

**Factors associated with breakfast skipping and AHB skipping
among adolescent Saudi girl In Tabuk City, Saudi Arabia**

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Abstract

Background: There is clear evidence for the importance of eating at breakfast time for both physical and psychological health in all ages, but particularly in young people, where the impact on educational attainment has also been highlighted. However, there is clear evidence across a number of cultures that breakfast is skipped regularly by adolescents, in particular. The reasons for this are likely to be complex and are not fully understood. Whilst skipping is seen in many societies and some common drivers such as education levels of the parents, peer pressure, socioeconomic status have been identified, there are also likely to be strong cultural elements, meaning that such research must be firmly embedded within a defined culture to gain a complete understanding of the issues involved. Therefore, this study was conducted amongst adolescent girls in Tabuk City, Saudi Arabia.

Aim: To estimate breakfast skipping and AHB skipping rate and explore the reasons and factors behind this practice among adolescents' females' students aged 16-18 years old in Tabuk city

Methodology and Methods: The study used a mixed method sequential design in order to identify the rates of breakfast through quantitative approaches and then to explore the reasons for skipping using a qualitative approach. Initially, 617 adolescent girls aged between 16 and 18 were recruited for the study from 3 Schools. Each was asked to complete a short questionnaire that explored their consumption behaviour around breakfast time. FGD interviews were achieved with 6 FGDs (3 groups of students known as Breakfast skippers and AHB skippers; and 3 groups of students' mothers whose daughters are AHB and breakfast skippers) to explore the motives and causes for skipping breakfast meal, along with viewpoints on the relevance and awareness of the breakfast meal among the girls.

Findings: Using internationally standardised definition of breakfast skipping as being – a lack of breakfast consumption on 4/7 days per week, it was found that 31.8% of girls fell into the category of breakfast skippers with 48.8 % identified as at home breakfast (AHB) skippers. The survey identified that age, friend's behaviour, knowledge about breakfast importance and poor food choices such as tea consumption are significantly associated with both breakfast skipping and AHB skipping. Also, residential status was significantly associated with breakfast skipping. Breakfast skipping was linked to causes such as a loss of appetite, a poor sleeping schedule, and frequent night-time mobile use, according to FGDs.

Discussions: The main sociocultural factors for school girls skipping breakfast were a lack of dietary awareness about breakfast, a desire for lunch and snacking, and the imitation of their parents' and friends' breakfast skipping behaviour. Saudi mothers have blamed their daughters' breakfast skipping on a lack of dietary awareness, parental management challenges, teen autonomy, Saudi society, and the power of social media and smart devices. AHB is often skipped due to mother's work schedules and a lack of time to prepare breakfast. Furthermore, the unhealthy school food and environment led to students' skipping breakfast.

Conclusions: The results obtained from this study were valuable to stakeholders in the education as well as nutrition sectors as they seek to deal with the situation. Also, the study offered a representative picture of breakfast-related habits of adolescents and represents a basis for designing and implementing appropriate measures in order to promote dietary education and health in adolescents.

Keywords: Breakfast; skipping; adolescents; Saudi Arabia; females; home; mothers; time; dietary; Tabuk; factors; education; parents; meal; health; school.

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ABBREVIATION

SA	Saudi Arabia
AHB	at home breakfast
SH	School Healthcare Department
MOE	Ministry of Education
WHO	World Health Organization
CDC	Centers for Disease Control and Prevention
BMI	Body Mass Index
FAO	Food and Agriculture Organization
EMR	Eastern Mediterranean Region
EAR	estimated average requirement
mg	Milligram
WT	Weight
HT	Height
FDA	Food and Drug Administration
GCC	Gulf Cooperation Council
HFSS	high fat, sugar and salt
USA	United states of America
UK	United Kingdom
TPB	Theory of Planned Behaviour

SES	Socio-economic status
h	hour
DGR	Dietary Guidelines Recommendations
GBP	British pound sterling
SBP	School Breakfast Program
USDA	United States Department of Agriculture
µg	microgram
g	gram
FGD	Focus Group Discussion
PIS	Participant Information Sheet
CRFs	Case Report Forms
SPSS	Statistical Product and Service Solutions
REC	Research Ethics Committee
GCP	Good Clinical Practice
TA	thematic analysis
FNS	Food and Nutrition Service
SLP	school lunch program
UAE	United Arab Emirates
MoH	Ministry of Health

Chapter 1: Introduction

1.1 Background

Adolescence is a fundamental growth period for a child in which there is an increased demand for nutrients due to rapid growth taking place in the body (Lehalle, 2020). As children enter adolescence, independence influences food intake (Auld et al., 2002; McKeown and Nelson, 2018; Egg et al., 2020), and adolescents express increased control over their food consumption (van Nee, van Kleef, & van Trijp, 2021). Whilst poor dietary habits can impact on wellbeing in this group, there is also additional importance as developed during this period of time can become established and persist throughout adult life (Videon and Manning, 2003). Such behaviours can be seen in all cultures, including Saudi Arabia where this study will be based. The nutrition initiatives neglecting adolescents in utmost developing nations. Evidence from the developed and developing nations specifies that there is an association between foetal under-nutrition and increased risk of several chronic illnesses in later life.

There is considerable evidence to support reports that breakfast is the most widely missed meal by adolescents (Moreno et al., 2010) and that missing breakfast is associated with greater snacking and increased risk of over-weight and obesity (Haines et al., 2007; Millimet et al., 2010). According to (WHO), Malnutrition refers to deficiencies or excesses in nutrient intake, imbalance of essential nutrients or impaired nutrient utilization. The double burden of malnutrition consists of both undernutrition and overweight and obesity, as well as diet-related noncommunicable diseases. Brugman et al., (1998) Addressing the adolescent's nutrition needs, possibly will be a vital step in the direction of breaking the cycle of intergenerational malnutrition, poverty, and chronic illnesses (World Health Organization (WHO), 2006). There have been many

attempts to try to educate young people about the importance of good nutrition and much of this has been based around schools. Whilst there is still a lack of such programmes within Saudi Arabia (SA), some attempts have been made in this direction. For example, Fahlman et al. (2008), performed a pilot study to scrutinize the consequence of nutrition intention intervention on nutritional awareness as well as behaviour transformation in 783 middle school students. Adolescents in the intervention group established a significant improved their nutrition knowledge, in addition to scoring considerably higher in nutritional behaviours than the control group post-intervention. Additionally, the study established that the intervention group considerably improved their fruit and vegetable intake as compared to the control group during the study (Fahlman et al., 2008). Beside the background of political, social, and economic, and change in the Arab region, and comparing with other regions in the world, in some parts of the Arab region, adolescents have more burden of ill health attributable to obesity, injuries, metabolic and cardiovascular illnesses, and mental health illnesses. Poor diets, is one of the main risk factors (Obermeyer, Bott, & Sassine, 2015). Saudi cultural and economic shifts, such as a recent increase in the number of working mothers together with the increasing economic wealth of the population may have contributed to changing family habits and food choices (Al-Ahmadi, 2011). This has been found to have had a negative impact on adolescents' breakfast intake (Spence, 2017). There is a research gap to be filled in the data regarding breakfast intake behaviours of Saudi adolescent girl's population especially in adolescent girls of Tabuk city. This study seeks to study the factors associated with breakfast skipping and AHB skipping among Saudi female adolescents in Tabuk City, SA, where there has been little research into this issue.

1.2 Aim and research objectives

1.2.1 Aim

The aim of the study was to estimate breakfast skipping and AHB skipping rate and explore the reasons and factors behind this practice among adolescents' females' students aged 16-18 years old in Tabuk city using a mixed method design methodology.

1.2.2 Objectives

1. To identify the rate of breakfast skipping and AHB skipping among adolescents' females' students aged 16-18-years-old in Tabuk city.
2. To explore the reasons and factors behind skipping AHB in this age group.
3. To provide an insight on the knowledge that adolescent females aged 16-18 years old possess about breakfast and AHB and its importance.

1.3 Definition of breakfast

The term "breakfast" is an English noun which originated in the 15th century. It was the contraction of the phrase "to break (verb) (the) fast (noun)" indicating that overnight while one slept, one was not able to eat, and that shortly after awakening one would need to break the fast with a meal (Bureau, 2010).

According to ALBashtawy (2015)" Breakfast consumption was defined as 'any food or beverage consumption between awaking and 45 minutes after the start of school' (Gleason 1995, Sun et al., 2013).

Since there is no universal definition for the term "breakfast", individual studies have developed their own definitions depending on their study objectives. According to Rampersaud (2009), there are three key considerations for defining the breakfast eating occasion, namely the type of

food consumed, the amount of food consumed and the time of day when the food is consumed. These considerations are outlined in Figure 1.1 below.

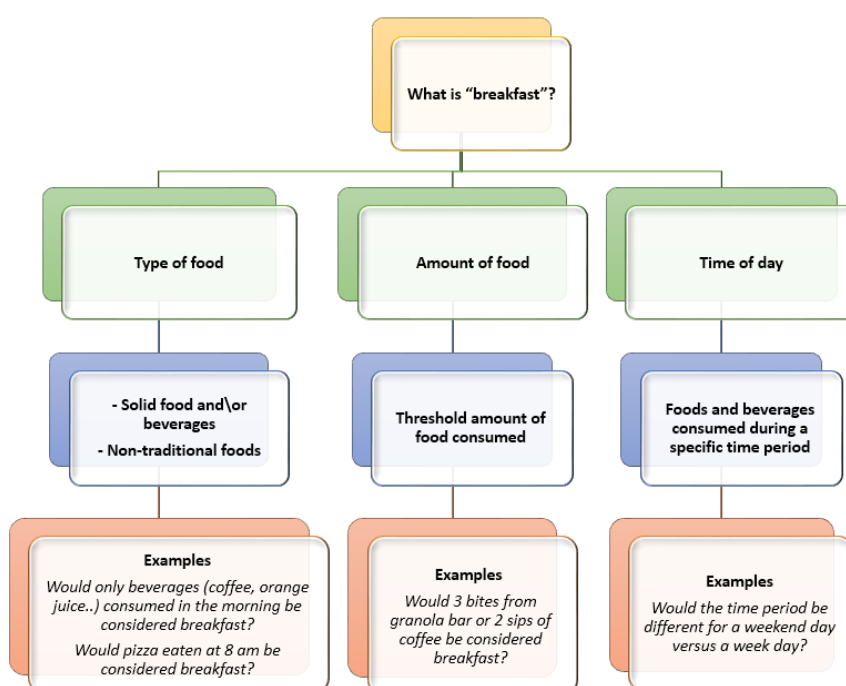


Figure 1.1: Considerations for how breakfast is defined (Re-drawn from Rampersaud (2009))

It is well known that a high-quality healthy breakfast should contain a source of amino acids, vitamins, minerals, antioxidants, fiber and dairy products which are rich in micronutrients, such as vitamins (C, D, B6, B12) and minerals (calcium, zinc, selenium) which positively impacts children’s global health and cognition (Peña-Jorquera et al., 2021). Differing definitions for breakfast across studies makes it difficult to compare results and research findings. Table 1.1 below summarizes the definitions of breakfast used in a handful of studies assessing breakfast intake. The table clearly shows the variety in the types of definitions which can exist across studies.

Table 1.1: Various definitions for breakfast throughout the literature

Definition for breakfast	References
The first meal of the day that breaks the fasting status after the longest period of sleep, it is consumed within 2 to 3 h of waking; and it is comprised of food or beverage from at least one food group, and may be consumed at any location	Gibney et al., 2018
A caloric intake between 5:00 a.m. and 9:30 a.m., which is based on the time period where the first peak of percent energy intake occurs for a population	Fayet-Moore et al., 2016
the first meal of the day that breaks the fast after the longest period of sleep and consumed within 2-3 hours of waking, comprising at least one food group	O'Neil et al., 2014
the first meal of the day, eaten before or at the start of daily activities, within two hours of waking, typically no later than 10am, of an energy level between 20-35% of total daily energy needs"	Pereira et al., 2011
Consumption of any food or beverage at a meal occasion named by the respondent as "breakfast"	Deshmukh-Taskar et al., (2010)
the largest eating occasion occurring between 6 am and 10 am	Clegg and Shafat, 2010
Eating a snack, small meal or large meal between 6 am and 9 am	Smith et al., (2010)
Any food or beverage consumed between 05:00 and 10:00 hours with a combined total energy ≥ 100 kcal	Alexander et al., (2009)

Any eating that occurred between 5:00 and 10:00 am on weekdays or between 5:00 and 11:00 am during weekends	Albertson et al., (2007)
The first eating occasion involving a solid food or a beverage that occurred after waking	Matthys et al., (2007)
Any eating that occurred between 5 am and 10 am on weekdays or between 5 am and 11 am during weekends	Affenito et al., (2005)
Eating between 5 am and 10 am on weekdays or 5 am and 11 am on weekends	Barton et al., (2005)
Any food or beverage between 6 am and 8 am before going to summer sports school	Vanelli et al., (2005)
Any intake of food or beverage between 6 am and 10 am during weekdays and between 6 am and 11 am for the weekends and holidays	Aranceta et al., (2001)
An eating occasion which the student considered to be his or her breakfast	Nicklas et al., (2002)
The consumption of a food, beverage, or both between 5 am and 10 am	Siega-Riz et al., (1998)
Any food or beverage consumed between 5 am and 10 am for children and between 5 am to 9 am for adults	Haines et al., (1996)
A solid item of food taken before attending school or before 11 am at weekends	Ruxton et al., (1996)
All foods eaten from the time a student got up in the morning	Gleason

until 45 minutes after the start of school, provided that the total food energy intake from these foods exceeded 50 kcal. If a student's food energy intake over this period was <50 kcal, he or she was considered to have skipped breakfast.	(1995)
Any solid food taken in the morning before arriving at school	Dickie and Bender (1982)

The definitions used most often were "what the study participant perceived to be their breakfast" and "consumption between 5 am and 11 am in the morning". Some studies distinguished between whether a solid, beverage or both constituted breakfast, and others allowed slightly different definitions for breakfast intake between weekdays and weekends. Certain studies also included a minimum energy requirement from the breakfast meal in order to be classified as a breakfast. It is also seen that some studies do not take time of consumption into account at all, but defined breakfast as the first meal consumed after waking (**Appendix 1**). Given that no universal definition for breakfast exists, researchers would need to create their own definition depending on the objectives of their research (Zilberter and Zilberter, 2014).

1.3.1 Definition of AHB skipper

The objective of the current study was to identify the factors behind at home breakfast (AHB) meal practice among Saudi female adolescents. Utter et al., (2007) defined AHB to be the breakfast that is prepared and eaten at home before leaving to school. Due to the absence of a national breakfast program at school in SA. AHB was defined as "the breakfast meal that is prepared and consumed at home before leaving to school". Hussein, (2014) defined AHB skippers as participants who chose to eat breakfast at fast food stall, cafeteria, restaurant or some other places other than home. Also, Keski-Rahkonen et al.,

(2003) defined AHB skipping as not eating a morning meal at home. In the current study, AHB skippers were defined as adolescents who skipped AHB on four or more days of the week. This study seeks to study the factors associated with breakfast skipping and AHB skipping among Saudi female adolescents in Tabuk City, SA, where there has been little research into this issue.

1.4 Health implication of skipping breakfast

The importance of breakfast was highlighted in a study of Horikawa et al. (2011) who conducted a meta-analysis, which demonstrated a connection between skipping breakfast and being overweight or obese. Furthermore, this relationship seems to persist regardless of the other cultural issues that influence nutrition. Other studies have proved that constant cases of skipping breakfast have been associated with being overweight as well as obesity amongst Fijian adolescents (Thompson-McCormick et al., 2010). Moreover, breakfast consumption not only lowers BMI significantly, but also serves to reduce body fat and insulin among American adolescents (Marlatt et al., 2016). Similar results were found among Saudi Arabian young people (Sachithananthan et al., 2012).

According to ALBashtawy (2015) breakfast skipping is a global attribute that is found among high school students, with most studies highlighting the issues that are concerned with the developmental lives of the children and adolescents. Some of these complications are manifested in areas such as cognitive ability, psychosocial functioning cognitive, psychosocial functioning, school attendance and the overall academic performance. Skipping breakfast among the students has been associated with a range of adverse health implications that can emerge from excessive consumption of soft drinks as well as fast foods (ALBashtawy, 2015). For example, the obvious physiological growth in adolescence affects the body's nutritional needs increasing adolescents' requirements for energy and all nutrients to support rapid growth rate and development (Stang and Story, 2008). As much as 50% of adults' ideal body weight is gained in adolescence, and a

failure to consume an adequate and balanced diet at this period of time can have a negative impact on growth status. In extreme situations, it may also result in delaying sexual maturation, and it can hinder or slow linear growth (Story, 1992). In adolescence, muscle and fat development are rapid in both boys and girls.

1.5 Adolescence nutritional behaviours

The major threats to adolescent health are nutritional behaviours (Kothandan 2014). These nutritional behaviours have important life-long consequences; many of major health problems confronting our nation are the result of behaviours established during adolescence (Mayosi et al 2009). The health status of adolescents is concern of health care providers. As the future generations, health of adolescents influences not only their own health but also the health of future populations (Chelvakumar and Kessler 2010).

Healthy behaviours during adolescence could prevent the prevalence of nutrition-related chronic diseases in adult life (WHO, 2005). This could be achieved by optimal nutrition and healthy eating practices that decrease young people's risk of a number of health problems such as iron deficiency anaemia, obesity, eating disorders, and dental caries. This may also protect them from long-term health problems, such as chronic heart diseases, cancer, stroke, hypertension and osteoporosis (Williams *et al.*, 1995).

Steyn (2010) asserted that unhealthy nutrition behaviours during adolescence may negatively affect the short- and long-term health of individuals. Longitudinal studies of adolescents show an overall decline in nutritional quality (Williams and Mummery, 2012) increase in total energy intake, tracking of eating patterns, food preferences and food choices and moderate or no tracking of total energy and specific nutrient intakes. These studies suggest that although healthy behaviours may be initially formed in childhood, many social and lifestyle factors influence change in adolescent nutrition behaviours (Chang et al 2011). Australian studies

report that while adolescents understand the importance, and recognise the value of healthy eating and dietary recommendations, the majority does not meet dietary guidelines, and many frequently consume foods high in fat and/or sugar and takeaway foods, and demonstrate suboptimal behaviours such as meal skipping and dangerous weight loss practices (Arcan et al., 2009).

