
A thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy

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Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Mohammad Alrashidi

Date:
Abstract

Background: The prevalence of overweight and obesity among children has reached epidemic proportions across the world. Overweight and obesity in children is associated with an increased risk of chronic diseases. This study was designed to assess the prevalence and the risk factors of overweight and obesity among public school children in Kuwait and explored how children and their parents perceived these issues. In addition, the study examined the perceptions and attitudes of school teachers and government officials toward this serious public health issue.

Methods: A mixed method study surveyed 635 parents and children aged 11–14 years (males and females) in 12 selected public schools. Questionnaires were developed to elicit information from parents’ and their children’s perceptions of weight status, physical activities, sedentary activities, daily food intake as well as their attitudes toward overweight and obesity in general. The children’s BMIs were measured according to the World Health Organization’s guidelines. Focus group discussions and face-to-face interviews with the school teachers and government officials were conducted to explore their perceptions of overweight and obesity. Survey data was analysed using descriptive and inferential statistics, and content analysis was used for qualitative data.

Results: One quarter of the surveyed children (25.5%) were overweight. An additional one third of the participants (36.5%) were classified as obese. The nurses’ measurements of BMI disagreed with the children’s perceptions of their own weight and obesity. The children’s perceptions were better aligned with their parents’ perceptions of overweight and obesity. Multiple regression models found that the BMI
of male children increased significantly with age, if they had overweight siblings, spent time on sedentary activities, or regularly ate food from fast food restaurants. The BMI of female children also increased significantly with age, if they had overweight siblings, ate at fast food restaurants, and for who not walk to and from school.

The focus group and interview findings revealed the following key themes and perceptions among participants:

1. obesity was considered a non-normal or disease condition
2. unhealthy diets and lack of exercise were contributing factors to obesity
3. schools did not appropriately address overweight and obesity among school children
4. there was a need for schools, school nurses, home, and community cooperation to promote healthy lifestyles.

**Conclusion:** With the diagnosis of overweight or obesity rising across the world, the need for early interventions is critical. There is a clear need for the collective effort of government officials, parents and teachers to provide measures that enhance prevention, control and management of overweight and obesity among Kuwaiti school children. School nurses could make substantial changes by assessing, monitoring and providing health teaching for parents and their children.

**Keywords:** Obesity, overweight, Kuwait, parents, school children, prevalence, factors, perception.
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Dedication

I dedicate this work to all the people who helped me in the completion of this project. First of all, my mother, whose tireless support and encouragement for me to achieve my goal was ongoing. My beloved wife, Mahaa, who has lived with me in my pilgrimage, for being patient and supporting me in the most difficult times of my life by caring for all my children and providing a good environment that helped me write this doctoral thesis. Furthermore, to all my children, Khaled, Fatemah, Omar, Aisha, Zainab and Sarah, who were deprived of several holiday celebrations as a result of my preoccupation with this research project. I especially dedicate this work to my autistic son, Omar, who needs my permanent support to meet his daily needs. I pray that Allah may cure you soon and that you will be able to read this project.
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<tbody>
<tr>
<td>ABAKQ</td>
<td>Adolescent Behaviours, Attitudes and Knowledge Questionnaire</td>
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<td>ANOVA</td>
<td>Analysis of Variance</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>BP</td>
<td>Blood Pressure</td>
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<td>CBI</td>
<td>Community-based Initiative</td>
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<td>CDC</td>
<td>Center for Disease Control and Prevention</td>
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<td>CFQ</td>
<td>Child-feeding Questionnaire</td>
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<tr>
<td>CI</td>
<td>Confidence Intervals</td>
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<tr>
<td>CLT</td>
<td>Central Limit Theorem</td>
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<tr>
<td>EMR</td>
<td>Eastern Mediterranean Region</td>
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<td>FTO</td>
<td>Fat Mass and Obesity-associated Protein</td>
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<tr>
<td>G</td>
<td>Gram</td>
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<tr>
<td>IOTF</td>
<td>International Obesity Task Force</td>
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<tr>
<td>Kg</td>
<td>Kilogram</td>
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<tr>
<td>Kcal</td>
<td>Kilocalories</td>
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<tr>
<td>ME</td>
<td>Ministry of Education</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<tr>
<td>NAFLD</td>
<td>Non-alcoholic Fatty Liver Disease</td>
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<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council of Australia</td>
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<tr>
<td>OSAS</td>
<td>Obstructive Sleep Apnoea Syndrome</td>
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<tr>
<td>PE</td>
<td>Physical Education</td>
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<td>PFS</td>
<td>Physical Fitness Score</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>RMIT</td>
<td>Royal Melbourne Institute of Technology University</td>
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<tr>
<td>SES</td>
<td>Socioeconomic Status</td>
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<tr>
<td>SSB</td>
<td>Sugar-sweetened Beverage</td>
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<td>TV</td>
<td>Television</td>
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<td>United Arab Emirates</td>
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<td>VIF</td>
<td>Variance Inflation Factor</td>
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<td>WHO</td>
<td>World Health Organization</td>
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Chapter 1: Introduction and Background

This thesis sits within the arena of child overweight and obesity and perceptions toward this epidemic, in particular, focusing on children living in the six provinces of Kuwait. The thesis draws largely upon data concerning the prevalence/risk factors that contribute to childhood overweight and obesity, along with the perceptions of the target population, and is obtained from two methodological approaches. Firstly, a quantitative approach involving a questionnaires given to school children and their parents was undertaken. Secondly a qualitative approach involving face-to-face interviews and focus group discussions with teachers, officials from the Education and Health Ministries was conducted.

This chapter is designed to provide background to the significance of the current study. In particular, the chapter provides a brief overview of the state of Kuwait in terms of its geography, climate, population, health system, education system and economic status, which will enhance the reader’s understanding of the research setting. Also, the significance of this study, its aims, the research questions and the structure of the thesis will be discussed.

1.1 Background of the Study

Globally, the prevalence of overweight and obese children and adolescents has reached epidemic proportions (World Health Organization [WHO], 2015a). The latest statistics on the incidence of overweight and obesity in developed and developing countries indicate the seriousness of this issue. For instance, in developed countries, within the
European region, a study conducted in 15 European countries (Spain, Italy, Belgium, Greece, Czech Republic, Hungary, Ireland, Latvia, Lithuania, Malta, Norway, Cyprus, Portugal, Slovenia and the Republic of Macedonia) presents alarming statistics showing that the rate of overweight ranged between 18% and 50% among girls and between 18% and 57% among boys (Wijnhoven et al., 2014).

In developing countries, the prevalence of obesity among children and adolescents was found to be 22.1 % in Brazil, 41.8 % in Mexico, 19.3 % in Argentina and 22.0% in India (Gupta, Shah, Nayyar & Misra, 2013). A recent review in the Eastern Mediterranean Region (EMR) showed that between 7% and 45% of school children were overweight or obese (Musaiger, 2011). Several studies conducted in Kuwait show that overweight and obesity are indeed prevalent in this country, with estimates suggesting that one third of children and adolescents are overweight or obese (El-Bayoumy, Shady & Lotfy, 2009; Musaiger et al., 2012; Ng et al., 2011; Zaghloul, 2013). Research studies have shown that individuals who were overweight or obese in childhood are more likely to have adverse health consequences during adulthood (Reilly & Kelly, 2011; WHO, 2015a). Several studies have also identified that obese children are more likely than healthy-weight children to become obese adults (Biro & Wien, 2010; Center for Disease Control, 2013).

Overweight and obesity are preventable conditions that have been identified as primary contributing factors in chronic disease. In fact, weight gain has been identified as contributing to more than 34% of mortality in people younger than 60 years of age in most Arab-speaking countries (Rahim et al., 2014). Therefore, understanding the factors that are associated with the prevalence of overweight and obesity among children is
critical to the development and implementation of effective prevention and management strategies (Ehrenthal et al., 2013; Sirin & Kolonin, 2013; Waters et al., 2011). Dattilo et al. (2012) suggest that interventions must begin in the early years and focus on children who are at risk of obesity. This period of life is recognised as the best time to instil behaviours associated with a healthy lifestyle, such as food preferences and physical activity that may then extend into adulthood (Campbell et al., 2014). Therefore, it can be anticipated that without early and effective interventions obesity will continue to be a public health concern in many countries.

A review of the current literature did not identify any Kuwaiti studies that examined the role of the parents, schools, school nurses and government in addressing child obesity. This is a significant gap in the literature that the current study attempts to address. A number of studies indicate that parents (Rutherford et al., 2015; Collins et al., 2011), schools (Clarke et al. 2013; Elizondo- Montemayor et al., 2013), school nurses (Wright, Giger, Norris and Suro, 2013; National Association of School Nurses, 2013) and the government (Taylor, Parento, & Schmidt, 2014; Tremblay, 2012) all play a significant role in promoting a healthy weight for school children.

This study was conducted to explore the prevalence of and risk factors for overweight and obesity among school children aged 11–14 years in Kuwait. The study examines the perceptions and attitudes of school children, their parents, school teachers and officials from the Ministries of Education and Health. The role of the school, school nurse, parents and government in tackling obesity among children was also examined. Hence, this study aims to inform the development of new public health policies to respond to this serious health problem.
1.2 Study Setting: Kuwait

The state of Kuwait is located on the coast of the Arabian Gulf and is bordered by Iraq in the North, Saudi Arabia in the South and the Arabian Gulf in the East. Kuwait is a small country, with its geographical area estimated at approximately 17,820 square kilometres, which is divided into six provinces: Al Asimah (Kuwait city), the capital of the country; Jahra province; Hawalli province; Farwaniyah province; Mubarak Al-Kabeer province and Al-Ahmadi province (see Figure 1.1) (Kuwait Central Statistical Office, 2013).

![Map of Kuwait](image)

*Figure 1.1. Map of Kuwait showing geographical location and bordered countries (source: Kuwait Government, online).*

The climate in Kuwait is characterised by cold, short winters with occasional rainfall and long, hot, dry summers with frequent sandstorms (Kuwait Central Statistical Office, 2013). Kuwait is an Islamic Arab democratic country with a national parliament of 50
members elected by the Kuwaitis every 4 years. Islam is the official religion of the state of Kuwait, while citizens and foreigners of other faiths are free to practice their religion. The Arabic language is recognised as the country’s official language, although English is widely used (Kuwait Central Statistical Office, 2013).

Kuwait’s total population as of 31 December 2013 was estimated at 3,965,000, comprising 1,242,000 citizens, 100,000 stateless persons and 2,720,000 foreigners. More than 90% of the population live within a 500 square kilometre area surrounding Kuwait city, the country’s capital. The population is expected to grow at an annual rate of 3.549%. The estimated infant mortality rate was 8.97 deaths for every 1,000 live births, and life expectancy was estimated at 76.51 years for males and 78.96 years for females (Kuwait Central Statistical Office, 2013).

Kuwait’s modern history began in the 18th century with the establishing of Kuwait City by Arab tribes from the Arabian Peninsula. In 1897 Kuwait became a British protectorate, subsequently gaining independence on 19 June 1961. Since attaining independence Kuwait has maintained a constitutional monarchy (Kuwait Central Statistical Office, 2013).

1.2.1 Education system. The general educational system in Kuwait consists of four levels, kindergarten lasting for 2 years, primary school for 5 years, intermediate for 4 years and secondary school for 3 years (Ministry of Education [ME] in Kuwait, 2013). The school year runs from mid-September to mid-June, and the school week is Sunday through Thursday. School starts at 7:15 a.m. and finish at 1:30 p.m., although timing varies between winter and summer and in some international private schools (ME in
Kuwait, 2013). The Ministry of Education (ME) regulates all schools, both public and private, and education is compulsory for children between the ages of 6–14 years. Since 1966 all levels of state education, including higher education, are offered to Kuwaiti citizens free of charge. The literacy rate among youth aged 15–24 years is 98.57%, one of the highest rates among the Arab world (ME in Kuwait, 2013).

Today, Kuwait’s education system is extensive; current statistics prepared by the Department of Planning in the ME in Kuwait show that education for the academic year 2010/11 had the following features (ME in Kuwait, 2013):

- 788 public schools in the state of Kuwait, with 353,327 students and 53,960 teachers,
- 489 private schools, with 212,618 students and 13,560 teachers.

The Ministry of Higher Education oversees two state-supported institutions of higher education: the Kuwait University and the Public Authority for Applied Education and Training.

1.2.2 Economic shift in Kuwait. In the past, Kuwait’s economy depended mainly on shipbuilding, the pearl industry and fishing. However, since oil was discovered in the 1930s and exports began in 1946, Kuwait has become a major oil producer (Kuwait Central Statistical Office, 2013). In 1960, Kuwait became a member of the Organization of Petroleum Exporting Countries (Kuwait Central Statistical Office, 2013).

Today, Kuwait is one of the richest countries in the world, with a relatively open economy and crude oil reserves of approximately 102 billion barrels—nearly 6% of the world’s reserves. The budget of the Kuwait Petroleum Corporation for the year
2013/2014 is estimated at 22 billion dinars, with expenditure of 21 billion dinars. One Kuwaiti dinar is equal to approximately 3 United States dollars. The wealth Kuwait gained from the production of oil has given Kuwait a per capita gross domestic product of about US$47,600 (Kuwait Central Statistical Office, 2013).

Kuwait relies on many other sectors that also play a major role in the economy, including the banking and financial sectors. These sectors include local and foreign banks and are subject to the supervision of the Central Bank of Kuwait. The investment and industrial sectors and the Kuwait Stock Exchange are also significant, which includes wholesale, retail and real estate (Kuwait Central Statistical Office, 2013).

1.2.3 Health system. Kuwait’s healthcare system is one of the most advanced in the Arabian Gulf region. The system incorporates both the public and private sectors, although over 80% of healthcare services for nationals are provided by the public sector under the Ministry of Health (MOH) (Kuwait MOH, 2012). Medical services are provided free of charge to the public in government-run clinics. The public healthcare system is run through a complex network of primary healthcare centres, secondary healthcare services, research institutions and specialised hospitals (Kuwait MOH, 2012).

Primary health care is delivered by a network of polyclinics, which are usually found in community centres, often near the local co-op supermarket in each suburb. These clinics provide preliminary examinations and routine care, and, where necessary, refer patients to hospital specialists (Kuwait MOH, 2012). Secondary healthcare services are provided by six major hospitals: Sabah Hospital, Amiri Hospital, Adan Hospital, Farwaniya
Hospital, Mubarak Al-Kabeer Hospital and Jahra Hospital. Each general hospital provides a full outpatient service and 24-hour emergency service to all citizens and residents in each region (Kuwait MOH, 2012).

Currently, there are over 100 primary healthcare centres spread across the country, where patients have access to various services, such as maternity nursing, preventative care, paediatrics and home visits if needed. Complex medical cases diagnosed at primary centres are usually referred to one of six secondary and/or one of 16 tertiary health centres, with a total bed capacity of 7095. Furthermore, the public health system is adequately staffed, with over 45,725 employees, including doctors, nurses and other technical medical staff (Kuwait MOH, 2012).

Kuwait also relies on the private sector to play an important role in supporting government hospitals. All patients, both Kuwaiti and non-Kuwaiti, pay a fee to access private healthcare facilities. Although the Government regulates private healthcare fees, they can still be expensive. Currently, there are 12 private hospitals in Kuwait, with a capacity of 1038 beds (Kuwait MOH, 2012).

The Kuwaiti MOH has recently announced a budget of US$4 billion for 2012–2013, a 100% increase from the US$2 billion budget 5 years ago. This accounts for more than 80% of the healthcare spending in the country. The Government is currently operating 19 general and specialised hospitals, with bed capacity for 10,000 people, and the public health sector is expected to grow moderately in the coming years (Kuwait MOH, 2012).

1.2.4 Nursing in Kuwait. Nursing in Kuwait goes back to 1911, with the beginning of healthcare services in Kuwait. However, nursing education first gained attention in 1962
when the Kuwait MOH, in cooperation with the ME, established the Institute of Nursing to address the shortage of indigenous nurses (Kuwait MOH, 2012; Kuwait News Agency, 2015). The Institute of Nursing in Kuwait offered a three-year nursing program for students who had completed 9 years of general education, leading to a nursing certificate (Al-Jarallah, Moussa, Hakeem, & Al-Khanfar, 2009; Al-Kandari & Lew, 2005; Kuwait News Agency, 2015). In 1974 another college of nursing was established, which offered a 2.5-year Diploma of Nursing for students who had completed 12 years of high school, and in 1982 a four-year Bachelor of Nursing was offered (Al-Jarallah et al., 2009; Al-Kandari & Lew, 2005; Kuwait News Agency, 2015).

Recent statistics from the MOH in Kuwait indicate that there are 18,000 nurses working in the Kuwaiti government sector and, of these, 1,235 are Kuwaiti (Kuwait News Agency, 2015; Kuwait MOH, 2014b). The majority of nurses working in Kuwait are from India, followed by the Philippines, Egypt, Pakistan and Indonesia (Al-Enezi, Chowdhury, Shah, & Al-Otabi, 2009; Shah, Al-Enezi, Chowdhury, & Shah, 2001).

Nurses play a prominent role in the provision of health services in Kuwait, particularly by bearing a major responsibility for primary, secondary and tertiary healthcare. Therefore, nurses in the school setting could potentially play an important role in addressing the overweight and obesity issue in this population.

Today, Kuwait is working to encourage Kuwaitis to join the nursing profession by offering financial incentives and scholarships. Also, the MOH, in collaboration with the Kuwait Nursing Association, is striving to meet the demands of nurses, and studies are
currently being conducted to increase Kuwaiti nurses’ levels of job satisfaction (Al-Jarallah et al., 2009; Kuwait MOH, 2012).

1.3 Significance of the Study

Childhood obesity has been classified as a burdensome health problem that doubles the risk of medical complications in adulthood (Kelsey, Zaepfel, Bjornstad & Nadeau, 2014). Moreover, body fat associated with adolescent overweight and obesity has been linked to increased morbidity and mortality during adulthood (Schmidt et al., 2013). Similarly, the link between obesity and non-communicable diseases is well documented (Chopra et al., 2013; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011). The non-communicable diseases that have been frequently reported include hypertension (Basiratnia, Derakhshan, Ajdari, & Saki, 2013), diabetes mellitus (American Diabetes Association, 2013; Wajchenberg & Cohen, 2014), osteoarthritis (Lee & Kean, 2012) and coronary heart diseases (De Schutter, Lavie, & Milani, 2014).

According to the data provided by the Kuwaiti Nutrition Surveillance System (2010), the incidence of overweight and obesity among the Kuwaiti population aged between 5 and 20 years is increasing for both sexes. Additionally, the rate of obesity in the population increases with age (see Figure 1.2).
Figure 1.2. Obesity among the Kuwaiti population (source: Kuwait nutrition surveillance, 2010).

Childhood obesity is a significant threat to the long-term health and wellbeing of the Kuwaiti people. Obesity creates a significant burden in terms of chronic diseases, rising healthcare costs, disability and premature death. The obesity problem among children is included among the emerging health concerns in the majority of countries around the world (WHO, 2015a). While exploring the problem of obesity, little research has been found that directly examines the engagement of educational institutions in an effort to reduce the prevalence of obesity among children in Kuwait. This research study focuses on schools as the study setting. Schools have been identified as an important sector in which to implement early intervention strategies for childhood obesity, as this is where the vast majority of children can be reached (Della Torre, Akré, & Suris, 2010).

1.4 Statement of the Problem

The results of relevant empirical studies reveal that Kuwait has the highest rates of obesity in the Gulf region, and these rates are predicted to increase (Ng et al., 2011).
Most studies investigating the prevalence of overweight and obesity in children in the Gulf region (Amin, Al-Sultan, & Ali, 2008; Gharib & Rasheed, 2013; Ng et al., 2011) and specifically in Kuwait (El-Bayoumy, Shady, & Lotfy, 2009; Zaghloul et al., 2013) agree that the rates have dramatically increased in recent decades. Al-Baghli et al. (2008) attribute this to the hot and dry climate of the Gulf region in which Kuwait lies, which discourages strenuous physical exercise and sports engagement. El-Sabban and Badr (2011) indicated that a deficiency of knowledge among Kuwait’s population about healthy eating habits and lifestyles was the main cause of overweight and obesity in Kuwaiti students. Also, the Kuwaiti lifestyle has been evolving gradually to include a greater consumption of high-calorie foods and decreased physical activity as a result of positive socioeconomic changes (El-Sabban & Badr 2011).

1.5 Gaps in Knowledge on Child Obesity Studies in Kuwait

1.5.1 Prevalence of overweight and obesity. Worldwide, the prevalence of overweight and obesity in children and adults has increased substantially from 857 million to 2.1 billion between 1980 and 2013 (Ng et al., 2014). Kuwait is no exception in relation to these global trends. The findings of sequential studies over the last 30 years indicate that overweight and obesity in children and adolescents is becoming more common in Kuwait. Bayoumi and Moussa (1985) revealed that the prevalence of overweight among children aged 6–9 years old (N = 5132) was 15.5% for boys and 16.8% for girls, while Eid, Al-Hooti, Bourisly and Khalafawi (1986) reported a slightly higher rate, with 22% of children and adolescents (N = 4174) being overweight. A year later, a cross-sectional study conducted by Moussa, Shaltout, Al-Sheikh and Agha (1999) documented that 26% of boys and 27% of girls (N = 2400) were obese, the rate doubling in children aged...
10–13 years compared with children aged 6–9 years. They also found gender differences in the rate of obesity in children of different age groups. The rate of obesity in male children aged 6–9 years was 20.5%, slightly higher than for girls where the rate was 19.6%. However, the rate of obesity in children aged 10–13 years was higher for girls, at 34.1%, than boys, at 30.5%. Similarly, Al-Isa and Moussa (2000) found gender differences in the rate of obesity in children aged 6–10 years, with male children having a higher rate than females (15.7% of males compared to 13.8% of females).

Al-Isa (2004) conducted a cross-sectional study to assess the prevalence of overweight and obesity among male and female children aged 10–14 years (N = 14659). Their findings indicated that the prevalence of overweight was higher in girls (31.8%) than in boys (30.0%), while obesity was higher in boys (14.7%) compared with girls (13.1%). Overall, there is a similar risk of overweight and obesity among girls and boys. This has been shown in the results of recent studies in Kuwait that indicate that overweight and obesity among children and adolescents of both genders has reached between 30–40% (El-Bayoumy et al., 2009; Musaiger et al., 2012; Ng et al., 2011; Zaghloul, 2013). As a consequence of this, the MOH in Kuwait has declared that being overweight or obese constitutes a major threat to Kuwaiti society, as it contributes to all chronic diseases and is therefore a major challenge for the health system (Kuwait MOH, 2014a). The failure in combating overweight and obesity over the last 3 decades has contributed to the current worsening situation in the state of Kuwait.

1.5.2 Childhood obesity risk factors. A review of the literature identified a number of studies conducted over the past 30 years in Kuwait that focused on overweight and obesity. However, most of the studies concentrate on the prevalence or associated
factors of overweight or obesity and focus on adult obesity rather than childhood obesity. Early studies by Bayoumi and Moussa (1985), Al-Isa and Moussa (2000) and Al-Isa (2004) found that Kuwaiti children and adolescents are heavier than their United States (US) counterparts. More recently, the findings of Zaghloul et al. (2013) show that nearly half of Kuwait’s children had higher energy intakes than the estimated requirements. This was explained by the findings of Al Shammari (2007) that indicate that Kuwait’s successful economy has increased food availability, and therefore increased caloric intake above the recommended daily requirement.

Several other factors were documented in previous studies. Moussa et al. (1999) and Moussa, Shaltout, Al-Sheikh and Agha (1999) found that a family history of obesity, hypertension and diabetes mellitus was associated with child obesity. In addition, a child’s birth order, respiratory diseases, diabetes mellitus and bone diseases were significantly associated with child obesity. El-Bayoumy, Shady and Lotfy (2009) and Al-Haifi et al. (2013) identified that overweight and obese children and adolescents have a high daily caloric intake and are physically inactive. Moreover, the findings of Al-Isa, Campbell and Desapriya (2010) indicate that having obese siblings, a higher number of individuals living at home and a non-working father are significantly associated with overweight and obesity in children. Further, chronic disease, age of the child and school level were significantly associated with overweight.

1.5.3 Perception toward child weight. There is a paucity of research in Kuwait investigating the perceptions of children and their parents toward children’s body weight. Only two studies were found in the literature, one limited to children aged 8–12 years in one suburb in Kuwait (Hussin, Mohammad, Al-Hamad, Makboul, & Elshazly,
2011), the other limited to examining mothers’ perceptions of preschool children’s weight status (Al-Qaoud, Al-Shami, & Prakash, 2010).

Earlier studies have left several research gaps that need to be filled to gain a clearer picture of childhood overweight and obesity. To address these gaps it is necessary to include all Kuwait provinces to ensure the broader population of school-aged children is represented. It is also necessary to assess the perceptions of teachers and decision-makers toward overweight and obesity in children, and to identify whether the Kuwaiti Government, teachers, school nurses and parents have a role in combating overweight and obesity among school children.

There are significant gaps in knowledge about the role of the Kuwaiti schools, teachers, school nurses, parents and the Government in addressing the problem of obesity among children in Kuwait. Therefore, it is essential to clearly define the role of the target population in relation to obesity prevention and treatment. Findings for this study will contribute to the understanding of obesity in Kuwait, as well as informing the development of new strategies to decrease the obesity rate among children.

It would be worthwhile to update the literature on the prevalence of overweight and obesity by using accurate body weight measurements and providing a clear statement on the possible contributing factors. Investigating the current situation from the children’s and their parents’ perspective is necessary to inform ongoing interventions and strategies.

**1.6 Research Aims/Objectives**

This study has been guided by the following objectives:
1. to assess the prevalence and risk factors of overweight and obesity among children between the ages of 11 and 14 years in 12 selected public schools in Kuwait

2. to explore the perceptions and attitudes of children, parents, school teachers and Kuwaiti officials to childhood overweight and obesity in Kuwait

3. to explore the role of government, parents, schools and school nurses in combating overweight and obesity

4. to inform recommendations for changes in government policies in relation to overweight and obesity among Kuwaiti school children.

1.7 Research Questions

The following research questions arise from the study aims:

1. What is the prevalence of overweight and obesity among Kuwaiti school children aged 11–14 years?

2. What are the risk factors for overweight and obesity among Kuwaiti school children aged 11–14 years?

3. What are the perceptions and attitudes of school children, parents, school teachers and Kuwaiti officials to childhood overweight and obesity in Kuwait?
4. How do school teachers and Kuwaiti officials perceive the role of the parents, school, teachers, school nurses and government in addressing childhood obesity?

1.8 Structure of the Thesis

The thesis consists of eight chapters. Chapter One gives a brief overview and background of the study and provides information on the research setting of this study, particularly the geographical location, population, health system, education system and economic status of the state of Kuwait and also sheds light on the significance of the study. Key components of the current study are introduced in the first chapter, including the statement of the problem, identification of gaps in the knowledge of child obesity studies in Kuwait, research objectives and research questions to be addressed.

Chapter Two, the literature review, part one, begins with the search strategy used to identify relevant studies and examines those studies that identify the risk factors contributing to overweight and obesity, particularly in relation to the influence of family income, culture, genetics, duration of breastfeeding, nutritional intake, beverage intake, lack of physical activity and sedentary activities on children’s body weight. The economic costs, as well as the health implications and psychological implications of overweight and obesity, are discussed in this chapter.

Chapter Three, the literature review, part two, examines the literature related to the worldwide prevalence of overweight and obesity, along with the perceptions of children and parents toward overweight and obesity. Relevant studies on the influence of the school environment and school staff on children’s body weight are discussed. Also, this
Chapter identifies regulatory actions that have been implemented across the world to reduce childhood obesity.

Chapter Four, the methodology chapter, describes the study design, research setting, sampling and research instrument. It also describes the measures taken during the quantitative data collection, including the distribution of the survey and the children’s weight measurements. This is followed by a description of the qualitative data collection with respect to the focus group and interviews, and the analysis techniques used in both approaches. Finally, ethical considerations are discussed.

Chapter Five presents the results of the survey of the school children and their parents, beginning with a description of the data collected in each survey and the statistical findings. The quantitative research question is addressed, namely the prevalence of and factors contributing to overweight and obesity among Kuwait children, along with the perceptions of parents and children toward overweight and obesity.

Chapter Six presents the findings of the qualitative analysis of the data from the focus group and interviews. This chapter examines the common themes identified by the focus group participants and the common responses from government officials in the six provinces of Kuwait. This chapter identifies the perceptions of the target population toward overweight and obesity in children as well as the role of the school, teachers, school nurses and Kuwait Government in addressing child obesity.

Chapter Seven discusses the results from the two research approaches and overviews the key findings in light of the existing knowledge on the topic. The triangulation
technique is used to triangulate the findings of both approaches to enhance their credibility.

Chapter Eight draws conclusions based on the findings and identifies both the strengths and limitations of the employed methodology. Recommendations for future research, education and training are made.
Chapter 2: Literature Review: Part 1

2.1 Introduction

This chapter will consider the aetiology, contributing factors and implications of overweight and obesity as they relate to school-aged children. Relevant literature will be identified, critically examined and discussed. The key risk factors for child obesity will be identified, which include family income, cultural influences, genetic factors, short duration of breastfeeding, nutrition intake, beverage intake, lack of physical activity and sedentary lifestyle. Key implications will be investigated in this chapter as well as health, social and economic implications.

2.2 Literature Search Strategy

To examine the existing literature, the initial comprehensive review was undertaken with the purpose of identifying research published in the last 5 years from 2009 to 2014. The review was updated to include 2015 literature to identify the most recent publications studies prior to finalising the thesis. The search process was limited to papers published in the English and Arabic languages, including articles, journals and reports from meetings and conferences by utilising online databases such as ProQuest, PubMed, Scopus and CINAHL. In addition, a number of medical sites were also accessed in this review, including those of the World Health Organization (WHO), Center for Disease Control and Prevention (CDC), Obesity Society, National Heart, Lung and Blood Institute, American Academy of Pediatrics, American Heart Association, the National Association of School Nurses, the International Obesity Task Force (IOTF), the World Obesity Federation, Australasian Child and Adolescent Obesity Research Network and the Centre for Obesity Research and Education. The
purpose of including these medical sites and using multiple search engines was to ensure the review on the subject of interest was comprehensive (Wu, Aylward, Roberts, & Evans, 2012).

The inclusion criterion for this review was that the research study focus on school-aged children. The exclusion criteria were studies that focused on preschool children or adults only. Both preschool children and adult studies were accepted in this review if school-aged children were also included in the study.

Different groups were targeted in this review of the literature, including parents, children, teachers, school nurses, decision-makers and government officials. The literature was analysed for findings regarding their perceptions and attitudes toward childhood overweight and obesity. Different keywords were used for each group to avoid a null result if there was no match in the database.


Finally, the relevant papers were evaluated by reading the abstract, then the entire paper if it fit the inclusion criterion and was not disqualified by the exclusion criteria. The studies that met the inclusion criteria were selected for this review and documented. All
selected paper’s titles, author names and abstracts were checked to avoid duplication of papers.

2.2.1 Search results. The initial electronic database search yielded 28,609 studies. A total of 23,091 were excluded: 8855 focused on preschool children only and 14,236 focused on adults only. Abstracts were reviewed for a total of 5518 citations, and of these, 5270 were not eligible and were excluded, leaving 248 for full text assessment. Of these, 104 were relevant and met the inclusion criteria and were included in the
literature review, parts one and two (see Figure 2.1).

<table>
<thead>
<tr>
<th>Potentially eligible studies (N = 38,799)</th>
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<tbody>
<tr>
<td>CINAHL = 4,412</td>
</tr>
<tr>
<td>SCOPUS = 6,870</td>
</tr>
<tr>
<td>PUBMED = 24,615</td>
</tr>
<tr>
<td>PROQuest = 2,902</td>
</tr>
</tbody>
</table>

Exclusion of duplication studies
(N = 28,609)

Abstract screened
(N = 5,518)

Excluded, did not meet the inclusion criteria
Preschool only = 8,855
Adult only = 14,236

No relevance studies
(N = 5,270)

Full text screened
(N = 248)

Relevant studies that meet the inclusion criteria
(N = 104)

Figure 2.1. Flow diagram of the search strategy and selection relevant studies.
2.3 Background Literature Concerning Childhood Overweight and Obesity

The terms ‘overweight’ and ‘obesity’ are defined as the excessive accumulation of fat in the body that creates negative health outcomes (WHO, 2015a). Body Mass Index (BMI) is commonly used to determine the weight status of children, adolescents and adults and is calculated as the ratio of body weight to the square of body height (kg/m$^2$) (WHO, 2015a). Generally, a BMI equal to 25 or greater is considered overweight, and a BMI equal to 30 or greater is considered obese (WHO, 2015a). However, BMI in children is age and gender specific. The CDC developed a BMI percentile curve for children aged between 2 and 20 years old, which classifies children with a BMI equal to or above the 85$^{th}$ percentile as overweight while those with a BMI equal to or greater than the 95$^{th}$ percentile are classified as obese (Kuczmarski et al., 2000).

Worldwide, the rate of obesity has doubled in the last 34 years and has been described as a global epidemic (WHO, 2015a). Today, overweight and obesity is ranked as the greatest leading risk factor for morbidity (WHO, 2015a), and contributes to a greater number of deaths than underweight (WHO, 2015a). In 2013, nearly 42 million children younger than 5 years of age were obese or overweight (WHO, 2015a).

The fundamental causes of overweight and obesity are an imbalance between energy intake and energy expenditure (WHO, 2015a). In addition, several studies have identified a positive relationship between increases in body weight and certain lifestyle factors. Current evidence identifies these factors as a higher family income (Al Alwan, Al Fattani, & Longford, 2013), cultural influences on physical activity and eating habits (Green et al., 2003), genetic factors (Wang et al., 2013), a sedentary lifestyle, such as
spending more than 2 hours per day on screen time (Herman et al., 2014), media advertising affecting food preferences (Boyland & Halford, 2013), fast food consumption (Poti, Duffey, & Popkin, 2014) and high sugar content beverage consumption (Malik, Pan, Willett, & Hu, 2013).

2.4 Contributing Factors Associated with the Prevalence of Overweight and Obesity Among Children

2.4.1 Family income. Various studies have indicated positive relationships between the prevalence of obesity and overweight among children and family socioeconomic status (SES) (Al Alwan et al., 2013; Collins, Pakiz & Rock, 2008; El-Bayoumy et al., 2009; Patel et al., 2011; Sidhu, Kaur, & Kaur, 2006). Poskitt (2009) found that children who live in an urban family setting with a high SES are at a higher risk of gaining weight. Poskitt suggests that this is due to sedentary behaviours and the availability of Western-style foods, together with increased snacking. In addition, Wang and Lim (2012) concluded that children belonging to affluent families had greater access to high-energy-dense food than their lower SES counterparts. Moreover, a cross-sectional questionnaire and the physical measurements of Indonesian adolescents (N = 1758) identified that children with a high family income were 3 times more likely to be obese as they are less physically active and spend a greater amount of time engaged in sedentary behaviours than children from poorer families (Collins et al., 2008).

However, in developed countries, obesity was found to be negatively associated with high SES (Ahrens et al., 2014; O’Dea, Nguyen Hoang, & Dibley, 2011; Wang & Lim, 2012), which contrasts with developing countries where high SES was positively associated with child overweight and obesity (Collins et al., 2008; El-Bayoumy et al.,
2009; Groeneveld, Solomons, & Doak, 2007; Maruapula et al., 2011; McDonald et al., 2009).

A study conducted by Tandon et al. (2012) found that children who grew up in a lower SES family had less access to playground equipment, more restrictions around outdoor activities and significantly higher screen time than children in high SES families. While this study has a large sample size of 715 children, the majority of participants were children belonging to families of higher SES; hence, these results are not able to be generalised. An identified limitation of this study was that the home environment was measured by parents, not by the researcher, and thus bias could be present.

A similar study of US children and adolescents aged 2–19 years (N = 39,822) examined the association between children’s dietary behaviours and parental income and education level using multivariable regression methods. The data for the study was collected from interviews conducted at home and in the mobile examination centre, as well as through surveys, which allowed the researchers to gain valid information. Moreover, the researchers checked the self-reported data to ensure it was not biased. The results revealed that there was a significant increase in energy intake and the amount of food and beverages consumed in the lowest family income categories (Kant & Graubard, 2013).

A cohort study in Europe assessed the prevalence of overweight and obesity among preschool and school children (N = 16,228) by region, gender, age and family SES. The children’s anthropometric measurements were taken and parents provided information on socio-demographic data. The results show that the highest prevalence of obesity was
among children from lower SES groups (Ahrens et al., 2014). Similarly, a study was conducted in eight European cities (Vilnius, Forli, Bonn, Ferreira do Alentejo, Angers, Geneva, Budapest and Bratislava) of 1184 children aged 6–18 years. These authors found that the family’s SES was inversely related to the children’s BMI. In this study, only complete data were accepted to more rigorously test the hypotheses. The researchers included statistical methods of structural equation modelling and bootstrapping to measure the accuracy and statistical controls, which made the data more valid (Evans et al., 2012).

In contrast, research findings from developing countries demonstrated that improvement of economic status in developing countries led to increased urbanisation, nutrition transition and reductions in physical activity. In turn, these have led to an increased prevalence of metabolic syndrome and obesity among children and adults (Misra & Khurana, 2008). A cross-sectional study of 17 secondary schools in Botswana, Africa, found that the prevalence of overweight and obesity was greater in children of higher SES and that they consumed more snacks and ate outside the family home frequently (Maruapula et al., 2011). However, in this study students were asked to report only a single day’s food consumption, hence, information on variations in typical food consumption on weekdays and weekends were not included.

The Gulf region consists of a number of countries that share a similar culture, including Kuwait, Saudi Arabia, UAE, Qatar, Oman and Bahrain. These countries have experienced rapid economic growth since oil was discovered in the region. As a result of this economic development, the population has acquired wealth and with wealth unhealthy lifestyle routines, including increased food consumption, leading to the
emergence of overweight and obesity (Al-Muraikhi, 2010). A cross-sectional study in Saudi Arabia among random school children aged between 6 and 10 years (N = 874) found that the SES of the family was significantly higher among overweight/obese students. These authors reported that the children of a higher income family tended to spend more on food and had a higher participation in sedentary lifestyle activities (Al-Mohaimeed et al., 2012). However, this study did not investigate children from private schools, who belong to the upper class and wealthy families of Saudi society. In contrast, another cross-sectional study in Saudi Arabia among female school children based at private schools (N = 1072) that only targeted children of affluent families found that nearly 90% of obese students lived in big houses or villas. Watching television (TV) was more prevalent among obese children as was consumption of fast food and sweetened beverages (Alam, 2008). These cross-sectional studies of Saudi students indicate the negative affect of high SES on Saudi children’s body weight.

Similarly, in Kuwait it appears that the relatively recent economic transition has negatively impacted Kuwaiti citizens’ lifestyles and dietary habits (Al Shammari, 2007). Several studies have identified a link between family SES and overweight and obesity in Kuwaiti children (El-Bayoumy et al., 2009; Al-Isa & Moussa, 1999; Musaiger, 2011). Al Shammari (2007) pointed out that the high SES of Kuwaitis has increased food availability and therefore increased caloric intake above recommended daily requirements. Not surprisingly, recent research shows that about half of Kuwaiti children and one third of adults consumed more than the recommended energy intake (Zaghloul et al., 2013).
Increasing caloric intake among the Kuwaiti population, a sedentary lifestyle and the number of servants of affluent families were all found to be factors significantly associated with overweight and obese children (Al-Isa & Moussa, 1999). Thus, the increase in the average income of the family appears to have had a negative effect on lifestyle and to have directly contributed to the increasing rate of overweight and obesity in these developing countries.

2.4.2 Cultural influences. Numerous studies have identified a link between culture and a child’s BMI (Burgi et al., 2010; Kumanyika, 2008; Mirmohammadi et al., 2011; Vu, 2012). Cultural characteristics, in terms of attitudes, beliefs, religion and traditions, have been shown to have a significant influence on people’s lifestyles and dietary preferences (Caprio et al., 2008; Cunningham, Vaquera, & Long, 2012; Green et al., 2003; Musher-Eizenman et al., 2009). This is evidenced by the different rates of overweight and obesity seen in many parts of the world as a result of cultural dietary practices.

A cross-cultural study undertaken by Musher-Eizenman et al. (2009) in the US and France considered whether there was a difference between family dietary practices in each country. Two samples of parents (US [N = 97] and France [N = 122]) provided information on their children’s eating habits. The study found that French parents have greater control over their children’s dietary intake in order to monitor their children’s weight, whereas US parents allowed higher intakes of poor-nutritive foods and drinks (Musher-Eizenman et al., 2009).
A study conducted by Cachelin, Thompson and Phimphasone (2014) in the US among diverse populations of different ethnicities (Asian/Asian [N = 66], black/African [N = 26], Hispanic/Latino [N = 218], white/Caucasian [N = 115]) evaluated the influence of culture on children’s feeding practices and whether this was associated with body weight. Participants completed the child-feeding questionnaire that elicited information on their children’s feeding practices. Analyses focused on associations between ethnicity and parental feeding attitudes. The results indicate that ethnicity plays a significant role in children’s BMI. For example, the authors noted that lower levels of restrictions or pressure over feeding practice was more pronounced among those of Asian background, which contributed to an increased risk of obesity in Asian children (Cachelin, Thompson, & Phimphasone, 2014).

The findings of an interview-based study in the US among 15 Hmong mothers suggest that Hmong mothers encourage healthy traditional food habits in their children. At the same time, the mothers reported a radical transition from traditional Aisha dietary habits to the US food culture and that this has led to unhealthy dietary habits (Vue, Wolff, & Goto, 2011). However, the sample size of this study was small. Hence, results from this study do not reflect the larger population of Hmong mothers.

A literature review conducted by Miller and Pumariega (2001) provided an explanation of the role of culture as a factor in eating disorders. The authors suggested that cultural transformation, such as immigrants moving to a new culture, might be associated with increased susceptibility to food intake disorders, particularly in relation to beliefs about physical appearance (Miller & Pumariega, 2001).
In support of these findings by Miller and Pumariega, the results of a Canadian Community Health Survey indicated that a recent immigrant population had a significantly lower rate of overweight compared with the resident population. These differences remain significant even when the effects of age, birthplace, SES and physical activity are taken into account. However, this difference tended to disappear over time. Particularly, the prevalence of overweight and obesity was higher among long-term immigrants than more recent immigrants (Tremblay, Pérez, Ardern, Bryan, & Katzmarzyk, 2005). The authors attributed this to the transition from traditional lifestyle patterns and cultural diets to a more ‘Western’ diet and sedentary lifestyle, or some combination of the two.

A similar study conducted in England examined ethnicity as a risk factor for obesity. The study examined the level of physical activity, screen time, unhealthy dietary behaviours and the obesogenic lifestyle of 3397 parents of black, South Asian and white children aged 4–11 years. The findings indicate that higher proportions of overweight and obese children were from the Asian or black group and these groups were 3 times more likely to adopt an unhealthy lifestyle than white children (Falconer et al., 2014). However, this study includes a low response rate of ethnic minority groups and the data was comprised of self-reported measures. Most importantly, the majority (70%) of the children in the sample were from white ethnic groups, while 22% and 8% were in Asian and black ethnic groups, respectively.

The findings of a comparative study of children from two culturally different urban regions in Switzerland (being French- and German-speaking parts of Switzerland) show differences between the children in relation to body weight, physical activity and
sedentary lifestyle (Bürgi et al., 2010). In particular, children from the French-speaking part had lower levels of physical activity, engaged in more sedentary activities, were less agile and had higher adiposity than children from the German-speaking part.

In Australia, a national study was conducted by O’Dea (2008) using questionnaires to measure the associations between obesity, gender, ethnicity, culture, social class and weight perceptions of students (N = 7889) from the following groups: Chinese/Southeast Asians, Anglos/Caucasians, Pacific Islanders, Aboriginals/Torres Strait Islanders, southern Europeans/Mediterraneans, Middle Easterners/Arabs, Africans and Indians. The findings indicate that obesity was more prevalent among children from the Pacific Islander group and female and male adolescents from Middle Eastern/Arabic backgrounds (O’Dea, 2008).

Another study in Australia was based around semi-structured interviews conducted by Green et al. (2003) with third-generation immigrants from Greek, Indian, Chinese and Turkish communities (N = 160). They assessed socio-cultural and ecological factors influencing health, physical activity and eating habits relating to overweight and obesity among children and adolescents. The study found evidence of cultural impact on types of physical activity, eating habits and dietary restrictions across all cultural groups (Green et al., 2003).

A cross-sectional study of Iranian children and adolescents (N = 29,988) aged 7–18 years used multistage cluster sampling of children of different Middle Eastern ethnic backgrounds, including Fars, Lor, Kurd, Turk, Baluch and Arab. The children’s BMIs by sex, age, and ethnicity were measured and a random technique was used. The
findings indicate that there is a significant difference in children’s BMI, particularly those from a Baluch background, as these children had the lowest body weight (Mirmohammadi, Hafezi, Mehrparvar, Rezaeian, & Akbari, 2011).

A comparative study was undertaken by Al-Hazzaa et al. (2013) examining the dietary habits and physical and sedentary activities of adolescents aged 14–18 years (N = 2,806) from Britain and Saudi Arabia. Children’s anthropometric measurements were gathered and a self-report survey was used to evaluate the children’s health behaviours in the four major cities in Britain and Saudi Arabia. The results showed that Saudi females spent more time engaged in sedentary behaviours than Saudi males, whereas there was no difference between British female and male adolescents in relation to their engagement in sedentary activities. This finding was explained in terms of culture and the social barriers facing Saudi women, as they have fewer opportunities to engage in outdoor activities compared to their male counterparts (Al-Hazzaa et al., 2013).

Another exploratory study using face-to-face interviews was conducted by Alqout and Reynolds (2014) in Saudi Arabia. They identified the barriers that Saudi women face in reducing their weight, including food, hospitality norms, traditional clothing and limited outdoor activities. As a consequence of these obstacles, there is an increased tendency among Saudi women to choose to undergo bariatric surgery as a way to lose weight (Alqout & Reynolds, 2014). Similarly, the literature review conducted by Musaiger (2007) found that cultural beliefs and discriminatory attitudes toward women are among the barriers to women being physically active.
Other studies have found that hospitality practices in Kuwait and Saudi Arabia contributed to increased food intake, as part of the socialisation norms included sharing traditional meals (meat and rice) that were high in fat and carbohydrates (Al-Kandari, 2006; Al Othaimeen, Nozha, & Osman, 2007; Badran & Laher, 2011). Furthermore, in Kuwait every house has a diwaniya (or reception room) to host guests and hold social gatherings, often on a daily or weekly basis. To show their generosity, it is customary for Kuwaitis to provide an abundance of food and beverages for their guests and the visitors feel they must eat this food, which can result in overeating (Al-Isa & Moussa, 1999).

A study of Moroccan and Turkish migrants living in Holland found that the hospitality practices of both groups stemmed from religious and cultural beliefs, which could easily lead to overeating and the development of weight gain as a result of energy imbalance (Nicolaou et al., 2009). People’s beliefs and attitudes are most likely to be linked to their background and religion, which is a hindrance to changing the customs and traditions of an immigrant population.

The available studies considering the influence of culture on food intake and physical activity clearly indicate the important role of culture in contributing to overweight and obesity, particularly in children, as their lifestyles are heavily influenced by their parents’ cultural beliefs. Children tend to eat what their parents eat and follow the same activity patterns.

2.4.3 Genetic factors. Several research findings have confirmed that genes play a significant role in the occurrence of overweight and obesity among children and
adolescents (Belsky et al., 2012; Grant et al., 2008; Liu, Mou, & Cai, 2013; Shahid et al., 2013). In fact, research shows that parental obesity increases the prevalence of obesity in their offspring, either as a result of genes and/or the environmental factors they share (Fox et al., 2014; Kral & Rauh, 2010; Li, Law, Conte, & Power, 2009).

Recent systematic review findings of genetic studies demonstrate that the influence of genetic factors on the BMI of children, adolescents and adults ranged from 61% to 80%, while the influence of environmental factors ranged from 14% to 40% (Nan et al., 2012).

Genetic factors play a strong role in relation to BMI, most importantly when there is interaction between environmental factors and genetic factors, which may result in a higher chance of overweight or obesity occurring. For example, a study conducted by Qi et al. (2012) identified that there was a stronger association between the BMI of people with a high genetic susceptibility to overweight and obesity and the consumption of sweetened beverages than those who consumed a lower amount of sweetened beverages. Similarly, another study conducted by Qi et al. (2014) found that there was a strong association between people with a genetic susceptibility to overweight and obesity and a higher intake of fried foods. Both these studies used longitudinal data and included multiple measurements of diet, lifestyle factors and BMI. They use a genetic risk score to combine genetic information associated with BMI, which shows that the conclusions drawn by the authors are well grounded and indicate the robustness of their findings.

Haworth, Plomin, Carnell and Wardle (2008) point out that genetic factors and environmental factors have a similar influence on children’s weight. Thus, both
environmental factors, which contribute to overeating and decreased physical activity levels, together with a genetic susceptibility to overweight and obesity, could explain increases in body weight and difficulties reducing weight (Cecil et al., 2012; Foraita et al., 2014; Lappalainen et al., 2012; Lee, 2009b; Qi et al., 2012).

To date, the medical literature has documented 370 genes associated with obesity (Butler, McGuire, & Manzardo, 2015). Some functions of the human body, such as appetite and energy expenditure, are regulated through genes. If this mechanism of regulation is disrupted, obesity can occur (Farooqi, 2014). For example, a study conducted by Cecil et al. (2008) assessed the fat mass and obesity-associated gene variant with food intake, energy expenditure and adiposity among children aged 4–10 years (N = 2726). The results show that there is an increase in the BMI and a reduction in the energy expenditure of children with the fat mass and obesity-associated protein (FTO) gene (Cecil, Tavendale, Watt, Hetherington, & Palmer, 2008). The FTO gene seems to confer the risk factor of obesity by increased energy intake. Therefore, the effect of this gene can be moderate through controlling energy intake to prevent FTO-genotype–associated obesity.

A study conducted by Müller et al. (2008) examined the association between weight and the single nucleotide polymorphism gene and the impact of health intervention programs on BMI. A genotyping method was performed for 480 overweight and obese patients to identify whether rs9939609 is associated with fasting blood levels of glucose, triglycerides, high-density lipoprotein and low-density lipoprotein cholesterol. The findings indicate that this gene, A-allele of rs9939609, is associated with overweight and obesity. However, no association between rs9939609 alleles with blood
glucose, triglycerides, fasting levels, weight loss or cholesterol was detected in this study.

A study conducted by Wardle et al. (2008) examined the association between regular appetite behaviour and the gene allele copy AA homozygotes in 3337 children who had been assessed using two validated scales (Satiety Responsiveness and Enjoyment of Food), against the objective measurement of habitual appetitive behaviour. The findings indicate that obese children had significantly reduced satiety, which increases their susceptibility to food intake, a factor associated with an increased risk of obesity in children.

Similarly, a cross-sectional study was conducted by Llewellyn et al. (2014) to assess the association of the satiety responsiveness with genetic predisposition to child obesity. Information on children’s body weight, satiety responsiveness and genotype were collected from 2258 children to examine the associations among the polygenic risk score, adiposity and satiety responsiveness. The study found that low satiety responsiveness as a result of genetic predisposition leads to increased adiposity in children.

Veerman (2011) and Foraita et al. (2014) suggest that individual genes may predispose a person to weight gain. However, adopting and maintaining a healthy lifestyle could prevent weight gain from occurring, or assist in weight loss. Likewise, Rampersaud et al. (2008) found that increased physical activity, especially in genetically susceptible people, was significantly associated with weight loss.
A meta-analysis of studies conducted on children, adolescents and adults aimed to identify whether physical activity attenuates the effect of the FTO gene on obesity. The results showed that obesity associated with the FTO gene was reduced by 30% in physically active individuals compared to inactive individuals (Kilpeläinen et al., 2011). The research to date suggests that genes play a passive role in the development of obesity and the increased current prevalence is largely due to today’s modern lifestyle. Genetically susceptible individuals appear to have a significant chance of becoming morbidly obese when exposed to an unhealthy environment (Lee, 2009b).

2.4.4 Short duration of breastfeeding. For the past 14 centuries, the recommended duration of breastfeeding as set out in the Holy Quran (Islamic religion) was for a period of up to 2 years (Bayyenat et al., 2014). With the development of science and research tools, the WHO (2007) provided evidence of the benefits of long-term breastfeeding for children, these being a lower risk of blood pressure, cholesterol, overweight, obesity, diabetes type 2 and a higher score on a cognitive test. Moreover, a longer duration of breastfeeding decreased the risk of premature infant death by 50% during infancy (Vennemann et al., 2009), and decreased the risk of obesity by 51% for children who breastfed for 26 weeks or more (McCrory & Layte, 2012). In contrast, a shorter duration of breastfeeding for the mother increased the incidence of ovarian cancer, breast cancer, weight gain, diabetes type 2, metabolic syndrome and myocardial infarction (Stuebe, 2009). Hence, in light of the advantages of breastfeeding for both the mother and infant, many studies recommend an increased breastfeeding duration (Kramer et al., 2008; McCrory & Layte, 2012; Stuebe & Schwarz; 2010; Vennemann et al., 2009), particularly from a preventative perspective (Al Mamun et al., 2014; Bartz &
Freemark, 2012; Colen & Ramey, 2014; Dee, 2013; Metzger & McDade, 2010), and also, most importantly, in reducing the risk of being overweight or obese (Gopinath et al., 2012; Li et al., 2007; Mayer-Davis et al., 2006; Scott & Cobiac, 2012; Zheng et al., 2014).

