal feeding styles and the association with children's obesity using a varied Likert scale with response options including never to always, markedly underweight to markedly overweight, unconcerned to very concerned and disagree to agree (Table 4.1). Higher scores indicate higher controlling maternal feeding practices yielding an increased risk of developing obesity (Birch et al., 2001).

The CEBQ (Haycraft, Farrow, Meyer, Powell & Blissett, 2011; Wardle et al., 2001), a 35-item self-report questionnaire, measures mother's assessment of their children's eating behaviors using a 5-point Likert scale with response options including never, rarely, sometimes, often and always (Table 4.1). Higher scores indicate a higher rate of that particular eating behavior constructs.

Table 4.1. Factors/Dimensions of Arabic Translated Versions of the Questionnaires

CFQ Factors (Birch et al., 2001)	CEBQ Dimensions (Wardle et al., 2001)
Perceived Responsibility (PR)	Food Responsiveness (FR)
Perceived Parent Weight (PPW)	Emotional Overeating (EOE)
Perceived Child Weight (PCW)	Enjoyment of Food (EF)
Concern about Child Weight (CN)	Desire to Drink (DD)
Restriction (RST)	Satiety Responsiveness (SR)
Pressure to Eat (PE)	Slowness in Eating (SE)
Monitoring (MN)	Emotional Undereating (EUE)
	Food Fussiness (FF)

Translation. Two independent Arabic-speaking translators translated the CFQ (Birch et al., 2001) and the CEBQ (Wardle et al., 2001). Both translators were recruited from the Saudi community; one residing in Saudi Arabia and the other residing in Jordan and Canada. The first translator was from Saudi Arabia and is fluent in both Arabic and English and has had years of experience in translation for a Saudi company and is currently a faculty member in academics. The second translator was from Jordan and was a PhD prepared researcher that had years of experience translating questionnaires. The first translation was received face-to-face and the second was received via e-mail and both translations were compared for the next phase. During this phase, both translators were informed via e-mail about the study aims, research questions and study concepts to ensure the accuracy of the translation.

Synthesis. This phase was conducted by the researcher; where she integrated the two Arabic translated versions of the CFQ to create one version and similarly integrated the two Arabic translated versions of the CEBQ. The researcher is fluent in both Arabic and English as she has lived almost equal years of her life in Saudi Arabia (16 years) and the US (17 years). The technique used during this phase considered four of the five equivalences recommended by Streiner and Norman (2008), including, conceptual, item, semantic and operational equivalences. Measurement equivalence, the fifth equivalence, will be tested later because it requires a larger sample to measure factor analysis.

Back-translation. This phase involved the process wherein two English-speaking translators were recruited from Elance.com (subsequently changed to upwork.com) to back translate the integrated versions of the CFQ and CEBQ from Arabic back to English. The newly translated English-back-translated versions were sent to the dissertation chairperson to compare with the original CFQ and CEBQ English versions. During this phase neither back-translators

was informed about the purpose of the study, research questions, and study concepts to avoid any bias in translation (Guillemin, Bombardier & Beaton, 1993). After comparison between the original CFQ and CEBQ and the English-back-translated versions both were found to be closely similar as judged by the researcher's dissertation chairperson.

Expert committee. Ten researchers studying childhood obesity in Saudi Arabia were invited to participate in evaluating the content of the Arabic version of the CFQ and CEBQ and were part of an expert panel via e-mail communications. The researchers were informed about the concepts of the study through a 200-word abstract. Three researchers accepted the invitation and participated. Feedback was returned within a week through an online Qualtrics survey. The researchers were asked to rate each item from the Arabic version of the CFQ and the CEBQ on a 4-point Likert scale (Figure 4.1) to the studied concepts of the researcher's aims and research questions.

Figure 4.1. Screenshot of Qualtrics Rater Options

Please rate the extent to whether you think each item on the scale is relevant to the constructs (as shown in the abstract). Thanks!

Please note this is the Arabic version of the Child Feeding Questionnaire by Birch et al. (2001):

	Not Relevant	Somewhat Relevant	Quite Relevant	Highly Relevant
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درجة المسؤولية (1=إبدا 2=تندرا 3=
 في كثير من الاوقات 4=في معظم الاوقات
 دائما 5=)

عندما يكون طفلك في المنزل، ما هي درجة
 مسؤوليتك عن إطعامه؟

Scale-Content Validity Index (S-CVI) and Item-Content Validity Index (I-CVI) displayed in Table 4.2 shows the S-CVI scores, which were found to be adequate (Lynn, 1986; Polit, Beck & Owen, 2001). However, the I-CVI did not result in one perfect score. The researcher

continued to the cognitive interviewing phase and focused on the items that did not result in one perfect score.

Table 4.2. Content Validity Index (CVI) Scores

Questionnaire	Scale-CVI	Item-CVI
CFQ*	0.99	1 item = 0.67
CEBQ**	0.92	8 items = 0.67

*Child Feeding Questionnaire; **Child Eating Behavior Questionnaire

Cognitive interviews. Five interviews were conducted using a convenience sample of mothers from the Saudi community to assess understanding of the Arabic versions of the CFQ and CEBQ (Abubakar, Dimitrova, Adams, Jordanov, & Stefenel, 2013; Knafl et al., 2007). The technique used in the interviews included a think-aloud technique, and the interviews were not focused on answering the survey questions, but rather on reflecting on the questions and whether they made sense to the mothers. Also, the participant and the interviewer (researcher) read question by question and assessed any grammar problems or awkwardly formatted sentences. The interviews ranged from 30 to 90 minutes. The participants' ranged from 32 to 70 years of age, and they had from 2 to 4 children who were 3 to 51 years of age. All the interviews were conducted at the participant's homes and were audio-taped and transcribed into the Arabic text by transcriptionists recruited from upwork.com. A few items were modified in accordance with the participants' feedback, thoughts, and remarks. The main changes were in word choices, and vague sentences were corrected.

Pilot and reliability testing. Eleven mothers from the Saudi community were invited to participate in the final phase of the translation procedure using a convenience sample. The sample included women residing in different areas of the country (two from Jeddah, two from

Riyadh, and the remaining seven from the eastern part of Saudi mainly Khobar and Dammam). Ten mothers participated in the pilot test to estimate the test-retest reliability and calculate the time spent to fill out the questionnaires. Test-retest reliability estimates showed acceptable alpha-coefficients (Table 4.3). The time spent to fill out the questionnaires ranged from 13 to 60 minutes. Since this was a small pilot test, further testing was recommended on a larger sample, and all survey items were kept in the questionnaire after consultation with the dissertation chair and an expert in psychometrics.

Table 4.3. Internal Consistency Scores

Questionnaire	α's
CFQ*	0.61 to 0.90
CEBQ**	0.86 to 0.94

*Child Feeding Questionnaire **Child Eating Behavior Questionnaire

Summary

The Arabic versions of the CFQ and CEBQ demonstrated acceptable agreement scores. Calculations showed acceptable scale-content validity scores. Moreover, acceptable internal consistency has been demonstrated through pilot testing for all the CEBQ concepts and all except one item in the CFQ. It was kept in the questionnaire as recommended by the dissertation chair and a psychometrics expert. This phase has demonstrated preliminary and acceptable findings of the Arabic versions of the CFQ and CEBQ.

Quantitative Findings

The final sample collected for this phase included 223 mothers and 223 children.

Sample

A total of 223 mothers (aged 22 to 51 years) consented for themselves and their

preschoolers (aged 2.5 to 7) and were recruited from 8 schools in the Eastern Province of Saudi Arabia. Cities and recruitment sites are detailed in Table 4.4.

Table 4.4. Participant Characteristics

Demographic	Range	Frequency (%)	Range	Frequency (%)
Age	Children (n= 223)		Mothers (n=223)	
	2.5- 3.5	20 (9.0)	22-27	31 (14.4)
	3.6- 4.5	50 (22.4)	28-33	88 (40.9)
	4.6- 5.5	95 (42.6)	34-39	68 (31.6)
	5.6- 6.5	57 (25.6)	40-45	19 (8.8)
	6.6- 7	1 (0.4)	46-51	9 (4.2)
Mean ($\pm SD$)	4.9 (± 0.88)		33.4 (± 5.7)	
Nationality				
Saudi	210 (94.6)		204 (92.3)	
Non- Saudi	12 (5.4)		17 (7.7)	
Gender			Social Status	
Female	122 (54.7)		Married	215 (96.8)
Male	101 (45.3)		Divorced	7 (3.2)
Recruitment Type				
Government school	112 (50.2)			
Private school	109 (48.9)			
Community	2 (0.9)			
City				
Khobar	114 (51.1)			
Dhahran	72 (32.3)			
Dammam	32 (14.3)			
Qatif	2 (0.9)			
Azeezeeya	1 (0.4)			

Note. 8 mothers did not report their age

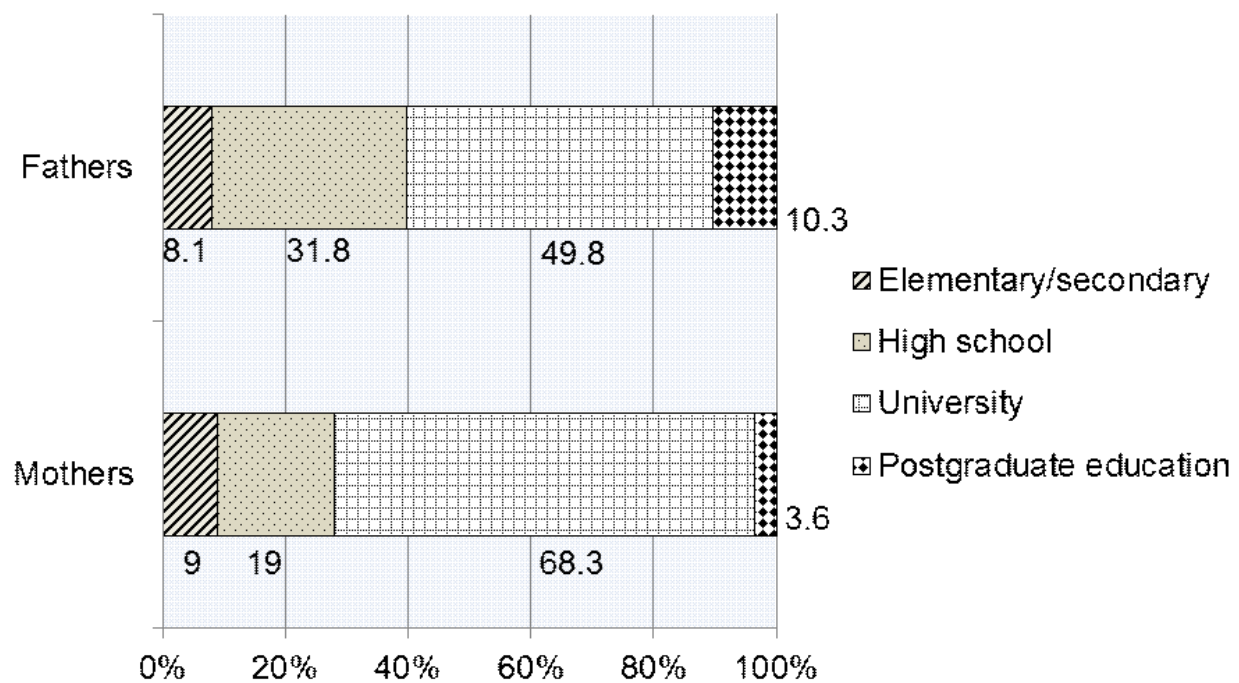
The mean age of mothers was 33.4 ($SD \pm 5.7$) and mean age for children was 4.9 ($SD \pm 0.9$). Slightly more than half of the children (54.7%) were female compared to males (45.3%).

The majority of the sampled children were Saudi (94.6%) versus non-Saudi (5.4%) and similarly mothers were predominately Saudi (92.3%) versus non-Saudi (7.7%). Most of the mothers were married (96.8%) and more than half rented their homes (52.8%).

Socioeconomic Status

Annual income in U.S. dollars for families ranged from less than 20K (low SES) to more than 32K (high SES) by the World Bank classification for Saudi Arabia. Low and high SES were equal percentages in the sample (34.6%) followed by medium SES (20-32K) which were 30.9% of the sample. Also, 32 mothers chose not answer SES related questions. Figure 4.2 illustrates that more mother's (68.3%) held a university degree compared to fathers (49.8%).

Figure 4.2. Stacked Bar Chart of Parental Education



Conversely, more fathers (10.3%) held a postgraduate education (master's or doctoral degree) compared to mothers (3.6%). Less than 10% of parents had elementary or secondary (9% for mothers and 8.1% for fathers).

More than half (52.7%) of mothers were non-working compared to fathers (1.8%). Government and private sector jobs constituted the majority of the work locations for parents (39.6 for mothers to 88.8% for fathers) as opposed to independent business owners (7.7 for mothers to 9.4% for fathers). The complete table of family socioeconomic status characteristics as reported by mothers can be found below (Table 4.5).

Table 4.5. Family Socioeconomic Status Characteristics

Demographic	Frequency (%)		Frequency (%)
Education	Mother (n=223)		Father (n=223)
Elementary/secondary	20	(9.0)	18 (8.1)
High school	42	(19.0)	71 (31.8)
University	151	(68.3)	111 (49.8)
Postgraduate education	8	(3.6)	23 (10.3)
Work Status			
Government	58	(26.1)	103 (46.2)
Private	30	(13.5)	95 (42.6)
Business owner	17	(7.7)	21 (9.4)
Not working	117	(52.7)	4 (1.8)
Family Income (annually)			
Low = < than 20K	66	(34.6)	
Med = 20-32K	59	(30.9)	
High = > than 32K	66	(34.6)	
Not reported	32		
Home Ownership			
Own	101	(47.2)	
Rent	113	(52.8)	
Not reported	9		

Recruitment and Settings

The initial plan was to approach four schools (two government and two private) to achieve the sample of 137 mothers and their children. In actuality recruitment expanded to include eight schools (two government and six private) to achieve the initial number. The total number of participants recruited included 233 mothers and their 233 children. The researcher worked with the Ministry of Education (the administration of the Eastern Province) to gain entrance to the schools to conduct the study via a permission letter. With this letter, schools are to accept the researcher in any of the schools in the Eastern Province. However, school systems varied in their cooperation level. As soon as the researcher did not see much cooperation from a school, she moved to the next school. The mothers were receptive in their participation with the proper strategy (i.e. school health lecture). The change in recruitment plan was from a passive approach to incorporating a more active role within the community. Due to the lack of resources found in the Saudi literature on recruitment, the researcher explored what was working and what was not during fieldwork. From the initial plan, meeting mothers before or after school was not feasible because mothers rarely dropped their children off at school and were rushed during these times.

Also, initially, 600 Arabic flyers were distributed (English flyer Figure 4.3), and with this strategy, only six mothers responded to the flyer (all private school). As recruitment was moving slowly, the researcher worked with the principals of the schools and the dissertation chairperson via e-mail about the progress. The principal of one of the schools advised adding the researcher to a mobile group texting platform popular in Saudi Arabia (WhatsApp) to have more direct contact with mothers through mobile technology. Thirteen more mothers participated as a result of this addition. The initial plan of distributing flyers in the newspaper was canceled due to security reasons in the country; therefore, the researcher distributed the flyer with her network

circle and recruited only two other participants. This initial plan resulted in a total of 21 participants.

Figure 4.3. Recruitment Flyer in English



SEEKING SAUDI MOTHERS WITH PRESCHOOL-AGED CHILDREN

WHO can PARTICIPATE?

- * Child must be between the ages of 3 to 6 years old.
- * Mother must be Saudi
- * Thank you cards & children's books will be given if you complete the first stage.
- * Market vouchers and baby-sitting service will be provided if you complete the second stage.
- * Please call Sama Hammad if you would like to participate!

WHAT is need from YOU?

- Fill out demographic information, sets of questions on your child's eating habits and your feeding styles.
- I will measure your child's height, weight, waist measures and skinfolds
- *We will be extra caring*
- TIME needed from YOU ~ 15-30 MINUTES ONLY (in the first stage).
- TIME needed from YOU ~ 45-60 MINUTES (in the second stage).
- ALL the information will be strictly confidential
- * Thank you for considering,

Sama Hammad, PhD(c) at University of North Carolina at Chapel Hill

PLEASE TAKE ONE...

hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600	hammad@unc.edu 0506828600
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The researcher sought the advice of a community leader to improve recruitment, and she recommended presenting a lecture to mothers as opposed to asking them to participate first. The researcher in consultation with the remaining participating schools proposed this idea. Schools varied in how they responded to this suggestion. Some were excited about the plan, and others indirectly showed an ill response by canceling the scheduled lecture the day before. Overall, it

was a positive recruitment strategy that yielded the final sample of 223 mothers and their 223 children.