Gender differences are found in adolescent nutrition behaviours with females more likely than males to exhibit healthy nutrition behaviours, males more likely to consume suitable amounts of vegetables and females more likely to consume suitable amounts of fruit (Williams and Mummery, 2012). Adolescent nutrition behaviours are positively associated with parent healthy nutrition behaviours and time spent in educational-learning-related sedentary behaviours (Fulkerson et al., 2006). Adolescent unhealthy nutrition behaviours are associated with time spent watching television, maternal unhealthy nutrition behaviours and having a television in an adolescent's bedroom. Meals skipping and not meeting dietary recommendations are associated with physical inactivity (Ogunkunle and Oludele, 2013). Factors influencing adolescence nutritional behaviour were summarized in Figure 1.2 below.

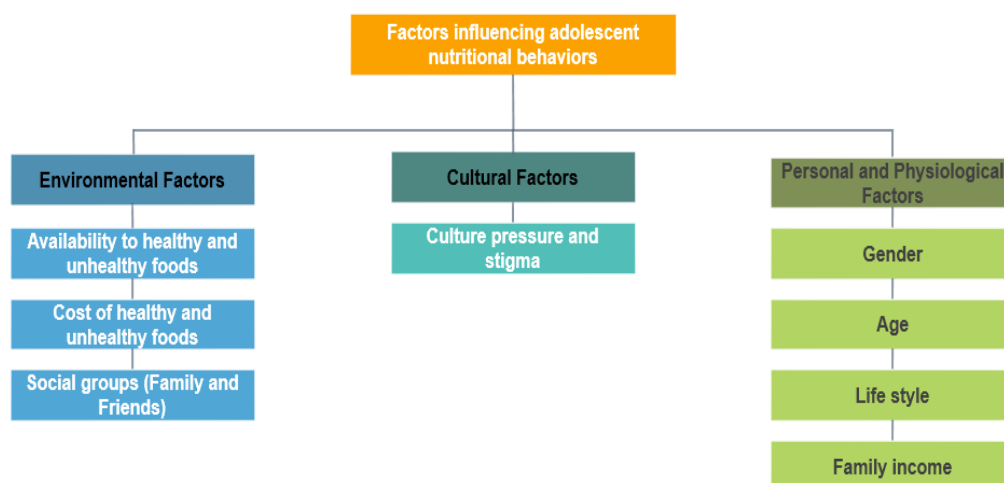


Figure 1.2: Factors influencing adolescent nutritional behaviours

There are many concerns surrounding adolescent food choice behaviour, including low intake of fruits and vegetables, and high intake of foods that are high in fat, sugar and salt (Voorend et al 2013). Although many adolescents demonstrate awareness and knowledge of nutrition and healthy eating, it does appear they find it difficult putting this theory into practice (Sebastian et al., 2009). According to Contento et al., 2006), there are multitude of factors that can influence adolescent food choices, and preferences. In general terms these may include availability, convenience, and cost influence of peers, parents, and hunger and health concerns. However, one of the most important determinants of food choices and preferences is taste. Taste in particular, plays an important role in food choice. Generally speaking, adolescents will not eat what they do not like (Hoffmann et al., 2012). Some factors influencing adolescent food choices were discovered in 1998 by Caldwell and his colleagues and were summarized in Figure 1.3 below.

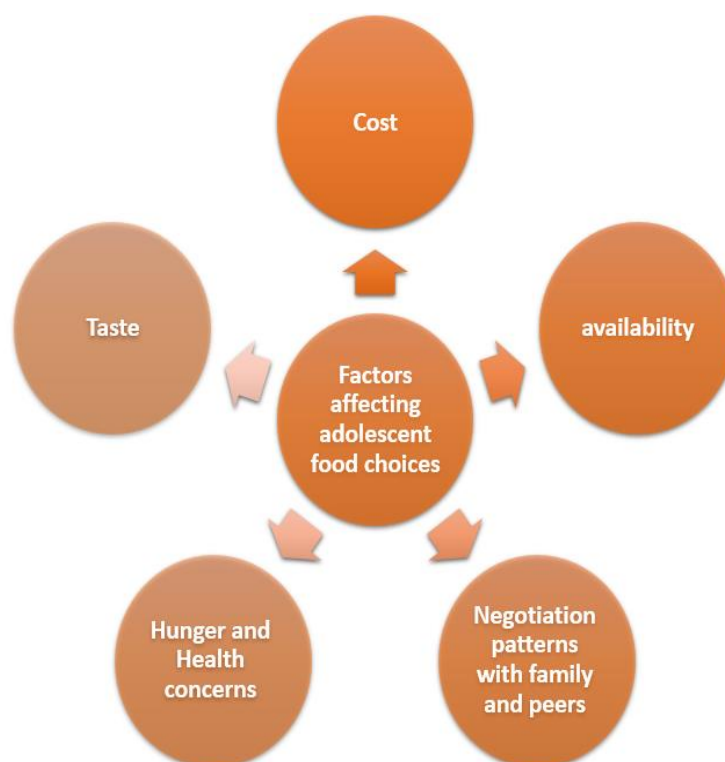


Figure 1.3: Factors influencing adolescent food choices and preferences

When promoting healthy eating, educators should recognize the many dilemmas that adolescents face in making food choices. Educators can help adolescents eat healthy by providing guidance on developing food decisions, effectively negotiating with family members and appropriate peer interactions (Caldwell et al., 1998)

1.6 Rationale behind choosing girls

The Saudi population comprises high proportion of Saudi girls. Saudi females aged from 15 to 19 years old are about 1,154,954 females from a whole population of 34,218,169 Saudis (General Authority for Statistics, 2019). They are gender differences in many situations such as inequity with Saudi boys, including schools' curriculums, restrictions of physical activities and sports at school and outside school. In addition, other cultural and social aspects that limit much of their behaviour and activities affect Saudi girls' health status. Previous Saudi Arabian research investigated the nutrition and health-related issues of boys more so than girls. Moreover, as a female researcher in SA, access to boys' schools is not legally possible. Female is an under researched group, but that whilst skipping is a problem in both boys and girls and there may be some common factors, there will also be some that are specifically related to girls particularly in Saudi situation where education and much of social experience separate. Assessing nutrition-related factors of Tabuk adolescent girls could fill a gap in the data regarding breakfast intake behaviours of this population. As well, it could highlight and provide information to guide policy makers, especially those in the Ministry of Education and the Ministry of Health in their development of intervention programmes.

1.7 Rationale behind choosing Tabuk city

Tabuk City is located at the north-western part of Saudi Arabia, close to the Jordanian border at 28 °24 '12.36 "N, and 36 °34 '14.45 "E (Figure 1.4). Tabuk area is known as an agricultural productive province in SA (Bahrawi and Elhag, 2019). The city covers an area of about 108,500 km².

Currently, Tabuk city record its strong presence on the map of the cities of the advanced world technically, scientifically and economically after embracing the latest and most powerful projects at the beginning (King Salman Bridge, Red Sea Project, Neom City) to be the gateway to the world and the most vibrant northwestern destination, which brings together a selection of the best minds and the most skilled competencies to create a model to be emulated with it.

Tabuk city culture is strongly religious and family oriented, and women usually remain out of public view (ALFaris et al., 2015). Females usually stay in separate places from males, even in the workplace, universities and schools, and women are not allowed to access the buildings of males, and vice versa.

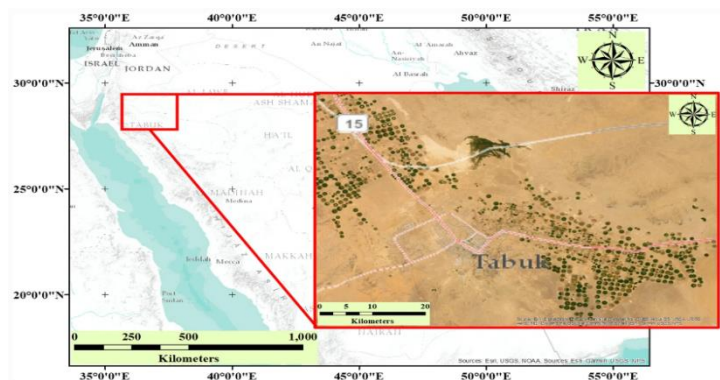


Figure 1.4: Tabuk province in the Kingdom of Saudi Arabia (adapted from Elhag and Abdurahman, 2020).

Whilst some studies about breakfast skipping have been conducted in the West of SA, few studies have addressed this issue in Tabuk city, north of SA (Alamri, 2017). Therefore, it is important to consider the factors behind skipping breakfast and the barriers to a healthy breakfast consumed among Saudi adolescents in Tabuk city which is an exemplar city that highlights many of the specific cultural factors that will be explored in current research. Tabuk is more located in the north western side of SA, and historically, Tabuk city is located on the oldest Islamic pilgrimage route that connects Damascus to Makkah and considered the closest city to the northern border of SA with Jordan. Being a main station on this route until this moment, it is believed that it is affected by many different cultures and their traditions. For example, according to cuisine custom, one of the local dishes in Tabuk city is Mansaf, which is the main dish to the Jordanian people, but it is uncommon to people who live in the central region of SA.

Presently, Tabuk city is one of the fastest-growing industrial centres of the country. The recent huge development of Tabuk city into a fast-growing residential city from a traditional rural society highlights the need for an epidemiological investigation in this region to identify lifestyle factors behind dietary behaviours. Few studies have discussed the factors and dietary behaviours of AHB consumption among Saudi females' adolescents in Tabuk.

1.8 Overview of Saudi Arabia (SA)

The Kingdom of SA is situated in the Arabian Peninsula and occupies most of that area. It covers around 200,000 square kilometres (General Authority for Statistics, 2014). It is bordered by Kuwait, Iraq and Jordan to the north, Yemen and Oman to the south, the Arabian Gulf, the Kingdom of Bahrain, Qatar and the United Arab Emirates to the east and the Red Sea to the west. There are many important cities such as Riyadh, which is the capital city, Makkah and Madinah, the holy cities. SA is divided into 13 provinces and five regions (General Authority

for Statistics, 2014). Each region has a capital city that administers the region; for example, the Tabuk Region is led by the Tabuk city governor.

However, local governors have limited authorities in regard to planning and finance because the Saudi Arabian government controls the decisions through many ministries such as the Ministry of Education, the Ministry of Health, the Ministry of Municipal and Rural Affairs and the Ministry of the Interior (Figure 1.5). The local governors must cooperate in decision making with the government in order to improve education regulations and increase awareness among responsible individuals in secondary schools,

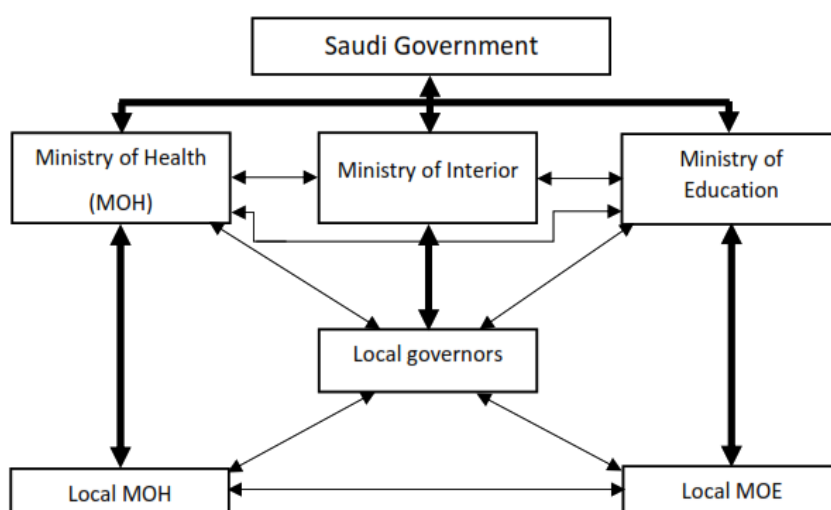


Figure 1.5: Kingdom of Saudi Arabian Governmental structure

1.8.1 The Saudi Arabian educational system

Historically, SA was established on three separate occasions. The last time was in 1902 by King Abdul-Aziz bin Saud (1882-1953). In 1925, the Directorate of Knowledge was established as the first step towards an education system. In 1932, King Abdul-Aziz announced that he was integrating all the Saudi regions into what he called the Kingdom of SA (Ministry of Municipal and Rural Affairs, 2015). King Saud bin Abdul-Aziz (1902-1969) was the first son of King Abdul-Aziz and led the country after him; he developed the Directorate of Knowledge to

become the Ministry of Knowledge. At the beginning of education in SA there was resistance to girls' education due to cultural and religion reasons. However, later King Faisal bin Abdul-Aziz (1906-1975) established the General Presidency for Girls' Education and to support this decision, the government ensured that people were convinced that the aim of girls' education was to increase their Islamic knowledge (Prokop, 2003).

In the era of King Fahad bin Abdul-Aziz (1921-2005) he announced the integration of the General Presidency for Girls' Education under the Ministry of Knowledge however, this decision maintains gender separation. He also established a new ministry to focus on university level, and called it the Ministry of Higher Education. In 1970, the government issued education policies. In 2002, the Saudi government changed the name of the Ministry of Knowledge to the Ministry of Education. In 2015, the Saudi government integrated the Ministry of Education and the Ministry of Higher Education into a single Ministry of Education (MOE, 2015). In 1970, SA issued education policies which emanate from the Islamic religion and comprise the main guidelines for Saudi education; for example, belief in Allah, Islam as the religion, Mohammed as a prophet and the Arabic language as the language of education at all levels (Issa, 1979). However, under rules and regulations on the Ministry of Education official web page there are rules and regulations of private education, foreign education, university education, but there are no rules and regulations for scholarship or general education (MOE, 2017).

1.8.2 Ministry of Education (MOE) in Saudi Arabia

The Ministry of Education in SA is responsible for education in the country. It is responsible for educational policy, manpower, opening new schools, providing materials, the provision of school buildings, designing the national curriculum for schools and preparing and supplying schools with textbooks. To achieve these responsibilities and to have good links between the Ministry of Education and

schools in the country, the Ministry of Education established 17 branches called "General Administration of Education" in big cities and 28 "Education Departments" to cover the rest of the country. According to MOE (2013) the Ministry of Education keeps many authorities such as national curriculum and textbooks under its control and delegates some responsibilities and authority to the branches to work independently.

1.9 School education, policies and health promotion for females in Saudi Arabia

The first formal Saudi school for girls (Madrasat AlBanat AlAhliyah) was a private school. The school was established in 1941 by a non-Saudi business person from Indonesia, and it was based in Mecca. However, people of Mecca were not overly interested in girls' education at that time (Al Rawaf and Simmons 1991). In the years that followed, a number of private schools for girls in different cities were established. Two decades after (in 1960), the first formal public school for girls was established in SA with some opposition from religion institutions and conservative parents. The curriculum was more for religious subjects and home economics. Currently, the Saudi government has placed considerable emphasis on the provision of high-quality education for girls, with substantial efforts being made by the Government to decrease the gender gap at different educational levels. The significant progress in Saudi girls' education has brought a number of social developments to the country such as improvement in girls' health and nutrition (AlMunajjed, 2009).

The concept of adopting programmes and activities with the view to promoting healthy living and practices in schools was implemented, to some extent, by many Arab countries, including SA. The concept was endorsed in different localities in SA; however, measurable outcomes were not recorded or totally evaluated, and the programmes were mainly applied in boys' schools (WHO, 2006). The School Healthcare Department in SA recommended schools to restrict

the selling of high sugar and high-fat foods on school premises. That being said, no legislation was implemented to enforce these recommendations. The consumption of fresh milk and dates as sources of energy and natural sweets was also encouraged in schools at all levels. A plan to allocate a health advisor to each school at all levels of education was established in 2008, and qualified health professionals extensively trained some teachers with no health or medical background to take the responsibility of the health advisor. The training programme covered such areas as health education, immunizations, health screening (e.g. screening for the anaemia programme that was started in the academic year 2008-2009), the school environment and means of security, safety, and first aid. The role of the health advisor in schools, however, has yet to become a fully established position in the Saudi school system.

One of the more important and strongly effective issues in promoting nutrition and health in schools could be through the integration of health concepts in the curriculum. Despite the large amount of money that has been devoted by the Saudi government in public education for girls, the curriculum at all levels of education lacks the required focus on nutrition and healthy cooking skills. General science, biology and home economics (which mainly are cooking classes that provide limited information on health and nutrition for two hours per week) are the main sources of nutrition and health information in the current Saudi curriculum. Past studies established that the existing system of school food provision is one of a range of factors contributing to the rising incidence of childhood obesity, and associated health problems in KSA. Also, obesity has been connected most often with unhealthy dietary habits (Al-Dossary et al., 2010). Past studies indicated that there is a need for interventions that will improve daily consumption of breakfast and lifestyle behaviours of Saudi children. Also, the educational campaigns and interventions on healthy breakfast food choices ought

to include children and parents (Jabri, Al-Rasheedi, Alsulaimani, & Al-Hazaa, 2021).

Physical education classes are non-existent in Saudi girls' curriculum at all educational levels and physical activities are not permitted at public schools. However, the exclusion of physical education from girls' schools does not limit girls' access to information about this type of education and Saudi girls were reported to use alternative sources of information about health and diseases such as media (mainly TV). In addition, their knowledge about the protective effects of physical activity against diseases did not differ from their male counterparts (91.8% vs. 92.9%), respectively (Taha et al., 2009).