A study conducted by Hunsberger et al. (2013) examined the association between childhood overweight and exclusive breastfeeding among children aged 2–9 years (N = 14,726) from eight European countries (Italy, Cyprus, Estonia, Sweden, Belgium, Germany, Spain and Hungary). They found that the exclusive use of breastfeeding from 4–6 months of age was associated with protection against being overweight or obese compared with non-breastfed children (Hunsberger et al., 2013).

A longitudinal study to examine fat mass in relation to the duration of breastfeeding in Australia examined a sample of 2,087 children from 3 months to 8 years old. Data collected by midwives included mothers’ weight, before and during pregnancy, birth weight and length, age, educational level, parity and smoking status. Children’s BMI was measured and subsequent surveys from 16 weeks’ gestation through to 8 years were used in the data collection. The results show that there is an association between overweight children and a short duration of breastfeeding of ≤4 months (Burke et al., 2005). Furthermore, a short duration of breastfeeding of less than 4 months is associated with the highest prevalence of maternal obesity, lower education and smoking (Burke et al., 2005).

Similarly, a cross-sectional study in Australia of preschool children (N = 2,092) found that increasing the duration of breastfeeding was associated with a decrease in
children’s BMIs. Specifically, increasing breastfeeding by 1 month was associated with an average decrease in BMI by between 0.03 kg/m² and 0.04 kg/m² among children aged 1–4 years; this association was higher in girls than boys (Gopinath et al., 2012). However, this significant association between length of breastfeeding and protection from gaining weight was not observed in children older than 5 years; neither did the authors investigate if there were any significant differences between age and sex. The authors stated that they used data from a survey of eye disease in children, which did not target adiposity as a key study outcome. Hence, information was not collected on some important variables, such as maternal weight, sedentary activities or physical activity. Therefore, the result of Gopinath et al. cannot make inferences of the link between the duration of breastfeeding and its effect on the weight of children of different ages and sex.

Another study in Australia involving children and adolescents (N = 2,066) examined the effect of breastfeeding duration on body weight status. Data were collected through a face-to-face home visit. Multivariate logistic regression analysis was used to estimate the effect. The findings revealed that children who were breastfed for 6 months or more had significantly higher protection against later childhood weight gain or obesity. This effect remained significant even after adjusting for all potentially predictive variables, such as age, ethnicity and level of education (Scott, Ng, & Cobiac, 2012). Furthermore, no sex or age differences were observed in this study.

A longitudinal cohort study conducted in China among children aged 4–5 years (N = 42,550) examined the relationship between exclusive breastfeeding and the risk of becoming overweight in children. The findings indicate that exclusive breastfeeding for
3–6 months reduced the risk of becoming overweight in children by between 13% and 27% (Zheng et al., 2014). Likewise, a longitudinal study conducted in Japan examined the relationship between breastfeeding and childhood overweight and obesity among school children (N = 43,367). Their results show that children who have been exclusively breastfed for 6 months or more have a lower risk of being overweight or obese (Yamakawa, Yorifuji, Inoue, Kato, & Doi, 2013).

A systematic review conducted by Oddy (2012) provided a possible explanation as to why breastfeeding aids in preventing adipocyte development: breast milk contains lower protein content, lower plasma insulin stimulants and promotes slower growth. Conversely, formula feeding is associated with overfeeding and higher postnatal growth rates (Oddy, 2012).

The findings of numerous studies reject the hypotheses that a longer duration of breastfeeding can protect against becoming overweight or obese (Al-Qaoud & Prakash, 2009; Kwok et al., 2010; Schack-Nielsen et al., 2010), with many studies finding an association between the early introduction of solid food and increased adiposity in children (Huh et al., 2011; Wen et al., 2014; Zhou et al., 2011). For instance, a longitudinal study was conducted by Seach et al. (2010) from birth to 10 years to assess the association between infant feeding practices and the risk of overweight/obesity. A sample of 620 pregnant women attending antenatal clinics was recruited. A total of 18 telephone interviews over the first 2 years of life recorded infant feeding practices. The anthropometric measurements of 307 children at age 10 were taken. The study found that delaying the introduction of solids until the children were 20 weeks of age or older
was associated with reducing the risk of gaining an unhealthy weight by 10 years of age (Seach et al., 2010).

Several factors influence a mother’s decision whether to breastfeed or introduce solid foods at an early age, such as maternal smoking (Almqvist-Tangen et al., 2012; Forster, McLachlan, & Lumley, 2006; Weiser et al., 2009), perception of insufficient milk (Al-Amoud, 2003; Bunik et al., 2010; Madhu, Chowdary, & Masthi, 2009), or being a working mother (Kehler, Chaput, & Tough, 2009; Mandal, Roe, & Fein, 2010; Skafida, 2012). Introducing solid food early in the postnatal period may influence late childhood health and result in overweight and obesity (Zhang et al., 2013). Therefore, helping the mother to overcome the barriers surrounding the duration of breastfeeding, the continued promotion of breastfeeding for up to 2 years and the timely introduction of solids might help reduce the risk of children becoming overweight or obese in childhood.

2.4.5 Nutrition intake. Over the last 3 decades the average dietary consumption of meat, fats and sugars has increased well over the recommended daily caloric intake, and this is recognised as contributing to the increased incidence of obesity (Popkin, 2009; Popkin & Gordon-Larsen, 2004). In the US, a country with one of the highest rates of overweight or obesity across a population, a study conducted between 1970 and 2000 investigated the energy intake of children (N = 963) and adults (N = 1,399). The results revealed that, for children, there was an increase in food energy intake from 1,960 kcal/d in the 1970s to 2,043 kcal/d in the 2000s, whereas, for adults, food energy intake increased from 2,398 kcal/d to 2,895 kcal/d over the same period. Further, as a result of
increased food energy intake, children’s weight increased by 4.0 kg, while adults’ weight increased by 8.6 kg (Swinburn, Sacks, & Ravussin, 2009).

Another study conducted in the US investigated the dietary energy density associated with the weight status of 2,442 children aged between 2 and 8 years. The researchers gained data from the National Health and Nutrition Examination 2001/2004. Survey measures included 24-hour dietary recall data, measurement of various food groups and children’s anthropometry. These findings revealed that energy density intake was associated with BMI and with an increased intake of sugar or fat, and lower intake of vegetables and fruit (Vernarelli, Mitchell, Hartman, & Rolls, 2011). However, this result was based on a 1-day measurement of eating habits, and would not reflect overall dietary intake. Had this been taken into account, it is possible that different outcomes would have been found.

In Middle Eastern and North African countries, a review of studies provided evidence to indicate that over the past 3 decades there has been an increase in daily energy intake per capita, particularly in fat and protein consumption, by approximately 730 kcal/day. Furthermore, the results show that the rate of obesity ranged from 20% to 40% for males and females above 18 years old (Sibai et al., 2010). Similarly, a systematic review was carried out by Musaiger (2011) in the EMR to assess the prevalence of overweight and obesity among various age groups and to identify the factors contributing to obesity. The findings revealed that nutrition transition, the massive marketing promotion of high-fat foods, food subsidisation policies, frequent snacking and eating outside the home have contributed to increasing the prevalence of overweight and obesity among school children to 45% (Musaiger, 2011).
A literature review conducted in India by Misra et al. (2011) investigated the trends in nutrient intake and the associated implications over the past 3 decades. The results showed a decrease of 7% in energy intake from carbohydrates and an increase of 6% in energy intake from fats. Also, meat consumption increased and the consumption of fruit and vegetables decreased. This has resulted in serious health implications, including a growing trend toward obesity.

An observational study was conducted by Adam, Osama and Muhammad (2014) in the Kingdom of Saudi Arabia to investigate the daily trend of food consumption patterns per capita from 1961 to 2007. The results demonstrate that there was an increase in food intake from 881 g/capita/day in 1961 to 1,735 g/capita/day in 1990. Moreover, there was a drop in vegetable intake from 400 g to 250 g during the period 1990 to 2000, while meat intake increased from 26 g in 1990 to 139 g in 2007.

A cross-sectional study was conducted in Saudi Arabia among randomly chosen adolescents and adults aged between 18 and 24 years (N = 357) to determine the relationship between the participant’s body weight status and their eating habits. A self-reported questionnaire was used for data collection. The results indicate there was a positive relationship between overweight and obesity and the consumption of snacks and frequent eating. The vast majority of participants (88.6%) reported irregular meal consumption and low intake of fruits and vegetables, which was the most common unhealthy eating habit of the participants (Al-Rethaiaa, Fahmy, & Al-Shwaiyat, 2010).

Another cross-sectional study conducted in Dubai examined the dietary habits and other factors associated with obesity among adolescents aged 12–17 years (N = 661). A
questionnaire was administered to students to assess their dietary and behavioural habits. The results show that there is an association between the frequency of eating breakfast and snacking between main meals and obesity in girls, but not in boys. This was attributed to the sedentary lifestyle among girls. However, the rate of overweight and obesity was higher in boys (18.5% and 22.2%) than girls (13.1% and 20.5%) (Bin Zaal, Musaiger, & D’Souza, 2009). Interestingly, in this study eating breakfast at school was associated with a high risk of obesity in boys and girls. However, the types of food available in the school canteen were not mentioned in this study, which resulted in some criticism of this research.

A cross-sectional study conducted in the United Arab Emirates (UAE) assessed the prevalence of overweight and obesity and associated factors among children and adolescents aged 6–18 years in 628 households. Demographic data, anthropometric measurements, physical activity and 24-hour dietary recall data were collected. The findings indicated that approximately 25% of males and 41% of females were overweight or obese. Snacking represented >20% of the total calorie intake, and, in particular, children consumed more than the recommended energy intake (Ng et al., 2011).

A cross-sectional study conducted in Kuwait assessed the prevalence of overweight and obesity and described the dietary intake of 1,704 people aged between 3 and 86 years. The study found that between 29% and 70% of adults were obese, and between 24% and 37% of adolescents were obese. Most importantly, the findings indicated that almost half of the children and one third of the adults participating in this study exceeded the average recommended intake of protein and carbohydrates by 78–100%,
and almost one third of the participants exceeded the average recommended total intake of fat by 35% (Zaghloul et al., 2013). These findings are consistent with another cross-sectional study conducted in Kuwait by El-Bayoumy et al. (2009) who found that overweight and obese children aged between 10 and 14 years were likely to consume food containing high amounts of fat, sugar and sodium, engage in excess frequent snacking between meals and eat more than three meals per day.

There are three main places where children tend to eat: the home, the school and restaurants. The available food at home and school is an important factor in children’s energy intake. A study conducted by Briefel, Wilson and Gleason (2009) investigated where school children at each school level consume low-nutrient energy-dense food. Their findings showed that about 527 empty calories were consumed daily, the highest amount being consumed at home (276 kcal) and the second highest amount being consumed at school (174 kcal).

Another study of children aged 9–13 years was conducted in Minnesota USA to investigate their dietary behaviour and assess weight status. Fourteen focus groups were audiotaped and children’s heights and weights were measured. The results show that 19% of the participants were overweight and 36% were obese. In addition, the children’s food intake at home was unhealthy due to the limited available food options, parental feeding practices, irregular food consumption patterns and ‘night eating’.

While at school the majority of children were unsatisfied with the quality of food available, such as hamburgers, pizza, hot dogs, cheese sticks, mashed potatoes and fried chicken (Dammann & Smith, 2010). Similarly, a literature review by Moreno and Rodríguez (2007) was undertaken to examine the evidence-based dietary aspects
influencing obesity development. They found that missing breakfast, eating school lunch, eating food while watching TV and consuming less energy at breakfast or more at dinner were positively associated with being overweight.

A cross-sectional study conducted in the US by Fox et al. (2009) investigated children’s body weight in relation to the food environment in schools. Data on a total of 2,228 children of all school levels were collected through on-site observations and interviews. The results demonstrated that school canteens that offered potato products and desserts more than once a week were significantly related to the increased risk of obesity in children (Fox, Dodd, Wilson, & Gleason, 2009). Similarly, in the US Schanzenbach’s (2009) study findings, based on dietary recall, indicate that children who ate lunch from the school canteen were more likely to be obese than children who brought their lunch from home.

Likewise, eating outside of home, particularly in fast food restaurants, was found to be strongly associated with overweight and obesity in children (Almuhanna et al., 2014; Fraser & Edwards, 2010; Rouhani et al., 2012). Fraser, Edwards, Cade and Clarke (2011) indicate that the adolescents who eat at fast food restaurants frequently are more likely to consume unhealthy foods and gain more body weight than adolescents who do not eat fast food frequently. However, the participants were not asked about the types of food eaten at fast food restaurants, so causation cannot be implied from this data. A recent study identified the effect of fast food consumption on the total energy intake of children and adolescents, showing that the consumption of fast food was associated with an increased intake of sugar (5.71–16.24 g), total fat (7.03–14.36 g) and saturated
fat (1.99–4.64 g) for children and adolescents, and protein (7.94 g) and sodium (396.28 mg) for adolescents (Powell and Nguyen, 2013).

In summary, the above studies’ findings regarding children’s food intake indicate that the children who have greater access to unhealthy food in the home, school canteen or fast food restaurants are more likely to gain unhealthy weight and adopt bad dietary habits. Hence, minimising children’s access to unhealthy food will help them improve their dietary behaviour and maintain a healthy weight, as well as reduce their risk of overweight and obesity.

2.4.6 Beverage intake. Along with unhealthy food consumption, the consumption of sweetened beverages increases the risk for being overweight or obese (Beck et al., 2014; Collison et al., 2010; Malik et al., 2013; Monasta et al., 2010; Sanigorski, Bell, & Swinburn, 2007). According to Basu, McKee, Galea and Stuckler (2013), the global consumption of sugar-sweetened beverages (SSBs) increased from 9.5 gallons per person per year in 1997 to 11.4 gallons per person per year in 2010. Worldwide, this was associated with an additional 4.8 per 100 adults being overweight and 2.3 per 100 adults being obese. In addition, a systematic literature review conducted in the US assessed the consumption of SSBs in relation to the risk of obesity and energy intake by age and gender. The findings demonstrate that the consumption of SSBs has increased and is significantly associated with obesity, accounting for nearly one fifth of the increase in body weight since 1977 in the USA (Woodward-Lopez, Kao, & Ritchie, 2011).
A longitudinal cohort study by Lim et al. (2009) conducted in the US among preschool children (N = 365) demonstrated that the excessive consumption of SSBs was positively associated with the increased risk of adiposity. Significantly, after 2 years follow-up, the rate of overweight increased from 12.9% to 18.7%, while obesity increased from 10.3% to 20.4% among children in this study (Lim et al., 2009). Similarly, another study in the US investigated the consumption of SSBs in relation to obesity by observing children from infancy to 5 years of age (N = 1,189) (Pan et al., 2014). The results of this study show that the prevalence of obesity was associated with SSB intake. Particularly, the consumption of SSBs during infancy before 6 months had a higher risk of obesity at 6 years than infants that did not consume SSBs (Pan et al., 2014).

A longitudinal study conducted by Zheng et al. (2014) examined the relationship between SSB intake and BMI among 9-year-old Danish children (N = 283). Data were collected at age 9 through to 21 years, and multivariate regression analyses were used to estimate the effect of SSB intake on body fat. An examination of the findings at 6 years and again at the 12-year follow-up revealed adolescents at age 15 who consumed at least 1 serve of an SSB per day had a greater risk of gaining weight than those who consumed less than 1 serve of an SSB per day.

In relation to Middle Eastern countries, a cross-sectional study was conducted in Qatar to assess the rate of overweight and obesity and the related contributing factors among children. Interestingly, a sedentary lifestyle, physical activity and dietary intake were not found to be significantly associated with obese children, while SSB intake was found to be significantly associated with overweight and obese children (Al-Muraikhi, 2010). Al-Muraikhi (2010) attributed this to the limitations in the dietary assessment
tool and a low response rate that may have affected the survey results and incorporated a bias.

A study in Saudi Arabia assessed dietary behaviours in relation to the body weight of children and adolescents aged 10–19 years (N = 9,433). The study found that SSB intake was positively associated with waist circumference and BMI in boys only. Further, in both male and female children SSB consumption was associated with the poor nutritional intake of fast food meals, iced desserts and savoury snacks (Collison et al., 2010).

Another cross-sectional study conducted in Saudi Arabia among male and female adolescents aged 14–19 years (N = 2906) found that adolescents of both sex were at a higher risk of being overweight or obese when they consumed SSBs 3 days per week (Al-Hazzaa et al., 2012). A similar study conducted in Kuwait among adolescent males and females aged 14–19 years (N = 960) found that almost 66% of boys and 60% of girls consumed SSBs on more than 3 days per week, which was associated with 50.5% of boys and 46.5% of girls being overweight or obese (Allafi et al., 2014). However, the information regarding dietary and beverage consumption was obtained based on frequency per week without considering portion size.

A number of studies have proposed that the excess caloric intake from SSBs is the possible mechanism for increased energy intake and, therefore, body weight is increased as a result of energy imbalance (Bachman et al., 2006; Bawa, 2005; Dubois, Farmer, Girard, & Peterson, 2007; Tate et al., 2012). For instance, Dubois et al. (2007) suggest that children who regularly consume SSBs during meal time had a greater risk of being
overweight. Therefore, a reduction of SSB intake would play an important role in weight loss, as indicated by Sichieri et al. (2009). Moreover, Tate et al. (2012) found that consuming non-caloric beverages instead of caloric beverages was associated with weight reduction by an average of 2% to 2.5%.

Numerous studies hypothesise that replacing SSBs with water may be an effective strategy for weight loss (Daniels & Popkin, 2010; Dennis et al., 2010; Pan et al., 2013). For instance, the study findings of Wang, Ludwig, Sonneville and Gortmaker (2009) show that any serving of SSBs was associated with a net increase of 106 kcal per day, and other beverages such as whole milk, low fat milk and 100% juice were associated with an increase from 123 kcal to 169 kcal per day. Only water was associated with 8 kcal per day and diet drinks at 47 kcal per day. These results show that water intake is associated with an average drop of 235 kcal per day, which supports the recommendation to replace SSBs with water to help reduce body weight.

2.4.7 Lack of physical activity. Engaging in a physical activity of moderate intensity for 60 minutes every day is an essential step to prevent chronic diseases and maintain a healthy weight (WHO, 2015a), whereas a decline in physical activity during childhood is associated with an increased risk of obesity in childhood (El-Bayoumy et al. 2009; Mandeya & Kridli, 2014) and in adulthood (Dwyer et al., 2009). Further, various research studies provide evidence of the positive link between a lack of physical activity and body weight gain in children and adolescents (Al-Hazzaa et al., 2012; Al-Nuaim et al. 2012; Memish et al., 2014).
A systematic review was conducted by Mistry and Puthussery (2015) to identify the risk factors associated with overweight and obesity in children and adolescents in several South Asian countries (Pakistan, India, Sri Lanka, Bangladesh, Nepal, Maldives and Bhutan). The findings show that a lack of physical activity was found to be associated with overweight and obesity. In particular, the study found that the time spent by children and adolescents on physical activity ranged from less than 2 hours per week to less than a half hour per day (Mistry & Puthussery, 2015). The generalisability of these findings is limited to three South Asian countries: Pakistan, India and Bangladesh. No relevant studies were found in relation to the other countries in this region. Further, this study represents children and adolescents attending schools. As mentioned by the authors, there are a total of 27 million children who are not enrolled in school in India, Pakistan, Bangladesh and Sri Lanka.

In Saudi Arabia, a national multistage survey of adolescents and adults found obesity was prevalent in 24.1% of males and 33.5% of females (Memish et al., 2014). The results revealed that the risk of obesity was higher among those who were not engaging in a physical activity. Overall, 75.1% of women and 46.0% of men were found to be physically inactive (Memish et al., 2014). In addition, Al-Nuaim et al. (2012) identified that in Saudi Arabia normal-weight male adolescents aged between 15 and 19 years had the highest levels of physical activity compared to overweight or obese male and female adolescents. Moreover, a cross-sectional study was conducted in Saudi Arabia among males and females aged 14–19 years (N = 2908), the findings showing that slightly less than a quarter of females and half of males met the current recommendation of 60 minutes per day of physical activity (Al-Hazzaa et al., 2011). A possible explanation for
the decline in physical activity among the Saudi population was given by Al-Nuaim et al. (2012) who attributed a lack of physical activity to the harsh desert climate, the lack of available facilities for exercise and parents’ interest in academic achievement over leisure time physical activities.

Physical inactivity is reported by a number of authors to be the major cause of obesity and overweight among children in Kuwait. A cross-sectional study by El-Bayoumy et al. (2009) indicated that a lack of physical activity has contributed to the increased prevalence of obesity and overweight among intermediate adolescent school children aged between 10 and 14 years (N = 5402). The study indicated that there was a close association between obesity and overweight and increased physical inactivity. In fact, the study indicated that the majority of children between the ages of 10 and 14 had increased body weight and obesity due to physical inactivity. The physical fitness score (PFS) shows that about 97% of obese and overweight children had a score below the median range of PFS. More recently, a cross-sectional study was conducted by Allaafi et al. (2014) of 906 male and female adolescents aged 14–19 years in a Kuwaiti secondary school to assess physical activity, sedentary behaviour and dietary habits. Their findings show 76.0% of girls and 44.6% of boys did not meet the daily recommended amount of physical activity.

Numerous studies have proposed strategies to increase physical activity as a way to combat becoming overweight or obese (Hills, Andersen, & Byrne, 2011; Sallis & Glanz, 2009), given the evidence on the benefit of physical activity in relation to reducing the risk of gaining unhealthy weight. For instance, a longitudinal intervention study was conducted with the purpose of evaluating whether increasing physical activity
during school time resulted in increased daily physical activity and decreased overweight and obesity among children. The study involved two groups, an intervention and a control group consisting of a total of 84 girls and 92 boys over a period of 2 years. In the intervention group there was a significant increase in physical activity from 1718 to 3247 steps per day during school time. The study found that children in the intervention group had a 3 times lower risk of becoming overweight or obese when compared with the control groups during the first year of physical activity intervention (Sigmund, El Ansari, & Sigmundová, 2012).

A similar study was conducted with the purpose of assessing a 3-month intervention program of physical activity. Anthropometric measurements and physiological parameters of 160 adolescents were collected twice, before and after intervention. The final evaluation of the program shows there was a significant reduction of overweight from 27.5% to 12.5% in the intervention group, whereas overweight increased in the control group. Further, the results also show that there was a similar beneficial effect for both boys and girls in the intervention group (El Ansari, El Ashker, & Moseley, 2010). Moreover, a recent systematic review by Vasconcellos et al. (2014) focused on studies that investigated the effects of physical activity in overweight and obese adolescents aged 12–17 years. These findings demonstrate that the effect of physical activity is associated with significant changes in waist circumference, fat percentage and a reduction in the risk of diseases associated with overweight and obesity.

Overall, the above studies indicate the significant role of physical activity in reducing the risk of obesity. Chaput et al. (2010) provided evidence to support this finding, identifying physical activity as a possible mechanism in the regulation of body weight.
through balancing energy intake and expenditure, controlling the appetite, improving metabolic adaptations and decreasing the risk of stress induced by being overweight.

Despite this valuable evidence, children and adolescents face a number of barriers to engaging in physical activity. Recognised barriers include a lack of support from school teachers, a lack of motivation to be engaged in physical activity, a lack of time (Musaiger et al., 2013), concern about the safety of the children and a lack of access to sporting facilities (Kelishadi et al., 2010). It is for these reasons that there has been a reduction in physical activity worldwide (De Moraes, Guerra, & Menezes, 2013; Guthold et al., 2010; Konstabel et al., 2014), which coincides with an increase in the prevalence of overweight and obese individuals globally. Consequently, encouraging children and adolescents to be physically active is a priority in promoting healthy weight.

2.4.8 Sedentary lifestyle. Sedentary behaviours, in terms of the time spent watching TV, using computers and playing videogames, is predicted to be more strongly associated with child obesity than a lack of physical activity (Lazarou & Soteriades, 2010; Maher, Olds, Eisenmann, & Dollman, 2012), despite the fact that sedentary lifestyles lead to a lack of physical activity (Berentzen et al., 2014; Brown, Nicholson, Broom & Bittman, 2011; Jackson, Djafarian, Stewart & Speakman, 2009; WHO, 2015a).

A recent systematic review of longitudinal studies provides evidence indicating that there is a yearly increase in the mean weight for girls (5.8%) and boys (5.7%) as a result of a daily sedentary lifestyle. Also, the sedentary behaviour of children and adolescents
increases with age by nearly 30 minutes extra per day every year (Tanaka, Reilly, & Huang, 2014).

Many research studies on sedentary behaviour show that screen time alone is linked to overweight and obesity in children and adolescents (Falbe et al., 2013; Maher, Olds, Eisenmann, & Dollman, 2012; Morales-Ruán et al., 2009; Stamatakis et al., 2013; Steele et al., 2009). For instance, a systematic review of cross-sectional studies aimed to examine the level of overweight and obesity in relation to physical activity and sedentary behaviour among children and adolescents. Overall, the findings indicate that the time spent on sedentary behaviour was significantly associated with BMI, while physical activities were not associated in some studies (Prentice-Dunn & Prentice-Dunn, 2012).

A longitudinal study of prospective observational design was conducted in the US by Mitchell, Pate, Beets and Nader (2013) to determine whether the time spent in sedentary activity is associated with the BMI among participants aged 9–15 years (N = 789). The results show that BMI of children and adolescents was significantly associated with the sedentary behaviour independent of moderate to vigorous physical activity. In addition, a study of Canadian children aged 8–10 years assessed children’s behaviour in relation to physical inactivity; the study found that nearly 46% of girls and 19% of boys met the recommendations of the Canadian sedentary behaviour guidelines for children who have screen time of 2 hours per day. Those who engaged in sedentary behaviour were significantly higher in overweight and obesity compared to children of normal weight (Herman et al., 2014).
Overweight and obesity is not only associated with sedentary behaviour in terms of inactivity, it is also associated with the unhealthy dietary habits of those engaged in sedentary activities (Cox et al., 2012; Manios et al., 2009; Pearson & Biddle, 2011; Rey-López et al., 2011). For instance, a cross-sectional study conducted among USA children and adolescents (N = 12,642) identified that TV watching was negatively associated with fruit and vegetable intake and significantly related to the intake of fast food, candy and skipping breakfast (Lipsky & Iannotti, 2012). A longitudinal study was conducted by Falbe et al. (2014) with US children and adolescents (N = 8272). The authors used consecutive questionnaires for 2 years to assess dietary changes over time. The results indicated that for each hour increase in screen time there was a decreased intake of fruit and vegetables and an increase in the consumption of SSBs, sweets, salty snacks and fast food (Falbe et al., 2014).

A study was conducted in Canada to determine the relationship between the time spent in sedentary activities and the frequency of food consumption among Canadian children aged 9–11 years (N = 523) (Borghese et al., 2014). The evidence showed that TV watching was negatively associated with healthy food and positively associated with consumption of unhealthy foods, such as sweets, ice cream, potato chips and fast food (Borghese et al., 2014). Further, the results from Borghese et al. (2014) indicated that unhealthy eating habits were strongly associated with body weight than is the total time spent on sedentary behaviour. Similarly, Pearson et al. (2014) found that TV viewing during the school day and on weekends was significantly associated with unhealthy dietary habits among Australian adolescents.
In the same context, television advertisements are one of the most harmful elements of TV watching. A longitudinal study by Andreyeva, Kelly and Harris (2011) was conducted to identify the effect of TV advertising on children’s food intake and body weight between the years 2002 and 2004. They found a positive correlation between food advertising and an increased intake of fast food and soft drinks, which was associated with a 9.4% rise in children’s intake of SSBs and a 1.1% rise in fast food consumption in 2004 (Andreyeva, Kelly, & Harris, 2011). In addition, exposure to food advertisements on TV was associated with the desire to eat (Kemps, Tiggemann, & Hollitt, 2014) and was significantly associated with attraction to purchasing the products (Costa, Horta, & Santos, 2012). Moreover, every one point rise in TV fast food advertising increased the risk of obesity by 19% (McClure et al., 2013), while a reduction in food advertising to zero reduced the average of BMI by 0.38 kg/m² and lowered the rate of obesity from 15.9% to 13.5% among girls and from 17.8% to 15.9% among boys (Veerman et al., 2009).

In summary, it appears from the literature review that sedentary activities are among the main risk factors contributing to obesity in children, not only as a result of the time spent on sedentary activities, but also due to the other behaviours acquired from the TV programs and advertisement. Boulos et al. (2012) point out that there are three possible explanations for the direct relationship between body weight and TV viewing. First, TV watching is a sedentary activity that decreases one’s amount of physical activity. Second, unhealthy food advertisements stimulate the intake of non-nutritious food. Third, watching TV is linked with mindless dietary intake.

### 2.5 Implications of Childhood Obesity
2.5.1 Health implications. An elevated BMI in children can lead to adverse health consequences during childhood and adulthood (Lloyd, Langley-Evans, & McMullen, 2010; Nathan & Moran, 2008; Reilly & Kelly, 2011). The most serious health implication of child obesity is an increased risk of obesity in adulthood (Biro & Wien, 2010; Juonala et al., 2011; Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014). A systematic review on the long-term effect of being overweight or obese on individuals’ health was conducted by Reilly and Kelly (2011), which provided evidence to indicate that being overweight or obese during childhood or adolescence increases the risk of premature death, diabetes, ischaemic heart disease, hypertension, stroke, asthma and polycystic ovary syndrome symptoms, which could lead to a reliance on the disability pension in adulthood. Similarly, evidence provided from longitudinal studies on the long-term consequences of childhood obesity in adulthood includes an increased risk of developing cardiovascular disease, non-alcoholic fatty liver disease (NAFLD), metabolic syndrome, type 2 diabetes, renal complications, retinal and orthopedic complications, obstructive sleep apnoea syndrome (OSAS), asthma, infertility, polycystic ovarian disease and an increased risk of cancer (Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014).

A large study conducted in European countries with a sample of 26,008 children found that nearly 50% of obese and severely obese children had at least one risk factor for cardiovascular disease, including high blood pressure, high dyslipidaemia, high or low-density lipoprotein cholesterol, high triglycerides, suspicion of diabetes and impaired glucose tolerance (L’Allemand et al., 2008). The authors stated that this study had a biased selection sample because it targeted children who transferred for treatment from
unhealthy weight and it is not a population-based data collection. Rizk and Yousef (2012) indicated that overweight and obese people had a significantly increased risk of cardiovascular disease, including hypertriglyceridemia, low-density lipoprotein cholesterol, hypercholesterolemia and increased risk of atherosclerosis.

A cross-sectional study conducted in China assessed the prevalence of hypertension among overweight and obese children and adolescents (N = 78,114). BMI, waist circumference and blood pressure (BP) were measured. The findings indicate that there is a significantly higher prevalence of raised systolic BP and diastolic BP in people who are overweight and obese than in the normal weight group. In addition, high BP was independently and positively associated with BMI and waist circumference (Lu et al., 2013). Additionally, Schwiebbe et al. (2012) identified that overweight children had a 2.1% higher risk and obese children had a 7.2% higher risk of suffering from hypertension.

In relation to the endocrine system, overweight and obesity in children increases the risk of diabetes type 2 (Hannon, Rao, & Arslanian, 2005; Lee, 2009a; Zhu, Zhang, Li, Xie, & Yang, 2013). According to the WHO (2013), nearly 90% of people diagnosed with type 2 diabetes are overweight or obese. In the US, a study was conducted to assess the prevalence of overweight and obesity among diabetic (N = 3953) and non-diabetic (N = 7666) children and adolescents aged 3–19 years. The results show that the prevalence of overweight and obesity among the type 2 diabetes group was 10.4% and 79.4%, respectively. Further, the prevalence of overweight or obesity among the type 1 diabetes group was 22.1% and 12.6%, respectively. Overall, the prevalence of obesity was higher among participants diagnosed with diabetes type 2, while overweight was higher
in the diabetes type 1 group compared to the non-diabetes group (Liu et al., 2010). Interestingly, Al Mamun et al. (2009) identified that being overweight at 5 years of age increased the risk of diabetes at age 21 compared to normal-weight children at 5 years of age. These associations remained after controlling for environmental factors, childhood dietary patterns, sedentary activity, physical activity and current weight.

Another serious disorder associated with childhood obesity is non-alcoholic fatty liver disease (NAFLD) (Abrams & Katz, 2011; Gupta et al., 2011; Welsh, Karpen & Vos, 2013). A study was conducted by Ezzat et al. (2012) to identify the frequency of NAFLD among 72 children and 83 adults who were overweight or obese. Based on the results of biochemical investigations of liver function, fatty liver disease was found in 47 of the 72 children and in 52 of the 83 adults. Similarly, Zaki, Ezzat, Elhosary and Saleh (2013) identified that dyslipidaemia and abdominal obesity in obese children were risk factors of NAFLD. Bedogni et al. (2012) conducted a study of 571 obese children, finding that 41% of participants had NAFLD. But the authors stated that the ultrasonography used in this study to diagnose the prevalence of fatty liver is associated with an unreliable estimation and does not offer any information on the presence of non-alcoholic or liver fibrosis. Furthermore, a lack of body composition measurements, including measurements of visceral fat, was reported in this study’s limitations.

The early health implications of childhood obesity are also present in the respiratory system. For example, asthma is well documented among overweight and obese children and adolescents (Black, Smith, Porter, Jacobsen, & Koebnick, 2012; Ginde, Santillan, Clark & Camargo, 2010; Ho et al., 2011; Okabe et al., 2011; Pulgarón, 2013; Wang et al., 2014). Meta-analysis findings reveal that overweight children have a greater risk of
developing asthma than non-overweight children and the incidence of asthma among children increases as the weight of the child increases (Chen, Dong, Lin, & Lee, 2013). Further, a study conducted in Iran to examine the prevalence of obesity and the associated symptoms of asthma among school children found that the prevalence of wheezing was 68% and 37% among obese and overweight children, respectively. Further, there was a significant correlation between the prevalence of wheezing and exercise-induced wheezing and obese children (Kajbaf, Asar, & Alipoor, 2011).

Kang et al. (2012) identified that obese children had a statistically higher obstructive apnoea index and a lower minimum oxygen saturation and apnoea–hypopnea index than normal-weight children and underweight children. An increase in the body weight of children and adolescents was found to be associated with a reduction of lung volume measurements, which could lead to impaired lung function (Davidson et al., 2014). Other health implications for the respiratory system, such as obstructive sleep apnoea syndrome (OSAS), were also reported among obese children (Bhattacharjee, Kim, Kheirandish- Gozal, & Gozal, 2011; Gozal & Kheirandish- Gozal, 2012; Udomittipong et al., 2011).

Musculoskeletal complications in overweight or obese children are also common. A number of studies have identified the health implications in relation to the musculoskeletal system among overweight or obese children, such as fractures, injuries, musculoskeletal pain (Paulis, Silva, Koes, & Middelkoop, 2014), knee and hip joint pain (Stovitz et al., 2008), impairment of the lower limb (O’Malley, Hussey, & Roche, 2012), blount disease, slipped capital femoral epiphysis (Chan & Chen, 2009) and chronic regional pain (Deere et al., 2012). In addition, Krul et al. (2009) point out that
overweight and obese adolescents more often consult their family physician regarding lower extremity problems than normal-weight adolescents. It has been shown that 38 out of 39 severely obese children or adolescents had at least one marked cartilage lesion at the knee, as evidenced by magnetic resonance imaging (Widhalm et al., 2014).

It is clear that overweight and obesity in children are the main contributing factors for several serious diseases that could appear early or later in life. In contrast, maintaining a healthy weight may protect against chronic diseases. Looking more closely at the importance of maintaining a healthy weight, a retrospective study was conducted by Alqahtani et al. (2012), which aimed to evaluate 108 severely obese children and adolescents who had undergone laparoscopic sleeve gastrectomy in Saudi Arabia. Their findings show that nearly half of the patients had a significant reduction in weight, ranging from 42.1% to 73.2% at the first-year follow-up. Further, there were significant resolutions of comorbidity at the second year, including nearly 70.0% of dyslipidaemia, 83.3% of prehypertension, 75.0% of hypertension, 100.0% of prediabetes, 93.8% of diabetes and 90.9% of symptoms of OSAS.

2.5.2 Psychological implications. The relationship between overweight and obesity and psychosocial problems in children and adolescents is well documented (BeLue, Francis, & Colaco, 2009; Luppino et al., 2010; Williams et al., 2013). Several research studies have identified that overweight and obese children and adolescents are more likely to develop psychosocial problems, such as depression, lower self-esteem and eating disorders, as a result of being teased or bullied about their weight (Bucchianeri et al., 2014; Lampard et al., 2014; Williams et al., 2013).
Being overweight or obese increases the risk of victimisation by bullying and teasing. Findings from the study by Jansen et al. (2014) indicated that an increase of 1 point in children’s BMI was associated with an increase of 0.05 on the standardised teacher-reported victimisation score. In addition, a study conducted by Brixval et al. (2012) with students aged 11–15 years to assess the relationship between body weight and exposure to bullying found that overweight and obese children were at higher risk of exposure to bullying compared to normal-weight children. More importantly, the risk of bullying increased as the weight of the children increased.

Farrant et al. (2013) identified that severely obese students were at 1.7 times higher risk of being bullied than normal-weight children. Likewise, the findings of Qiao-Zhi et al. (2010) indicate that the incidence of bullying and harassment doubled among overweight adolescents compared to their normal-weight peers. Similarly, Puhl, Luedicke and Heuer (2011) identified that being overweight is a primary reason for teasing and victimisation during physical activities and when eating in the cafeteria at school. Furthermore, overweight and obese adolescents are more likely to be excluded from social activities. Fonseca et al. (2009) point out that overweight adolescents are more likely to describe themselves as unhappy as they have negative attitudes toward their physical appearance and are more likely to experience peer rejection. Also, many obese adolescents tend to consume alcohol every day.

Zeller, Reiter-Purtill and Ramey (2008) and Gunnarsdottir et al. (2012) found that obese children are more likely to have difficulties making new friendships. Therefore, the possibility that overweight and obese children will have psychosocial problems as a consequence of harassment is high. A study conducted in the US among 119 obese
adolescents to assess the correlation between weight-related teasing, depression and low self-esteem found there was a positive association between teasing, lower self-esteem and the prevalence of depression (Porter et al., 2012). However, this study did not take into account specific cultural variables such as perceived pubertal timing, racial socialisation and social self-image, which may influence perceptions of body satisfaction.

Rojo-Moreno et al. (2013) conducted a study among adolescent students (N = 57,997) to assess the correlation between teasing and emotional symptoms, body satisfaction, eating disorders and a drive for thinness. They found a significant correlation between weight-related teasing and abnormal eating behaviour. In addition, male adolescent weight-related teasing has a strong independent correlation with body dissatisfaction, while female adolescent weight-related teasing is significantly associated with eating disorders (Rojo-Moreno et al., 2013).

Lampard et al. (2014) found there was a high correlation between weight-associated teasing and depression in boys, and higher body dissatisfaction and low self-esteem in girls. Likewise, Williams et al. (2013) found that higher weight-related bullying by peers was associated with lower body self-esteem in girls. In addition, the findings of Libbey, Story, Neumark-Sztainer and Boutelle (2008) indicate that the frequent teasing of overweight adolescents by family and friends was associated with depression, anger, lower self-esteem, anxiety and higher rates of eating disorders.

Interestingly, overweight and obesity among children at 5 years of age increases the risk of depression during adulthood (Sánchez-Villegas et al., 2010). This was confirmed by
the findings of Korczak, Lipman, Morrison and Szatmari (2013), which indicated that obese female adolescents are at higher risk of developing depression in adulthood. Similarly, Sanderson et al. (2011) identified that overweight and obese children are more likely to be associated with mood disorders during adulthood, and the risk of depression increased among obese women who were overweight in childhood.

The findings from the study of Rancourt et al. (2014) indicate that a decrease in body weight is associated with a decrease in weight-related teasing and the fear of being negatively viewed among adolescents. Likewise, Quinlan, Kolotkin, Fuemmeler and Costanzo (2009) conducted a study to evaluate the psychosocial outcome of US adolescents (N = 130) who participate in intervention weight loss programs with a focus on controlling daily calorie intake, increasing physical activities and providing healthy supportive classes. They found that a significant reduction in BMI (equivalent, on average, to a 7.5 kg decrease in weight) was associated with the improvement of adolescents’ self-esteem, weight-related quality of life, self-efficacy and anti-fat attitudes. Most importantly, there was an improvement in self-efficacy, social function and physical function as a result of weight reduction.

2.5.3 Economic cost of childhood obesity. The total economic costs of obesity is divided into three components includes direct cost (Anis et al., 2010), indirect cost (Wang et al. 2011), and intangible cost (Ottova et al., 2012). The direct cost of obesity refers to the utilisation of a medical service to treat obesity and the diseases resulting from obesity (Withrow & Alter, 2011). The indirect cost of obesity refers to the loss of productivity due to mortality and morbidity caused by obesity (Wang et al. 2011). The
intangible costs of obesity are those associated with a reduction in overall quality of life (Rippe, 2013).

Worldwide, the direct cost of obesity is estimated to be around 0.7% to 2.8% of total healthcare service expenditures. Further, the medical costs of obese individuals are nearly 30% higher than normal-weight individuals (Withrow & Alter, 2011). In addition, in the US an increase in the BMI of children and adolescents was associated with an extra $14.1 billion every year in outpatient visit costs, prescription drug expenditure and emergency room expenditure (Trasande & Chatterjee, 2009). Moreover, child hospitalisation as a result of obesity has nearly doubled and the economic cost of medical care increased from 125.9 to 237.6 million US dollars between 2001 and 2005 in the US (Trasande, Liu, Fryer, & Weitzman, 2009).

Not surprisingly, study findings in various states of the US suggest that medical expenditure could be reduced by 6.7% to 10.7% annually if the incidence of obesity was greatly reduced (Trogdon, Finkelstein, Feagan, & Cohen, 2012). In Canada overweight and obesity was estimated to account for $6 billion Canadian dollars of direct costs in 2006, with 4.1% attributed to obesity (Anis et al., 2010). In addition, the findings of a study conducted by Kuhle et al. (2011) indicate that obese children in Canada had a significantly higher number of physician visits and specialist referrals per year and higher health costs compared to normal-weight children. In Australia, study findings reveal that being overweight at 4 or 5 years old was associated with higher medical care costs. In 2004 and 2005, the total medical cost of overweight children aged 4 and 5 years was approximately AUD$9.8 million higher than the medical costs of normal-weight children (Au, 2012).
Wang et al. (2011) point out that overweight and obesity also cause indirect costs, including a loss of productivity and an increased risk of mortality and premature death. In addition, the findings of a study conducted by Lightwood et al. (2009) indicate that the current number of overweight adolescents is predicted to contribute to 1.5 million life years lost and 161 million life years complicated by obesity, diabetes and coronary heart disease from 2020–2050 among adults aged 35–64 in the US. Likewise, the findings of a study conducted by Neovius, Rehnberg, Rasmussen and Neovius (2012) indicate that people diagnosed with obesity in early adulthood had twice the risk of normal-weight individuals in relation to lost productivity over a lifetime. Similarly, Franks et al. (2010) conclude that childhood obesity, hypertension and glucose intolerance were significantly associated with the prevalence of premature death. Moreover, a study conducted in Germany found that childhood obesity increased the risk of obesity in adulthood and significantly contributed to higher indirect lifetime costs, these being 2,445 EUR for women and 4,209 EUR for men (Sonntag, Ali, & De Bock, 2014).

The intangible cost of overweight and obesity is also associated with quality of life. A study to assess the health-related quality of life among children and adolescents in 10 European countries (United Kingdom, France, Germany, Czech Republic, Poland, Spain, Austria, Switzerland, Hungary and Netherlands) found that those who were in the overweight group had a lower mean of health-related quality of life scores than those in the normal-weight group (Ottova et al., 2012). Likewise, the findings from a study conducted in Hong Kong indicated that normal-weight children had significantly higher quality of life scores in physical functioning than overweight or obese children.
Further, the results show that overweight children had double the risk of experiencing problems in social functioning, while obese children had 2–5 times the risk of experiencing problems in school performance, and physical and social functioning (Chan & Wang, 2013).

Studies conducted by Riazi et al. (2010) and Keating, Moodie and Swinburn (2011) drew similar conclusions, finding that for both children and adolescents, obesity had a significant impact on social, emotional and physical functioning. The findings of Wang et al. (2010) indicate that a 1% point reduction in overweight and obesity among adolescents aged 16–17 years will reduce the rate of obese people by 52,821 among adults, increase the quality-adjusted life years by 47,138 (0.0059 per person) and decrease the medical costs by $586.3 ($73 per person) in adults at 40 years old in the US.

### 2.6 Chapter Summary

This chapter has clearly shown that the risk factors associated with being overweight or obese are similar in developed and developing countries, in terms of the impact of culture on children’s dietary intake, genetic factors associated with obesity, short duration of breastfeeding, unhealthy food intake, sweetened beverage consumption, lack of physical activity and time spent in sedentary activities such as TV watching. However, this is not the case for SES, as the literature indicates that high family income is significantly associated with an increase in the risk of overweight or obesity in developing countries. Conversely, in developed countries, a low family income is significantly associated with prevalence of overweight and obesity in children and adolescents.
There are three implications of childhood obesity. First, the health implications related to child obesity that can lead to serious health problems that might appear in early childhood or later in adulthood with an increased risk of premature death. Second, the socio-psychological problems associated with overweight and obesity in children and adolescents as a result of bullying and teasing. Third, the economic costs of overweight, being direct (costs of using a healthcare service), indirect (costs associated with lost productivity) and intangible (costs associated with a loss in the quality of life).

The next chapter provides an overview of the prevalence of overweight and obesity among children and adolescents in developed and developing countries, followed by an overview of how society perceives the issues of overweight and obesity and the roles of parents, school, school nurse and governments in addressing these challenges.
Chapter 3: Literature Review: Part 2

3.1 Introduction

Over the last decade, the incidence of overweight and obesity in children and adolescents has risen dramatically worldwide (WHO, 2015a). With this increasing incidence, there is an increased risk of non-communicable diseases, disability and premature death in adulthood (WHO, 2015a). In addition, the implications of not intervening early to combat overweight and obesity are psychological costs (Williams et al., 2013) and economic costs (Anis et al., 2010). No country can claim to having succeeded in reducing its rate of overweight and obesity across all ages (Ng et al., 2014).

This chapter is a supplement to part one of the literature review of this study in which studies that met the criteria of the search strategy were reviewed. Part two of the literature review presents a review of the literature related to overweight and obesity with a focus on children and adolescents, and will be presented in several parts. An overview of the most recent findings on the prevalence of overweight and obesity in developed and developing countries is provided. This is followed by a review of the current literature on the perceptions and attitudes of children, parents, teachers, school nurses and decision-makers toward overweight and obesity. The role of the school, school staff, parents and government in tackling obesity among children will also be explored and discussed.

3.2 Prevalence of Overweight and Obesity Among School Children and Adolescents Worldwide
In recent years, the findings of several studies show an increase in the prevalence of overweight and obesity among children and adolescents (Gupta, Goel, Shah, & Misra, 2012; Ng et al., 2014; Ogden, Carroll, Kit, & Flegal, 2012; Schönbeck et al., 2011; Vuorela, Saha, & Salo, 2011). Some studies show stabilisation in the prevalence of overweight and obesity (Ogden, Carroll, Kit, & Flegal, 2014; Salanave et al., 2009), while others suggest a decline (Morgen et al., 2013; Moss et al., 2012; Wen et al., 2012). However, when examining the issue from an international perspective, the rate of overweight and obesity among children and adolescents has tended to increase or remain at a high level. The findings of a recent systematic analysis of existing literature conducted by Ng et al. (2014) indicate that the rate of overweight and obesity increased in developed countries from 16.9% of boys and 16.2% of girls in 1980 to 23.8% of boys and 22.6% of girls in 2013. In contrast, in developing countries 12.9% of boys and 13.4% of girls were overweight or obese in 2013 compared with 8.1% of boys and 8.4% of girls who were overweight or obese in 1980 (Ng et al., 2014). In the US, data published from the National Health and Nutrition Examination Survey (2011/2012) showed that 14.9% of US children and adolescents were overweight and 16.9% were obese (Fryar, Carroll, & Ogden, 2014). Similarly, the findings of Ogden, Carroll, Kit and Flegal (2014) showed that 31.8% of adolescents were overweight or obese, and the rate of obesity in US adolescents remained high throughout 2003–2012, with no changes cited since 2003. Further, in 2011 and 2012 boys and girls had a similar rate of obesity.

However, there are variances in the prevalence of obesity in relation to race and age, showing that Asians and white children aged 2–5 years have a lower rate of obesity,
while Hispanic and black children aged 6–19 years recorded a higher rate of BMI compared with the white and Asian groups (Ogden, Carroll, Kit, & Flegal, 2014). The authors of this study did not propose a specific hypothesis to assess the variances in the rate of obesity in relation to race. Bethell, Simpson, Stumbo, Carle and Gombojav (2010) conducted a study based on data obtained from the National Survey of Children’s Health in the US that shows that the percentage of children and adolescents who were overweight remained stable while the rate of obesity increased significantly from 14.8% to 16% between 2003 and 2007. Specifically, the authors estimated that about 10.58 million US children were overweight or obese in 2007. In contrast, Cunningham, Kramer and Narayan (2014) point out that the annual incidence of obesity between 1998 and 2007 in US children decreased from 5.4% in kindergarten to 1.7% during the fifth and eighth grade. However, the factors associated with the development of overweight during the first years of life were not covered.

Another study conducted by Ogden, Carroll, Kit and Flegal (2012) did not find any significant changes in the prevalence of obesity among children and adolescents from 1999 through 2008. Moreover, Skinner and Skelton (2014) conclude that the rate of obesity has remained stable in most recent data related to children and adolescents in the US.

In European countries, according to statistics provided by the WHO/European region (2014), 1 in 3 children aged 11 years in Europe were overweight or obese. Recent findings in eight European countries (Germany, Italy, Sweden, Spain, Belgium, Cyprus, Estonia and Hungary) show that the rate of overweight was higher in girls (21.1%) compared with boys (18.6%). Overall, the prevalence of overweight and obesity
reached more than 40% in southern Europe and less than 10% in northern European countries (Ahrens et al., 2014). Similarly, a study conducted in seven European countries (the Netherlands, Italy, Romania, Germany, Bulgaria, Turkey and Lithuania) indicated that 15.6% of children were overweight and 4.9% were obese. The prevalence of overweight and obesity was at its lowest rate (10.4%) for Italian children, while Romanian children had the highest rate (31.4%) (Olaya et al., 2015). The authors indicted that political and economic transitions as factors that have negatively affected the lifestyle of Romanian children by increasing their daily energy intake.

In England the prevalence of overweight and obesity remained stable between 2004 and 2013 according to gender but not age. Children below 10 years of age had a stable rate compared with children of 11–15 years, for whom the rates continued to rise (van Jaarsveld & Gulliford, 2015). As this study obtained data from primary care electronic health records, the children’s health records regarding their annual BMI measurements could be low and irregular, as most of the children were ill.

Nevertheless, in support of van Jaarsveld and Gulliford (2015), the findings from a study by Stamatakis, Wardle and Cole (2010) indicated that the rate of overweight and obesity remained stable among English children aged 5–10 years from 2002–2007. However, this did not occur in relation to children and adolescents from Cyprus where the rate of overweight increased from 16.5% in 2000 to 20.1% in 2010, and over the same period the rate of obesity increased from 5.9% to 8.1%. School-aged boys and children in rural areas had a greater risk of becoming obese. In contrast, the risk of obesity in rural areas decreased with an increase in the mother’s level of education (Savva, Kourides, Hadjigeorgiou, & Tornaritis, 2014).
In Greece a study conducted by Tzotzas et al. (2011) found 31.2% of male and 26.5% of female children were overweight or obese. Ahluwalia et al. (2015) reported that from 2002–2010 the rate of overweight increased among the 11–15 year age group in Eastern European countries, while the rate of overweight among adolescents levelled off in several European countries and North America. This could be explained by the findings of Olaya et al. (2015), who identified that children from Eastern European countries had a higher risk of being overweight and obese due to the unhealthy lifestyle they had adopted from living in this region.

In Australia, a report released by the Australian Bureau of Statistics (2013) indicated that the prevalence of overweight/obesity among Australian children and adolescents rose significantly from 20.9% to 24.7% between 1995 and 2007. Further, the report shows the rate of overweight and obesity remained stable till 2012. This could possibly be explained by the reduction in sedentary lifestyle activities from 71% to 67% between 2007 and 2012.