Anthropometric Measurements

Anthropometrics were measured after the researcher received the questionnaires with the consent forms signed. Prior to measuring each child, the researcher asked for the child's verbal assent in addition to explaining what measurements were being taken and why.

All measurements were in a private room beside the administration office during school days (Sunday to Thursday), except community participants (n=2) who were measured in their home. Measurement equipment was portable and thus facilitated movement between schools and homes. Child's height, weight, waist circumference, triceps and subscapular skinfolds were all measured directly three times and averaged in the final database. Height and weight were measured using a stadiometer and scale by Charder Medical Proficient Hybrid Scale, Taiwan (Figure 4.4.).

Figure 4.4. Stadiometer for Measuring Children's Height and Weight



Height was measured in centimeters, and weight was measured in kilograms. BMI percentile was calculated via computer for all the measured children and BMI was calculated via computer for mother's self-reported height and weight data as well. Ten children were not measured out of the 233 participants because two were not present when the researcher visited the school and the remaining eight children refused to be measured. Thus those ten were dropped from the study leaving 223 children and mothers in the study. Mother's self-reported data and children's anthropometrics are shown in Table 4.6.

Table 4.6. Children's and Mothers' Anthropometric Data

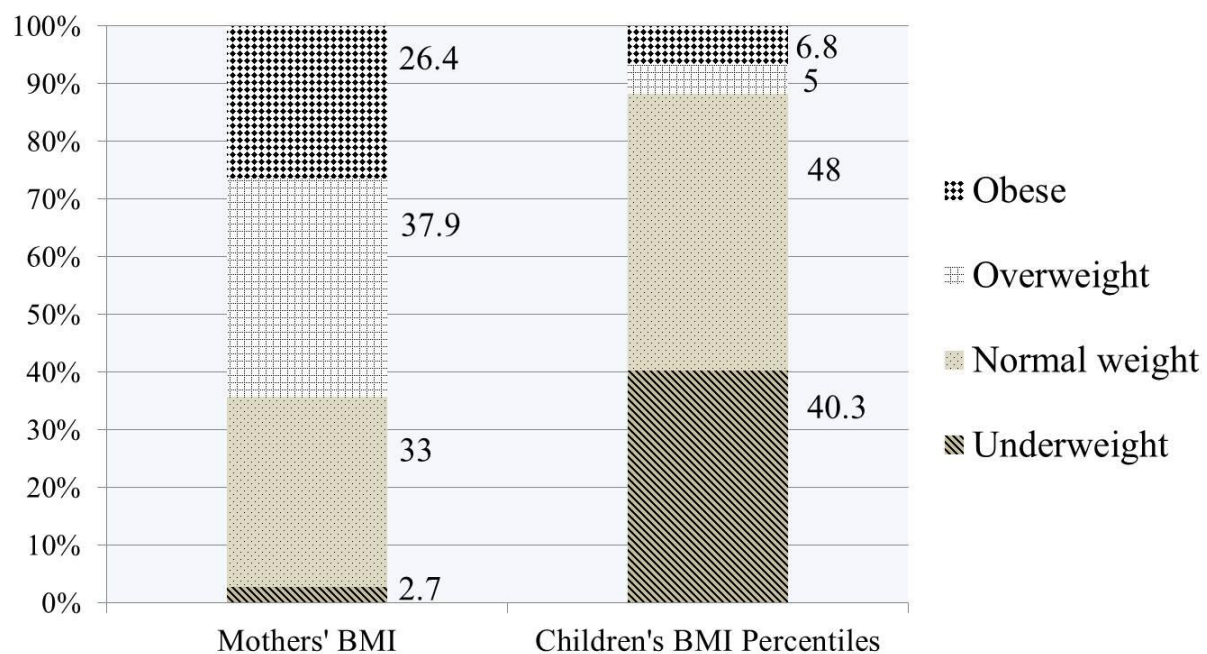
Demographics	Child (n= 223)		Mother (n=223)	
	Range	Mean ($\pm SD$)	Range	Mean ($\pm SD$)
Height (cm)	95.0 - 130.5	113.1 (± 6.9)	0 – 186.0	160.0 (± 7.2)
Weight (kg)	12.0 - 42.3	19.0 (± 4.5)	43.0 – 163.0	69.9 (± 14.1)
BMI (calculated)	10.7 - 27.2	14.7 (± 2.3)	17.3 – 41.6	26.5 (± 4.9)
BMI percentile	0.0 - 100	27.6 (± 33.0)	-	-
Waist circumference (cm)	40.5 - 78.5	50.0 (± 6.2)	-	-
Triceps skinfolds (mm)	6.0 – 40.0	13.7 (± 4.9)	-	-
Subscapular skinfolds (mm)	4.0 – 40.0	8.6 (± 4.3)	-	-
Birthweight (kg)	0.6 – 4.5	2.95 (± 0.6)	-	-
Gestational age at birth (weeks)	-	-	25.0 – 42.0	37.7 (± 2.8)

Table 4.7 details underweight, normal weight, overweight and obese classifications by the CDC for both mothers and children. Nearly half (48%) of children were normal weight, and 40.3% were underweight. A total of 11.8% of the children were overweight or obese. A total of 2.7% of mothers were underweight, 33% were normal weight, 38% were overweight, and 26.4% were obese. The column chart below illustrates this comparison (Figure 4.5).

Table 4.7. Children's and Mothers' Body Mass Index (BMI) Classification

BMI category	Children (n= 223)		Mothers (n=223)	
	Frequency	(%)	Frequency	(%)
Underweight	89	40.3	5	2.70
Normal/Healthy Weight	106	48.0	60	33.0
Overweight	11	5.0	69	37.9
Obese	14	6.8	48	26.4

Notes. 41 mothers did not report height and weight

Figure 4.5. Stacked Column Chart of Mothers' and Children's BMI Classifications

Environmental Factors

Mothers reported several environmental factors regarding their preschoolers and these included exclusive breastfeeding, solid food introduction, accessibility to fruits and vegetables for their child, eating out per week, total siblings, and child order (Table 4.8).

Table 4.8. Children's Characteristics and Home Environment

Demographic	Frequency	Percentage
Exclusive Breastfeeding in months		
0-5	121	58.5
6-11	35	16.9
12-22	33	15.9
24-36	18	8.7
Solid food introduction in months		
4-5.9	42	20.3
6	86	41.5
6.1-11	41	19.8
12	21	10.1
15-36	17	8.2
Eating out per week		
0-2	170	84.2
3-8	32	15.8
Total siblings		
1	11	5.1
2	68	31.5
3	66	30.6
4	27	12.5
5	28	13.0
6	8	3.7
7	6	2.8
8	2	0.9
Child order between siblings		
1	74	33.9
2	60	27.5
3	30	13.8
4	26	11.9
5	17	7.8
6	6	2.8
7	4	1.8
8	1	0.5

Instruments

The self-reported data from the mothers came from the Arabic versions of the CFQ (Birch et al., 2001) and the CEBQ (Wardle et al., 2001). The tables below show the results for the total sample (Table 4.9 and 4.10).

Child Feeding Questionnaire. The original internal consistency of the seven factors included, perceived parent weight ($\alpha = 0.72$ for mothers and 0.69 for fathers), perceived responsibility ($\alpha = 0.67$ for mothers and 0.70 for fathers), perceived child weight ($\alpha = 0.82$ for mothers and 0.84 for fathers), concern about child's weight ($\alpha = 0.74$ for mothers and 0.77 for fathers), restriction ($\alpha = 0.77$ for mothers and 0.66 for fathers), pressure to eat ($\alpha = 0.68$ for mothers and 0.67 for fathers) and monitoring ($\alpha = 0.86$ for both mothers and fathers). Alpha coefficients for the total scale ranged from 0.70 to 0.92 (Birch et al., 2001).

Table 4.9. Descriptive Statistics and Internal Consistency of the CFQ

Factor/Descriptive	Range	Mean \pm SD	Internal Consistency
Perceived Responsibility	2-5*	4.38 \pm 0.6	0.63
Perceived Parent Weight	2-5*	3.21 \pm 0.5	0.60
Perceived Child Weight	1-5	2.98 \pm 0.5	0.69
Concern about Child Weight	1-5	2.99 \pm 1.4	0.81
Restriction	2-5*	4.25 \pm 0.5	0.57
Pressure to Eat	1-5	3.98 \pm 0.8	0.53
Monitoring	2-5*	4.26 \pm 0.7	0.78

Notes. * Participants answered from 2 to 5 and none of them answered 1

In this study, however, only mothers were tested and alpha scores ranged from 0.53 to 0.81 (Table 4.9). Answers to the questionnaires varied depending on the factor and these included: perceived responsibility (1= never; 2= seldom; 3= half of the time; 4= most of the time; 5=

always); perceived parent weight and perceived child weight (1= markedly underweight; 2= underweight; 3= normal; 4= overweight; 5= markedly overweight); concern about child weight (1= unconcerned; 2= a little concerned; 3= concerned; 4= fairly concerned; 5= very concerned); restriction and pressure to eat (1= disagree; 2= slightly disagree; 3= neutral; 4= slightly agree; 5= agree); and monitoring (1= never; 2= rarely; 3= sometimes; 4= mostly; 5= always).

Child Eating Behavior Questionnaire. The original internal reliability of the questionnaire ranged from 0.74 to 0.91 on the 8-subscales and these included, food responsiveness ($\alpha = 0.80$), emotional overeating ($\alpha = 0.79$), undereating ($\alpha = 0.74$), enjoyment of food ($\alpha = 0.91$), desire to drink ($\alpha = 0.89$), satiety responsiveness ($\alpha = 0.74$), slowness in eating ($\alpha = 0.74$) and food fussiness ($\alpha = 0.91$) (Wardle, Guthrie, et al., 2001). In this study, mothers were tested, and alpha scores ranged from 0.51 to 0.93 (Table 4.10).

Table 4.10. Descriptive Statistics and Internal Consistency of the CEBQ

Factor/Descriptive	Range	Mean \pm SD	Internal Consistency
Food Responsiveness	1-5	2.71 \pm 1.2	0.85
Emotional Overeating	1-5	2.34 \pm 1.3	0.93
Enjoyment of Food	1-5	3.20 \pm 0.9	0.80
Desire to Drink	1-5	3.47 \pm 1.1	0.79
Satiety Responsiveness	1-5	3.60 \pm 0.7	0.57
Slowness in Eating	1-5	3.31 \pm 0.9	0.63
Emotional Undereating	1-5	3.31 \pm 0.9	0.60
Food Fussiness	1-5	3.68 \pm 0.7	0.51

Descriptive Correlation Data Analysis

This section provides analysis of the significant Pearson's correlations results from the two instruments used the CFQ, CEBQ and family socioeconomic status (SES) found in Table 4.11. Moreover, regression analyses testing was conducted on children's BMI percentile on the CFQ factors, CEBQ dimensions, and family SES variables.

Perceptions in relation to child's weight status. The first factor of the CFQ is perceptions which included, perceived responsibility, perceived parent weight, perceived child's weight and concern about child's weight. Saudi Arabian mothers' self-reported child's weight was positively correlated ($r = .449, P < 0.01$), with the child's actual measured weight. The factor perceived responsibility did not correlate significantly with the child's weight status. However, the factors concern about child's weight and perceived child's weight both positively correlated ($r = .22$ and $.38$, respectively; $P < 0.01$) with child's weight. Finally, the factor, perceived parent weight was positively correlated ($r = .14, P < 0.01$) with child's BMI percentiles, but not the child's weight.

Maternal feeding styles in relation to child's weight status. The second set of factors of the CFQ were maternal feeding styles and these included restrictions, pressure to eat, and monitoring. The only factor that was significantly correlated with child's weight was pressure to eat ($r = -.21, P < 0.01$), however, restriction and monitoring feeding styles were not significantly correlated with child's weight.

Child eating behaviors in relation to child's weight status. The CEBQ's eight factors explored included food responsiveness, enjoyment of food, satiety responsiveness, slowness in eating, emotional overeating, desire to drink, emotional undereating, food fussiness. Food responsiveness ($r = .15, P < 0.01$) and enjoyment of food ($r = .24, P < 0.05$) both were positively correlated with the child's weight. Whereas, satiety responsiveness ($r = -.20, P < 0.01$) and

slowness in eating ($r = -.17$, $P < 0.05$) were negatively correlated with the child's weight. The remaining factors, emotional overeating, desire to drink, emotional undereating, and food fussiness were not significantly correlated with child's weight.

Table 4.11. Pearson's Correlation of Children's BMI Percentile with CFQ, CEBQ and SES

	Child BMI Percentile
Child Feeding Questionnaire (CFQ)	
Perceived Parent Weight	.14*
Perceived Child Weight	.30**
Concern about Child Weight	.18**
Pressure to Eat	-.23**
Child Eating Behavior Questionnaire (CEBQ)	
Enjoyment of Food	.18**
Satiety Responsiveness	-.23**
Slowness in Eating	-.15*
Socioeconomic Status (SES)	
Home Ownership (own v. rent)	-.15*
Mother Citizenship (Saudi v. not)	-.14*

Notes. * = $P < .05$, ** = $P < .01$

Socioeconomic status in relation to child's weight status. The factors on socioeconomic status for this sample included yearly family income, mother's social status, parent's education, parent's work place, mother's and child's citizenship and home ownership. The two factors that were found to be significant with a negative correlation with child's weight status were home ownership ($r = -.14$, $P < 0.05$) and mother's citizenship ($r = -0.16$, $P < 0.05$). In

other words, child's weight status increased with parent's having a rented home rather than a home they owned. Also, the child's weight status increased with Saudi mothers as opposed to non-Saudi.

Regression Data Analysis of Quantitative Aim

Before data analysis, assumptions of regression testing were assessed (Table 4.12).

Table 4.12. Assessment of Regression Assumptions

Assumption	Result
Outliers	An analysis of standard residuals was carried out on the data to identify outliers and none of the participants needed to be removed. An analysis of standard residuals was carried out and the data contained no outliers (Std. Residual Min.= -1.95, Std. Residual Max= 1.97).
Collinearity	Tests of data met the assumption of collinearity and indicated that multicollinearity was a concern with 3 questions (VIF test) and 1 question (Tolerance test). CEBQ2, Tolerance = .01, $VIF = 12.4$; CEBQ13, Tolerance = .01, $VIF = 16.6$; CEBQ15, Tolerance = .05, $VIF = 20.3$
Independent errors	Data met the assumption of independent errors (Dubin-Watson value = 1.81)
Random normal distribution errors	The histogram of standardized residuals indicated that the data contained approximately normally distributed errors, as did the normal P-P plot of standardized residuals, which showed points that were close to the line, but not completely on it.
Homoscedasticity and linearity	The scatterplot of standardized residuals showed that the data met the assumptions of homogeneity of variance and linearity.
Non-zero variance	The data did not meet the assumption of non-zero variances; 18 variables were less than zero (CFQ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 14, 15, 23, 26, 27 & 28; CEBQ 1 & 26). Variance ranged from 0.327 to 0.946

Aim 2 was to determine if Saudi Arabian mother's child-feeding practices as measured by CFQ and eating behaviors (external eating, emotional eating, speed of eating, interest in

eating, satiety responsiveness and food fussiness) as measured by the CEBQ were associated with their children's anthropometrics (weight, height, waist circumference, triceps and subscapular skinfolds) and maternal socioeconomic factors (maternal education, employment status and family income).

Maternal feeding styles and child's BMI percentile. Maternal feeding styles, as measured by the CFQ, and child's adiposity, as measured by BMI percentiles, were the initial quantitative components of the conceptual model. To explore the relationship between feeding styles and children's adiposity and to assess the conceptual model, an independent multiple regression analysis of CFQ on children's BMI percentiles was conducted (Table 4.13). In the model summary, maternal feeding styles accounted for an estimated 17% of the variance in children's BMI percentile. A significant association was found. See Table 4.13. This result suggests that maternal feeding styles (measured by the CFQ) had a slight ability to estimate children's BMI percentile and was consistent with the model that suggested a weak association between the two constructs. Table 4.13 below shows the independent variables that were found to be statistically significantly and predict the dependent variable, $F(7, 185) = 6.61, P < 0.00$ the regression model is a good fit.

Table 4.13. Model Summary: Maternal Feeding Styles with Children's BMI Percentile

R	R²	Adjusted R²	SE of the Estimate	ΔF	df1	df2	Significance ΔF
0.45	0.20	0.17	31.33	6.61	7	185	0.00

Note. The predictor was maternal feeding styles (as measured by the CFQ). The dependent variable was child's BMI percentile. SE= standard error, df= degree of freedom.