1.10 Saudi culture associated with nutrition

Whilst some of the factors that influence adolescent's diets will be common across cultures, many will be reflective of the culture in which the adolescents live. As this current study will be carried out in SA, it is necessary to understand the specific food culture in this country before proceeding. Traditionally, most of the Saudis were Bedouin Arabs who live in desert tents furthermore using camels for transportation. They depended on eating food from their immediate surroundings, as dates, fresh in addition to dried milk products, livestock as well as animal products, bread, and a partial quantity of vegetables (Musaiger, 2007). Following the discovery of crude oil in SA, the conventional everyday life began on a fundamental transformation, connected with an overall enlargement of the per capita income (Musaiger, 1993). The region has been affected by momentous contact with the Western countries (Dadfar et al. (2003), which has contributed to the remarkable and swift change in food consumption trends from natural surrounding food sources such as fruits and vegetables to more high in fat and sugar food stuffs such as Junk Food. This is characterised by the movement away from the conventional "Arabian Peninsula" diet towards the westernized diet characterised by high in energy, salt, fats as well as sugar (Al-Rethaiaa et al., 2010). Eating fruit along with vegetables occurs infrequently in the Saudi population, with numerous individuals failing to meet the bare minimum daily recommendations (Musaiger and Al-Hazzaa, 2012) for fruit and vegetables. The Saudi female population aged ≥ 15 years have a low intake of fresh fruit and vegetables (≤ 5 servings/day) in a percentage of 95.3.

Saudi culture is family-oriented and the assessment of the Saudi cultures leads to the conclusion that the social, as well as cultural attributes of the Arab societies, are significantly different from those of the rest of the world, especially in the case of western societies. Culturally, Saudi Arabian women/females are separated

from males, even in the other social places as the workplace and schools (Dadfar et al., 2003).

Partaking daily meals together with family members is widespread among the Saudi population. Female adolescents are believed to be less autonomous than their counterparts in other countries. For instance, it is not suitable in Saudi society for most female adolescents to go to restaurants to have breakfast without the company of their mothers. Consequently, mothers have a greater impact on the nutritional behaviours of their daughters than might be the case in other societies at this age. On the other hand, adolescents spend a high percentage of their day in school, starting from 7.00 am and eat at least two meals of breakfast and lunch. These meals generally took the structure of restaurant-procured meals, since mothers are not present and the girls are more autonomous in their choice of food items (Al-Rethaiaa et al., 2010).

1.11 Adolescence stage

Defining the phase of life that stretches between childhood and adulthood has long posed a conundrum. The definition of adolescence as 10–19 years of age dates from the mid-20th century, when patterns of adolescent growth and the timing of role transitions were very different to modern patterns in many places. The UN Convention on the Rights of the Child defines a child as an individual aged 0–18 years and, in time, the UN has come to formally define adolescence as the period between 10 and 19 years of age (WHO, 2015). The adolescence period consists of three stages which were summarized in Figure 1.6 (Allen and Waterman, 2019).

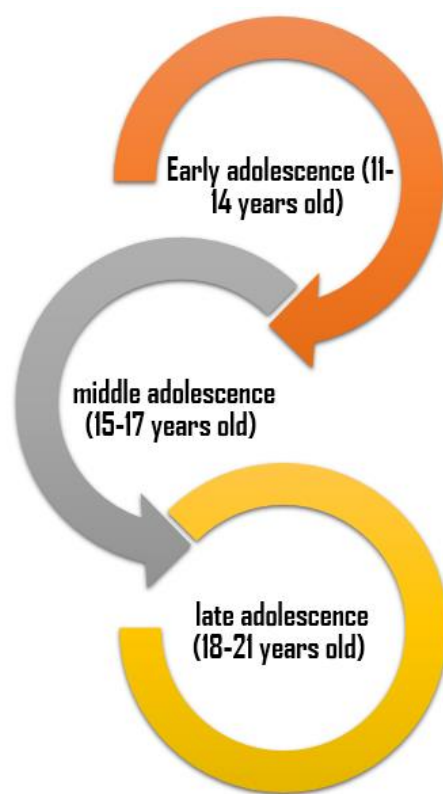


Figure 1.6: The three identified stages of adolescence period

Young adolescence characteristics include physiological development, such as growth in height and weight, organ sizes, development in skeletal muscular system, and motor skills (Kellough and Kellough, 2008). Puberty starts at this stage, and by middle adolescence, most complete their physical growth (Allen and Waterman, 2019). At this stage, physical maturation in girls is faster than in boys. Onset of eating disorder is common at this stage and independency from parents and deepen in bond with friends are common (CDC, 2021). Physiological and sexual changes in late adolescence are mostly completed. In this stage, adolescents develop acceptance to body image, balance relationship with parents and independency, and peer relationships have greater influence on behaviours than school and parents (Pulkkinen et al., 2006). Because of all these changes, adolescence is considered to be an especially nutritionally vulnerable stage of life. The nutrient needs in this period are greater than in infancy or childhood periods (Lifshitz et al., 1993).

1.12 Nutritional status and behaviours of Saudi adolescents

Studies done so far show Saudi researchers have used multiple measures to assess growth and nutritional status of Saudi adolescents. Anthropometric measures, including height, weight and BMI were frequently used to monitor growth in adolescents and to assess their nutritional status. The measures were referred to different international standards for comparison. Assessment instruments like questionnaires (self-reported questionnaire or in-person interviews) to collect data on socio-demographic, diet histories, and nutritional behaviours have also been used.

Saudi findings on assessing the nutritional status of Saudi adolescents using different anthropometric measurements are presented in Table 1.2. Results of comparison between studies showed that stunting and wasting are observed among adolescents in SA.

Statistics show that adolescents in Arab countries, including SA, suffer from nutritional behaviour-related problems and diseases, such as iron deficiency anaemia, calcium and vitamin D deficiencies, and those associated with over nutrition and changes in lifestyle such as obesity (Musaiger et al., 2011).

Nutrition habits and lifestyle in SA have been the focus of a number of studies. Al-Hazzaa *et al.*, (2012) reported that around one third of Saudi adolescent girls aged between 14-19 years (from Riyadh, Jeddah and Al-Kobar) consumed sugar-sweetened drinks on a daily basis, whilst 60% consumed such drinks 3 to 6 times per week. Moreover, all of those adolescents did not consume fruit or vegetables on a daily basis. It was found that consumption of sugar-sweetened drinks was positively associated with BMI in Saudi adolescents (Collison et al., 2010). Worryingly, Al-Hazzaa *et al.*, (2012) found that approximately three quarter of girls (age 14-19 years) who live in Riyadh, did not consume vegetables or fruit daily, 53% of them consumed sweets and chocolates and 52% ate fast foods (e.g

shawarma, pizza, French fries) more than three times per week. Similar results were reported amongst adolescents in Jeddah (Musigar and Zagzoog., 2014).

A study in Jeddah of 1,067 Saudi adolescent girls aged 12–18 conducted by Shaath and colleagues (2008) found that 64.3% of participants consumed fast foods one to three times per week mainly at dinner, and that 74.5% of them drank sweetened carbonated beverages daily. Shaath (2008) also reported that kabsah, chicken shawarmah, and masoub (bread mixed with, sugar, and butter) are favourite fast foods for lunch, dinner, and breakfast, respectively. In SA fried chicken, pizza, and noodles are the preferred “westernized” fast foods, and American-cuisine restaurants, such as MacDonalds, came top of the participants’ favourites when dining outside (Shaath 2008).

ALFaris *et al.*, (2015) examined fast food consumption trends among Saudi adolescent girls living in Riyadh (13-18 years). Among study participants, 79.1% consumed fast food at least once weekly. Burgers and soft drinks were the main types of fast food consumed. ALFaris *et al.*, (2015) suggested that the increasing portion size of fast food led to a significant increase in an adolescent’s BMI. Al-Muammar *et al.*, (2014) revealed that around 90% of Saudi adolescent girls in Riyadh consumed chips, chocolate and sweets daily, as well as fizzy drinks. Fruit and vegetables on the other hand were consumed daily by only 15% of them. Past studies indicated that there is an association between breakfast skipping and consuming of fast food; the distance to the grocery store and fast food outlet was found to be associated with skipping breakfast (Virtanen *et al.*, 2015).

The adverse health consequence that may result from excessive intake of soft drinks and fast food is hypothesised to be increasing the rate of obesity (Michael and Alden, 2012). Now numerous studies have demonstrated an association between body weight and nutritional behaviour (Rampersaud *et al.*, 2005; Al-Muammar and El Shafie, 2014; ALFaris *et al.*, 2015). The changes in these prevalence rates are attributed to the major socio-cultural and lifestyle changes

that have accompanied the overall increase in per capita income and recent modernization (Musaiger 1993; Al Qauhiz., 2010).

Al-Jawaldeh et al., (2020) have established the most recent and comprehensive review to assess nutritional behaviours amongst school-aged children (5–10 years) and adolescents (10–19 years) in countries of the Eastern Mediterranean Region (EMR). Focusing on Saudi adolescents, the review documented that the most frequently consumed food items amongst adolescents were grains (rice and breads), with more than 50.5% of adolescents reporting to consume rice at least once daily. They reported that half of adolescents did not consume any fish or seafood during the week preceding the survey. Also, close to 60% of adolescents consumed less than 6 cups of water per day and that water provided only 37% of mean daily fluid intake in adolescents. Moreover, mean protein intake (70.8 ± 40.6 g/day) amongst 13–18-year adolescents in Jeddah, was around 1.6 times higher than that recommended by the Academy of Nutrition and Dietetics (44 and 59 g/day for males and females respectively). Average dietary fiber intake was estimated at 12.6 g/day which is considerably lower than the recommendation of the Food and Agriculture (FAO)/WHO of more than 25 g/day. Adolescents were reported to consume high levels of total sugar, providing 26% energy intake. Concerning micronutrients, 63% and 87% of adolescents (9–18 years old) had intakes below estimated average requirement (EAR) for vitamin A and E, respectively. The data also suggested that high proportions of adolescents do not meet the recommendations for iron, calcium and zinc. Mean intakes of potassium (K) ranged between 1530 mg and 1961 mg/day, thus being inferior to the adequate intake of 4500–4700 mg/day and 87% of adolescents had intakes less than the adequate intake level for K. Mean Sodium (Na) intakes amongst adolescents ranged between 2209 and 2250 mg/day, exceeding the adequate intake level (1700 mg/day) and the WHO Upper limit (2000 mg/day).

Table 1.2 anthropometric measures

Study	Region	Population (Age)	Sample size	Measurements	Standard population	Obesity\Overweight prevalence (%)	Underweight prevalence (%)
Al-Shoshan, 1990	Riyadh, Central province	Adolescents at the Health Week Exhibition campaign in 1988 (15-18 years old)	311	WT, HT and BMI Questionnaire	American standards for Weight, height and BMI	Males (M): 5.5\14.3 Females (F): 18.7\24.5	Not identified (NI)
Abahussain et al.,1999	AL-Khobar city, Eastern	Adolescent girls (12-19 years old)	676	WT, HT and BMI	The standard international definition for child overweight and obesity (IOTF)	2\8	11

	province				(Cole et al.,2000)		
Al-Rukban, 2003	Riyadh, Central province	Intermediate and secondary schools (12-20 years old)	894	WT, HT and BMI Self-administered questionnaire	WHO classification of overweight and obesity for adults	20.5\13.8	NI
Al-Almaie, 2005	Al-Khobar, Eastern province	Intermediate and all 3 grades of secondary school (14-19 years old)	1766	WT, HT and BMI	The NHANES growth charts from the WHO -The standard international definition for child overweight and obesity (IOTF) (Cole et al., 2000)	(M) Overweight 10.2% and obesity 19.3% (F) Overweight 17.2% and obesity 11.8%	NI

Farahat et al., 2007	Different provinces	intermediate schools for boys and girls (12-19 years)	1454	WT, HT and BMI Questionnaire	WHO/National Center for Health Statistics (NCHS) Reference population (Dibley et al., 1987)	N/A Sig higher prevalence of overweight in girls compared to boys	NI
Collison et al., 2010	Riyadh, Central province	intermediate and secondary schools (10-19 years old)	5033	WT, HT, BMI	Center for Disease Control and Prevention charts (2000)	(F) Overweight 16.7% and obesity 15.8% - WC of >75th percentile was among 11.98% of girls	(F) Underweight: 6.8%
Washi and Ageib, 2010	Jeddah	Eight schools (13 to 18 years old)	239	WT, HT and BMI	Center for Disease Control and Prevention charts (2000)	Overweight 44.6%	NI

Abahussain, 2011	Al-Khobar city, Eastern province	Adolescent girls (15 to 19 years old)	721	WT, HT and BMI	National Center for Health Statistics (NCHS)	%Overweight and obesity remained the same in about 30%	Underweight is about same level of prevalence at 3.5%
"Jeeluna" Survey AlBuhairan et al., 2015	all 13 regions of SA	intermediate and secondary schools	12,575	BMI	Center for Disease Control and Prevention charts (2000)	15.9\14.1	15.2
Fatima and Alqhatani, 2019	Arar City	Adolescent school girls (15-19 years old)	322	WT, HT and BMI	Center for Disease Control and Prevention charts (2000)	7.76%\13.97%	19.20%

1.13 Factors affecting Nutritional status and behaviours of Saudi adolescents

Food consumption patterns in the (Gulf Cooperation Council) GCC countries have changed drastically, shifting towards high density, high energy, high saturated fat and added sugar, and low dietary fiber-rich diets (Musaiger et al., 2012). Specifically, in 2014, SA became the world's 19th-largest economy making it one of the fastest growing economies. SA's household income rose by 75% during the decade 2003 to 2013 driven by higher public-sector employment and wages. It also underwent a significant modernization that brought prosperity and change to Saudi society. In addition, about 83% of the Saudi population lives in cities, a degree of urbanization that is larger than in some Western European countries (Al-Kibsi et al., 2015). These changes were accompanied with dietary changes, which lead to greater consumption of foods high in added sugars, salt, and unhealthy fats and low in important micronutrients. Combined with decreases in physical activity and the dramatic increase in sedentary behaviours (Patton et al., 2016).

Adolescence's nutritional behaviours in SA are strongly affected by environmental, social, and psychological factors that affect their preferences. The effect of these factors increases with age as adolescents go through more development changes and external factors (Kastorini et al., 2019). Environmental factors include the availability and accessibility to healthy and unhealthy foods, the cost of healthy and unhealthy foods, and social groups, such as family, friends, and peers (Birch, 1999; Patrick and Nicklas, 2005). Many reviewed studies indicated that the influence of family on intakes of fruits, vegetables, and snack among adolescents was significant (Sleddens et al., 2015). The role of parents in encouraging consumption of different kind of foods and limiting intakes of unhealthy foods have influential effect on adolescents' dietary behaviour (Sleddens et al., 2011). Influence of peer pressure during early adolescence can replace familial authority and can promote following fad diets (Gidding et al., 2006).

Knowledge of healthy foods, in addition to other factors, such as family, can influence adolescents' intake of fruits and vegetable (Hussein, 2011). Level of nutrition knowledge is associated with breakfast skipping among adults (Matsumoto, Ishige, Sakamoto, Saito, & Ikemoto, 2019), children and young adolescents (Grosso, Mistretta, Turconi, Cena, Roggi, & Galvano, 2013). Also, family environment and structure influence breakfast skipping among children and adolescents (Pearson, Biddle, & Gorely, 2009). Culture pressure has a significant influential effect on the dietary behaviour of adolescents as they could feel obligated to achieve an ideal body shape. The glory associated with thinning and the stigma associated with obesity could have significant effect on children and adolescents body image and self-esteem. There is a cross-national difference in eating habits among countries. Specifically, gender difference regarding breakfast and breakfast skipping every morning on school days among young people and it becomes more obvious with age (Currie and World Health Organization, 2004). Main Factors affecting nutritional behaviours of Saudi adolescents were shown in Figure 1.7 below.

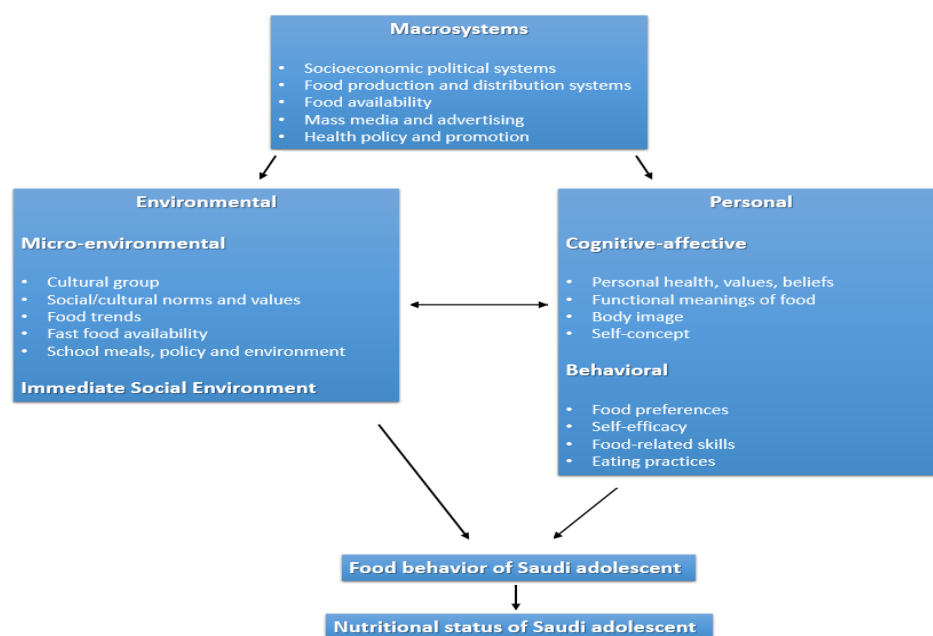


Figure 1.7: Factors affecting Nutritional status and behaviours of Saudi adolescents

Aljaaly, 2012 studied the factors affecting nutritional behaviours of female Saudi adolescents in Jeddah City, SA. She found that nutritional-related behaviours were affected by multiple factors that work at the individual, micro and macro-system levels. The media, which was an important source of nutrition information to these adolescents, influenced nutritional behaviours. In addition, the media were advertising high fat, sugar and salt (HFSS) food\beverage items. Girls were also concerned with the media influence on their food choice, they were insightful about their body image and had appropriate negative perceptions of their healthy eating. Added to this, media regulations directed to young groups in SA are lacking.