A systematic review and meta-analysis of studies on Australian children and adolescents found that there was a slight increase in overweight, with almost no changes cited in the past 10 years. Findings suggest that the rate of overweight and obesity settled at between 21% and 25% in boys and girls (Olds, Tomkinson, Ferrar, & Maher, 2010). Since this study relied on a review of published studies collected from a wide range of earlier studies, it is likely that subjects from specific geographical areas or age groups were overrepresented or underrepresented in the study’s findings.
A study by Martin et al. (2014) in Western Australia found that the rate of overweight and obesity in school aged children was 22.9% and 23.2%, respectively, in 2003. In addition, the rate of overweight and obesity stayed stable between 2003 and 2008, except for adolescent girls’ whose level of overweight and obesity dropped from 23.1% to 15.9% (Martin et al., 2014). However, as all the students in this study participated voluntarily, it is possible that fatter children may have avoided participating, leading to an underestimation of the rate of overweight and obesity. In contrast, the findings of a study conducted by O’Dea and Dibley (2014) showed that the rate of overweight and obesity among children and adolescents reached 25% in boys and in girls. This rate stayed stable between 2006 and 2012. However, O’Dea and Dibley identified that students from low SES groups had a higher BMI and also students from Pacific Islander, Polynesian or Middle Eastern backgrounds had a higher mean BMI.

In African countries, the findings of a cross-sectional study conducted on adolescents in seven African countries (Egypt, Malawi, Morocco, Ghana, Benin, Djibouti and Mauritania), based on WHO (2007) criteria, showed that the percentage of overweight ranged from 8.7% to 31.4%, and obesity ranged from 0.6% to 9.3%. Overall, the prevalence of overweight and obesity in these African countries was higher in females than males. Egyptian adolescents recorded higher rates of overweight and obesity compared with other countries, whereas the lowest prevalence of overweight was in Ghana and the lowest prevalence of obesity was recorded in Benin (Manyanga, El-Sayed, Doku, & Randall, 2014).

In South Africa the prevalence of overweight and obesity increased from 2002–2008 among adolescents of both genders, with overweight increasing from 6.3% to 11%
among males and from 24.3% to 29.0% among females. The obesity rate for males doubled (from 1.6% to 3.3%) and for females it increased from 5.0% to 7.5% (Reddy et al., 2012). In contrast, Kruger et al. (2012) found that overweight and obesity in South African children decreased significantly from 17.1% in 1999 to 14.0% in 2005. These studies by Kruger et al. and Reddy et al. had a large representative sample from South Africa, but they recruited from different age groups and used different BMI reference measurements, hence, it is not surprising that there was a different outcome.

In another African country, Kenya, the findings of Kyallo, Makokha and Mwangi (2013) showed that 19% of children were overweight or obese and that more female children were overweight or obese than boys (21% compared to 16.9%). Further, children from private schools had a higher rate compared with children from public schools (29% compared to 11.5%). This study was a descriptive study designed to determine the prevalence of overweight/obesity and associated risk factors. However, the authors did not provide a sufficient explanation on the variation in the results with regard to the school’s influence on the children’s body weight.

In Asia, a study of Chinese children found a slight increase in BMI from 16.6% in 2008 to 16.8% in 2011 (Lu et al., 2015). Another study reported a gradual increase in the mean BMI of Chinese children and adolescents from 17.4 kg/m² in 1991 to 18.3 kg/m² in 2006. Further, the results show gender differences, with male children and adolescents males having more excess body weight compared with females, at 15.4% and 11.0%, respectively, in 2006 (Cui, Huxley, Wu, & Dibley, 2010). These studies by Lu et al. and Cui et al. used data from a health and nutrition survey carried out by the Chinese Government and, even though they used different BMI measurement criteria,
their findings are consistent, showing that the trend toward obesity increased in Chinese children. A recent meta-analysis of 41 studies of Chinese overweight and obesity revealed that the rates of overweight and obesity has risen, respectively, from 1.8% and 04% in 1981–1985 to 13.1% and 7.5% in 2006–2010. Overall, boys had a higher risk of being overweight or obese compared with girls, and the rate of overweight and obesity was higher in urban areas compared to rural areas (Yu, Han, Chu, Xu, Zhu, & Guo, 2012).

In South Asia, a systematic review was conducted on studies published between 1999 and 2013 in 8 countries (India, Pakistan, Bangladesh, Nepal, Bhutan, the Maldives, Sri Lanka and Afghanistan). The findings revealed that the prevalence of overweight and obesity had reached 19.7% and 14.5% among children and adolescents, respectively (Mistry & Puthussery, 2015). In India, the rate of obesity in adolescents increased significantly from 9.8% to 11.7% and the rate of underweight decreased from 11.3% to 3.9% between the period 2006–2009. These findings also show that the risk of being overweight or obese increased between 2006 and 2009 and was higher for boys compared with girls (Gupta et al., 2011).

In Arabic countries, a study of Lebanese children and adolescents compared the rate of overweight and obesity between 1997 and 2009. The findings show that the rate of overweight during this period was slightly higher, at 20.0%, in 1997 compared with 21.2% in 2009. However, the rate of obesity increased significantly from 7.3% in 1997 to 10.9% in 2009 (Nasreddine, Naja, Chamieh, Adra, Sibai, & Hwalla, 2012). The rate of overweight and obesity of Jordanian adolescents aged 13–16 years was recorded at 24.4% for both females and males (Abu Baker & Daradkeh, 2010). In Iraq, the
prevalence of overweight and obesity was similar to the Jordanian adolescents, with 24.1% of Iraqi children being overweight or obese. However, there was no difference between the genders in regard to the prevalence of overweight or obesity for Iraqi children (Salman & Ajeel, 2013).

In Gulf region countries (Saudi Arabia, Kuwait, Bahrain, Oman, Qatar and the UAE), a systematic literature review conducted by Ng, Zaghloul, Ali, Harrison and Popkin (2011) found that the rate of overweight and obesity among adolescents aged 10–18 years in this region was higher than their US counterparts. This was particularly so for Kuwaiti adolescents and girls in the Gulf region (Musaiger et al., 2012; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011).

A recent survey in Saudi Arabia, based on the IOTF cut-off reference standards, was carried out among adolescents aged between 14 and 19 years (N = 2,908). The findings show that the prevalence of overweight was 20.8% for females and 19.5% for males, whereas obesity was recorded at 14% for females and 24.1% for males. Adolescents in private schools recorded a higher prevalence of obesity (Al-Hazzaa et al., 2014). But, as indicated by the authors, there was a difference in the age distribution in this study, in that the majority of respondents were in the 15-year-old age group, which does not make these results applicable to other age groups.

El Mouzan, Al Herbish, Al Salloum, Al Omar and Qurachi (2012) found regional variations in Saudi Arabia in the rate of overweight and obesity, showing that the prevalence among children and adolescents was 30.3% in the central regions, 19.4% in the southwestern regions and 29.2% in the northern regions. Similarly, Al Shehri, Al
Fattani and Al Alwan (2013) point out that southern regions of Saudi Arabia have the lowest rate of obesity and overweight, while the highest rate occurred in the central and eastern regions.

The prevalence of obesity and overweight among Kuwaiti children and adolescents has been rising over the past 3 decades. The recent cross-sectional study findings of Zaghloul et al. (2013) show that the rate of obesity for Kuwaiti children and adolescents was 24% for females and 37% for males and that the rate of obesity was higher in boys than girls. Similarly, a recent study was conducted with Kuwaiti adolescents aged 14–19 years to assess the prevalence of overweight and obesity using the IOTF cut-off reference standards. The findings show that the prevalence of overweight and obesity was higher among boys compared with girls 50.5% and 46.5%, respectively (Al-Haifi et al., 2013). Surprisingly, boys are more physically active and engage in less sedentary activities compared with girls. However, boys have a higher rate of being overweight or obese compared with girls, which might be due to the sample size, as there were slightly more male than female participants (51% compared to 48%).

As found by the aforementioned studies, the rate of overweight and obesity among children and adolescents has a tendency to increase or remain at a high level, and there are variances between females and males, between different age groups and also between different countries and regions. Differences in the rate of obesity are expected as a result of the impact of cultural beliefs and the influence of rapid development that has occurred in most countries of the world. In contrast, Yu et al. (2012) suggest that the variation in the rate of prevalence of overweight and obesity was related to several influential factors that might affect the results of research studies, such as study quality,
sample size variances, BMI criteria measurements and geographical distribution. Nevertheless, there is an urgent need to conduct studies on overweight and obesity to measure the level of prevalence and associated factors on certain groups or those of a specific age, and to update the literature and produce recommendations that might help reduce the prevalence of obesity.

3.3 Parental Attitudes and Perceptions Toward Child Body Weight

As role models and caregivers, parents’ lifestyles play a key role in the formation of their children’s dietary behaviours and physical activity habits (Scaglioni, Arrizza, Vecchi, & Tedeschi, 2011; Sleddens et al., 2014; Yao & Rhodes, 2015; Zecevic, Tremblay, Lovsin, & Michel, 2010). Particularly in childhood, parents have control over their children’s nutrition in diverse ways, such as parental monitoring, restrictive control over certain food choices or pressure to eat certain foods (Cislak, Safron, Pratt, Gaspar, & Luszczynska, 2012; Loth, Fulkerson, & Neumark-Sztainer, 2014; Towner, Reiter-Purtill, Boles, & Zeller, 2015). Recent research shows that parents, as role models of healthy eating behaviours, are positively associated with children’s healthy dietary habits (Draxten, Fulkerson, Friend, Flattum, & Schow, 2014).

With regard to physical activity, parents also have the ability to enhance children’s physical activity by providing exercise equipment at home or walking/cycling facilities (Millstein et al., 2011), limiting screen time spent on watching TV and playing video games (Carlson et al., 2010) and encouraging children to be active. Zecevic, Tremblay, Lovsin and Michel (2010) point out that children who receive greater support from their parents to engage in physical activity were 6 times more likely to be physically active than inactive children. Parents also model healthy physical activity by being active
themselves and incorporating regular exercise in their daily lives as a family (Zecevic, Tremblay, Lovsin, & Michel, 2010).

A longitudinal study demonstrated that parental practices in early childhood significantly contributed to children’s lifestyles and body weight in late childhood (Rutherford et al., 2015). Therefore, most child obesity intervention programs tend to involve a parent as a vital component in programs aimed to modify children’s behaviour (Boutelle, Cafri, & Crow, 2012; Collins et al., 2011; Dulin Keita, Risica, Drenner, Adams, Gorham & Gans, 2014; Knowlden & Sharma, 2012; Kruk, Kortekaas, Lucas & Jager-Wittenaar, 2013; Magarey et al., 2011; Niemeier, Hektner & Enger, 2012). Olstad and McCargar (2009) stated that the engagement of parents in child obesity prevention programs is essential to ensure the success of the program. Heinberg et al. (2009) identified that children who have lower parental involvement were less likely to reduce their weight. Heinberg et al. (2009) identified lower parental engagement in a weight intervention trial to the child’s gender and weight. These authors found that girls of African background and adolescents with higher BMIs were less likely to attend weight intervention.

In general, parents are aware of the factors that contribute to child obesity (Pocock, Trivedi, Wills, Bunn, & Magnusson, 2010), and they acknowledge the importance of healthy food and physical activity in relation to their children’s weight (Pocock, Trivedi, Wills, Bunn & Magnusson, 2010). However, they are less likely to recognise signs of overweight or obesity in their own children (De La, 2009; Doolen, Alpert, & Miller, 2009). Hence, they are often unwilling to take part in programs aiming to reduce overweight and obesity because they do not recognise the need (Chaparro, Langellier,
Kim, & Whaley, 2011; Doolen, Alpert, & Miller, 2009; Vuorela, Saha, & Salo, 2010). Gerards et al. (2012) identified that parental denial that their child has an overweight problem is one of the major obstructions to engaging parents of overweight children in intervention programs. Similarly, Tschamler, Conn, Cook and Halterman (2009) conclude that parental misperception of their children’s weight is one of the barriers to preventing or managing child obesity.

Several studies have focused on parental perception of children’s weight (Abbott et al., 2010; Aljunaibi, Abdulle, & Nagelkerke, 2013; Black et al., 2015; Chen et al., 2014; De La, 2009; Doolen, Alpert, & Miller, 2009; Hernandez, Cheng, & Serwint, 2010; Manios et al., 2010; Spargo & Mellis, 2014; Towns & D’Auria, 2009; Vanhala et al., 2011; Warschburger & Kröller, 2012). Overwhelmingly, parents misclassify their children’s weight. In particular, it was more common for parents to underestimate their child’s weight (Abbott et al., 2010; Black et al., 2015; Chen et al., 2014; Regber et al., 2013; Spargo & Mellis, 2014) than to overestimate it (Abbott, Lee, Stubbs, & Davies, 2010; Chen et al., 2014; Spargo & Mellis, 2014). With respect to gender, parents were more likely to overestimate the weight of girls and underestimate the weight of boys (Abbott et al., 2010; Jeffery et al., 2014; Manios, Kondaki, Kourlaba, Vasilopoulou, & Grammatikaki, 2009; Vanhala et al., 2011).

The findings of a literature review conducted by Towns and D’Auria (2009) show that the parents of overweight children were not concerned about the risks associated with overweight and were more likely to underestimate the degree to which their child was overweight. Doolen, Alpert and Miller (2009) point out that parents were more likely to perceive the weight of a normal-weight child correctly than an overweight child. Not
surprisingly, a study found that 7,191 out of 11,530 overweight children were perceived by their parents to be of a normal weight (Rietmeijer-Mentink, Paulis, Middelkoop, Bindels, & Wouden, 2013). In the US, Sylvetsky-Meni, Gillepsie, Hardy and Welsh (2015) studied parental (N = 1811) perceptions of the weight of their children aged 4–15 years. This study found that 95% of parents agreed, in general terms, that overweight and obesity in children can cause serious health complications. However, 42.4% of these parents failed to recognise obesity in their own children. This may result in a failure to promote healthy behaviours in their children and increase the incidence of obesity. Another cross-sectional study of US children aged 5–12 years and their parents (N = 576) examined parents’ perceptions by asking parents to classify their child’s weight on a Likert scale from ‘extremely underweight’ to ‘extremely overweight’. The parent’s answers were compared to their child’s weight measurement. Approximately 75% of overweight children were misclassified as underweight or about the right weight and this misclassification was higher for boys (29%) than girls (21%) (De La O et al., 2009). The authors cited the following factors that influence parental perceptions, including a parental lack of education, denial of obesity and distrust of the current child growth chart guidelines.

In eight European countries (Germany, Italy, Belgium, Sweden, Cyprus, Estonia, Hungary and Spain) questionnaires were used to assess parental perceptions of the weight of their children aged 2–9 years (N = 16,220), using a 5-point Likert scale ranging from ‘much too underweight’ to ‘much too overweight’. The findings show that 29.9% of parents were concerned about their children’s weight and that they may become overweight children in the future, while in contrast, 63% of parents
underestimated the weight of their children (Regber et al., 2013). Interestingly, Regber et al. (2013) cited more accurate parental perceptions in Central and Northern Europe than in southern Europe. The authors refer to regional differences in relation to the variances in health care systems and environments. In contrast, in Northern Finland 75% of parents (N = 120) classified their overweight children as normal-weight children (Vanhala, Keinänen-Kiukaanniemi, Kaikkonen, Laitinen, & Korpelainen, 2011).

In Australia, Spargo and Mellis (2014) surveyed 93 parents of children aged 2–17 years to evaluate the degree to which parents accurately assessed their child’s weight category. Their findings show that 25% of children and adolescents were overweight or obese, but nearly 89% of parents underestimated the weight of their children and adolescents.

A longitudinal study conducted in Australia recorded the BMI of 13-year-old adolescents and followed up at age 15. Their mothers (N = 224) were surveyed to determine the accuracy of their perceptions regarding their adolescent’s weight. The findings indicate that approximately 25% of mothers misclassified their adolescent’s weight status (Shrewsbury et al., 2012). Another study in Australia that supports the findings of Spargo and Mellis (2014) and Shrewsbury et al. (2012) found that 20% of parents (N = 3043) underestimated the overweight/obesity of their children and adolescents, and 1% of parents overestimated their child’s weight status. It was more common for adolescent boys’ weight to be underestimated (26.4%) compared to girls (10.2%), whereas it was more common to overestimate the weight of adolescent girls (11.8%) than adolescent boys (3.4%) (Abbott et al., 2010).
Wen and Hui (2011) conducted a study in China to assess parental perceptions of their adolescents’ weight. A total of 1,869 parents were asked to assess their children’s weights by choosing one of the following answers: very underweight, slightly underweight, normal, slightly overweight or very overweight. The results indicate that approximately 40% of parents classified their overweight adolescents as either underweight or normal weight. In contrast, about 42% of parents classified their normal-weight children in the underweight category. Another study in China found that 143 of 176 mothers of overweight children underestimated their child’s weight (Yao & Hillemeier, 2012).

Aljunaibi, Abdulle and Nagelkerke (2013) conducted a study in the UAE to assess parental perceptions of the weight of their children aged 6–19 years (N = 1440). The parents were asked to classify their children’s weight under one of the following categories: underweight, normal, overweight or obese. Overall, 33.8% of parents misclassified their children’s weight (27.4% underestimated and 6.3% overestimated). The parents’ accurate identification of their children’s weight was associated with the BMI percentile classification charts from CDC, but parent’s failed to recognise the accurate weight of children according to the child’s age, sex and parental education or income (Aljunaibi, Abdulle, & Nagelkerke, 2013).

In Saudi Arabia, Hashemi (2009) conducted a study to examine parents’ awareness of obesity among children aged 7–12 years. Parents completed a questionnaire that included questions about whether they considered their child to be underweight, about the right weight, overweight or very overweight. Their findings indicated that parents misclassified their children’s weight by either underestimating or overestimating.
Hashemi (2009) revealed that parents overestimated their overweight children’s weight (9% actual weight compared to 30% perceived weight) while for obese children, parents underestimated their children’s weight (36% actual weight compared to 3% perceived weight). The data in this study were self-reported, including the children’s height/weight. However, as indicated by the author, Saudi culture plays an important role in parental perceptions of their child’s weight, as they prefer their child’s to be overweight rather than underweight. As a result of this perspective, most Saudi families rated their children as being overweight or obese (Hashemi, 2009).

Hussin, Mohammad, Al-Hamad, Makboul and Elshazly (2011) conducted a study in Kuwait using a purposive sample of overweight and obese children aged 8–12 years (N = 106), where 94.3% of the participants were obese and 5.7% were overweight. Their parents’ perceptions were recorded, showing 29.2% of parents perceived their child to be of normal weight, 42.5% perceived their child to be overweight and 28.3% perceived their child to be obese. More parents (50%) underestimated their female child’s weight as normal compared to their male child (13.3%) (Hussin et al., 2011).

The extensive body of data gathered from these studies indicate that it is very common for parents to misclassify their children’s weight by either overestimating or underestimating, and they are more likely to misclassify girls’ weight than boys’ weight. This could be a significant contributing factor for childhood overweight and obesity. Therefore, accurate parental awareness of their children’s weight is a critical component in the strategy to prevent overweight and obesity in children. For this reason, the current study assesses parental perceptions of overweight and obesity in boys and girls.
### 3.4 Children’s Perception of Their Weight

Internationally, a number of research studies have considered the perception of children and adolescents in relation to their own weight (Abrahamson-Richards, 2014; Heshmat et al., 2015; Khambalia, Hardy, & Bauman, 2012; Lim & Wang, 2013; Quick et al., 2014; Standley, Sullivan, & Wardle, 2009). Several studies found that adolescents who misperceived their weight were less likely to try to lose weight compared to adolescents who had an accurate perception of their weight (Abrahamson-Richards, 2014; Khambalia, Hardy, & Bauman, 2012; Quick et al., 2014). In addition, male adolescents are more likely to misclassify their weight than female adolescents (Edwards, Pettingell, & Borowsky, 2010; Quick et al., 2014; Standley, Sullivan, & Wardle, 2009; Sutin & Terracciano, 2015; Yang, Turk, Allison, James & Chasens, 2014).

Data from a longitudinal study provides evidence indicating that overweight adolescents who perceive their weight incorrectly are more likely to become obese in early adulthood (Sutin & Terracciano, 2015). Sutin and Terracciano’s findings are worrying, particularly in light of the fact that it has been found that a high rate of overweight/obese children and adolescents do not classify their weight accurately. For instance, in the US a cross-sectional study conducted by Wang, Liang and Chen (2009) found that 38% of US adolescents were overweight or obese, but only 27.2% classified themselves as obese. It was also found that female adolescents were more dissatisfied with their body compared with males.

Another study in the United Kingdom evaluated children’s perceptions of body weight using verbal descriptors, from ‘too thin’ to ‘too fat’, and visual images (the children’s body image, matching two images to indicate BMIs). The authors found that nearly
45% of the surveyed children (N = 399) aged 7–9 years underestimated their actual weight, both verbally and visually (visual = 0.43 compared to verbal = 0.41) especially girls (Saxton, Hill, Chadwick, & Wardle, 2009). In another cross-sectional study conducted in Australia, a survey was carried out among students from grade 7–12 (N = 7553), revealing that nearly one third of adolescents failed to recognise their weight accurately. The data also shows that adolescent girls are more likely to overestimate their weight and less likely to underestimate their weight compared with boys (Khambalia, Hardy, & Bauman, 2012).

The findings of a study conducted in Korea revealed that over 50% of adolescents (N = 72,399) either underestimated or overestimated their weight status. More adolescent boys (30.3%) underestimated their weight compared to girls (15.6%) and fewer boys (21.3%) overestimated their weight compared to girls (33%) (Lim & Wang, 2013). In Malaysia a study found that the majority of surveyed adolescents (N = 2050) were concerned about their body shape. However, the findings revealed that 20% of girls and 35.4% of boys were underweight but perceived themselves in the normal weight category. In contrast, 26.7% of girls and 29.4% of boys were overweight but they perceived their weight as being in the normal weight category (Khor et al., 2009).

Musaiger, Bin Zaal and D’Souza’s (2012) study of adolescents in the UAE demonstrated that 45% of boys (N = 324) and 52.3% of girls (N = 337) were overweight but perceived themselves in the normal weight category. Further, 56.9% of boys and 46.4% of girls were obese but perceived themselves as being in the normal weight category (Musaiger, Bin Zaal, & D’Souza, 2012). Hussin et al.’s (2011) study of Kuwaiti overweight and obese children (N = 106) revealed that 39.6% of overweight
children overestimate their weight verbally and 42.5% overestimate their weight visually, whereas 13.3% of obese children underestimate their weight verbally and 40.0% underestimate their weight visually in boys and girls, respectively. The authors described the methodology in detail, but the sample size is inadequate and small, comprising only 106 school children. In addition, the sampling technique used was a purposive sample, which has a high probability of researcher bias.

However, there is sufficient and consistent evidence to show that in both developed and developing countries adolescents’ perceptions of their own weight is an important aspect in the promotion of a healthy weight. With consideration, there are many children living with a single parent or grandparent who receive no input from other people in regard to their lifestyle choices. Therefore, the current study also examines children’s’ perceptions of their weight.

3.5 School Intervention Influences on Child Obesity

The school setting is one of the most logical and effective places in which to combat obesity in school-aged children (Clarke et al. 2013; Elizondo-Montemayor et al., 2013; Lee, Ho, Keung, & Kwong, 2014; Verstraeten et al., 2012), as this is where the vast majority spend a significant amount of time learning and developing skills (Clarke et al., 2013). Schools are uniquely situated to promote physical activity and healthy nutrition, which can, in turn, strongly influence students’ eating habits and level of physical activity (De Bourdeaudhuij et al., 2011; Magarey, Pettman, Wilson, & Mastersson, 2013; Safdie et al., 2013; Shirley et al., 2015). Therefore, many scholars believe that schools can utilise a variety of strategies, such as providing healthy and nutritious food and increasing physical activity opportunities, to combat the incidence
of overweight and obesity among school children (Brandt, Moss, Berg, & Wabitsch, 2010; Clarke et al., 2013; Elizondo- Montemayor et al., 2013).

Several studies have provided evidence on the effectiveness of school-based interventions. Cadzow, Chambers and Sandell (2015) evaluated a 3-year school-based obesity intervention program in the US that aimed to improve the physical activity and nutritional habits of 4000 students. In particular, the intervention program provided physical education (PE) equipment, a health education curriculum, healthy food options and offered after-school access to sports equipment and activities. Their findings indicated that, as a result of the intervention, the mean BMI percentile of students reduced significantly from 70.4% to 65.7%.

Another school-based healthy lifestyle intervention for US school children focused on promoting physical activity and the consumption of vegetables/fruit. A school healthy lifestyle intervention program was implemented, which included health education, improving physical activity, community involvement and enhancing school wellness policies. All students K–5 in four rural elementary schools were included in this intervention. An evaluation of the intervention after 5 months showed that the percentage of the participants who met the recommendations in terms of nutrition rose from 15% to 26% and physical activity rose from 1% to 5% (Ling, King, Speck, Kim, & Wu, 2014). There is substantial data from these findings on the effectiveness of the school environment on children’s health that could align with the current study’s findings.
In support, a school-based lifestyle intervention was conducted in Mexico with a purposive sample of 96 overweight/obese children. These children were recruited for a 10-month intervention program with an emphasis on special dietary meals and a physical activity plan, and parental involvement was also required (Elizondo-Montemayor et al., 2013). The results show that nearly 32% of the overweight children achieved normal weight, while 24% of the obese children reduced their weight level to the overweight category. Also, physical activity increased by 16 minutes per day for all participants in the intervention group (Elizondo-Montemayor et al., 2013). The authors attributed the efficacy of the intervention to the high degree of commitment with which the intervention was delivered, in addition to the frequent nutritional assessment of each child by the registered dietitians. Furthermore, the volunteer participants had a higher desire to comply with what was required of them.

In China, a school-based intervention focused on increasing the physical activity of school children aged 7–15 years over a period of 12 weeks. The intervention included the improvement of PE, additional physical activities, health education lectures for students and parents and encouragement for children to engage in physical activities at home. The results revealed that there was a significant decrease in their BMI, fasting glucose and skinfold thickness, and an increase in the duration of moderate to vigorous physical activity of the intervention group (0.02 ± 0.06 kg/m^2) compared with the control group (Li et al., 2014).

In Egypt, school-based intervention programs aim to increase physical activity and encourage the adoption of healthy dietary habits. A total of 718 adolescents were assigned to a health education program, delivered by the physicians and dieticians, for
one year. All adolescents were subjected to baseline assessment at 6 and 12 months. The results showed that 27.9% of participants reduced their body weight by 5% or more and the mean total daily caloric intake significantly decreased (Samy, Khairy, Ibrahim, Matter & Hassan 2012). Similarly, a 3-year school-based intervention was conducted in Tunis. Student leaders and teachers were trained in motivating school children to adopt healthy behaviors, such as eating five serves of vegetables or fruit daily and meeting the recommended level of physical exercise. An evaluation of the intervention program showed there was an increase in fruit and vegetable intake and in reducing the intervention group’s risk of excess weight (Maatoug et al., 2015).

The findings of a systematic review conducted by Verstraeten et al. (2012) indicate that almost 80% of the school-based interventions in six European countries (Germany, England, France, Spain and the Netherlands) reviewed had a positive effect on physical activity and dietary behaviour. Further, Verstraeten et al.’s review also documented a decrease in student’s body weight in eight of the 12 studies, due to the effective multicomponent interventions that targeted both diet and physical activity and engaged multiple stakeholders.

It has been shown that school interventions, both short-term and long-term, have a significant effect on children’s body weight and are associated with an improvement in children’s behaviour. However, Khambalia et al. (2012), Brown and Summerbell (2009), Brandt et al. (2010) and Bleich et al. (2013) found that longer intervention programs, including a combination of nutrition and physical activity, in the school setting were more effective in preventing overweight and obesity.
In conclusion, a school setting is an important place to tackle overweight and obesity problems in students. This is because schools play a prominent role in the education of children at an early age, as well as having an influence on their lifestyle, which might encourage them to maintain a healthy weight. Most importantly, the evidence provided from the literature on school-based obesity interventions shows positive results in children’s lifestyles regardless of the type of intervention or the duration of the program, as positive outcomes are achieved whether it is long- or short-term. But the utilisation of a long-term school intervention program is financially costly, requires extensive effort, takes a long time, and it may clash with school holidays.

3.6 Teachers’ Attitudes and Perceptions Toward Overweight and Obesity

Many studies have investigated the ability of the school staff, that is, teachers and nurses, to contribute to school-based obesity interventions. Many studies have investigated teachers’ perceptions and attitudes toward a child’s weight (Clarke et al., 2013; El Derwi, El Sherbiny, & Atta, 2011; Griffin et al., 2014; Lirgg, Gorman, & Parish, 2014; Stott, Marks, & Allegrante, 2014). These studies show that teachers acknowledge that being overweight or obese are health problems, and most teachers suggest a healthy lifestyle to prevent these health issues. In addition, the studies conducted by El Derwi, El Sherbiny and Atta (2011), Turner, Slater and Chaloupka (2013), Stott, Marks and Allegrante (2014) and Lirgg, Gorman and Parish (2014) indicate that teachers are aware that both the school and the teachers themselves have a great responsibility in preventing childhood obesity.
Clarke et al. (2013) identified that school teachers can provide a role model for a healthy lifestyle by participating in physical activity with children and motivate children to engage in physical activity. A recent study conducted in the US by Stanfill (2014) examined school teachers’ (N = 628) attitudes and perceptions toward their role in preventing childhood obesity, concluding that approximately 64% of teachers believed they should be a part of an obesity prevention program and nearly 68% believed that they could influence children’s health behaviours. While this was a good sample size, the problem was the method of questionnaire distribution. The author mentioned that the school principal sent the link of the online survey to the participants’ teachers, which may have influenced compliance and introduced a high bias to response rate.

El Derwi, El Sherbiny and Atta’s (2011) Egyptian study of teachers (N = 48) found that 70.8% of teachers agreed that they should play an active role in obesity intervention programs, but only 48.8% of teachers perceived that they were appropriately equipped to do so. Moreover, Jodkowska, Oblacińska, Tabak and Radiukiewicz (2009) identified that PE teachers were more likely to engage in activities to support obese students, such as evaluating the personal development of obese students, conducting counselling and collaborating with an obese students’ parents.

Ridder et al. (2013) pointed out that school teachers are aware that overweight is a health problem, but they underestimate the prevalence and associated unhealthy behaviour of the students in their school. Likewise, Johnson (2011) mentions that teachers believe their role in the prevention of obesity is limited and they tend to blame parents for child obesity, but avoid discussing obesity with parents. Lirgg, Gorman and Parish (2014), Stanfill (2014) and Griffin et al. (2014) attribute this limited role of
teachers to time constraints. In contrast, Johnson (2011) indicates that a lack of resources to help teachers is a barrier to delivering an obesity prevention program.

The most important role of the teacher is to teach, which means they need time to undertake their classroom duties. However, the teacher can play a role in addressing child obesity by being a good role model. Involving the school teacher in obesity studies is an essential component of this research.

3.7 School Nurses’ Attitudes and Perceptions Toward Overweight and Obesity

School nurses have been identified by a number of studies to be an important facilitator in helping students achieve a healthy weight. Mehrley and Leibold (2011) state that nurses in a school setting can cooperate with students, parents, school staff and healthcare clinics to prevent obesity and identify students who may be at risk of health problems as a consequence of obesity. Also, Mehrley and Leibold (2011) state that school nurses can advocate for change both in schools and in the community to promote a healthy lifestyle for school children. Tucker and Lanningham-Foster’s (2015) study findings on the effect of school nurses in delivering a healthy message to primary school students indicate a significant increase in children’s physical activity. Leibold’s (2009) study also documents the positive influence of the school nurse on adolescents’ physical activity levels and on children’s health in general. Gonzaga et al.’s (2014) integrative review findings indicate that the health promotion programme developed by school nurses contributed to the adoption of a healthy lifestyle by overweight students.
A cluster-randomised controlled trial conducted by Pbert et al. (2013) evaluated a 2-month intervention, delivered by school nurses, to improve activity, diet and BMI of overweight/obese adolescents. The findings show that the intervention resulted in a number of positive modifications in adolescents’ behaviours, including eating breakfast more often and reducing their consumption of sweet beverages and fast food. However, there was no significant difference between the two groups in terms of body weight, calorie intake and physical activity.

In contrast, a randomised controlled trial conducted by Wright, Giger, Norris and Suro (2013) cited the influence of the school nurse on a reduction in children’s body weight. These authors evaluated an educational program of physical activity and nutrition classes delivered by nurses for 90 minutes every week for parents and children aged 8–12 years (N = 251). The results show a statistically significant increase in girls’ daily physical activity and boys decreased their sedentary activity. Further, the 12-month follow-up showed there was a decrease in BMI z-scores for both male and female students (Wright, Giger, Norris, & Suro, 2013). However, this sample population represented the Hispanic/Latino population, thus its generalisability to other ethnic groups may be limited, and there was low retention in attendance, which may affect the findings of the study.

The aforementioned studies indicate that obesity interventions implemented by school nurses lead to positive outcomes. Clarke et al. (2013) indicate that school nurses are concerned about childhood obesity and the consequences associated with obesity and have a desire to do more to reduce the prevalence of obesity in school children. In addition, Lirgg, Gorman and Parish (2014) found that school nurses perceived child
obesity as a serious health problem more so than PE teachers and other classroom teachers. Strobel (2014) identified that the majority of nurses agreed that schools should provide an annual screening of students’ BMI and share the result with parents.

Strobel (2014) identified that school nurses did not agree that they had adequate time to handle and supervise obesity prevention programs at school. Likewise, Quelly (2014) stated that most school nurses had never or seldom offered counselling to parents regarding a child’s body weight concerns. Several factors were found to influence school nurse’s perceptions of practices to prevent childhood obesity. Quelly (2014) identified that a lack of time and self-efficacy to involve parents in sensitive discussions about a child’s obesity was a major factor. In addition, Wu and Steele (2011) state that the barriers to nurses addressing obesity include time limitations, self-perceived competence and perceptions of whether addressing children’s weight is part of a school nurse’s role.

In support, Morrison-Sandberg, Kubik and Johnson (2011) conclude that school nurses provide a height/weight assessment of students, but had stopped offering assessments due to barriers such as staffing limitations, concern that screening was not used for counselling, a lack of surveillance or education and the poor reception of previous weight assessments by parents. Similarly, Steele et al. (2011) identified a lack of institutional support, a lack of knowledge, a lack of resources, a lack of time and personal weight challenges as obstacles to weight-related communications with families.
The available evidence provided in the literature shows the effectiveness of the role of the school nurse on child obesity. However, several difficulties hinder the school nurse from taking part in child obesity intervention. As a result of these barriers, the role of school nurses has been largely underestimated.

### 3.8 Government Legislative and Regulatory Action to Reduce Child Obesity

Governments have the power to enact a number of regulations and legislations to address overweight and obesity among children (Allender et al., 2009; de Silva-Sanigorski, 2011; Taylor, Parento, & Schmidt, 2014; Tremblay, 2012). In fact, several policies, in the form of governmental legislation, have been proposed as a response to the worldwide obesity epidemic. This legislation includes taxes measures on unhealthy food or SSBs (Kristensen et al., 2014; Smith, Lin, & Lee, 2010; Taylor, et al., 2014), health initiative campaigns (Taylor et al., 2014; Tremblay, 2012; Wojcicki & Heyman, 2010), food calorie labelling (Kiszko, Martinez, Abrams, & Elbel, 2014; Taylor et al., 2014; Tremblay, 2012) and more restrictions on marketing and advertising to children (Kristensen et al., 2014; Taylor et al., 2014).

A number of studies have summarised the effectiveness of these policies. Claro, Levy, Popkin and Monteiro (2012) indicate that increases of 1% in the price of SSBs led to a 0.85% decline in calorie consumption. A meta-analysis finding indicates that higher prices of SSBs are associated with a lower demand for SSBs (Escobar, Veerman, Tollman, Bertram, & Hofman, 2013). Similarly, Smith, Lin and Lee (2010) predict that a 20% increase in excise tax on SSBs could lead to a calorie intake reduction of 37 calories per day for adults and an average of 43 calories per day for children.
Tandon et al. (2011) identified that the nutrition labelling regulations in restaurants in Seattle/King County (US) have contributed to increasing parents’ nutrition awareness. In addition, Tandon et al. (2011) point out that the post-regulation of nutrition labelling was significantly associated with an increase in parents viewing nutrition labelling information (44% compared to 87%). Moreover, Dowray, Swartz, Braxton and Viera (2013) found that a menu with calorie labelling and the walking time required to burn these calories was significantly associated with a selection of lower calorie meals. Furthermore, the study findings of Hunsberger, McGinnis, Smith, Beamer and O’Malley (2015) indicate that using calorie labelling in middle school was associated with healthier food selection and decreased the average calorie consumption by 47/day and reduced the fat intake by 2.1 g/day.

Kristensen et al. (2014) reviewed the literature to estimate the effect of three federal policies on childhood obesity after 20 years of implementation in the US, these being an SSB excise tax, after-school physical activity programs and a ban on fast food TV advertisements. The authors predicted that the soft drink excise tax would decrease obesity among youths aged 13–18 years (2.4%), the after-school activity program would decrease obesity among children aged 6–12 years (1.8%) and a ban on fast food advertisements would decrease obesity (0.9%). They found that black and Hispanic individuals were more influenced by these policies than whites.

Globally, several health campaigns have been launched by governments to tackle the overweight and obesity epidemic. For instance, in the US the Healthy Eating, Active Communities initiative was designed to address five key areas that influence children’s physical activity performance and nutrition habits: schools, after-school,
neighbourhoods, healthcare setting, and marketing and advertising. The findings indicate that children change to adopt a healthy lifestyle and the program successfully enhanced children’s dietary habits and physical activity (Craypo & Boyle, 2010).

In European countries, Bemelmans, Wijnhoven, Verschuuren and Breda (2014) evaluated 71 community-based initiatives (CBIs) to fight child obesity. Most of these initiatives were implemented in kindergartens, schools, sport facilities, healthcare centres and neighbourhoods. The findings of these CBIs indicate the improvement of children’s knowledge related to physical activity and nutrition, with evidence provided from eight CBIs indicating a positive effect on children’s weight.

In Australia, Be Active Eat Well is a community-based child obesity prevention intervention. Key strategies of this intervention included promoting a healthy weight by providing healthy canteen menus, reducing sedentary activities and supporting a physically active environment. Evaluations of the intervention demonstrate that the program was successful in reducing children’s weight and promoting a healthy lifestyle (Johnson, Kremer, Swinburn, & de Silva-Sanigorski, 2012).

Governments have the authority to support healthy initiatives and lead the fight against obesity. In contrast, governments are blamed for the prevalence of overweight and obesity. Swinburn et al. (2011) suggest that governments have generally renounced accountability for addressing obesity among the population. The author’s inferences were based on the slow progress made by governments in the implementation of the WHO’s strategies on diet and physical activity.
Henderson, Coveney, Ward, and Taylor (2009) point out that governments are reluctant to impose food marketing industry regulations. The authors attribute the position taken by the federal government of Australia as being due to favouring industry self-regulation through codes of practice in addition to a personal responsibility for healthy food choices. Allender et al., (2012) identified that local government in Victoria (Australia) has not considered promoting healthy eating environments as a priority. Further, Allender et al. (2009) point out that the policy makers at the local government level perceived several barriers to change, including a lack of authority to make change, complexity of the legislative context and a reluctance to add new regulations.

However, Clarke et al. (2013) and Swinburn et al. (2011) assert that the prevalence of obesity will not decrease without broad governmental support and imposed regulations on the marketing and availability of inappropriate food. The findings in the literature indicate that obesity is a societal problem, and all segments of society are implicated in the solution. For example, enacting new government regulations will not enhance health if the population does not follow these regulations. Individuals are influenced by their surrounding environment, hence providing a healthy environment will help individuals to maintain a healthy lifestyle.

3.9 Chapter Summary

The findings from the literature indicate that the prevalence of overweight and obesity among children and adolescents is increasing or remaining high. There is recognition that the level varies between females and males, between different age groups and also between different countries. Also, the literature shows that parents are more likely to misperceive their children’s weight by either overestimating or underestimating, and are
more likely to misclassify girls’ weight than boys’ weight. Similarly, adolescents failed to recognise their own weight. Adolescent girls were more likely to overestimate their weight and less likely to underestimate their weight compared with boys.

Parents play a key role in the formation of their children’s dietary behaviours and physical activity habits and many studies have documented the effectiveness of involved parents in programs aimed to modify children’s behaviours. In addition, the school setting has been identified as an effective place in which to contribute to programs aimed at combating obesity in school children. Teachers and school nurses also play an important role in promoting children’s weight via education or as role models for a healthy lifestyle. Most importantly, several studies confirmed the power of governments to enact a number of regulations and legislations to support schools, parents and children to intervene with overweight or obesity.

Niehoff (2009) concludes that to prevent the current young generation from carrying obesity into adulthood, collaborative efforts are needed. Involving parents, communities, schools, nurses, dietitians, physicians and the media to design programs to educate children and adolescents who are overweight or obese about the importance of exercise and healthy dietary habits is essential.
Chapter 4: Methodology

4.1 Introduction

This mixed methods research study, using triangulation of data sources, was conducted to assess the risk factors and the prevalence of overweight and obesity among a sample of school children in Kuwait. In addition, a two-phase approach was utilised to explore the knowledge, attitudes and perceptions of school children, parents, school teachers and officials from the Ministries of Education and Health regarding childhood obesity in Kuwait.

The methodology outlined in this chapter utilised both qualitative and quantitative approaches. This chapter describes the setting, research design, sample size, sampling technique, research instruments and the pilot study. The remaining sections provide an overview of the data collection of anthropometric measurements, the teachers’ focus group interviews, the government officials’ interviews, the data analysis, ethical considerations and a summary of the chapter.

4.2 Research Setting

The collection of data was conducted in 12 public intermediate schools, of which six were boys’ schools and six were girls’ schools. The schools were selected from six provinces in Kuwait. One boys’ school and one girls’ school were targeted in each of the six following provinces: Al-Asimah, Al-Farwaniyah, Al-Ahmadi, Al-Jahrah, Mubarak al-Kabir and Hawalli. Twelve focus groups were also conducted with the school teachers in each of the participating schools, followed by face-to-face interviews...
with officials in the Education and Health departments in each province. Figure 4.1 illustrates these six provinces.

*Figure 4.1* Map of Kuwait showing six provinces (source: Kuwait Central Statistical Office, 2013).

### 4.3 Research Methodology

A mixed methods design was employed. The data was gathered between February and June, 2013. The methodology involved the administration of questionnaires to samples of intermediate school students aged 11–14 years and to their parents. Focus group discussions were conducted with groups of 6–12 teachers. In addition, face-to-face interviews with government officials from the Education and Health Ministries were conducted to collect qualitative data.
The justification for using a combination of qualitative and quantitative approaches is that The following overweight and obesity studies in Kuwait undertook a single approach: Abdelalim et al. (2011); AlMajed (2011); Al- Isa et al. (2010); Moussa et al. (1999); Al Shammarri (2007); Almarzouq (2001); Al-Isa and Moussa (1998); Al-Isa and Moussa (1999); Al-Isa, Campbell and Desapriya (2010); Al-Isa (2004); Jackson et al. (2011); Al-Qaoud and Prakash (2009); Amine and Al-Awadi (1996); Boodai and Reilly (2013); Boodai et al. (2014); El-Bayoumy, Shady and Lotfy (2009); El-Bayoumy and Shalaby (2012); Bayoumi and Moussa (1985); Hussin et al. (2011); Zaghloul (2013). In addition, using both qualitative and quantitative approaches in this study was advantageous to enhance the integrity of the results and to gain an in-depth understanding of the problem under investigation (Kettles, Creswell, & Zhang, 2011).

The justification for adopting the quantitative approach in this study was to enable data to be gathered using methods such as the survey questionnaire (Cooper, Porter, & Endacott, 2011) where statistical methods are generated and the research questions are tested empirically to identify the significant factors contributing to overweight and obesity. In addition, the qualitative approach was adopted to obtain in-depth information and ascertain knowledge of and attitudes toward obesity utilising methods such as interviews and focus group discussions; hence, meaning is drawn through understanding and interpretation of the perception of respondents (Ritchie et al., 2013). Further, using only one approach may not be adequate to address the research questions (Teddlie & Tashakkori, 2009). Therefore, both qualitative and quantitative approaches were considered important for this study to elicit comprehensive quantitative and qualitative data (Kettles, Creswell, & Zhang, 2011).
Moreover, a two-method approach generates more evidence when examining a research problem than either a qualitative or quantitative approach alone (Creswell & Clark, 2007), and researchers are also allowed to use all the research tools of data collection rather than being restricted to one tool of data collection (Creswell & Clark, 2007). This research methodological approach allows triangulation to occur, ‘that is, describing a social phenomena from different perspectives, with each perspective testing and adding research that can each make up for the methodological blind spot of the other to provide a fuller picture of the phenomenon being studied’ (Ritchie et al., 2013, p. 40).

### 4.4 Sampling

Sampling is one of the most significant aspects of research. According to Guo et al. (2013), selecting the right sample size is an important step in conducting research. A study with an inadequate sample size may lead to unreliable answers to the research questions (Guo et al., 2013). Hence, the sample was selected to enhance the applicability of findings to the broader population. It is uncommon for an entire population to be included in a study due to the time-consuming nature of doing so in cases where there is a large population (Groves et al., 2011).

Twelve intermediate public schools were selected by convenience sampling to participate in this study, six public schools for boys and six public schools for girls, with two public schools being chosen from each of the six provinces. The researcher met with an official of the Kuwait ME to advise about the study requirements and to seek support. The head of the department of PE was asked to support the study by selecting one boys’ and one girls’ school in each province. After the schools had been selected, the researcher visited all the selected schools, met with the school principals
and provided formal letters from the ME in support of this research (Appendix A) along with a letter from the researcher (Appendix B) explaining the project and seeking the school principals’ and the teachers’ support and cooperation in conducting this study. In addition, the study included various participants such as students, parents, teachers and officials (six officials from the Health Department and six from the Education Department). Participants in the current study were voluntary participants who formed a convenience sample and were recruited through invitation letters.

4.5 Phase One (Quantitative Data)

Surveys to collect quantitative data were distributed to school children aged 11–14 years (Appendix C) and their parents (Appendix D). The children’s surveys were used in this research study to elicit information on the children’s perceptions of their own weight category, daily food intake and physical activities. This was followed by taking measurements of the children’s heights and weights to obtain their BMI (weight/height squared). The parents’ surveys elicited information on the parents’ perceptions of their child’s weight status, physical activities, daily food intake and their attitudes toward overweight and obesity in general.

4.5.1 Inclusion and exclusion criteria. All children who provided signed parents’ consent forms were included in the study. Exclusion criteria applied to children who did not provide a signed consent form by their parents. To justify the chosen sample population (children aged 11–14) it is important to refer to the research observations presented by Tremblay and Frigon (2005), who suggest that young adolescents have the greatest need for consideration because they experience significant physical, psychological and biological changes. Moreover, a study by Amin et al. (2008)
identifies that school children in grade five and older are at a good age to participate in research studies as they are able to communicate effectively.

4.5.2 Research instruments.

4.5.2.1 Students’ questionnaire. The Adolescent Behaviours, Attitudes and Knowledge Questionnaire (ABAKQ) (Mathews et al., 2009) was adapted to elicit information on the eating habits, physical activities and sedentary behaviour of youth. The ABAKQ questionnaire was initially piloted in a sample of 95 students from Australia (Mathews et al., 2009), and the feedback indicates that the survey was easily understood, produced reasonable answers and was both ethical and age appropriate. The original copy of the ABAKQ questionnaire consists of 83 items and was identified as too long and complex for the current study. Therefore, the researcher used 13 items from the original ABAKQ questionnaire that were related to the purpose of the current study. Many existing studies have also specifically selected items from the original ABAKQ questionnaire (Fredrickson, Kremer, Swinburn, de Silva, & McCabe, 2015; Hoare et al., 2014; Jensen et al., 2013; Fredrickson, Kremer, Swinburn, de Silva, & McCabe, 2013; Marks, Barnett, Strugnell, & Allender, 2015). However, the current study is also seeking to collect data directly from parents rather than relying completely on the children’s reports. The following section explains the content of the student questionnaire consisting of a demographic profile, their perception of their own weight status, their eating habits and physical exercise/sedentary behaviours.

Questions 1–7 of the student questionnaire consisted of questions concerning the province’s name, the school’s name and their gender and age. In terms of their weight, the students were required to rate their perception of their weight as ‘very overweight’,
'slightly overweight’, ‘average weight’, ‘slightly underweight’ or ‘very underweight’. The student’s actual height and weight were measured by an appropriately gendered and experienced nurse and recorded in this section.

In questions 8–14, the students were required to indicate where they usually eat their breakfast and lunch on school days. To further understand the eating habits of the students, there were questions regarding the frequency of eating dinner with family members, the frequency of eating fruit and the number of times they ate in fast food restaurants. The students were also asked to nominate their favourite foods and the number of times they ate their favourite foods per week.

In questions 15–22, students were asked about the means of transportation they used to travel to and from school and also the frequency and the time taken in walking to and from school. The students’ engagement in physical exercise was assessed, and questions regarding the students’ engagement in sports activities were also included. The students were required to indicate the number of days they engaged in dance, sports and games. Other questions aimed to determine the extent of their sedentary life styles, so questions were directed toward the students’ frequency and time spent watching videos or TV and using a tablet, computer or phone in a week. Whether or not the students have a TV in the bedroom and the role their parents play in encouraging them to be physically active or to engage in healthy eating behaviours was also assessed in the questionnaire. Finally, the students were requested to rate their perception of the frequency with which the school encourages them to engage in sports or in healthy eating behaviour.
4.5.2.2 Parents’ questionnaire. Given that the Saudis and Kuwaitis share the same religion, language and culture, the parents’ questionnaire was adopted from Hashemi’s study (2009). The parent survey content validity and readability were reviewed previously through an expert panel (Chiarchiaro, 2008; Hashemi, 2009). This questionnaire investigated the factors that contribute to overweight and obesity among children between the ages of 11 and 14 years, and it explored the perceptions and knowledge of parents about overweight and obesity. The questionnaire comprises three sections with a total of 35 questions to be answered by parents. The following section explains the content of the parents’ questionnaire.

The first 15 questions of the parents’ questionnaire required the parents to indicate the following demographic data: their province, their educational level (postgraduate degree, bachelor degree, high school diploma or intermediate/primary schooling), their occupation and their monthly income. The mother and father were also required to report their own heights and weights in order to determine their BMI. The parents were also asked with whom their child lives and at what age the mother stopped breastfeeding.

In questions 16–21, the parents were asked to report their understanding of the implications of overweight and obesity, as well as their perception of their children’s weight. The family’s health history, including whether there were diseases in the family that related to obesity, such as arthritis, diabetes, cardiovascular disease, OSAS, high cholesterol levels and high BP, was also asked to be reported.
Questions 22–25 of the parents’ questionnaire elicited information on the child’s physical activities, the type of activity or exercise the child was undertaking and the duration of the exercise performed by the child in a day, as well as their child’s involvement in physical exercise classes in school during a 1-week period. The sedentary lifestyle of the child was also assessed. The parents were required to estimate the number of hours spent by the child playing video games, browsing the Internet, watching TV and the influence of TV advertisements on the child’s food choices.

The rest of the items in the parents’ questionnaire (items 26–35) gathered information relating to their children’s eating habits, such as types of meals consumed per day, the quantity and type of snacks consumed, the time of eating the snacks and the volume of sweetened drinks and milk consumed in a day. Other information sought about the eating habits of the child included the consumption of fried foods per week and the number of times in a week that the child ate in fast food restaurants.

4.5.3 Questionnaire adaptation process. The questionnaire adaptation process involved certain steps that guided the formulation of the questionnaire design. First, the information sought in the adapted questionnaire was specified, based on the research questions and the aims of the study. Second, the language of the survey was in Arabic, to represent the native language of the participants. Third, the wording of the questions was determined and a pre-test was conducted using a small sample drawn from the population targeted but not participating in the main study in order to receive feedback and make necessary changes to the questionnaire language to ensure clarity and avoid ambiguity. The specific design of the questionnaire is detailed in the following subsections.
4.5.4 Translation of questionnaires. The parent’s questionnaire was available online in both Arabic and English languages. The children’s questionnaire was only available in English and needed to be translated into Arabic, because, all of the participating in current study non English speaking. According to Dörnyei and Taguchi (2010), questionnaire translation is common and necessary due to the fact that most available published questionnaires are in the English language. Studies conducted in different cultural settings often use similar questionnaires for different ethnolinguistic populations and many multi-national researchers developed the original version of the instrument in English before translating this to the language of the target population. Furukawa, Driessnack and Colclough (2014) state that many methods are used for translation, such as back translation, forward translation and the committee approach.

Douglas and Craig (2007) suggest that the back translation technique is the most utilised method used to check translation accuracy in research. However, the employment of the back translation technique has been associated with a number of limitations. For instance, the technique relies on back translation only, without a careful evaluation of an equivalence of meaning in each language, and it is not combined with a pretesting check to provide an appropriate solution to determining whether a translation is adequate or not. Further, Squires et al. (2013) identify that using back translation or forward translation alone may produce an invalid and unreliable translation of the questionnaires. Therefore, due to the limitations of these techniques, it was felt that it was advisable to discard these approaches in this study and use the committee approach to ensure the reliability of the translation.
The children’s questionnaire was translated based on the committee approach. Pan and Fond (2012) suggest that using the committee translation approach is an alternative method of obtaining uniformity in meaning and relies on the involvement of a team of experts (subject-matter experts, the researchers and the survey designers). A comprehensive committee translation process begins with several bilingual translators who have knowledge of both the language and culture when translating the original survey. As identified by Douglas and Craig (2007), this technique can help decrease the cultural bias by introducing the disciplinary expertise necessary to collectively translate the study’s questionnaire. A pilot study of the questionnaire occurs after the translation process.