Table 4.14 shows the general form of the equation that predicts child's BMI percentile from CFQ factors (PR, PPW, PCW, CN, PE, RS & MN), which only found PCW, CN and PE to

be significant ($P < 0.05$) abbreviations explained earlier (Table 4.1). Therefore, these variables that were statistically significant predicted children's BMI percentile and formulated the following model while holding the non-significant variables constant:

$$\text{Children's BMI Percentile} = 24.34 + (16.03 * PCW) + (4.18 * CN) - (11.63 * PE)$$

Table 4.14. Coefficients for CFQ Factors and Children's BMI Percentile

Model	Unstandardized		<i>t</i>	Sig.	95% CI for B	
	Coefficients					
	B	SE			LL	UL
1	24.34	30.81	0.79	.43	-36.43	85.12
(constant)						
PR	.30	4.16	0.72	.94	-7.90	8.50
PPW	6.97	4.94	1.41	.16	-2.79	16.72
PCW	16.03	4.59	3.50	.00*	6.98	25.08
CN	4.18	1.85	2.26	.03*	.53	7.83
RST	-2.86	4.51	-0.63	.53	-11.75	6.04
PE	-11.63	3.03	-3.84	.00*	-17.60	-5.65
MN	-4.77	3.86	-1.24	.22	-12.38	2.85

Note. *= Significant $P < 0.05$; PR= perceived responsibility; PPW=perceived parent weight; PCW= perceived child weight; CN= concern about child weight; RST= restriction; PE= pressure to eat and MN= monitoring

Second, child eating behaviors and child's BMI percentile. The next step was to explore the relationships between children's eating behaviors as measured by the CEBQ with children's BMI percentile. The relationships between the CEBQ dimensions and children's BMI percentile were explored using linear regression procedures as shown in the conceptual model.

Table 4.15 is the model summary and showed that the CEBQ accounted for 8% of the variance in predicting children's BMI percentile. A significant association was found (Table 4.15). This result suggests that children's eating behaviors (measured by the CEBQ) had a slight ability to estimate a children's BMI percentile.

Table 4.15. Model Summary: Child Eating Behaviors with Children's BMI Percentile

R	R²	Adjusted R²	SE of the Estimate	ΔF	df1	df2	Significance ΔF
0.35	0.12	0.08	32.20	2.74	8	162	0.01

Note. The predictor was maternal feeding styles (as measured by the CFQ). The dependent variable was child's adiposity. SE= standard error, df= degree of freedom.

Table 4.16 shows the coefficients for the CEBQ dimensions and children's BMI percentile.

Table 4.16. Coefficients for CEBQ Dimensions and Children's BMI Percentile

Model	Unstandardized Coefficients		<i>t</i>	Sig.	95% CI for B	
	B	SE			LL	UL
1 (constant)	28.00	26.56	1.06	.30	-24.43	80.45
FR	10.72	5.50	1.95	.05	-.12	21.57
EOE	-8.72	4.12	-2.12	.04*	-16.85	-.59
EF	4.76	4.39	1.08	.28	-3.90	13.41
DD	-3.62	2.62	-1.38	.17	-8.79	1.55
SR	-11.02	4.61	-2.39	.02*	-20.13	-1.92
SE	-.97	3.49	-.28	.78	-7.86	5.92
EUE	-4.22	3.40	1.24	.22	-2.48	10.92
FF	5.04	4.24	1.19	.24	-3.34	13.41

Note. *= Significant $P < 0.05$; FR= food responsiveness; EOE=emotional over-eating; EF= enjoyment of food; DD= desire to drink; SR= satiety responsiveness; SE= slowness in eating; EUE= emotional undereating; FF= food fussiness

The general form of the equation that predicts children's BMI percentile from the CEBQ dimensions (FR, EOE, EF, DD, SR, SE, EUE & FF), which only found EOE and SR to be significant ($P < 0.05$) abbreviations explained earlier in the chapter (Table 4.1). Therefore, these variables that were statistically significant predicted children's BMI percentile and formulated the following model while holding the non-significant variables constant:

$$\text{Children's BMI Percentile} = 28.00 - (8.72 * \text{EOE}) - (11.02 * \text{SR})$$

Third, socioeconomic status and children's BMI percentile. The next step was to explore the relationships between family's socioeconomic statuses (SES) with children's BMI percentile. The relationships between SES and children's BMI percentile were explored using linear regression procedures. Since SES was not part of the conceptual model, however, it is of high interest in understanding trends of childhood obesity in Saudi Arabia, the variables chosen to be regressed in the model were significantly correlated using Pearson's testing and these included, home owned (or not), maternal citizenship (Saudi or not). In addition, family's monthly and yearly income were explored because the Saudi literature found inconclusive results with family's SES and children's adiposity. Table 4.17 is the model summary and showed that family's SES accounted for 7% of the variance in predicting children's BMI percentile. A significant association was found P was less than 0.05 (Table 4.17). This result suggests that family socioeconomic status has a very slight ability to estimate children's BMI percentile.

Table 4.17. Model Summary: Family SES with Children's BMI Percentile

R	R²	Adjusted R²	SE of the Estimate	ΔF	df1	df2	Significance ΔF
0.31	0.93	0.71	32.46	4.28	4	167	0.00

Note. The predictor was family socioeconomic status (income, home ownership & mother citizenship). The dependent variable was child's BMI percentile. SE= standard error, df= degree of freedom.

Table 4.18 shows the general form of the equation that predicts children's BMI percentile from the family's SES characteristics, which found home ownership, family monthly and yearly income to be significant ($P < 0.05$) and maternal citizenship was non-significant. Therefore, these variables that statistically significantly predicted children's BMI percentile formulated the following model while holding the non-significant variable constant:

$$\text{Children's BMI Percentile} = 64.33 - (10.81 * \text{homeownership}) + (.00 * \text{monthly income}) - (7.23 * \text{yearly income})$$

Table 4.18. Coefficients for Socioeconomic Status and Children's BMI Percentile

Model	Unstandardized Coefficients		<i>t</i>	Sig.	95% CI for B	
	B	SE			LL	UL
1 (constant)	64.33	13.05	4.93	.00*	38.58	90.08
Home ownership	-10.80	5.16	-.16	.04*	-20.99	-.62
Monthly income	.00	.00	2.80	.01*	.00	.00
Yearly income	- 7.23	3.28	-2.21	.03*	-13.69	-.76
Mother citizenship	-15.42	8.84	-1.75	.08	-32.87	2.03

Note. home ownership= owned vs. rent; monthly income= reported continuous (blank space); yearly income= low = < than 20K; medium = 20-32K; high = > than 32K (multiple choice question); mother citizenship= Saudi vs. non-Saudi; * = Significant $P < 0.05$

Qualitative Phase

Design

The final sample collected for this phase included interviews with 15 mothers selected from the previous quantitative phase that was analyzed using ATLAS.ti version 7.5.16 (Berlin, Germany). Detailed descriptions are provided for the sample, setting, interviews, and data analysis of the interviews are discussed.

Sample

All participants were Saudi Arabian. Participating mothers' ages ranged from 23 to 45 years with a mean of 32.6 years ($SD \pm 5.8$). Children's ages ranged from 3 to 5.1 years of age with a mean of 4.5 years ($SD \pm 0.84$). Children's gender included nine females and six males and their BMI classifications, according to the CDC criteria, included four obese (two female and two male), four overweight (three female and one male), six normal weight (four female and two male) and one was classified as underweight (male). All of the participants lived in the Khobar and Dhahran areas except for two who lived in Dammam. All socioeconomic levels were included following the World Bank's classification for Saudi Arabia's annual income rank (low = < than US 20K; medium = US 20-32K; high = > than US 32K) and the average was 54K (three were low, six were medium, and six were high). Five of the children attended government schools, and 10 attended private schools. Total siblings ranged from 1 to 5 with a mean of 2.6 children in the family ($SD \pm 0.99$), and child order ranged from the first born to fifth born (Mean = 1.87; $SD \pm 1.13$).

Setting

Most interviews took place in the participants home ($n = 9$), several other interviews took place at the child's grandparents' home, one mother requested the interview to be at her office at work, and one other participant requested to meet outside of the home, so the researcher invited her to be interviewed at the researcher's home. The researcher requested that all interviews be in a quiet place for recording purposes and offered babysitting service during the interviews. However, none of the mothers utilized this service indicating that either there would be house helpers or that the children would not interrupt the interview. The researcher had some challenges keeping the environment quiet at all times as she interviewed the mothers. The

interviews were recorded on two devices to ensure accuracy and backup. The majority of interviews that took place at home were at the guest living space.

Interviews

The primary data for the qualitative phase included 15 semi-structured interviews with mothers from the quantitative phase. The length of interviews ranged from 25 minutes to 1 hour and 46 minutes with an average of 52.6 ($SD \pm 18.3$) minutes. After all of the interview questions were completed, the researcher encouraged the mothers to share further thoughts and remarks.

After each interview session had ended, the researcher reflected on her impression and thoughts about each interview. Interview audio files were sent via a secure messaging system to the transcribers and translators recruited from www.upworks.com, a website that enables researchers to hire freelance translators and transcribers. The translators were certified translators and had mastery in both Arabic and English. The researcher requested the translation and transcription to be sent back within three and no later than five days. All participants were given pseudonyms to preserve confidentiality and privacy. The researcher reviewed the English transcripts and compared them to the Arabic audio files to check for accuracy of translated content for each interview. After each interview memos were formulated, as the researcher added comments in the word document of the English translated version. These steps facilitated data immersion for the researcher. All interviews were imported into ATLAS.ti for comments and thoughts that furthered the researcher's understanding of the interviews and the overall data.

After each interview had been completed, the English text was sent to the dissertation chairperson for independent memo writing and initial coding. Simultaneously, the researcher and chairperson coded the interviews. The steps taken included, listening to the Arabic audio, reading, re-reading the transcripts (both Arabic and English) and reviewing the text data for theoretical content. Directed content analysis was used to code the interviews, with codes

derived from Costanzo and Woody's theory (1984) and the literature, and the nature of the interviews helped in the coding process. Disagreements between coders (dissertation chairperson and the researcher) were discussed and resolved during weekly meetings and e-mails.

Participants in the qualitative phase shared their thoughts, feelings, and perspectives on the questions asked during the interviews. The interview questions revolved around three main sections based on the study's theoretical framework and constructs on childhood eating. These sections included perceptions on children's health and weight status, maternal feeding styles and children eating behaviors.

Data Analysis

The process taken during analysis included, interview data were reviewed on pre-selected codes from the conceptual framework, templates were created to compare across codes, themes were identified based on the content of the codes and any new emerging themes were added. There were two new themes that arose from the interviews that were not a part of the theoretical framework or the studied constructs and included media's role on children as expressed by mothers and the father's roles on their child's weight issue. These emerging themes are included within the discussion of the three main sections of the interview (perceptions, maternal feeding styles, and child eating behaviors). The findings of the qualitative phase are organized in order of the interview sections. Within each section, the discussion starts with children in the overweight and obese category then children in the underweight and normal weight category. Moreover, percentages are provided when appropriate to signify themes that were similar across participants in the following narrative expressions, *the greater majority* $\geq 80\%$, *the majority* $\geq 50\%$, *some* $\geq 30\%$ and *few* $\sim 20\%$.

Maternal Perceptions of Child's Health and Weight

Mothers were asked to tell me about their children's health, what they thought about their

weight, what others including family members, relatives, friends, teachers, and health care professionals said about their child's weight, how they would describe how a child with a healthy weight looked, played, behaved and ate, and what their thoughts were about a child with excess weight. This section includes themes about perceptions these were: Close to accurate measure of their child's weight, what mothers reported others said and what mothers said about the consequences of overweight and obesity for their children.

Close to accurate measure of their child's weight. When mothers were asked to tell me about their children's health, mothers of children who were in the overweight and obese category all acknowledged that their children had excess weight, but tended to minimize the problem. Several mothers described their children as "a bit overweight." Another mother stated, "when I see her play in a playground I feel she's normal but just a bit overweight."

Whereas, mothers of children in the underweight and normal weight category perceived their children as normal weight; one mother perceived her child as overweight, and another mother perceived her child as markedly overweight saying "I feel she is a little bit overweight." The remaining mothers of children in the underweight and normal weight category described their child's weight as "normal, fine and active" or described their child's health in general as "good." "Her weight is always in the normal range, unlike her height, it's always over the normal range." Another mother shared "I think it is very good that he is very energetic."

When mothers were asked to tell me about their children's weight, they shared the following. Mothers of children who were in the overweight and obese category varied in their responses. One mother shared "I am not pleased with his weight at all." Still, other mothers frequently used terms such as "big-boned, chubby and heavy" and one mother said, "since her early days, God bless her, she's been chubby." Another mother shared, "his body is very easy to

get overweight. When I came back (*after traveling for work*), I could see that he was overweight, so I did a little controlling, and I taught him table manners. This helped him lose weight and get back in shape. He is big boned.” Another mother explained “she’s heavy.... I mean I can’t carry her. Her Dad has to come and carry her upstairs.”

Whereas mothers of children in the underweight and normal weight category varied in describing their children’s weight, some expressed weight by comparing their child with other children or siblings. One mother said “I really don’t know, but when I took him to school, there are bigger children than him, but compared to his sister, both of them are the same weight. I even thought my daughter is skinny.” Another mother expressed worry saying, “I always worry about him. I am worried that he will become fat. Obesity is common among children as you can see nowadays.” A few others used the terms “good” and “fine” to describe their children’s weight.

What mothers reported others said. Mothers were then asked to tell me about what others including family members, relatives, friends, teachers, and health care professionals said about their child’s weight. The majority of mothers of children who were in the overweight and obese category received feedback on their child’s weight from family and friends than from health care providers or their children’s school. One mother of a child in the obese category received feedback from family members and her child’s health care provider. “I heard from many of them (family members). My sister told me my daughter might have trouble with her glands.” However, the doctor said, “she is fine, but he noticed a problem with obesity, and he said that we should find a solution. He told us that she should decrease eating chips, sweets, and fried foods.”

Similarly, another mother of a child in the obese category shared information about family history and obesity. “Since he is overweight, they do comment on that all the time, for

example, my father keeps telling me to watch your son's weight, take care of him, and take him to a doctor." While one of the mothers of a child in the obese category only received feedback from friends. "They say that she's overweight. They tell me that she's not like her sisters, they're all young, but they are different and that her weight surpassed that of her sisters because the ones in her age group aren't the same."

A mother of a child who was in the overweight category talked about family and then the health care providers concerns. "My family all have the same comments when they see him, and they say that he is overweight. Our close relatives like my aunt for example." While health care providers concerns varied from one doctor "who never commented on his weight or health, while another doctor confirmed that he was overweight in regards to his age. That doctor told me that we should decrease the amount of food he eats and he should eat beneficial food like vegetables and fruits." Another mother with a child in the overweight category shared, "family and relatives say it's good to be overweight." However, the same mother took her child to the doctor, and one doctor said; "your child is normal." The "doctor did not talk about his weight and told me nobody starves to death. Let him eat when he wants and don't force him."

Other mothers of children in the overweight and obese category received feedback about their children's weight either from family and friends or the doctor. A mother in the overweight category said that "only once when he was a year old, the doctor said his body could easily get overweight, but they said his weight was fine." Another mother with a child in the overweight category indicated that "family and relatives say she's overweight." While her health care provider "didn't have any concerns, usually he doesn't say anything about her weight and height unless I ask."

Whereas, mothers of children in the underweight and normal weight category echoed the same message from family, friends, health care provider or the school using thinness as a form of comparison. One mother explained, “no one said to me that she is thin or fat. She does not seem thin or fat.” Another explained further, “they (referring to nurses or doctors) never told me that she suffers from malnutrition or there is some issue about her health.”

How mothers described a child with a healthy weight also varied. Mothers of children who were in the overweight category talked about looks, play, behavior, and meals when describing healthy children. Whereas, mothers of children in the obese category commented more on appearance and weight, with one mother sharing “I feel that a healthy child wears his size of clothing.” Another mother said, “I feel that he should weigh around 20 kilograms for his age.... and shouldn’t have a tummy.” While another mother added her thoughts about eating, “a healthy child only eats what he needs. He will not eat more than needed.” One mother also shared that a healthy child “would be highly confident when talking and walking.”

The mothers of children in the overweight and obese category also talked about physical appearance and then about controlled eating and balanced meals. One mother shared “He should look good and have a normal weight not over or underweight and if they are slightly fat, no problem.” The same mother also explained, “He has to eat balanced meals; he should know when the meals are provided and know this that he should eat breakfast, lunch, dinner, and snacks and knows when to eat chocolate.”

Whereas, when mothers of children in the underweight and normal weight category were asked how they would describe a child with a healthy weight, they described a child’s movement and meals. One mother said, “the child who runs without getting tired, this means the child is healthy, not the child who keeps asking for fast food or does not want to eat food, even without

tasting it, just because it does not contain fried food, the things the child is used to eating. I feel this is the most important.” While another echoed the same message but described it more generally, “a healthy child likes to play all the time. He also likes arts, but in the afternoon, he likes to play jump up and down and run around, and I let him. I think they are lighter (normal weight children) when they play.” Another mother of a child in the normal weight category elaborated more on eating, “I think if the child eats all three meals and some snacks. If the child is attentive, plays and does not feel sluggish, then the child is healthy.