The majority of participants were physically inactive at school and outside school. This behaviour was supported by the absence of any source of physical education or activity in the governmental sponsored schools (limited physical activities in private schools). This reflects the role of the macro-system in contributing to the negative behaviours and lack of availability of physical activities for adolescents. In addition, micro-system (school meals and snacks) provides HFSS food and beverages such as drinks with added sugars, cakes, candies, pastries, ice cream, pizza, and chips, adding to the negative environment available in the schools. Moreover, Saudi culture and socioeconomic profile are characterized by the sedentary lifestyle and high economic level allowing pocket money to facilitate and encourage unhealthy food choice and lifestyle.

Food consumption and nutritional behaviours of Saudi female adolescents whether because of affordability, availability, convenience, preference or other reasons such as social, lifestyles, and cultural is not consistent with the dietary pattern that is optimal for their health. These food patterns and the other environmental reasons are associated with the burden of some nutrition-related disease. Food consumption and nutritional behaviours of Jeddah adolescents whether because of affordability, availability, convenience, preference or other reasons such as social, lifestyles, and cultural is not consistent with the dietary pattern that is optimal for their health. These food patterns

and the other environmental reasons are associated with the burden of some nutrition-related disease.

Fatima et al., 2019 found that the nutritional behaviour and status of Saudi female adolescents in Arar city was significantly associated with mother's occupation and education, family size, and a number of meals taken per day. Figure 1.8 illustrates specific factors influenced Saudi adolescent girls' nutritional behaviour and eventually affected their nutritional status.

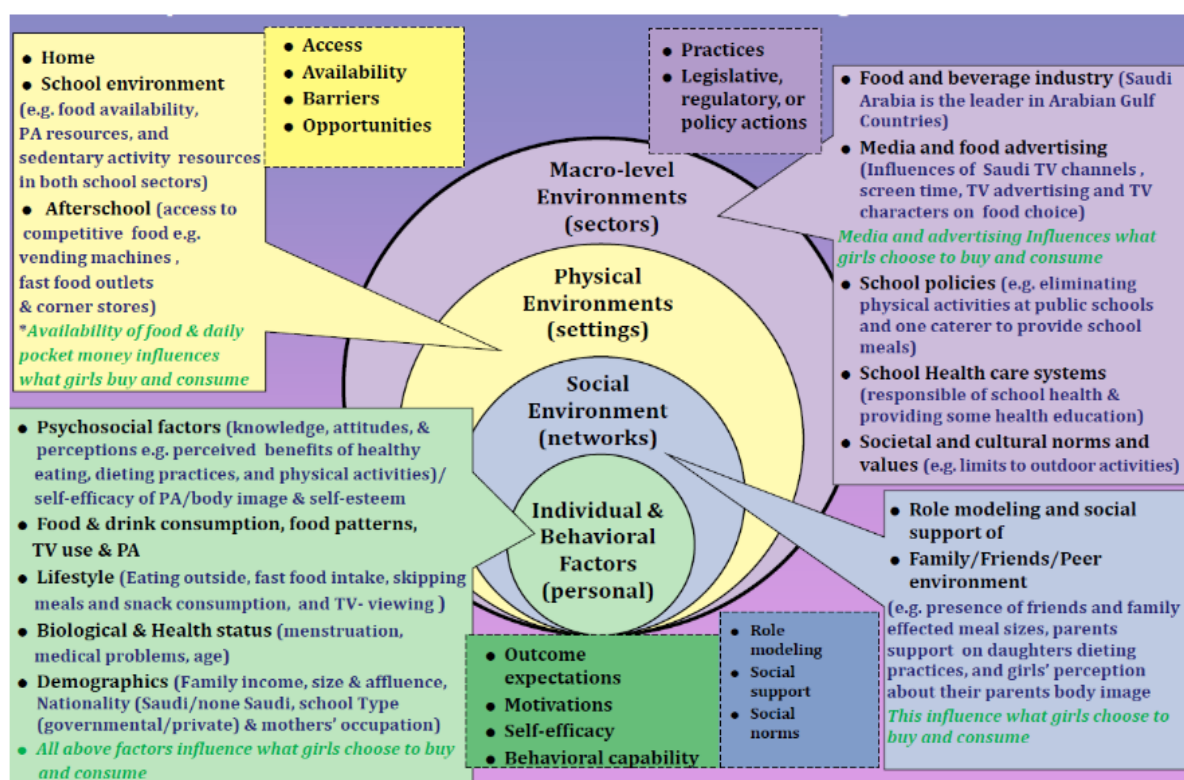


Figure 1.8: Specific factors influenced Saudi adolescent girls' nutritional behaviour and eventually affected their nutritional status (adapted from Aljaaly, 2012).

1.14 Conclusion

From the above discussions, Adolescence is a critical phase in a child's development when there is an increased demand for nutrients owing to fast growth in the body. Saudi cultural and economic transformations, such as the recent growth in the number of working moms, as well as the population's rising economic status, may have led to changes in family routines and dietary choices. This was discovered to have a detrimental influence on teenage breakfast consumption. Breakfast was defined as "any food or beverage taken between the time of awakening and 45 minutes after the start of school," while At Home Breakfast was described as "the breakfast meal prepared and eaten at home prior to departing for school." The GCC nations' food consumption habits have shifted dramatically, with a move toward high-density, high-energy, high saturated fat and added sugar diets, and low-dietary fiber-rich diets. Environmental, social, and psychological variables affecting adolescent eating habits in SA have a significant impact on their choices. Adolescents' food behaviour is significantly influenced by cultural pressure, since they may feel forced to obtain an ideal body form. Despite the large amount of money that has been devoted by the Saudi government in public education for girls, the curriculum at all levels of education lacks the required focus on nutrition and healthy cooking skills. Nutrition-related issues such as obesity and anemia, and unhealthy behaviours such as breakfast skipping are observed among Saudi female adolescents.

Chapter 2: Literature Review

2.1 Introduction

Given that breakfast can be seen to be so important, and also that there is clear evidence that adolescents are often skipping this important meal, it is important to understand the reasons for these decisions. A literature review of this area has been conducted concerning the factors that could influence Saudi adolescents' breakfast intake and reasons for skipping. The assertion, in this case, is that there is a lack of studies that have addressed the specific drivers responsible for breakfast skipping among the secondary school adolescents in Tabuk City, SA.

The review question adopted for the completion of this literature search strategy was: what are the main reasons that drive secondary school students aged between 16 to 18 years to skip breakfast?

2.2 The Literature Review Strategy

The aims of the study were diverse and thus require the use of the scoping approach to assess the numerous studies to be used. The literature review employed the scoping review strategy to help the researcher to refine the research question and to get a good sense of what was published in this area (Peters et al., 2015). The strategy played a significant role in highlighting the possible gaps in these studies. The assertion was that rather than the common reviews that seek to deal with certain queries, the use of scoping was preferred as they aid in mapping the main concepts that relate to the study area, the main sources as well as the accessible evidence. They also aid in the clarification of the working definitions and conceptual definitions (Peters et al., 2015). The use of scoping reviews is thus critical in the evaluation of emerging evidence especially in those cases that a lot of data and information does not exist for the examination of the issues under research.

2.2.1 Research strategy

According to Roberts and Priest (2010) there is no wrong or right approach to choosing search terms. The terms themselves are defined by the topic. How meticulous the search is and which databases are used is dependent on the time available for searching. Alternative words and synonyms need to be considered to ensure that a meticulous search process was carried out; these synonyms are listed in table 2.1

Table 2.1 the key words used in the research

Breakfast	reasons	Adolescents	students
Morning meal	Factors	teenager	pupils
Breakfast meal	causes	young	Secondary school students
Breakfast consumption	At home breakfast	Saudi females	family
Breakfast skipping	Middle schools	Saudi adolescents	Saudi Schools
breakfast eating			

The first phase encompassed the use of Google Scholar and PubMed to carrying a limited search via the use of keywords as "breakfast and nutrition," "secondary school students" "Skipping breakfast" "breakfast consumption by students," ". The search was preceded by an assessment of the text words in the titles of the evaluated studies, their abstracts, introduction as well as the index terms that had been used in the description of these articles.

The second phase entailed additional research via the use of the established keywords across the major databases as the electronic databases MEDLINE, Cumulative Index to

Nursing and Allied Health (CINAHL), Excerpta Medica data BASE (EMBASE), (SCOPUS) from 1994 to 2017. The emphasis, in this case, was paid to the subject headings that had been used. The terms used in the search were linked with Boolean operator 'OR' between the words.

Searching only one database alone does not provide data saturation. Dickersin et al. (1994) found that searching MEDLINE alone produces only 30-80% of relevant published studies from many fields of medical sciences. For rigour more databases need to be utilised to reduce the chances of selection bias. However, specific searching of MEDLINE and EMBASE is still endorsed for biomedical searching review (Higgins and Green, 2014), finally, grammar and spelling of words need to be considered (Burns and Grove, 2009). This reduced the possibility of missing research due to misspelling or alternative spellings of key words. When appropriate, wildcard, truncations and Boolean phrases were used in the search process.

In the third phase, 587 studies were exported to the referenced, leading to the generation of the reference lists that were consequently scanned against the eligibility criteria to establish the relevant studies

2.2.2 Objective

To produce an explicit reproducible method and search strategy, with clearly defined eligibility criteria, which identifies all relevant studies for this review. To undertake searching of databases and critically appraise, interpret, present and summarise the findings.

2.2.3 Eligibility Criteria

Inclusion and exclusion criteria are fundamental for maintaining the transparent systematic methodology of the review (Tranfield et al., 2003). The search process used was based on the eligibility criterion that is determined before location of the relevant studies begins. As such, the eligibility criteria specify which studies will be included and excluded (Meline, 2006).

Table 2.2: Development of eligibility criteria

criteria	Inclusion criteria	Exclusion criteria
Type of Participants	The studies were limited to the results that reflected on both children and adolescents from the age of 16 to 18 years old in Saudi Arabia	Students under the age of 16 years
Type of Intervention	Online portable resources that have breakfast skipping among high school students	Any online resources designed for in school use and that cannot be accessed to indicate the interventions under consideration in the subject of breakfast skipping
Outcome measures	data on skipping breakfast and /or outlines the reasons for breakfast skipping	Any outcome that are not related to breakfast skipping
Study design	Mixed study designs that have been published in English language.	Descriptive reports as well as discussion articles that do not offer any form of indication of whether there was variation in student breakfast skipping

2.2.4 Data Charting

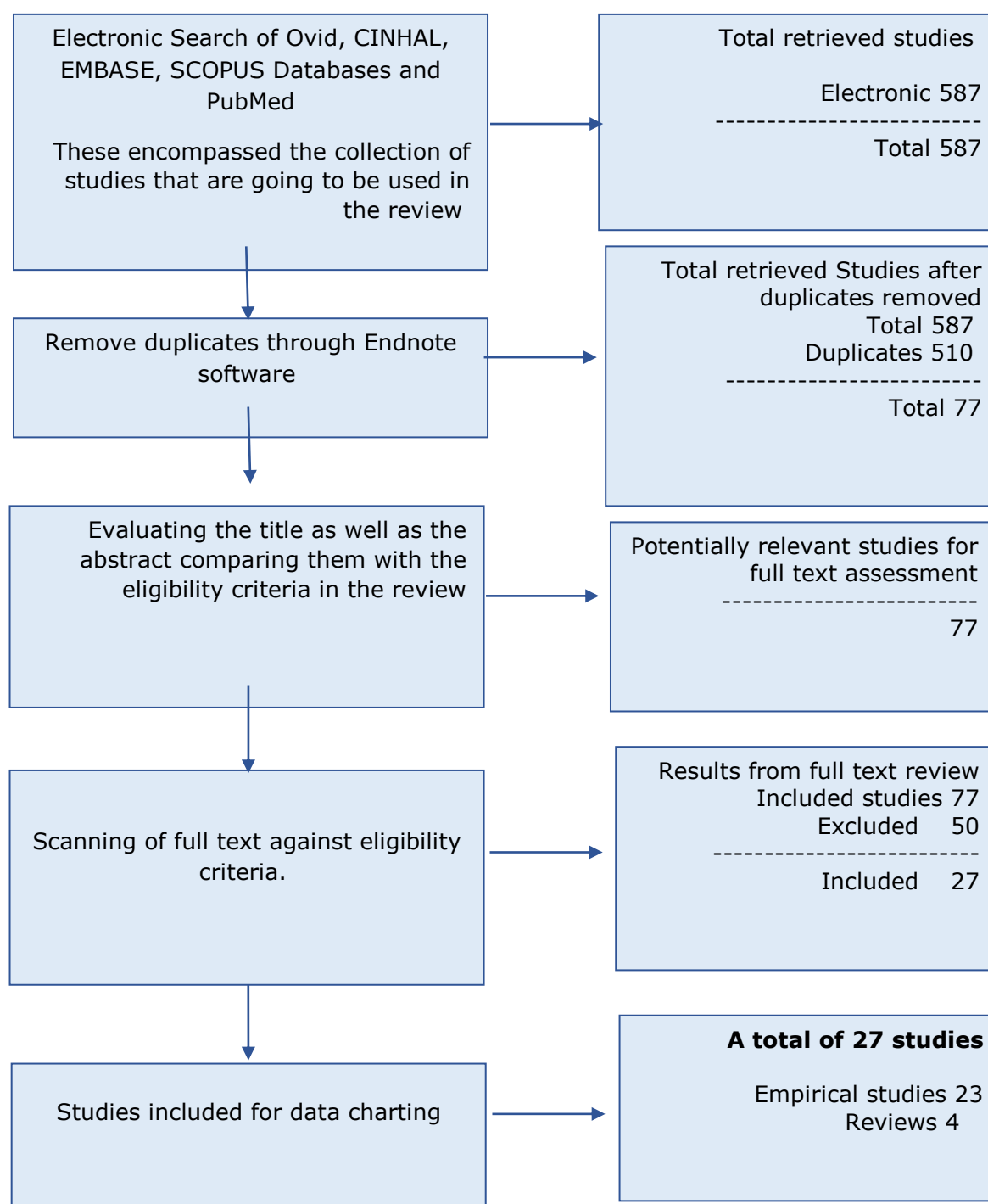


Figure 2.1: A flow chart of the literature scanning process.

2.3 Rates Skipping Breakfast and importance of Breakfast

Research on adolescent eating patterns in westernised countries suggests that adolescents frequently skip meals and eat erratically and inconsistently (Moreno et al., 2010). Savage, studying Australian adolescents, found that patterns of snacking "on the run" were more likely to result in adolescents skipping meals, using high-fat and or high-sugar snacks as meal replacements (Savage et al., 2007), concluded that 13% of the adolescents in secondary school in The Netherlands, skipped breakfast before going to school and that breakfast-skipping is more frequent in girls, older adolescents, adolescents with fathers of low education or living with a single parent and in adolescents attending school in large cities (Pearson et al., 2009; Merten et la., 2009). DeJong et al., 2009 found attitude, perceived behavioural control, modelling by friends and parents, and intention were associated with daily breakfast consumption. Political (breakfast rules), physical (available breakfast products), and socio-cultural (eating meals with a parent) environments were also associated with daily breakfast consumption. Further findings by Pearson suggest the importance of parents eating breakfast with their children and acting as role models (Pearson et al., 2009).

As well as the association between breakfast and general health, there have been a number of studies addressing breakfast consumption, cognition and attainment in school. Benton et al. published work in 2007 from Swansea looking at glycaemic load of breakfast and its influence on behaviour in school. Breakfasts providing a low glycaemic load (i.e. High fibre, low glucose) resulted in improved memory and sustained attention, as well as reduced frustration at attempting a difficult task. This supports the hypothesis that high fibre breakfast consumption results in better school performance. Benton also looked at the size of breakfast and concluded that those adolescents who had eaten a larger breakfast did better than those who had eaten a small breakfast; however, the effects of a small breakfast were reversed by the consumption of a mid-morning snack. This further emphasised the importance of breakfast upon performance, however also emphasise how mid-morning snack can also help those who are unable or unwilling to

take a substantial breakfast (Benton and Jarvis, 2007; Benton et al., 2007). In summary, adolescents frequently skip meals and breakfast is likely to be the meal most frequently missed.

The majority of the studies established that breakfast consumption demonstrated an overall decline in all age groups, predominantly amongst older females and female adolescents aged 15-18 years (Utter et al., 2007). In the case of young adolescents, the tendency to skip breakfast has been connected to a larger BMI. Most of these studies have further demonstrated that adolescents who consume breakfast daily can make enhanced food choices all through the day, while their counterparts who skip breakfast are unable to compensate for other eating opportunities (Nicklas et al., 2002).

Individuals who consume three meals a day are more likely to meet their recommended dietary allowance than those who tend to skip breakfast. It has been established that breakfast consumption provides approximately 20% of the daily energy needs by the body. Skipping of breakfast is one of the core attributes that are responsible for the less than satisfactory nutrient consumption amongst the young people. Breakfast is the most skipped meal by the young people, and This issue of meal skipping becomes a concern especially, since the breakfast meal is unlikely that it is going to be substituted by snacks that are taken later in the day (Al-Sudairy and Howard (1992)

The results of the scoping review confirmed that skipping breakfast is a global problem (Keski-Rahkonen et al., 2003). According to Ali et al., (2018) breakfast skipping in the industrialized countries has been associated with low family socioeconomic status. Skipping breakfast has been linked with an assortment of health-compromising behaviours as well as unhealthy lifestyles as tobacco, alcohol as well as substance abuse and risk-taking attributes in general. Characterisers of studies looking for breakfast skipping were attached (**Appendix 2**).

2.3.1 Rate of skipping breakfast internationally

Research conducted among adolescents internationally has provided an indication of the prevalence of breakfast skipping in a number of countries. Table 2.3 below provides a summary of breakfast skipping prevalence data for different countries.