The translation process of the children’s questionnaire comprised three steps, based on the committee translation approach. First, a copy of the children’s questionnaire was sent to a Kuwaiti specialist in the Department of Linguistics at Kuwait University to translate the questionnaire into the Arabic language. Second, a copy of the translated questionnaire was sent to the Department of Statistics in the MOH in Kuwait for review and feedback from the reviewer, namely, a statistician with expertise in developing questionnaires and in public health research, whose expertise includes research on obesity. Third, a version was sent to a professor from the Department of Public Research in the MOH in Kuwait who is an expert in health research, questionnaire design and is fluent in both Arabic and English. Finally, the evaluation indicated that the language used in the questionnaire was clear and age appropriate and the translated version contained no vague or ambiguous words.
4.5.5 Pilot test of the questionnaires. According to Grove, Burns, and Gray, (2012), some of the reasons for conducting a pilot test include the following: to determine whether the proposed study is feasible, to identify potential problems with the research design, to examine the reliability of the data collection and research instruments, to give the researcher more experience with the research method and to determine the representativeness of the sample. The purpose of piloting is to examine the questionnaires for timing, clarity and accuracy. One school was selected randomly in Al-Farwaniyah province to conduct this pilot study. The researcher organised a brief meeting with the school principal to explain the purpose of the pilot study. In addition, the ME gave its approval to the school principal to conduct the pilot study.

Five students aged between 11–14 years of age volunteered from one class to take part in the study with their families. These students were provided with envelopes that included the plain language letters introducing the study, the questionnaires and the assent forms. The pilot sample was not included in the main study. The parents and their children were requested to sign consent forms and complete the questionnaires and remark on how long it took them to complete the questionnaire, whether all items were understood and to comment on other problems they encountered while filling in the questionnaire.

The results of this pilot test showed that it took around 20–25 minutes to respond to each of the surveys and there was no difficulty in understanding the questions. The feedback received from the pilot study showed that the questionnaires were relevant and easily understood by the respondents. Additionally, the questionnaires were found to produce reasonable answers that would help in attaining the aims of the study.
4.5.6 Distribution of the survey. After approvals from the school principals were obtained, the researcher visited each school and met with the school principals and teachers to further inform them of the protocols of the study and to identify a convenient time to collect data as suggested by the teachers and the school principals. The researcher aimed to avoid clashes with student exam periods and to increase the response rate.

The students aged 11–14 years were in four classes (grades six, seven, eight and nine) in each selected school, and were provided with an envelope to take home via their school teacher containing the student information sheet written in simple age-appropriate language (Appendix E). This information sheet explained the study and what they, as school children, would be involved in. Student assent forms were also included (Appendix F) for them to sign if their parents gave their consent. The envelopes also included the parents’ information sheets, written in plain language (Appendix G), explaining the study and the parents’ consent forms should they approve of their child participating in this study (Appendix H). Also included in the envelope was the parents’ questionnaire (Appendix D) and the students’ questionnaire (Appendix C).

The signed consent forms, the completed parents’ questionnaires and the students’ completed questionnaires were returned by the students the next day. All students who had the signed assent forms and the completed questionnaires were directed to the researcher who stood in front of the classroom and checked that all documents were complete. Students were then directed to the where the nurses were waiting to take their measurements in a private area. A total of 960 envelopes containing questionnaires for the students (480 boys and 480 girls) and 960 questionnaires for their parents were
distributed. A response rate of 75% was achieved with the return of 720 envelopes, out of which 635 of the returned surveys were complete documents. All participants in this study were informed that they can freely withdraw from the study at any time, for any reason, without any questions asked.

4.5.7 Body mass index measurements. Dessinioti and Zouboulis (2014, p. 295) stated that ‘Body Mass Index (BMI) is one of the most accurate ways to measure obesity in practice’. The BMI is calculated as the ratio of body weight to the square of body height (kg/m²).

Registered nurses from the Health Department took the children’s height and weight measurements. A female nurse measured the height and weight of female students and a male nurse measured male students. The involvement of the nurses was important because they were trained in measuring the heights and weights and in calculating the BMI scores of the students. An electronic scale (digital reading) was used for the children’s weight measurement. To ensure that weight measurements were accurate, the digital measurement scale was calibrated in each school before taking children’s weight, and the scale was set at zero reading before starting to take the children’s weight and tested by repeating the measurement to ensure a similar outcome. Most importantly, only one electronic scale was used for all 12 schools to ensure the validity of the weight measurement. All children’s measurements were taken by the nurses in a private classroom in the school to ensure confidentiality and privacy to the child. The children were admitted one by one for their weight measurement in an assigned private room, separated from where the other children waited. Child's height and weight measurements were taken according to the World Health Organisation guidelines for
height and weight measurements (WHO, 2008). All collected information were checked and entered into SPSS to calculate each child's BMI and the measurement results were not shared with the children or with anyone else at the school.

4.5.8 Quantitative data analysis.

4.5.8.1 Descriptive statistical analysis. The data from completed questionnaires were checked, coded and entered into the Statistical Package for Social Sciences (SPSS) program, version 20.0. The data analyses were performed using two main approaches: descriptive statistical analysis and inferential statistical analysis. The descriptive analysis involved the computation of frequency distributions (counts and percentages) of the responses to the children’s questionnaires and the parent’s questionnaires.

4.5.8.2 Inferential statistical analysis. The inferential statistical analysis approach, Cramer’s V Coefficients, was used to measure the associations between a pair of categorical variables (i.e., age, gender and item responses with BMI categories) Cramer’s V, which ranges from 0 to 1, is not a function of the sample size. The stronger the association between the categorical variables the more Cramer’s V tends toward a value of 1. \( V \leq 0.25 \) indicates little, if any, association. \( V = 0.26 \) to 0.49 indicates a weak association. \( V \geq 0.5 \) indicates a strong association (Prematunga, 2012). Also, to determine the magnitude of association between two continuous variables (i.e., parent’s perception of their child’s BMI and the child’s actual BMI \([\text{kg/m}^2]\)), Pearson Product Moment of Correlation \((r)\) was calculated (Morgan, Leech, Gloeckner, & Barrett, 2012).
The multifactorial analysis of variance (ANOVA) was also used in this study as the most appropriate multivariate method to determine if the mean values of dependent variables varied with respect to two or more categorical variables (Hoaglin, Mosteller, & Tukey, 2009). In this study, the effect of age, gender and their interaction were tested to determine how much the variables contributed to the total variation in the values of BMI (kg/m$^2$). In the two-way ANOVA test for between subject effects, $p$-values corresponding to a particular independent variable were verified, indicating that a less than or equal to 0.05 level of significance would mean that at least one of the mean values within that independent variable was significantly different from the other. The Scheffé post hoc test was conducted, since sample sizes were not the same across age groups or gender (Toothaker, 1991). The assumption of homogeneity of variance for two-way ANOVA was tested using Levene’s Test. Herein, the null hypothesis that the variances are equal is tested versus the alternative hypothesis that the variances are unequal. A $p$-value obtained as < .05 was interpreted as evidence of unequal variance.

Kappa Statistics were computed to determine the level of agreement between the children’s perception of their BMI categories and the actual BMI categories based on the nurses’ computations. The $p$-value of the kappa statistic assessed whether the estimated kappa was due to chance or if it truly existed in the population. A negative kappa statistic at $p$-value ≤ 0.05 indicated a non-agreement chance between the two groups (Morgan, Leech, Gloeckner, & Barrett, 2012).

Stepwise multiple regressions were utilised to predict the children’s BMI (kg/m$^2$) using dichotomous, ordinal or interval level responses provided by the children and their parents to the questionnaire items as the independent variables (Streiner, 2013). All the
variables that were not significant predictors of the children’s BMI at the .05 level of significance were automatically excluded by the stepwise procedure.

The final multiple regression model contained statistically significant predictors (indicated by \( p < .05 \) for the \( t \)-test statistics). The effect sizes were indicated by \( R^2 \). The interpretation of the effect sizes followed Ferguson (2009), that is, \( R^2 = .04 \) as the minimum effect size representing a practically significant effect for social science data, whereas \( R^2 = .25 \) represents a moderate effect and \( R^2 = .64 \) represents a strong effect (Ferguson, 2009). The assumption of multiple regression analysis that the independent variables should not be collinear (i.e., inter-correlated with each other) were tested using Variance Inflation Factor (VIF) statistics. White’s test assessed the null hypothesis that error variances were homogenous versus the alternative that the error variances were multiplicative function of one or more variables (Hassan, Hossny, Nahavandi, & Creighton, 2012). A \( p \)-value of > 0.05 indicated homogeneity of all error variances. This study assumed a 5% level of significance in all hypotheses tested and utilised SPSS version 20.0 in computing the appropriate statistics.

4.6 Phase Two (Qualitative Approach)

In this study, two qualitative methods were used: a focus group discussion with school teachers and one-to-one interviews with government officials. An advantage of a focus group is that the interaction between participants’ responses and the researcher usually generates more data in relation to the subject of interest (Ary, Jacobs, Sørensen, & Walker, 2013). Moreover, a focus group provides an environment for the researcher to target a particular group of interest, for example, school teachers, to elicit in-depth information about school environment (Palmer, Larkin, Visser, & Fadden, 2010).
Likewise, ‘Interviews are used to gather data from people about opinions, beliefs and feelings about situations, in their own words’ (Ary, Jacobs, Sørensen, & Walker, 2013, p. 466).

4.6.1 Sampling in phase two. The second phase of this study involved discussions with the school community and government officials who received plain language statements (Appendix B) and informed consent forms (Appendix I) for them to sign should they wish to participate in this study. The study sought a sample of between 6 and 12 school teachers. The 12 focus group discussions elicited information in relation to perceptions, knowledge and attitudes of teachers to overweight and obesity among Kuwaiti school children. Information was also gathered in relation to the children’s physical activities at school and the awareness of the teachers of the food provided in the children’s lunch boxes and the foods the school canteen provides to the school children.

One-to-one interviews with officials from the Ministries of Education and Health (six officials from the Health Department and six officials from the Education Department) were invited through invitation letters to discuss governmental attitudes, perceptions and knowledge regarding the prevalence of overweight and obesity in the state of Kuwait. All interview and focus group questions were devised to determine participants’ understanding of the issues of overweight and obesity among school children in Kuwait.

4.6.2 Rigour in qualitative research. The term rigour in a qualitative research approach refers to criteria to establish the trustworthiness of the findings in a research study (Thomas & Magilvy, 2011). In other words, rigour in a qualitative approach is
similar to the terms *reliability* and *validity* in a quantititative approach (Thomas & Magilvy, 2011). Strategies for ensuring rigour in qualitative research were proposed by Lincoln and Guba (1985), who suggested that four trustworthiness criteria should be applied to evaluate the validity of the qualitative data. These four criteria are credibility, transferability, dependability and confirmability.

According to Lincoln and Guba (1985), credibility in qualitative research indicates that the researcher has provided truthful findings in relation to the study under investigation, from the viewpoint of the participant. Transferability refers to the possibility that the findings of a qualitative study can be transferred to other situations. This can be achieved by providing sufficient details for the reader to decide whether these findings can apply to other settings or not. To meet the criterion of dependability, which refers to the stability of the findings, the researcher needs to explain in detail the research process, such as the method of data collection and data analyses, to allow the external validity of the findings to be considered for other settings. Finally, for confirmability, the final results should be written and documented without bias and not to meet the researcher’s expectations.

Creswell (2007) suggests that there are several strategies to ensure the trustworthiness of qualitative studies, such as peer review, triangulation, verbatim quotes from the participants, a description of the analysis and reflexivity. The researcher must employ at least two of these to ensure the rigour of the research findings. MacCarthy et al. (2013) suggest that if a study lacks rigour it may be difficult to obtain clear inferences or to accurately test certain concepts. In addition, publishing incorrect findings may result in harmful practices and dangerous adaptation (Long & Johnson, 2000).
In this study, to establish rigour, the researcher used several strategies to ensure the trustworthiness of the findings in the qualitative data collection. First, the triangulation technique was utilised in this study with a different method of interview (focus group and individual interviews). In addition, a wide variety of interviewees (school teachers and decision-makers from the Department of Health and Education) was chosen. Second, the focus groups and interviews were recorded and the tapes were listened by researcher to several times and then transcribed verbatim, providing direct quotations from the participants’ to identify and support the thematic interpretations. Lastly, sufficient details about the participants in the current study were provided, to allow other researchers to make decisions about transferring the findings of this study to another setting.

4.6.3 Focus group discussions. During the researcher’s visits to each school, the significance of the second phase of data collection was explained to the school principal and school teachers. The researcher provided the school principal with 12 copies of the consent form along with a letter that explained the purpose of the study to the participants. The school principal distributed the invitation letters that were written in plain language explaining the purpose of the study, along with consent forms inviting the teachers to sign and participate in this study. In addition, the school principals were asked to provide a conference room at a convenient time to conduct the focus group discussions. Two focus group discussions were conducted in each province (one in the boys’ school and one in the girls’ school). Each focus group lasted 40–60 minutes.

There were 11 open-ended questions (Appendix J) used. These focus group questions were initially developed from the current literature prior to initiating data collection, and
the content validation was checked and approved by the supervisor and co-supervisor and a qualitative research specialist from the ME in Kuwait. In the focus group discussions the participants were required to provide their responses based on their own perceptions on the health issue of overweight and obesity. The school teachers were asked to indicate what they understood by the terms *obesity* and *overweight*. In addition, they were asked whether they thought obesity and excess weight caused any health problems. They were required to name some of the health problems associated with overweight and obesity. Participants were asked about their perceptions of the factors that contributed to overweight and obesity among school children, the nutrition policies in their schools and the engagement of the students in physical exercise and sports and whether or not the school supported the students in adopting healthy lifestyles. Other questions in the focus group discussions included whether the schools employ school nurses, what they understood about the role of the Government, school, school nurse and parents in tackling this health issue and promoting good health among students. In most cases conversation flowed very well in the groups but probing questions such as “can you give me an example” were used to assist with data gathering. The focus group discussions were audiotaped to help the researcher prepare the transcripts for analysis.

4.6.4 Interviews data collection. A total of 12 interviews were conducted with six government officials from the Health Department and six government officials from the Education Department in each province of the state of Kuwait. The reason for inviting officials from the departments in each province was to achieve representativeness of the two areas of responsibility across the six provinces.
Before the interviews were conducted, invitations were sent to representative officials in each province, which included a plain language letter explaining the study that provided the name and the contact details of the researcher and the supervisors. The voluntary nature of participation was explained in this letter and it was accompanied by a consent form that was signed prior to the involvement in the face-to-face interviews.

Eight open-ended questions (Appendix K) were developed from the current literature prior to initiating data collection, and content validation was checked and approved. Participants provided responses on their perception of overweight and obesity, the risk factors contributing to these health issues and whether these chronic diseases have any associated health problems. In addition, they were asked to indicate whether obesity and excess weight was a disease that burdens communities. They were also asked about the role of government officials in promoting healthy living in school populations, and who they believed was responsible for tackling the health issues raised. The government officials were also asked whether Kuwaiti schools employ school nurses and what was the attitude toward school nurses in terms of their role in contributing to contain obesity and excess weight in the schools.

The reason for conducting the interviews was to help in assessing whether the sampled government officials were aware of government initiatives to control and prevent the occurrence of obesity and excess weight among children. The face-to-face interviews were audiotaped to help the researcher prepare the interview transcripts for analysis.

4.6.5 Qualitative data analyses.
4.6.5.1 Transcription. Data was collected from 12 focus groups and 12 one-to-one interviews. The face-to-face interviews were designed to gain an in-depth understanding of what overweight and obesity means to Kuwaiti officials. According to Teddlie and Tashakkori (2009), using interviews for data collection can be a powerful tool to further explain and confirm the research findings. The face-to-face interview is commonly used as a data collection tool in health sciences research to gather information from interviewees (Ryan, Coughlan, & Cronin, 2009). Interviews help researchers gather rich information and they offer the opportunity for explanation, investigation, modification and clarification of the data in the interaction between the researcher and the interviewees (Gillham, 2005). There are many advantages to interviews, including the generation of important and rich data that cannot be produced by other methods, and allowing an opportunity to follow up incomplete or unclear data responses by asking further questions for clarification, modification and to gain more in-depth data from participants (Turner, 2010).

The interviews were conducted by a single interviewer (the researcher) and followed the same format, with each lasting up to 60 minutes. All interviews were audiotaped and were in the Arabic language, because all the participants were Arabic speakers from Kuwait and most did not speak English. The interviews were recorded using an MP3 device in addition to a mobile device in case there was a malfunction in the recording device, hence there was a backup.

The interview questions were translated into Arabic by a professional translator who speaks fluent Arabic and English. The data from the interviews was transcribed in Arabic to ensure that no data was missing and then all of this data was translated into
English by a professional translation office in Kuwait. The data was back translated from English to Arabic by an expert in translation who was not involved in the first translation process (Appendix L) to verify that all data was translated correctly and that no meaning was lost in the translation process.

4.6.5.2 Content analysis. The qualitative data was analysed using content analysis. The researcher identified, coded and categorised the patterns that emerged from the data (Vaismoradi, Turunen, & Bondas, 2013). The common statements were used to generate themes that represented the perceptions of the group. These statements were grouped, or clustered, into thematic categories. These thematic categories are presented as part of the findings along with the frequency of occurrence among the focus groups or interview participants. In addition, textual data offered as verbatim examples from the focus groups or interview discussions were included to highlight the key common responses and to clarify these concepts. Relevant data were coded by researcher throughout the document following an inductive process, which allowed for emergent categories. NVivo 10® qualitative analysis software was used during the process of coding and the development of themes. NVivo software provided an organised workspace to conduct the classification and sorting of data and the tracking of the frequency of occurrences across the data sources (Ritchie et al. 2013).

Finally, a comprehensive review and interpretation of the data provided the conclusions of the analysis, which were revealed in the form of several overarching themes representing the perceptions of the individual interviews and focus group interviews as a whole (Bazeley & Jackson, 2013).
4.7 Ethical Considerations

Ethics approvals from Royal Melbourne Institute of Technology University (RMIT) (Appendix M) and the Kuwaiti Ministries of Education and Health (Appendices A and N) were obtained prior to the commencement of this study. The MOH was formally approached to arrange for a female nurse (for girls’ schools) and a male staff nurse (for boys’ schools) from the ministry to accompany and assist the researcher by taking the heights and weights of the school children. These nurses were trained by the researcher to follow the research protocols for taking height and weight measurements of the school children. The female nurse was in charge of taking the height and weight measurements of the girls in the girls’ schools, whereas the male staff nurse took the height and weight measurements of the boys in the boys’ schools.

The ethical considerations were addressed by seeking consent from the participants before they were allowed to be involved in the study. As indicated by Ritchie et al. (2013), a consent form should provide participants with adequate information, such as the purpose of the study, details of the researcher or organisation, information on the voluntary nature of participation, the participant’s ability to withdraw from the study at any time, the participant’s role, the duration of the experiment and the confidentiality and anonymity of the data they provide.

The students were informed that their participation in the study was voluntary and they were asked to sign assent form to indicate their ability and willingness to be participants. Prior to being asked to sign the assent form, the students were informed of the aim of the study and their role in it, in simple language. Their parents were also
made aware of the study’s aims and were required to sign consent forms to demonstrate that they had permitted their children to be sampled and studied.

In addition to the other participants in this study, teachers and officials from the health and education sector were invited to participate. They were sent both the invitation letter that explained the purpose of the study and the consent form that they were required to sign if they wished to take part in the study. All the participants in the study were informed that they could withdraw from the study at any time, for any reason, without any questions asked.

4.8 Confidentiality and Anonymity of the Participants

Participation in the study was voluntary. The anonymity and confidentiality of all the participants was assured. According to RMIT and the National Health and Medical Research Council of Australia (NHMRC) guidelines, there were some points that needed to be addressed, and the researcher used the prescribed RMIT template to develop the informed consent forms (see Appendix I). Informed consent was obtained in writing from each study participant who offered data in both the quantitative and qualitative phases of the study.

No names or identifying information was sought in the current study. Codes were used to label the parents’ and students’ questionnaires during the data collection in this study to ensure that the confidentiality and anonymity of the participants were respected throughout the research process. The codes were constructed by taking the first letter of the province in Kuwait in which the participant lived as a reference. There are six
provinces: Al Asimah (the capital of the country), Jahra province, Hawalli province, Farwaniyah province, Mubarak Al-Kabeer province and Al-Ahmadi province.

As an example, the letter (J) was used as a reference to the Jahra province. A capital letter (J) was used to indicate a parent and a small letter (j) was used to indicate a student. A numbering system was also used. As 160 questionnaires were distributed with a capital letter (J) to indicate the parents and 160 questionnaires with small letter (j) to indicate the students were distributed in Jahra province, the numbers from 1–80 indicated the boys’ school and 81–160 indicated the girls’ school. This coding technique was used for all the provinces with the coding representation as follows: Capital (C), Hawalli (H), Farwaniyah (F), Mubarak Al-Kabeer (M), Ahmadi (A) and Jahra (J).

In addition, the students’ weight and height measurements were taken in private rooms that were not disclosed to the participants or other staff members. This practice was adhered to in order to avoid any occurrence of teasing or bullying in the playground in relation to the shared knowledge of physical measurements by other children. Ensuring the confidentiality of information was important in avoiding the victimisation or stigmatisation of the study participants. Anonymity was guaranteed, no individual could be recognised and group data only was reported.

All the participants in the face–to-face interviews and focus groups indicated their agreement for the interviews and discussions to be audiotaped. Further, they were aware of the confidentiality and anonymity of this study.

4.9 Security of Research Data
All collected data (printed hard copy and recorded data) were shipped back with the researcher to Australia. They were placed at RMIT in a locked filing cabinet throughout the period of the research process. During the research process, all computers were password protected and only authorised individuals had the ability to access the research data. Upon completion of the research, the records were labelled and stored in the research and data storage area at the university, where they will be stored for a period of 5 years before they are destroyed.

4.10 Chapter Summary

In this study, quantitative as well as qualitative research techniques were employed to answer the study research questions. Both qualitative and quantitative approaches were considered important for this study to elicit a broad understanding of the incidence of overweight and obesity among Kuwaiti school children. A mixed methods approach was an advantage to use all available instruments rather than restricting the researcher to one tool of data collection. Survey, focus group discussions and structured interviews were used to collect the data to obtain in-depth details about overweight and obesity among school children in Kuwait.

Children, parents and school teachers were invited to participate voluntarily. The pilot study was conducted to enhance the language used in the questions and to check the time it took to complete each questionnaire and identify any areas that required changes.

The quantitative data were analysed using SPSS version 20.0 to compute the appropriate statistics. The qualitative data were analysed using content analysis. NVivo
10® qualitative analysis software was used during the process of coding and the development of themes.

Ethical considerations were addressed by seeking consent from the participants before they became involved in any face-to-face data collection for the study. All the participants in this study were informed that they could withdraw from the study at any time.

The following two chapters present the study results in two parts: quantitative results and qualitative results.
Chapter 5: Survey Results

5.1 Introduction

This chapter presents the results of statistical analyses of the surveys completed by intermediate Kuwaiti school children aged 11–14 years and their parents, as well as actual BMI measurements of a cohort of children. The data were analysed using SPSS, Version 20.0. The descriptive statistics included cross-tabulations between variables, measures of frequency distribution, means and standard deviation to determine the prevalence of overweight and obesity. The inferential statistical analyses included the two-way ANOVA to test the interaction effect between age and sex on children’s BMI. Kappa measures were utilised to indicate the difference between perceived and actual body weights. A prediction of children’s BMI (dependent variable) from selected explanatory variables was conducted and a multiple linear regression technique was employed.

The results of the analyses of the responses to the parent questionnaire are also presented in cross-tabulations, frequency measures, correlation tests and multiple regression step wise methods to identify the highest predictor variables that affect increased BMI in children.

5.2 Analysis of Responses to the Student (Children) Questionnaire

A total of 960 envelopes containing student questionnaires were distributed to 480 boys and 480 girls of 12 selected public schools; 720 questionnaires were returned, implying a 75% response rate, out of which 85 of the returned surveys were incomplete and not considered for analysis. Thus the analysable sample contained data from 635 students.
(children). Students (children) were asked to provide information on their demographic characteristics (province, school, age and gender), perception of their own body weight category, food and eating habits, physical activities and sedentary activities. Actual measurements (weight and height) were taken by nurses.

This section presents the results from analyses of data collected from children. Descriptive and inferential statistical analyses were performed and organised in eight subsections:

1. children’s demographic characteristics
2. children’s perception of their body weight
3. prevalence of obesity and overweight among children
4. children’s body weight characteristics by age and sex
5. children’s food and eating habits
6. children’s physical activities
7. children’s sedentary activities
8. prediction of children’s BMI.

5.2.1 Children’s demographic characteristics. Table 5.1 presents a profile of the children sampled for this study through distributions and descriptive measures of their demographic characteristics. The children were selected from six provinces (Capital, Hawally, Amida, Farwaniya, Jahraa and Mubarak ALKabeer). The children’s ages
ranged from 11–14 years, but most children ($N = 414, 65.20\%$) were 13 or 14 years old; and with a mean 12.89 ±1.04 ($SD$) years old. The male–female ratio was almost 1:1, with $N = 298, 46.93\%$ male children, and $N = 337, 53.07\%$ female children. The frequencies and percentage of the participants according to the province, age and gender (items 1, 3 and 4) were reported in Table 5.1 and item number 2 (school name) was excluded to ensure the confidentiality of the participants.

Table 5.1

*Demographic Characteristics of Children.*

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<th>Characteristics</th>
<th>N</th>
<th>%</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
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</tbody>
</table>
5.2.2 *Children’s perception of their body weight.* Children were asked to describe their own weight through a ranking of ‘very underweight’, ‘underweight’, ‘about the right weight’, ‘slightly overweight’ or ‘very overweight’. Questionnaire item 5, ‘How would you describe your weight?’, was designed to collect data on children’s perceived body weights and it attained a response rate of 97.3% \((N = 618)\). The distribution (frequencies, proportions with 95% confidence intervals \((CI)\)) of the children by their perceived body weight categories are presented in Table 5.2. The responses indicated that 26.54% \((N = 164, 95\% CI = 23.05\%, 30.03\%)\) of children perceived themselves to be very or slightly underweight; 35.11% \((N = 217, 95\% CI = 31.35\%, 38.88\%)\) perceived themselves to be about the right weight, 25.89% \((N = 160, 95\% CI = 22.44\%, 29.34\%)\) perceived themselves to be slightly overweight, and 12.46% \((N = 77, 95\% CI = 9.85\%, 15.07\%)\) perceived themselves to be very overweight. A higher proportion of females \((N = 133, 40.55\%)\) than males \((N = 84, 28.97\%)\) perceived themselves to be about the right weight. A higher proportion of females \((N = 98, 29.88\%)\) than males \((N = 62, 21.38\%)\) perceived themselves to be slightly overweight, and a higher proportion of females \((N = 47, 14.33\%)\) than males \((N = 30, 10.34\%)\) perceived themselves to be very overweight. Unlike other weight categories, a higher proportion of males \((N = 114, 39.31\%)\) than females \((N = 50, 16.25\%)\) perceived themselves to be underweight.

Table 5.2

*Children’s Perception of their Weight.*

<table>
<thead>
<tr>
<th>Q5. Perceived body weight</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N)</td>
<td>% (95% CI)</td>
<td>(N)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2.3 Prevalence of overweight and obesity among children. Data on children’s height and weight were used to calculate BMI (weight [kg]/height [m²]) and the WHO’s guidelines for children boys and girls aged 5–19 years were used to classify the study children into four BMI categories (Onis et al., 2007).

The true prevalence of overweight among 635 Kuwaiti children aged 11–14 years was estimated to be 25.51% (95% CI = 22.11%, 28.91%), while the prevalence of obesity was estimated to be 36.54% (95% CI = 32.78%, 40.29%). Table 5.3 presents the estimated prevalences with corresponding CIs. The normal approximation to binomial distribution was used to obtain the CIs for estimated prevalence values.

Table 5.3 also presents the cross distributions of children by BMI categories and sex. The results indicate that 25.5% (N = 162) of the children were overweight, comprising a quarter of the entire sample. Proportion of being overweight was similar among the male (N = 76, 25.5%) and female children (N = 86, 25.5%). Over one third of the participants, 36.5% (N = 232), were classified as obese, and the male children (N = 112,
37.6%) were higher in proportion to being obese than the proportion of female children 

(N = 120, 35.5%)
Table 5.3

*Actual Body Weight Measurement of Children.*

<table>
<thead>
<tr>
<th>6,7. Measured body weight</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>% (95% CI)</td>
<td>N</td>
</tr>
<tr>
<td>Underweight</td>
<td>20</td>
<td>6.71 (3.87, 9.55)</td>
<td>17</td>
</tr>
<tr>
<td>Normal</td>
<td>90</td>
<td>30.2 (25.0, 35.4)</td>
<td>114</td>
</tr>
<tr>
<td>Overweight</td>
<td>76</td>
<td>25.5 (20.6, 30.5)</td>
<td>86</td>
</tr>
<tr>
<td>Obese</td>
<td>112</td>
<td>37.6 (32.1, 43.1)</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td>298</td>
<td>100</td>
<td>337</td>
</tr>
</tbody>
</table>

The error bars in Figure 5.1 depict the distributions of the children in the sample in the four measured (actual) categories by sex and helps to reveal the prevalence comparison at a glance.
Figure 5.1. Error bar plots showing the distribution (in proportion) of children in measured (actual) weight categories by sex and total.

5.2.4 Comparisons between actual weight and children’s weight perceptions. A further investigation was carried out to compare the agreement between perceived and measured prevalence of body weight characteristics among the children. The comparisons are presented in Figure 5.2 (for male children) and in Figure 5.3 (for female children). A kappa statistic = −0.084, \( p < 0.05 \) indicated that there was a statistically significant overall non-agreement between actual assessment on weight category and children’s perception of their weight. Also, the statistically significant kappa measures of agreement/disagreement between perceived and actual body weight indicated that such disagreement was higher among females (\( K = −0.11, p < 0.05 \)) than males (\( K = −0.05, p < 0.05 \)). The result of the kappa statistic is an example of social desirability bias and perhaps even deniability, because the distribution of the perceived body weight categories reported by the children was not consistent with the accurate BMI categories (actual body weight) measured by the nurses.
Figure 5.2. Comparison of measured and perceived body weights for male children.

Figure 5.3. Comparison of measured and perceived body weights for female children.
5.2.5 Children’s body weight characteristics by age and sex. Due to the large sample size used in this study, the Central Limit Theorem could be applied, as it states that, regardless of the population’s distribution, provided the sample is sufficiently large, as in this study \((N = 635)\), the distribution of the sample means will be approximately normal, with a sample mean equal to the population mean.

Sample means of children’s actual BMI were calculated per age group. For the age groups, it was observed that the BMI of females was higher than the BMI of males. Further, the overall average BMI of females was 24.81 kg/m\(^2\), which was higher than the overall average male BMI, 24.32 kg/m\(^2\). Results showed a pattern whereby BMI increased as age increased both for males and females (see Table 5.4).

Table 5.4

Descriptive Statistics for Children’s BMI by Age and Sex.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Female</th>
<th></th>
<th>Male</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Q3.</td>
<td>11</td>
<td>57</td>
<td>22.82</td>
<td>22</td>
<td>22.72</td>
<td>6.17</td>
</tr>
<tr>
<td>12</td>
<td>76</td>
<td>23.77</td>
<td>5.60</td>
<td>66</td>
<td>22.91</td>
<td>5.90</td>
</tr>
<tr>
<td>13</td>
<td>90</td>
<td>25.55</td>
<td>6.65</td>
<td>93</td>
<td>24.61</td>
<td>6.08</td>
</tr>
<tr>
<td>14</td>
<td>114</td>
<td>25.93</td>
<td>6.45</td>
<td>117</td>
<td>25.18</td>
<td>5.87</td>
</tr>
<tr>
<td>Total</td>
<td>337</td>
<td>24.81</td>
<td>6.20</td>
<td>298</td>
<td>24.32</td>
<td>6.02</td>
</tr>
</tbody>
</table>

Two-way ANOVA was performed to test the interaction effect between age and sex on children’s BMI (kg/m\(^2\)) and how much of this interaction would influence the total variation in children’s BMI. Partial Eta Square \((\eta^2)\) would measure the proportion of the
total variance in BMI as explained by the independent variables. To perform ANOVA analysis, an important data assumption is to ensure equal variances in the response (BMI in this case) for each group of the independent variables. As per the results from Levene’s Test for Equality of Error Variances ($F = 1.11, p = 0.355 > 0.05$), it was evident that the data met necessary assumptions of homogeneity in variances. The two-way ANOVA results in Table 5.5 below show that there was a significant difference in the BMI values of children when grouped according to age ($F = 6.28, p < 0.05$).

However, its effect size was only 0.029, indicating that only 2.9% of the total variation in BMI of children could be accounted for by age. The mean BMI difference between males and females was not proven to be significant, with an almost negligible effect size of 0.02%.

Table 5.5

*Results of Two-way ANOVA Testing Variation in BMI by Age and Sex.*

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>$F$</th>
<th>$p$-value</th>
<th>Partial $\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q3. Age</td>
<td>688.11</td>
<td>3</td>
<td>229.37</td>
<td>6.28</td>
<td>0.00</td>
<td>0.029</td>
</tr>
<tr>
<td>Q4. Sex</td>
<td>53.47</td>
<td>1</td>
<td>53.47</td>
<td>1.47</td>
<td>0.23</td>
<td>0.002</td>
</tr>
<tr>
<td>Age $\times$ sex</td>
<td>8.81</td>
<td>3</td>
<td>2.94</td>
<td>0.08</td>
<td>0.97</td>
<td>0.000</td>
</tr>
<tr>
<td>Error</td>
<td>22847.55</td>
<td>626</td>
<td>36.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $R^2 = 0.04$ (Adjusted $R^2 = 0.02$)

Further, a post hoc analysis was conducted using Scheffé’s multiple comparison tests to examine which of the age groups of children have significantly different BMI. The Scheffé post hoc tests are presented in Table 5.6. It was clear from the findings that the children aged 11 years (mean BMI = 22.79) had a statistically significantly ($p < 0.05$)
lower BMI on average than children aged 14 years (mean BMI = 25.55). The children aged 11 years (mean BMI = 23.37) also had a statistically significantly ($p < 0.05$) lower BMI on average than children aged 14 years (mean BMI = 25.55). The children aged 11 years were not significantly different in average BMI than children aged 12 and 13 years. Children aged 12 years and 13 years, and 13 years and 14 years, were not significantly different in average BMI as well.
Table 5.6

Scheffé’s Post Hoc Multiple Comparisons of BMI at Different Ages.

<table>
<thead>
<tr>
<th>3. Age (Years) (I)</th>
<th>Age (Years) (J)</th>
<th>Mean Difference (I–J)</th>
<th>p-value</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>12</td>
<td>−0.58</td>
<td>0.93</td>
<td>−2.96</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>−2.28</td>
<td>0.05</td>
<td>−4.56</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>−2.76*</td>
<td>0.01</td>
<td>−4.96</td>
<td>−0.55</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>−1.70</td>
<td>0.10</td>
<td>−3.60</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>−2.18*</td>
<td>0.01</td>
<td>−3.98</td>
<td>−0.37</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
<td>−0.48</td>
<td>0.89</td>
<td>−2.16</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Note: * The mean difference is significant at the 0.05 level (p < 0.05).

Figure 5.4. Error bar plots showing average BMIs of children at different ages.

Note: The error bar plots in Figure 5.4 present the average BMIs at ages along with their 95% CI and reflect differences among averages.
Further, the lines in Figure 5.5 present average BMIs at different ages by sex. It was observed that at all ages females had higher BMIs than males, although the differences were not statistically significant, as they showed no statistically significant interaction between age and sex in the ANOVA model (see Table 5.5).

![Figure 5.5](image)

*Figure 5.5. Line plots showing average BMIs of children at different ages by sex.*

**5.2.6 Risk factor 1: children’s food and eating habits.** The frequency distributions for the responses of the children to items 8, 9, 10, 11, and 12, reporting their nominal or ordinal categories of food and eating habits, are presented in Table 5.7. The percentages for each item were computed based on the total number of children who responded to each item. The majority of the children who responded \((N = 397, 62.6\%)\) reported that they ate breakfast at home, and also that they also ate lunch at home \((N = 597, 94.5\%)\). A smaller proportion \((N = 64, 10.1\%)\) reported that they did not eat breakfast, and an even smaller proportion \((N = 10, 1.6\%)\) did not eat lunch. About one half of the respondents \((N = 295, 47.5\%)\) reported that they ate an evening meal together as a
family 5 days a week. Only a small proportion (36, 5.8%) did not do so. About one fifth of the respondents (N = 132, 20.9%) never ate fruit, but nearly two thirds ate fruit some days (N = 254, 40.1%) or most days (N = 151, 23.9%).

All of the children who responded to the questionnaire reported that they ate food from takeaway restaurants. About one third (N = 225, 35.8%) did so once a week. About one quarter (N = 155, 24.7%) did so on 2 or 3 days a week. Further, items 13 and 14 were designed to collect data on favourite foods (with four required responses) and frequently eaten favourite foods. A total of 129 types of food were reported by the children; these types of food were transferred into five food groups by a nutritionist to facilitate the data analyses. The favourite food types in order of endorsement were carbohydrates (bread, rice) (87.7%), protein (76.4%), fruit and vegetables (33.2%), fat (14.5%) and carbohydrates sugar (14.5%). About half the children (N = 319, 50.2%) ate their favourite food on 1–3 occasions per week.
Table 5.7

Children’s Responses to Items Reporting Food and Eating Habits.

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Score</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q8. On school days, where do you usually get your breakfast from?</td>
<td>Home</td>
<td>397</td>
<td>62.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School canteen</td>
<td>146</td>
<td>23.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shop (outside school)</td>
<td>26</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>From friends</td>
<td>1</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Don’t eat breakfast</td>
<td>64</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Q9. Where do you usually get your lunch from?</td>
<td>Home</td>
<td>597</td>
<td>94.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>School canteen</td>
<td>20</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shop (outside school)</td>
<td>5</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>From friends</td>
<td>0</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Don’t eat lunch</td>
<td>10</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Q10. How many times per week do you eat an evening meal together as a family?</td>
<td>0 days</td>
<td>36</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 day</td>
<td>42</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 days</td>
<td>65</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 days</td>
<td>116</td>
<td>18.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 days</td>
<td>67</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 days</td>
<td>295</td>
<td>46.5</td>
<td></td>
</tr>
<tr>
<td>Q11. How often do you eat fruit?</td>
<td>Hardly ever/never</td>
<td>4</td>
<td>132</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>Some days</td>
<td>3</td>
<td>254</td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>Most days</td>
<td>2</td>
<td>151</td>
<td>23.8</td>
</tr>
<tr>
<td></td>
<td>Every day</td>
<td>1</td>
<td>96</td>
<td>15.1</td>
</tr>
<tr>
<td>Q12. How often do you eat food from a takeaway restaurant?</td>
<td>Once/month</td>
<td>1</td>
<td>64</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>2–3 times/month</td>
<td>2</td>
<td>95</td>
<td>15.0</td>
</tr>
</tbody>
</table>
### Item 13. How often do you eat your favourite food?

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once/week</td>
<td>3</td>
<td>225</td>
<td>35.4</td>
</tr>
<tr>
<td>2–3 times/week</td>
<td>4</td>
<td>155</td>
<td>24.4</td>
</tr>
<tr>
<td>Most days</td>
<td>5</td>
<td>89</td>
<td>14.0</td>
</tr>
</tbody>
</table>

### Item 14. How often do you eat your favourite food?

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit and vegetables</td>
<td>1</td>
<td>211</td>
<td>33.2</td>
</tr>
<tr>
<td>Protein</td>
<td>2</td>
<td>485</td>
<td>76.4</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>3</td>
<td>557</td>
<td>87.7</td>
</tr>
<tr>
<td>Fat</td>
<td>4</td>
<td>92</td>
<td>14.5</td>
</tr>
<tr>
<td>Sugar</td>
<td>5</td>
<td>92</td>
<td>14.5</td>
</tr>
</tbody>
</table>

Q13. What is your favourite food?

Q14. How often do you eat your favourite food?

Table 5.8 presents the Cramer’s V Coefficients between food and eating habits of children and their BMI categories. It was noted that none of the specified food and eating habits were significantly associated with the children’s BMI categories measured by nurses.
Table 5.8

*Cramer’s V Coefficients between Food and Eating Habits of Children and their BMI Categories.*

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q8. On school days, where do you usually get your breakfast from?</td>
<td>0.08</td>
<td>0.29</td>
</tr>
<tr>
<td>Q9. Where do you usually get your lunch from?</td>
<td>0.08</td>
<td>0.20</td>
</tr>
<tr>
<td>Q10. How many times per week do you eat an evening meal together as a family?</td>
<td>0.08</td>
<td>0.79</td>
</tr>
<tr>
<td>Q11. How often do you eat fruit?</td>
<td>0.05</td>
<td>0.83</td>
</tr>
<tr>
<td>Q12. How often do you eat food from a takeaway restaurant?</td>
<td>0.08</td>
<td>0.44</td>
</tr>
<tr>
<td>Q13. Favourite food.</td>
<td>0.30</td>
<td>0.75</td>
</tr>
<tr>
<td>Q14. Frequency of eating favourite food.</td>
<td>0.05</td>
<td>0.75</td>
</tr>
</tbody>
</table>

5.2.7 Risk factor 2: children’s physical activities. The frequency distributions of the responses of the children to items 15, 16, 17, 18 and 19, reporting their nominal or ordinal categories of physical activities, are presented in Table 5.9. The percentages for each item were computed from the total number of children who responded to each item. The majority of the children (*N* = 557, 87.7%) reported that they did not get to school by walking. Most of them (*N* = 486, 76.5%) travelled to school by car or bus. Relatively few children (*N* = 66, 10.4%) walked to and from school every day of the week. Most of the children who walked to school (*N* = 64, 86.5%) took < 15 minutes. Only a minority of the children (*N* = 100, 16.1%) reported that they had not, in the last 5 school days, participated in sports, cultural performances or played games in which they were physically active. A little over half of the children (*N* = 352, 56.5%) reported that
they had done so on 1–4 occasions. Over one quarter of the children ($N = 171, 27.4\%$) reported that they had done so on 5 or 6 occasions.

Table 5.9

*Children’s Responses to Items Reporting Physical Activities.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q15. Do you get to school by walking?</td>
<td>No</td>
<td>557</td>
<td>87.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>78</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>635</td>
<td>100.0</td>
</tr>
<tr>
<td>Q16. Do you get to school by car or bus?</td>
<td>No</td>
<td>149</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>486</td>
<td>76.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>635</td>
<td>100.0</td>
</tr>
<tr>
<td>Q17. In the last 5 school days, how many times did you walk to or from school?</td>
<td>0</td>
<td>10</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>20</td>
<td>26.3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>12</td>
<td>15.8</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>11.8</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3</td>
<td>3.9</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>22</td>
<td>28.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>76</td>
<td>100.0</td>
</tr>
<tr>
<td>Q18. How many minutes does it take to walk from home to your school?</td>
<td>&lt; 15</td>
<td>64</td>
<td>86.5</td>
</tr>
<tr>
<td></td>
<td>16-30</td>
<td>6</td>
<td>8.1</td>
</tr>
<tr>
<td></td>
<td>&gt; 30</td>
<td>4</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>74</td>
<td>100.0</td>
</tr>
<tr>
<td>Q19. In the last 5 school days, how many times after school did you participate in sport, cultural performances or play games in which you were physically active?</td>
<td>0</td>
<td>100</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>84</td>
<td>13.5</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>153</td>
<td>24.6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>115</td>
<td>18.5</td>
</tr>
</tbody>
</table>
Table 5.10 presents the Cramer’s V Coefficients between physical activities of children and their BMI categories. None of the reported physical activities of children were significantly associated with their BMI categories.

Table 5.10

*Cramer’s V Coefficients between Physical Activities of Children and their BMI Categories.*

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q15. Do you get to school by walking?</td>
<td>0.10</td>
<td>0.12</td>
</tr>
<tr>
<td>Q16. Do you get to school by car or bus?</td>
<td>0.08</td>
<td>0.31</td>
</tr>
<tr>
<td>Q17. In the last 5 school days, how many times did you walk to or from school?</td>
<td>0.16</td>
<td>0.95</td>
</tr>
<tr>
<td>Q18. How many minutes does it take to walk from home to your school?</td>
<td>0.20</td>
<td>0.23</td>
</tr>
<tr>
<td>Q19. In the last 5 school days, how many times after school did you participate in sport, cultural performances or play games in which you were physically active?</td>
<td>0.11</td>
<td>0.11</td>
</tr>
</tbody>
</table>

### 5.2.8 Risk factor 3: children’s sedentary activities.

The frequency distributions of the responses of the children to items 20, 21 and 22, reporting their nominal or ordinal categories of sedentary activities, are presented in Table 5.11. The percentages for each item were computed from the total number of children who responded to each item. The
majority of the respondents \((N = 486, 77.3\%)\) reported that they watched TV and videos, and spent time on the computer, tablet and phone every day of the week. Over one third \((N = 248, 39.4\%)\) did this for more than 4 hours per day. About one half of the children \((N = 325, 51.2\%)\) had a TV in their bedroom.
Table 5.11

*Children’s Responses to Items Reporting Sedentary Activities.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q20. Do you have a TV in your bedroom?</td>
<td>No</td>
<td>310</td>
<td>48.8</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>325</td>
<td>51.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>635</td>
<td>100.0</td>
</tr>
<tr>
<td>Q21. How often do you watch TV, videos or DVDs, spend time on the computer, tablet, phone?</td>
<td>Every day</td>
<td>486</td>
<td>77.3</td>
</tr>
<tr>
<td></td>
<td>Every second day</td>
<td>45</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Two times a week</td>
<td>63</td>
<td>10.0</td>
</tr>
<tr>
<td></td>
<td>Once a week</td>
<td>17</td>
<td>2.7</td>
</tr>
<tr>
<td></td>
<td>Less than once a week</td>
<td>18</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>629</td>
<td>100.0</td>
</tr>
<tr>
<td>Q22. How many hours per day do you spend watching TV, videos or DVDs?</td>
<td>&lt; 1 hour/day</td>
<td>106</td>
<td>16.8</td>
</tr>
<tr>
<td></td>
<td>2 hours/day</td>
<td>276</td>
<td>43.8</td>
</tr>
<tr>
<td></td>
<td>&gt; 4 hours/day</td>
<td>248</td>
<td>39.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>630</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 5.12 shows the Cramer’s V Coefficients between sedentary activities of children and their BMI categories showed that none of the reported sedentary activities of children was significantly associated with their BMI categories.
Table 5.12

*Cramer’s V Coefficients between Sedentary Activities of Children and their BMI Categories.*

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q20. Do you have a TV in your bedroom?</td>
<td>0.09</td>
<td>0.14</td>
</tr>
<tr>
<td>Q21. How often do you watch TV, videos or DVDs, spend time on the computer, tablet, phone?</td>
<td>0.09</td>
<td>0.22</td>
</tr>
<tr>
<td>Q22. How many hours per day do you spend watching TV, videos or DVDs?</td>
<td>0.05</td>
<td>0.14</td>
</tr>
</tbody>
</table>

5.2.9 Prediction of children’s BMI. Prediction is a general term in statistics that implies determining the values of a response (dependent) variable as function of a set of explanatory (independent) variables. A mathematical regression model of the relationship between dependent and independent variable(s) is required to make predictions. This model makes prediction possible through establishing the relationship between dependent and independent variables and is often called a prediction/regression equation. Linear regression technique is the well-known statistical method to study linear relationship between a dependent and a set of independent variables and consequently to obtaining a linear prediction equation for the dependent variable.

This study sought to obtain a linear prediction equation for children’s BMI (dependent variable) using a selected set of explanatory (independent) variables (age and the responses to the student questionnaire items 8–22 in Tables 7, 9 and 11). A multiple linear regression technique was employed. As this analysis sought findings on all
effects for male and female children separately, the regression analysis was also carried out for male and female children separately.

The stepwise model building procedure was used while fitting multiple linear regression models. The stepwise procedure is a statistical technique that selects only the independent variables to keep in model and discards the unimportant ones. The stepwise model selection works by taking all the independent variables in the first step and tests the contribution of them to the model in subsequent steps. Any independent variable not contributing significantly to enhance the model’s performance is excluded from the model after testing in both forward and backward manners. A multiple linear regression fitted with a good number of independent variables, we used stepwise technique to filter out the unimportant ones. After starting with the four independent variables (predictors) (noted above) to explain the BMI of male children, the stepwise multiple regression procedure resulted in a final model containing two predictors. The fitted model is presented in Table 5.13.

Although the multiple regression model for the male children was statistically significant \( F = 8.29, p < .001 \), only a small proportion of the variance in BMI (Adjusted \( R^2 = 4.9\% \)) was explained, reflecting limited clinical/practical significance. The two predictors were: (a) the age of the male children (from 11 to 14 years); and (b) how many hours per day the male children spent on sedentary activities, such as watching TV, videos or DVDs in their free time (5 = every day, 4 = every second day; 3 = 2 times a week; 2 = once a week; 1 = less than once a week). Based on the standardised regression coefficients, the age of the children \( (\beta = 0.17) \) was a more important predictor of BMI than time spent on sedentary activities \( (\beta = 0.12) \). Using the
un-standardised regression coefficients, the model predicted that, on average, the BMI of the male children increased by 0.97 kg/m$^2$ for every unit (1 year) increase in their age, and increased by 1.11 kg/m$^2$ for each unit of time (hour per day) that the children spent on sedentary activities.

Tests to check the assumptions of multiple linear regression were conducted. The VIF statistics were close to 1.0, indicating that the predictor variables were not collinear (see Table 5.13). Further, White’s test of heteroscedasticity ($\chi^2 = 1.69, p > 0.05$) indicated that the assumption of homoscedasticity was met for the fitted model in Table 5.13.

Table 5.13

Prediction of Male Children’s BMI (kg/m$^2$).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Un-standardised $\beta$</th>
<th>SE</th>
<th>Standardised $\beta$</th>
<th>t</th>
<th>p</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>9.97</td>
<td>4.01</td>
<td>-</td>
<td>2.49</td>
<td>.013</td>
<td>-</td>
</tr>
<tr>
<td>Q3. Age (years)</td>
<td>0.97</td>
<td>0.31</td>
<td>0.17</td>
<td>3.12</td>
<td>.002</td>
<td>1.02</td>
</tr>
<tr>
<td>Q22. How many hours per day do you spend watching TV, videos or DVDs in your free time?</td>
<td>1.11</td>
<td>0.51</td>
<td>0.12</td>
<td>2.17</td>
<td>.031</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 4.9\%$ ($F = 8.29, p < .001$)

The second stepwise regression model for the female children is presented in Table 5.14. The model for the female children was statistically significant ($F = 5.95, p < .001$), but only a small proportion of the variance in BMI (Adjusted $R^2 = 8.0\%$) was explained, reflecting limited clinical/practical significance. The three significant predictors were the age of the female children (from 11–14 years), how many times in the last 5 days the female children had walked to or from school (from 0–10), and how
often the female children ate food from takeaway restaurants (1 = once/month, 2 = 2–3 times/month, 3 = once/week, 4 = 2–3 times/week, 5 = most days).

Based on the standardised regression coefficients, the age of the children \((\beta = 0.187)\) was the most important predictor of BMI, followed by walking to school \((\beta = -0.142)\) and eating food from takeaway restaurants \((\beta = 0.121)\). Using the un-standardised regression coefficients, the model predicted that, on average, the BMI of the female children increased by 1.185 kg/m\(^2\) for every unit (1 year) increase in their age, decreased by −0.611 kg/m\(^2\) for every time they had walked to or from school in the last 5 days, and increased by 0.625 kg/m\(^2\) for every 1 point increase in the 5-points score for eating food from takeaway restaurants.

Tests to check the assumptions were conducted. The VIF statistics were close to 1.0, indicating that the predictor variables were not collinear (see Table 5.14). White’s test of heteroscedasticity \((\chi^2 = 18.53, p > 0.05)\) supported the assumption of heteroscedasticity. Hence, the statistical inferences were not compromised by either collinearity or heteroscedasticity.

Table 5.14

Prediction of Female Children’s BMI (kg/m\(^2\)).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Un-standardised (\beta)</th>
<th>(SE)</th>
<th>Standardised (\beta)</th>
<th>(T)</th>
<th>(p)</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>9.478</td>
<td>4.86</td>
<td>–</td>
<td>1.95</td>
<td>.05</td>
<td>–</td>
</tr>
<tr>
<td>Q3. Age</td>
<td>1.185</td>
<td>0.37</td>
<td>0.19</td>
<td>3.20</td>
<td>&lt; .01</td>
<td>1.02</td>
</tr>
<tr>
<td>Q17. In the last 5 school days, how many times did you walk to or from school?</td>
<td>−0.611</td>
<td>0.25</td>
<td>−0.14</td>
<td>−2.44</td>
<td>.02</td>
<td>1.02</td>
</tr>
</tbody>
</table>
Q12. How often do you eat food from a takeaway/month?  