Mother’s report of the consequences of obesity. When mothers were asked to describe a child with excess weight; mothers of children who were in the overweight and obese category mainly described, child’s future, disease, stigma, being bullied, emotions, appearances, and clothes size. One mother in this category said, “I am worried about his future.” Another mother of an obese male spoke about her child’s future by comparing her son to her brother, “One of my older brothers had the same thing, he had an obesity problem, he had to have an operation, and there were some complications he is still suffering from.” Some mothers spoke about the consequences of overweight and obesity associating it with illness “being overweight is a disease for children and so is diabetes. I know a girl in the fifth grade who did a sleeve gastrectomy.” Another mother also shared, “maybe this [referring to overweight] causes diseases such as diabetes.” One mother was more specific “high blood sugar, and blood pressure is a big problem caused by unhealthy food.”

A few mothers described stigma by how a child would be received, and one stated simply “kids don’t like fat people.” Another mother shared “the society we live in will make fun of my girl, and this severely affects her health. Even the clothes, when the child’s weight is normal, you can’t find suitable clothes for him easily. When the child is overweight, other children mock

him. I feel sad for this as a teacher in the first place.” While another mother of a child in the overweight category described similarly “I think that moving would be so tiring for him, he won’t be able to catch up with his friends, he will not like how he looks in clothes as kids like to comment on how others dress, and they could say mean words about his looks and criticize him, also some grownups will criticize him. All of this stuff will hurt the child deep inside and will remain with him all his life.”

Another mother echoes a similar message, “he wears very big sizes of clothes, very different than the size he’s supposed to wear. Also, not everything looks good on him. The second thing, he feels embarrassed because people will say things that hurt. Concerning the way he plays, you would find him lazy, and he prefers sitting down to moving.” However, a mother of a child in the obese category described it slightly differently. “The one who is plump keeps hearing some comments from here and there. His shape is different. When he wears clothes, he is sad, as his shape is different in his clothes and they are less active.” Other than embarrassment and sadness, a mother of a child in the obese category provided further insight sharing “I feel like people say that overweight people are not angry; however, I feel that they are angry.” Another mother of a child in the obese category described excess weight related to eating, stating “he has a big appetite, and he eats large quantities. He is busy eating all the time, he has no other activities, and you feel like his only hobby is eating.”

Whereas, mothers of children in the underweight and normal weight category described a child with excess weight regarding their physical appearance, tiredness, and quietness with food and obesity as being inherited and passed down in families. One mother did not describe a child with excess weight, but expressed her feelings of concern regarding children’s mental health stating “I don’t like it because it affects the child psychologically.”

Another mother shared her thoughts about a child in the overweight and obese category in regards to their physical appearance, “you can see obesity in the child’s abdomen. All the body may seem good, but a child may suffer from abdomen obesity that affects his breath, or movement, or when wearing school uniform.” Also “when the child plays, you may notice he gets tired quickly, or can’t breathe, or feels bored. At this time, he only desires food.” Another mother shared she noticed her son “is quiet and likes to stay alone when studying he is smart and has ideas, when he chooses a meal, he wants to have a heavy meal and chooses luxury places like restaurants and so on.” Another mother shared that overweight and obesity was passed down from generation to generation “I feel it is hereditary in her family and parents should control their children’s food intake.”

The consequence of excess weight was also highlighted when mothers were asked whether they were bothered if their child had excess weight and why or why not. The majority of mothers of children in the overweight and obese category spoke about personal reflection or family members that have struggled with weight throughout their lives. Some of the mothers of children in the overweight and obese category shared concerns about physical appearance, future disease, and the psychological impact.

A mother of a female child in the obese category focused on clothes and psychology. “Because it’s weary, you feel it psychologically, and clothes are what bother me the most.” While another mother of a male child in the obese category was more specific. “I am upset about seeing him with a tummy. He is still young to have a tummy. He shouldn’t appear in this way.” The talk about disease was in general terms. A mother of a female child in the overweight category shared “It’s not good for children to be overweight. They get diseases and even have difficulty walking.”

Personal reflections of mothers were more detailed, where a mother of a female child in the overweight category shared “because I had excess weight and she takes after me a lot. I want her to be better. I don’t want her to experience what I have been through like bullying and not feeling comfortable in her clothes, and I want her to have a normal life.”

While another mother of a male in the overweight category remembered herself earlier in life and reflected on how this could impact her child. “After I was pregnant I suffered to lose the weight and to get in shape. My son wears big sizes now. You can only imagine if he gains more weight. You know how one’s appearance is important in our society. We can’t be sure that others will accept him. I don’t want this to affect his feelings. When I helped him lose weight, I didn’t force anything on him. It took two years. I didn’t say no to him. I just explained to him that we have rules.”

A mother of a male child in the obese category talked about a family relative impacted by obesity. “I have an overweight brother. He is now 39 years old. But he did the operation a while ago. I mean my brother didn’t start gaining weight until the fifth grade, my son has begun gaining weight really early, and I do feel that with time he might just have surgery.” Another mother of a female in the overweight category shared how others around her talked to children with excess weight. “I do care, but her health is more important. I happen to compare with other people who make it complicated for their children and talk to them directly in front of people calling them “bears” or say “you must lose weight. I am a bit uncomfortable about it only for her health, so that she can move, not to get affected later on.”

Mothers of children who were in the underweight and normal weight category were asked about whether they would be bothered if their child had excess weight and why and why not. They echoed similar thoughts as the mothers of children in the overweight and obese

category in that they spoke about personal or family members' experiences with excess weight and the psychological impact. However, a few mothers seemed concerned about the future health of their children, how they would be received in society, their physical appearance and were more specific with naming diseases as opposed to being more general like the mothers with children in the overweight and obese category. A mother of a female in the normal weight category explained her reasons. "I suffered. If she is going to be overweight, she won't have self-confidence, won't find suitable clothes, will be shy, and her movements will be slow. I hate this thing. I haven't changed my ideas about that till now. If I gain weight at this age, I feel down and get depressed. I stay at home and never go outside. I become psychologically ill. I remember school days when I used to be a plump."

A mother of a female child in the normal weight category shared family members' experiences and food. "My husband's family is overweight. His brother and father. My father is slim. He takes care of these things, and he always tells us to take care. He worries about his health. He controls his sugar and salt intake. My husband's family is the opposite. My father-in-law is my father's brother, they are siblings, but they are so different like sky and earth, he does not care about these things. He believes that we will die anyway. We only live once, many people think like this."

Another mother of a male in the underweight category shared similar concerns by illustrating different family member's experiences but elaborated more on the type of food and lifestyle choices. "I hope that (excess weight for her child) does not happen. It is so hard in the future. I have my husband's child. He is overweight. He wants to lower his weight while he is a teenager. It is so hard for him, so I want him to change his lifestyle. He says "I want to be between people who live like this, to change my lifestyle like them." At home, his siblings are in

college now, and he stayed like this waiting. They get used to fast food, if you give them regular food, they prefer fast food.”

Maternal Feeding Styles and Attitudes

For the purpose of the following results, interviews were categorized into two groups, which included underweight and normal weight and overweight and obese categories. In this portion of the interview mothers were asked to, first, tell me about a typical day for the families’ and child’s eating pattern, second, how mothers manage meals, third, whether mothers were bothered if their child had excess weight; why and why not, and fourth, when mothers were faced with an eating problem with her child, how would they solve it. The child’s favorite foods were reported in the questionnaires during the quantitative phase. The discussion in this section consists of themes around strategies for food management, discrepant views between parents and the use of electronics during meals.

Strategies for food management. First, when mothers shared a typical day for the families’ eating pattern and more specifically their children’s eating patterns, it was clear that with all the families in both the overweight and obese and normal weight and underweight categories were consistent in that weekday and weekend routines differed. Weekdays were more structured, and they had consistent meals, whereas weekends were spent alongside extended family members and there were usually two meals (i.e. late heavier breakfast and then lunch and dinner as one meal). A mother of a female in the normal weight category shared the importance of routine. “You have to keep it (routine) like this, if you change something it will change all our life, you have to keep this track, or it will destroy your life, so I have to put them in bed on weekends at the same time as weekdays. I may let them stay up an hour more or something until

9 pm. I know if I let them stay up till 9:30 pm, they will wake up the next day at 12 pm. So I have to keep it controlled, when you keep children in this routine, they will get used to it.”

Breakfast during the weekdays for the majority of families in both categories was rarely eaten at home and children either had no breakfast or a light start to their morning (i.e. milk, a piece of fruit, biscuits, half a piece of bread) or ate more traditional food items that will be discussed later.

Another time routine that altered schedules were when guests were coming. One mother of a female child in the obese category expressed how her food management was altered and that could be attributed to Saudi customs. She explained “We usually don’t have dinner, everyone inside the house takes something, and that’s it, except if we have guests. Having people over equals’ food.” Similarly, a mother of a child from the overweight category echoed a similar message in regards to her child and chocolate milk saying, “I bought a box of it yesterday because we have guests at our house and I noticed that he drank two in a short time. Therefore, I decided to hide the boxes. Otherwise, he was going to drink it all.”

Mothers were asked how they managed meals. There was a difference in how working versus non-working mothers managed meals for children in the overweight and obese category. The non-working mothers also shared how the father’s role in feeding the child impacted their meal management. The working mothers of children who were in the overweight and obese category described scheduling meals with house helpers or her parents to prepare with the exception of a mother of a male in the overweight category. One mother shared “most of the time I cook, but when I’m busy, I have a cook that does it.” The remaining mothers shared their experiences with house helpers. One mother of a female child in the obese category explained “I have a house helper (has been with the family for 15 years), she cooks, and she’s responsible for

the daily menu, she chooses, and sometimes my daughter chooses the food for the day, I mean if someone wants something particular for lunch, they request it, and it also depends on what she has in the fridge.” Another working mother of a female child in the overweight category explained further in regards to the methods of cooking. “I write a schedule, and the nanny follows it, and sometimes I give her immediate instructions if I need something changed or done. She usually makes sautéed food because when she was hired my other daughter had to eat poached or sautéed food and this is, of course, healthier.”

One mother of a female child in the overweight category said that she never prepared lunch due to her working schedule of being a resident in several hospitals. She shared her child ate with her parents. “I feel lunch is the only constant meal my child has during the school days at my parent’s home because they are more organized. My mother has a set time out of work, and my daughter has the same schedule and that’s it, my father is always at home, it means lunch is always at 1 pm.”

Similarly, the help of parents was also shared from one of the working mothers from the underweight and normal weight category. This mother of a female from the normal weight category shared she could not manage without her mother’s help “Mama is really a gift from God. To have parents to keep your children with them (while the mother is at work), it is impossible to do it alone. I tried it while taking a course, and I was coming back while leaving them with the babysitter. I came back to find them so hungry. We just would get anything like a burger from the freezer or chicken nuggets. We were consuming bad things, and our boy gained a lot of weight.” She also shared “my mom is available now, my parents don’t like restaurant food, my mom cares about them, she lets them play, but food, they must eat together, we were raised like this too, so it is the same routine, we were doing the same thing with my siblings.”

One other working mother, who does not have her family in the same city shared, “Sometimes I prepare lunch the day before I go to work. In this case, it just needs to be heated and by 2:30 pm lunch is ready.”

The greater majority of the non-working mothers of children in the normal weight category talked about house helpers with varying degrees on how they helped out. A mother of a male child in the underweight category shared how she benefited from her house helper who has been with the family for four years. “Our housemaid, she cooks, and on weekends, we usually go to my mother-in-law’s where she cooks by herself and my mom she has a maid too.” While another mother of a female in the normal weight category shared how she would soon be in need of a house helper. “Currently, I want to get a house helper because we are moving to a two-story house. I can handle a one story house, but a larger house would be difficult. I have to manage the kids, cooking, cleaning and so on.”

A few of the non-working mothers of the children in the underweight and normal weight category talked about specific roles for their house helpers, which was not in the kitchen. “She helps with the cleaning, but not the cooking.” A few others expressed their gratitude to their house helpers. “My mom had a Filipina, and she didn’t know how to cook anything. It depends on the person. Thank God, he blessed me with a good one.”

Aside from house helpers, mothers were asked to reflect on how they reacted when they were faced with an eating problem with their child. Mothers of children who were in the overweight and obese category were asked to reflect on two scenarios. One if the child refused a particular food and two if the child wanted a certain food, the mother disapproved of the child having. For the first scenario, the mothers of children in the overweight and obese category

mainly described using methods of either giving choices, or not giving choices, punishing or attending to the child's needs.

A mother of a female in the overweight category explained giving choices, "I will give her choices and if she asked for another unhealthy choice I will tell her sorry you can't have that, and I'll tell her fine you don't look hungry it's ok for me if you don't want to eat now, and she usually gives up and eats what was offered." Whereas, another mother of a male in the overweight category explained not giving choices, "I tell him that this is the only thing available, even if he is stubborn." When a mother of a female from the obese category explained how she punished her child when she refused to eat, "She's a little tiresome. Stubborn. Sometimes with punishing, just like yesterday, she did something, and I punished her. She was supposed to go on a trip with her friends, and she caused a problem, so I decided that she won't go. It helped a bit. Like today, her friend was coming over, but no she isn't going." Finally, a mother of a male from the obese category explained how she attended to the child's need, "I prefer to remove the salad from his dish, so he eats his meal."

A few mothers indicated that their children usually never refused food. A mother of a child in the obese category shared "when it's about food; he goes with it. I mean he always says yes if it is about food. He never says no." Another mother of a child in the overweight category justified the situation. "She does not get stubborn she eats what I tell her. I mean for example she would pick from the plate only things like carrots, eggplant, potatoes and would not eat zucchini. I think it's normal, and everyone has their own taste." A few mothers responded to this scenario by stating "I do not force my children to eat."

For the second scenario if the child wanted a particular food the mother disapproved of, the mothers of children in the overweight and obese category shared how they managed this

situation and often were not consistent with one way. It was either they gave a little (then no is no), did not give a choice, hid the food (or gave a little), or said no (sometimes choice). A mother of a female in the obese category explained how she gave a little (then no is no), “I give her a small quantity, for example, if she wants chocolate or sweets, I tell her okay, we will take it, but I will give you a small quantity, and I give her the quantity I want.” If the child is still persistent, mother says, “Sometimes no, she shouts for example, but I stand my ground.” Another mother of female in the obese category also explained, “I will ask her to eat one or two more spoons and that is all. I will tell her then to stop.” The other way was by simply no is no, one mother of a female from the overweight category, “No, that’s it. No is no.” Finally, a mother of an obese male who hid the food reported, “I mean I would just hide the food so he wouldn’t find it.” And if the child is still begging she gave a little, “I will just give him a little bit, not all what he wants.” One mother reported what she noticed in general. “I noticed something when you force a child to eat; he refuses to do so.”

Whereas, mothers of children who were in the underweight and normal weight category responded to the two scenarios differently (refused to eat and the child wants a food mother disapproves of). For the first scenario when the child refused to eat a certain food, the child usually ate after the mother sometimes told the child that others would eat your food, she then asked the child just to try it, and she did not force the child and explained the benefits and asked other children around the child to try the food.

A mother of a normal weight female explained if her child refused to eat, “If she doesn’t like something on the table, she will find something else which she likes, she does not oppose you. If she is sick or I feel she is not normal, isolated or does not make sport, I start convincing her to eat; I can tell her your cousin will eat your food, and then she will come to eat it fast.”

While another mother of a normal weight female reported, “She never says that she doesn't like certain types of food.” Another strategy used was to ask the child to just try the food, a mother explained, “If he does not like some kind of food, I ask him to try it. Some spicy food, grilled eggplant, for example, I ask him to try it to taste it. At first, he refuses to taste it, but then he likes to eat it.” While another mother reported she never forces and explained benefits to her normal weight child, “I never force her to eat something. It is difficult to do that. However, I try to tell her about the benefit of this food and how it will affect her appearance, make her hair longer, and makes her grow faster.” Finally, a mother of a normal weight child explained she uses other children to get her child to eat something she refused, “I may ask other children to psychologically support her.”

For the second scenario if the child wanted a particular food the mother disapproved of, mothers of children who were in the underweight or normal weight category either tried to discourage the child from that food item, depended on the food itself (if it was healthy or not) or used control.

One mother of a normal weight child shared she discouraged her child in the following manner. “The rule of my daughter is that she will do the opposite. So I must convince her because threatening does not work with her. I have to tell her things like Princess Sofia does not do this bad act, so my princess shall not do it. Sometimes I use her brother to convince her. I tell him you are a good boy, but if the father comes and sees your sister not eating, you won't get to go as well. So he goes to her and tells her to please do this so that father will take us. These are tricks I use.”