Table 2.3: Summary of the reviewed studies regarding breakfast intake and skipping prevalence among adolescents

Authors	Country	Design	Sample attributes	Participant attributes	Measurement	Frequency of skipping breakfast
A N Oniriuka (2013)	Nigeria	Cross-sectional	Public school girl	2097 adolescents (12-19)	Frequency of skipping, Reasons for skipping meals	46.3% of skipped breakfast lack of appetite and time
Sweeney & Horishita, 2005).	USA	cross-sectional	High School Students	846 inner-city high school students.	Why do you skip breakfast	57% of students indicated skipping breakfast
Keski-Rahkonen, Kaprio, Rissanen, Virkkunen, & Rose, (2003).	Finland	behavioural and medical self-report questionnaire	Family set up	16-y-old girls and boys (n=5448) and their parents (n=4660).	Socio-demographic factors as well as behavioural attributed associated with breakfast skipping in adolescents	Adults had breakfast significantly less often than adolescents. Girls had breakfast significantly less often than boys

Yi, (2006).	Korea	Comparative Study	elementary, middle as well as high school students	1,886 school student, with female 893 and male 959) from 51 schools elementary school children 544 middle school students 661 High school students 681	Dietary life furthermore recognition of diet related factors	The rate of skipping breakfast was 14.4% in elementary school, 16.1% in middle school, and 25.0% in high school.
Chung et al. 2003	Korea	Cross-sectional	College students	20.41 ± 1.82 years	The breakfast eating status	74.4% skipped
Danquah et al. 2010	Ghana	Cross-sectional	University students	64.6% 21–30 years	Do you consume breakfast?	25% skipped
Sakamaki et al. 2005	Japan & Korea	Cross-sectional	University students 141 from Korean	(20 ± 1.8 years)	The rate of breakfast consumption	21% of Japanese students skipped 64% Korean students skipped

			and 124 from Japan			
Gajre, Fernandez, Balakrishna & Vazir, (2008).	India	Cross-sectional	Two schools that handle middle class households in Hyderabad city	379 urban 11- 13 years old school children	relationship of breakfast to immediate recall memory, attention - concentration, nutritional status as well as academic achievement of school children	About 62.3 % of children habitually consumed breakfast (Group I), 33.8 % consumed it irregularly, skipping it 2 or 3 times a week (Group II) and, 3.9 % did not consume breakfast at all (Group III).
Yahia et al. 2008	Lebanon	Cross-sectional	University students	20 ± 1.9 years	Breakfast consumption	67% skipped breakfast
Hoyland, Dye & Lawton,	UK	Systematic review	Article Review	45 studies in forty-one journals published between	Impact of breakfast on the cognitive performance of	

(2009).				1950 and 2008	children as well as adolescents	
Sun, et al., Yang, Y. (2013).	China	cross-sectional survey	students in years 1–3 of their education	6044 students from the Inner Mongolia Medical College campus	Reasons for skipping breakfast	Skipping breakfast occurrence was 41.7% for males and 23.5% for females, respectively
Cheng, Tse, Yu, & Griffiths, 2008).	USA	cross-sectional	N/A	426 students aged 10-14 years in 4 local schools	Attitudes that have an impact on Breakfast Skipping	130, 30.5%, 95% confidence interval indicated that they skipped breakfast for at least 1 day in a school week.
Hussein, (2014).	Egypt	cross-sectional study	N/A	426 students aged from 10 to 14 years in 4 local schools	The ` of breakfast skipping among primary sixth-grade students	Home breakfast skippers established 71.75% of the whole sample.
Mullan & Singh,	USA	systematic review	N/A	24 studies	Who is eating what, where, and with	Between 1.7 and 30% of participants are found to skip breakfast and approximately one-

(2010).					whom	quarter of the studies report that those with lower socio-economic status, non-whites, and females were the groups more likely to omit breakfast
Pendergast, Livingstone, Worsley, & McNaughton, (2016)	USA	systematic review	141 full-text articles evaluated for eligibility, leading to 35 included studies.	Global Health, EBSCO host, MEDLINE Complete, Scopus, Web of Science and Informit platforms	Breakfast skipping behaviours in young adults (aged 18–30 years).	Breakfast was the most regularly skipped meal at between 14–88% in comparison to lunch 8–57% and dinner 4–57%
Tominaga et al. 2012	Japan, Korea and Austria	Cross-cultural	University students; 276 Japan, 103 Korea, 127	Japan; (19.9 ± 1.2 years), Korea (21.5 ± 1.8 years),	Frequency of breakfast consumption	JAPAN - 50% skipped breakfast, KOREA - 54% and AUSTRIA - 42%

			Austria,	Austria (22.3 ± 5.2 years)		
Berkey, Rockett, Gillman, Field, & Colditz, (2003)	USA	Longitudinal study	N/A	More than 14 000 boys and girls from all over the US, between the ages of 9- to 14-year old	To assess whether skipping breakfast was associated with variations in body fatness	Children who never ate breakfast were heavier (26.4% of boy never-eaters were overweight and 25.3% of girl never-eaters were overweight) than those who ate breakfast nearly every day (21.2% of boys and 15.8% of girls were overweight)
Brugman, Meulmeeste, Wekke & Verloove- Vanhorick, (1998).	Netherlands	cross-sectional	4,377 children data were collected	4–15 year old children	Evaluate the prevalence of breakfast-skipping furthermore the connection with sociodemographic	5% of the children in primary school along with 13% of their counterparts in secondary school skipped breakfast before they went to school. Breakfast-skipping is more prevalent among girls, elder children, children

						whose fathers are of low education and in other cases living with a single parent and in children who attend schools in large cities
Moy, Johari, Ismail, Mahad, Tie, & Wan Ismail, (2009).	Malaysia	cross-sectional study	Random sample of 2665 undergraduates	43.5% male respondents, with Malays being the majority (58.3%)	Evaluate the prevalence of breakfast skipping along with its connected attributes	The prevalence of breakfast skipping was at 29.2%.
Min, et al, (2011).	Korea	cross-sectional	415 employees comprising of 118 men and 297 women;	Respondents between the ages of 30-50 years old from Jaesang Hospital in Korea along with their associates	Impacts of skipping breakfast on quality of diet as well as metabolic disease risk factors	The numbers (%) of subjects classified as 'Regular breakfast eater', 'Often breakfast eater' and 'Rare breakfast eater' were 265 (63.9%), 106 (26.5%), and 44 (10.6%)

Frasca et al. (2014)	USA	cross-sectional		7,788 were derived from the National Longitudinal Study of Adolescent Health	To study how consumption breakfast influences indicators of school engagement and academic achievement on a long-term basis.	A total of 257 schools (57.6%) implemented a Breakfast in the Classroom (BIC) program during the 2012-2013 academic year, whereas 189 (42.4%) did not.
McGregor et al. (2005)		Review			To find out the short and long term influence of skipping breakfast on school-going children.	Skipping breakfast has a negative impact on cognitive performance on a short-term basis. Its influence in behaviour is associated with the classroom environment. The long-term impact of breakfast consumption is seen in increased attendance rates and better grades

						in arithmetic.
Imberman et al. (2013)	USA	quasi-random	N/A	6,353 students and 84 schools in 2009-10 38,425 students in 87 schools	To examine the impact of shifting breakfast from cafeteria to classroom in grades, achievements and attendance rates.	A pronounced increase in math grades and reading achievement was observed in low-performing, free-lunch eligible, Hispanic and low BMI students.
Herrero, & Fillat, (2006).	Saragossa	cross-sectional	ages ranging 12-13 years	141 students 70 males and 71 females	To establish the clear link between breakfast and school performance.	Increase in academic performance with the improvement in breakfast quality was observed.

Hasz & Lamport, (2012).	Europe	cross-sectional	N/A	Review of nutritional as well as governmental reports published from the 1980s	To detect the academic effects of skipping breakfast.	The breakfast skippers have a low level of visualization, low memory and increment of errors whereas the non-skippers are academically and behaviourally good.
Pearson, Biddle & Gorely, (2009).	USA	systematic review	24 papers reviewed, 6 studied children and 19 studied adolescents	24 papers reviewed, 6 studied children and 19 studied adolescents	Correlation of family correlates breakfast consumption among children and adolescents.	It is imperative for parents to be encouraged to become constructive role models to their children via targeting their dietary behaviours. The family structure ought to be taken into consideration when developing programs to encourage healthy breakfast behaviours
ALBashtawy, M. 2015	Jordan	cross-sectional school-based	1303 school students from grades 7 to 12, aged 12 to 18	Occurrence of breakfast consumption was 52.3%	Examine the prevalence of breakfast consumption in	The prevalence of breakfast consumption was 52.3%

		design	years		addition to assess the nutritional status of students aged 12-18 years	
Feeley et al., (2012)	South Africa	cross-sectional	aged 13, 15 and 17 years	1451 adolescents	Examine the prevalence of breakfast consumption	The prevalence of breakfast skipping for each age group was 24%, 36% and 35% respectively
Jääskeläinen et al., (2012)	Finland	cross-sectional	aged 16 years	6247 adolescents	Examine the prevalence of breakfast consumption	16% of the boys and 24% of the girls reported regular breakfast skipping
Gómez-Martínez et al., (2012)	Spain	cross-sectional	aged 13 to 18.5 years	2859 adolescents	Examine the prevalence of breakfast consumption	11% of participants reported they had not had breakfast on the day of the survey

Estima et al., (2009)	Brazil	cross-sectional	aged 12 to 18 years	528 adolescents	Examine the prevalence of breakfast consumption	Skipping breakfast was observed in 4.5% of the boys and 12.4% of the girls
Deshmukh-Taskar et al., (2010)	US	cross-sectional	aged 14 to 18 years	5339 adolescents	Examine the prevalence of breakfast consumption	31.5% of adolescents were breakfast skippers
Woodruff et al., (2008)	Canada	cross-sectional	in grades 9 and 10	1826 adolescents	Examine the prevalence of breakfast consumption	27% of participants reported breakfast skipping
Yeung (2010)	Japan	cross-sectional	aged 11 to 18 years	836 adolescents	Examine the prevalence of breakfast consumption	54% of the participants did not eat breakfast every day

Maddah (2009)	Iran	cross-sectional	N/A	2090 Iranian high school girls from urban and rural areas	Examine the prevalence of breakfast consumption among urban and rural areas and relationship with being of normal weight or not.	Breakfast skipping was reported by 53% of normal weight urban girls, 63.7 % of overweight urban girls, 47.9% of normal weight rural girls and 65.7% of overweight rural girls
Shaw (1998)	Australia	cross-sectional	13-year-old	699 adolescents	Examine the prevalence of breakfast consumption	12% of the sample skipped breakfast
Kang and Park, (2016)	Korea	cross-sectional	N/A	1,652 adolescents (942 males and 710 females)	Examine the prevalence of breakfast consumption	37% of males and 41% of females reported skipping breakfast

Abdelghaffar et al., (2020)	Morocco	Mixed Methods	(14–19 years)	764 adolescents	Examine the prevalence of breakfast consumption and to assess that factors related to unhealthy nutritional habits among Moroccan adolescents	46.1 % skipped breakfast
Croezen et al., (2009)	Netherlands	cross-sectional	aged 13–16 years	25176 adolescents	Examine the prevalence of breakfast consumption	29.3–39.2% skipped breakfast
Zalewska & Maciorkowska (2017)	Poland	cross-sectional	aged 18 years	1999 adolescents	Examine the prevalence of breakfast consumption	25% skipped breakfast

Based on literature review, approximately one third of all international adolescents regularly go to school without eating breakfast. These adolescents have been found as being more likely than their classmates to be unfit, inactive as well as obese. Some of the assertions that have been used in explaining students skipping breakfast is that they are rushed in the morning, that they are tired and in the other cases that they are not hungry yet (Pearson et al., 2009). Attributes relating to time limitation is one of the main reasons that contribute to breakfast skipping. According to medical professionals, this habit of skipping breakfast can result in serious health challenges if it progresses into adulthood. Also, globally, skipping breakfast is highest among adolescents, who are accordingly at risk of poorer physical growth and academic performance (Wesnes, Pincock, Richardson, Helm, & Hails, 2003). A large university population from 28 countries that skipping breakfast was associated with 10 of 15 health risk behaviours, nine poor mental health indicators, and poor academic performance (Pengpid, & Peltzer, 2020).

2.3.2 Rate of skipping breakfast among adolescents in Saudi Arabia

Research conducted among adolescents locally has provided an indication of the prevalence of breakfast intake and skipping in a number of cities. Table 2.4 below provides a summary of breakfast skipping prevalence data for different cities in SA.

Table 2.4: Summary of breakfast intake prevalence among adolescents in Saudi Arabia

Reference	City	Methodology	Population	Measurements	Skipping breakfast	Skipping breakfast rate
Fatima et al., (2019)	Arar, SA	Across-sectional survey	322 adolescent girls with a mean age of 17.14 ± 1.15 years.	To assess the nutritional status of adolescent girls and to investigate its association with socio-economic status, eating and physical activity pattern.	N/A	skipped meals such as dinner (40.06%) whereas 37.88% stated that they skip breakfast and 22.04% skipped lunch
Farghaly et al., (2007)	Abha, SA	Cross-sectional study	767 male and female students	To evaluate the life style and dietary habits of school students and the prevalence of some nutritional problems To identify the	Regular, Sometimes or Never consuming Breakfast meal	51%

Abalkhail and Shawky, (2002)	Jeddah, SA	in-person interviews	42 boys' and 42 girls' schools	nutritional habits and the prevalence of anaemia among school students in Jeddah, as well as to recognize the students' awareness of their anaemic nutritional status.	N/A	15%
Alrayes <i>et al.</i> (2018)	Riyadh, SA	Cross-sectional study	170 adolescents aged (15 - 19 years)	To investigate the association between breakfast intake and short-term memory, performance, and mood, among Saudi female adolescents.	If breakfast was eaten in the day of the survey.	On the day of the survey, 61% of the students reported that they skipped their breakfast before coming to school.

AlBuhairan <i>et al.</i> , (2015)	13 cities of SA	cross-sectional	12,575 adolescents (51% male) and (49% female)	To identify the health risk behaviours and health status of adolescents in Saudi Arabia	If breakfast consumed daily/most of the time	45.2%
Aldulaylan (2016)	Al-Qassim, SA	cross-sectional	361 adolescents (203 Female) and (158 male) aged 12 to 18 years	To compare the food choices of male and female adolescents made during school hours.	If breakfast was eaten in the day of the survey.	15% of females and 8% of males

It can notice that the overall rate of breakfast skipping prevalence data for different cities in SA was high, with an overall rate 36.3%.

2.4 Factors affecting skipping breakfast of adolescents at international level

The individual and environmental influences which adolescents are exposed to during the critical phase of transition from childhood to adulthood can affect food choices and dietary behaviour (Pearson et al., 2009). By understanding the factors underlying breakfast skipping behaviour, more effective and relevant strategies to improve the behaviour can be implemented (de Moraes et al., 2012; Story et al., 2002). However, there are many dynamic and interlinked factors which influences adolescents eating behaviour, and none can be seen as predictive of behaviour in isolation (Stevenson et al., 2007).

Story and co-workers attempted to create a conceptual framework describing the various factors influencing breakfast behaviour, they offerings a conceptual model based on social cognitive theory and an ecological perspective to understand factors that influence adolescent eating behaviours and food choices. According to this model, adolescent eating behaviour is conceptualized as a function of individual and environmental influences. Four levels of influence are described: individual (intrapersonal) influences (eg, psychosocial, biological); social environmental (interpersonal) (eg, family and peers); physical environmental (community settings) (eg, schools, fast food outlets, convenience stores); and macro-system (societal) (eg, mass media, marketing and advertising, social and cultural norms) (Story et al., 2002). Conceptual models are commonly used for understanding and explaining the dynamics of health behaviour (Glanz, 1997). Two models were considered in the development of this framework. The first was Social Cognitive Theory which focusses on the role of personal, environmental and behavioural factors in guiding health behaviour (Baranowski et al., 1997). The second was an ecological model, which focuses on interactions between people and their environments (McLeroy et al.,

1988). Taking these two models into account, Story et al., (2002) noted that the factors influencing breakfast behaviour can be summarised into four broad categories: individual or intrapersonal influences, social-environmental or interpersonal influences, physical environmental or community settings and lastly, macro-system or societal influences. Figure 2.2 below shows the matrix of interacting factors which influence breakfast behaviour.

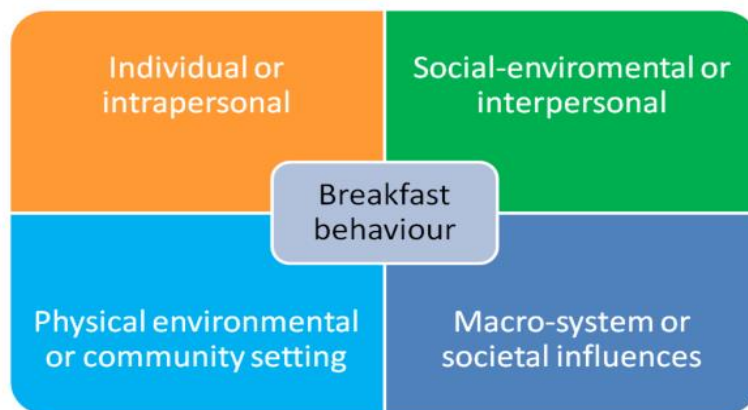


Figure 2.2: Factors influencing breakfast behaviour (adapted from Story et al., (2002))

2.4.1 Individual or intrapersonal factors

Individual influences are individual characteristics which influence eating behaviour. Examples include age, gender, food preferences, attitudes and beliefs towards foods, knowledge regarding nutrition and foods, as well as biological factors such as hunger. Meal frequency, snacking habits and perceived barriers to healthy eating (such as time available, convenience and cost) are also individual influences (Story et al., 2002).

i. How age contributes to skipping breakfast

Adolescents of all ages have a plethora of reasons for skipping breakfast. Majority of the adolescents are busy with homework until late into the night and extracurricular activities. This implication is that they go to bed late and wake up only to rush off to school without taking breakfast. Further, it has been suggested that as children get older, they are more

inclined to fall asleep late at night and awake later in the day (Pearson et al., 2009). In these cases, the adolescents prefer to sleep than going for breakfast.

Frequency of breakfast intake has been seen to decline with age during adolescence (Affenito et al., 2005; Delva et al., 2006). Delva et al., (2006) and his team investigated ethnic and sociodemographic differences in overweight adolescents to determine the relationship between the variables and predicting health-related behaviours among American student. Delva et al., (2006) observed that substantially fewer White, Black and Hispanic youth had frequent breakfast intake in grade twelve when compared to the frequency of breakfast intake among students in grade eight.