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.625</td>
<td>0.30</td>
</tr>
<tr>
<td>0.12</td>
<td>2.07</td>
</tr>
<tr>
<td>0.04</td>
<td>1.02</td>
</tr>
</tbody>
</table>

Adjusted $R^2 = 8.0\% (F = 5.95, p < 0.001)$

The investigation of the student (children) questionnaire ends with the analyses and results presented above. The next section starts the investigation of the parent questionnaire.

5.3 Analysis Results of the Responses to the Parent Questionnaire

The parents’ questionnaires were returned with the children’s questionnaires in the same envelope. Thus the response rate was similar, with 75% for the parent questionnaire. This section presents the results from analyses of data collected from the parent questionnaire.

The results of the analysis of the responses to the parent questionnaire are presented in 12 subsections: (1) parents’ socio-demographic characteristics, (2) relationships between parent’s characteristics and children’s BMI, (3) prevalence of obesity among parents, (4) relationships between parent’s BMI and children’s BMI, (5) childcare characteristics, (6) parents’ perception toward children’s weight, (7) risk factor 1: family history of disease, (8) risk factor 2: physical activities, (9) risk factor 3: sedentary activities, (10) risk factor 4: food and eating, (11) risk factor 5: drinking, and (12) prediction of children’s BMI.

5.3.1 Parents’ socio-demographic characteristics. The socio-demographic characteristics of the parents who participated in the survey are summarised in Table 5.15. The parents’ questionnaire items 1–4 were identical to the children’s questionnaire and used for cross-checking. The parents’ answers to items 5, 6, 7, 8 and 9 indicate that
nearly half of the fathers \((N = 288, 45.3\%)\) and mothers \((N = 312, 49.1\%)\) had a bachelor’s or postgraduate degree. More than three fourths of the fathers \((N = 504, 79.4\%)\) and more than half of the mothers \((N = 357, 56.2\%)\) reported that they are currently employed. One hundred and eight fathers \((17.0\%)\) and 44 mothers \((6.93\%)\) were retired or deceased. More than half of parents \((N = 377, 59.4\%)\) were classified in the highest family income group, with a net monthly income \(> 1000\) KD.
Table 5.15

*Parents' Socio-demographic Characteristics.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>Father</th>
<th>Mother</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5, 6. Level of education</td>
<td>Less than High school</td>
<td>137</td>
<td>114</td>
<td>18.0</td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>197</td>
<td>197</td>
<td>31.0</td>
</tr>
<tr>
<td></td>
<td>Bachelor’s degree</td>
<td>227</td>
<td>289</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>Postgraduate degree</td>
<td>61</td>
<td>23</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>12</td>
<td>12</td>
<td>1.9</td>
</tr>
<tr>
<td>Q7, 8. Employment status</td>
<td>Employed</td>
<td>504</td>
<td>357</td>
<td>56.2</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>6</td>
<td>218</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td>Retired/deceased</td>
<td>108</td>
<td>44</td>
<td>6.93</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>17</td>
<td>16</td>
<td>2.52</td>
</tr>
<tr>
<td>Q9. Net monthly income (KD)</td>
<td>&lt; 500</td>
<td>24</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td></td>
<td>500–750</td>
<td>72</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750–1000</td>
<td>142</td>
<td>22.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 1000</td>
<td>377</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>20</td>
<td>3.10</td>
<td></td>
</tr>
</tbody>
</table>

5.3.2 Relationship between parents’ characteristics and children’s BMI. Table 5.16 presents the Cramer’s V Coefficients and corresponding *p*-values between the socio-demographic categories of the parents and the BMI categories of their children. One significant association was found at *α* = 0.05, with respect to the father’s educational
level (Cramer’s V = 0.12, \( p < 0.001 \)). A father’s education level was found to be associated with a child’s BMI category.

Table 5.16

*Cramer’s V Coefficients between Parents’ Socio-demographic Characteristics and Children’s BMI Categories.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cramer’s V</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5. Father’s level of education</td>
<td>0.12</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Q6. Mother’s’ level of education</td>
<td>0.09</td>
<td>0.06</td>
</tr>
<tr>
<td>Q7. Father’s employment status</td>
<td>0.13</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Q8. Mother’s employment status</td>
<td>0.09</td>
<td>0.46</td>
</tr>
<tr>
<td>Q9. Income</td>
<td>0.06</td>
<td>0.68</td>
</tr>
</tbody>
</table>

The cross-tabulation between the frequencies of the fathers’ educational levels and the frequencies of the children’s BMI categories are presented in Table 5.17. This categorical association arose because the proportion of obese children whose father’s educational level was less than high school (\( N = 69, 50.36\% \)) or high school (\( N = 75, 38.07\% \)) was greater than the proportions of obese children whose father’s educational level was a bachelor’s degree (\( N = 63, 27.75\% \)) and postgraduate degree (\( N = 19, 31.15\% \)), and also because the proportion of normal-weight children whose father’s educational level was less than high school (\( N = 28, 20.44\% \)) or high school (\( N = 59, 29.95\% \)) was less than the proportion of normal-weight children whose father’s educational level was a bachelor’s degree (\( N = 90, 39.65\% \)).
Table 5.17

Cross-tabulation of Children’s BMI vs. Father’s Education.

<table>
<thead>
<tr>
<th>Children’s BMI categories</th>
<th>5. Father’s education level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less than high school</td>
<td>High school</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Underweight</td>
<td>8</td>
<td>5.840</td>
</tr>
<tr>
<td>Normal</td>
<td>28</td>
<td>20.44</td>
</tr>
<tr>
<td>Overweight</td>
<td>32</td>
<td>23.36</td>
</tr>
<tr>
<td>Obese</td>
<td>69</td>
<td>50.36</td>
</tr>
<tr>
<td>Total</td>
<td>137</td>
<td>100.0</td>
</tr>
</tbody>
</table>

5.3.3 Prevalence of obesity among parents. Both the mother and father in this study (questionnaire items 10, 11, 12 and 13) were asked to report their height/weight. When classified by BMI, nearly half of the fathers \((N = 264, 41.6\%)\) and over a third of the mothers \((N = 222, 35.0\%)\) were overweight (see Table 5.18). Nearly one third of the fathers \((N = 172, 27.1\%)\) and mothers \((N = 206, 32.4\%)\) were classified as obese. Only 0.3% of the fathers were underweight and 0.2% of the mothers were underweight.
Table 5.18

*Parents’ Body Weight Characteristics (Computed from Items 10, 11, 12 and 13).*

<table>
<thead>
<tr>
<th>BMI group</th>
<th>Father</th>
<th></th>
<th>Mother</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Underweight</td>
<td>2</td>
<td>0.30</td>
<td>1</td>
<td>0.20</td>
</tr>
<tr>
<td>Normal weight</td>
<td>91</td>
<td>14.3</td>
<td>129</td>
<td>20.3</td>
</tr>
<tr>
<td>Overweight</td>
<td>264</td>
<td>41.6</td>
<td>222</td>
<td>35.0</td>
</tr>
<tr>
<td>Obese</td>
<td>172</td>
<td>27.1</td>
<td>206</td>
<td>32.4</td>
</tr>
<tr>
<td>Missing value</td>
<td>106</td>
<td>16.7</td>
<td>77</td>
<td>12.1</td>
</tr>
</tbody>
</table>

It was revealed that a mother’s education level, employment and family income were all significantly associated with her BMI characteristic, while a father’s level of education and family income were significantly associated with his BMI characteristic (see Table 5.19). Obesity rates were higher among lower-educated mothers and fathers ($V = 0.15, p < 0.001$ for mothers and $V = 0.11, p = 0.05$). Overweight and obesity rates among mothers and fathers were found higher in families with higher incomes ($V = 0.12, p < 0.05$ for both mothers and fathers).
Table 5.19

*Cramer’s V Coefficients between Parents’ BMI and Parent’s Socio-demographic Characteristics.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5. Father’s level of education vs. BMI of father</td>
<td>0.11</td>
<td>0.05</td>
</tr>
<tr>
<td>Q6. Mother’s level of education vs. BMI of mother</td>
<td>0.15</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Q7. Father’s occupation vs. BMI of father</td>
<td>0.23</td>
<td>0.07</td>
</tr>
<tr>
<td>Q8. Mother’s occupation vs. BMI of mother</td>
<td>0.23</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Q9. Family Income vs. BMI of mother</td>
<td>0.12</td>
<td>0.01</td>
</tr>
<tr>
<td>Q9. Family Income vs. BMI of father</td>
<td>0.12</td>
<td>0.02</td>
</tr>
</tbody>
</table>

5.3.4 Relationships between parents’ BMI and children’s BMI.

The relationship between the BMI of the children and their parents is visualised using scatter plots in Figure 5.6 and Figure 5.7. The scatter plot in Figure 5.6 shows that the BMI of the children has an insignificant weak positive correlation with the BMI of their fathers (Pearson’s r = 0.146, p > 0.05), indicating only 2.1% ($R^2$) of the total variation in the children’s BMI could be explained by their father’s BMI. Also, the BMI of mothers exhibited a statistically insignificant weak positive correlation (Pearson’s r = 0.169, p < .05) with their children’s BMI (see Figure 5.7), indicating only 2.8% ($R^2$) of the total variation in children’s BMI could be accounted for by the mother’s BMI.
Figure 5.6. Relationship between BMI of father and child.

Figure 5.7. Relationship between BMI of mother and child
5.3.5 Childcare characteristics. The childcare characteristics reported by the parents’ questionnaire, items 5 and 16, are summarised in Table 5.20. The majority of the children \((N = 574, 90.4\%)\) lived with both parents. The mothers of about half of the children \((N = 294, 46.3\%)\) stopped breastfeeding when the child was 3–6 months old. There were no significant associations between the BMI categories of the children and who the children lived with (Cramer’s \(V = .07, p > 0.05\)) or the age when the mother stopped breastfeeding (Cramer’s \(V = .11, p > .05\)).

Table 5.20

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5. Who the child lives with</td>
<td>Both parents</td>
<td>574</td>
<td>90.4</td>
</tr>
<tr>
<td></td>
<td>Mother alone</td>
<td>49</td>
<td>7.70</td>
</tr>
<tr>
<td></td>
<td>Father alone</td>
<td>6</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>Guardian</td>
<td>4</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2</td>
<td>0.30</td>
</tr>
<tr>
<td>Q16. Age when mother stopped breastfeeding the child (months)</td>
<td>3–6</td>
<td>294</td>
<td>46.3</td>
</tr>
<tr>
<td></td>
<td>7–9</td>
<td>101</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>10–12</td>
<td>79</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>13–24</td>
<td>103</td>
<td>16.2</td>
</tr>
<tr>
<td></td>
<td>&gt; 24</td>
<td>30</td>
<td>4.70</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>28</td>
<td>4.40</td>
</tr>
</tbody>
</table>

5.3.6 Parents’ perception of children’s body weight. The responses to the questions (items 19 and 20) concerning the parents’ perceptions of their children’s body weight
are presented in Table 5.21. Most of the parents strongly agreed \((N = 399, 62.8\%)\) with the item, ‘What is your opinion of the statement: “Overweight children are unhealthy”? (item 21). The parents perceived that over one third of their children \((N = 225, 35.4\%)\) were overweight or obese. A similar proportion of the parents \((N = 228, 35.9\%)\) thought that their child had a weight problem. Nearly one third of the children included in this survey \((N = 181, 28.5\%)\) were perceived by their parents to be overweight. Among these 181 children, 66 (36.5\%) have an obese sister, 68 (37.6\%) have an obese brother, and 43 (23.8\%) have both a sister and brother who are obese.
Table 5.21

*Parents’ Perceptions of Children’s Body Weight.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Girls</th>
<th></th>
<th>Boys</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Q16. Does your child have any overweight or obese siblings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>181</td>
<td>28.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>454</td>
<td>71.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q17. Overweight or obese siblings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brother</td>
<td>68</td>
<td>37.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sister</td>
<td>66</td>
<td>36.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both</td>
<td>43</td>
<td>23.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td>2.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q18. How do you rate your child’s body weight?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>34</td>
<td>5.40</td>
<td>43</td>
<td>6.80</td>
<td>77</td>
<td>12.1</td>
</tr>
<tr>
<td>Normal</td>
<td>165</td>
<td>26.1</td>
<td>164</td>
<td>26.0</td>
<td>329</td>
<td>51.8</td>
</tr>
<tr>
<td>Overweight</td>
<td>108</td>
<td>17.1</td>
<td>76</td>
<td>12.0</td>
<td>184</td>
<td>29.0</td>
</tr>
<tr>
<td>Obese</td>
<td>27</td>
<td>4.30</td>
<td>14</td>
<td>2.20</td>
<td>41</td>
<td>6.50</td>
</tr>
<tr>
<td>Q19. Do you think that your child has a weight problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>133</td>
<td>20.9</td>
<td>95</td>
<td>15.0</td>
<td>228</td>
<td>35.9</td>
</tr>
<tr>
<td>No</td>
<td>204</td>
<td>32.1</td>
<td>203</td>
<td>32.0</td>
<td>407</td>
<td>64.1</td>
</tr>
<tr>
<td>Q20. What is your opinion of the statement: ‘Overweight children are unhealthy’?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strongly agree</td>
<td>223</td>
<td>66.2</td>
<td>176</td>
<td>59.1</td>
<td>399</td>
<td>62.8</td>
</tr>
<tr>
<td>Agree</td>
<td>82</td>
<td>24.3</td>
<td>85</td>
<td>28.5</td>
<td>167</td>
<td>26.3</td>
</tr>
<tr>
<td>Disagree</td>
<td>14</td>
<td>4.20</td>
<td>16</td>
<td>5.40</td>
<td>30</td>
<td>4.70</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>6</td>
<td>1.80</td>
<td>8</td>
<td>2.70</td>
<td>14</td>
<td>2.20</td>
</tr>
<tr>
<td>Missing</td>
<td>12</td>
<td>3.60</td>
<td>13</td>
<td>4.40</td>
<td>25</td>
<td>3.90</td>
</tr>
</tbody>
</table>
The proportion of parents who agreed that ‘Overweight children are unhealthy’ was not associated with the measured BMI categories (Cramer’s $V = 0.10, p > 0.05$) (Table 5.22). The parents’ perceptions of their children’s body weight indicated that there was a statistically significant but low agreement with their children’s measured BMI categories ($K = 0.15, p < 0.05$). The proportion of parents who thought their children had a weight problem was strongly associated with the prevalence of obesity among the children (Cramer’s $V = 0.36, p < 0.05$). The implication of these associations is that the parents, unlike their children, did not report biased perceptions of their children’s body weight.

Table 5.22

Measures of Associations between Parents’ Perceptions of Children’s Actual Body Weight Category.

<table>
<thead>
<tr>
<th>Item</th>
<th>Measure of association coefficient</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q18. Parents’ perception of children’s body weight</td>
<td>Kappa = 0.15</td>
<td>.000</td>
</tr>
<tr>
<td>Q19. Parent thinks child has weight problem</td>
<td>Cramer’s $V = 0.36$</td>
<td>.001</td>
</tr>
<tr>
<td>Q20. What is your opinion of the statement: ‘Overweight children are unhealthy’?</td>
<td>Cramer’s $V = 0.10$</td>
<td>.072</td>
</tr>
</tbody>
</table>

5.3.7 Risk factor 1: family history of disease. The frequencies of item 21, related to the family history of diseases, are summarised in Table 5.23. The most prevalent diseases reported among the families were diabetes ($N = 230, 36.2\%$), high BP ($N = 186, 29.3\%$), asthma ($N = 159, 25.0\%$) and joint problems ($N = 142, 22.4\%$).
The associations between the family history of diseases and the BMI categories of the children are summarised in Table 5.24. Family histories of high cholesterol (Cramer’s $V = 0.13$, $p < 0.05$) and diabetes (Cramer’s $V = 0.13$, $p < 0.05$) were significantly associated with the children’s BMI categories. The implication of these associations is that the proportions of overweight and obese children with histories of high cholesterol and diabetes were greater than among normal and underweight children.
Table 5.24

*Cramer’s V Coefficients between Family History of Disease and Children’s BMI Categories.*

<table>
<thead>
<tr>
<th>Q15. Disease</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cholesterol</td>
<td>0.13</td>
<td>0.01</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.13</td>
<td>0.02</td>
</tr>
<tr>
<td>High BP</td>
<td>0.10</td>
<td>0.11</td>
</tr>
<tr>
<td>Other health problems</td>
<td>0.09</td>
<td>0.17</td>
</tr>
<tr>
<td>Joint problems</td>
<td>0.08</td>
<td>0.25</td>
</tr>
<tr>
<td>Heart disease</td>
<td>0.07</td>
<td>0.32</td>
</tr>
<tr>
<td>Asthma</td>
<td>0.07</td>
<td>0.38</td>
</tr>
<tr>
<td>Sleep apnoea</td>
<td>0.06</td>
<td>0.49</td>
</tr>
</tbody>
</table>

5.3.8 Risk factor 2: physical activities. The frequencies of the children’s physical activities at parents’ questionnaire items 22 and 23 are summarised in Table 5.25. The most frequently reported physical activities were soccer \(N = 225, 35.4\%\), walking \(N = 191, 30.1\%\) and household chores \(N = 134, 21.1\%\). Over two thirds of the parents \(N = 236, 37.2\%\) reported that their children participated in physical activities for less than 30 minutes every day; whereas less than one quarter \(N = 148, 23.3\%\) reported that their children participated in physical activities more than 60 minutes every day.
Table 5.25

*Physical Activities of the Children.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q22. Does your child participate in any of the following activities?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>Yes</td>
<td>225</td>
<td>35.4</td>
</tr>
<tr>
<td>Walking</td>
<td>Yes</td>
<td>191</td>
<td>30.1</td>
</tr>
<tr>
<td>Household chores</td>
<td>Yes</td>
<td>134</td>
<td>21.1</td>
</tr>
<tr>
<td>Swimming</td>
<td>Yes</td>
<td>118</td>
<td>18.6</td>
</tr>
<tr>
<td>Bicycling</td>
<td>Yes</td>
<td>90</td>
<td>14.2</td>
</tr>
<tr>
<td>Other</td>
<td>Yes</td>
<td>84</td>
<td>13.2</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>Yes</td>
<td>35</td>
<td>5.50</td>
</tr>
<tr>
<td>Jogging</td>
<td>Yes</td>
<td>34</td>
<td>5.40</td>
</tr>
<tr>
<td>Horseback riding</td>
<td>Yes</td>
<td>24</td>
<td>3.80</td>
</tr>
<tr>
<td>Q23. Time spent on physical activity (minutes/day)</td>
<td>&lt; 30</td>
<td>236</td>
<td>37.2</td>
</tr>
<tr>
<td></td>
<td>30–60</td>
<td>142</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td>&gt; 60</td>
<td>148</td>
<td>23.3</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>109</td>
<td>17.2</td>
</tr>
</tbody>
</table>

Cramer’s V Coefficients between physical activity and children’s BMI categories presented in Table 5.26 show the association between physical activities of children and their BMI category. It was found that none of the physical activities or even the amount of time dedicated to the activity had a significant association with their BMI categories.
Table 5.26

*Cramer’s V Coefficients between Physical Activity and Children’s BMI Categories.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q22. Physical Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>0.10</td>
<td>0.08</td>
</tr>
<tr>
<td>Walking</td>
<td>0.04</td>
<td>0.80</td>
</tr>
<tr>
<td>Household chores</td>
<td>0.08</td>
<td>0.25</td>
</tr>
<tr>
<td>Swimming</td>
<td>0.08</td>
<td>0.26</td>
</tr>
<tr>
<td>Bicycling</td>
<td>0.05</td>
<td>0.71</td>
</tr>
<tr>
<td>Other</td>
<td>0.03</td>
<td>0.92</td>
</tr>
<tr>
<td>Gymnastics</td>
<td>0.07</td>
<td>0.34</td>
</tr>
<tr>
<td>Jogging</td>
<td>0.11</td>
<td>0.06</td>
</tr>
<tr>
<td>Horseback riding</td>
<td>0.05</td>
<td>0.60</td>
</tr>
<tr>
<td>Q23. Time spent on physical activity (minutes/day)</td>
<td>0.08</td>
<td>0.42</td>
</tr>
</tbody>
</table>

5.3.9 **Risk factor 3: sedentary activities.** The frequencies of the children’s sedentary activities at item 24 of the parents’ questionnaire are summarised in Table 5.27. The most frequently reported sedentary activities were watching TV for 2 hours per day ($N = 170$, 26.8%), playing video games for one hour per day ($N = 193$, 30.4%) and computer-based activities for one hour per day ($N = 161$, 25.4%).
Table 5.27

*Sedentary Activities of Children.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Hours</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Sedentary activity (hours/day)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td>0</td>
<td>1</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>120</td>
<td>18.9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>170</td>
<td>26.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>122</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>92</td>
<td>14.5</td>
</tr>
<tr>
<td></td>
<td>≥ 5</td>
<td>80</td>
<td>12.6</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>50</td>
<td>7.90</td>
</tr>
<tr>
<td>Playing video games</td>
<td>0</td>
<td>2</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>193</td>
<td>30.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>124</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>56</td>
<td>8.80</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>43</td>
<td>6.80</td>
</tr>
<tr>
<td></td>
<td>≥ 5</td>
<td>38</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>179</td>
<td>28.2</td>
</tr>
<tr>
<td>Computer-based activities</td>
<td>0</td>
<td>4</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>161</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>79</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>52</td>
<td>8.20</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>25</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>≥ 5</td>
<td>47</td>
<td>7.40</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>267</td>
<td>42.0</td>
</tr>
</tbody>
</table>
Cramer’s V Coefficients between sedentary activities and children’s BMI categories are presented in Table 5.28 showed that the number of hours spent in playing video games was significantly associated with the BMI categories of the children (Cramer’s V = 0.27, p < 0.05).

Table 5.28

*Cramer’s V Coefficients between Sedentary Activities and Children’s BMI Categories.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q24. Sedentary activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watching TV</td>
<td>0.17</td>
<td>.42</td>
</tr>
<tr>
<td>Playing video games</td>
<td>0.27</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Computer-based activities</td>
<td>0.17</td>
<td>0.72</td>
</tr>
</tbody>
</table>

5.3.10 **Risk factor 4: food and eating.** The frequencies of the children’s food and eating habits at parents’ questionnaire items 25, 26, 27, 28, 29 and 30 are summarised in Table 5.29. Over half of the parents (N = 370, 58.3%) reported that their child asked for food that he/she saw on the TV. Over half of the parents (N = 331, 52.1%) also reported that their child skipped breakfast three or more times a week. The majority of the children ate snacks in the afternoon (N = 236, 37.2%) or evening (N = 233, 36.7%). According to the parents, the most frequently eaten snacks were cereals and bread (N = 493, 77.6%) and sugar (N = 292, 46.0%). Over half of the children (N = 351, 55.3%) ate out at fast food restaurants on one or two occasions per week. Relatively few (N = 85,
13.4%) did not eat at fast food restaurants. Most of the families eat the main meal together always \((N = 399, 62.8\%)\) or frequently \((N = 121, 19.1\%)\).

Table 5.29

*Frequencies of Food and Eating Habits of Children.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q25. Does your child ask for food that he/she saw on the TV?</td>
<td>No</td>
<td>265</td>
<td>41.7</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>370</td>
<td>58.3</td>
</tr>
<tr>
<td>Q26. Does your child skip breakfast three or more times a week?</td>
<td>No</td>
<td>304</td>
<td>47.9</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>331</td>
<td>52.1</td>
</tr>
<tr>
<td>Q27. When does your child usually eat snacks?</td>
<td>Morning</td>
<td>124</td>
<td>19.5</td>
</tr>
<tr>
<td></td>
<td>Afternoon</td>
<td>236</td>
<td>37.2</td>
</tr>
<tr>
<td></td>
<td>Evening</td>
<td>233</td>
<td>36.7</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>29</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>13</td>
<td>98.0</td>
</tr>
<tr>
<td></td>
<td>Protein</td>
<td>256</td>
<td>40.3</td>
</tr>
<tr>
<td></td>
<td>Carbohydrate</td>
<td>493</td>
<td>77.6</td>
</tr>
<tr>
<td></td>
<td>Fat</td>
<td>159</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td>Sugar</td>
<td>292</td>
<td>46.0</td>
</tr>
<tr>
<td>Q29. How often does your child eat out at fast food restaurants during the week?</td>
<td>0</td>
<td>85</td>
<td>13.4</td>
</tr>
<tr>
<td></td>
<td>1–2</td>
<td>351</td>
<td>55.3</td>
</tr>
<tr>
<td></td>
<td>3–4</td>
<td>149</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>5–6</td>
<td>27</td>
<td>4.30</td>
</tr>
<tr>
<td></td>
<td>7+</td>
<td>23</td>
<td>3.60</td>
</tr>
<tr>
<td>Q30. How often does family eat (main meals) together</td>
<td>Always</td>
<td>399</td>
<td>62.8</td>
</tr>
<tr>
<td></td>
<td>Frequently</td>
<td>121</td>
<td>19.1</td>
</tr>
</tbody>
</table>
Sometimes 87 13.7
Seldom 28 4.40
Never 0 0.00

The Cramer’s V Coefficients between food and eating habits of children and children’s BMI categories, presented in Table 5.30, show that, according to the parents, none of the food and eating habits, except family meals together (Cramer’s V = 0.10, p < 0.05), had a significant association with their BMI categories.

Table 5.30

*Cramer’s V Coefficients between Food and Eating Habits of Children and Children’s BMI Categories.*

<table>
<thead>
<tr>
<th>Food and Eating Habits</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q25. Does your child ask for food that he/she saw on the TV?</td>
<td>0.06</td>
<td>0.84</td>
</tr>
<tr>
<td>Q26. Does your child skip breakfast three or more times a week?</td>
<td>0.04</td>
<td>0.82</td>
</tr>
<tr>
<td>Q27. When does your child usually eat snacks?</td>
<td>0.28</td>
<td>0.41</td>
</tr>
<tr>
<td>Q28. What snacks do your children eat most often?</td>
<td>0.37</td>
<td>0.05</td>
</tr>
<tr>
<td>Q29. How often does your child eat out at fast food restaurants during the week?</td>
<td>0.10</td>
<td>0.07</td>
</tr>
<tr>
<td>Q30. How often does the family eat (main meals) together?</td>
<td>0.10</td>
<td>0.02</td>
</tr>
</tbody>
</table>

**5.3.11 Risk factor 5: beverage intake.** The frequencies of the children’s drinking habits at parents’ questionnaire items 31, 32, 33, 34 and 35 are summarised in Table 5.31. The most frequently reported drinking habits were one cup of whole milk per day
(\(N = 274, 53.2\%\)), two cups of fruit juice per day (\(N = 185, 29.2\%\)), one cup of skim milk per day (\(N = 166, 26.2\%\)), one cup of soda, lemonade, fruit packs, or sports drinks per day (\(N = 166, 26.2\%\)), and four cups of water per day (\(N = 139, 21.9\%\)).

Table 5.31

*Drinking Habits of Children.*

<table>
<thead>
<tr>
<th>Item</th>
<th>Category</th>
<th>(N)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q31. How many cups per day drunk by child? Water</td>
<td>1</td>
<td>41</td>
<td>6.50</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>94</td>
<td>14.8</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>122</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>139</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>78</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>&gt; 5</td>
<td>129</td>
<td>20.3</td>
</tr>
<tr>
<td>Q32. How many cups per day drunk by child? Fruit juice</td>
<td>1</td>
<td>216</td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>185</td>
<td>29.2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>69</td>
<td>10.9</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>36</td>
<td>5.70</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>13</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>&gt; 5</td>
<td>11</td>
<td>1.70</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>105</td>
<td>16.5</td>
</tr>
<tr>
<td>Q33. How many cups per day drunk by child? Skim milk</td>
<td>1</td>
<td>166</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>40</td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>12</td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2</td>
<td>0.30</td>
</tr>
<tr>
<td>Item</td>
<td>Category</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>---------------------</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>&gt;5</td>
<td>3</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>408</td>
<td>35.7</td>
</tr>
<tr>
<td>Q34. How many cups per day drunk by child? Whole milk</td>
<td>1</td>
<td>274</td>
<td>53.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>101</td>
<td>15.9</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>25</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>&gt; 5</td>
<td>6</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>222</td>
<td>35.0</td>
</tr>
<tr>
<td>Q35. How many cups per day drunk by child? Soda, lemonade, fruit packs, sports drinks</td>
<td>1</td>
<td>166</td>
<td>26.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>40</td>
<td>6.30</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>12</td>
<td>1.90</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>4</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>&gt; 4</td>
<td>5</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>408</td>
<td>64.3</td>
</tr>
</tbody>
</table>

The Cramer’s V Coefficients between drinking habits of children and children’s BMI categories are presented in Table 5.32, showing that none of the drinking habits of the children had a significant association with their BMI categories.

Table 5.32

*Cramer’s V Coefficients between Drinking Habits of Children and Children’s BMI Categories.*

<table>
<thead>
<tr>
<th>Drinking habits</th>
<th>Cramer’s V</th>
<th>p-value</th>
</tr>
</thead>
</table>


### How many cups per day drunk by child?

<table>
<thead>
<tr>
<th>Question</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q31. Water</td>
<td>0.15</td>
<td>0.90</td>
</tr>
<tr>
<td>Q32. Fruit juice</td>
<td>0.12</td>
<td>0.65</td>
</tr>
<tr>
<td>Q33. Skim milk</td>
<td>0.19</td>
<td>0.48</td>
</tr>
<tr>
<td>Q34. Whole milk</td>
<td>0.16</td>
<td>0.31</td>
</tr>
<tr>
<td>Q35. Soda, lemonade, fruit packs, sports drinks</td>
<td>0.16</td>
<td>0.05</td>
</tr>
</tbody>
</table>

#### 5.3.12 Prediction of children’s BMI.

Similar to the children’s questionnaire analysis, stepwise multiple regression analysis was conducted to predict the male and female child’s BMI (dependent variable) using the children’s age, the mothers’ and fathers’ BMI, whether the children had overweight siblings, and the scores for the parent questionnaire items listed in Tables 21, 23, 25, 27, 29 and 31 (predictor variables). The final multiple regression model for the male children containing four statistically significant predictors (indicated by \( p < .05 \) for the t-test statistics) is presented in Table 5.33. Tests to check the assumptions were conducted. The VIF statistics were close to 1.0, indicating that the predictor variables were not collinear. White’s test of heteroscedasticity (\( \chi^2 = 1.69, p > 0.05 \)) provided no evidence for heteroscedasticity. Therefore, the VIF measures and Breusch-Pagan/Cook Weisberg test confirmed that statistical inferences were not compromised by collinearity or heteroscedasticity respectively.

The model to predict the BMI of the male children, based on the parent questionnaire, was statistically significant (\( F = 21.59, p < 0.001 \)). A moderate proportion of the variance in BMI (Adjusted \( R^2 = 22.9\% \)) was explained, reflecting clinical/practical significance. The four significant predictors were: the age of the children (from 11–14
years), if the children had overweight siblings (1 = Yes, 0 = No), how often the children ate food from takeaway restaurants (scored from 1–5), and how many hours per day the children spent watching TV (scored from 0–5).

Based on the standardised regression coefficients, having overweight siblings ($\beta = 0.27$) was the most important predictor of BMI, followed by watching TV ($\beta = 0.25$), eating food from takeaway restaurants ($\beta = 0.21$) and age ($\beta = 0.11$). Using the un-standardised regression coefficients, the model predicted that, on average, the BMI of the male children increased by 0.68 kg/m$^2$ for every unit (1 year) increase in their age, increased by 3.85 kg/m$^2$ for every overweight sibling, increased by 1.53 kg/m$^2$ for every 1 point increase in the 5-point score for eating food from takeaway restaurants, and increased by 1.06 kg/m$^2$ for every hour of watching TV.

Table 5.33

*Prediction of Male Children’s BMI (kg/m$^2$) Using the Parent Questionnaire.*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Un-standardised $\beta$</th>
<th>$SE$</th>
<th>Standardised $\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>15.69</td>
<td>4.76</td>
<td>–</td>
<td>3.30</td>
<td>&lt; 0.01</td>
<td>–</td>
</tr>
<tr>
<td>Q3. Age</td>
<td>0.68</td>
<td>0.33</td>
<td>0.11</td>
<td>2.06</td>
<td>.03</td>
<td>1.01</td>
</tr>
<tr>
<td>Q17. Does your child have any overweight/obese siblings?</td>
<td>3.85</td>
<td>0.77</td>
<td>0.27</td>
<td>5.04</td>
<td>&lt; 0.001</td>
<td>1.03</td>
</tr>
<tr>
<td>Q24. How many hours per day does your child spend watching TV?</td>
<td>1.06</td>
<td>0.22</td>
<td>0.25</td>
<td>4.76</td>
<td>&lt; 0.001</td>
<td>1.02</td>
</tr>
<tr>
<td>Q29. How often does your child eat out at fast food restaurants during the week?</td>
<td>1.53</td>
<td>0.38</td>
<td>0.21</td>
<td>4.01</td>
<td>&lt; 0.001</td>
<td>1.02</td>
</tr>
</tbody>
</table>
Adjusted $R^2 = 22.9\% \ (F = 21.59, \ p < 0.001)$

The regression statistics to predict the BMI of the female children, based on the parent questionnaire, are presented in Table 5.34. The VIF measures (all near 1.00) and Breusch-Pagan/Cook Weisberg test ($\chi^2 = 2.81, \ p > 0.05$) confirmed that statistical inferences were not compromised by collinearity or heteroscedasticity, respectively, for this model.

The model for the female children, based on the parent questionnaire, was statistically significant ($F = 19.67, \ p < 0.001$). A moderate proportion of the variance in BMI (Adjusted $R^2 = 19.7\%$) was explained, reflecting clinical/practical significance. The three significant predictors were the age of the children (from 11–14 years), if the children had overweight siblings ($1 = \text{Yes}, \ 0 = \text{No}$) and how often the children ate food from takeaway restaurants (scored from 1–5). Based on the standardised regression coefficients, age was the most important predictor of BMI ($\beta = 0.20$) followed by having overweight siblings ($\beta = 0.19$) and eating at fast food restaurants ($\beta = 0.17$).

Using the un-standardised regression coefficients, the model predicted that, on average, the BMI of the female children increased by 1.07 kg/m$^2$ for every unit (1 year) increase in their age, increased by 2.44 kg/m$^2$ for every overweight sibling and increased by 1.43 kg/m$^2$ for every 1 point increase in the 5-point score for eating at fast food from restaurants.

Table 5.34

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Un-standardised $\beta$</th>
<th>$SE$</th>
<th>Standardised $\beta$</th>
<th>$t$</th>
<th>$p$</th>
<th>VIF</th>
</tr>
</thead>
</table>
5.4 Chapter Summary

A total of 635 children from 12 selected schools in Kuwait provided responses to the student questionnaire, and their parents provided responses to the parent questionnaire. The prevalence of obesity and overweight among the school children in Kuwait at ages 11–14 were estimated to be 36.5% (95% CI = 32.8%, 40.3%) and 25.5% (95% CI = 22.11%, 28.91%), respectively. Two-Way ANOVA showed that there was a significant difference in the BMI values of children when grouped according to age ($F = 6.28, p < 0.05$). However, only 2.9% of the total variation in the BMI of children could be accounted for by age groups. The mean BMI difference between males and females was not proved to be significant, with a very minimal effect size of 0.02% on the total variation in BMI of children.

The BMI of the children was categorised into four levels (underweight, normal, overweight and obese) using the accurate measurements of the nurses. Similarly, the proportions of the children and their parents on their perceived BMI categories (children) were also calculated. The nurses’ measurements disagreed with the
participants’ perceptions, possibly implying social desirability bias while parents had slight agreement with the nurses’ measurements. Both the children and parents underestimated the prevalence of obesity.

The majority of children ate from fast food restaurants and pursued sedentary activities (e.g., watching TV and videos, and spending time on the computer, tablet and phone every day of the week), of which the number of hours spent playing video games were significant factors associated with the BMI categories of the children (Cramer’s V = 0.27, p < 0.001). Also, family histories of high cholesterol (Cramer’s V = 0.13, p < 0.05) and diabetes were prevalent and significantly associated with the children’s overweight and obesity (Cramer’s V = 0.13, p < 0.05).

Multiple regression models, using the stepwise method, based on the responses to the student questionnaire predicted that the BMI of the male children increased significantly with respect to every one-year increase in age, and for each unit of time that they spent on sedentary activities. Meanwhile, the BMI of the female children increased with respect to every one-year increase in age, decreased for every time they had walked to or from school in the last 5 days, and increased for every 1 point increase in the 5-point score for eating food from takeaway restaurants. However, the effect sizes were low, indicating the models have limited clinical/practical significance.

Multiple regression models, using the stepwise method, based on the responses to the parent questionnaire predicted that the BMI of the male children increased significantly with respect to every one-year increase in age, if they had overweight siblings, for each unit of time that they spent on sedentary activities, and for every 1 point increase in the
5-point score for eating food from fast food restaurants. The BMI of the female children also increased significantly with respect to age, having overweight siblings and eating at fast food restaurants. The following chapters present the findings from the interviews and focus groups conducted for this study.
Chapter 6: Qualitative Findings

The qualitative data analysis was utilised to gain an understanding of the knowledge and attitudes of school communities toward the risk factors of overweight and obesity among 11–14-year-old Kuwaiti students and to identify the need for schools, parents, the Government and school nurses to assist in combating this pandemic. This part of the study incorporated focus group discussions with school community members and individual interviews with representatives from the Ministries of Education and Health. The aim of this qualitative section of the study is to examine the perceptions and attitudes of the school teachers and government representatives from the Ministries of Education and Health regarding childhood overweight and obesity in Kuwait. It is hoped that this information will support the development and implementation of targeted public health policies.

Data were collected from 12 focus group discussions with teachers, with the findings presented in part A of the chapter. Twelve individual interviews with government representatives were also conducted, these findings being presented in part B of the chapter. These data were analysed separately using the process of data analysis, described in the methodology chapter, to reveal common responses (responses, statements or expressed perceptions or thoughts) from the focus group participants and common responses among the government representatives. The results are presented in two forms: focus group findings and one-to-one interview findings.

6.1 Overview of Participants in the Focus Group
Eighty participants (39 males and 41 females) from the 12 schools accepted the invitation to voluntarily take part in this study. Their ages ranged from 25–60 years. The number of participants from each province is presented in Table 6.1. However, only six of the 12 selected public schools employed a school nurse. As the study ensured that participation was purely voluntary, all school nurses declined to take part in this study because they were employed through private companies that restricted nurses from participating in any research study. The focus group discussions were conducted face-to-face and were audiotaped to help the researcher prepare the transcripts for analysis.

Table 6.1

*Number of Participants from Each Province.*

<table>
<thead>
<tr>
<th>Provinces</th>
<th>Codes</th>
<th>Schools’</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-Al-Asimah (capital)</td>
<td>C</td>
<td>Boys’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>Girls’ school</td>
<td>8 participants</td>
</tr>
<tr>
<td>2-Hawalli</td>
<td>H</td>
<td>Boys’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td></td>
<td>HH</td>
<td>Girls’ school</td>
<td>7 participants</td>
</tr>
<tr>
<td>3-Farwaniyah</td>
<td>F</td>
<td>Boys’ school</td>
<td>8 participants</td>
</tr>
<tr>
<td></td>
<td>FF</td>
<td>Girls’ school</td>
<td>8 participants</td>
</tr>
<tr>
<td>4-Mubarak Al-Kabeer</td>
<td>M</td>
<td>Boys’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td></td>
<td>MM</td>
<td>Girls’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td>5-Al-Ahmadi</td>
<td>A</td>
<td>Boys’ school</td>
<td>7 participants</td>
</tr>
<tr>
<td></td>
<td>AA</td>
<td>Girls’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td>6-AL-Jahra</td>
<td>J</td>
<td>Boys’ school</td>
<td>6 participants</td>
</tr>
<tr>
<td></td>
<td>JJ</td>
<td>Girls’ school</td>
<td>6 participants</td>
</tr>
</tbody>
</table>

*Total: 80*
6.2 Focus Group Findings

The data obtained from the 12 focus group discussions with teachers were analysed to reveal several main thematic categories, which were then further separated into sub-categories. The thematic categories are presented individually and include the main categories of perceptions of overweight and obesity, and school and home influences on childhood health and healthy weight. These two categories were broken down into several sub-categories, which are described in Table 6.2, showing sub-categories and common themes revealed in each.

Table 6.2

*Categories, Sub-categories, and Themes from the Analysis of Focus Group Data.*

<table>
<thead>
<tr>
<th>Primary category</th>
<th>Sub-category</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of overweight and obesity</td>
<td>Obesity defined</td>
<td>Disease/disorder of abnormal increase in weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Excessive accumulation of body fat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cannot control easily</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leads to more serious disease/health problems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Starts from childhood</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Has a genetic factor</td>
</tr>
<tr>
<td>Overweight defined</td>
<td>Leads to obesity</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Normal (non-disease) increase in weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controlled through diet and exercise</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Results from overeating and/or lack of exercise</td>
</tr>
<tr>
<td>Perceived health problems associated</td>
<td>Heart disease/cardiovascular disease</td>
<td></td>
</tr>
<tr>
<td>with obesity</td>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypertension</td>
<td></td>
</tr>
<tr>
<td>Primary category</td>
<td>Sub-category</td>
<td>Themes</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>--------</td>
</tr>
<tr>
<td>Psychological effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthritis/joint pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreased physical activity/mobility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respiratory disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is a disease itself</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not able to live normal life/negative effect on life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived contributing factors to obesity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Welfare/high standard of living</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal behaviours of overeating/lack of exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast food restaurants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media promoting unhealthy food/restaurants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of exercise/physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prolonged TV/video game use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of awareness/ misperceptions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetic factors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All of these factors, not just one</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultural norms/perspectives</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents choosing unhealthy food for children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-hour restaurants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot weather contributes to lack of exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large portion size/ offering too much food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychological factors (e.g., depression)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep immediately following meals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thyroid problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School influences on health and healthy weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School influences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing health education/ spreading awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools and family should work together</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools provide food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE classes and other physical activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schools and ministries have great influence/role in supporting student health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need for more education and awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary category</td>
<td>Sub-category</td>
<td>Themes</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>School lunch options</td>
<td>Great influence because of time spent at school&lt;br&gt;Need to redevelop curriculum because of influence&lt;br&gt;Canteen sells high-sugar/high-fat food and beverages&lt;br&gt;Children eat unhealthy, junk food from canteen&lt;br&gt;Children bring unhealthy drinks/food from home or outside school&lt;br&gt;High sugar food attractive to students&lt;br&gt;Students buy junk food because lack alternatives&lt;br&gt;Junk food used as rewards by teachers&lt;br&gt;Students buy junk food because lack knowledge of healthy food&lt;br&gt;Some bring own healthy lunch</td>
</tr>
<tr>
<td></td>
<td>School nutrition policies/programs</td>
<td>No nutrition programs&lt;br&gt;Individual teachers do some on own&lt;br&gt;Posters about healthy/unhealthy foods&lt;br&gt;Program about fitness and obesity&lt;br&gt;Some policies at private schools</td>
</tr>
<tr>
<td></td>
<td>Sports/activities</td>
<td>Active participation in physical activity&lt;br&gt;Sports teams&lt;br&gt;Have activities, but not enough&lt;br&gt;Some, not all are active&lt;br&gt;PE class participation&lt;br&gt;Rare to see children active&lt;br&gt;Not as active as older generation was&lt;br&gt;Activity is specific to athletic children</td>
</tr>
<tr>
<td></td>
<td>School responsibility to support health</td>
<td>Schools responsible to spread awareness and provide health education&lt;br&gt;Schools responsible, but parents/family more so&lt;br&gt;Cooperation with family and school and/or ministries&lt;br&gt;School responsible for nutrition and physical activity</td>
</tr>
</tbody>
</table>
6.2.1 Perceptions of overweight and obesity. The first main category encompasses responses that relate to the focus group participants’ perceptions of overweight and obesity. These responses were categorised into sub-categories that included defining the terms, perceptions of health-related problems associated with obesity, and the contributing factors believed to influence the development of obesity. The sub-

<table>
<thead>
<tr>
<th>Primary category</th>
<th>Sub-category</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Presence and function of school nurse</td>
<td>Schools only responsible for learning, not health</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schools responsible for supporting children to be healthy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>School responsible for promoting/holding sports and physical activities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schools responsible as the first educational institute for children</td>
</tr>
<tr>
<td></td>
<td>Teacher roles versus parent roles in supporting healthy habits</td>
<td>Have a school nurse, but only first aid role</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not have a school nurse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do not believe nurse will/would help with obesity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Believe nurse could help if had one</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Does not speak Arabic; difficult communications</td>
</tr>
<tr>
<td></td>
<td>Teacher roles:</td>
<td>To advise, encourage and educate on healthy habits/spread awareness</td>
</tr>
<tr>
<td></td>
<td>Role models:</td>
<td>No role—can’t control students</td>
</tr>
<tr>
<td></td>
<td>Great influence</td>
<td>Great role</td>
</tr>
<tr>
<td></td>
<td>Parent roles:</td>
<td>Advise and encourage</td>
</tr>
<tr>
<td></td>
<td>Set up rules/control family diet</td>
<td>Great role</td>
</tr>
</tbody>
</table>
categories are presented individually using both response frequencies (between focus groups) and textual examples from the data to promote understanding of the concepts perceived by participants. It is noted that all 12 focus groups described agreement that overweight and obesity are serious problems in the community.

6.2.1.1 Obesity defined. Focus group participants were asked to describe what is meant by obesity and the following question was asked to the participants: ‘Describe to me what is your understanding of the words “overweight” and “obesity”? ’ Both differences and similarities were noted between obesity and overweight. When describing obesity, common responses highlighted the perception of obesity as a disease condition of abnormal body weight, as an excessive accumulation of body fat, as a condition that is not easily controlled (often requiring surgery), and as a condition that leads to more serious diseases. Table 6.3 demonstrates the responses offered by participants in the 12 different focus groups, noting the frequency of similar responses in the 12 focus groups.

Table 6.3
Responses to Describing Obesity.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease or disorder; abnormal increase in weight or body fat</td>
<td>11</td>
</tr>
<tr>
<td>Excessive accumulation of body fat</td>
<td>7</td>
</tr>
<tr>
<td>Cannot control easily; may require surgery</td>
<td>4</td>
</tr>
<tr>
<td>Leads to more serious diseases or general health problems</td>
<td>4</td>
</tr>
<tr>
<td>Obesity starts from childhood</td>
<td>2</td>
</tr>
</tbody>
</table>
Has a genetic factor 2
Measured by age and weight 1
Results from bad eating habits and lack of physical activity 1

To understand the key themes revealed in the analysis of obesity as a disease condition of abnormal increase in body weight or body fat and the perception of obesity as an excessive accumulation of body fat, textual examples from the focus group data are offered: ‘There is a difference between overweight and obesity. Overweight leads to obesity but is considered a normal increase in weight, while obesity is an abnormal increase in weight’ (Focus group A. Boys).

A similar sentiment was described in the group from Focus Group AA. Girls, as reflected in the words of three participants:

Yes, there is a difference between obesity and overweight. Overweight is (to some extent) a normal increase of weight, but obesity is an abnormal increase of weight.

Obesity is a disease but overweight isn’t a disease.

I think obesity is a disease but overweight is something normal. (Focus group AA. Girls)

Other focus groups expressed similar sentiments:
Obesity is an abnormal increase in weight but overweight is something normal. It is not a disease. (Focus group FF. Girls)

There is a difference between overweight and obesity. Overweight is exceeding the normal weight by 1 or 2 kilos, whereas obesity is a large amount of excess weight. Obesity is a disease, whereas overweight is not. (Focus group CC. Girls)

Yes, of course. Overweight could be an increased 1 or 2 kilos above the normal weight, whereas obesity is an abnormal increase. (Focus group C. Boys)

The second common theme related to excessive fat accumulation. This was identified by respondents as different to body weight in that overweight was described in terms of increased body weight, while obesity was defined in terms of body fat content. For example, a participant in one focus group stated: ‘Obesity is a real result of having too much fat. Being overweight means that one may be 1 or 2 kilograms over the normal weight, but this may be due to extra muscle, not necessarily fat’ (Focus Group F. Boys).

Conversely, some participants described no difference in definition between the two terms. For example: ‘There is no difference between the two words. They both have the same meaning. Overweight and obesity are a kind of fat accumulation in the body’ (Focus group HH. Girls).

The data also supported common themes related to the perception that obesity cannot be controlled, whereas overweight can be controlled through diet and exercise, and obesity leads to more serious diseases or illnesses. The following are examples of the perception that obesity is not easily controlled compared to overweight.
Overweight can be reduced by exercise and sports, whereas surgery is the only way to treat obesity. (Focus group A. Boys)

Overweight can be controlled whereas obesity can’t be controlled. Obesity is more difficult to overcome. (Focus group HH, Girls)

Obesity was also noted to lead to more serious illnesses or diseases. For example, the members of the Focus Group M. Boys agreed: ‘Overweight and obesity have the same meaning, but obesity leads to more serious diseases.’

6.2.1.2 Overweight defined. Similarly, focus group participants offered their perceptions of what is meant by the term overweight. In defining this term, the common responses maintained a focus on overweight—as a precursor to obesity, as a normal increase in weight (non-disease condition), as fat accumulation resulting from poor eating habits, and as a controllable disorder through diet and exercise. Table 6.4 provides the responses offered in the focus group discussions and the number of times a particular response was offered in the focus group discussions.

Table 6.4

Response to Describing Overweight.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (meaning non-disease condition) increase in weight</td>
<td>11</td>
</tr>
<tr>
<td>Overweight leads to obesity</td>
<td>8</td>
</tr>
<tr>
<td>Fat accumulation resulting from bad eating habits</td>
<td>6</td>
</tr>
<tr>
<td>Can control through diet and exercise</td>
<td>5</td>
</tr>
</tbody>
</table>
The themes in this sub-category focus attention on overweight leading to obesity, overweight as a normal (non-disease) condition, overweight as an accumulation of fat resulting from poor eating habits, and the ability to control overweight through diet and exercise. Many of these themes were also noted in the examples given in the previous section, as participants sought to define the terms and distinguish between the terms. As noted in the previous section defining obesity, the textual examples highlighted the difference between obesity and overweight in terms of being a disease condition (abnormal weight gain) and a non-disease condition (normal weight gain). In addition to the example given previously, a participant from Focus Group C. (Boys) stated: ‘Obesity is an abnormal increase in weight but overweight is a normal increase in weight.’

Overweight was seen as a precursor to obesity. For example, a participant from Focus Group CC. (Girls) noted, ‘Overweight is the start or the beginning of obesity. Overweight will become obesity if we don’t control the weight.’ In addition, several participants in several focus groups stated simply, ‘Overweight leads to obesity.’ Although both obesity and overweight were seen as an accumulation of fat, as noted in the previous section, participants noted a difference in terms of overweight resulting from eating habits and, therefore, being more controllable compared to obesity. A
participant from Focus Group F. (Boys) explained, ‘They both mean fat accumulation … overweight is a result of bad eating habits.’

Finally, another distinction given between obesity and overweight was that the participants believed overweight could be controlled through diet and exercise, whereas obesity in many cases was felt to only be controlled through surgery or not at all. For example:

Overweight can be reduced by exercise and sports, whereas surgery is the only way to treat obesity. (Focus group A. Boys)

We can control overweight but we can’t control obesity. Overweight can be controlled by playing sports but the only way to overcome obesity is to have surgery procedures (Focus Group FF. Girls)

Overweight can be controlled whereas obesity can’t be controlled. Obesity is more difficult to overcome. (Focus group HH. Girls)

6.2.1.3 Perceived health problems associated with obesity. The third sub-category under the perceptions of overweight and obesity was developed from responses pertaining to health problems that often arise from obesity, as perceived by the focus group participants. The following focus group questions were asked of the participants: ‘Does overweight or obesity cause serious health problems for children? If yes, what are they? Please explain?’ Participants in all the focus groups acknowledged that obesity contributes to serious health problems. The most common responses between focus groups highlighted cardiovascular disease, diabetes, hypertension, psychological effects,
joint pain, decreased mobility and respiratory disorders. Table 6.5 shows at the varied responses offered by the different focus group discussions and their frequencies.

Table 6.5

*Perceived Health Problems Associated with Obesity.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease; cardiovascular disorders</td>
<td>12</td>
</tr>
<tr>
<td>Diabetes</td>
<td>11</td>
</tr>
<tr>
<td>Hypertension</td>
<td>11</td>
</tr>
<tr>
<td>Psychological effects</td>
<td>10</td>
</tr>
<tr>
<td>Joint pains/arthritis</td>
<td>6</td>
</tr>
<tr>
<td>Decreased mobility: difficulty moving</td>
<td>5</td>
</tr>
<tr>
<td>Respiratory disorders: breathing problems, dyspnoea</td>
<td>5</td>
</tr>
<tr>
<td>Is a disease itself</td>
<td>3</td>
</tr>
<tr>
<td>Not able to live normal life; negatively affects life</td>
<td>2</td>
</tr>
<tr>
<td>Liver disease</td>
<td>1</td>
</tr>
<tr>
<td>Death at a young age</td>
<td>1</td>
</tr>
<tr>
<td>Affects all the organs; mother of all diseases</td>
<td>1</td>
</tr>
<tr>
<td>The number five killer</td>
<td>1</td>
</tr>
<tr>
<td>Cancer</td>
<td>1</td>
</tr>
<tr>
<td>Increased cholesterol</td>
<td>1</td>
</tr>
</tbody>
</table>

The most commonly cited complications resulting from obesity include heart disease, diabetes, hypertension and psychological effects (including educational attainment). All focus groups cited multiple health problems in different combinations. A few examples are provided below:
Yes, it causes a lot of diseases, such as heart disease and diabetes. As a teacher, I can see a difference between an obese and a normal-weight student through their educational attainment. (Focus group AA. Girls)

Yes, of course, any accumulation of fat in the body will affect the heart and can cause cardiovascular or respiratory system disorders. It will also cause difficulty in breathing, especially when such children participate in physical education. (Focus group JJ. Girls)

Yes, of course it does. Obesity causes a lot of problems, like diabetes, high blood pressure and heart disease. (Focus group HH. Girls)

It is important to explain in more detail the assertion of the influence of overweight and obesity on psychological problems. To provide clarity on the issue, this example is provided from the discussion in Focus Group A. (Boys):

Yes, obesity definitely has a negative impact on children, as obese children aren’t able to physically play with their friends. They are also subject to teasing and bullying by the other children.