When mothers responded on how it depended on the food itself, one mother shared about her normal weight child the following. “If something will harm him, we don't have to even

discuss it. I tell him that is it, my dear. I give him care and explain that so he knows I have his best interest.” Another mom echoes, “I prepare it for her, especially if it is healthy and do keep it out of reach. Then I would say no and have it out of their reach, so they will not see it.”

Another mother of a male in the normal weight category shared the following strategy for controlling her child’s eating: “Then he will not eat it unless I was giving him a hard time for no reason and as long as he not full. Sometimes, when we are eating, he says he is not hungry, but then after we finish, he says that he wants to eat. I don’t allow him to eat then so he could learn from his mistakes.”

Discrepant views between parents. Mothers’ perceptions of the father’s role in shaping children’s eating behaviors have been discussed elsewhere in this report. For example, in the previous section, maternal food management, a mother used the father as a way to convince the child to eat. Another was with the use of electronics; the father would give the child an old tablet when he buys a new one; in addition to the father’s preference in watching television during meal time, will be reported in the next section. Father’s role was more apparent when the non-working mothers shared the father’s role in feeding the child impacted their meal management. A mother of a female child in the overweight category shared the father took her out for fast food. “Sometimes their dad takes them for MacDonald’s. I have no problem with that, but not every day. I don’t want them to get into the habit of takeout every day.” Another non-working mother of a male child in the obese category had similar challenges. “That’s what they eat, ice cream every day. I mean they love this stuff, their father also loves it. I mean the father sees that he is overweight and yet he gives him ice cream.” The mother explains further about the father, “he doesn’t believe that food is the problem he keeps saying that our child’s weight problem is coming from my family.... I feel like he is not helping me a lot in this area.” A few other

mothers talked about breaking their meal routines by eating out, a mother of a male child in the overweight category shared “we eat fast food from restaurants. I’m not strict about it. I don’t want my children to go outside and find out about food they’re not familiar with. I try as much as I can to be healthy, but we can’t avoid these things.”

The underweight and normal weight category mothers had shared a slightly different perspective than their overweight and obese counterparts. One mother of a male child in the normal weight category shared how they as a family never ate out, except when they were traveling and told about an incident to emphasize this point. “Three days ago, someone asked me about the best restaurants in the eastern side. I told her I am not aware of the best restaurants and cafes in our areas. Let us be without the restaurants.” She later spoke about her main influence when it came to food. “My family especially my mom is selective about food. She buys organic wheat flour and purchases food from farms that she knows the origin of the meat and rarely does she purchase those huge chickens that are injected with hormones. Also with fish, we take care not to eat it also too much because of the mercury.”

Electronics during meals. When it came to television viewing, the majority of mothers of children in the overweight and obese category indicated that television was viewed during meals or was in the background. While a few of the mothers indicated that television viewing depended on where they sat (on the floor versus on the table). One mother of a female child in the overweight category noted that the television is in the background, but iPad’s are prohibited with a few exceptions, “only when they do something good or if I was very busy and wanted an hour or so for me.” While another mother of a female child in the obese category found the iPad a challenge during meals with her daughter. “She likes the iPad, and she always has it on at lunch time. The other thing is quantity. If you’re not attentive, she uses it a lot, so you have to

be attentive all the time. She needs someone to monitor her, and she is very hard to control if no one does.” A few mothers in the overweight and obese category verbalized the problem of electronics during meals; one mother of a female in the obese category reported a problem with her child’s eating. “She likes to watch everything while eating, and this is the problem we’re trying to work with.” Another mother echoed the same message with her obese child, but then said, “.... I mean my husband and daughters don’t really like eating at the table because there is no television.” Whereas, in the normal weight category a mother associates her child’s emotions with electronics indicating, “when you prevent my daughter from using her iPad, she gets sad and goes to her bed to sleep.”

Child Eating Behaviors as Expressed by Mothers

In this portion of the interview mothers were asked to first, describe their child’s eating, second, how they responded if her child’s specified that s/he was not hungry during a meal, third, if mothers were bothered if their child ate when emotions were heightened (i.e. happy, nervous or sad), if so why or why not, and fourth, mothers were asked to describe their child’s food environment. These results are presented in two subsections, eating time and traditions in eating.

Eating time. Mothers of children in the underweight and normal weight category described that their child ate only when they were hungry or a scheduled time. “My children eat according to a schedule. They don’t eat much. They eat when they are hungry and on a scheduled time. If they don’t eat on time, they feel sick. When I feel this, I give them some snacks when I feel that my child does not want to eat her meal.” Another mother commented on the same topic and added, “If he is hungry, he loves to eat and asks me to cook fast and sometimes he helps me to finish cooking fast.” When asking the mothers of children in the underweight and normal weight category to elaborate on the speed of eating there were mixed

responses, some ate slowly, and others ate fast; additionally, one mother further described her son's eating style as "he is so clean, he does not like mess on his plate."

All but four mothers responded similarly when asked, how they responded if their child stated s/he was not hungry during a meal. Three of the four from the underweight, and normal weight category responded similarly. The first mother simply answered, "She never says that." The other two mothers seemed to second guess their children's hunger cues, and they had to make sure their child was not hungry. One mother shared "if I was sure that he already ate something, its okay. Otherwise, I tell him to sit with us and eat." The other mother said "if she is not hungry I don't force her to eat. If she is really not hungry, that's okay." The fourth mother who responded differently had a child in the overweight category, and she tried to encourage the child to eat even when the child verbalized she was not hungry. "I try to encourage her by saying the food is delicious, and don't you want to eat with me?" She explained further that she now encourages and does not force her child to eat. "In the past, if she was not hungry, I used to force her. I used to force her and make her eat. She would tell me she couldn't breathe. She was four at the time. I used to force her, and she would vomit. So why force her?"

What also stood out when asking the question on child's eating without hunger was a mother of a child in the obese category said, "I just keep his food and tell him he can play and eat later when he is hungry. I always make sure that he has drinking water. I try to help him. Sometimes he just vomits. Most of the time he vomits if he drinks something with food. He eats a lot, and there is no room left for liquids. Imagine in Ramadan he vomits every day. At the beginning I used to serve juice with meals in big cups, now I just use small ones. Food time is only for food."

Another description that also stood out from a mother of a male in the underweight category was that the mother explained about food and hunger in her family. “My son eats to be more physically active, and we eat to have energy. He gets this from his father, my husband’s family eats when they feel hungry, they eat sweets just as kind of treat and to try it. They travel abroad, so they bring sweets just to try it.”

Mothers also were asked whether they were bothered if their child ate when emotions were heightened (i.e. happy, nervous or sad), if so why or why not. Collectively all the mothers interviewed responded to this question either stating they were bothered (or not) or by noticing (or not) emotional eating in their child. One mother of a female in the overweight category reported seeing this in her child. “When she is happy she doesn’t eat a lot because she is more focused on the moment and on the thing that’s making her happy, but when I notice she is overeating I wonder if she is feeling sad and I start distracting her by asking her to do some arts and crafts.” Two other mothers with children in the overweight category reported not noticing if their child was an emotional eater. While the majority of mothers in this category reported being bothered if their child was an emotional eater; a mother of a male child in the obese category shared her struggle. “He eats in both cases. It bothers me, and I advise him to stop eating, but he does not stop. What can I do, I just can try. I feel that he is fussy with food for some kinds of food.” There was only one mother in this category who reported it did not bother her if her child was an emotional eater.

Similarly to one of the mothers of a child in the overweight and obese category, the majority of mothers of children who were underweight and normal weight indicated they were not bothered if their child was an emotional eater or they were still young. One mother of a normal weight female reported that she did not notice this in her child, but drew a comparison

between adults and children. “For us as adults, I feel it is normal. We are like this. If they are happy, I don’t want to forbid them. Until now they are not like this, when they are sad they don’t want to do anything or talk, they go to sleep. Food is an entertainer in your loneliness, you feel bad, so food can entertain you, chocolate, chips, ice cream or sometimes salty things. Children are different, and I never noticed my children doing this.”

Traditions in eating. Interviewed mothers described different things when it came to family and their children’s eating patterns and these included traditional ways and traditional food, eating on the floor versus on the table, eating with the hand or not, and child serving her/himself versus mother serving. A few of the mothers of children in the overweight and obese category when asked to describe their child’s eating, described eating with the hand, a traditional way of eating in Saudi Arabia. A mother of a male child in the overweight category shared “he likes to eat with his hands, and he takes a long time to finish eating.” However, when asked about the speed of his eating and how she would describe his appetite, she indicated, “he eats fast and has a big appetite.” Another mother of a male in the overweight category shared a more visual description. “He usually pours the buttermilk over the rice or the chicken and eats them all. He mixes it with his hands.” Similarly, she described the speed of her son’s eating and his appetite. “He had an increased appetite and he eats fast.” Another mother of a male in the obese category described her child as follows. “He has an open appetite, and eats fiercely, and he likes sweet stuff all the time all day long.”

A mother of a female in the overweight category described how her child enjoyed her food. “She chews with all her senses. When we are eating in a restaurant, she likes to change her plate after finishing what was on it, and she asks the waiter to remove the plate and bring a new plate for the rest of the courses. However, her sister and I would eat all of our food on the

same plate. And you can tell she is enjoying her food when you watch her eating and I expect her to be a chef when she grows up or an artist because she lives in her own world.”

A few mothers of children in the underweight and normal weight category when asked to describe their child’s eating, described the traditional way of eating in Saudi with the hands. However, they expressed dislikes, one using full hands. “She doesn’t start with salad or soup, but with the dense food. She eats with a very good appetite. Her hands become full and not that clean, and I often ask her to try to use her hands skillfully. She eats fast. This is wrong; however, I tell her to take smaller bites. Sometimes she responds but then forgets again.” Whereas, another mother of a male in the normal weight category shared “he does irritate me sometimes. He eats rice using his hands sometimes, just like his father. I want him to use the spoon and the fork when he eats. It is not a nice thing to watch really.”

Another mother of an obese female child described how her child’s eating varied with her mood, saying “I do not understand how exactly my daughter eats. My daughter has a moody appetite. I will not tell you that she always eats too much, for sometimes she has no mood to eat and she keeps repeating that she does not want to eat and does not want nor desire food. Sometimes she wakes up or comes from the kindergarten like this. She wakes up from her nap, and I would ask her if she wants to have lunch and she will say that she does not want to. Then, she goes to eat an apple or a banana. She will eat anything, and that is it. This is all that she eats all day sometimes.”

The majority of mothers of children in the overweight and obese category reported they ate on the floor, which is a Saudi tradition. Approximately a quarter of the mothers alternated between eating on the floor and the table. One mother of a female child in the obese category who eats only at the table stated, “I think things have changed and people nowadays can’t bear

sitting on the floor anymore with all the knee and back problem.” Another mother of a female child in the overweight category who ate on both the floor and at the table stated, “I don’t like sitting on the floor because I have a problem with my legs. I sit at the table upstairs.” However, for one family eating on the floor was described as bringing a sense of unity for the family as a mother of a female child in the obese category shared, “they sometimes eat on the table in the kitchen if they are eating alone and if the father is there, then we all sit together and eat on the floor.”

The greater majority of mothers with children in the overweight and obese category indicated that their children served themselves except one mother of a female child in the obese category who served her food. The mother explained, “I don’t allow her to serve herself because she takes too much.” Another mother of a female child in the obese category shared how she tried to manage her child’s portions when the whole family traditionally ate from one large dish. She said “she eats from the main dish. I tried to serve her alone in a different dish, but sometimes I forget. I do not limit her, but if I see her eating too much I will tell her, it is enough. No more eating. Stop. If I said, it is enough. It means it is enough and she will stop eating.”

In contrast, another mother of a male child in the obese category shared that one Saudi tradition (eating on the floor) was better for her child. She explained, “Sometimes we eat at the table, other times on the floor, and we have a problem with him about that. He doesn’t know how to eat when he is sitting at the table. He keeps reaching out to take this and that, and he wants something else. On the table, he keeps taking food from here and there. That is why I prefer to serve the food on the floor. Sometimes it’s better to eat on the floor.”

Mothers were asked to describe their child’s food environment and what was within their child’s reach regularly, and mothers from both categories described traditional food such as

spoon of honey in the morning time before any food, dates, and buttermilk before or after lunch meals, bread with thyme and labna or just bread with thyme as breakfast or dinner item.

Aside from these traditions mothers of children who were in the overweight and obese category reported a variety of food items available and these included fruits, apples, oranges, chips, biscuits and ice cream. A mother of a female in the overweight category reported in general terms that “they take the sweets available in the compound.” While a mother of a female child in the obese category indicated her child reaches for sweets “she takes them when she finds them. If it is there, we hide them and we try not to buy them, except for occasions. Aside from hiding food, a mother of a female in the overweight category explained, “we don’t have candy, chocolate, or chips at home and those are the main source of anxiety for me. We buy biscuits and chocolate only in small amounts.”

The mothers of children in the underweight and normal weight category differed slightly from the overweight and obese category in the food items that they mentioned and these included apples, cakes, carrots, bell peppers and some fruit juice. One mother of a female in the normal weight category responded to this question as follows. “I don’t leave sweets and chocolates in front of her. If she knows where they are, she goes and takes some and will just eat them.”

Summary

The Arabic version of the CFQ and CEBQ has gone through six stages of translation procedure and has shown initially acceptable alpha coefficient and content validity index scores; cognitive interviews helped in further refinement of wording, and sentence structure and overall were understandable and easy. Both questionnaires were administered for the quantitative phase in a sample of 223 mothers, and their children were measured in the schools.

In the quantitative phase, 223 mothers and their preschoolers recruited from 8 schools in the eastern province of Saudi Arabia for this study participated. Mean age for mothers was 33.4

($SD \pm 5.7$) and mean age for children was 4.9 ($SD \pm 0.9$). More than half of the children were female (54.7%), and the majority were Saudis (92.3%) and married (96.8%). More mothers (68.3%) held a university degree compared to fathers (49.8%). However, more than half (52.7%) of the mothers did not work fathers (1.8%). Anthropometrics for children showed that 5% were overweight and 6.8% were obese. While mothers who self-reported their height and weight showed that 37.9% were overweight and 26.4% were obese.

Data analysis of the CFQ and CEBQ results demonstrated internal consistency for the CFQ factors ranged from 0.53 to 0.81; while the CEBQ dimensions ranged from 0.51 to 0.93. Pearson's correlation showed the factors that were significantly correlated with Saudi children's BMI percentile were *perceived parent weight, perceived child weight, concern about child weight and pressure to eat* from the CFQ. From the CEBQ, *enjoyment of food, satiety responsiveness, slowness in eating* was found to be significant. However, child's BMI percentile and family socioeconomic status was significantly correlated with home ownership and mother being Saudi.

Further regression analyses found that not all the assumptions were perfectly met (i.e. non-zero variance test). While testing the variables, it was found that with the CFQ, maternal feeding styles accounted for an estimated 17% of the variance in child's BMI percentile. The factors that were significant included, *perceived child weight, concern about child weight and pressure to eat*. The CEBQ accounted for 8% of the variance in predicting child's BMI percentile. The dimensions that were significant included, *emotional overeating and satiety responsiveness*. The final testing was of family socioeconomic status, and that accounted for 7% of the variance in predicting child's BMI percentile. The significant variables in this model were home ownership, family monthly and yearly income.

In the qualitative phase, mothers were selected based on their child's BMI to participate in semi-structured interviews to deepen our understanding of the sociocultural aspects of the Saudi Arabian community as it related to food consumption and child feeding practices. Themes that emerged from maternal perceptions included, close to the accurate measure of their child's weight; what mothers reported others said about their child's and what mothers perceived as the consequences of overweight and obesity. Mothers shared their perspectives on their child's health and had an accurate understanding of their child's weight status. Themes were identified related to maternal feeding styles and attitudes included strategies for food management, discrepant views between parents, and use of electronics during meals. Mothers strategies differed based on their employment status, with employed mothers relying on others (i.e. grandparents, house helpers) to manage some of their child's meals. Discrepant views between parents focused on fathers bringing home sweets for the child despite the mother's desire to limit such items because of her concerns about the child's weight. Mothers also described their efforts to limit the unit electronic devices during mealtime.

Finally, the themes that emerged related to child eating behavior included eating time and traditions in eating. Themes about eating time related to the timing and setting of meals and mothers discussed food-related cultural traditions and practices that influenced their child's eating behavior such as eating on the table versus the floor and eating with the hand versus silverware.

The Arabic version CFQ and CEBQ, the quantitative and qualitative phases of this study have provided new insight into the literature on childhood obesity, maternal perceptions, feeding styles, attitudes and child eating behaviors. Cultural traditions shared by mothers in this study have played an intricate detail in better understanding the Saudi context.