Affenito et al., (2005) conducted a study to measure breakfast consumption among African-American and White adolescent girls in the US. To determine frequency of breakfast consumption, dietary intake over three days was assessed, and intake was considered frequent if the participants consumed breakfast on all three days of assessment. Among study participants aged 9 years, 77% of White girls and 57% of African-American girls ate breakfast frequently. Among study participants aged 19 years, only 32% and 22% of White and African-American girls reported frequent breakfast consumption. The study concluded that the number of days' breakfast was eaten tended to decrease with increasing age, and this finding was significant ($P < 0.0001$).

Levin and Kirby, (2012) used data from the Scottish Health behaviour in School-aged Children surveys conducted in 2002, 2006 and 2010 to determine which factors within the family environment influenced irregular breakfast consumption. Regardless of family structure, being of older age or of higher grade was significantly associated with irregular breakfast consumption for adolescents.

According to research conducted by Hallstrom et al., (2011), younger adolescents are more likely to be influenced by their parents' food choices and breakfast behaviour. This trend

tends to decrease as the adolescent's age increases. This may be as a result of older adolescents expressing their independence and autonomy, and choosing not to follow their parents' example (Hallstrom et al., 2011).

ii. How gender contributes to skipping breakfast

Hallstrom et al., (2011) assessed the factors affecting food choices and breakfast habits among European adolescents, it was found that overall, girls were less likely to be regular breakfast consumers when compared to boys ($p < 0.05$). These findings were supported in the research conducted by (Merten et al., 2009), which also concluded that females were less likely than males to eat breakfast during adolescence. An Australian based study investigating adolescent breakfast skipping identified gender to be the only statistically significant demographic variable predicting breakfast skipping behaviour ($p < 0.00001$) (Shaw, 1998).

The previous findings contradict understanding of female dietary behaviour as females typically make healthier food choices and have a greater concern for health than males (Hallstrom et al., 2011; Lattimore and Halford, 2003). A possible explanation for this observation is that because females are typically more health conscious and are more likely to adopt energy-restrictive dieting techniques, they are significantly more likely to skip breakfast (Lattimore and Halford, 2003).

Yeung, (2010) conducted a study among adolescents age 11 to 18 years in Hong Kong to understand different gender perspectives on adolescent nutritional behaviours. While the study found no significant difference in the likelihood of breakfast intake between male and female students, it did find that females were more likely to be weight conscious, in line with the findings of Lattimore and Halford (2003).

iii. Food preferences, taste and hunger

Self-reported food preferences have been found to be one of the strongest predictors of food choices, especially among adolescents. Food preferences are life, such as exposure, experience associated with certain foods and individual genetic palate, ultimately conditioning individuals to their food preferences (Story et al., 2002).

According to the research conducted by Hallstrom et al., (2011), the personal factors of 'hunger' and 'taste' were some of the most important influences of food choice at breakfast among adolescents. Similar findings were reported by Yeung (2010), indicating that 'flavour' was a key factor in driving food choice. Yeung (2010) also reported that cost was a main concern when making food choices, but nutritive value and hygiene were less important influences among these adolescents.

In 12 focus group discussions conducted by Stevenson et al., (2007) among adolescents based in the UK, it was found that food aesthetics, such as taste, texture, appearance and smell were the most powerful reinforcers of food choice. As a result, foods which were less healthy, but offered good taste were viewed as rewarding because of the foods physical properties, where healthier foods (notably green vegetables) were noted to be bland or unpleasant.

Berg et al., (2003) conducted a study among Swedish adolescents aged 11 to 15 years to determine the reasons for choosing different fat and fibre-containing foods at breakfast. While students were aware of which cereal products were higher in fibre, and aware of the associated health benefits of fibre, the study participants were less likely to choose these foods for usual breakfast consumption. The reason for this was that in general, the students perceived foods higher in fibre to be less palatable. In this example, the taste of the food was the key factor in determining which food would be consumed at breakfast regardless of the nutrition credentials of the food.

French et al., (1999) assessed motivational forces for selecting different foods from a vending machine among adolescents. Adolescents who rated 'taste' as the most important factor in snack choice had a significantly lower intention to choose lower fat snack options from the vending machine. Addressing attitude and food beliefs may be more important than knowledge in altering food-related health behaviour (Nowak and Buttner, 2003).

iv. Lack of knowledge and breakfast skipping

An additional significant attribute encompassed the assertion that "snackers" did not feel hunger in the morning, which was considered as an attribute that made them skip breakfast. Further, (Pendergast et al., 2016), established that the small changes that occur in the diet composition exhibit the potential to impact the feelings of hunger as well as satiety, with the main attribute being that when daily nutrition is not met, people tend to become obese. The assertion, therefore, was that the individuals who tend to skip breakfast have a greater likelihood of becoming obese than the adolescents who eat breakfast frequently (Pendergast et al., 2016). It was, thus, established that school administrators ought to formulate suitable educational strategies meant to aid adolescents in recognition of the fact that provision of energy and nutrients via the consumption of breakfast has positive impacts on their energy as well as nutrient intake levels throughout the day.

MacNicol et al., (2003) assessed the relationship between attitudes and dietary behaviour among Scottish adolescents aged 11 to 15 years. The study found that children who were better-informed or had a higher level of knowledge with regard to food, nutrients and diet had better dietary habits, and a more positive attitude to foods. However, it has been noted that knowledge about nutrition and food risks often does not translate into healthier nutritional behaviour (Stevenson et al., 2007). When assessing the knowledge of adolescents with regard to healthy eating, in general adolescents understand the theoretical guidelines and messages, however despite this, adolescents find it difficult to practically apply theoretical healthy eating guidelines (Stevenson et al., 2007; Yeung, 2010). This is

likely as nutritional knowledge may not be the central motivation for food choice among adolescents. In South Africa, there is little published data on the nutrition knowledge of adolescents, and their impact on food-related behaviour (Steyn, 2010).

Dejong et al., (2009) sought to identify the cognitive and environmental correlates of breakfast consumption among adolescents in the Netherlands. Individual cognitions defined by the TPB namely intention to perform a behaviour, attitude towards a behaviour, perceived control over the behaviour and social norms surrounding the behaviour were assessed. The study found that individual factors attitude, intention and decision for self were associated with daily breakfast consumption.

2.4.2 Socio-economic status (SES) and Family and Peers

i. Socio-economic status (SES)

The Health-Related Behaviours among American students: National Trends Report conducted in the US sought to establish long term trends in race and socio-economic status (SES) relating to students who are overweight and engaging in health behaviours associated with weight loss (Delva et al., 2006). The study showed a consistent positive association between SES and regular breakfast consumption. Students of high SES were significantly more likely to consume breakfast than students of low SES. Breuning et al., (2011) found similar results; in a study aiming to identify the predictors of breakfast consumption among adolescents in the US, based on the findings of the Project 'Eating Among Teens' (EAT). One finding of this study was that study participants from higher SES were more likely to report regular breakfast consumption. Breuning et al., (2011) noted that interventions promoting breakfast consumption in lower income schools are required.

Merten et al., (2009) analysed data from the National Longitudinal Study of Adolescent Health in the US to understand the interaction between breakfast, obesity and community and family influences. According to Merten et al., (2009), higher levels of community

disadvantage and family poverty decreased the likelihood of adolescent breakfast consumption.

A number of factors linked to lower SES could influence decreased breakfast consumption, such as limited access to food outlets, limited shared family time, strained financial resources, food insecurity and lack of nutrition and health knowledge (Gable and Lutz, 2000). An Egyptian study on adolescent students showed that 72% of them consume breakfast daily and SES was the only predictor associated with daily intake of breakfast (El-Gilany and Elkhawaga, 2012).

Contrary to these findings, (Hallstrom et al., 2011) found that adolescent males in ten European cities who perceived their family to be “not well off” were more likely to consume breakfast regularly when compared to adolescent males who perceived their family to be “well off”.

Pearson et al., (2009) conducted a systematic review (included Published English-language (n 60) papers) of correlates of breakfast consumption among adolescents. Of the 13 studies included which investigated adolescent breakfast consumption, seven found that socio-economic status was positively associated with breakfast consumption. The remaining six study samples reviewed found no association between these variables. While studies have shown the inverse relationship between SES and breakfast consumption among adolescents, others have argued that the influence of peers, schools and the environment outweigh the influence of SES on breakfast intake.

ALBashtawy, (2015) explained that adolescents who came from high income families had a greater likelihood of skipping breakfast in Jordan. The finding is attributed to the ease of accessing money that would be spent on snacks along with the other fast foods instead of concentrating of a nutritious breakfast in their homes. In the case of better educated mothers, the author asserts that there is an increase in breakfast consumption. The idea by

the author was that adolescents from wealthy families had enough pocket money to purchase snacks in the course of the day without paying a lot of attention to breakfast since they know they will not be hungry. Such adolescents were more motivated to skip breakfast knowing that they will purchase snacks during the day to compensate for the hunger they may feel for skipping breakfast. The assessment further established that mothers were not predictors of the rate of breakfast consumption at home. There also was no linkage that was established between the level of mothers' education, occupation as well as breakfast consumption among their children. The education that was accessed by the father, as well as the occupation, were some of the greatest determinants sociodemographic determinants that were associated with breakfast eating among the adolescent. These measures had been correlated with the specific transition from unemployment to manual work as well as from secondary to university graduation.

The research by (Hoyland et al., 2009) included forty-five studies described in forty-one papers published between 1950 and 2008 established that adolescents who exhibited higher monthly expense had a greater likelihood of skipping breakfast than their counterparts who exhibited lower monthly expenses. The assertion in this case, therefore, is that higher monthly expenses were a risk factor in when it came to the adolescents' breakfast consumption habits (Hoyland et al., 2009). One attributes that the authors considered in explaining the situation are the assertion that adolescents who had higher monthly expenses were likely to eat more snacks later in the day compared to their counterparts who had lower monthly expenses.

In the Netherlands, Brugman et al., (1998), argued that homes with better educated mothers were characterised by greater emphasis on breakfast consumption were the mother ensured that the children took breakfast before going to school. The implication of the increased emphasis was the consequent reduction in the cases of breakfast skipping among the adolescents.

ii. Family and Peers

Adolescents and the young adults are more focused on their image and opinion of the peers, which occasionally leads to the emergence of conflicts in breakfast eating habits. One of these examples was the perception that taking milk which is a significant breakfast component was childish according to the adolescents (Mullan and Singh, 2010). In this study, the authors conducted a systematic review of 24 studies on the effect of peer pressure on the tendency to skip breakfast. They established that there was the issue of children and young adolescents being cautious of their body image, especially before their peers and friends. These adolescents may decide to skip breakfast as a way of dieting to maintain the peer-approved body images (Mullan and Singh, 2010).

The influence of peers and conformity to acceptable norms within a peer group is typical of adolescent behaviour (Story et al., 2002). Adolescents spend a significant amount of time with their friends, and eating is a form of socialisation and recreation. Adolescent peers help to create the norms concerning acceptable behaviour, including dietary behaviour. Dejong et al., (2009) identified 'modelling by friends' as an environmental correlate of adolescent breakfast consumption. Study participants were asked to rate the question, "How often do your friends eat breakfast" as always (+2) or never (-2). Participants who reported a higher score for "How often your friends eat breakfast" were more likely to eat breakfast regularly themselves. This indicates that behaviour which is deemed acceptable among a peer group, in this case eating breakfast, will influence individuals within that group to conform to this behaviour.

Breuning et al., (2012) examined the associations of healthy eating between adolescents and their friends looking specifically at breakfast, fruit, vegetable, wholegrain and dairy intake. Data for the study was drawn from Project EAT. The study found significant positive associations between adolescents and their friends for breakfast eating, wholegrain intake

and dairy intake. The study findings suggested that adolescent friends exhibit similarities in dietary intake.

Research regarding the role of peer influence on dietary behaviour is sparse. One reason for this may be that social influences are difficult to measure (Feunekes et al., 1998; Story et al., 2002). In the case of adolescents who are becoming independent and expressing their autonomy, admitting their behaviour is influenced by their peers is unlikely. Furthermore, adolescents may not be aware of the impact of social eating norms on their behaviours. Good self-perception as was identified as one of the core attributes that promoted breakfast intake among students, with cases of breakfast skipping being more prevalent among the students with a bad self-perception. Further research is required on this topic to understand the role of peer pressure on dietary behaviour, particularly breakfast behaviour.

Families mediate dietary behaviours for adolescents in two ways: first is the provision of certain foods affecting availability and accessibility of foods to the adolescent, and second is the role of the family and parents in particular in influencing food preferences, values, attitudes and habits (Story et al., 2002).

While parents have little influence on adolescent food choices outside of the home, they can influence which foods are available within the home. Ensuring that nutritious healthy foods are available and visible guides the adolescent's food choices (Story et al., 2002). Levin and Kirby, (2012) investigated irregular breakfast consumption by family structure, and breakfast intake was shown to vary depending on the family dynamics present. Difficult parent-child relationships or poor communication and irregular personal and family routines were associated with irregular breakfast intake regardless of the number of parents in a household. In households where both parents were present, living with siblings, being treated unfairly and having older siblings was associated with irregular breakfast consumption. Being close to at least one parent was associated with reduced likelihood of irregular breakfast consumption in single mother households, and in single mother homes,

adolescents with mothers who worked away from home also had higher likelihood for irregular breakfast intake. Similarly, Merten et al., (2009) found that adolescents who had at least one parent present in the morning were more likely to eat breakfast than adolescents who had no parents present in the morning.

Family routines are important to facilitate communication and connections between family members, as well as to promote family identity and organisation. Opportunities for connecting with family members allows parents to socialise with young people, share values and experiences, and influence their children's habits and activities. Family organisation and routine have been linked to adolescent psychological health, body weight status and dietary intake. Routines and socialisation in turn impact parent-child relationships (Levin and Kirby, 2012).

Hallstrom et al., (2011) highlighted the role of parents in encouraging healthy nutritional behaviour among adolescents. In this study, boys from single-parent/divorced families were less likely to eat breakfast regularly when compared to boys from traditional families. Boys whose parents gave little or no encouragement to eat breakfast or follow a healthy diet tended to be less likely to eat breakfast regularly. Where parents of boys practised healthy nutritional behaviours themselves, their sons were more likely to eat breakfast regularly when compared to boys whose parents did not practise healthy nutritional behaviours.

From the information above, it appears that parents have a key role to play in guiding food behaviours among their children. By setting a positive example of dietary intake behaviours themselves, they create a standard of acceptable dietary behaviour, which their children are more likely to comply with. It has been suggested that increased frequency of meal eaten together as a family is an effective way of influencing adolescent's breakfast habits and to create an environment that encourages general health conscious behaviour (Hallstrom et al., 2011; Levin and Kirby, 2012).

According to Chitra and Reddy, (2007), the issue of skipping breakfast is becoming a prevalent issue in the contemporary society mainly due to the changes that are occurring in family lifestyle. Pendergast et al., (2016) supported the position held by other studies that a mother's dietary behaviour, as well as knowledge, are not indicators of healthy food choices for their children. In this case, it is common for some adolescents to skip breakfast since they consider it to either be unnecessary tasteless or poorly cooked. there is an indication that the food purchasing decisions that are made by a mother are mainly dependent on the adolescent's likes and dislikes, with the dislikes mainly being dependent on the maturity of the children as well as their levels of independence.

2.4.3 Physical, environmental or community setting

The physical environment in which a community exists affects accessibility and availability of different foods (Story et al., 2002). As young adolescents become young adults, their likelihood for eating more meals out of the home increases. It has been reported that a third of adolescent eating occasions take place outside of the home, and is comprised of meals at school, fast food restaurants, vending machines and other locations. For this reason, the physical environment to which an adolescent is exposed significantly impacts the type of foods made available to them, thus influencing dietary intake, meal frequency and patterns.

i. School

The school food environment may have a key influence on adolescents' dietary behaviour and food choices because a large portion of adolescent's total daily energy intake is consumed at school (Burghardt et al., 1993).

Temple et al., (2006) investigated foods items consumed by 476 students attending different schools in Cape Town. While 22% of the study participants skipped breakfast before going to school, 80% did eat a meal at school, which in the majority of the cases was purchased from the school. Three quarters of the food purchased at the school came from a tuck shop and was generally regarded as less-healthy food. One quarter of the students who bought food from school purchased from local vendors. In this case, the types of food to which children are exposed at school influence their dietary choices and as a result, have a less healthy diet. By influencing the types of food made available, it would be possible to improve the overall diet among these children (Temple et al., 2006). In 1994, the Department of Health implemented the Primary School Nutrition Programme (PSNP) which aimed to improve the health and nutritional status of South African primary school children, improve levels of school attendance and improve the learning capacity of children by providing a nutritious meal to learners in lower income primary schools. In 2004, the

programme was reallocated to the Department of Basic Education and was renamed the National School Nutrition Programme which allowed the programme to focus on secondary schools as well as primary schools (Department of Basic Education, 2012). The meal provided to learners as part of the programme includes a food item from each of the following food groups: Protein (including soya, fish, eggs, milk, beans or lentils), carbohydrate or starch (rice, bread or maize), fats, oils and salt (added for taste) and fruit or vegetable (should be served daily where possible). The meal should be served to the learners by 10:00 am, and where breakfast is served before school starts, the main meal may be served later in the day (Department of Basic Education, 2012). The provision of a meal through the NSNP provides a significant contribution to food intake among South African adolescents from lower socio-economic background (Department of Basic Education, 2012; Shisana et al., 2014).

According to the World Health organisation (WHO) a school health programme is a combination of services aiming to ensure physical, mental and social wellbeing of learners so that they are better able to learn and reach their full potential. Because children spend around 13 years in the classroom environment, this provides an ideal opportunity for health education and intervention, which in turn can be shared by the children with their families and communities (Department of Health and Department of Basic Education, 2012).

2.4.4 Macro-system or societal influences

Macro-system factors have an indirect role in influencing food behaviours, and examples include mass media and advertising, food production and distribution systems, national laws and policies guiding food supply issues, as well as social and cultural norms with regard to food (Story et al., 2002). These influences have a much broader effect which guides trends and the environment of whole communities and countries.