I think that the psychological impact is the most serious problem caused by obesity. I noticed that the obese children can’t play or physically contribute in the class activities with their classmates. This affects them psychologically. (Focus group A. Boys)

6.2.1.4 Perceived contributed factors for child obesity. Focus group participants also described their perceptions of factors that contribute to obesity by answering the focus
group question: ‘What do you think contributes to overweight and obesity?’ Many factors were commonly noted by the different focus groups in the study. The most common responses (noted by at least six of the 12 focus groups) highlighted strong themes related to the welfare and high standard of living among Kuwaitis, individual behaviours of overeating and lack of exercise, media promoting unhealthy food choices, lack of physical activity and exercise, and the commonly noted prolonged TV and video game use.

Other common factors included misperceptions and lack of awareness, genetic factors, cultural norms, poor parental food choices, 24-hour restaurants, large portion sizes, the hot weather restricting outdoor activities, psychological factors, sleeping after eating, and thyroid problems. The full variety of responses and frequency data are provided in Table 6.6, which offers the reader an understanding of the degree of commonality among the responses and the diversity of response types. However, due to the large number of common response themes, this sub-category will focus discussion on the common elements first noted, which include welfare, poor personal habits (overeating/lack of exercise), fast food, media promoting unhealthy food choices, lack of exercise and physical activity.

Table 6.6

Perceived Contributing Factors to Obesity.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welfare and high standard of living; servants, cars, technology</td>
<td>11</td>
</tr>
<tr>
<td>Personal behaviours of overeating, lack exercise, bad</td>
<td>11</td>
</tr>
</tbody>
</table>
## Habits

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast food and restaurants being unhealthy food</td>
<td>10</td>
</tr>
<tr>
<td>Media promoting unhealthy food</td>
<td>9</td>
</tr>
<tr>
<td>Lack of exercise and physical activity</td>
<td>7</td>
</tr>
<tr>
<td>Prolonged TV watching and or video games leading to sedentary lifestyle</td>
<td>6</td>
</tr>
<tr>
<td>Misperceptions about food; lack of awareness</td>
<td>5</td>
</tr>
<tr>
<td>Genetic factors</td>
<td>4</td>
</tr>
<tr>
<td>Cultural norms or perspectives</td>
<td>4</td>
</tr>
<tr>
<td>Parents choosing unhealthy food for children</td>
<td>3</td>
</tr>
<tr>
<td>24-hour restaurants</td>
<td>3</td>
</tr>
<tr>
<td>Hot weather contributes to lack of movement or exercise</td>
<td>3</td>
</tr>
<tr>
<td>Offering too much food; portion size</td>
<td>3</td>
</tr>
<tr>
<td>Psychological factors, e.g., feeling sad or depression</td>
<td>2</td>
</tr>
<tr>
<td>Going to sleep immediately after eating</td>
<td>2</td>
</tr>
<tr>
<td>Thyroid problems</td>
<td>2</td>
</tr>
<tr>
<td>Irregularity of meals</td>
<td>1</td>
</tr>
<tr>
<td>Mothers losing control of their children</td>
<td>1</td>
</tr>
<tr>
<td>Cultural and religious restrictions on women restricting activities</td>
<td>1</td>
</tr>
<tr>
<td>Poor upbringing</td>
<td>1</td>
</tr>
<tr>
<td>Offering sweets as rewards for children</td>
<td>1</td>
</tr>
<tr>
<td>Canteen selling unhealthy food</td>
<td>1</td>
</tr>
</tbody>
</table>

To illustrate some of these perceived contributing factors, the following examples are given. In the focus groups participants most frequently described welfare, lack of
exercise, poor eating habits, fast food and media influences. The following are some comments made by Focus Group A (Boys):

Modern technology such as iPhones, iPods and computers contribute to overweight and obesity. There is a change of lifestyle. In the past, we used to play sports, but now we play with modern devices. Fast food and restaurants also contribute to it.

Yes, sure. I think that the advertising of unhealthy food is a cause of obesity. Welfare and money are the most important reasons. Children have money, and there are a lot of restaurants. Parents are busy at work, not at home, so children are free and no one is looking after them, so they buy fast food at any time.

In the past, we used to return from school, leave our bags and go outdoors to play with our friends. We didn’t care about the weather being hot or cold. We played in all weather conditions, but, now, we blame the weather. Nowadays, when the children come home from school, they play with their iPods, iPhones and computers.

Similar comments were offered, for example, by Focus Group C (Boys):

The main reason is not playing sports and depending on modern technology for everything.

I believe that the main reason is the welfare and the high standard of living in Kuwait. This leads to us depending on house-maids ‘servant’, which decreases our physical activity and leads to obesity.
I think that not only welfare contributes to overweight and obesity but also the lack of awareness. The media always publishes advertisements about fast food.

Focus group FF. (Girls) offered some additional examples:

I think modern technology and welfare are the main reasons behind children not wanting to move. They want to play with their iPods and computers all day.

We sit all the time. We don’t move. We have cars, servants and technology.

As a final example, touching on some other factors, Focus Group MM (Girls) noted:

I think bad eating habits; fast food in addition to restaurants being away from healthy food. Also, prolonged TV watching that leads to a sedentary lifestyle.

I think irregularity in having meals. We haven’t had a fixed time for our meals. And a lack of exercise … and a family, father or mother that have bad effects on their children by choosing unhealthy food.

I think the high standard of living and media advertisement of unhealthy food is one of the main reasons. Also, lack of movement.

I agree with her. In addition, welfare that leads to bad eating habits, such as consuming fast food and sweet beverages or chocolate.

6.2.2 School influences on childhood health and healthy weight. The second major theme consists of eight sub-categories of responses related to the school influences on childhood health and healthy weight. Participants were asked about the school influence on children’s health, such as in the following question: ‘Do you think schools have an
influence on the health of children? Although these influences focus on school elements, it was impossible to separate home environment from many of the themes, such as lunch options, the need for cooperation between home and school, and parental roles in children’s health, as the two environments affect each other. Each sub-theme is presented individually with frequency data and textual examples used to support common themes.

6.2.2.1 School influences. Through the focus group discussion, the participants shed light on their perceptions of the specific influence of the school on children’s health in Kuwait. Common responses described the school’s influence in terms of providing health education and spreading awareness, the need for cooperation between the school and home environments, the perceived influence of schools and government ministries (Education and Health), the school’s influence in terms of providing food for the students, and finally for providing PE classes to support exercise and movement. Table 6.7 provides the full variety of focus group responses and the associated frequencies from the 12 focus groups.
Table 6.7

School Influence on Children’s Health.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through teaching and health education; spreading awareness and teachers as role models</td>
<td>11</td>
</tr>
<tr>
<td>Need for school–home cooperation, as school has influence, but family influence is greater</td>
<td>8</td>
</tr>
<tr>
<td>School and/or government ministries have a great role in supporting student health</td>
<td>6</td>
</tr>
<tr>
<td>Through the kind of food provided, especially unhealthy food</td>
<td>5</td>
</tr>
<tr>
<td>PE classes and other physical activities</td>
<td>5</td>
</tr>
<tr>
<td>Lack of awareness and action of schools; need for education and awareness</td>
<td>2</td>
</tr>
<tr>
<td>Great influence because of time spent at school</td>
<td>2</td>
</tr>
<tr>
<td>Have influence, but curriculum is poor; need to redevelop curriculum</td>
<td>2</td>
</tr>
<tr>
<td>No influence because of financial and time limitations</td>
<td>1</td>
</tr>
<tr>
<td>Main factor in influencing student health</td>
<td>1</td>
</tr>
</tbody>
</table>

Eleven of the 12 focus groups felt the school had an influence through teaching health education and spreading awareness, with teachers also serving as role models. For example, in Focus Group M. (Boys) the participants mentioned the influence of schools in terms of spreading awareness, teacher role models and health education:

Yes, schools have a great influence on the health of children and that is through spreading awareness. Teachers are also role models for their students.
Yes, schools have an influence, especially through awareness and by discussing the problems of obesity with the children.

Yes, of course the schools have an influence on the health of the children. The schools give the students instructions and show them the difference between the healthy and unhealthy foods.

One participant in Focus Group JJ (Girls) suggested:

Yes, schools have a good opportunity to improve the health of students through their health education programs.

Finally, as another example, Focus Group HH (Girls) provided many of these types of responses, highlighting the school’s influence.

I think schools have a great influence on children. Preventing obesity needs the cooperation of the school staff. Facing obesity needs a strong plan and changes in lifestyle, and it is time for a change.

Of course schools have an influence on the children’s health and also the Ministry of Education has a great influence too.

Yes, for sure they do influence the student’s health through health awareness and selling healthy food in the canteen.

Yes, they definitely do. Schools have a great influence on children by making posters about the healthy and unhealthy food. The curriculums should also contain lessons about the healthy and unhealthy food.
Another theme revealed through common responses was the need for cooperation between family and school. For example, Focus Group AA. (Boys) described:

The school has a big role, but it is not enough. There must be some sort of cooperation between the parents and the school.

I agree with him. The school can’t work alone. The parents, too, have a major role. For example, the father could help his children to exercise and play sports by taking them for a walk for 30 minutes every day.

6.2.2.2 *School lunch options.* Common responses to the questions, ‘What sort of food is sold at the school canteen? What do you think the children normally buy at school?’ indicate that the food available at school is perceived to have a significant influence on student health, particularly in terms of overweight and obesity. The problems identified within this sub-category related to unhealthy food choices provided by the schools. All 12 focus groups noted the availability of high-sugar and high-fat, and generally unhealthy foods served from the school canteen. In addition, unhealthy foods are reported to be often brought from home, or from outside sources. Participants acknowledged that students are attracted to unhealthy foods and that teachers often use junk food as rewards. At the same time, three focus group discussions noted the lack of healthy food options overall from the school, and the lack of knowledge among students about healthy food choices. Table 6.8 provides the diversity of participant responses.
Table 6.8

School Lunch Options.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canteen sells high-sugar or high-fat foods/beverages, unhealthy junk foods</td>
<td>12</td>
</tr>
<tr>
<td>Students bring unhealthy drinks or food from home or outside school</td>
<td>7</td>
</tr>
<tr>
<td>High sugar food attracts the children</td>
<td>5</td>
</tr>
<tr>
<td>Students buy junk food because have no alternatives; canteen doesn’t have healthy food</td>
<td>5</td>
</tr>
<tr>
<td>Students receive junk food as rewards from teachers</td>
<td>3</td>
</tr>
<tr>
<td>Students buy junk food because have no knowledge of healthy foods</td>
<td>3</td>
</tr>
<tr>
<td>Some bring own healthy lunch because canteen food is unhealthy</td>
<td>2</td>
</tr>
<tr>
<td>Different between public and private schools</td>
<td>1</td>
</tr>
<tr>
<td>Do not follow ME guidelines</td>
<td>1</td>
</tr>
<tr>
<td>Healthy, but portion size too large</td>
<td>1</td>
</tr>
</tbody>
</table>

High-fat and sugary foods are common lunch items eaten by the students. The canteen itself primarily focuses on these high-demand types of foods. Focus Group AA (Girls) noted:

They buy chips, chocolate, juice and pastry. They only sell cartons of juice, which have a high sugar content.
Students always buy chips and juice from the canteen, which contain fats, but also bring with them soft drinks from home.

One participant in Focus Group FF (Girls) described how the school lunch options are not healthy alternatives: ‘Unfortunately, the canteen looks for profits; therefore, it attracts students to buy its food, even unhealthy food.’

6.2.2.3 School nutritional policies programs. The third sub-category relates to school influences on student health and was developed from responses regarding the perceptions and experiences of school nutritional policies and programs. For the majority (10 of 12 focus groups), when asked, ‘Have you heard of any nutrition policies at your school?’, the participants mentioned having no specific nutritional program at the school. Participants in seven focus groups noted the individual efforts of teachers who supported promotion of healthy behaviours (food choices and exercise) and the presence of posters promoting healthy foods. In four of the focus groups the members discussed a brief nutritional program offered related to fitness and obesity and a discussion of the problem. Table 6.9 provides the variety of responses offered by participants in the different focus group discussions.
Table 6.9  
*School Nutritional Policies and Programs.*

<table>
<thead>
<tr>
<th><strong>Response theme</strong></th>
<th><strong>Frequency among focus groups (n = 12)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>No school nutritional program</td>
<td>10</td>
</tr>
<tr>
<td>Only individual teachers doing some things on their own</td>
<td>7</td>
</tr>
<tr>
<td>Presence of some posters about healthy and unhealthy foods</td>
<td>6</td>
</tr>
<tr>
<td>Held a program about fitness and obesity and talked about the problem</td>
<td>4</td>
</tr>
<tr>
<td>May be some policies at private schools</td>
<td>3</td>
</tr>
<tr>
<td>Committee to look for fizzy drinks</td>
<td>1</td>
</tr>
<tr>
<td>Is in the curriculum throughout, such as in science and English</td>
<td>1</td>
</tr>
<tr>
<td>Think have heard of nutrition policy only once</td>
<td>1</td>
</tr>
<tr>
<td>Was a program put in place, but did not have cooperation of parents</td>
<td>1</td>
</tr>
<tr>
<td>Heard about it</td>
<td>1</td>
</tr>
<tr>
<td>Yes we have</td>
<td>1</td>
</tr>
<tr>
<td>No, ministry should institute workshops and programs to support awareness among parents and students</td>
<td>1</td>
</tr>
<tr>
<td>During morning assembly</td>
<td>1</td>
</tr>
</tbody>
</table>

The participants in 10 of the 12 groups expressed that they had no knowledge of nutritional programs in their school. Others in the focus groups (7 of the 12) described a lack of programs while noting only the efforts of individual teachers. For example, ‘No, we haven’t, except having posters, which are made by the science department’ (Focus Group CC, Girls). Similarly, a participant in Focus Group AA (Girls) stated, ‘I haven’t
heard about any nutrition programs except from the science department. They are specialists in healthy food.’ As a last example, a participant in Focus Group M (Boys) described, ‘I have only heard about some individual efforts that teachers have done, but not any programs done neither by the Ministry of Health nor by the Ministry of Education.’

Although some participants (in six of the 12 focus groups) noted posters with health information, it was uncertain if these posters were created by the administration or individual teacher efforts. For example, comments from participants in Focus Group CC (Girls) described:

Yes, we have posters about healthy and unhealthy food. When I visited a boy’s school, I saw a lot of posters about the energy and fizzy drinks and their harm, and warning the students about drinking them. I admired that idea.

No, we haven’t, except having posters, which are made by the science department.

No, we only have posters about the healthy and unhealthy food.

Finally, in four of the 12 focus groups at least one participant noted some sort of a program that was in operation at the school. In Focus Group C (Boys) one participant explained: ‘Last year we had ‘symposium’ about healthy nutrition food and one of our colleagues have talked about it in our school.’ Similarly, in Focus Group FF (Girls), two participants stated:
Yes, we held a program about fitness and obesity and talked about the obesity problem.

Yes. We explained to the girls the ways of eating healthy food and the importance of eating fruit and vegetables and their importance in building their bodies. We also taught them how to count calories to stay fit and healthy.

But again, it is difficult to discern whether the program was simply the effort of the school level teachers.

6.2.2.4 Sports and activities. Also, school influences on children’s physical activities were identified by the participants, and the following focus group questions were asked: ‘Are the school children active at school? What do they do?’

Strong themes were revealed indicating that students generally participate in physical activities and play at school, including PE; most students are perceived to participate in sports teams; and there is a need for additional activities, specifically targeted to obese children. From the less common responses, it may be concluded that not all students are active and that the activities are limited to the athletic children, not the obese students. Table 6.10 illustrates the findings of this section.
Table 6.10

*Availability of Student Physical Activities and Sports.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students participating in physical activity and playing</td>
<td>10</td>
</tr>
<tr>
<td>Sports teams—most students</td>
<td>9</td>
</tr>
<tr>
<td>Have activities for children, but not enough; need more time for obese children</td>
<td>8</td>
</tr>
<tr>
<td>Some are active, but not all are active</td>
<td>6</td>
</tr>
<tr>
<td>Participate in PE classes</td>
<td>5</td>
</tr>
<tr>
<td>No, not active; rare to see children active</td>
<td>3</td>
</tr>
<tr>
<td>We were more active than the kids today</td>
<td>2</td>
</tr>
<tr>
<td>Activity is specific to athletic students</td>
<td>2</td>
</tr>
<tr>
<td>Playground not covered and too hot to play on</td>
<td>1</td>
</tr>
<tr>
<td>Ministry sent wrong types of equipment</td>
<td>1</td>
</tr>
<tr>
<td>Special program for obese students to give more time on playground</td>
<td>1</td>
</tr>
<tr>
<td>Don’t have activities</td>
<td>1</td>
</tr>
<tr>
<td>Monitor and follow up student weight</td>
<td>1</td>
</tr>
</tbody>
</table>

In nearly all of the focus groups (10 of 12) at least one participant noted that the students are generally active and participate in physical activity and play at school, and that most students participate in sports teams (9 of 12 focus groups). The following are examples of these types of statements:
There are activities in our school. The students are always active at this age. (Focus Group A. Boys)

Yes, we have one day a week specified for sports activities and students participate in these activities. (Focus Group C. Boys)

In the past, we didn’t have a gym, we only had a theatre. Now we have a new gym so we have increased the physical activities. (Focus Group CC. Girls)

Yes, we have a lot of sports activities in school such as basketball teams and volleyball teams. (Focus Group FF. Girls)

Yes, we have some exercises in our morning routine during the morning assembly. (Focus Group FF. Girls)

Yes, the students are active. We have a lot of sports activities, such as basketball and volleyball. Students always participate in these activities. (Focus Group J. Boys)

Most students tend to participate in the school’s activities, especially the sports activities. (Focus Group J. Boys)

Despite these activities being available, participants commonly noted that it was not enough to combat the obesity problem. One participant, for example, discussed how the obese children do not like to join in school sports activities. He stated, ‘Only the fit students are the ones who participate in sports activities. The obese students don’t want to join’ (Focus Group C. Boys). In Focus Group JJ. Girls one participant noted, ‘Yes, we have activities for the children, but not enough. We need more time, especially for
the obese children.’ Although participants often cited that most children are active, as seen above, some (in six of the 12 focus groups) noted that not all students are active and that the inactive students tend to be the obese students. This participant stated, ‘Yes, most students are active and play in the playground, except the children who suffer from health problems such as obesity. They don’t.’

As a final description of a common response, the participants commonly noted the use of PE classes to promote exercise and movement. One participant from Focus Group HH. Girls noted, ‘All students participate in the PE lessons.’ In addition, a participant from Focus Group CC. Girls stated:

Yes, we have PE classes and pupils always participate in these activities …

The goal is to be healthy and fit. We have competitions in our area to battle obesity. We choose different students from different grade levels and different age groups. We measure their height and weight and then follow up these students.

Thus, the PE lessons seem to be supporting at least some activity in all students, while also promoting healthy weight.

6.2.2.5 School responsibility to support health. Focus group participants were asked for their perceptions of the responsibility of the school in supporting healthy habits of eating and exercise in the following focus group question: ‘Do schools have a responsibility in supporting children to be healthy, eat a healthy diet and be active physically?’ Responses to this question formed a fifth sub-category related to school influences. Very common responses highlight a perception of responsibility on the part
of the school in terms of spreading awareness and providing health education; a perception of school responsibility coupled with parental/family responsibility; school responsibility in terms of cooperation with family/home, school and government ministries (Health and Education); school responsibility for providing good nutrition and physical activities; and schools not being responsible for the health of students, only for learning. Table 6.11 provides the different responses given by participants relating to the perceptions of school responsibility for childhood health and healthy weight.

Table 6.11

School Responsibility to Support Student Health.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools have responsibility to spread awareness; provide health education</td>
<td>11</td>
</tr>
<tr>
<td>Schools are responsible, but parents or family more responsible</td>
<td>8</td>
</tr>
<tr>
<td>Schools have responsibility but is in cooperation with family, school and/or Health Ministry or ME</td>
<td>8</td>
</tr>
<tr>
<td>Schools are responsible for nutrition and physical activity</td>
<td>7</td>
</tr>
<tr>
<td>Not responsible; only responsible for learning</td>
<td>6</td>
</tr>
<tr>
<td>Schools have responsibility to support kids to be healthy</td>
<td>4</td>
</tr>
<tr>
<td>Responsible to promote and hold sports and physical activities</td>
<td>3</td>
</tr>
<tr>
<td>Responsible as the first educational institute for the children</td>
<td>2</td>
</tr>
<tr>
<td>Schools only have a small role</td>
<td>1</td>
</tr>
<tr>
<td>To give advice</td>
<td>1</td>
</tr>
</tbody>
</table>
According to most of the focus group participants (11 of the 12 focus groups), schools have a responsibility to spread awareness and provide health education. This is evident in the following examples taken from the focus groups:

Yes, schools have a responsibility and that is through awareness and teaching students how to count calories.

Schools have a great role in solving this problem.

Schools must make awareness programs about healthy and unhealthy food.  
(Focus Group AA. Girls)

Schools have a responsibility by spreading awareness among the students.

Yes. In general, schools have a great responsibility in educating the students.  
(Focus Group FF. Boys)

Yes schools have the responsibility of guiding the students and spreading awareness.

Yes, I agree with him. Schools have a responsibility in supporting the children’s health through health education. (Focus Group H. Boys)

Focus group participants also commonly noted that although the schools are responsible, the parents and family are also responsible. For example, in Focus Group CC. Girls, one participant stated:

I think that the school’s responsibility comes after the family’s responsibilities.
Yes, schools have a responsibility but the family has the bulk of the responsibility.

In other focus groups, the participants gave further examples of this perception:

I don’t agree with them because schools come second, after the family, in bringing up children; therefore, schools have less influence. (Focus Group FF. Girls)

Yes. Schools have a 30% responsibility but the bigger responsibility lies with the student’s family. (Focus Group H. Boys)

Indeed, it was felt that schools have a responsibility in cooperation with not only the parents, but with the ministries as well. For example, in Focus Group C. (Boys), participants stated:

Yes. I think that mainly the responsibility lies with the family but actually both the family and school must work together to help the students and encourage them to play sports and eat healthy food.

Yes but the family and school must cooperate to encourage and raise the awareness of the students. There are a lot of parents who say, ‘I don’t want my son to play in school. He comes to school to learn.’

Also, in Focus Group MM. Girls, one participant supported this notion, explaining:

Yes, schools have a great responsibility, but there must be a kind of cooperation among the family, school and Health Ministry.
6.2.3 *Presence and function of school nurse.* Also related to school influences on children’s health was the presence and function of the school nurse, which formed the sixth sub-category of school influences. The following question was asked: ‘Does your school have a school nurse? If so, do they have a role in tackling this health issue? How? Please explain.’ In six of the 12 focus groups, the participants discussed having a school nurse present, but felt that the nurses’ role was limited to first aid, rather than being used to support improved student health related to obesity. In three of the focus groups, participants discussed the perception that school nurses can play an integral part in the prevention, tracking and treatment of obesity and overweight, but this increased role would depend on the nurses’ qualifications and the responsibilities given to them. In contrast, participants in these and other focus groups also described the absence of a school nurse (in total, noted in 6 of 12 focus groups). Table 6.12 provides the variety of responses and associated frequencies.

Table 6.12

*Presence and Function of School Nurse.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived limited role of nurses in schools (first aid only)</td>
<td>12</td>
</tr>
<tr>
<td>School has a school nurse in the limited capacity (does not treat obesity, first aid only)</td>
<td>10</td>
</tr>
<tr>
<td>Do not have a school nurse</td>
<td>6</td>
</tr>
<tr>
<td>Believe nurse could help prevent, track and treat obesity depending on qualifications and responsibilities</td>
<td>3</td>
</tr>
<tr>
<td>Nurse does not speak Arabic: difficult communication</td>
<td>2</td>
</tr>
<tr>
<td>Ministry should support policies to educate and monitor students</td>
<td>1</td>
</tr>
</tbody>
</table>
Some schools reportedly had a school nurse, while others did not. Responses of participants described the limited role of the nurse.

He doesn’t. Besides the fact that he is Indian and can’t speak Arabic, he can only do first aid and follow up on chronic diseases. (Focus Group A. Boys)

Yes, we have a nurse but she doesn’t have any role. She should have files and documents for the girls who suffer from obesity or who suffer from any sort of health problem.

No, she can’t even speak Arabic. She is unable to communicate with the girls. She only does first aid (Focus Group AA. Girls)

We don’t have a nurse in our school. I think that there is no point in having a nurse, because he’d have a limited role with little scope. (Focus Group F. Boys)

Yes, we have a nurse but she doesn’t have any role in solving the obesity problem.

Yes, we have a nurse, but she doesn’t have a medical scope. Her work is limited in what she can do.

Yes, we have a nurse but she can only do first aid. (Focus Group FF. Girls)
6.2.4 Teacher roles in contrast to parental roles in supporting healthy habits. In the discussion regarding teachers’ and parents’ roles in supporting children’s health and healthy weight, participants in the focus groups were asked the following question: ‘Do you believe that you as a school teacher and parents have a role in controlling overweight and obesity in school children? How? Please explain.’

Responses revealed similar roles related to advising, encouraging and educating the children on healthy habits. However, teacher roles were more confined to an advisory role or a role model, whereas the participants felt that parents were able to control or regulate what the children/family eat in the home, in addition to educating and encouraging the children to make good choices outside the home. Table 6.13 illustrates the themes evident in the data through the common responses of participants.

Table 6.13

*Teacher and Parent Roles in Supporting Healthy Habits.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School teacher role</strong></td>
<td></td>
</tr>
<tr>
<td>Try to advise, encourage and educate students on healthy habits; spread awareness</td>
<td>12</td>
</tr>
<tr>
<td>Serve as a role model</td>
<td>5</td>
</tr>
<tr>
<td>No role—can’t control students’ habits</td>
<td>3</td>
</tr>
<tr>
<td>Balance between school and home</td>
<td>1</td>
</tr>
<tr>
<td>Serve as a supervisor</td>
<td>1</td>
</tr>
<tr>
<td><strong>Parent role</strong></td>
<td></td>
</tr>
<tr>
<td>Advise and encourage children; spread awareness</td>
<td>11</td>
</tr>
</tbody>
</table>
Set eating rules for family; control what family consumes  10
Role model  6
Make good choices for children  1
First influences on children  1

Generally, the results show a predominant perception of the school teachers’ roles encompassing advice, encouragement and education of students on healthy habits, seeking to spread awareness. For example:

As a teacher, I can contribute to awareness programs.

Yes, I take 5 minutes to talk to my students and advise them. We talk about lots of different things. I advise them and talk to them about fast food and its negative effects on their health. As a teacher, I advise my students to eat healthy food and to keep away from fast food. (Focus Group A. Boys)

The teacher has a great influence on his students. He should talk with the students about obesity and its negative effects on their health whenever he has some free time. (Focus Group F. Boys)

In contrast, while the parental role is also advisory and encouraging of children and spreading awareness, it also should incorporate setting rules for the family on eating habits and controlling what the family consumes. The following examples demonstrate these responses:
As a father, I don’t let my children buy fast food and I talk to them about the dangerous health problems that are caused by obesity. (Focus Group C. Boys)

As a mother, I can advise my children by talking to them about the negative effects of obesity. I also give them information about healthy food. I have prevented them many times from buying fast food and only allow them when it is necessary. (Focus Group CC. Girls)

Both parents and teachers were seen as role models for students:

When students see me fit, healthy and well-dressed they try to copy me and they ask me how I stay fit and healthy. I use their questions to advise them and explain to them the benefits and advantages of being fit. (Focus Group C. Boys)

I have a great role. As a model, I should advise my students as well as my children. (Focus Group MM. Girls)

These distinctions in the perceived roles of teachers and parents were fairly consistent across the focus groups, allowing for the development of clear themes, as presented, of the advisory and educational role of teachers and parents, but also of the role of parents in terms of controlling or monitoring the food and exercise habits of the family.

6.2.5 Summary of focus group data findings. From the thematic categories and sub-categories as presented in the previous sections, several overarching themes were revealed, highlighting the perceptions of the different focus groups as a whole. These themes represent the conclusions of the analysis of the focus group data.
Focus group theme 1: obesity is seen as a disease condition of an abnormal increase in body weight (accumulation of body fat), whereas overweight is seen as a normal (i.e., non-disease condition) increase in body weight.

Focus group theme 2: there were perceptions that obesity is not controlled easily and often requiring surgery; in contrast, overweight was perceived to be controlled through diet and exercise.

Focus group theme 3: overweight and obesity was acknowledged to contribute to increased health problems, such as heart disease, diabetes, hypertension, psychological disorders, respiratory disorders, arthritis and mobility issues.

Focus group theme 4: schools influence the issue of obesity by providing food, health education and opportunities for physical activity among the children; however, the school canteen is reported to typically serve high-fat/high-sugar foods without any noted nutritional policy. Although students participate in physical activities, there is a perceived need for more options for overweight and obese students.

Focus group theme 5: schools are perceived to be responsible for education and awareness of obesity, as well as for supporting nutrition and physical activity during the school day; however, cooperation is perceived to be necessary from parents/home.

Focus group theme 6: availability of school nurses limited to some schools and, of those schools who have nurses, the role of the school nurse is limited to first aid.

Focus group theme 7: teachers serve as role models and advisors, encouraging and educating students toward healthy habits, while parents, who also serve in a role
model/advisory/encouragement role, have the ability and responsibility to control the family diet.

6.3 One-to-One Interview Results

The data obtained from the 12 individual interviews with government representatives from the ME and the MOH were analysed to reveal several main thematic categories, which were then further separated into sub-categories, following the process similar to that of the focus group interviews. The thematic categories are presented individually and include four main categories: perceptions of overweight and obesity, social involvement, presence and role of school nurses, and recommendations for improvement. These categories were broken down into several sub-categories, which are described in Table 6.14 showing sub-categories and highlighting the common themes in each.

Table 6.14

Categories, Sub-categories and Themes for Interview Data.

<table>
<thead>
<tr>
<th>Primary category</th>
<th>Sub-category</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of overweight and obesity</td>
<td>(Q1) Understanding of overweight and obesity</td>
<td>Significant problem in society</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Categorisation determined by BMI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Both indicate an increase in body weight above normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear problem among children in Kuwait</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obesity is more dangerous than overweight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Obesity is an unhealthy phenomenon due to unhealthy nutritional behaviours</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overweight leads to obesity</td>
</tr>
<tr>
<td>Primary category</td>
<td>Sub-category</td>
<td>Themes</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>--------</td>
</tr>
<tr>
<td>(Q2) Perceptions of serious health problems related to obesity</td>
<td>Heart disease, Arthritis, bone/joint problems, Diabetes, Hypertension and endocrine disorders, Psychological problems/disease, Respiratory diseases/problems, Cancer</td>
<td></td>
</tr>
<tr>
<td>(Q3) Contributing factors</td>
<td>Unhealthy diet, especially fast food, Lack of exercise for a variety of reasons, Welfare/high standard of living, Lack of parental involvement/neglect, School canteen offering unhealthy food options, Cultural food traditions, Lack of awareness, Increasing food consumption/portion sizes</td>
<td></td>
</tr>
<tr>
<td>Social involvement</td>
<td>(Q4) Government initiatives</td>
<td>Nutritional, educational programs and exercise programs/marathons, Failed ministry programs, Health clinics, ME seminars</td>
</tr>
<tr>
<td>Personal role of interviewee in promoting healthy weight in school population</td>
<td>Support clinics to treat and educate patients, Support education through seminars, increased awareness and information via mass media</td>
<td></td>
</tr>
<tr>
<td>(Q5) Who should contribute to solving the issue of childhood obesity</td>
<td>Cooperation between ministries, schools and families, All of society, Ministries of Education, Health, Information, and Youth Affairs</td>
<td></td>
</tr>
</tbody>
</table>
### Themes

<table>
<thead>
<tr>
<th>Primary category</th>
<th>Sub-category</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence and Function of School Nurses</td>
<td>(Q6) Presence of nurses in schools</td>
<td>Schools employ nurses through private company</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nurses only in some schools—nursing shortage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes, the schools have nurses</td>
</tr>
<tr>
<td></td>
<td>Function/Role of school nurses</td>
<td>No role in obesity prevention, only first aid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Need for more qualified nurses, need for training</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focus on treatment, not prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trained to educate about and prevent obesity, but not used for prevention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Important role in health education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Language barriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Confront health problems and work for health awareness/early detection</td>
</tr>
<tr>
<td>Recommendations</td>
<td></td>
<td>Highlight the critical role of parents and the need to engage parents to prevent obesity</td>
</tr>
</tbody>
</table>

### 6.3.1 Perceptions of overweight and obesity.

Twelve individual interviews with government participants allowed the participants to express their perceptions regarding obesity and overweight, contributing factors, and health issues stemming from obesity/overweight. This thematic category is further categorised into three thematic sub-categories related to these areas: understanding obesity and overweight, perceptions of serious health problems related to obesity/overweight, and contributing factors to obesity/overweight. Each of these sub-categories is presented individually, incorporating frequency of occurrence among the 12 interviews and textual examples to support clarity and understanding of the themes revealed in the analysis.
6.3.1.1 Understanding of obesity and overweight. Interview participants, who were government representatives, were asked for their perceptions of the terms overweight and obesity. Their responses were used to generate the first thematic sub-category related to the primary category of perceptions of overweight and obesity. Differences and similarities between the terms were noted by participants. All 12 participants noted that obesity is a problem in the community, particularly among children.

Common responses revealed themes demonstrating the similarity of terms, such as overweight and obesity being determined by BMI, and both overweight and obesity indicating an increase in body weight above normal levels. Themes distinguishing the terms were also noted in the perceptions that overweight leads to obesity, obesity is an unhealthy phenomenon resulting from unhealthy eating behaviours, and obesity is considered more dangerous than overweight. Table 6.15 shows the diversity of responses given by the interview participants, with the associated frequencies of occurrence.
Table 6.15

Understanding of Obesity and Overweight among Interview Participants.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both overweight and obesity determined by BMI</td>
<td>5</td>
</tr>
<tr>
<td>Both indicate an increase in body weight above normal</td>
<td>3</td>
</tr>
<tr>
<td>Obesity is an unhealthy phenomenon due to unhealthy eating behaviour</td>
<td>3</td>
</tr>
<tr>
<td>Obesity is more dangerous than overweight</td>
<td>3</td>
</tr>
<tr>
<td>Overweight leads to obesity</td>
<td>2</td>
</tr>
<tr>
<td>Overweight is the result of bad eating habits</td>
<td>1</td>
</tr>
<tr>
<td>Obesity is considered an epidemic in Kuwait</td>
<td>1</td>
</tr>
<tr>
<td>Obesity refers to the body and psychological disease</td>
<td>1</td>
</tr>
<tr>
<td>Obesity is an epidemic disease affecting all ages around the world</td>
<td>1</td>
</tr>
</tbody>
</table>

Common responses that suggest similarity between the two terms, obesity and overweight, highlight that the conditions are determined by the BMI of an individual, and that both conditions indicate an increase in body weight above the normal levels.

Examples from the interview text demonstrate these notions:

Of course, although obesity and overweight are related to one another, they vary in terms of the rate of weight increase. (C.1)

Obesity or overweight both mean an increase in a person’s weight above their normal weight. There are different grades of obesity and overweight; as long as the weight increases, however, the danger increases as well. (J.1)
It depends on whether the BMI has increased beyond the 25th percentile; if so, this is considered overweight. If the BMI increases beyond the 30th percentile, this is considered obesity. Therefore, it depends on the BMI. (A.2)

Overweight was described as leading to obesity or as a precursor to the disease. For example, one participant stated during the interview: ‘Obesity refers to the body and psychological diseases, and it is dangerous to our health. We should be aware of such problems. Being overweight can lead to obesity if it is not addressed’ (F.1). As such, overweight and obesity are considered very dangerous. For example, participants stated:

Obesity is a very dangerous phenomenon. I believe overweight is considered the result of bad eating habits. (A.1)

It is an unnatural phenomenon. It is measured through the body mass index and has different percentages by age and gender. Obesity is considered an epidemic in Kuwait. (H.2)

Overweight often is leading to the obesity, which is an unhealthy phenomenon, as a result of unhealthy nutritional behaviour. (M.1)

From these perceptions of severity, the participants were then asked about health problems they felt may be related to obesity, which formed the next sub-category.

6.3.1.2 Perceptions of health problems related to obesity. The second thematic sub-category related to perceptions of obesity and overweight involved interview participants’ responses regarding their perceptions of the health problems associated with overweight/obesity. The most common responses touching on strong themes
included heart disease and high cholesterol; arthritis and bone and joint problems; diabetes; hypertension and endocrine disorders; psychological problems and disease; and respiratory diseases. Table 6.16 provides the full variety of responses offered by participants, demonstrating commonality through the frequency of occurrence among the different interview participants.

Table 6.16

*Perceived Serious Health Problems Associated with Obesity.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease and high cholesterol</td>
<td>10</td>
</tr>
<tr>
<td>Arthritis, bone and joint problems</td>
<td>10</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9</td>
</tr>
<tr>
<td>Hypertension and endocrine disorders</td>
<td>7</td>
</tr>
<tr>
<td>Psychological problems and diseases</td>
<td>4</td>
</tr>
<tr>
<td>Respiratory diseases; inflammation, shortness of breath, snoring</td>
<td>3</td>
</tr>
<tr>
<td>Cancer</td>
<td>2</td>
</tr>
<tr>
<td>Digestive disorders</td>
<td>1</td>
</tr>
<tr>
<td>Epidemic</td>
<td>1</td>
</tr>
<tr>
<td>Elevated body temperature</td>
<td>1</td>
</tr>
<tr>
<td>Skin sensitivities</td>
<td>1</td>
</tr>
<tr>
<td>Liver disease</td>
<td>1</td>
</tr>
<tr>
<td>Negative educational outcomes</td>
<td>1</td>
</tr>
<tr>
<td>Reduced mobility</td>
<td>1</td>
</tr>
</tbody>
</table>
The interview participants cited several serious health problems they felt were associated with obesity in children. The most common occurrences were references to heart disease and high cholesterol, arthritis and bone/joint problems, diabetes, hypertension (or high BP) and other endocrine disorders. Examples of participants’ responses include:

Obesity is the mother of diseases. It causes heart diseases and blocks the arteries. It also causes diabetes and joint pain. Furthermore, educational outcomes are also negatively affected by this problem. (C.1)

As scientific research has proven, it is a disease that leads to increased cholesterol, heart diseases, high blood pressure, diabetes, cancer and liver diseases. Obesity is considered the umbrella of all of these problems. (C.2)

High cholesterol in the blood, high blood pressure, joint inflammation and diabetes all lead to health complications. (F.1)

There is no doubt. There are problems that research has proved; through working with obese children, we document heart disease and problems with arteries and joints, diabetes, psychological problem such as isolation, depression and a general dissatisfaction that affects students’ educational attainment. (H.1)

These examples touch on the many different responses and highlight the knowledge that obesity is a problem that contributes to multiple health issues.

6.3.1.3 Perceived contributing factors to overweight and obesity in children.
The third thematic sub-category relating to the one-to-one interview participants’ perceptions of overweight and obesity incorporated the perceived contributing factors to obesity and overweight among the Kuwaiti population of school children. The themes from the most common responses revealed the contributing factors of unhealthy diet, especially fast food diets; a general lack of exercise, resulting from factors such as technology use, TV and video game use, weather, reduced PE and parental factors; and the level of welfare, or high standard of living, common in Kuwait. The various responses offered by the interview participants are illustrated in Table 6.17 below.

Table 6.17
Perceived Contributing Factors to Overweight and Obesity in Children.

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unhealthy diet, especially fast food</td>
<td>9</td>
</tr>
<tr>
<td>Lack of exercise</td>
<td>9</td>
</tr>
<tr>
<td>From technology use, TV, video games</td>
<td>8</td>
</tr>
<tr>
<td>Use of cars and transportation for even short trips</td>
<td>3</td>
</tr>
<tr>
<td>Weather and work contribute to lack of exercise</td>
<td>1</td>
</tr>
<tr>
<td>Reduction in PE</td>
<td>1</td>
</tr>
<tr>
<td>Parents prevent kids from going outside</td>
<td>1</td>
</tr>
<tr>
<td>Welfare; high standard of living</td>
<td>5</td>
</tr>
<tr>
<td>Lack of parental involvement, different family arrangements, absence of parents</td>
<td>3</td>
</tr>
<tr>
<td>School canteen unhealthy</td>
<td>3</td>
</tr>
<tr>
<td>Food traditions, culture</td>
<td>3</td>
</tr>
<tr>
<td>Parents’ lack of knowledge, lack awareness, neglect</td>
<td>3</td>
</tr>
</tbody>
</table>
The most common contributing factors offered by the interview participants (Government representatives) included unhealthy diet (including fast food), lack of exercise and a high standard of living. A few examples of the participants’ responses are given, demonstrating the multiple and interconnected factors revealed by each participant:

I think the factors that contribute to this problem are a lack of nutritional awareness and the fact that fast food is available everywhere in Kuwait. In addition, Kuwaiti families are likely to eat high-calorie food and are not interested in healthy food, such as vegetables and fruit. A lack of movement has also contributed to this problem. In my generation, we were always playing outdoors. Nowadays, children have changed; they prefer indoor activities, such as video games. The over-reliance on cars has also contributed to this sedentary lifestyle. (A.2)
I believe the contributing factors include the lifestyle in Kuwait, video games, fast and unhealthy food, lack of parental involvement in resolving problems, the food served in school cafeterias and lack of movement. (A.1)

Some of the contributing factors include welfare, increasing income and the consumption of fast food. Also, many restaurants are open 24 hours, and our children have pocket money to buy whatever they want. Some other factors include technology, lack of movement and sport, the role of the house maid and the absence of the parents. (C.1)

The first thing that contributes to childhood obesity is bad habits. Often, these are based on parents’ lack of knowledge about how to teach their children good habits. We have also found that the main cause of obesity in our culture is food insecurity, which can make children feel attracted to fast food. This is made worse by schools’ cafeterias, which are sometimes stocked with unhealthy food choices. (F.1)

There is too much consumption of unhealthy food. There is also a lack of movement because children are watching TV and playing too much PlayStation. Also, the parents contribute to this problem by preventing their children from going outside to play and instead forcing them to stay inside and watch TV and play video games. Also, the over-reliance on transportation to get to the nearest point further contributes to the problem. (F.2)

The school canteens are unhealthy. Other factors include fast food, lack of movement as a result of TV and video games, increasing food consumption
during leisure time, less sport activities and the fact that many children are addicted to eating restaurant food. Also, having a maidservant at home is a big problem and is often the main cause for the lack of movement and lack of participation of the child at home. (J.1)

6.4 Social Involvement

The second primary thematic category was social involvement. This was further categorised into three sub-categories: government initiatives, personal role in promoting healthy weight in the school population, and who should contribute to solving the issue of obesity. These sub-categories are discussed in terms of the themes revealed from the analysis and the frequency of mention of the 12 interview participants. Textual examples from the interview data are given to support each key common theme.

6.4.1 Government initiatives. Interview participants who work within the ME or MOH were asked to detail the current governmental initiatives, if any, targeting obesity among the school-aged population. The following question was asked: ‘Are you aware of any government initiatives to control overweight and obesity? What are they? Please list/describe them.’ The common responses revealed three themes: health programs to raise awareness, including educational programs, seminars and walking marathons; failed ministry programs; and health clinics. The variety of responses is given in Table 6.18, where the most common responses are highlighted as key themes revealed in the analysis.
Table 6.18

*Governmental Initiatives.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health programs to raise awareness, nutritional education, seminars, walking</td>
<td>6</td>
</tr>
<tr>
<td>marathons</td>
<td></td>
</tr>
<tr>
<td>Failed MOH program</td>
<td>3</td>
</tr>
<tr>
<td>Health clinics</td>
<td>2</td>
</tr>
<tr>
<td>Government has not exerted enough effort to solve the problem</td>
<td>1</td>
</tr>
<tr>
<td>Project from MOH using teamwork to fight all chronic diseases</td>
<td>1</td>
</tr>
<tr>
<td>Only individual initiatives by teachers</td>
<td>1</td>
</tr>
<tr>
<td>Important to start interventions at the younger elementary and middle ages</td>
<td>1</td>
</tr>
<tr>
<td>Initiatives supporting growth of football playgrounds in suburbs</td>
<td>1</td>
</tr>
<tr>
<td>ME provides PE, but not enough time is dedicated to it</td>
<td>1</td>
</tr>
<tr>
<td>Have not heard of any government initiatives</td>
<td>1</td>
</tr>
<tr>
<td>MOH committee</td>
<td>1</td>
</tr>
</tbody>
</table>

The interview participants (six of 12 participants, who are ministry representatives) reported the need for health programs to raise awareness, nutritional educational programs, seminars and marathon events. For example, one participant stated:

*The Ministry of Education has established seminars on diseases, but there are shortcomings in obesity evaluation. The Ministry of Health has an obesity committee that has created walking marathons and nutritional education*
programs. It has also established many clinics of obesity, which see patients of all ages and occupations one day a week. (H.2)

Another participant expanded on the role of clinics, stating: ‘Each clinic in the province plays a role by promoting a healthy lifestyle through lectures in schools and through the efforts of the doctors’ (A.2). Similarly, one participant explained that a committee in the MOH supports efforts to identify and treat obesity. The participant stated:

Yes, there is a committee in the Ministry of Health. The goal of this committee is to treat or identify obesity. All of the departments in the Ministry of Health participate in this committee. Also, private companies sponsor marathons for the community and send invitations through the media; however, this is very rare. (C.2)

Finally, one participant described the clinics and seminars, but also noted that the Government is not doing enough to combat this problem of obesity.

There are health clinics that try to combat obesity in each suburb. Furthermore, the Ministry of Education has conducted seminars on this issue. However, the Government has not exerted enough effort toward solving this problem … The Ministry of Information and the Ministry of Health are creating an intensive health program in order to raise awareness about this problem. Working together with the Ministry of Education, they will use the mass media to increase awareness throughout Kuwaiti society. (M.1)
Turning attention, then, toward the individual roles played by the participants in promoting health in the school population, participants’ responses were developed into the second sub-category under social influences.

6.4.2 Personal role in promoting healthy weight in school population. The second sub-category under social involvement was developed from participants’ responses relating to their personal role in promoting a healthy weight in the school-aged population as a government representative in the MOH or ME. Common responses highlight themes relating to the educational roles of the participants in facilitating education and awareness (11 of 12 participants) and of supporting clinics to treat and educate the population (two of 12 participants). The various ways that the participants educated the population were also discussed, including the use of seminars to teach exercise and nutrition and the use of mass media to increase awareness in both the schools and general society. Table 6.19 lists the responses and frequencies from the interview data.
Table 6.19

*Personal Role in Promoting Healthy Weight in the School Population.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>12</td>
</tr>
<tr>
<td>Through seminars teach exercise, nutrition and medicinal supplements</td>
<td>3</td>
</tr>
<tr>
<td>Facilitating education and awareness in society and schools</td>
<td>3</td>
</tr>
<tr>
<td>Information spread via mass media</td>
<td>2</td>
</tr>
<tr>
<td>Teach values of health and ethics in schools</td>
<td>1</td>
</tr>
<tr>
<td>Provide lectures and health education</td>
<td>1</td>
</tr>
<tr>
<td>Follow up on implementation of PE and sports programs</td>
<td>1</td>
</tr>
<tr>
<td>Provide courses to doctors to train them in health promotion</td>
<td>1</td>
</tr>
<tr>
<td>Limited work in schools to educate students</td>
<td>1</td>
</tr>
<tr>
<td>Supporting school activities focused on sports</td>
<td>1</td>
</tr>
<tr>
<td>Support clinics that treat and educate patients</td>
<td>2</td>
</tr>
</tbody>
</table>

All 12 interview participants noted a personal educational role in promoting healthy weight among the school population; however, for two of the participants, this role was fulfilled through supporting clinics to treat and educate patients. For example:

> Our role begins with supporting the clinics. We focus on improving doctors’ education by providing courses that train them to promote health among the population in society. We also participate in school seminars and offer workshops, but unfortunately the school selects what topics to address and
usually ends up concentrating on raising awareness about the dangers of smoking. (F.2)

Participants described a number of ways in which they are involved with the education of the student population. Some conducted seminars and used media to spread awareness and educate the public. For example, the following two examples demonstrate the use of seminars in this way:

My role is in education, by giving seminars and courses, and publishing these seminars in radio, TV, and newspapers. (J.2)

Through health seminars, where we teach how exercise and nutrition (M.2)

Some participants also described facilitating education and awareness directly at the schools and within society. To clarify this concept, some examples are given, which include the following:

We conduct a workshop to raise awareness about obesity. Our role is comprehensive because we work with parents, students and teachers of physical education in order to educate the students who are struggling with overweight and obesity. However, despite these efforts, it is not enough. Our role is educating our society and enhancing the health of the population to enable the individual to resolve his/her health problems. We also work to limit the unhealthy behaviours in our society by creating greater awareness through the media. (C.2)
We work on health-related issues by promoting health awareness during the morning assembly and during other classes. When these issues are discussed in class, it is typically the teacher who will talk about the importance of healthy food and movement. (J.2)

6.4.3 Who should contribute to solving the obesity problem? The third sub-category related to social involvement was developed from the responses of interview participants related to the key stakeholders who are believed to be critical in addressing the childhood obesity issue. The strong theme in this sub-category came from all 12 participants, who cited the need for cooperation to form a collective effort through interactions between the various government ministries, as well as with schools and parents and families. Table 6.20 illustrates the different interview responses, highlighting the theme of social cooperation.

Table 6.20

*Perceived Contributors to the Solution.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooperation</td>
<td>12</td>
</tr>
<tr>
<td>Ministries cooperate to improve children’s health; collective effort</td>
<td>10</td>
</tr>
<tr>
<td>All cooperate in society</td>
<td>2</td>
</tr>
<tr>
<td>Cooperation with families, schools and government ministries</td>
<td>2</td>
</tr>
<tr>
<td>All of society</td>
<td>2</td>
</tr>
<tr>
<td>ME</td>
<td>2</td>
</tr>
</tbody>
</table>
The interview participants unanimously felt that the cooperation of all stakeholders is necessary to facilitate and implement an effective solution to the obesity problem. This cooperation was discussed in terms of cooperation within the different ministries and the need for teamwork. For example:

The Ministry of Education, the Ministry of the Interior and the Ministry of Information all have an important role in the mass media. The Ministry of Labor and the Ministry of Youth Affairs can also play a crucial role. We need cooperative efforts because it is a societal problem and not just an individual problem. (C.2)

All of the ministries in Kuwait, from Information to Education, Commerce, Health and the Ministry of Young Affairs, should be involved. (F.1)

There needs to be cooperative efforts. The Ministry of Health, the Ministry of Information and the Ministry of Education all play an important role. We need to work as a team. We want new regulations to combat this epidemic of obesity. (F.2)

Others discussed a more general level of cooperation, not limited to the ministries, but inclusive of all of society. For example, participant H.1 explained:
The problem faces our whole society, not just individuals, and I think the whole society should face it, with the Ministry of Information using media and the Ministry of Education and Ministry of Awqaf using communications with members of the community. (H.1)

This notion was supported by participants H.2, M.1 and J.2:

We need to cooperate together to resolve this problem; this means the mass media, the Ministry of Health, because it shares initial responsibility with the Ministry of Education, and the cooperative societies. (H.2)

The entire society should participate in tackling this issue, including the Ministry of Information, the Ministry of Youth Affairs and the Ministry of Education. (M.1)

It is society’s problem, not just the Ministry of Health’s problem, and we cannot forget the role that schools and their administration plays. The Ministry of Information, Ministry of Education and the Ministry of Awqaf should join to educate society through the Islamic religion, because our prophet taught us by regulating food and doing exercise, and I think obesity demands a collective effort of our whole society. (J.2)

Finally, the participants noted the specific importance and role of parents, families and schools in combating childhood obesity. To clarify, the following two examples demonstrate the perceived necessary involvement of families and schools in addition to the ministries:
There must be cooperation between the families, the schools and the government sector in order to tackle this issue … I think the Ministry of Information, the Ministry of Education and the Ministry of Health must all cooperate. I also believe that the family must play the primary role in solving this epidemic. (H.2)

The first step begins with the parents. After the parents, the school plays the second most important role because it is the place where students spend most of their time. Finally, the Ministry of Youth Affairs, the Ministry of Health, the Ministry of Commerce and the Ministry of Information all have an important role to play. (C.1)

6.5 Presence and Function of School Nurses

A major thematic category was developed from participant’s responses pertaining to the presence and role of a nurse within the schools. Two sub-categories were developed, demonstrating themes that reveal diversity in the availability of school nurses as well as the limited role of school nurses. The two sub-categories of the presence of school nurses and the role of school nurses in the schools are presented individually.