CHAPTER 5: DISCUSSION

This study determined the cultural appropriateness and fidelity of the Arabic Child Feeding Questionnaire (CFQ) by (Birch et al., 2001) and Child Eating Behavior Questionnaire (CEBQ) by (Wardle, Guthrie, Sanderson, & Rapoport, 2001) with a sample of Saudi Arabian mothers of preschoolers (3-6 years old); then determined if Saudi Arabian mother's child-feeding practices as measured by the CFQ and eating behaviors as measured by the CEBQ were associated with their children's anthropometrics and maternal socioeconomic factors; finally this study described mothers' perceptions of their children's weight status, nutritional beliefs and traditional dietary habits with a follow-up sample using semi-structured interviews.

Translation Procedure

To our knowledge, the CFQ and CEBQ had not been previously translated or assessed in an Arabic population. Therefore, the aim of this phase was to determine the fidelity and cultural appropriateness of the CFQ (Birch et al., 2001) and the CEBQ (Wardle, Guthrie, Sanderson, & Rapoport, 2001) using translation, synthesis, back-translation, expert committee review, cognitive interviews, test-retest reliability and pilot testing.

Preliminary findings with a sample of Saudi mothers (n=10) showed acceptable scale-content validity scores. Acceptable internal consistency was also demonstrated in the pilot test for all CEBQ concepts and all except one concept in the CFQ. All questions were kept in the Arabic translated versions of the CEBQ and CFQ for the current study. Anderson and colleagues (2005) used a modified version of the CFQ in a different population, Blacks and Hispanics, where they removed the factor perceived child weight items because they found an error after

data collection (Anderson, Hughes, Fisher, & Nicklas, 2005). However, in our study, no modification was warranted as we underwent the six stages of translation and no major revisions were indicated. Further testing and analysis will proceed in future research in the form of a factor analysis.

In both the CFQ and CEBQ, it was found that Cronbach's alpha ranges were more acceptable during the translation procedure compared to the quantitative phase. For the CFQ (Birch et al., 2001), the translation procedure Cronbach's alphas ranged from 0.61 to 0.90 compared to the quantitative phase, which was less acceptable and ranged from 0.53 to 0.81. Similarly, the CEBQ (Wardle et al., 2001) translation procedure Cronbach's alpha ranged from 0.86 to 0.94 compared to the quantitative phase, which ranged from 0.51 to 0.93. This may be because it was the first and second sample ever to test the Arabic version of the CFQ and CEBQ and further testing in other Arabic populations is needed to further evaluate internal consistency. It has been documented that after the translation of questionnaires there is a tendency to have lower reliability scores (Polat & Erci, 2010). That said, a strength that this procedure utilized is the translation of both the CFQ and CEBQ in the formal Arabic language (Fus-ha). The translation in formal Arabic has been recommended in the literature, and more importantly this will help in the usability of the questionnaire in any Arabic-speaking populations (Khalaila, 2013).

Quantitative and Qualitative Data

For the following section, each component will start with the operational definition used followed by the integration of both quantitative and qualitative findings supported by discussion from the literature.

Maternal Perceptions of Child's health and Weight

This is operationally defined as the mother's view and understanding regarding her child's weight and her responsibility to the child (Birch et al., 2001). Mothers and fathers both contribute to the formation of their children's self-concept and this includes their children's self-perception (Hart, Damiano, Chittleborough, Paxton, & Jorm, 2014; Liechty, Clarke, Birky, & Harrison, 2016). This section will consist of what mothers said about their child, what others said, and the perceived consequences of childhood overweight and obesity.

What mothers said. The quantitative data indicated that Saudi Arabian mother's self-report of their children's weight was positively correlated, with their children's actual measured weight. In other words, mothers had closely estimated their children's actual weight status. In the qualitative interviews mothers of overweight and obese children, all felt that their children had a weight problem. While, most mothers of underweight and normal weight children described their children as normal, fine, and active and only two mothers overestimated their children's weight with one mother reporting her child was overweight and another mother reporting her child was markedly overweight. A range of international studies have documented parental misperceptions and that parents tended to mispresent their children's weight status in various populations including the western region (Al-Qassim) of Saudi Arabia and two of the Gulf countries, the United Arab Emirates and Kuwait (Aljunaibi, Abdulle, & Nagelkerke, 2013; Kim & So, 2014; Al-Mohaimed, 2016; Al-Qaoud, Al-Shami, & Prakash, 2010; Rietmeijer-Mentink, Paulis, van Middelkoop, Bindels, & van der Wouden, 2013). The results of the studies in Saudi Arabia, United Arab Emirates and Kuwait are dissimilar to this study in that mothers in this study had a clear perception of their children being overweight or obese. Although not documented in the literature, this may be explained by the fact that in recent years the problem of obesity has dramatically increased in Saudi Arabia and the Saudi Arabia's Ministry of Health

and Education have undertaken a national public campaign within the school systems to increase awareness of the problem; the campaign is targeting 20 percent of the schools in Saudi (an estimated 7,000 schools) to decrease the rate of obesity by five percent in the next five years (Taha, 2017).

Cultural preferences and family knowledge about their children's weight status is important to understand. One recent longitudinal study found that when parents identified their children as overweight, those children gained more weight over time (Robinson & Sutin, 2016). This may be explained that once parents realized their children were overweight, the parents may have been more flexible in monitoring nutritional intake than if their children were normal weight. Another study about parental knowledge about what their children's body shape looked like found that objective outer attractiveness (i.e. weight status, attractiveness, appearance) and was not understood as the subjective inner body that is based on physical capability and strength (Liechty et al., 2016).

In our study, the factor perceived responsibility did not correlate significantly with children's weight status. This may be explained in Saudi Arabian culture in that there is shared responsibility in the family between house helpers and relatives. The undeniable help of migrant and domestic workers in the country has been well-established and a part of the Saudi culture for over seven decades (Shah & Fargues, 2011). Migrant workers in the country account for an estimated 23.4% percent of the population, an estimated 7.4 million individuals (General Authority for Statistics, 2016). Due to the historical nature of migrant workers in Saudi homes, they have assumed many roles in assisting families at home, one being responsibility around the children's daily chores. During the qualitative interviews, working mothers of overweight and obese children provided further insight into the quantitative results. Mothers explained how they

delegated the responsibility of cooking and preparing food for their children to house helpers or relatives while they were at work during the week. In Saudi Arabia, the school day ends between 1:00-2:00 pm depending on the school. Children then go home and are served their big meal of the day. Mothers shared that house helpers or grandparents prepared food for their children and their children were either served in their home by the house helper or at their grandparent's home while the mother was working during the week. The emerging trend that more Saudi mothers are working outside the home full-time or part-time has surged in recent years as the world gender gap report has indicated Saudi Arabia to have the second largest improvement on the index of economic participation and opportunity globally (World Economic Forum, 2015). Literature in Saudi Arabia has only started to describe the phenomenon of house helpers, but warrants further investigation to better understand how the influence of house helpers may be beneficial or not to the family and children's health (ALNohair, 2014; Hammad & Berry, 2016).

What others said. We did not collect quantitative data on this subject. However, qualitative interviews revealed that family and friends influence on the mothers were important. Families felt comfortable voicing their concerns compared to school and health care providers. Similarly, a study found that family members had a major influence on children's experiences with their body shape since they tended to transfer their biases that were taken from the society onto children; this, in turn, impacted the children's self-concept and body image (Liechty et al., 2016; Ruffman, O'Brien, Taumoepeau, Latner, & Hunter, 2016).

One main reason why school personnel and health care providers in Saudi Arabia are not voicing their concerns about children's weight status may be due to hesitancy to discuss the problem secondary to stigma and societal perceptions. In our qualitative findings, mothers

reported that their overweight and obese children at times were called a “bear” which in Arabic (*doub*) means overweight and obese. Saudi literature is starting to cite the negative impacts of stigma (ALNohair, 2014; Bawazir et al., 2015). One study indicated that health care providers needed further skill training for addressing the problem of obesity in their clinics (Bawazir et al., 2015). The authors found that nurses and pediatricians reported feeling less competent when dealing with children with excess weight and assisting parents with lifestyle and behavioral modifications, providing assistance in parenting techniques and providing guidance in resolving family conflict (Bawazir et al., 2015). Another study focused on the negative effects of stigma on the Gulf region and the issues such as shame due to excessive weight, low self-esteem, and insulting remarks received from others (ALNohair, 2014). However, much more research is needed on the emerging problem of overweight and obesity in children and the stigma resulting as a result of it.

Consequences of overweight and obesity. The quantitative data demonstrated that factors that as children’s weight increased, mothers’ concern for their children’s health and well-being increased. Similarly, mothers of overweight and obese children during the qualitative interviews had concerns about future health problems, physical and psychological, that their children would be stigmatized because of their weight in the future. This often stemmed from the mother’s personal experience, family or friends experiences, or the views held in society. Research has found that despite gender both girls and boys experience stigma as early as preschool (Tatangelo, McCabe, Mellor, & Mealey, 2016). Other research has found that the majority of parents believed that their preschool children were too young to experience any body image or weight issues (Liechty et al., 2016). Similar to our findings, mothers, in particular, were concerned about their children’s weight issues, and their major focus was on their

children's health (Berge, Hanson-Bradley, Tate, & Neumark-Sztainer, 2016; Wright et al., 2016). From a theoretical perspective our study results have aligned with the underpinnings of Costanzo and Woody's theory, which indicated that parents who perceive that their children are at risk in certain aspects of their life such as risk for excess weight gain will use more control with their children in that specific domain of feeding (Costanzo & Woody, 1979, 1985). The aspect of control that was found significant, pressure to eat, is later discussed under maternal feeding style.

Mothers were also concerned that their children would be stigmatized if they were either overweight or obese. The literature is clear on the impact stigma has on children's well-being and later in life. Stigmatization has been found to significantly mediate the relationship between weight status and body dissatisfaction, weight status and symptoms of depression, and childhood overweight and symptoms of depression (Stevens, Herbozo, Morrell, Schaefer, & Thompson, 2016). In a literature review on stigma, the researcher describes stigma as a 'vicious cycle,' where an individual who is stigmatized leads to more stress and more stress leads to more eating and more weight gain (Tomiya, 2014). Therefore, the impact of stigma, either direct or indirect may influence children's overall well-being. Research has also shown that fathers and siblings were found to have the highest prevalence of negative stigmatizing talk towards their overweight or obese child or sibling (Berge et al., 2016). Stigmatizing talk influences a children's body image in negative ways that impacts them psychologically (Harrison, Rowlinson, & Hill, 2016; Mills & Fuller-Tyszkiewicz, 2016; Ruffman et al., 2016). Fathers and siblings concerns about participants were not the scope of this study; however, future research focusing on this area is needed.

Maternal Feeding Styles and Attitudes

Maternal feeding styles were operationally defined as the mother's approach to modifying their children's eating behaviors (Goldman, Radnitz & McGrathe, 2012). Maternal attitudes were operationally defined as the mother's view on controlling their children's feeding in regards to restriction and pressure to eat and monitoring food intake (Birch et al., 2001). As Costanzo and Woody's theory (1985) indicates, parents show more control in areas that they have issues controlling (Costanzo & Woody, 1985). A parent that has had issues around dieting and overweight and obesity may be more concerned with their children's eating and may feel their child is at risk for gaining excess weight (Johnson & Birch, 1994). This was also noted in the current study as noted below.

Strategies for food management. In our quantitative findings, regression analysis found that maternal feeding styles, as measured by the CFQ (Birch et al., 2001b), accounted for an estimated 17% of the variance in children's BMI percentile. A significant negative association was noted in one of the controlling styles which were focused on pressuring their children to eat; in other words, the more mothers pressured their children to eat the lower their children's BMI percentile was.

During the qualitative interviews, mothers of overweight and obese children expressed how they pressured their children to eat and this provided insight into the traditional practices and customs evident within the Saudi home environment. The shift of certain cultures from a more traditional to a more modern way of life many times impacts individuals and families in several domains (Thompson & Gordon-Larsen, 2011). Researchers have found that when population shifts from cultural to urban ways of eating, this sometimes creates an environment that increases individual and family risk of developing overweight and obesity (Thompson & Gordon-Larsen, 2011). This change in tradition was exemplified in the current study, where the

majority of Saudi mothers reported alternating between eating on the table and eating on the floor, which is the traditional way to eat in most Saudi homes. There was only one mother who reported her and her family only sat and ate at the table for the majority of their meals. This could be indicative of the transition within society secondary to a more urbanized way of life. Similar transitions have been reported in the Saudi literature and in other cultures as they moved from a more traditional to urbanized society and the effects and changes in the family (Al-Hazzaa et al., 2013; Ogden, Dalkou, Kousantoni, Ventura, & Reynolds, 2016; Pereira-Da-Silva, Rego, & Pietrobelli, 2016). Recent research has demonstrated that children's increased weight gain may be associated with less structure in the children's food environment, which has been documented in Mediterranean countries (Ogden et al., 2016).

The significant association between children's adiposity and pressure to eat was clear in the quantitative phase. During interviews, the majority of mothers of overweight and obese children did not directly verbalize any form of pressuring their children to eat. However, they did speak about how they allowed their children to serve themselves. Only one mother of an obese female served her child because she wanted to maintain control of portion sizes. One study reported that there were no significant differences between overweight and obese children when it came to their mother's encouraging or discouraging different categories of food such as cupcakes, green beans, or artichokes; however, they did not describe if there were any differences found between mothers of overweight or obese children and whether the children served themselves or their mothers served them their meals (Pesch et al., 2016).

Pressuring a child to eat as a way to manage their children's food intake may be examined as either positively or negatively. Parents who encouraged and addressed their children's food intake in a warm and supportive manner and who allowed their children to pay

attention to satiety cues allowed children to self-regulate; however, parents who used a lot of pressure and were demanding and controlling may inadvertently be encouraging further weight gain in their children (Fisher & Birch, 1999a; Johnson & Birch, 1994; Mosli et al., 2015; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). Our results on the construct of pressuring a child to eat was consistent with the literature related to the negative association between pressuring children to eat and children's weight status (Fisher & Birch, 1999a; Hughes, Power, O'Connor, Orlet Fisher, & Chen, 2016; Hurley, Cross, & Hughes, 2011; Johnson & Birch, 1994; Rhee et al., 2006; Shloim, Edelson, Martin, & Hetherington, 2015). More recently, a longitudinal study found the same results providing even stronger evidence and causality (Hughes et al., 2016).

Moreover, during the qualitative interviews, mothers described their feeding styles especially during the holidays and special occasions. The main holidays in Saudi Arabia include the fasting month of Ramadan and the Hajj holiday. Holidays and special events include having guests over, family visits, and other celebrations. Mothers shared how during the holidays and changes in usual routines, their children were free to eat whatever they liked at any time. For example, during big holidays there was less control over their children's meal schedule, because sweets were everywhere and they visited many homes during the day, and they did not know exactly how much their children were consuming. Another change in routine mothers described was when they had guests over, and they served dinner leading the child to eat more than usual because on normal days dinner was a light meal for the family and did not include elaborate dishes. Another issue one mother verbalized was having to hide certain foods and drinks from their child because the mother brought more for the guests such as chocolate milk or sweets. Similar to the current study, researchers have found that parents of overweight children used

non-restrictive feeding styles during special events such as Christmas, whereas parents of normal weight children were usually more restrictive (Martijn, Pasch, & Roefs, 2016).

Discrepant views between parents. The quantitative data did not incorporate father's perspectives on how fathers, managed their children's food intake and how the interplay between mothers and fathers influenced their children's eating behaviors or feeding styles. During the qualitative interviews with mothers, there were discrepant views between mothers and fathers regarding their children's food intake. Mothers expressed their repeated attempts in trying to modify their children's behavior. Mothers explained, that the fathers' voiced concern about their children's weight; however, many times placed blame for the children's weight problems on the mother's family and fathers many times brought sweet treats home for their children. Fathers were many times unknowingly undermining the mothers' efforts. There was one mother of a child in the overweight category that had the fathers support, and he replaced sweet treats with an occasional toy.

Research has also found that fathers had a strong impact on their children's physical activity, television screen time, and outdoor play in other countries such as South Korea (Park, Patil, & Norr, 2016). Interestingly enough, research has shown that father's and not mother's weight status were a significant predictor of childhood overweight and obesity; therefore, future research should include fathers as well (Brophy, Rees, Knox, Baker, & Thomas, 2012; Morgan et al., 2017; Yogman & Garfield, 2016). Research examining the relationship between fathers and their children's feeding styles has found that fathers play an important role in their children's nutrition (Parada, Ayala, Horton, Ibarra, & Arredondo, 2016). Understanding the impact that Saudi Arabian fathers have on their children's nutrition may be crucial in fully understanding the problem of overweight and obesity in children in Saudi Arabia.