One way of influencing cultural beliefs and stigmatizations is by ensuring that the advertising food and beverages to children and adolescents is appropriate and promotes consistent health messages. By allowing food advertisements for unhealthy foods to be displayed to communities, confusing messages are reinforced among the public, creating a need for foods which are associated with success rather than health (Stupar et al., 2012).

In the case of breakfast, fast food manufacturers are increasingly promoting consumption of fast foods as a convenient, quick breakfast. Given that adolescents are susceptible to the media and this type of advertising, the impact of these advertisements will cause switching from traditional breakfast meals to refined high fat alternatives, decreasing overall diet quality for adolescents.

There is a strong need to explore contextual factors affecting breakfast behaviour among adolescents (Merten et al., 2009). Identifying important changeable determinants is critical to the development and implementation of relevant and effective interventions within the target group (Dejong et al., 2009; Hallstrom et al., 2011).

2.5 Factors contributed with breakfast skipping among Saudi female adolescents

A nationally representative school-based study on secondary school adolescents (12,575 adolescents) in all 13 regions of SA has identified that male adolescents (64.0 percent) more frequently consumed breakfast than female adolescents (48.0 percent) (AlBuhairan et al., 2015). Similar to AlBuhairan et al., 2015, Saudi female adolescents were reported skipping breakfast meal more often than male adolescents in Al-Qassim city (Aldulaylan, 2016) and Abha city (Farghaly et al., 2007).

In Jazan city, SA, a school-based study on adolescents indicated that majority of boys (80 percent) ate breakfast regularly, while only half of the girls reported regular intake of breakfast. It was attributed to the idea that Saudi boys are more open to socialize and

entertain as groups and have more access to cafeterias and eating together, whereas girls have fewer opportunities. Their positive feeling toward eating breakfast is self-initiated and was expressed by liking to take breakfast, whereas girls reported that their mothers urge them to take breakfast. Apparently, boys are more independent regarding their choices even with their eating patterns, and this condition could be a cultural norm (Moukhyer et al., 2019).

Starting from primary levels, the prevalence of breakfast skipping among Saudi female school students in Riyadh statistically increased with age (Al Turki et al., 2018a). These are similar to another study in the same city where breakfast skipping was significantly increased with age in upper primary girls aged 9 to 13 years (Al-Oboudi, 2010)

Al Turki et al., (2018b) indicated that 37.5% of the adolescent girls (aged 16-18) from secondary schools in Riyadh had the habit of skipping breakfast regularly. Among them 65.3% skipped breakfast due to lack of appetite in the morning and 27.80% skip breakfast as they had a lack of time.

Althuwaykh et al., (2017) indicated that majority of female students reported eating breakfast, during school days, daily or three to four times per workdays. About 40% of the 400 female students reported skipping of breakfast. The two most common reasons to skip breakfast were "I'm not hungry in the morning" (31%) and "I don't have enough time" (22%). In consistency with Soyer et al., (2008), the most skipped meal among female Turkish adolescents was breakfast (46.6%) and the leading reasons were not feeling hungry (73.1%) and lack of time (20.6%).

Another study in Riyadh City involved 170 female adolescents (15-19 years) showed a high prevalence of breakfast skipping about 61 percent among girls with "not feeling hungry" and "not having enough time" being the most mentioned factors for skipping behaviour (Alrayes et al., 2018).

Al-Hazzaa et al., 2014 conducted a multicenter school-based study in the secondary schools from three major cities in SA (Riyadh, Jeddah and Al-Khobar). They found a significant association between longer sleep duration (≥ 8 h/day) and the frequency of breakfast intake. This finding makes sense as adolescents with adequate sleep time can afford to wake up early and have their breakfast before heading to school. It is also possible that having regular breakfast may reflect more stable family structures with the parents and children having their breakfast together.

In a comparison study between Saudi female adolescents and Egyptian female adolescents conducted by El-Sayed et al., (2013), the Egyptian girls' daily intake of breakfast, fruit, and vegetables was significantly higher than the Saudi girls' group who also reported more days per week when they ate or ordered from a fast food restaurant.

In 2011, Al-Hazzaa et al. documented that from about 67% to more than 80% of adolescents in SA didn't consume the daily US- Dietary Guidelines Recommendations (DGR) for milk, fruit, and vegetables. Breakfast was not consumed on a regular basis and unhealthy food choices such as sugar sweetened beverages were most often consumed (67% for males and 57% for females). Similarly, candy and chocolate consumption were 37% for male and 52% for female Saudi adolescents.

AL-Oboudi and AL-Khudhayri, (2011) concluded that the breakfast meal was the most frequently skipped meal (only 36.2% eating breakfast 6-7 days/week) among Saudi female adolescents. However, they observed a positive association between family meal frequency and increased breakfast consumption. Also, a significant increase in the consumption of healthy food items such as fresh vegetables and dairy products with more family meals, but a decrease in consumption for decreased family meals. This also confirms that the family meals have a significant positive influence on the quality of food eaten among Saudi female adolescents.

Breakfast meal was found to be the least consumed meal (52%) with family among Saudi female adolescents in Tabuk city compared to lunch (100%) and dinner (78%). But consistent with AL-Oboudi and AL-Khudhayri, (2011) study, family breakfast was positively associated with female adolescents' intake of dairy products and meat alternatives (Eman, 2020).

In accordance to Alahmari et al., (2017), the majority of female adolescents with higher educated parents were more likely to have breakfast. Similar to the results of a study in Sweden found that adolescents from areas with high SES more often ate breakfast compared to adolescents from areas with low SES (Höglund et al., 1998). One reason maybe awareness difference (van Ansem et al. 2014).

In a sample of 107 Saudi female students aged 12-15 years in Riyadh, the prevalence of breakfast skipping was very low (7.5%) compared to other studies in SA. The SES of the majority of the adolescents was high, most of them are living in villas (86.0%) and their families had an average monthly income of > 10,000 Saudi rials (> 1900 GBP) (76%). Also, For the majority of the participants their parents were university-educated (90.7% for fathers and 67.3% for mothers). It is suggested that the high SES of this sample played a vital role in daily breakfast intake and improved dietary habits (Al-Muammar and El Shafie, 2014).

In contrary, Musaiger and Zagzoog, (2014), found that Saudi female adolescents from private schools (high SES) were skipping breakfast meal than adolescents from government school (medium and low SES), suggesting that SES was not associated with breakfast skipping behaviour. Moreover, Abuzaid, (2012) found that there was no significant difference in breakfast skipping frequency between rural and urban high school adolescents in Riyadh city and Dawadami town (approximately 320 kilometres west outside the city of Riyadh).

However, in SA, several canteens did not follow the governmental instructions and the current guidelines either do not provide precise guidance or do not have the needed authority on canteen managers and staff to follow. In SA, the School Healthcare Department (SH) was established in 1964. The Department is responsible for health in the school environment and school foods that are provided by canteens. In addition, they conduct periodic health and nutrition surveys in order to investigate, evaluate and control the prevalent health and nutrition-related problems in schools throughout SA [Personal contact with Al-Shehri (Department Chief of School Health)]. As mentioned in Chapter 1, all governmental sponsored schools across SA are run by one outside caterer who provides meals and snacks for students at reasonable prices. As a result, individual schools have little influence over the food provided.

Despite the policies and regulation for school health services, the meals and snacks provided by the caterer do not meet the basic provision for healthy foods, and the most prevalent options in school canteens are high fat, sugar and salt (HFSS) foods and imitation fruit juices. These meals and snack foods are intended either to supplement foods brought from home or in many cases, these actually constitute the student's breakfast. Private schools operate their own canteens by making contracts with different caterers who give them the right to sell fast food meals or snack foods and mostly have no healthy options. In addition, the regulations for some of these schools do not prohibit the sale of sweetened carbonated beverages. As mentioned above, nutrition and health education in schools are within the national curriculum core subjects of science, and food and nutrition education are part of science in both education levels (intermediate and secondary levels). The curriculum covers the basic need for food as a vital part of life through to the more complex aspects of how nutrients work within the body (MOE, 2017).

Yahya, (2017), found that the nutrients' level in the breakfast meals were lower than the federal minimum requirements for SBP in the United States. Such low level of nutrients

provided from school meals would make it difficult for the students to compensate for the nutrient imbalance when they are eating outside of school, and since 44% of intermediate level canteens and 33% of the secondary level canteens, in this study, reported never to changing their food lists, low micronutrient composition of the breakfast meals could significantly affect the health of adolescents. This indication is in concordant with previously mentioned studies from SA and other GCC countries that reported adolescents and adults' daily intake of nutrients such as calcium, iron, and vitamin D failed to meet the daily recommendations (Al-Assaf, 2007; Al-Musharaf et al., 2012).

Yahya, (2017) also showed that the average content of iron provided in the school breakfast meals was 2 mg in both levels, which means that the breakfast meals contribute to iron recommendation allowance by 13%, a value that is lower than the recommended quarter by the USDA and less than the federal minimum requirement. The breakfast meal provided very low levels of vitamin D to the students (0.1 µg in intermediate level and 0.3 µg in secondary level), reinforcing studies that indicated prevalence of vitamin D hypovitaminosis among adolescents in the country. A study in Jeddah showed that 81% of female adolescents were found to have low vitamin D levels, ranging between 2.2-24.0 nmol/L (Siddiqui and Kamfar, 2007).

However, the sugar content in the breakfast meals showed that its average content in intermediate level was 24 g and 23 g in secondary level, which is almost equal to the American Heart Association daily recommendation of added sugar for children and adolescents. Based on the obtained food lists and nutritional composition of the breakfast meals, it seemed that the canteens receive small share of the profit from the school or the caterer. Insufficient funding prevented supplying the canteen with fruits and vegetables and improved cooked meals.

While SA is a particularly conservative country, lifestyle in the Kingdom is ultramodern and high-tech. For example, in 2001, 99% of the Saudi households were reported by Euromonitor statistics to own a color TV and 23% to own a personal computer (Rice, 2004).

In the age of globalization and similar to youth in other parts of the world, young Saudis are avid users of mobile telephones and text messaging, the internet, social- networking satellite television and popular music. In addition, they can access mass media through print media, e.g. books, magazines, and comics or through electronic media, e.g. the home utilities of radio, television (and variations, including broadcast, cable, satellite, video, and DVD), and the internet. Films can only be accessed by these adolescents on video cassettes or DVDs and on paid TV channels such as ART Cinema, Rotana Cinema, and 'Melody Aflam'. This is because paid cinema and cinema halls are not permitted in SA except in very limited and private occasions, and places where girls can watch films separately from boys or when accompanying their family on special occasions.

SA is considered as the largest market in the Arabian Gulf region which offers investors and exporters many opportunities, including food marketing and advertising (Rice, 2004). In their report that was based on a Jeddah survey on snack foods, the United States Department of Commerce and Department of Agriculture (2011) reported that SA has, about 25 producers of snacks and half of them are located in Jeddah. The rests are located in Riyadh and Eastern Province (Department of Commerce and Department of Agriculture 2011). The same research reported that more than 60 different brands of savoury snacks are sold in Saudi retail outlets such as supermarkets and corner stores. Two-thirds of these are local brands and several other are U.S.-origin brands. There are more than 55 local brands on the market and salted snacks are the most widely available snacks in the Saudi market (e.g. Tasali and Lays).

Food preferences, consumption choices and purchases of children and adolescents of different ages can be affected by the food advertising that they are exposed to. Findings

about the influences of food promotion were reviewed from both developed and developing countries (Hastings et al., 2007). There is a growing body of literature about sedentary behaviour, particularly television viewing, which merits some attention. In his review, Al-Hazzaa, (2002), associated television viewing by Saudi youth with obesity and lack of physical activities.

A cross-sectional study on secondary school adolescents in Al-Khobar Area (eastern province of SA) concluded that knowledge of healthy diets among school students was inadequate. About 65% of the female students recognized unsaturated fats as healthy foods, and dietary knowledge of both male and female students on the dangers of unhealthy foods and the benefits of fiber-rich diets was found to be unsatisfactory. The main sources of knowledge about health and disease reported by female respondents were television (61%), magazines (39%) and daily newspaper (34%). Primary health care centers (PHCCs) staff were the least source of knowledge (16%) (Al-Almaie, 2005). These results indicated the unsuitable influence of media on adolescents' dietary knowledge which consequently would affect breakfast intake frequency.

2.7 Summary of the scoping Review

The core objective of this literature review was in the exploration of the prevailing evidence of the core attributes that motivate adolescents to skip breakfast, identify the social factors such as sharing family meal, mothers or teachers' engagement, to identify knowledge factors, to identify health factors, as well as identify personal factors contributing to this tendency. The review has successfully managed to realize these core objectives and reached the conclusions below.

It was clear that the presence of parent figure in the lives of these adolescents was a major determinant of whether they will skip breakfast or not, with the finding being that occasions where there is the presence of such a figure, adolescents are more inclined to eat breakfast.

The composition of the breakfast meal as well as the tastiness of the meal itself has been established as a significant issue that accounts for whether a student will eat breakfast or not, with there being the skipping of breakfast that is considered not to be tasty. The role of teachers in promoting breakfast consumption has additionally come to the fore, with the assertion being that it is imperative that teachers ensure that adolescents appreciate the role played by breakfast in their daily lives. Further, it has been established that overweight and obesity are more prevalent among adolescents who skip breakfast than their counterparts who eat breakfast regularly.

2.8 Conclusion

The scoping review that has been conducted has made it clear that breakfast consumption has an assortment of benefits to a student, not only regarding their academic but also in their general lives. Breakfast was consumed for its health benefits, to satisfy hunger, to keep alert, prevent fatigue, and keep up energy levels. It has been evident there has been research examining the reasons that account for the skipping of breakfast among high school students especially in SA. The literature review section conducted a thorough research on the attributes that drive secondary school female adolescents into skipping breakfast. The next chapter presented a discussion of the methodology that has been used in accomplishing the research aim as well as objectives.

Chapter 3: Methods and Methodology

3.1 Introduction

This study examined the factors that could influence Saudi adolescents' breakfast intake and reasons for skipping. The literature review has demonstrated that there is a lack of studies that have addressed the specific drivers responsible for breakfast skipping among the secondary school adolescents in Tabuk City, SA. All the existing studies are originated from the western world with different research methodologies (Fiuza et al., 2017; Berkey et al., 2003; Shaw 1998).

Hence, the methodological plan that was applied in this study was divided into two phases (Catallo et al, 2013):

- **Phase one:** aimed to identify the prevalence of breakfast skipping and AHB skipping among adolescent females aged 16-18 years old and their demographic, social and economic backgrounds using a quantitative survey. This phase addressed the first primary objective of the study.
- **Phase two:** aimed to explore the reasons and factors behind skipping breakfast and AHB, and the perspectives on the importance and knowledge of AHB meal among adolescent's females aged 16-18 using a qualitative inquiry through six Focus Group Discussions (FGDs); three groups of students who was identified as AHB skippers and three groups of students' mothers whom their daughters were AHB skippers.

3.2 Methodology overview

The study sought to investigate the reasons and factors underlying why adolescents within SA skip breakfast before they go to school. According to Creswell (2014), the choice of the research method to be used in a study is based on the objective that researcher has established. The three main methods that a researcher can use in a study include the

qualitative, quantitative and the mixed methods. The decision on the method is thus based on the researcher's assessment of the pros and cons of each method and the effectiveness with which the method has to the targeted study.

Quantitative design deals with numbers and is analysed through statistical methods. The major advantage of this approach is that it produces reliable results that can be generalized to a larger population because of the large size of the studied sample (Rees, 2011). However, the quantitative method has a weakness in that it cannot identify the reason behind certain behaviours or actions. For instance, quantitative methods can clearly indicate the percentage of participants who were not engaging in physical activity but may not explain why this was the case. Where quantitative methods fail, qualitative methods become applicable.

Qualitative research is defined by Creswell (2014) as 'an approach for exploring and understanding the meaning individual or groups ascribe to a social or human problem'. Qualitative research deals with words and phrases and converts them into the narrative analysis (Rees 2003). Here, emotional intelligence, self-awareness, mindfulness and verbal and nonverbal communication skills become the researcher's tools (Collins and Cooper, 2014). A popular qualitative methodology involves collecting face to face data from the participants via semi-structured FGD. The advantage of using qualitative research is that it gives rich information about participants' personal experiences and their own reasons behind such experiences (Saunders et al. 2016). However, it is often difficult to generalize qualitative findings because this method is time consuming and hence the sample size must be kept small (Rees, 2011). The researcher must be vigilant against her personal and cultural value systems causing perceptual biases (Collins and Cooper, 2014).

It can be seen from the above that both quantitative and qualitative approaches were used because each can significantly contribute to an understanding of the phenomenon under investigation. In the current study, most questions and all measurements are quantitative in nature, and seeks to identify the backgrounds of the Saudi female adolescents. The

qualitative aspect of the study enquires why the girls skip and feel about breakfast meal. Thus, the quantitative and qualitative aspects of the study complement each other.

According to (Creswell, 2013), mixed method research design encompasses the design that adopts both qualitative and quantitative data in either a single or multiple studies. Mixed methods designs is the cover that describes the use of both quantitative and qualitative data collection procedures as well as research methods and entails mixed methods research along with mixed model research (Teddlie and Tashakkori, 2003). While mixed research method relies on quantitative and qualitative data collection as well as analysis, they are parallel on most occasions without any cases of mixed and that the questions they pose in addition to their inferences are either quantitative or qualitative in nature and not blended (Sale et al., 2002).

The strengths of using the mixed methods are that it helps in gaining an in-depth understanding and corroboration in drawing out the correct conclusions (Brannen, 2017). The understanding is reached by use of various methods and data researchers to examine the same phenomenon which is known as triangulation. Triangulation helps in the approach of phenomena in different ways hence accurate information is collected; it also helps in the development of a theory.

3.3 The Philosophical Framework

Based on the advances in understandings of complex theories, agencies that fund evaluations are increasing their support for mixed methods evaluations. For example, the Office of Behavioural and Social Science Research of the National Institutes of Health supports the use of mixed methods and recognizes that researchers and evaluators need specific guidance in the preparation of proposals that use mixed methods. Their interest in this topic was operationalized by the preparation of a guide to best practices in the use of mixed methods in the social sciences (Creswell et al, 2011).