6.5.1 Presence of school nurses. In discussing the presence of nurses in schools, the majority of participants (10 of 12) described a disparity between schools, where some schools had access to a school nurse, while others did not. This discrepancy was noted by five participants as being due to a shortage of available nurses to work in schools. The nurses that were employed by schools were described as being recruited through private company sources. Table 6.21 provides the full variety of responses and associated frequencies.
Table 6.21

*Availability of School Nurses.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some, but not all, schools have a nurse</td>
<td>10</td>
</tr>
<tr>
<td>Some schools employ nurses through private company</td>
<td>6</td>
</tr>
<tr>
<td>Nurses only in some schools due to shortage of nurses</td>
<td>5</td>
</tr>
<tr>
<td>Schools have nurses</td>
<td>3</td>
</tr>
</tbody>
</table>

The participants generally agreed that nursing staff are not always available to all schools, which was attributed to a shortage in nurses. The following examples shed light on this problem:

Yes, the Ministry of Health used to provide nurses for the schools. We tried to cover all the schools; however, sometimes one nurse would have to cover three or four schools because of the shortage of nurses. Nowadays, school nurses are under the Ministry of Education and are employed through private companies. (A.2)

Yes. At first, these nurses were provided by the Ministry of Health; however, now they are provided by the Ministry of Education, which tasks private companies with providing school nurses. The Ministry of Health is unable to provide these nurses because of the shortage in nursing staff. (C.2)

### 6.5.2 Role of nurses in schools.

The perceived role of the school nurse—if present—is also critical. From the data, for schools in which a nurse was employed the role of the
nurse was limited to first aid in most cases, and they played no role in prevention or education (9 of 12 participants). Despite the need for education and prevention and the presence of qualified nursing staff, the nurses were reportedly not used in this capacity. Table 6.22 illustrates the response variety and the frequency of occurrence in the interview data.

Table 6.22

**Nursing Role in Schools.**

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No role in prevention; role is focused on treatment and first aid</td>
<td>9</td>
</tr>
<tr>
<td>Need for training and work program; need for more qualified nurses</td>
<td>3</td>
</tr>
<tr>
<td>Are trained and educated to handle role of reducing obesity, but not used in this capacity</td>
<td>2</td>
</tr>
<tr>
<td>Important role in health education, but not used in this capacity</td>
<td>2</td>
</tr>
<tr>
<td>Language barriers</td>
<td>2</td>
</tr>
<tr>
<td>Confront health problems and work for health awareness for students; role of early detection</td>
<td>2</td>
</tr>
</tbody>
</table>

Along with the problem of a shortage of nursing staff, the role of the nurses in schools was described by nine of the 12 participants as limited, primarily to first aid, and the school nurse was not utilised for prevention purposes:

Nurses are in the schools to provide first aid only. They have no role in addressing this problem. (F.1)
The school nurse does not have a role in this problem because the work of the nurse in Kuwaiti schools is only related to treatment and first aid. (J.1)

In Kuwait, there are roles that the school nurse is not asked to play, such as the prevention and curative role. Nurses have an important role in health education. (J.2)

However, three participants had concerns that the nurses were not qualified to fill the preventative role. For example, one participant stated:

I don’t think that nurses in Kuwait have reached this stage because they are not qualified to play such a role. Currently, they only focus on treatment and not on prevention. We need courses and programs that will enable them to resolve this problem. (F.2)

Other participants felt the nurses were or could be qualified for the role, and should receive training for this. This was demonstrated in the response by H.1, who stated: ‘The school nurse’s role is more about treatment than prevention, and this is wrong. I think that if nurses are trained well first, they could help through education and measuring weight and height.’ If appropriately trained and given responsibility for prevention, school nurses could be a significant part of the solution to childhood obesity. This was expressed by participant C.1 as follows: ‘If nurses were given more responsibilities, worked as a team in the schools and developed an intensive program for each school, then they could play a very important role in solving this problem.’

6.6 Participants’ Recommendations
Finally, the participants were asked, ‘Is there anything else that you would like to add?’ A thematic category was developed from the interview data in which participants offered their recommendations for addressing childhood obesity in Kuwait. There were no sub-categories for this category. The responses were varied, indicating only a single weak common theme (shared by two participants) of the critical role of parents and the need to engage parents in the issue. The variety of recommendations offered by the interview participants is listed in Table 6.23.

Table 6.23

*Interview Participants’ Recommendations.*

<table>
<thead>
<tr>
<th>Response theme</th>
<th>Frequency among focus groups (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlight the critical role of parents; need to engage parents</td>
<td>2</td>
</tr>
<tr>
<td>Concentrate on student attitudes about diet and exercise</td>
<td>1</td>
</tr>
<tr>
<td>Need to rethink how we view food</td>
<td>1</td>
</tr>
<tr>
<td>Treatment beginning with the parents</td>
<td>1</td>
</tr>
<tr>
<td>A more active role for the school nurse</td>
<td>1</td>
</tr>
<tr>
<td>Need increased awareness</td>
<td>1</td>
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<tr>
<td>Need to increase efforts in treating obesity as an epidemic disease that causes all chronic diseases</td>
<td>1</td>
</tr>
<tr>
<td>Need new policy and regulations to support efforts to educate and treat</td>
<td>1</td>
</tr>
<tr>
<td>Need a shift in focus to prevention, not treatment</td>
<td>1</td>
</tr>
<tr>
<td>Will support academic achievement with relationship between health and educational attainment, between healthy body and brain</td>
<td>1</td>
</tr>
</tbody>
</table>
The only common response to the request for recommendations from the interview participants was that of the critical role of parents and the need, therefore, to engage parents in the fight against childhood obesity. The following two participants noted this and explained it well:

The family is cooperating because it has the most significant role in solving this problem. Food usually reaches children through the parents; therefore, parents must educate their children regarding what they should and should not eat. (H.2)

We should concentrate on the attitudes that schoolchildren have about diet and exercise; we are a rich country and can handle this problem. We also need to engage the parents because fathers and mothers have been fairly absent until now in dealing with these problems. Finally, we need to rethink how we view food. For instance, why do we encourage stomach-stapling operations instead of encouraging weight loss? (M.2)

Another participant mentioned the role of the parents, as a starting point, highlighting the need for society-wide involvement and the critical role of the nurse: ‘I would call for our whole society to gather together to fight this problem, with treatment beginning through the father and the mother but not forgetting the active role for the nurse’ (H.1).

Supporting a shift in attitude, the C.2 discussed the need to shift the focus from treatment to prevention:

We have a lot of health problems as the result of unhealthy lifestyles. This has also resulted in an increase of epidemic diseases. Kuwait spends a lot of money
to treat these diseases. The Ministry of Health should focus on prevention, not treatment. (C.2)

To accomplish this type of shift, it would be necessary for healthcare workers and government representatives to focus more on this issue to provide solutions, as noted in the following participants’ comments:

I wish that the health workers gave more focus to this issue and were more aware of the problem of obesity, because it has negative effects on the students, including negative views about their schools. Students in Kuwait are always teasing and bullying each other, especially obese children, which is harmful to them. (H.1)

Obesity is an epidemic disease nowadays. It is considered the main cause of all chronic diseases and may shorten people’s lifespan. We need to treat it in order to save the Ministry of Health’s budget and efforts. (F.2)

We have done limited work in our schools to educate the students; we need a new policy and new regulations that can support us in order to handle these problems. (F.1)

These recommendations follow directly from the concerns and perceptions expressed by the interview participants in the thematic categories. From the revealed thematic categories, the focus of the analysis is on the common responses that will form the perceptions of the group as a whole, and provide the conclusions for the analysis.

6.7 Conclusions from Interview Findings
From the thematic categories and sub-categories, several overarching themes were revealed, highlighting the perceptions of the interview group as a whole. These themes represent the conclusions of the analysis of the interview data.

Theme one: overweight and obesity, as determined by elevated BMI as an indication of increased body weight beyond normal, is seen as a clear problem among the population of school-aged children in Kuwait.

Theme two: the condition of being overweight is perceived to lead to obesity, which is defined as an unhealthy, non-normal phenomenon resulting from unhealthy nutritional and physical behaviours.

Theme three: obesity contributes to an increased incidence of major health problems, such as heart disease, diabetes, hypertension, arthritis and psychological disorders.

Theme four: factors believed to contribute to obesity among the school-aged population in Kuwait include a generally unhealthy diet, inclusive of a high rate of consumption of fast food and a lack of exercise, both of which are believed to be exacerbated by welfare; high technology use; and the lack of outdoor play among children in Kuwait.

Theme five: minimal government initiatives were noted, with existing programs including clinics, seminars, use of mass media and limited educational programming; greater effort is needed in this area.

Theme six: the problem of childhood obesity in Kuwait needs to be addressed with cooperative efforts among the different ministries and throughout society as a whole, including parents, schools, communities and government ministries.
Theme seven: poorly-utilised nursing staff in schools with evidence of nursing shortages, and the role of school nurses limited to first aid and treatment, rather than capitalising on the potential of nurses to serve an important role in health promotion and disease prevention.

Theme eight: critical role of parental engagement and awareness in addressing the prevention of obesity among children.

6.8 Overall Summary of the Chapter: Synthesis of Focus Group and Interview Conclusions

After combining the findings from both the focus groups and the one–to-one interview data with government representatives, several strong themes are evident across both groups. Some data provides a unique look at the perceptions of the teachers’ perspective versus the government representatives’ perspectives. A comparison of the common themes highlights the following results:

The focus group participants and interview participants described obesity as a non-normal or disease condition of increased body weight or fat, which is a problem among children in Kuwait. Both overweight and obesity stem from unhealthy eating and physical activity habits. The focus group participants added that obesity is not easily controlled, often requiring surgical intervention. Both interview and focus group participants reported similar health problems associated with obesity/overweight, which included heart disease, diabetes, hypertension, psychological disorders, respiratory problems and arthritis or other mobility issues.
Contributory factors to obesity were also similar across the data sets, including unhealthy diets with the frequent consumption of fast foods and a lack of exercise, both of which were perceived as being exacerbated by welfare (high standard of living) among Kuwaitis, technology use among children (computer, video and remote device use), and a lack of outdoor play. In addition, schools were perceived to have a significant role in addressing issues related to obesity by providing healthy food choices and opportunities for physical activity; however, this was generally reported as not the case, with dietary options high in fat and sugar and limited participation in physical activities among overweight/obese students.

The focus group participants discussed the need for school and home cooperation in supporting healthy lifestyles and the interview participants highlighted the critical role of parents, in particular, but also of the community in providing cooperative and cohesive solutions. However, the interview participants who work in government ministries acknowledged the lack of government initiatives supporting education, awareness and treatment, which were limited to clinics and a few seminars and educational programs, acknowledging the need for greater efforts in this area.

In addition, nurses and teaching staff serve critical roles in the schools to support healthy choices. The possible important role of the school nurse is minimised due to limitations of availability (not in every school) and their current roles. Both the interview group and the focus groups reported that nurses were limited to providing first aid to students, whereas nurses are able to serve in a more proactive, preventative capacity, although not asked to do so. Teachers were described as serving as role models and advisors to encourage and educate students in healthy lifestyles. Parents
have the added role of monitoring and actually controlling the family diet and exercise routines, highlighting the importance of parental engagement and awareness.
Chapter 7: Discussion

7.1 Introduction

The purpose of this chapter is to discuss the findings as they relate to each of the research questions and to consider these findings in relation to the current literature. The findings of this study are obtained using two approaches: a quantitative approach and a qualitative approach to gather the data to address the research questions. The research questions seek to assess the prevalence and risk factors of overweight and obesity among Kuwaiti children, and to explore the perceptions and attitudes of parents, school teachers and Kuwaiti officials to childhood overweight and obesity in Kuwait, as well as to explore the role of government, parents, schools and school nurses in combating overweight and obesity. There are four research questions, the first to be answered using a quantitative approach, the second and third to be answered using a combination of quantitative and qualitative methods, and the fourth to be answered using a qualitative approach. Hence, this chapter discusses and interprets the findings in relation to each research question separately, then the triangulation technique is used to increase the credibility and validity of the findings of both approaches.

7.2 Prevalence of Overweight and Obesity: Research Question One

The first research question asked: ‘What is the prevalence of overweight and obesity among Kuwaiti school children aged 11–14 years old?’ The results from the first phase (items, child’s height, weight, age and gender) indicate that the prevalence of overweight and obesity, based on the BMI measurements drawn from the sample of 635 children aged 11–14, was 25.5% \( (N = 162) \) of the children were overweight, comprising a quarter of the entire sample, of which 46.9% \( (N = 76) \) were male (76) and 53.1% \( (N = \)
were female. Over one third of the participants, 36.5% ($N = 232$), were classified as obese, of which 48.3% ($N = 112$) were male and 51.7% ($N = 120$) were female. The results also show there was no significant difference between female and male children in terms of the prevalence of overweight and obesity, with an almost negligible effect size of 0.02%.

The prevalence of overweight and obesity in children and adolescents has been reported previously in Kuwait (Musaiger et al., 2012; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011). However, after comparing the results of the current study with recent and previous studies conducted in Kuwait, the rate of overweight and obesity among children and adolescents is higher and is getting worse with no signs of improvement (Al-Haifi et al., 2013; Al-Isa, Campbell, & Desapriya, 2010; El-Bayoumy et al., 2009; Zaghloul et al., 2013). For example, in 2010 the prevalence of overweight and obesity among school children was 20.2% and 16.8%, respectively (Al-Isa, Campbell, & Desapriya, 2010), while a recent study conducted by Al-Haifi et al. (2013) among adolescents shows that 50.5% of boys and 46.5% of girls were overweight or obese. Similarly, the current study’s findings show that one quarter of the surveyed children, 25.5% ($N = 162$), were overweight and over one third of the participants, 36.5% ($N = 232$), were classified as obese. Also, the current study was able to include all Kuwaiti provinces to make these findings representative of all Kuwaiti children.

In relation to Kuwait’s Middle Eastern neighbouring countries, studies on the prevalence of overweight and obesity among children and adolescents in the UAE revealed that 14.7% were overweight and 18.9% were obese (Al Junaibi, Abdulle, Sabri, Hag-Ali, & Nagelkerke, 2012); in Saudi Arabia 23% of children were overweight
and 9.3% were obese; (Al Shehri, Al Fattani, & Al Alwan, 2013); in Qatar 32.78% of girls and 31.71% of boys were overweight or obese (Rizk & Yousef, 2012). However, Kuwait ranked among the highest of the Arab-speaking countries for the prevalence of overweight and obesity (Musaiger et al., 2012; Ng, Zaghloul, Ali, Harrison, & Popkin, 2011).

The prevalence of overweight and obesity was also reported in developed countries such as the US, where 17.3% of school children were reported as overweight and 19.4% as obese (Moreno et al., 2013). In European countries, 15.6% of children were overweight and 4.9% were obese (Olaya et al., 2015). In Australia, 22.9% and 23.2% of children and adolescents were overweight or obese, respectively, in 2003 (Martin et al., 2014).

It has also been found that the prevalence of overweight and obesity among children and adolescents in developing countries is growing at a faster rate than developed countries and is reaching alarming figures. The WHO (2015a) stated that the prevalence of overweight and obesity in children was 30% higher in developing countries than developed countries. Gupta, Goel, Shah and Misra (2012) attributed this to rapidly changing eating practices and an increasingly sedentary lifestyle that was common in developing countries. Further, Misra and Khurana (2008) indicated that increasing urbanisation, a reduction in physical activity and nutrition transition in developing countries have contributed to an increase in the prevalence of obesity in children and adults.
7.3 Risk Factors Associated with Overweight and Obesity: Research Question Two

Research question two asked: ‘What are the risk factors for overweight and obesity among Kuwaiti school children aged 11–14 years old?’ The question was answered using both the quantitative and qualitative approaches. In the first phase, several factors were identified from a survey of parents and children as well the BMI measurements of both male and female children, which were shown to increase significantly with respect to age ($F = 19.67, p < 0.001$) and fathers with a low level of education (Cramer’s V = 0.12, $p < 0.001$). Also, having overweight siblings ($F = 19.67, p < 0.001$) and a family history of high cholesterol (Cramer’s V = 0.13, $p < 0.05$) and diabetes was strongly significantly associated with children’s overweight and obesity (Cramer’s V = 0.13, $p < 0.05$). Further, eating food from takeaway restaurants was found to be significantly associated with the children’s BMI ($F = 21.59, p < 0.001$). However, a sedentary lifestyle was significant for male children only ($F = 8.29, p < 0.001$), while walking to or from school was found to be significant for female children only ($F = 5.95, p < 0.001$). In the second phase, several overarching themes were revealed, highlighting the perceptions of the different focus groups and the face-to-face interviewees. Several common factors were noted by the different focus groups in the study. The most common responses indicate that a high standard of living among Kuwaitis, an unhealthy diet, a lack of exercise and sedentary behaviours are significant contributing factors for child obesity. These findings are now discussed separately in relation to the relevant literature.
7.3.1 **Children’s demographic data items.** The age of the children in the current study was predicted to be a risk factor for increased BMI, as the results indicated that as the children’s age increased their weight also increased. The BMI of both female and male children varied significantly with respect to age ($F = 2.464, p < 0.001$). The 11-year-old children had the lowest BMI ($M = 22.79, SD = 5.34$) and the 14-year-old children had the highest BMI ($M = 25.55, SD = 6.16$). This result is consistent with previous studies in Kuwait (Al-Isa & Moussa, 1999; Al-Qaoud & Prakash, 2009). For instance, Al-Qaoud and Prakash (2009) identified that children of 4 years and older in Kuwait were at a higher risk of becoming overweight or obese than children below 4 years of age. Another study in Kuwait on adults found that obesity increased with age, the results showing the heaviest weight (mean BMI of 33.8) at age 60 years and older (Al-Kandari, 2006). However, the current study found that children of 11 years were at a higher risk of becoming overweight or obese than at 14 years old.

To further explain age as a risk factor for overweight and obesity in the Kuwaiti population, a comparison is made of overweight and obesity in children and adults. In the current study, overweight and obesity in children was 25.51% and 36.54%, respectively. In contrast, previous studies have shown that overweight and obesity in adults in Kuwait was 80.4% and 47.5%, respectively (Al Rashdan & Al Nesef, 2010). The findings of this study and previous studies clearly indicate that for the Kuwaiti population, living in an unhealthy contemporary environment has led to an increase in the prevalence of overweight and obesity. In support, Garduño-Diaz and Garduño-Diaz (2014) point out that the Kuwaiti population has access to an unlimited amount of food, including sugars and trans fats; they also engage in limited outdoor activity. These
factors contribute to an obesogenic environment in Kuwait. Therefore, as the age of the Kuwaiti population increases, their weight also increases as a result of their unhealthy environment.

7.3.2 Parents’ demographic data items. In the present study, the parents’ demographic data, such as occupation, level of education, family income and body weight, were investigated. The results indicate that only a father’s low educational level (Cramer’s $V = 0.12, p < 0.001$) was found to have a significant association ($\alpha = 0.05$) with the children’s BMI.

Previous research has identified that children, whose parents have a low education level, have a higher risk of being obese (Bingham et al., 2013; Chaput, Brunet, & Tremblay, 2006; Lamerz et al., 2005; Lazzeri et al., 2011). The findings of these studies are consistent with the current study, as the results revealed that the proportion of obese children whose fathers had an education level less than high school or high school only was greater than the proportion of obese children whose fathers had an education level of bachelor’s or postgraduate degree. Lamerz et al. (2005) point out that children of parents with less than 9 years of education had an almost 3 times higher risk of being obese. Similarly, Larson and Story’s (2009) findings show that a population with a high level of education is more likely to choose healthy food than a population with a low level of education. This could lead to the conclusion that educated people are more likely to be aware of the benefits of eating healthy food and have the capacity to provide it to their children. Brophy et al. (2009) suggest that targeting the education of the caregiver is an important key in tackling obesity in children.
7.3.3 Sibling body weight. Interestingly, the findings from the current study indicated there was no statistical significance between parents’ BMI and children’s BMI. However, having an overweight sibling was found to be an associated factor for both female and male children. A similar study on US children indicated that having an obese sibling was more strongly associated with child obesity than having obese parents (Pachucki et al., 2014). A previous study in Kuwait also found that having an obese sibling was a contributing factor for overweight and obesity in Kuwaiti male children aged 6–10 years (Al-Isa et al., 2010). However, the current study’s findings indicate the effect of overweight sibling(s) on male and female children.

Pender, Murdaugh and Parsons (2011) point out that relationships with others are crucial sources of interpersonal influence that can contribute positively or negatively to health-promoting behaviour. This means that siblings who are physically active and engage less in sedentary activities are more likely to contribute positively to the other sibling’s activity behaviour. Similarly, Granich et al. (2010) state that friends, siblings and parents play a role in shaping a child’s lifestyle, such as playing video games or engaging in physical activity. Thus, there is a documented relationship between child obesity and parents (Boutelle et al., 2012), siblings (Pachucki et al., 2014) and friends (Maximova et al., 2008).

7.3.4 Family history. The present study also found that a family history of high cholesterol and diabetes were significantly associated with children’s overweight and obesity. This association of a family history has been well documented in relation to children’s body weight (Chen et al., 2010; Epstein et al., 2001; Sorof & Daniels, 2002; Umer, 2015). Jung et al. (2009) demonstrate that parents with a family history of
diabetes mellitus, hypertension, renal diseases, hypercholesterolemia and coronary heart disease were all associated positively with the development of obesity in children at a young age. Likewise, Umer (2015) found that children with a family history of high cholesterol were at a significantly higher risk of being obese compared to children with no family history of high cholesterol.

Moreover, Moussa et al. (1999) identified that a family history of chronic diseases, such as diabetes mellitus, bone disease and respiratory problems, are factors associated with child obesity in Kuwait. However, in the current study most of the parents reported only one or two diseases in their families, of which diabetes and high BP were the most prevalent. The proportion of overweight and obese children with a family history of high cholesterol and diabetes was greater than for the normal weight and underweight children.

7.3.5 Food and eating habits. A positive correlation between fast food consumption and children’s weight status for both genders was a significant finding in the current study and is consistent with previous studies (Al-Haifi et al., 2013; Andreyeva, Kelly, & Harris, 2011; Braithwaite et al., 2014; Collison et al., 2010; Duffey, Gordon-Larsen, Jacobs, Williams, & Popkin, 2007; Fraser et al., 2012; Jeffery, Baxter, McGuire, & Linde, 2006; Washi & Ageib, 2010). Wellard, Glasson and Chapman (2012) identified that the consumption of fast food is associated with a 30% excess of sugar, sodium and saturated fat intake above the daily recommendation for all children. Likewise, adolescents who eat fast food more often are most likely to consume unhealthy foods and gain body weight (Fraser et al., 2011). Similarly, adolescents who consume fast food frequently had a higher risk of being overweight or obese in adulthood (Niemeier,
Raynor, Lloyd-Richardson, Rogers, & Wing, 2006). Badran and Laher (2011) stated that the spread of Western-style fast food in Arabic countries has led to increased obesity among the Arab population. As a result of this, the third Arab conference on obesity and physical activity proposed a strategy to reduce the percentage of school children who eat unhealthy fast food more than 3 times per week to address obesity (Musaiger et al., 2011).

7.3.6 Sedentary activities. The current study revealed that a sedentary lifestyle, in terms of TV watching, playing video games and spending time on the computer, was a significant contributing factor for male, but not female, children. Previous studies indicate that the sedentary behaviour of adolescents of either sex was not a significant factor in Kuwait (Al-Haifi et al., 2013) or in Saudi Arabia (Al-Hazzaa et al., 2012). However, in contrast to these studies’ findings, a cross-sectional study of adolescents in Saudi Arabia indicated that there was a positive relationship between the weight of male and female adolescents and a sedentary lifestyle (Al-Nuaim et al., 2012). Nevertheless, looking more closely at children’s sedentary lifestyles, a review of the research provides evidence that increasing any type of sedentary behaviour is associated with decreasing physical activity and the increasing BMI of children and adolescents aged between 5 and 17 years (Tremblay et al., 2011). Supporting this evidence, the following studies indicate that time spent on sedentary behaviour is linked to child overweight and obesity (Falbe et al., 2013; Maher, Olds, Eisenmann, & Dollman, 2012; Morales-Ruán et al., 2009; Stamatakis et al., 2013; Steele et al., 2009). Therefore, the time children spend on sedentary and physical activities should be considered in any strategies aiming to combat the problem of overweight and obesity.
7.3.7 Physical activity. Interestingly, walking to and from school was found to be a significant factor for female children only. Not surprisingly, previous studies in Arab countries have reported that women, in particular, are restricted in their practice of outdoor activities due to cultural beliefs and traditional barriers (Ali, Baynouna, & Bernsen, 2010; Alqout & Reynolds, 2014; Badran & Laher, 2011; Henry, Lightowler, & Al- Hourani, 2004). Further, children across the globe face common problems in walking to and from school, including personal safety and distance (National Center for Chronic Disease Prevention and Health Promotion, 2002; Zhu & Lee, 2009). As a result of these problems, several studies have reported a positive correlation between children who do not actively travel to school and overweight in China (Li et al., 2007), Portugal (Silva & Lopes, 2008) and France (Klein-Platat et al., 2004).

Further, the literature suggests that children with a healthy body weight are those who walk to or from school (Davison, Werder, & Lawson, 2008; Lubans, Boreham, Kelly, & Foster, 2011). Supporting this suggestion, Cooper et al. (2005) point out that children who walk to or from school are classified in a higher physical activity category than those who use transport to travel to school.

7.3.8 Qualitative findings regarding research question two. The participants in the present study highlighted that the following factors contributed to child obesity in Kuwait: a high standard of living among Kuwaitis, overeating, media promoting unhealthy food choices, a lack of physical activity, prolonged TV watching, video game use, a lack of awareness, genetic factors, cultural norms, poor parental food choices, the hot weather restricting outdoor activities, psychological problems and thyroid problems. Similarly, El Derwi, El Sherbiny and Atta (2011) point out that teachers highlighted
similar contributing factors for child obesity in Egypt: a lack of physical activity, high food consumption, hormonal factors, psychological factors and genetic factors.

Likewise, Odum, McKyer, Tisone and Outley (2013) reported that school staff stated that home environment, poor dietary habits, child control of food choices, physical inactivity and sedentary activities contributed to child obesity.

However, in the current study the most common responses given by the majority of participants highlighted strong themes relating to the welfare and high standard of living among Kuwaitis as the main contributing factors for obesity in Kuwait. They believe that the increased SES of the Kuwaiti population has led to increased dependence on servants, use of cars even for short distances, the increased availability of iPods and computer games in every home, and children in Kuwait having pocket money to buy whatever they want at any time with no restriction from their parents.

Al-Muraikhi (2010) stated that the rapid economic growth in Gulf region countries has led to the development of unhealthy lifestyles and has contributed to the emergence of obesity in the Gulf region. In addition, Al-Mohaimeed et al. (2012) found that due to the higher family income in Saudi Arabia, people are more likely to spend more on food and sedentary activities. Likewise, studies conducted in Kuwait by Al Shammari (2007) Al-Isa and Moussa (1999), El-Bayoumy, Shady and Lotfy (2009) and Musaiger (2011) have all documented the influence of the economic transition on the Kuwaiti population’s lifestyle and dietary habits. However, previous studies’ findings in Kuwait were obtained from a single approach—the quantitative method—whereas the current study has utilised a mixed methods approach.
7.4 Perceptions of Children’s Weight: Research Question Three

Research question three asked: ‘What are the perceptions and attitudes of school children, parents, school teachers and Kuwaiti officials to childhood overweight and obesity in Kuwait?’ The study collected data from the two phases of the study to answer this research question. This section will now discuss the children’s and parents’ perceptions of children’s weight and present the findings of the qualitative approach on the perception toward overweight and obesity in children.

7.4.1 Children’s perceptions of their weight. Despite the high rate of overweight and obesity, the children in the current study failed to identify their actual weight, with the disagreement between perceived and actual body weight being higher among females ($K = -0.11, p < 0.05$) compared to males ($K = -0.05, p < 0.05$). This finding is consistent with a previous study conducted in Kuwait showing that 42.4% of overweight or obese children perceived themselves as thin or of normal weight, with this being more prevalent in girls than boys (Hussin, Mohamad, Al-Hamad, Makboul, & Elshazly, 2011). However, the current study examines the perceptions of children in six provinces of Kuwait toward their weight, while the findings of Hussin et al. (2011) represented only one province in Kuwait.

In contrast to the findings of this study, there are a number of studies in the literature that show that male adolescents are more likely to misperceive their weight than female adolescents (Edwards, Pettingell, & Borowsky, 2010; Quick et al., 2014; Sutin & Terracciano, 2015; Standley, Sullivan, & Wardle, 2009; Yang, Turk, Allison, James, & Chasens, 2014).
Children’s misperception of their actual body weight was also reported in the US (Economos et al., 2014), Canada (Chaimovitz, Issenman, Moffat, & Persad, 2008) and the UAE (Musaiger, Zaal, & D’Souza, 2012). Sutin and Terracciano (2015) point out that overweight adolescents who failed to recognise their own weight correctly were more likely to become obese in adulthood. Further, Swaminathan, Selvam, Pauline and Vaz (2013) identified that overweight children who perceive themselves correctly are more likely to try to lose weight. Maximova, McGrath, Barnett, O’Loughlin, Paradis and Lambert (2008) concluded that children and adolescents who share an environment where overweight or obesity is common, such as in the classroom, may see their own overweight as normal and therefore not be a cause for concern.

7.4.2 Parent’s perceptions of their children’s weight. Interestingly, more than half of the parents in the current study strongly agreed (N = 399, 62.8%) that overweight children are unhealthy. However, they failed to recognise the actual body weight of their children as indicated by the kappa statistic (K = 0.15, p < 0.05), showing that 394 children were overweight or obese, but only 225 children were perceived to be overweight or obese. Similar results were found in a previous study conducted in Kuwait. Al-Qaoud, Al-Shami and Prakash (2010) found that the majority of mothers of overweight children in Kuwait incorrectly perceived their children’s body weight.

Furthermore, another study in Kuwait revealed that parents tended to underestimate the body size of their children (Hussin, Mohammad, Al-Hamad, Makkoul, & Elshazly, 2011). Similarly, Sylvetsky-Meni, Gillepsie, Hardy and Welsh’s (2015) study conducted in the US found that most parents agreed that overweight and obesity can
cause serious health problems, but 42% of parents failed to identify obesity in their own children.

Several studies cited in the literature suggest that parents are neither concerned about (Campbell, Williams, Hampton, & Wake, 2006; Towns & D’Auria 2009) nor able to recognise overweight or obesity in their children (Aljunaibi, Abdulle, & Nagelkerke, 2013; Hackie & Bowles, 2007; Hashemi, 2009; Jansen & Brug, 2006; Spargo & Mellis, 2014; West et al., 2008). Recent systematic review findings indicate that approximately 63.4% of parents failed to recognise overweight in their children (Rietmeijer-Mentink, Paulis, Middelkoop, Bindels, & Wouden, 2013).

Not surprisingly, Chen et al. (2014) found in their study that misperception is more likely to occur when children are overweight rather than obese. Hudson, McGloin and McConnon (2012) identified that the child’s age and gender and the parent’s weight status are all factors that could affect parents’ perceptions of overweight in their children. Supporting these factors, Gerards et al. (2014) indicate that 85% of parents underestimated overweight in their own children at 5 years of age. Likewise, Wald et al. (2007) concluded that parents were more likely to perceive their children’s weight correctly for girls and older children.

7.4.3 Qualitative findings regarding research question three. When the focus group and interview participants (teachers and government officials) were asked for their understanding of the terms ‘overweight’ and ‘obesity’, the majority described these as non-normal conditions of increased body weight or fat, which is a problem among children in Kuwait. Also, the participants in all the focus groups and interviews
acknowledged that being obese or overweight could lead to serious health problems, such as cardiovascular disease, diabetes, hypertension, psychological effects, joint pain, decreased mobility and respiratory disorders.

A similar perspective was found in the studies conducted by Lirgg, Gorman and Parish (2014), Derwi, El Sherbiny and Atta (2011), El Stott, Marks and Allegrante (2014), Clarke, Fletcher, Lancashire, Pallan and Adab (2013) and Odum, McKyer, Tisone and Outley (2013), who all reported that teachers recognise that overweight and obesity in school children are serious health problems. Derwi, El Sherbiny and Atta (2011) indicate that teachers are aware that obesity leads to joint diseases, heart diseases, respiratory problems, cancers, psychological problems and can also lead to death. All these diseases were documented in the literature (Kelsey, Zaepfel, Bjornstad, & Nadeau, 2014; Reilly & Kelly, 2011).

Interestingly, a theme that emerged from the 11 focus group discussion participants, but not the interviewees, was that overweight is a normal (non-disease) condition that could be easily controlled through diet and exercise. It seems this perception is widespread, worldwide. Malikm and Bakir (2007) point out that parents in the Emirates perceived overweight children as a sign of high social status, attractiveness, fertility and affluence. Similarly, He and Evans (2007) found that 63% of parents of Canadian children perceived their overweight children as being of normal weight and worried about children being underweight, but not overweight. Francescatto, Santos, Coutinho and Costa (2014) concluded that the increasing prevalence of obesity in all age groups was a factor possibly leading to misperceptions of overweight in children. Therefore, the high
prevalence of obesity in Kuwait could explain why the Kuwaiti population tended to perceive overweight children as being of normal weight.

7.5 Qualitative Findings Regarding Research Question Four

Research question four asked: ‘How do school teachers and Kuwaiti officials perceive the role of the parents, school, teachers, school nurses and government in addressing childhood obesity?’ This question will be answered by a qualitative method only. A number of key overarching themes emerged across the 12 focus group discussions with school teachers and the 12 individual interviews with government officials, which reflected their ideas, thoughts and understandings of the role that parents, teachers, school nurses and the Kuwait Government play in preventing child obesity. The themes of each group are summarised separately and discussed in relation to the literature.

7.5.1 Perceived role of parents. The participants in the current study recognised the importance of the role of the parents in maintaining children’s weight. Various opinions about the parents’ responsibility were revealed as follows: the parent, as a role model, is one of the primary influences on children; the parent can be an advisor and motivator for their children; and the parent can raise their children’s awareness of, or control, their children’s food intake. Several studies have documented the influence of the parents on their children’s behaviour. Loth, Fulkerson and Neumark-Sztainer (2014) and Towner, Reiter-Purtill, Boles and Zeller (2015) found that parents have the ability to support the healthy dietary habits of their children by monitoring or restricting food choice.

Carlson et al. (2010) stated that parents have the power to enhance their children’s physical activity by restricting sedentary activities and supporting participation in sport.
Likewise, Pender, Murdaugh and Parsons (2011) identified that parents are a vital source of interpersonal influence that can increase engagement in health-promoting behaviour.

A common theme emerging from the participants’ responses was that schools should work in cooperation with parents to prevent and manage overweight and obesity. They believe that obesity is not solely a school responsibility and a partnership with the parents is needed to be effective. A similar perspective was proposed by Clarke, Fletcher, Lancashire, Pallan and Adab (2013), El Derwi, El Sherbiny and Atta (2011) and Stott, Marks and Allegrante (2014), who reported that schools need to work with parents to keep children healthy. Olstad and McCargar (2009) concluded that parents should be involved in school obesity interventions to ensure the effectiveness of the school intervention. Sharma (2007) found that all school interventions that documented parental participation had a positive influence on the child obesity rate.

Some participants accused parents of being part of the problem, stating that parents often ignored child obesity. The following different opinions were obtained: parents choose unhealthy food for their children, parents are busy at work so the children are free to buy fast food at any time, and parents lack knowledge on child obesity. In support, the findings from the first phase of the current study indicate that the parents’ misperceptions of the children’s actual weight and the children’s consumption of fast food was significantly associated with children’s body weight.

A similar picture was presented by Odum, McKyer, Tisone and Outley (2013), who identified that school staff tended to blame parents and the home environment as the
most significant contributing factor for child obesity. Supporting the participants’
statements in the present study, the literature also indicates that parents are also blamed
for preschool-aged children’s obesity. Reilly et al. (2005) identified being exposed at an
early age to a sedentary lifestyle and food high in sugar, and the mother’s feeding
practices during infancy, as risk factors of obesity in later life. In addition, Mendoza,
Zimmerman and Christakis (2007) indicate that preschool-age children who watch or
play video games for more than 2 hours per day have a higher risk of being overweight.
Moreover, Pagnini, Wilkenfeld, King, Booth and Booth (2007) found that mothers are
more concerned about their preschool children being underweight than overweight and
are more likely to increase their pressure on children to eat.

Stott, Marks and Allegrante’s (2014) study on teachers’, parents’ and students’
perceptions of childhood obesity in the Middle East indicates that a lack of knowledge,
a lack of supervision and a lack of encouragement from parents in relation to their
children’s health are barriers to the prevention of childhood obesity. Further, the current
study’s findings in both phases indicate the lack of knowledge Kuwaiti parents have
about overweight and obesity in children. Clarke, Fletcher, Lancashire, Pallan and Adab
(2013) identified a lack of parental support as a barrier to the promotion of healthy
dietary habits at school. Likewise, Pocock, Trivedi, Wills, Bunn and Magnusson (2010)
indicate that fatigue and busy parents who work act as barriers to preparing healthy
food, leading to a reliance on fast food to satisfy their children’s hunger. Therefore, the
participants from focus groups and interviews in this study considered changes in
parental behaviours to be pivotal in the fight against child obesity in Kuwait.
7.5.2 School environment influences on children’s weight. The focus group and interview participants believed that schools can have a significant influence on children’s health, particularly in terms of providing health education and raising awareness of health issues, making nutritious food available for students, and providing PE classes to support exercise. Similarly, Clarke, Fletcher, Lancashire, Pallan and Adab (2013) found that school stakeholders believed that schools can play a significant role in preventing childhood obesity due to the large amount of time school children spend in the school environment. Pender, Murdaugh and Parsons (2011) indicate that the environment is a critical factor and can play an important role in shaping individuals’ behaviour. Several other research studies also indicate that schools have a great influence on the student’s level of physical activity and dietary habits (Clarke, Fletcher, Lancashire, Pallan, & Adab, 2013; De Bourdeaudhuij et al., 2011; Elizondo-Montemayor et al., 2013; Lee, Ho, Keung, & Kwong, 2014; Magarey, Pettman, Wilson, & Mastersson, 2013; Safdie et al., 2013).

Interestingly, in the present study schools are blamed for contributing to the unhealthy lifestyles of students in relation to unhealthy food served in school canteens and for not encouraging children to be physically active. All participants in the present study noted that there is no specific policy on nutrition for the school canteen and they agreed that the school canteen served unhealthy foods that were high in sugar and fat. A similar finding was observed in Egypt in the study conducted by El Derwi, El Sherbiny and Atta (2011) that demonstrated that most teachers blamed the school canteen for offering unhealthy food to school children.
Clarke, Fletcher, Lancashire, Pallan, and Adab (2013) stated that a school canteen that offered unhealthy food options was considered an obstacle to the promotion of healthy eating habits for students. Sanigorski, Bell, Kremer and Swinburn (2005) point out that students who frequently buy food from the school canteen are more likely to consume a higher amount of calories from cakes, fast food and sweet soft drinks than students who are non-canteen users. Similarly, Schanzenbach (2009) found that students who purchased their lunch from school cafeterias were more likely to be obese than those who brought their lunch from home.

In addition, despite the benefits of physical activity to students’ health, the participants in the present study commonly noted that the physical activities offered by schools were not enough to support children to be active, specifically for obese children. A result of this lack of support for Kuwait children, according to El-Bayoumy et al. (2009), is that most overweight and obese Kuwaiti children are not physical active. Likewise, Allaafi et al. (2014) indicate that the daily activity requirements of adolescents in Kuwait are not being met. Similar findings were observed in the UAE by Stott, Marks and Allegrante (2014), who identified that school children in the UAE did not receive enough PE classes, as the authors believe that the one or two classes per week are not sufficient to meet the requirements.

Al-Muraikhi (2010) drew similar conclusions from a study of primary schools in Qatar. The author noted the inadequate physical activity education classes that are often replaced with mathematics and science classes. Likewise, El Derwi, El Sherbiny and Atta (2011) revealed that the school environment does not encourage children to be physically active and the time allocated for PE classes is often given over to Arabic or
mathematics classes to meet the curriculum requirements. In contrast, Donnelly et al. (2009) identified that schools that allocated 75 minutes per week to the PE curriculum had a significantly greater impact on children’s daily physical activity and the promotion of a healthy weight.

A review of the literature indicates that no studies conducted in Kuwait have highlighted the school environment as a contributing factor for child obesity. However, the findings of the present study indicate that in Kuwait the food offered by the school canteen and the lack of physical activities in schools are contributing factors for an unhealthy lifestyle, with evidence provided from the teachers indicating that children in Kuwait are not adequately supported to be active, and they often buy junk food from the school canteen.

7.5.3 Perceived role of teachers. The participants thought that teachers have a significant role to play in preventing child obesity in terms of being an advisor on healthy habits and a motivator through being a role model and educating children about the consequences of obesity. They believed that all teachers, not just the PE teacher, could have a positive impact on children’s behaviour, including specialist teachers, such as the language or music teacher. Similar findings were reported by Prelip et al. (2006), who assessed the roles and perceptions of 78 school teachers regarding student nutrition education. Their findings revealed that teachers recognise their role in nutrition education as role models, teachers, motivators and advocates. Likewise, other studies conducted in school settings (Della Torre Swiss, Akré, & Suris, 2010; El Derwi, El Sherbiny, & Atta, 2011; Jodkowska, Ołabąńska, Tabak, & Radiukiewicz, 2009;
Stanfill, 2014) indicate that teachers believe they can play a role in child obesity intervention.

Teachers are the primary people interacting with students at school, and many students are influenced by their teacher’s behaviour. The school’s health initiatives are most likely to be delivered by the teacher to the school students (Cunha, de Souza, Pereira, & Sichieri, 2013; Harrison, Burns, McGuinness, Heslin, & Murphy, 2006; Panunzio, Antoniciello, Pisano, & Dalton, 2007). Each school initiative has a different purpose; however, overall, school teachers play an essential role in influencing a student’s BMI (Donnelly et al., 2009; Lubans et al., 2012), increasing physical activity and self-efficacy (Harrison, Burns, McGuinness, Heslin, & Murphy, 2006), increasing the consumption of vegetables and fruit, decreasing the consumption of sugar-sweetened drinks and chips (Panunzio, Antoniciello, Pisano, & Dalton, 2007) and decreasing student sedentary activities (Kobel et al., 2014).

As discussed earlier in this chapter, the participants in the focus groups revealed that there are no school nutritional programs. As a result of this, teachers in seven focus groups cited the individual efforts of teachers who promoted healthy behaviours in children in relation to healthy food and exercise by placing posters in their classrooms. In four of the focus groups, the participants mentioned that teachers presented a brief session to discuss the promotion of healthy food habits and to talk about the health problems associated with obesity. This effort was exerted individually by the teacher. However, the teachers stated that the poor curriculum, a lack of time and a lack of parental support were barriers to addressing obesity.
Clarke, Fletcher, Lancashire, Pallan and Adab (2013) identified a lack of resources, a lack of funding, a lack of parental involvement and a lack of time as common barriers to promoting healthy eating and physical activity at school. Similarly, Stott (2013) indicates a lack of PE classes and unhealthy foods provided in the school canteen as barriers to addressing child obesity. Likewise, Prelip et al. (2006) found that limited teacher training, a lack of time and a lack of adequate equipment or facilities were barriers to teachers teaching nutrition and PE in classes.

Interestingly, in the present study several teachers acknowledged that students are attracted to unhealthy foods and that they, as teachers, often use junk food as rewards. Similarly, Kubik, Lytle and Story (2005) cited that food as a reward incentive was the most prevalent practice used in school. Clarke, Fletcher, Lancashire, Pallan and Adab (2013) point out that using unhealthy food as rewards for good behaviour is a hindrance to the promotion of healthy eating habits at school.

In addition, Kubik, Lytle, Hannan, Story and Perry (2002) found that school teachers do not model healthy eating behaviour and most commonly used unhealthy food, such as candy, cookies, doughnuts, sweetened drinks and pizza, as an incentive reward for students. Rossiter, Glanville, Taylor and Blum (2007) mentioned that attitudes, knowledge and dietary behaviours of teachers could be a hindrance to promoting healthy habits in students. In contrast, the findings of this study and those in the literature illustrated that the school teacher’s daily practices can have an influence on student behaviours, either positively or negatively. Hughes, Gooze, Finkelstein and Whitaker (2010) make the following three suggestions for schools and teachers to address the barriers related to the prevention of obesity: providing healthy meals and
snacks, increasing training and technical assistance for staff, and developing staff wellness programs.

7.5.4 Perceived role of school nurses. A strong theme that emerged from the focus groups and interviews demonstrated that school nurses were poorly utilised in Kuwaiti schools. All the participants reported that school nurses were limited to providing first aid rather than capitalising on the potential of nurses to serve an important role in health promotion and disease prevention. Similar findings from a qualitative study conducted in the US indicates that parents and teachers perceived that the role of the school nurse was to administer medications and provide first aid (Maughan & Adams, 2011).

Similarly, studies on US parents (N = 369) indicated that the majority of parents (71%) perceived that the role of the school nurse was to provide emergency care, while 31% of parents perceived that nurses had a role to play in identifying health problems or performing health screenings (Kirchofer, Telljohann, Price, Dake, & Ritchie, 2007). Likewise, a study conducted in Greece revealed that 63.9% of teachers (N = 144) thought that the role of the school nurse was to provide first aid and 36% believed that the school nurse should provide treatment and health education (Mastrogiannis et al., 2013).

In contrast, several studies disagreed with the results of the current study (Bonde, Bentsen, & Hindhede, 2014; Wright, Giger, Norris, & Suro, 2013; Gonzaga et al., 2014; Leibolds, 2009; Mehrley & Leibold, 2011; Pbert et al., 2013; Tucker & Lanningham-Foster, 2015; Wright, Giger, Norris, & Suro 2013). These studies indicate that school nurses can play a critical role in promoting children’s health. Kubik and Lee (2013)
identified that school nurses are highly skilled members of staff who have been poorly utilised in the fight against obesity.

The findings of a systematic review on the role and influence of nurses in US elementary schools highlighted many significant activities of school nurses that can be described as disease prevention or health promotion, including screening students’ vision and BMI, educating students and school staff, and tracking student immunisations (Lineberry & Ickes, 2014). Pender, Murdaugh and Parsons (2011) conclude that nurses can work with individuals, families and communities to create the optimal conditions for the expression of a high level of wellbeing.

Moreover, evidence provided in the literature indicates that school nurses can contribute to the improvement of adolescents’ dietary habits (Pbert et al., 2013), increase children’s physical activity (Leibold, 2009; Tucker & Lanningham-Foster, 2015; Wright et al., 2013), decrease sedentary activity (Wright et al., 2013) and help overweight children and adolescents adopt healthy habits (Gonzaga, Araujo, Cavalcante, Lima, & Galvao, 2014). O’Brien (2012) identified that each point increase in school nurses’ activities was associated with a 0.16% reduction in obesity in school students.

Soto and White (2010) point out that the first step toward obesity intervention starts with screening BMI and sending parents a notification. In fact, several studies’ findings indicate that school nurses are screening children’s body weight in their daily practice (Krause-Parello & Samms, 2009; Kubik, Story, & Davey, 2007; Lineberry & Ickes, 2014; Stalter, Chaudry, & Polivka, 2011). Stoddard, Kubik and Skay (2008) stated that school nurses are skilled staff and capable of measuring a child’s BMI in a reliable and
private manner. Likewise, Hendershot, Telljohann, Price, Dake and Mosca’s (2008) study on school nurses (N = 2,629) found that 81% of nurses believed they should set a plan to address overweight in children, and up to 67% of the nurses believed they should measure BMI and send this information home.

Some participants in the current study suggest that school nurses can play an essential role in the prevention of disease, but this role would depend on the nurses’ qualifications and responsibilities. It is true that the literature indicates that the school nurses perceived several barriers to addressing obesity, including a lack of knowledge, a lack of resources, time and support, as well as personal weight challenges (Steele et al., 2011). In addition, a lack of privacy, high workloads and a lack of policy support were seen as key barriers to body weight assessment (Stalter, Chaudry, & Polivka, 2011). Moyers, Bugle and Jackson (2005) found that school nurses perceived numerous barriers to taking a more active role in tackling childhood obesity, including a low level of competence and difficulty in providing counselling and a lack of parental support.

Quelly (2014) summarised that school nurses need further education, policy support and professional mentoring to take part in childhood obesity intervention. Moreover, Melin and Lenner (2009) found that trained school nurses with sufficient knowledge working in a collaborative team were more effective in tackling overweight and obesity in their schools.

Another important barrier noted by two focus groups in the current study was a lack of communication. One participant commented that nurses do not speak Arabic, and that they faced difficulties in communicating with nurses. This is common in the Arabic
world (Al-Khathami, Kojan, Aljumah, Alqahtani, & Alrwaili, 2010; Al-Jarallah, Moussa, Hakeem, & Al-Khanfar, 2009; Almutairi, McCarthy, & Gardner, 2014), since the majority of nurses are foreign and they are not Arabic speakers. Indeed, barriers to communication are considered a serious matter that needs to be addressed to provide a high quality of service and ensure client satisfaction.

Divi, Koss, Schmaltz and Loeb (2007) mentioned that a language barrier can seriously harm patient safety—this harm ranging from moderate to death. Therefore, health providers are often obligated to provide an interpreter service (Green et al., 2005; Suliman & Tadros, 2011). For instance, Suliman, and Tadros (2011) stated that nursing administrations in Saudi Arabia have addressed the language barrier by appointing bilingual staff as interpreters to facilitate effective communication between patients and nurses.

Finally, it was noted in the present study that there are shortages of school nurses. Not surprisingly, this is a global issue and has been reported in many countries, for example, in China (Yun, Jie, & Anli 2010), in India (Saeed, 2010), in Iran (Zarea, Negarandeh, Dehghan- Nayeri, & Rezaei- Adaryani, 2009) and in Saudi (Almalki, FitzGerald, & Clark, 2011). Chan, Tam, Lung, Wong and Chau (2013) attribute the shortage of nurses to individual factors, including job satisfaction, demographic factors, burnout and organisational factors such as work commitment, environment, social support, culture and work demands.

Al-Kandari and Lew (2005) attribute the shortage of nurses in Kuwait to the high turnover rate among foreign nurses, low production of indigenous nurses and the
expansion of health care services. In contrast, Almalki, FitzGerald and Clark (2011) point out that the mass media in Saudi Arabia should engage in promoting nursing as a career, and the education sector should support students financially and reduce the length of nursing training to 3 years, rather than 5 years, to encourage Saudi youth to study nursing as a specialty. Similarly, Chan, Tam, Lung, Wong and Chau (2013) suggest that enhancing the work environment and increasing nurses’ external rewards is needed to address the nursing shortage.

The findings of the current study indicate that the role of school nurses in Kuwait is under-recognised and, not surprisingly, the majority of school nurses in Kuwait are employed from private companies who look for profit rather than the quality of work. The findings of this study show that most of the participants agreed that school nurses do not play a role in either promoting children’s health or the prevention of disease. However, this is not in line with the evidence provided in the literature. It seems that the shortage of nurses, language barriers and qualifications result in the underestimation of the role of school nurses.

7.5.5 Perceived role of the Government in addressing child obesity. The Kuwaiti Government is seen as a key player, in terms of being the authority regulating all government sectors; most participants agreed that the Government has a considerable and influential role to play in addressing childhood obesity. Notably, all participants frequently expressed the need for governmental support to address child obesity. Studies by Ashe et al. (2007), Algazy, Gipstein, Riahi, and Tryon (2009), and MacKay (2011) indicate that governments can use the power of law to lead the fight against obesity. Swinburn (2008) reports that policies and laws are often needed to motivate the
community and implement environmental changes that, ultimately, will have a positive impact on the rate of obesity.

Stanton (2009) points out that governments play a significant role, ranging from their authority over the physical environment in which the population lives, to the facility of public transport and the implementation of policies that influence people’s choices of drinks, food and physical activities.

In terms of the role of the current Kuwaiti Government toward child obesity, participants in the present study cited that some effort had been made to address obesity, including providing health educational programs, school seminars and walking marathons. Al Dossary, Sarkis, Hassan, Ezz El Regal and Fouda (2010) drew a similar conclusion in their study of obesity in Saudi children. The authors identified that the Saudi Arabian Government and local authorities have exerted efforts to address child obesity by implementing educational programs.

In the US, Novak and Brownell (2012) point out that the Government has implemented several policies and programs to address obesity, including nutrition labelling on packaged foods, education and social marketing efforts, calorie labelling on restaurant menus, development of national clinical guidelines and improved access to vegetables and fresh fruit. Taylor, Parento and Schmidt (2014) identify recent government legislation in relation to tackling obesity globally, including tailored tax measures, broader use of counter-advertising and health campaigns, greater restrictions on advertising and marketing to children, increased attention to building a healthy environment, expanded food labelling, more targeted screening and brief interventions,
restrictions and bans on certain foods, expansion of bundled school-based strategies, and the promotion of a sustainable physical environment and healthy food.