Electronics during meals. There has been a dramatic cultural shift with technology use in Saudi Arabia with more than half (63.7%) of the population as active internet users, they are ranked the largest YouTube users per capita globally, the seventh globally in regards to social media accounts, the eighth most active country on Twitter and the 14th globally in regards to WhatsApp users, a group messaging mobile application (Arabnews, 2015; Global Media Insight, 2016; Smith, 2013).

Neither CFQ nor CEBQ address technology use in relation to maternal feeding or children's eating behaviors, so technology was not assessed in the quantitative phase. However, during the qualitative phase, technology was clearly apparent as mothers expressed the use of iPads as problematic during their children's mealtime. Other mothers reported their family preferred to watch television during mealtimes. Mothers of underweight or normal weight children avoided technology usage during meals and only used either a television or iPad as a reward for their children when they behaved well or during the weekends or when they spent time at their grandparents' homes.

Research has clearly advocated the avoidance of technology use during meals and with limited screen time after the age of two and never during meals (Paul et al., 2014). The act of eating while watching television contributes to unhealthy eating, consumption of more sugary drink, mindless eating and weight gain (Lee, Koleilat, Hernandez, Whaley, & Davis, 2016; Loya, Hussain, & Ismail, 2016). Similar to our study findings, one study found a common routine parents used with their preschoolers was to enable snacking while watching television in more than half of the sample (68%) who were mostly overweight and obese and that parents were using food as a form of 'enjoyment' and not for nutritional value (Blaine et al., 2016).

As mothers discussed the use of technology use during meals, it appears that the Saudi culture is moving from a more traditional culture to a more modern culture and eating patterns as evidenced by mother's reports are changing. The majority of mothers of overweight and obese children allowed the use of television during meals around the table and on the floor in the living area. In comparison, mothers of normal and underweight children less frequently reported the use of television during mealtimes and one said that television would sometimes be on when they had a salad, or it was in the background and was on mute. This rapid shift in traditional cultural practices provides an understanding of how changes in culture ultimately may be affecting the health of young children. Research that emphasizes the importance of understanding these cultural differences may provide a foundation for developing culturally appropriate interventions (Al-Nakeeb, Dodd, Lyons, Collins, & Al-Nuaim, 2014; Errickson & Berry, 2015).

Child Eating Behavior as Expressed by Mothers

This was operationally defined as children's eating patterns. The understanding of a mother's knowledge about her child's eating was important because it could either foster or hinder their child's eating behaviors and could lead to overweight and obesity (Hughes et al., 2016). Issues to consider that influenced children's development of eating behaviors are cultural norms and traditions (Niemeier, Duan, Shang, & Yang, 2017). This next section will examine children's timing and traditional ways of eating.

Eating timing or eating in the absence of hunger or eating while hungry. The quantitative results of the CEBQ found four out of eight of the factors significant, which included a positive correlation with food responsiveness and enjoyment of food with children's weight. A negative correlation was found with satiety responsiveness and slowness in eating with children's weight. In other words, the higher the child's weight, the more they responded to

food and the more they enjoyed food and the higher the child's weight, the less they responded to satiety cues, and they scored lower on eating slowly. Similarly, the qualitative findings supported the quantitative findings. Mothers of overweight and obese children shared descriptions about their children eating all the time and truly enjoying food (i.e. eating with their senses and loved food); however, mothers of underweight and normal weight children shared how their children ate only when they were hungry (i.e. ate to fuel with energy and play).

The literature on this topic is mixed when looking at the different factors related to children's eating behaviors and the results vary with the children's age. Several studies found that food responsiveness and enjoyment of food did not predict children's weight or food intake, which differed from the current study (Fildes et al., 2015; Mallan, Nambiar, Magarey, & Daniels, 2014). This may be because the participants in those studies were from the UK and Australia (Fildes et al., 2015; Mallan et al., 2014). Also, participants from one study were two years old, and they were younger than the children in the current study, and they used BMI z-scores while in the current study BMI percentiles were used (Fildes et al., 2015). Finally, the authors in one study noted their sample was small and may have been biased because none of the children were obese (Fildes et al., 2015). Similar to our findings, another study found that satiety responsiveness was a predictor of children's weight at four years of age (Mallan et al., 2014). Several other studies, similar to the current study, also found that the correlation between children's weight was positively related to food responsiveness and enjoyment of food and an inverse correlation was noted with satiety responsiveness and slowness in eating (Ek et al., 2016; Hughes et al., 2016; Silva Garcia, Power, Fisher, O'Connor, & Hughes, 2016).

A systematic review on eating in the absence of hunger found in children 12 years and younger that there was strong evidence that overweight and obese children had higher levels of

eating in the absence of hunger compared to children of normal weight children (Lansigan, Emond, & Gilbert-Diamond, 2015). It is important to note, that when parents used food to modify their children's behavior or if they encouraged their children to eat in the absence of hunger, both led to weight gain (Blaine et al., 2016). Negative parental role modeling is also a very important predictor of children's dietary patterns and is also important to take into consideration (Hebestreit et al., 2017).

The constructs found in this study that correlated with adiposity have been well established in the literature in the field of nutrition and psychology and include, food responsiveness, enjoyment of food, satiety responsiveness and slowness in eating (Ashcroft, Semmler, Carnell, van Jaarsveld, & Wardle, 2008; Epstein, Paluch, & Coleman, 1996; Jansen et al., 2003; Van Strien, Frijters, Roosen, Knuiman-Hijl, & Defares, 1985; Wardle, 2006, 2007). Additionally, these constructs that are aspects of a child's appetite have been observed as early as infancy and have demonstrated that infants with a heightened enthusiasm for feeding essentially gain more weight (Ashcroft et al., 2008; Stunkard, Berkowitz, Stallings, & Schoeller, 1999). The importance of weight gain over time has also been documented with certain eating behavior constructs; for example, satiety responsiveness (i.e. slowness in eating and fussy eaters) has been shown to reduce over time; whereas, food responsiveness (i.e. enjoyment of food and emotional overeating) has been shown to increase over time (Ashcroft et al., 2008).

Traditions in eating. The quantitative data from the CEBQ does not address traditional ways of eating; however, the qualitative interviews provided a glimpse of Saudi mothers' experiences with their children's eating. Certain cultural customs and traditions around food and eating may lead children to eat either more or less food. A tradition in Saudi Arabia that led to

eating more was shared through one mother's report of trying to control her child's portions while the entire family was eating from one main dish. This may be due to the nature of a large plate dish that everyone ate from without any plates and thus was difficult for the mother to control the child's eating. Conversely, another mother reported that it was helpful when her child ate on the floor from one main dish because her child would focus on the one meal served and would eat less compared to when her child ate at the table, and more dishes were served, and thus the child would reach for the various dishes at the table. There was no literature found that addressed child eating in the traditional manner on the floor compared to the more modern way of eating at a table in Saudi literature. Another area mothers discussed was their children eating with their hands. Some mothers reported being bothered by this traditional way of eating, and other mothers were not bothered when their children ate with their hands. There is no research to support whether children eating in the traditional manner with their hands take smaller bites and eat slower. Also, it is unclear whether children who eat with their hands are more in tune with their individual satiety level.

Other traditional issues related to obesity that are starting to emerge from the literature include traditional Saudi female attire (i.e. the black dress called abaya) has been documented as hindering movement and because it fits loosely it does not show excess weight (Alqout & Reynolds, 2014; Khalaf, Westergren, Berggren, Ekblom, & Al-Hazzaa, 2014). Also, siblings were found to have both a positive and a negative association between children's BMI in one study (Khalaf et al., 2014). The results found an association between higher fruit consumption and lower BMI when a girl had sisters; conversely, girls' BMI increased in families that had more than three brothers (Khalaf et al., 2014).

Non-Significant Findings

Complex problems, such as obesity, can be better understood with a study design that incorporates both quantitative and qualitative data (Creswell & Clark, 2011; Davidson, Lawson, & Coatsworth, 2012). Although the qualitative data has informed the quantitative data and new information on the Saudi population are starting to be understood, there remain unexplained results, and this section will attempt to provide support for the non-significant results found in this study.

Maternal Feeding Styles

The two maternal feeding styles as measured by the CFQ that did not find any significant correlation with children's weight in our sample were maternal monitoring and restriction. Similarly, during the regression testing both maternal monitoring and restriction did not predict children's BMI. Similar to the Birch and colleagues (2001) original confirmatory factor analysis study of the CFQ, the authors found monitoring was not related to children's weight status. Dissimilar to our results, food restriction was slightly positively related to children's weight. Costanzo and Woody's theory (1984) discusses both monitoring and food restricting feeding styles that tend to stem from parental concern about their children's weight. They also note the importance of understanding parental self-report be it truthful or biased (Costanzo & Woody, 1984). The current study is the first in a Saudi population. Thus, further testing is needed to better understand the underlying relationships. Both feeding styles monitoring and restriction may hold contextual meaning and cultural and societal influences that have not been closely examined.

Monitoring was operationally defined as the extent to which mothers supervise and oversee their children's eating (Birch et al., 2001). In Saudi Arabia, the influence of family relatives and house helpers as expressed by mothers was apparent. Further examination of the

different adults supervising children's day to day life in Saudi Arabia and how these adults monitor children's nutrition and food intake is needed. The influence other care providers have in children's daily life has been supported in this study by the qualitative phase, where working mothers shared the extent house helpers prepared meals and made schedules. Other mothers shared they received family support by having their children go to their grandparents' home after school, and they received consistent meals throughout the week.

Restriction to eat was operationally defined as a mother limiting access to specific foods with the intent to improve child's eating behaviors (Birch et al., 2001; Goldman, Radnitz, & McGrath, 2012). Literature supports that restriction and pressure to eat has been consistently found to be related to children's weight status, unlike monitoring (Benton, Skouteris, & Hayden, 2015; Birch et al., 2001; El-Behadli, Sharp, Hughes, Obasi, & Nicklas, 2015). Restriction of certain foods has been shown to be unhelpful in the development of appropriate eating behaviors, it increases the children's intake of that particular food and yields the risk for excess weight gain (El-Behadli et al., 2015; Rollins, Loken, Savage, & Birch, 2014). The effects of maternal restrictive feeding styles have been supported and replicated over time and in experimental studies (Fisher & Birch, 1999b; Rollins et al., 2014).

Within the Saudi context, mothers during the qualitative interviews shared different ways on how they restricted food and were not consistent with one way. Food items (i.e. sweets and candy) that mothers' did not approve of sometimes gave a little; other times stood their grounds or other times said no. Moreover, the meaning around food within the Saudi culture holds deep values of generosity and giving. This can be exemplified and is more apparent during special observances such as Ramadan that is considered the month of giving and generosity (Aldossry &

Varul, 2016; Bakhotmah, 2011). Therefore, restriction as a feeding style with Saudi mothers needs further investigations to understand better these associations and the meaning it holds.

Child Eating Behaviors

The three constructs on childhood eating behavior that found no significant relationship between children's BMI in our studied sample were a desire to drink, fussiness and emotional undereating. Emotional eating either way (over or under) is strongly associated with stress (Jääskeläinen et al., 2014). Our studied population (children aged 3 to 6) may be still too young to exhibit emotional eating that is associated with their perceived stress (Chao et al., 2016). Additionally, weight gain and emotional eating have been documented to increase later in life (Ashcroft et al., 2008).

Dissimilar to our results, food fussiness has been linked to excess weight gain in children and may be part of children's temperament, a biological characteristic, such as being shy, activity and emotionality (Ashcroft et al., 2008). Food fussiness has also been found to highly predict children's food preferences such as the liking of fewer vegetables and less variety of food (Holley, Haycraft, & Farrow, 2017). In our study, mothers reported in the qualitative phase, that they gave their children what they were asking for and if they were fussy about a particular food, they don't force them to eat it. Further investigation is needed in this area among Saudi Arabian children.

Similar to our results with the construct desire to drink on childhood obesity proneness, previous literature has documented a nonsignificant relationship between desire to drink and children's BMI (Sweetman, Wardle, & Cooke, 2008). The results were explained as a desire to drink in preschoolers that were associated with a preference in drinking sugary drinks and was not related to thirst (Sweetman et al., 2008). Dissimilar to our results, other researchers found a desire to drink in relation to a higher BMI in children (Wardle et al.,

2001). More recently, the construct desire to drink has also been removed from the adult version of the CEBQ, the Adult Eating Behavior Questionnaire (AEBQ) due to the lack of clarity on the type of drinks that it pertained to, which could include either water, sugary drinks, or milk (Hunot et al., 2016). As with the children in our study, some of the mothers wrote a comment beside the statement on the CEBQ (Wardle et al., 2001) “*My child is always asking for a drink*” or that they were not clear about which type of drink was meant in the statement asking about a desire to drink.

Socioeconomic Factors

The socioeconomic factors that were examined included, yearly family income, mother’s social status, mothers’ and fathers’ education, mothers’ and fathers’ workplace, mother’s and children’s citizenship (Saudi or not) and home ownership (owned or rent). These factors have been documented as being influential when studying childhood obesity in the Saudi literature and elsewhere (Al-Quwaidhi, Pearce, Sobngwi, Critchley, & O’Flaherty, 2014; Al-Saeed, Al-Dawood, Bukhari, & Bahnassy, 2006; Al Alwan, Al Fattani, & Longford, 2013), with the exception of home ownership and citizenship, which has yet to be documented in the Saudi literature. Additionally, residential areas (city and neighborhood) were also used for data collection, but were not within the scope of the study and will be examined in the future.

The correlation testing found all but two of the above factors were not significant correlates with child adiposity. Maternal citizenship and homeownership were found to have significant negative correlations. Being a Saudi mother was associated with increased children’s weight status. Increased children’s weight status was also correlated with rented homes rather than owned homes. Whereas being a Saudi mother did not predict children’s weight with the regression analysis, a rented home, increased family monthly income, but oddly decreased yearly income, did predict higher children’s weight status. In the Saudi literature, a higher family

income correlates with childhood obesity (Alam, 2008; ALNohair, 2014; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011). In our results, it seems inconsistent that monthly family income and yearly family income contradict one another and were not aligned. To provide a better context, during the quantitative data, mothers answered the question of family income in two ways and forms; one was fill in the blank, what is your yearly family income? The other was based on the World Bank's Saudi average salaries for low, medium and high socioeconomic status and was in the form of a multiple-choice question, the monthly family income. This may have caused some confusion to mothers. Another reason may be due to the sensitivity regarding finances that may have led to misinformation in their answers, and other mothers either left one or both questions unanswered. A different reason may be due to the changing demographics related to obesity, where socioeconomic factors and obesity in Saudi Arabia are at a plateau, and we might observe in future years a change in the relationship between obesity and socioeconomics. Obesity and socioeconomic in different countries have been documented to be associated with lower socioeconomic status (He, James, Merli, & Zheng, 2014).

Future Research and Policy Implications

Evidence has shown that the success of childhood obesity prevention and management programs are highly dependent on families' engagement and participation (Kelleher et al., 2017; Robertson, Murphy, & Johnson, 2016). More specifically, the father's role has been understudied, and there is a knowledge gap in examining the effectiveness of engaging both parents in research trials that deliver parenting skills and positive health messages (Morgan et al., 2017; Wilson et al., 2016). Family dynamics and siblings' influence is another understudied area and is integral in studying childhood obesity especially in Saudi Arabia due to the larger family sizes and close family circles.

Aside from the family environment, school settings may be a good place to start obesity prevention programs as it has been documented to have positive results and can be a safe space to promote a positive environment for children (Berry et al., 2014). While conducting this research study in Saudi Arabia, the collaboration with the schools was very positive and supportive. The majority of schools requested that the researcher keeps in contact for future research and this holds promise for collaborative efforts with the researcher, community, and school systems. This may also facilitate the implementation of proper school policies that are based on research. The researcher found during data collection that several of the schools had started health promotion programs to address the rising problem of childhood obesity in the country. One area of focus these schools were working on was increasing fruit and vegetable intake, as a policy which has been recommended in the literature (Leeman, Myers, Ribisl, & Ammerman, 2016). This was surprising as the researcher was unaware of these programs and they have yet to be documented in the Saudi literature.

Current evidence on prevention work on childhood obesity that has found encouraging results includes, targeting schools and homes, creating policies on reducing sugar intake and soft drinks. Management of childhood obesity has shown mixed results, underscoring that childhood obesity is difficult to manage (Robertson et al., 2016). Thus, the focus on prevention and taking a systems approach is critical in addressing this problem (Leeman et al., 2016; Robertson et al., 2016). The social and cultural contexts of any population influence the way research questions are asked, yet despite these differences across cultures, the overall goal is universal and is focused on enhancing children's health (Christian, 2017).