In the current study, the participants stated that the Kuwaiti Government provides health clinics for chronic disease management and associated problems such as obesity and smoking. These clinics are open 2 days a week for patients with a chronic disease (diabetes and hypertension) and aim to promote knowledge and prescribe medication if needed. These clinics mainly focus on secondary and tertiary intervention rather than working on primary intervention.

Overweight and obesity are the result of the individuals’ behaviours interacting with the surrounding environment (Stanton, 2009). Therefore, obesity prevention is considered a primary intervention and governments should enact legislation to promote a healthy environment that encourages people to be active and to eat healthy food, rather than going beyond early intervention and working on secondary or tertiary intervention. Hence, the findings of the first phase and the participants’ testimonials in the current study indicate that the Kuwaiti Government has not exerted enough effort to address obesity. This result is congruent with Garduño-Díaz and Garduño-Díaz (2014), who identified that the Kuwaiti Government initiatives and privately-sponsored programs that encourage a healthier lifestyle are limited and often unknown to the Kuwaitis.

Similarly, Stott, Marks and Allegrante (2014) found that a lack of governmental campaigns, a lack of physical activity opportunities, a lack of healthy food options at school, the media and poor role modelling of parents are contributing factors to child obesity in the UAE. Bagchi (2008) attributed the prevalence of overweight and obesity
in the Gulf countries, including Kuwait, Qatar, Saudi Arabia, Bahrain, Oman and the UAE, to the role of the government in these countries, including a lack of consumer education and protection regulations, inadequate food safety and nutrition education for the population, a lack of nutrition policies and strategies, and a lack of coordination and collaboration between the national authorities concerned.

Further, Clarke, Fletcher, Lancashire, Pallan and Adab’s (2013) meta-synthesis of qualitative studies shows there is a lack of government policies and guidance around obesity intervention in primary schools, and that a lot of effort is being wasted due to informal or uncoordinated roles to explain the governments’ low priority for childhood obesity prevention. Likewise, Stott, Marks and Allegrante (2014) conclude that the government agencies in the Middle East do not have established links within community organisations to facilitate healthy lifestyles for children to prevent childhood obesity.

Therefore, the prevalence of overweight and obesity in the Middle East, particularly, has reached epidemic proportions in the last 10 years and this is expected to remain at a high level due to the lack of policies concerning obesity of the governments in Middle Eastern countries.

7.5.6 Perceived contributors to the solution. Despite the fact that the prevalence of overweight and obesity in the Kuwaiti population has reached a particularly high level, neither the Government nor the non-government sector have been visibly involved in the fight to combat this serious problem. Thus, it is necessary to explore the viewpoint of the participants in the current study for a solution to control or reduce the prevalence
of overweight and obesity among Kuwaiti children. All the participants cited the need for cooperation and interaction between the various government ministries, as well as with schools and families, to form a coordinated effort.

Al-Saeed, Al-Dawood, Bukhari and Bahnassy (2007) point out that, for obesity prevention in Saudi Arabia to be successful, it needs a collective effort at all levels—that is, government, school, community and parents, and a commitment to a long-term intervention program to promote healthy dietary habits and physical activity behaviours in school children. Similarly, Stott, Marks and Allegrante (2014) suggest that obesity prevention in UAE children will require the cooperative effort of families, community, schools and government agencies. They must take the initiative and play a role to help positive change come about. Likewise, Korwanich, Sheiham, Srisuphan and Srisilapanan (2007) conclude that a partnership of parents, school staff, the community and health officers is essential to develop a policy to promote healthy eating practices and address the external factors influencing children’s food choices.

The WHO (2015a) identified that overweight and obesity are largely preventable conditions that can be avoided with the help of supportive healthy environments that are essential in shaping healthier choices of food and regular physical activity, which, in turn, leads to a reduction in the incidence of obesity. Gupta, Goel, Shah and Misra (2012) state that lifestyle changes, effective health educational programs, parental initiative in maintaining children’s regular physical activity and social support interventions are the most effective strategies in the treatment of childhood obesity.
The participants of the present study generally felt that the cooperation of all stakeholders is necessary to facilitate and implement an effective solution to the obesity problem. They believe that obesity is a social problem, not an individual problem, and they particularly paid attention to the role of both parents and the school in shaping children’s lifestyles. Stott, Marks and Allegrante (2014) suggest that, to address childhood obesity, parents, schools, the community and government organisations need to understand that the childhood obesity problem exists and there is a need to identify the associated risk factors to encourage a healthier lifestyle.

Further, all the Kuwaiti ministries were seen to be key players in supporting parents and teachers in childhood obesity prevention. All the participants perceived Kuwaiti ministers, including those in the Ministry of Education, Ministry of Interior and Ministry of Information, as having an important role in the mass media. Also, the participants expressed the view that the Ministry of Labor, Ministry of Commerce and Ministry of Youth Affairs should be involved in tackling child obesity. They stated that to address child obesity they need to work as a collaborative team, and this should not be limited to the ministries, but should include all elements of society, expressing the view that it is society’s problem, not just the MOH’s problem.

Mohammadpour-Ahranjani, Abdollahi, Pallan and Adab (2014) conclude that the ME in Iran can contribute to the prevention of child obesity through a review of the curriculum content to increase the opportunities for children to be exposed to active environments at school and at home.
Interestingly, some participants called for the Ministry of Awqaf, which controls and takes responsibility for all Kuwaiti mosques, to educate society through the Islamic religion, because the prophet Muhammad taught and gave advice on a balanced food intake and the importance of maintaining physical activity. Stott, Marks and Allegrante (2014) report similar findings that indicate that making announcements in mosques is an effective way to reach all members of the community and increase awareness of the importance of maintaining a healthy body.

Most importantly, the literature agrees with the current study’s findings that obesity intervention requires the collective efforts of different levels of the community to address child obesity; therefore, it is important to take into account the findings of this study to tackle the problem of overweight and obesity among the Kuwaiti population.

### 7.6 Triangulation of the Findings

A major rationale for using a two-approach method design is to triangulate the findings of both the quantitative and qualitative approaches. Triangulation enhances the trustworthiness of the findings (Creswell, 2007; Yeasmin & Rahman, 2012). In addition, the triangulation technique allows researchers to enhance the validity of the results by comparing the different sources of data on the same topic (Creswell, 2007; Torrance, 2012). Yeasmin and Rahman (2012) point out that one of the specific purposes of triangulation is to attain confirmation of results through the junction of different perspectives. In other words, triangulation helps researchers minimise the insufficiencies of single types of data, as different sources of data verify one another (Yeasmin & Rahman, 2012). In the current study, the findings were combined by the triangulation of different methods (questionnaires, focus groups and interviews) and
data from different sources. In particular, date from children, parents, teachers and government representatives were collected to give a more complete picture than could be provided by one single method, after which the quantitative and qualitative results were validated. A summary of the triangulation across all the data sources follows.

7.6.1 **Prevalence of overweight and obesity among children.** It is noted that all 12 focus groups and all 12 interviewees agreed that overweight and obesity are serious problems in the community. This statement is supported by comments like, ‘Yes, sure, because obesity has increased to more than an acceptable level here in Kuwait and has become a problem in all sectors of Kuwait.’ This agrees with current findings from the quantitative approaches, which show that 25.5% \((N = 162)\) of the children were overweight and over one third of the participants, 36.5% \((N = 232)\), were classified as obese.

7.6.2 **Parents’ lack of knowledge and awareness of child obesity.** An emerging theme from the qualitative data suggests that parents in Kuwait lack knowledge and awareness of overweight and obesity, which is considered a risk factor contributing to child obesity and is also classified as a barrier to addressing obesity in Kuwaiti children. The following is an example of the comments of the participants: ‘The first thing that contributes to childhood obesity is bad habits. Often, these are based on parents’ lack of knowledge about how to teach their children good habits.’

This is also consistent with the quantitative data, which indicates that fathers with a low level of education were significantly associated with obesity in children. Moreover,
parents in the present study were more likely to misperceive their children’s body weight.

7.6.3 Factors contributing to child obesity. Participants in the focus group and interviews described their perceptions of factors that contribute to obesity, which included unhealthy diets (with the frequent consumption of fast food), a lack of exercise, technology use of children (computer, video and remote device use) and a lack of outdoor play. This is supported by comments such as:

There is too much consumption of unhealthy food. There is also a lack of movement because children are watching TV and playing too much PlayStation. Also, the parents contribute to this problem by preventing their children from going outside to play and instead forcing them to stay inside and watch TV and play video games. Also, the over-reliance on transportation to get to the nearest point further contributes to the problem.

These views are similar across the data sets of parents’ and children’s questionnaires, indicating that the majority of children ate unhealthy food from fast food restaurants. In addition, the quantitative results show that children pursue sedentary activities (e.g., watching TV and videos, and spending time on the computer, tablet and phone every day of the week), all of which were found to be significant factors associated with the children’s BMI.

Overall, the triangulation technique in the current study shows that the qualitative data are consistent overall with the quantitative results and, most importantly, validate the current findings. There is agreement on the prevalence of overweight and obesity
among children, and also on the contributing risk factors associated with child obesity, and in the finding of misperceptions of overweight and obesity.

7.7 Chapter Summary

The findings of this study were presented and discussed in this chapter, revealing that a high level of overweight and obesity is still prevalent in Kuwaiti children. This was consistent with the findings of previous studies in Kuwait and developing countries, as well as in developed countries. With respect to variations in the prevalence rate worldwide, empirical studies show that developing countries had higher rates of overweight and obesity than developed countries, due to the rapid economic growth in the last 10 years. As a result of this growth, developing countries have adopted Western-style food, such as fast food restaurants, and have also adopted sedentary activities. Interestingly, parents and their children in the present study are more likely to underestimate the level of overweight and obesity, a phenomenon that was not only seen in Kuwait, but also in other Arab and Western countries. It was also found that weight perception varies according to gender and age. Parents are more likely to underestimate boys’ weight than girls’, and also their youngest child’s weight.

Most of the significant contributing factors found in the present study were reported previously in Kuwait and Arab countries. However, walking to and from school was not reported previously in Gulf countries as a significant contributing factor for child obesity. The current study highlighted that girls who were not active when travelling to school had a higher risk of gaining weight.
The focus group and interview participants were aware that obesity is a major issue in the Kuwaiti community. They were also aware of the contributing factors and associated health problems. The school, teachers, parents and the Government were all identified as important components that can contribute to child obesity intervention. This was similar to the findings of several other studies. However, some unique findings emerged from the second phase, which had not been reported in Kuwait previously. These include the view that the school canteen and the PE offered in schools do not support the adoption of a healthy lifestyle, findings that were also reported in the Emirates, Egypt and other Western countries. In addition, the present study found that teachers underestimated overweight in school children, citing this as normal or healthy. This tendency was also explained as a cultural norm, as in Arabic countries overweight children are considered of healthy weight and overweight is considered a sign of beauty.

Moreover, unique findings emerged from the participants in the second phase of this study indicating that school nurses were under-utilised, which was not consistent with the literature in the Western world, as several existing studies found that the school nurse can implement several activities that could be considered obesity intervention, including BMI screening, counselling and health education. Further, the Government in Kuwait has not exerted enough effort to address child obesity compared to Western countries.

The triangulation of the two methods was described in this chapter to give more validity to the findings of this study. The triangulation revealed that the findings of both approaches were consistent in relation to prevalence, perception and the contributing factors to overweight and obesity. This chapter completes the review of the current
findings in relation to the literature, which gives more clarity and strength to the findings of the current study. The next chapter will present conclusions and recommendations, including the thesis summary, strengths, limitations, recommendations and suggestions for further studies.
Chapter 8: Recommendations and Conclusions

This chapter concludes the research thesis. This thesis discusses the high prevalence of overweight and obesity in Kuwaiti children. In particular, the research questions focus on the prevalence, risk factors and perceptions of this epidemic. Two methods are used to answer the research questions. This concluding chapter presents the strengths and limitations of this research and also suggests future research directions. Finally, recommendations are made in regard to Kuwaiti Government regulations, schools, teachers, nurses and parents.

8.1 Strengths of the Study

To our knowledge, this is the first study on child obesity to be conducted in the Gulf region using two approaches, quantitative and qualitative, with different data collection tools, including questionnaires, focus groups and interviews with the participants (being male and female children, parents, teachers and representatives from the MOH and ME). In addition, the study involves all Kuwaiti provinces to ensure the sample is representative of all sectors of Kuwait. Most importantly, the results build on the existing literature on child obesity in the Gulf region.

Another important strength of the present study is that overweight and obesity were identified by using accurate BMI measurements and were classified according to the WHO (2007) weight percentile. The weight measurements were taken by qualified nurses who helped the research through data collection. The weight of all the children was measured using an electronic scale (with a digital reading) to ensure accuracy; the scale was calibrated before measuring the children’s weight. Only one electronic scale
was used for all 12 schools to ensure the validity of the weight measurements. Therefore, every two schools took one week for the data collection.

Most importantly, previous studies on child obesity in Kuwait focused on quantitative analysis rather than using the two approaches, and they report the statistical results with further exploration. Therefore, the two-approach method is considered the main strength of the current study. It allows the researcher to use different tools and to target different populations to explore their perspectives, and also to use triangulation, by combining the quantitative and qualitative data, to validate the findings of this study. Yeasmin and Rahman (2012) emphasise that triangulation is an important technique that is used to increase the rigidity and validity of the findings.

As a result of using the two approaches, this study has highlighted new and unique findings in Kuwait. These findings might help to reduce the high rate of overweight and obesity among school children. The findings are as follows:

1. Schools have a significant role in addressing the issue of obesity among school children, but they have failed in this by providing dietary options that have high fat and sugar content and limiting physical activities.

2. The Kuwaiti Government has not exerted enough effort to address child obesity, and there were minimal government initiatives regarding child obesity.

3. There has been poor utilisation of nursing staff in schools, with evidence of an inadequate number of nurses, and the role of the school nurse has been
limited to first aid and treatment only, rather than capitalising on their preventative capacity.

4. Teachers have a poor understanding of the prevalence and implications of overweight in children and often see them as being of normal weight.

All these findings were obtained from the focus groups and interviews. This shows that, in Kuwait, qualitative studies were needed in relation to child obesity to explore Kuwaitis’ perceptions of child obesity. Therefore, all participants in the second phase were very interested to express and share their perceptions of child obesity. All participants stated that this was their first chance to take part in a research study. Most significantly, many qualitative research studies have limitations in terms of the number of participants, hence, the current study addressed this issue by conducting 12 focus groups (N = 80 participants) and 12 interviews to ensure that a large number of participants had the opportunity to participate in this study.

8.2 Limitations of the Study

This study was limited to a sample of middle school students attending public schools in all Kuwaiti provinces. Therefore, the results may not be applicable to students in private education settings. This is a very important limitation of this study, as the existing literature indicates a positive link between high SES in developing countries and child obesity (Collins et al., 2008; El-Bayoumy et al., 2009; Groeneveld et al., 2007; Maruapula et al., 2011; McDonald et al., 2009). Most private schools in Kuwait demand high enrolment fees, therefore, only the most affluent children in Kuwait are enrolled in a private school. Poskitt (2009) identified that high family income increased the
availability of sedentary activities, which in turn decreased children’s physical activity. Therefore, as this study is limited to children in government schools, this might mean that the majority of the children who participated in this research are in the lower family income classes.

Another limitation is that all school nurses in the selected schools declined to take part in this study. This is because they were hired by private companies and, according to the regulations of the contract, they are not allowed to participate in research studies or share their thoughts with others. Therefore, this limitation meant that it was not possible to identify the opinions of school nurses on child obesity among school-aged children in Kuwait. Therefore, the research questions related to the role of school nurses in tackling child obesity were answered from the other participants’ perspectives.

The parents’ and children’s questionnaires were closed-ended questionnaires, which meant that participants could not add further comments on the questions. A review of the literature shows that no previous studies have been conducted that include focus groups or interviews with parents to elicit more in-depth information on their perceptions and attitudes toward child obesity. Draxten, Fulkerson, Friend, Flattum and Schow (2014) point out that parents have a huge influence on their children’s behaviour, especially school-age children, as they are not yet independent in their behaviour.

Other important limitations include the self-reporting of parents’ weight, rather than taking actual weight measurements for the parents, which implies that parents might have given false information on their child’s weight. Hence, the self-reporting of weight
by parents may hinder the comparison of children’s weight with their parents’ weight. The findings of the studies conducted by Wrotniak, Epstein, Paluch and Roemmich (2004) and Boutelle, Cafri and Crow (2012) provide evidence to indicate that there is a positive link between the parents’ weight and the children’s weight. Hence, the present study indicates that the parents’ self-weight report is a weakness of this study. In addition, the questionnaire did not identify whether it had been completed by the mother or the father and, as fathers play a different role and have different perspectives on child obesity to mothers, this is also considered a limitation of this study.

Moreover, in this study, the survey used for the children had been greatly modified which might affect the reliability and validity of the survey. Although many studies have used specific questions which differed from the original survey, it is recommended that future studies use a valid and reliable child questionnaire. In addition, every study is restricted by a time frame. The time constraints upon this study meant that it was not possible for the researcher to engage in more comprehensive research. Further, the sample recruited for the research was huge, comprising 635 children and their parents, as well as more than 80 participants in the second phase. Additionally, the sample for this study was recruited through convenience sampling, which has the disadvantage of under-representing the entire population.

8.3 Recommendations of the Study

This study was conducted to produce recommendations for the Kuwaiti community. The findings of the study led to several recommendations in relation to the incidence of overweight or obesity among children in Kuwait. These recommendations should be taken into account to develop a strategy that could help to fight child obesity. Therefore,
the following recommendations have been made to ensure that the entire society is involved and contributes to addressing child obesity.

8.4 Recommendations for Policy

The Government can implement laws and regulations to build a healthy environment that helps children adopt a healthy lifestyle. No action can be taken without government support; therefore, all the ministries of the Kuwaiti Government can play a role in the reduction of child obesity. Each ministry has different responsibilities toward child obesity, therefore, separate recommendations are made for each ministry.

8.4.1 Ministry of Health. The prevalence of obesity and associated health consequences has negatively impacted the Kuwaiti health system, with Kuwait being ranked among the countries with the highest rate of overweight and obesity for all age groups. Hence, to raise community awareness of the consequences of child obesity, it is recommended that medical health care providers in each suburb provide workshops and lectures on these health consequences and also place posters about the effects of child obesity in prominent areas. Further, it is recommended that health care providers measure the BMI of preschool children either in the healthcare centre or through home visits. Leaflets about child obesity can be distributed during home visits. More importantly, the MOH should work on improving staff knowledge and skills to help them in their role as health educators to raise community awareness of health, in general.

8.4.2 Ministry of the Youth/Sports and Ministry of Public Works. There are many empty squares in all regions of Kuwait where parks or playgrounds could be built to
help children and their families increase their physical activity. Fan and Jin (2013) suggest that adding a neighbourhood playground and park will help children become fit and reduce the risk of obesity. Moreover, Blanck et al. (2012) point out that access to parks and recreational facilities increases the opportunities for children to be physically active, stating that the health and wellbeing of children is influenced by the environment in which they live, study and play, hence, the provision of parks and playgrounds is an important step in childhood obesity prevention. As another recommendation, it is suggested that the Ministry of Public Works should embark on projects such as building walking paths for school-going children. This would be a very important step in helping children improve their physical activity, as indicated by the findings of this study that show that female children who are not physically active when going to and from school have a higher risk of becoming obese. Findings from similar studies show that children who walk to school are more likely to be active.

8.4.3 Ministry of Commerce and Industry. The Ministry of Commerce and Industry plays an important role in controlling food industries; all food imported into the state of Kuwait is under the responsibility of the Ministry of Commerce and Industry. Therefore, introducing regulations to force food industries to include nutrition labelling on their packaging of food products would help consumers to increase their awareness of their food intake. Magnusson (2010) concludes that nutrition labelling has the capacity to allow consumers to make healthier choices and is an incentive for the enhancement of the nutritional quality of commercial guidelines. Hawkes (2008) indicates that the regulation of nutrition labelling has the potential to encourage the food industry to supply healthier food. In addition, imposed regulations on fast food
restaurants to introduce a calorie labelling menu to increase consumer awareness of fast food is an important step, taking into account the fact that the current study provides evidence to indicate there is a positive link between fast food consumption and obesity among children.

### 8.4.4 Ministry of Awqaf and Islamic Affairs

The majority of the Kuwaiti population is Muslim. Muslims pray 5 times every day and also have a weekly congregational prayer time on Fridays. This weekly prayer time gives the Imam of the mosque the opportunity to advise the worshippers about Allah and life’s needs. It could provide an opportunity to raise the awareness of the Kuwaiti population of health and how to balance energy intake and energy output.

### 8.4.5 Ministry of Information

The media in general has a great influence on society. The Ministry of Information specifically has the ability to use all mass media, including radio, newspapers and TV, to increase the knowledge of the Kuwaiti population in relation to overweight and obesity. Beaudoin, Fernandez, Wall and Farley (2007) found that mass media campaigns have improved attitudes toward walking behaviours and healthy food choices. Likewise, Miles, Rapoport, Wardle, Afuape and Duman (2001) point out that TV and radio mass media contributed significantly to an increase in exercise levels and vegetable and fruit intake, and to a reduction in snack and fat intake, during the 6 months of the campaign.

Additionally, the Ministry of Information should work on banning unhealthy food advertisements to help Kuwaiti children improve their food choices. Andreyeva, Kelly and Harris (2011) found that children who are exposed to fast food advertisements
significantly increased their BMI. Furthermore, Andreyeva, Kelly and Harris (2011) suggest that TV fast food advertising increases the overall intake of unhealthy food. Therefore, banning unhealthy food advertisements is an important component of the current study’s recommendations.

8.4.6 Ministry of Education. The ME is able to make the most significant contribution to the prevention of child obesity. The ME manages all stages of learning from primary to secondary level. School students represent a large proportion of the community and they spend a large amount of time developing their knowledge, practical skills, dietary habits and physical activity, which may persist into adulthood. Therefore, the following recommendations are made to the ME:

1. The school curriculum should be developed to introduce subjects on health that focus on the fundamentals of disease prevention, the promotion of student knowledge toward overweight and obesity, and the enhancement of student knowledge toward healthy food choices and the benefits of regular physical activity.

2. The number of PE classes should be increased and the PE teacher should be encouraged to participate in the activities with the students, and focus on children who are at risk of overweight.

3. The school canteen should provide healthy food options, such as vegetables, fruit and other healthy food, which is free of sugar and fat. Also, all unhealthy food, such as candy, chocolate and soft drinks, should be banned from school canteens.
4. Playgrounds should be built on under-utilised areas within the school boundaries so students can spend their break time playing and being physically active.

5. Teachers should be encouraged to be role models and health advisors and to deliver programs that promote knowledge of overweight and obesity.

6. School nurses should be supported to engage in BMI screening and encourage other activities, such as health education, to tackle child obesity.

7. Crossing supervisors should be provided, to support a safe environment that could help and encourage students to walk to and from schools.

8.5 Recommendations for Practice

8.5.1 School nurses. The literature review provided evidence to indicate that school nurses can play an important role in designing and implementing intervention strategies to prevent obesity and promote healthy lifestyles to students (Gonzaga, Araujo, Cavalcante, Lima, & Galvao, 2014; Kubik, Story, & Davey, 2007; O’Brien, 2012). Therefore, it was felt that it was important to produce particular recommendations for school nurses to help nurses take part in the obesity prevention program. It is recommended that the MOH and Ministry of Education should cooperate with nurses to address all the barriers currently facing school nurses, such as a lack of knowledge, a lack of time, a lack of resources and a lack of support. For instance, the ME has the responsibility for the education of nurses in Kuwait, so they should rethink this and provide a comprehensive education program to help nurses be more effective in terms of health education. Also, they should ensure that school clinics are adequately
equipped and resourced with the necessary materials to help nurses engage in child obesity prevention programs.

Another recommendation is for the ME to recruit school nurses according to their experience and qualifications. This recommendation will ensure that nurses are able to effectively perform their duties in relation to obesity prevention in school children. In addition, the MOH has a role to play in helping nurses improve their skills and knowledge by providing intensive programs that will restore nurses’ confidence in being involved in primary, secondary and tertiary intervention. The MOH also needs to build relationships between the healthcare providers, parents and school nurses to identify children who are at risk of overweight and need intervention for follow-up.

8.6 Recommendations for Parenting

The aforementioned recommendation aims to increase parents’ awareness of child overweight and obesity to assist them to be active in relation to child obesity prevention. He and Evans (2007) point out that the first step in promoting a healthy lifestyle is to help parents become aware of overweight and obesity in their children.

However, obesity prevention starts as early as infancy. Mothers should ensure that they breastfeed their children exclusively for at least 6 months and continue for 2 or more years, with the introduction of appropriate solid food from around 6 months of age (WHO, 2015b). The current study was unable to determine when and what type of solids were introduced, which in hindsight would have provided important information. Both parents should also be good role models for their children by eating healthy food, reducing or refraining from eating fast food and being physical active. Parents should
also provide healthy food options at home, such as vegetables and fruit. In addition to promoting children’s physical activity, parents should minimise the time they allow them to watch TV or play video games to no longer than 2 hours per day. Instead, children should be taught outdoor games, such as football, that encourages physical activity, such as running. Parents should also reduce the pocket money that they give their children. Giving children money on a daily basis encourages them to buy fast food or sweetened drinks.

### 8.7 Recommendations for Training and Education

Education and training are of vital importance, therefore, it should be a priority in every workplace in Kuwait to provide ongoing training and education for employees to raise the level of their performance and increase their degree of awareness. Hence, there is an urgent need for further education concerning obesity and its management for people who work with children, such as teachers and school nurses. It is recommended that training and education be offered to staff, and that the subject of overweight and obesity be given adequate attention in the curriculum of colleges of education and nursing in Kuwait. Further, there should be an annual evaluation of employees to determine the types of programs and courses they need to develop their skills and knowledge.

### 8.8 Further Studies

This study highlights the need for future research on overweight and obesity of Kuwaiti children. The following recommendations are made for future studies:
1. As indicated by the literature, child obesity in developing countries is linked to high family income, therefore, including private schools is an important step in future studies on Kuwaiti child obesity.

2. This study explored parents’ and children’s perceptions of obesity and risk factors using closed-ended questionnaires, which means that their answers were limited to the questions; hence, future studies should conduct focus groups with parents and children to explore their perspectives in depth.

3. In the current study, school nurses declined the invitation to participate, therefore, their role was explored from the perspective of school staff and Kuwaiti Government representatives. For this reason, it is unfair to make a final judgement on the role of the school nurse in relation to Kuwaiti child obesity. Future research studies need to conduct interviews with school nurses to investigate their perceptions and attitudes toward child obesity.

4. This study was limited to obesity in Kuwait children, although there are expats who are largely the ones working in Kuwait and not involved in this study, with that there is evidence that the effect of race on the children dietary habits, therefore. It would be interesting for a future study to take race into consideration when studying the differences between groups.

8.9 Conclusion of the Thesis

Overweight and obesity in children is a global issue and it seems that no country has yet succeeded in addressing this issue. Therefore, investigating the current situation in regard to overweight and obesity in children by using both the qualitative and
quantitative research approaches was an important decision made at the beginning of the data collection for this thesis. The current study began by implementing the quantitative method by recruiting more than 600 children (both girls and boys) and their parents using two tools for each of them to gain a greater in-depth knowledge on the children’s physical activity, their sedentary activity and their daily food intake.

The quantitative data of the current study highlighted important findings that need to be taken into consideration. This includes the observation that parents and children are more likely to underestimate overweight and obesity, which indicates the seriousness of this issue in the Kuwaiti community and which might hinder efforts to reduce the prevalence of overweight and obesity. The quantitative findings also showed that children in the current study were pursuing unhealthy lifestyles of poor dietary habits and a lack of physical activity. The majority of children spent more than 2 hours per day on sedentary activities, such as watching TV and playing video games. Therefore, children are at a high risk of increasing their weight if they continue to engage in this lifestyle.

One important new finding from the quantitative data that had not been previously reported in the literature on Arab countries shows that the rate of obesity in female children is positively associated with not travelling to school using their own effort, that is, by either walking or riding a bike to school. This can be explained by the cultural barriers that exist for females in Arab countries. However, this phenomenon was also reported in Western countries and some countries in Asia. The literature attributes this to a perceived lack of safety and a lack of government support.
Individuals have a responsibility to develop healthy habits; however, individuals are likely to be influenced by their surrounding environments, and thus the Government should play a role in promoting a healthy environment to help people adopt healthy lifestyles. Most importantly, it should be taken into account that obesity intervention should start early, as children’s behaviours are more likely to be shaped at a young age, and unhealthy behaviours may persist into adulthood. In addition, research has shown that children who are obese are more likely to be obese in adulthood. Therefore, interventions for child obesity are considered to be primary health care interventions, similar to other primary health interventions, such as vaccination.

Another important finding from this study is that the qualitative results highlighted unique findings that, if considered by the Government, would lead to the achievement of positive outcomes. These findings include the observation that schools do not support children to develop healthy dietary and physical habits, as they offer unhealthy foods that are high in sugar and fat content and there are no other healthy options. Research studies show that children who buy food from canteens have a higher risk of being obese than those who take boxed lunches from home. Therefore, stocking healthy foods in school canteens is an important step in improving children’s dietary habits.

In addition, there were not enough physical activity classes to help children reduce their weight. The focus group discussions with school teachers revealed that PE classes did not adequately assist obese children to be active. The literature review for the current study shows that physical activity in schools was positively associated with children being a healthy weight. In addition, children who are more active at school are more likely to retain a normal weight.
Moreover, school nurses were under-recognised and not appropriately utilised, as most participants in the second phase did not consider the school nurse as a part of the solution and believed that nurses were employed for emergency needs only. This is not in line with several studies that found that the activities of school nurses, such as delivering health education and taking body weight measurements, is associated with school children having a healthy body weight. Also, school nurses play a major role in advocating for the creation of a healthy environment for school children. Therefore, the current study calls for school nurses to be a part of the solution.

Finally, the Government was identified as being a key and significant player to lead the fight against obesity. No program or strategies can move forward without government support. Solving the problem of child obesity will reduce pressure on the health system, the economic system and society at large. However, the findings of the current study reveal that the Kuwaiti Government is not exerting enough effort to address child obesity, as it has been identified that there are few government initiatives. Further, the unhealthy food available in school canteens and a lack of health education in the curriculum indicates that the Kuwaiti Government is not using the appropriate power of the law to address child obesity; therefore, the Government should take further steps to combat child obesity.
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Appendix A: Permission from Ministry of Education

To whom it may concern

The sector of public education in the Ministry of Education in Kuwait certifies that the researcher / Mohammed El rashidi is conducting a study of middle-school students (boys & girls 11-14 years) under the title of (obesity) through a questionnaire. For students, parents, students‘ weight and height will be measured. Personal interviews of teachers and administrators will be held to discuss the problems of obesity and suggest solutions.

Assistant Undersecretary for public education

Miss / Mona El-loghany
Appendix B: Plain Language Statement

Dear participants,
You are invited to participate in a research project being conducted by RMIT University in Australia. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate or not. If you have any questions about the project, please do not hesitate to call one of the investigators.

Who is involved in this research project? Why is it being conducted?
MOHAMMAD ALRASHIDI is a student at RMIT University in Australia. He is conducting this research as a part of a PhD degree programme in Nursing. The RMIT Human Research Ethics Committee has approved this research project.

Why have you been approached?
You have been invited to take part in a study to examine the perceptions and attitudes of school teachers, school nurses (where applicable) and government officials from the Ministries of Education and Health regarding childhood obesity in Kuwait.
Please, note your participation is on a voluntary basis and you may withdraw from this study at any time without any questions asked.
You may contact the researcher by phone or email to seek further clarification regarding your participation.

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What is the project about? What are the questions being addressed?
The aim of this study is to establish the prevalence of overweight and obesity in children between the ages of 11 and 14 years in Kuwait; to explore the perceptions and attitudes of school children, their parents and teachers regarding childhood obesity in Kuwait; to explore the role of school nurses and to determine the government policies aimed at addressing overweight and obesity among Kuwaiti school children.

1. What is the prevalence of overweight and obesity among school children aged between 11 and 14 years in Kuwait?
2. What are the perceptions and attitudes of parents and teachers regarding childhood obesity in Kuwait?
3. What government health policies have been formulated to address overweight and obesity among Kuwaiti school children aged between 11 and 14 years?
4. What means of promoting health can be recommended as an outcome of this research to help reduce overweight and obesity among school children?

If I agree to participate, what will I be required to do?
After reviewing and understanding this plain language statement, you will be asked to participate in the focus group discussion, which will be audio-taped and conducted in a private room at the school. The discussion is expected to last for up to 45 minutes.

What are the possible risks or disadvantages?
There are no known risk/harms associated with participating in this focus group discussion. All responses will remain confidential and will be reported as group data, and will have no influence on your employment.

What are the benefits associated with participation?
This project is expected to benefit you directly as a person; however, it will benefit the Kuwaiti school community at large by tackling the health issues of overweight and obesity among school children.

What will happen to the information I provide?
Any information obtained in connection with this project will be reported as group data. The information obtained from this study will be kept in secure storage as a digital
hardcopy under lock and key at RMIT University for five years, and will be published as group data without identifying any of the participants. No personal information will appear in the report.

**What are my rights as a participant?**

• You will be provided with an explanation in relation to this research.
• You have the right to participate or to withdraw at any time in this study without any questions asked.
• The information you provide will be kept strictly confidential and anonymous, and only group data will be reported; therefore, no one will be able to identify any of your responses.

**Whom should I contact if I have any questions?**

You may contact the project supervisor Associate Professor Lina Shahwan-Akl at +613 99257443 (phone) or lina.shahwan-akl@rmit.edu.au (email):

• If you have any questions about this study or your part in it,
• If you have any questions, concerns or complaints about the researcher and/or
• If you feel that there is any other issue that may stop you from participating in this survey.

**What other issues should I be aware of before deciding whether to participate?**

You should be aware that this research would not have proceeded without the approval of the RMIT University Ethics Committee. Gaining informed consent from you as a participant is considered to be a legal requirement. If a research activity proceeds without obtaining each participant’s informed consent, legal action could be taken against the supervisor and/or the researcher.

Confidentiality is an important ethical issue, and only group data will be reported.
Appendix C: Children Questionnaire

1. Province name: ............
2. School name: ..............
3. Age: ...........years old
4. Gender M F
5. How would you describe your weight?
   □ Very underweight
   □ Slightly underweight
   □ About the right weight
   □ Slightly overweight
   □ Very overweight
6. Student weight ..................kg
7. Student height ..................cm
8. On school days, where do you usually get your breakfast from?
   □ Home
   □ School canteen
9. Where do you usually get your lunch from?

- [ ] Home
- [ ] School canteen
- [ ] Shop (outside school)
- [ ] From a friend
- [ ] I don't eat lunch

10. How many times per week do you eat an evening meal together as a family?

- [ ] 0 days
- [ ] 1 day
- [ ] 2 days
- [ ] 3 days
- [ ] 4 days
- [ ] 5 days

11. How often do you eat fruits?

- [ ] Everyday
- [ ] Most days
- [ ] Some days
- [ ] Hardly ever or never

12. How often per month do you eat food from a takeaway (e.g., McDonalds, KFC, pizza, etc.)?

- [ ] Once a month
- [ ] Once a week
- [ ] 2–3 times a week
- [ ] Most days

13. What is your favourite food?

A. ..........................

B. ..........................

C. ..........................
14. How often do you eat your favourite food?

☐ Once a week
☐ 1–3 times a week
☐ 4–7 times a week

15. How do you get to school?

☐ Walking (go to question 17)

16. Do you get to school by?

☐ Car or bus (go to question 19)

17. In the last 5 school days, how many times did you walk to or from school? Please note, walking from home to school and back on 1 day counts as 2 times; walking to school and taking a car home counts as 1 time.

☐ 0 times
☐ 2 times
☐ 4 times
☐ 6 times
☐ 8 times
☐ 10 times

18. How long does it take you to walk from home to your school?

☐ Less than 15 minutes
☐ 15–30 minutes
☐ More than 30 minutes

19. In the last 5 school days, how many days after school did you do sports, dance, cultural performances or play games in which you were physically active?

☐ 0 days
☐ 1 day
☐ 2 days
☐ 3 days
☐ 4 days
☐ 5 days

20. Do you have a TV in your bedroom? ☐ Yes ☐ No
21. How often do you watch TV, videos or DVDs, and/or spend time on a computer, tablet or phone?

- [ ] Every day
- [ ] Every other day
- [ ] A couple of times a week
- [ ] Once a week
- [ ] Less than once a week

22. How many hours per day do you spend watching TV, videos or DVDs in your free time?

- [ ] Less than 1 hour/day
- [ ] 2 hours/day
- [ ] More than 4 hours/day

Thank you
Appendix D: Parents Questionnaire

Demographic data

1. Province name: ................
2. School name: ................
3. Age of your child: ........... years old
4. Gender  □ M  □ F
5. Level of education
   Father
   □ Less than high school
   □ High school
   □ Bachelor’s degree
   □ Postgraduate degree
6. Level of education
   Mother
   □ Less than high school
7. Occupation
Father………………………………………………

8. Occupation
Mother…………………………………………

9. What is the net average monthly income of your family, in Kuwaiti dinars?
☐ Less than 500
☐ 500–750
☐ 750–1000
☐ More than 1000

10. What is the most recent weight of the child’s mother? ………….kg

11. What is the height of the child’s mother? ............. cm

12. What is the most recent weight of the child’s father? .............kg

13. What is the height of the child’s father? ............. cm

14. With whom does the child live?
☐ Both parents
☐ Mother alone
☐ Father alone
☐ Guardian

15. How old was the child when the mother stopped breastfeeding?
☐ 3–6 months
☐ 6–9 months
☐ 9–12 months
☐ 12–24 months
☐ >24 months

16. Does your child have any overweight or obese siblings?
☐ Yes  ☐ No

17. If yes, please specify:
18. How do you rate your child’s body weight?
- [ ] Underweight
- [ ] Normal weight
- [ ] Overweight
- [ ] Obese

19. Do you think that your child might have a weight problem?
- [ ] Yes
- [ ] No

20. Please respond to the following statement ‘Overweight children are unhealthy’.
- [ ] Strongly agree
- [ ] Agree
- [ ] Disagree
- [ ] Strongly disagree

21. Is there a family history of the following health problems? Check all that applies.
- [ ] Diabetes
- [ ] Heart disease
- [ ] Sleep apnea
- [ ] Asthma
- [ ] High blood pressure
- [ ] High cholesterol
- [ ] Joint problems
- [ ] Other……………………………………………………………..

22. Does your child participate in any of the following activities? Please check all that apply.
- [ ] Soccer
- [ ] Swimming
- [ ] Gymnastics
- [ ] Bicycling
- [ ] Household chores
- [ ] Horseback riding
- [ ] Walking
- [ ] Jogging
- [ ] Others……………………………………………………………..

23. If yes how many minutes per day?
- [ ] Less than 30 minutes
- [ ] 45 minutes
24. How many hours per day does your child spend doing the following activities?
Watching TV: .................hrs/day
Playing video games: ............hrs/day
Computer based activities, i.e., Facebook: ............hrs/day

25. Does your child ask for food that he/she saw on TV?
☐ No
☐ 1–2 times per week
☐ 3–4 times per week
☐ 5–6 times per week
☐ 7 times or more per week

26. Does your child skip breakfast three or more times a week?
☐ Yes  ☐ No

27. When does your child usually eat snacks? Check all that apply.
☐ Morning
☐ Afternoon
☐ Evening
☐ Other

28. What snacks does your child eat most frequently?
A. .................
B. .................
C. .................
D. .................

29. How often does your child eat out (i.e., restaurants, fast food) during the week?
☐ None or we rarely eat out
☐ 1–2 times
☐ 3–4 times
☐ 5–6 times
☐ 7 times or more

30. How often does your family eat (main meals) together?
☐ Always
Frequently
Sometimes
Seldom
Never

31. How many cups (80oz = cup) of water does your child drink per day? ........cups
32. How many cups of fruit juice does your child drink per day? ........cups
33. How many cups of skim milk does your child drink per day? ........cups
34. How many cups of whole milk does your child drink per day? ........cups
32. How many cups of soda, lemonade, fruit punch, sport drinks or sweetened tea does your child drink per day? ........cups

Thank you
Hello! My name is Mohammad Alrashidi. I am a student at the RMIT University in Australia. I am doing a project to find out what people your age know about overweight and obesity. When I finish my project it will be part of my degree, called a ‘PhD’. My teacher, Dr. Lina Shahwan-Akl, helped me with my project. She is called my ‘supervisor’. We both are part of the School of Health Sciences, Nursing and Midwifery at RMIT University.

The Ministries of Health and Education, your school principal and your teacher have given me permission to send you this letter to tell you a bit about my project. Once you and your parents have read the letters you can decide if you would like to take part in my study.

If you and your parents agree to join this study you will be asked to answer some questions about your daily food intake and physical activities. You don’t have to write your name on the questionnaire at all, and this way no one will be able to tell who you are. During the lunch break your height and weight will be measured by a nurse. You only will be asked to remove your shoes and will remain in your light school uniform for these measurements. The measurements will be taken in a private room and no one other than the nurse will get to see your measurements.
Remember, you don’t have to take part in this study unless you want to. If you and your parents want to be part of this study, please sign your name below and get your parents to sign as well.

Student Signature:……………………………………..Date:………………

Parent signature:……………………………………….Date:………………

Thank you, Mohammad.
Appendix F: Student Assent Form

I agree to answer the written questions and I agree to have my height and weight measured.

__________________________
Student’s Signature
Appendix G: Parents Information Sheet

Dear parent or guardian:
You and your child are invited to participate in a research project being conducted by RMIT University in Australia. The Department of Education has given approval for your school to take part in this research project. Please read this sheet carefully and be confident that you understand its contents before deciding whether or not to participate. Once you understand what the project is about and if you agree to take part, you will be asked to sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent for you and your child to participate in the research project. If you have any questions about the project, please do not hesitate to call one of the investigators.

Who is involved in this research project? Why is it being conducted?
MOHAMMAD ALRASHIDI is a student at RMIT University in Australia. He is conducting this research as a part of a PhD degree programme in Nursing. The RMIT Human Research Ethics Committee has approved this research project in order to award the researcher a degree.
Why have you been approached?
You have been invited to respond to a survey questionnaire to assist in understanding the factors that contribute to the prevalence of overweight and obesity among children aged 11–14 years. Please note that your participation is on a voluntary basis. You may contact the researcher by phone or email to seek further clarification regarding your participation.

What is the project about? What are the questions being addressed?
The aim of this study is to establish the prevalence of overweight and obesity in children between the ages of 11 and 14 years in Kuwait; to explore the perceptions and attitudes of school children, their parents and teachers regarding childhood obesity in Kuwait; explore the role of school nurses and to determine the government policies aimed at addressing overweight and obesity among Kuwaiti school children.

1. What is the prevalence of overweight and obesity among school children aged between 11 and 14 years in Kuwait?
2. What are the perceptions and attitudes of parents and teachers regarding childhood obesity in Kuwait?
3. What government health policies have been formulated to address overweight and obesity among Kuwaiti school children aged between 11 and 14 years?
4. What means of promoting health can be recommended as an outcome of this research to help reduce overweight and obesity among school children?

If I agree to participate, what will I be required to do?
Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. We expect that the questionnaire will take no more than 20 minutes to complete. Some example of the questions asked include:

1. Are overweight children are unhealthy?
2. Do you agree to allow schools to measure the height and weight of your child to determine your child's body mass index?
Your decision to participate or not will in no way impact your current or future relationship with the school your child attends. You will also be asked to provide consent for your child to participate in this study. We will only allow your child to take part if they consent to participate, and if you consent to this participation. Their participation is voluntary as well, and they can withdraw from this study at any time without any questions asked.

**What will you and your child will be asked to do?**

1. You will be asked to sign a consent form to give us permission to invite your child to participate in this study.

2. You will be asked to fill out the Home survey; this will require approximately 20 minutes of your time.

3. Your child will be asked to complete a survey at home, which asks questions relating to nutrition, physical activities and general health.

4. Your child’s height and weight will be measured at school by a registered nurse.

These height and weight measurements will be taken in a PRIVATE room to ensure privacy and confidentiality. The measurement results will NOT be shared with the child or with anyone else at the school. Children who take part will be asked to remove their shoes and coats and will be weighed in light indoor clothing. Any cultural needs of the child will be respected. Children will not be forced to take part in these measurements if they do not wish to do so.

Body mass index is a number calculated by dividing the child’s weight over the child’s height squared. It is a way of checking to see if a child is at a healthy weight. Body mass index is a useful tool that enables health professionals to:

- Identify individuals who may be at nutritional risk
- Identify individuals who are at risk for eating disorders
- Identify individuals who are underweight, overweight or obese
- Encourage discussions between families and health care providers about their child’s growth and development
- Promote healthy eating and physical activity in the school environment
What are the possible risks or disadvantages?
We do not expect anyone to become distressed as a result of completing the questionnaire; however, if you find that the questions cause you any discomfort I would ask you to stop responding to the questionnaire. Please note that you do not have to complete any question(s) that you feel uncomfortable answering.

What are the benefits associated with participation?
There will be no immediate or direct benefit to your child or to you; however, this study will benefit our current understanding of factors contributing to childhood obesity, and the researcher hopes that it will provide a clear understanding of obesity and overweight among students.

What will happen to the information I provide?
Any information obtained in connection with this project that might identify you will remain confidential. The questionnaire you complete will remain entirely anonymous—you will not be asked to provide any potentially identifying information. The information obtained from this study will be kept in secure storage as a digital hardcopy under lock and key at RMIT University for five years, and will only be published as group data without identifying any of the participants. No personal information will appear in the report.

What are my rights as a participant?
• You will have the purpose of the research explained to you.
• You will be given an explanation of any benefits relating to the study.
• You have the right to participate or to withdraw at any time during this study without any penalty or loss.
• The information you provide will be kept strictly confidential and anonymous; only group data will be analysed and no one will be able to identify your responses.

Whom should I contact if I have any questions?
You may contact the project supervisor Associate Professor Lina Shahwan-Akl at +613 99257443 (phone) or lina.shahwan-akl@rmit.edu.au (email):
  • If you have any questions about this study or your part in it,
  • If you have questions, concerns or complaints about the researcher and/or
• If you feel that there is any other issue that may stop you from participating in this survey.

**What other issues should I be aware of before deciding whether to participate?**

You should be aware that this research would not have proceeded without the approval of the RMIT University Ethics Committee. Gaining informed consent from you as a participant is considered to be a legal requirement. If a research activity proceeds without an individual’s informed consent, then legal action could be taken against the supervisor and/or the researcher.

Confidentiality is an important ethical issue, and only group data will be reported.
Appendix H: Parents Consent Form

**Parent Consent Form**

1. I have had the project explained to me, and I have read the information sheet.

2. I agree to complete the questionnaire provided in relation to the study entitled *Prevalence of Overweight and Obesity among School Children in Kuwait: A Call for School Nurses.*

3. I give permission for my child to participate in the research project entitled *Prevalence of Overweight and Obesity among School Children in Kuwait: A Call for School Nurses.* I understand that, in order to participate in this project, my child must also agree to participate. I understand that my child and/or I can change our minds about participating in this study and that we can withdraw from this study without any questions asked.

4. I acknowledge that:

   (a) I understand that my participation is voluntary, and that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).

   (b) The project is for the purpose of research. It may not be of direct benefit to me.

   (c) The privacy of the personal information I provide will be safeguarded and only disclosed where I have consented to the disclosure or as required by law.

   (d) The security of the research data will be protected during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to RMIT University. Any information that might identify me will not be used.

---

**Participant’s Consent**

Participant: ___________________________ Date: ________________

(Signature)
Appendix I: School Community and Officials Consent Form

Official and Teacher Consent Form

1. I have had the project explained to me, and I have read the information sheet.

2. I agree to participate in the research project as described.

3. I have read and understood the information in the ‘Letter to Participants’ provided for the research study *Prevalence of Overweight and Obesity among School Children in Kuwait: A Call for School Nurses*. I agree to participate in the interview/focus group discussions for the agreed length of time required and I also give my consent for this discussion to be recorded.

4. I acknowledge that:

   a. I understand that my participation is voluntary and that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).

   b. The project is for the purpose of research. It may not be of direct benefit to me.

   c. The privacy of the personal information I provide will be safeguarded and only disclosed where I have consented to the disclosure or as required by law.

   d. The security of the research data will be protected during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to RMIT University. Any information that might identify me will not be used.

Participant’s Consent

Participant: __________________________  Date: ______________

(Signature)
Appendix J: Focus Group Discussion Questions

School Focus Group Interviews

1. Describe to me your understanding of the words ‘overweight’ and ‘obesity’.

2. Does overweight or obesity cause serious health problems for children? If yes what are they? Please explain.


4. Do you think schools influence the health of children? If yes, in what way?

5. Do school children buy lunch at school? What sort of foods is sold at the school canteen? What do you think the children normally buy at school?

6. Does the school canteen sell foods and/or beverages that are high in sugar and/or fat?

7. Have you heard of any nutrition policies at your school (e.g., No soda allowed to be sold on campus; high fat and )?

8. Are school children active at school? What do they do (e.g., participate in P.E., join sports teams, play on the playground, etc.)?

9. Do schools have a responsibility to support kids in being healthy, eating a healthy diet and being active physically? In what way should they do this?

10. Does your school have a school nurse? If so, do they play a role in tackling this health issue? Please explain.

11. Do you believe that you as school teachers and parents have a role to play in controlling overweight and obesity in school children? Please explain.
Appendix K: Interview Questions

Government Official Interview

1. Describe to me your understanding of the words ‘overweight’ and ‘obesity’.

2. Does childhood overweight/obesity cause serious health problems? If yes what are they? Please explain.

3. What do you think contributes to overweight and obesity in children?

4. Are you aware of any government initiatives to control overweight and obesity? What are they? Please list/describe them.

5. Who should contribute to or assist in tackling this health issue? The school? The community at large? The government?

6. Do schools in Kuwait employ school nurses?

7. Do you believe that a school nurse has a role to play in controlling overweight and obesity?

8. Is there anything else that you would like to add?

Thank you
Appendix L: Letter of Certified Translation

Al Diwan Translation Center do hereby certify that it translated the research data collected by the individual and group interviews performed by Researcher Dr. Mohammad Al-Rashidi.

Knowing that a dedicated, approved, specialized translation team performed the translation from Arabic into English.
Appendix M: Ethics Approval Letter

Notice of Approval

Date: 5 September 2012
Project number: 23/12
Project title: Prevalence of overweight and obesity among school children in Kuwait: A call for school nurses
Risk classification: More than low risk
Investigator: A/Prof Lina Shahwan-Aki
Approved: From 5 September 2012 To 31 December 2013

Terms of approval:
1. Responsibilities of Investigator
   It is the responsibility of the above investigator to ensure that all other investigators and staff on a project are aware of the terms of approval and to ensure that the project is conducted as approved by HREC. Approval is only valid whilst investigator holds a position at RMIT University.
2. Amendments
   Approval must be sought from HREC to amend any aspect of a project including approved documents. To apply for an amendment use the request for amendment form, which is available on the HREC website and submitted to the HREC secretary. Amendments must not be implemented without first gaining approval from HREC.
3. Adverse events
   You should notify HREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
4. Plain Language Statement (PLS)
   The PLS and any other material used to recruit and inform participants of the project must include the RMIT university logo. The PLS must contain a complaints clause including the above project number.
5. Annual reports
   Continued approval of this project is dependent on the submission of an annual report.
6. Final report
   A final report must be provided at the conclusion of the project. HREC must be notified if the project is discontinued before the expected date of completion.
7. Monitoring
   Projects may be subject to an audit or any other form of monitoring by HREC at any time.
8. Retention and storage of data
   The investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.

In any future correspondence please quote the project number and project title above.

A/Prof Barbara Polus
Chairperson
RMIT HREC

cc: Dr Peter Burke (Ethics Officer/HREC secretary), Mr Mohammad Atrashidi (researcher).
K:/Governance/RMIT Ethics/HREC/Applications database/2012/23-12/23-12 notice of approval.doc
Appendix N: Supporting Letter from Ministry of Health

MINISTRY OF HEALTH
Kuwait Institute for Medical Specialization
www.kims.org.kw
E-mail: info@kims.org.kw

Ref.: kims/1812
Date: __________

April 8, 2012

Lina Shahwan-Akl
Director, Post Graduate Studies
School of Health Sciences
RMIT University
Plenty Road, Bundoora
Victoria 3083, Australia

With regards to your letter dated on March 23, 2012 concerning Mr. Mohammed AlRahsidi, student number 3308134, enrolled PhD candidate at the Royal Melbourne Institute for Technology (RMIT) University, School of Health Sciences. Entitled thesis “Prevalence of obesity and overweight among school children aged 11-14 years in Kuwait.”

Please be advised that KIMS will support and assist Mr. Mohammad AlRahsidi for all his needs in order for him to be able to progress in his research that will provide beneficial information to the public health and health policy in the state of Kuwait.

If you have any questions please do not hesitate to contact us at kims.kuwait@gmail.com

Best Regards,

Dr. Ibrahim A. Hadi
Secretary General
Kuwait Institute for Medical Specialization