Limitations

This study has some limitations. First, further testing of the Arabic CFQ and CEBQ is needed because initial Cronbach's alphas were low and that may be due to the new population it was administered with. Second, because the quantitative phase study was observational in nature, associations must be interpreted with caution; moreover, the data were self-reported and may be subject to bias. Third, the qualitative phase may not have reached theoretical saturation as security issues in the country endangered the researcher, and the dissertation chair felt it wise to stop data collection. Fourth, generalizations are difficult to conclude in this study since it was one cross-sectional sample in Khobar city. Future research using a theory-based intervention that is culturally tailored to Saudi families to prevent the development of overweight and obesity in young children and testing the efficacy and eventually effectiveness is needed (Lansigan et al., 2015).

Summary

This study provides new knowledge in the area of maternal perceptions, attitudes, feeding styles and their children's eating behavior through the use of quantitative and qualitative data to further deepen our understanding of the rising problem of childhood obesity in Saudi Arabia. Childhood obesity is a complex multi-level issue that requires multi-component, comprehensive and effective interventions that consist of a multi-disciplinary team that carefully considers the targeted culture (Caprio et al., 2008; Ells et al., 2015; Hodges, Smith, Tidwell, & Berry, 2013; Townshend & Lake, 2017).

Mothers shared what they thought about their children's weight and health in general, shared what others had told them and their views on the consequences of overweight and obesity. Maternal feeding styles and attitudes revealed food management strategies used in the home, discrepant views between parents and technology use during meals. Saudi Arabian children's

eating behaviors as expressed by mothers has shed light on traditions and cultural practices that have yet to be further studied and better understood. These mothers have shared their experiences and wisdom on how they managed their daily lives and have opened the door to better understand these concepts and constructs within a new population in Saudi Arabia.

Results from this study contribute to the literature in that it provides further support to the rising problem of obesity in children, and this can be attributed to a combination of Saudi cultural practices, adapting modern changes and rapid economic growth, which has facilitated an obesogenic environment (DeNicola, Aburizaiza, Siddique, Khwaja, & Carpenter, 2015).

**APPENDIX A. LETTER OF SUPPORT FROM MINISTRY OF EDUCATION
(EASTERN PROVINCE BRANCH)**

الرقم : ٣٧٦٨٨٥٣٣
التاريخ : ١٠/١/١٤٣٧ هـ
المرفقات : استمارة

بسم الله الرحمن الرحيم
وزارة التعليم
Ministry of Education

المملكة العربية السعودية
وزارة التعليم
(٢٨٠)
الإدارة العامة للتعليم بالمنطقة الشرقية
إدارة التخطيط والتطوير

الرؤية: الريادة لبناء جيل مبدع	الرسالة: تقديم خدمات تربوية وتعليمية ذات جودة عالية وفق معايير عالمية بمشاركة مجتمعية	القيم: المواطنة - الأمانة - العدل - العمل بروح الفريق - التنمية الذاتية - المسؤولية الاجتماعية
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إلى : المحكرمين / مديري مكتبي التعليم (الخبر - الظهران)
من : مديرة إدارة التخطيط والتطوير
بشأن: تسهيل مهمة الباحثة / سمي سامر حماد

السلام عليكم ورحمة الله وبركاته ، ، ،
بناءً على موافقتنا بشأن تسهيل مهمة الباحثة / سمي سامر حماد طالبة الدراسات العليا
لمرحلة الدكتوراه بجامعة نورث كارولينا بالولايات المتحدة الأمريكية، والتي تجري بحثاً
بعنوان (بحث كمي و نوعي عن اساليب تغذية الطفل و نموه في المملكة العربية السعودية)،
حيث يتطلب البحث تطبيق استبانة على مرحلة رياض الأطفال و أولياء الأمور من الأمهات.
عليه فلا مانع من تسهيل مهمتها ، علماً أن التطبيق سيكون من قبل الباحثة نفسها.
يسعدني شكركم على عنايتكم وتجاوبكم مع ظروف الباحثة.
والسلام عليكم ورحمة الله وبركاته ، ، ،

نوال بنت عبد الرحمن التيسان
عنا

م/الخبر
١٠/١/١٤٣٧ هـ

APPENDIX B. PERMISSION TO TRANSLATE THE CFQ INTO THE ARABIC LANGUAGE

Response: On Mar 31, 2014, at 12:03 PM, "Leann Birch" <llb15@uga.edu> wrote:

>
> Attached are the CFQ materials you requested. To my knowledge, the CFQ has not been translated to Arabic. Thanks for your interest in our work, and let me know if you need anything else, Leann
>
> Leann L. Birch
> William P "Bill" Flatt Professor
> Department of Foods and Nutrition
> 176 Dawson Hall
> The University of Georgia
> Athens, GA 30602-3632
> email: llb15@uga.edu<<mailto:llb15@uga.edu>>
> Phone: 706-542-2899
> FAX: 706-542-5059

E-mail Sent: 28 February 2014 01:45

Dear Dr. Birch,

I hope this finds you well. I am currently a PhD student in Nursing at the University of North Carolina at Chapel Hill. I am from Saudi Arabia researching childhood obesity in my country, particularly exploring mother's child-feeding practices, attitudes and beliefs and perceptions of their child's weight status (preschool age: 3-6years).

I am interested in using your most current tool, Child Feeding Questionnaire (Birch et al., 2001) for my dissertation work, but kindly wanted to ask your permission and if there were any associated fees with using your tool. I also would like to kindly request the original development of the tool (Johnson & Birch, 1994), as I am writing a class paper this semester examining a tool of interest.

There were two questions, I tried to find an Arabic version of the current CFQ, but was unable to find any published work on that. Are you aware if there was any? Was there anything you wanted to mention about the tool and its use? I have been fascinated by your work and your contribution to the literature has been exceptionally unique. Thank you in advance for your time.

Kind Regards,
Sama Hammad

References:

Birch, L. L., Fisher, J. O., Grimm-Thomas, K., Markey, C. N., Sawyer, R., & Johnson, S. L. (2001). Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite*, 36(3), 201-210.

Johnson, S. L., & Birch, L. L. (1994). Parents' and children's adiposity and eating style. *Pediatrics*, 94(5), 653-661.

APPENDIX C. PERMISSION TO TRANSLATE THE CEBQ INTO THE ARABIC LANGUAGE

Response: Friday, February 28, 2014 10:58 AM

Dear Sama,

Thank you for your email and interest in Professor Wardle's research. Professor Wardle is very pleased that you are interested in her work and is happy for you to use the 'Child Eating Behaviour Questionnaire' for the purpose of your research. Please note that the questionnaire, along with scoring information, is available free of charge on our website:

(<http://www.ucl.ac.uk/hbrc/diet/resources.html>).

We have not got Arabic version of the questionnaire on our record so you are welcome to translate it and adapt it, although we would ask that you send us a copy for our records and keep us up to date with any publications arising from this work.

Please note that you should use backward and forward translation method (i.e. translating the English version to Arabic and your Arabic version back to the English version) when translating the questionnaire. Both translation methods should be carried out by at least two independent translators who should corroborate their versions and agree on the final version. Lastly, it would be advisable that you pilot your adapted version in order to validate the questionnaire in its final form. Good luck with your research.

With best wishes,

Maggie (On behalf of Professor Jane Wardle)

Dr Malgorzata Heinrich

Chartered Psychologist and Research Associate

Health Behaviour Research Centre (Rm 217)

University College London

1-19 Torrington Place

London, WC1E 6BT, UK

Tel: +44 (0)207 679 1809; Fax: +44(0)207 813 2848

E-mail Sent: 28 February 2014 01:45

Dear Dr. Wardle,

I hope this finds you well. I am currently a PhD student in Nursing at the University of North Carolina at Chapel Hill. I am from Saudi Arabia researching childhood obesity in my country, particularly exploring children's eating behaviors as assessed by their mothers (preschool age: 3-6years).

I am interested in using your most current tool, Child Eating Behavior Questionnaire (Wardle, Guthrie, Sanderson, & Rapoport, 2001) for my dissertation work, but kindly wanted to ask your permission and if there were any associated fees with using your tool.

There were two questions, I tried to find an Arabic version of the current CEBQ, but was unable to find any published work on that. Are you aware if there was any?

Was there anything you wanted to mention about the tool and its use? I have been fascinated by your work and your contribution to the literature has been exceptionally unique. Thank you in advance for your time. Please do correct me if I have any misinformation about your tool.

Kind Regards,

Sama Hammad

Reference:

Wardle, J., Guthrie, C. A., Sanderson, S., & Rapoport, L. (2001). Development of the children's eating behaviour questionnaire. *Journal of Child Psychology and Psychiatry*, 42(7), 963-970.

APPENDIX D. COMPARISON BETWEEN THE CHILD FEEDING QUESTIONNAIRE AND CHILD EATING BEHAVIOR QUESTIONNAIRE

Criteria	CFQ (Birch et al., 2001)	CEBQ (Wardle et al., 2001)
Components of instruments:		
1-Instrument format, number of items & alpha coefficients.	<p>31-item Likert scale with 7 factors:</p> <p>1-Perceived responsibility ($\alpha = 0.67^m$; 0.70^f)</p> <p>2-Perceived parent weight ($\alpha = 0.72^m$; 0.69^f)</p> <p>3-Perceived child weight ($\alpha = 0.82^m$; 0.84^f)</p> <p>4-Concern about child weight ($\alpha = 0.74^m$; 0.77^f)</p> <p>5-Restriction ($\alpha = 0.77^m$; 0.66^f)</p> <p>6-Pressure to eat ($\alpha = 0.68^m$; 0.67^f)</p> <p>7-Monitoring ($\alpha = 0.86^m$; 0.86^f)</p> <p>^m Mother (n= 197); ^f Father (n= 195)</p>	<p>35-item Likert scale with 8 scales:</p> <p>1-Food responsiveness ($\alpha = 0.80^{i2}$; 0.82^{i3})</p> <p>2-Enjoyment of food ($\alpha = 0.91^{i2}$; 0.91^{i3})</p> <p>3-Emotional overeating ($\alpha = 0.79^{i2}$; 0.72^{i3})</p> <p>4-Desire to drink ($\alpha = 0.89^{i2}$; 0.90^{i3})</p> <p>5-Satiety responsiveness ($\alpha = 0.74^{i2}$; 0.83^{i3})</p> <p>6-Slowness in eating ($\alpha = 0.74^{i2}$; 0.80^{i3})</p> <p>7-Emotional under-eating ($\alpha = 0.74^{i2}$; 0.75^{i3})</p> <p>8-Fussiness ($\alpha = 0.91^{i2}$; 0.91^{i3})</p> <p>ⁱ² Sample 2 (n=177); ⁱ³ Sample 3 (n=222)</p>
2-Printed layout	<p><i>Handling:</i> Easy to read and organized; however due to the variety of responses (from agree- disagree; concerned - unconcerned) can be confusing for participants. Moreover, the use of numbers inside the response option can be confusing. Although the authors emphasize to only check one, but I can see how they can choose multiple options.</p> <p><i>Audience:</i> Parents</p> <p>* It has been administered alone and with other instruments along too.</p>	<p><i>Handling:</i> Easy to read, clear and organized. The ease of response options is better than CFQ when compared, because there is a tick box instead of numbers and due to the consistency of responses flows easily.</p> <p><i>Audience:</i> Mothers</p> <p>* It has been administer alone and with other instruments along too.</p>
3-Instructions to the subjects	Redundant instructions repeated on each section (6 times) and the use of CAPS LOCK could be interpreted and understood differently (i.e. aggressive tone, shouting).	Clear and to the point instructions with only two sentences.
4-Wording and structuring of the items	<p><i>Reading level:</i></p> <p>Flesch-Kincaid Grade Level score: 7.1 (via Microsoft word)</p> <p><i>Strengths:</i></p> <ul style="list-style-type: none"> - All short one-sentence items. - Each item expressed one idea. <p><i>Weaknesses:</i></p> <ul style="list-style-type: none"> - Used positively and negatively worded terms in the same item in item 23 & 24. - Used health term 'high-fat food' and 'right kind of food' maybe understood differently by parents and between cultures in items 18 & 3. 	<p><i>Reading level:</i></p> <p>Flesch-Kincaid Grade Level score: NA (indicated 0 via Microsoft word)</p> <p><i>Strengths:</i></p> <ul style="list-style-type: none"> - All short items. - Avoided health care jargon. <p><i>Weaknesses:</i></p> <ul style="list-style-type: none"> - Value-laden term 'always' in items 6, 12, 31 & 34.
5-Response format	<p>Ranged with different 5-responses depending on the factor and included,</p> <ul style="list-style-type: none"> - Always to never - Markedly underweight to markedly overweight. - Unconcerned to very concerned - Agree to disagree <p><i>Weakness:</i> Can be confusing or misunderstood.</p>	<p>One consistent response format was used, always to never.</p> <p><i>Strength:</i> Consistent and more clear.</p>

* Criteria based on Pett and colleagues (2003) on components of instrument for comparison.

APPENDIX E. DEMOGRAPHIC QUESTIONS

Child's health history: _____

Child's birth weight: _____

Child's birth length: _____

Gestational age at birth: _____

Duration of exclusive breastfeeding: _____

Time of solid food introduction: _____

Mother's current age: _____

Mother's birthdate: _____

Mother's height: _____

Mother's weight: _____

Child's age: _____

Child's birthdate: _____

Child's preferred meals: _____

Child's preferred drinks: _____

Number of children: _____

Mother's education: _____

Mother's work: _____

Father's education: _____

Father's work: _____

Household income: _____

Residence area: _____

APPENDIX F. INTERVIEW GUIDE

Interview Questions (*probing questions in italic*):

1. Tell me more about your last doctor's visit about (child's name) health?
 - *Describe child's health?*
 - *What is mother's perception of child's health and weight and if it is a problem?*
 - *What others (family, relatives, friends, healthcare professional, media) say about child's weight?*
 - *What does mom do for child's weight, if any?* (Questions adapted from McDonald [2012])
2. How would you describe a child with a healthy weight?
3. Do you think it is a problem to have a child with excess weight? *Why... Why not...*
4. Tell me more about when you were growing up as a child in regards to food and activity?
5. What was different for you in terms of food and diet that changed now for your child?
6. Can you describe your typical day in relation to the family's feeding patterns and activity?
7. When you are faced with a problem with your young one, how would you solve it?
8. Do you think an overweight or obese child would have an increased risk of diabetes? *Why... Why not...*
9. What is the probability that you think an overweight or obese child will grow into adulthood?
10. Did your child's doctor ever tell you that your child is gaining too fast or is overweight?
11. In relation to your child's weight: I feel my child is... (*Underweight, a little underweight, about the right weight, a little overweight, or overweight*) (Adapted from Eckstein et al., 2006)
12. What are your concerns about your child's health if s/he was overweight?
13. What are your concerns about your child's weight status?
14. What is your child's activity level? (*per day, per week and compared with other children*)
15. What are your concerns about the health effect of your child in relation to the degree of influence on the child's food choices?
16. What is the importance of parents' being role models on exercise and dietary habits?

APPENDIX G. CHECKLIST FOR ENHANCING TRUSTWORTHINESS OF QUALITATIVE ANALYSIS

Phase of the content analysis study	Questions to check
Preparation phase	<p>Data collection method</p> <p>How do I collect the most suitable data for my content analysis?</p> <p>Is this method the best available to answer the target research question?</p> <p>Should I use either descriptive or semi-structured questions?</p> <p>Self-awareness: what are my skills as a researcher?</p> <p>How do I pre-test my data collection method?</p> <p>Sampling strategy</p> <p>What is the best sampling method for my study?</p> <p>Who are the best informants for my study?</p> <p>What criteria should be used to select the participants?</p> <p>Is my sample appropriate?</p> <p>Is my data well saturated?</p> <p>Selecting the unit of analysis</p> <p>What is the unit of analysis?</p> <p>Is the unit of analysis too narrow or too broad?</p>
Organization phase	<p>Categorization and abstraction</p> <p>How should the concepts or categories be created?</p> <p>Is there still too many concepts?</p> <p>Is there any overlap between categories?</p> <p>Interpretation</p> <p>What is the degree of interpretation in the analysis?</p> <p>How do I ensure that the data accurately represent the information that the participants provided?</p> <p>Representativeness</p> <p>How to I check the trustworthiness of the analysis process?</p> <p>How do I check the representativeness of the data as a whole?</p>
Reporting phase	<p>Reporting results</p> <p>Are the results reported systematically and logically?</p> <p>How are connections between the data and results reported?</p> <p>Is the content and structure of concepts presented in a clear and understandable way?</p> <p>Can the reader evaluate the transferability of the results (are the data, sampling method, and participants described in a detailed manner)?</p> <p>Are quotations used systematically?</p> <p>How well do the categories cover the data?</p> <p>Are there similarities within and differences between categories?</p> <p>Is scientific language used to convey the results?</p> <p>Reporting analysis process</p> <p>Is there a full description of the analysis process?</p> <p>Is the trustworthiness of the content analysis discussed based on some criteria?</p>

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