Generally, the mixed methods evaluation enjoys a plethora of **paradigms** which are a set of philosophical assumptions commensurate with each other that guide thinking and decision

making in evaluation work. Lincoln and Cuba (2005) adapted the concept of paradigms and extended their meaning to include four sets of philosophical assumptions that characterize a person's worldview. The four sets of assumptions:

- Axiology: the nature of ethics and values
- Ontology: the nature of reality
- Epistemology: the nature of knowledge and the relationship between the evaluator and stakeholders
- Methodology: the nature of systematic inquiry

The quantitative philosophy follows the principle of naturalism as well as positivism, where natural science is applied to social research and knowledge is created in a number of ways, for instance when it is based on empirical data collection, theory testing and the development of the universal law (Brannen, 2017). Data collected through this method is considered to be more accurate due to standardized strategies such as the statistical methods (Robson, 2011).

The qualitative philosophy follows the principle of constructivism works under the phenomena that information is created through a collective way of understanding and shared knowledge. In this case, it is believed that one individual is connected to the other. In this case, the existence of an object, in reality, is disputed among the people, where it is termed as anti-naturalistic according to the philosophy (Creswell and Poth, 2016). The qualitative methods help to explore the world in an interruptive way as well as investigation of meaning as known to the world, hence making emphasis on the language used. In this response, the philosophy is based on peoples understanding which determines their behaviour.

Weaknesses of the mixed research would include the complexity of using both methods which may lead to high expenses. A lot of time in the research by both methods is consumed; this is in terms of the resource planning as well as the implementation of the

method. Discrepancies may arise which would be hard to resolve and through the interpretation of data collected as well as findings (Creswell et al., 2003).

Justification of the mixed method research is used in the validation of information and the results collected are correct. The method is used when one philosophical method needs to inform the other for instance when there is little knowledge on a topic and the known variables need to be studied. To clarify the various findings of phenomena, one can also look at different data from different angles hence as a justification of the mixed methods (Brannen, 2017).

Overall, the debate about the merits of qualitative as well as quantitative research paradigms has been in occurrence for a very long time. Proponents of these research methods support the method they prefer, considering it as the best strategy that can be used in any studies, with a section of them asserting that the two cannot be integrated together. It, however, follows that while the names suggest the two strategies are different, they have similarities that make it easy to use them together (Tashakkori and Teddlie, 1998). One of these attributes is the fact that the two methods aids in answering the prevailing queries using empirical observation, describing as well as summarizing data in adoption to developing patterns that can be used in explaining the results.

Most of the recent arguments on the selection of the method have been focused on the manner in which mixed research methods can be designed and used effectively. While there is apparent complexity how the two methods can be used together, there are an increasing number of researchers who are embracing the concept. Proponents of quantitative researcher's assert that scientifically-based rules, as well as laws, are the main attributes shaping the social world in the same way they shape the physical world. Qualitative researchers on the other hand believe that an individual and the world are so interconnected that one cannot live without the other.

Data collected through the quantitative strategy has been considered as being more objective as well as accurate since it is gathered by via the use of standardized strategies,

can be replicated analysed via the use of statistical procedures. Qualitative strategies have occasionally been considered to be less reliable and accurate.

3.3.1 Pragmatism

A pragmatic researcher understands the importance of focusing the study design to its objectives—to find answers to the research question. To maintain such focus, a research paradigm (the philosophical basis of research) helps guide the direction and methodology of the research so that the objectives are always kept in view (Houghton et al. 2012). According to Saunders et al. (2016), a research paradigm is a belief on how data should be gathered, analysed, and used in providing essential information in a given study. A robust research paradigm should incorporate elements of epistemology and ontology (Saunders et al., 2016). A researcher's epistemology refers to what is known (understood) by the researcher to be true. Ontology refers to the nature of reality as believed by the researcher (Saunders et al., 2016).

In response to criticisms from philosophers of science that quantitative and qualitative research rest on different epistemological foundations and thus are incompatible and cannot be integrated (Tashakkori and Teddlie, 2012), mixed methods proponents have adopted the philosophy of pragmatism. Pragmatism is a philosophy rooted in common sense and dedicated to the transformation of culture, to the resolution of the conflicts that divide us, thus approving of the use of the formulation or combination of evaluation methods that best meet the needs of the evaluation questions and, by extension, of society (Maxcy, 2003).

Choosing the methodology and research methods used in the study, pragmatism was adopted as the underpinning philosophical framework. Pragmatism is based on clarifying one's thoughts which are tools for problem-solving, prediction and also can be used to mirror reality. Pragmatism allows a wide variety of views on any issue that is being reviewed.

According to pragmatism, there is no single point of view about a philosophical topic, but there are different ways of explaining that problem and can also have different realities. Thus, the philosophical approach of pragmatism was developed in response to the debate of qualitative and quantitative paradigms to bridge the differences that made the two incompatibles, it also argues that both paradigms can be used together to achieve the aim of the study. This gives a researcher the opportunity to choose a method that best fits the research question of the study (James, 1975).

Pragmatism is used in mixed methods as it applies pluralistic approaches to answer the research questions and acquire more knowledge on the study problem. This allows for the adoption of multiple methods, worldviews and assumption in collection, analysis and interpretation of data. Thus, in mixed method study design, a researcher can use different paradigms to answer the research questions of the study (Creswell et al., 2003).

The opinion of the researcher of this study is that this mixed-methods approach has indeed provided an integrated picture of the situation under study. Moreover, the undertaken research needs to be both deductive and inductive when pragmatic research paradigm is adapted (Morgan, 2014). The current study therefore needed to be undertaken using an appropriate research design to include both objective and subjective elements so that the study is both deductive and inductive, as expected of a pragmatic research paradigm. **Table 3.1** showed the description of research philosophy and methodology of the current study.

Several reasons make the pragmatic research philosophy appropriate for this research study. It allows different ways of interpreting the world and including beliefs on multiple models of reality. This free the researcher to investigate the phenomenon of interest from various perspectives (Saunders et al., 2016). In the present study, the researcher could assess the habits of adolescent girls toward breakfast meal and the reasons behind skipping it from various perspectives because of the adoption of the pragmatic research paradigm. The explanatory sequence design has some elements of pragmatic philosophy and quantitative and qualitative approaches are carried out sequentially. This helps to

triangulate and provide a deeper understanding of factors associated with skipping and what underpins them. This is likely to have enhanced the understanding of the issues investigated in the study, which were the effect of factors such as SES, food preferences, hunger, knowledge about food, time availability and school environment on the breakfast skipping habit among Saudi adolescent girls.

Table 3.1: Research philosophy and methodology of the current study

Research philosophy	Pragmatism Paradigm
Ontology	Researcher believes that this method is the best to answer the research questions. Their understanding of reality is based on multiple (objective, subjective and intersubjective) realities and they select the appropriate one to solve the studied problem.
Epistemology	Understanding the reality or gaining knowledge by getting objective answers for the research questions from quantitative data (Survey) and subjective answers from qualitative data (semi-structured FGD) and merging both the views.
Methodology	Sequential Explanatory Mixed Method approach, (quantitative followed by qualitative).

3.4 Study Design

3.4.1 Rationale in the use of mixed method design

The use of mixed method approach is sometimes better than a single method as it makes it possible to answer the questions that other single design paradigms cannot answer. By combining the methods, it becomes possible to verify findings obtained by another method, with one method serving as the groundwork and the other as complementary, thus allowing the exploration of different attributes of the same question (Creswell, 2011).

3.4.2 The mixed research design application to present study

The primary rationale for the selection of the mixed research design is that both qualitative and quantitative data necessary for the comprehension of the issues leading to students skipping breakfast. Use of mixed methods approaches has the potential to provide a greater depth and breadth of data which is not possible utilising singular approaches in isolation (Almalki, 2016), and has great potential to strengthen the consistency and enrich the analysis and findings (Wisdom, & Creswell, 2013). Also, the use of mixed methods ensures that the researcher is guarded against the subjectivity occasioned by the use of qualitative methods by the quantitative method. On the other hand, the use of qualitative methods will enhance the researcher's ability to establish the core themes that are evident from the studies. The use of two methods ensures that the researcher is protected from challenges presented by the use of one method such as overlooking integral information.

In this study, the quantitative component of the design acted as the foundation of the qualitative section in dealing with the set research questions. A mixed methods approach was necessary in order to be able to achieve the main objectives of the study. Therefore a sequential mixed methods approach was adopted (Hall, 2013).

There are primary reasons why a mixed methods approach was chosen for this study:

1. The studies interested in school breakfast and breakfast consumption has been mostly quantitative, with few qualitative studies, mainly in school student's breakfast. Consequently, there is a dearth of experience in the research literature.
2. This approach may offer new information about possible commonalities and differences among age groups.
3. It is suggested that examining the subjective perceptions and experiences of participants may provide important knowledge about the sociocultural impacts of breakfast in this age group.

In this study, the first phase was started with the collection of demographic, social and economic backgrounds of adolescents' females aged 16-18 years old in secondary schools in Tabuk City, SA using a questionnaire survey. After the data collection was completed, the data were analysed. In the second, qualitative phase of this study the data were collected by using in-depth individualized interviews with a sample of surveyed adolescents to get an in-depth understanding about the survey results and particularly to explore the reasons and factors behind skipping AHB, and the perspectives on the importance and knowledge of breakfast meal among adolescents' females aged 16-18. The interviews were tape-recorded and transcribed verbatim and then analysed.

The second qualitative phase was informed by the results of the quantitative phase by two ways. First, the quantitative data analysis provided data that was explained by the qualitative method (Morse, 1991; Creswell and Plano Clark, 2011). This data included: the prevalence of breakfast skipping and AHB skipping; the frequency and compositions, and missing data or multiple answer to the same question. Second, the quantitative method enabled and guided purposive sampling for qualitative phase (Creswell and Tashakkori, 2007). After the quantitative data were collected, the descriptive data of the surveyed adolescents including demographic, social and economic characteristics were analysed. These data provided an overview about adolescents' females included in the study which helped in planning and conducting the sampling process of the next qualitative phase and in

attaining a representative sample. For example, the adolescents' age and background data were used to recruit adolescents' skippers of AHB and having different background and knowledge about breakfast in secondary schools.

3.5 Population and study sample

In this study the population were all female students in the three matching schools. The participants for this study were 700 girl's students in the three selected schools in Tabuk city between the ages of 16 and 18.

In the first quantitative phase, the sample was all female students. Researcher distributed the survey to all females' students aged 16-18 who were available in the above schools, approximately 700 students. In fact, representative sample was calculated by a statistician using the sample size calculation (**Appendix 3**), about 380 or more measurements/surveys are required to have a confidence level of 95% that the real value is within $\pm 5\%$ of the measured /surveyed value, and were required to represent the entire population of interest. Indeed, targeting all students increased the response rate and the chance to collect data from at least 380 participants. For the second qualitative phase, the population that took part in the focus group discussion encompassed the section of participants who had indicated to have skipped breakfast. Subjects who did not consume breakfast on most days of the week, four out of seven, were categorised as breakfast skippers (ALBashtawy, 2015). The aim of sampling was to recruit a diverse and representative sample. Six FGDs were arranged and each group consisted of 10-15 participants who were purposefully selected (**Table 3.2**).

Table 3.2: Sample size and population of the study phases

Phase	Description	Sample size	Justification
Phase 1	Questionnaire	A population of 700 students was targeted and was invited for participation. The study sample calculation showed that we needed at least 380 participants to represent the entire population of interest.	The sample sized was based on power calculation which produced an estimate of 380.
Phase 2	Focus Group (students)	10-15 Participants/Focus Group	This was based on the results of the reviewed literature.
Follow-up FGD	Focus Group (Mothers)	10-15 participants/Focus Group	This was based on the results of the reviewed literature.

3.5.1 Sampling process

Data collection method employed in the first phase which encompassed the quantitative section was via the use of questionnaire. The selected sample comprised 700 participants. This sample comprised students in schools who fall between these upper-lower upper age limits. Through the concentration on this sample, it was possible to get the rate of the adolescents skipping breakfast and the breakfast consumption. Participants in phase one were recruited using convenient sampling. This meant that study invitations and consent forms were distributed to all students available on the day of visiting the school.

However, participants in second phase were chosen randomly, after identifying students who were breakfast skipper and AHB skippers, while students' mothers whom their

daughter's breakfast skipper and AHB skippers were chosen. The sample was selected via a random selection method from the participants who had returned the questionnaires. Students who were identified as skippers were provided with their coded number and put all numbers on a box then 15 number from each selected school was randomly choosed. These participants were selected to ensure that each focus group was made of 10-15 students from three schools selected. Ideally, participants from each of the selected schools participated in one focus group, to make up a total of three focus groups. The same process was done to choose student's mothers.

3.6 Setting

This was a multi-centre research study. In both study phases, data collection process took place in three main state schools for females only in Tabuk city (**Appendix 4**) and they are:

- A. 17th secondary school
- B. 6th secondary school
- C. 42th secondary school

These schools have been selected after contacting the Tabuk City Education Department as they are considered as main schools in Tabuk city and attended by large number of students. Also, they include different social classes and are the most involved in entrepreneurial and volunteer work. The school calendar of the schools was attached in appendices (**Appendix 5**)

3.6.1 Recruitment method and participant selection criteria

The data collection and recruitment of study participants followed ethical approval from the University of Nottingham and Education Department in Tabuk City (**Appendix 6**). Data collection letters were written by supervisors to enable the researcher getting permission from any organisation during the study period (**Appendix 7**). Participants' involvement was anticipated to be undertaken over a period of approximately 6-9 months with an anticipated start date of October 2018 to May 2019 including the recruitment period and participation in

surveys and FGDs. The actual data collection time was recorded from October 2018 to January 2019 by school managers.

Study participants participated in the study for 6 to 9 months. Four weeks were needed to accomplish the first phase for each school. This meant that three months were required to collect the quantitative data from the three schools. Following this, collected data were entered onto a statistical software package and was analysed to identify students who are breakfast skippers. The analysis process of the quantitative data required one to two months according to the study statistical plan. Because this was required in the sequential design in order to identify skippers for further qualitative study.

In second phase, and once researcher identify breakfast skipper and AHB students' skippers, 10-15 participants mixed from both groups were invited to one of a three 45-90 minutes long FGDs through phone calls. It was arranged and conducted at the schools where participants were considered as current students and they weren't asked to make any travel arrangements. It was expected that students' FGDs may need four to six weeks.

On the other hand, students' mothers' FGDs were conducted after students' FGDs where 10-15 participants were invited to one of a three 45-90 minutes long FGDs through phone calls. It was arranged and conducted at the schools where their daughters are considered as current students and they were reimbursed for any travel arrangements. It was expected that students' mothers' FGDs may need four to six weeks. Indeed, and according to our research timeline plan, data collection process needed six to nine months (Figure 3.1)

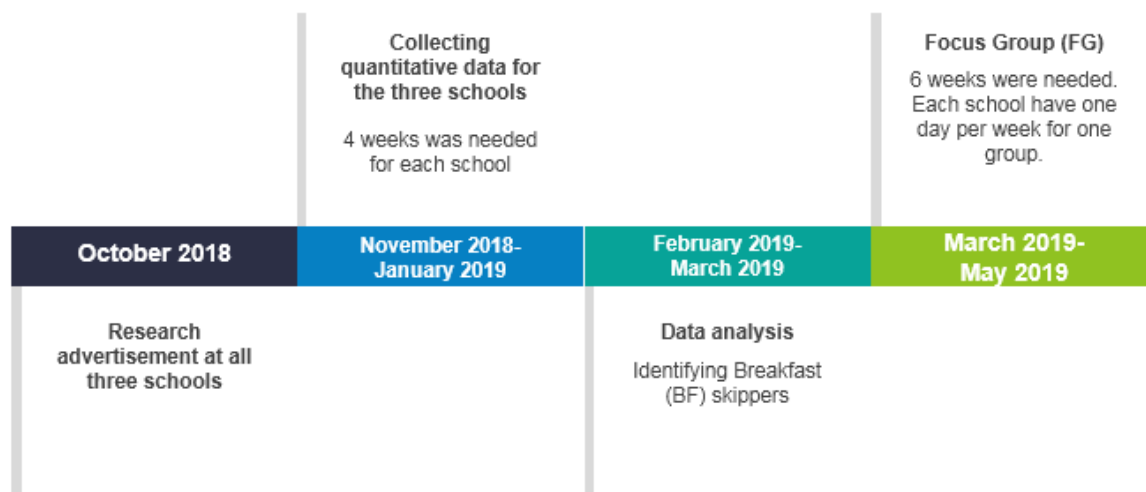


Figure 3.1: timeline schematic diagram demonstrating the time cost for each phase of data analysis

3.6.2 Selection and withdrawal of participants

Participants were made aware that their participation was entirely voluntary, and they could withdraw at any time during data collection period. In the event of their withdrawal, it was explained that their data collected so far couldn't be erased and it was used in the final analyses where appropriate.

Students were made aware that their participation was not related to any academic teaching, thus, their evaluation. Participants were made aware via the Participant Information Sheet (PIS) and consent form that should they withdraw, the data collected to date couldn't be erased and may be used in the final analysis. Withdrawn participants were replaced with other eligible students where possible.

3.6.3 Compliance

Researcher expected to see students at study settings as they normally attend their schools every day Sunday to Thursday. This routine helped maximise the chance of collect data from the required sample size of 380 participants. Furthermore, they had the chance to

complete study survey whenever they can during the permissible period of school day, in addition to, the ability of dropping the completed form in a large, sealed, non-transparent box.

All participants whom invited to enrol in FGDs were contacted and pursued via phone calls. This practice eased approaching participants to discuss the arrangements of FGD and its arrangements. Researcher tried as much as she could to ensure that study design is flexible and resilient to be implemented in study settings smoothly.

3.7 Methods and data collection

3.7.1 First phase: quantitative

3.7.1.1 Introduction

Methodology

Deutscher succinctly summarizes the different ways we collect data: “(1) we can observe it in process; (2) we can view the records people leave behind; and (3) we can ask questions and listen to answers” (Deutscher, 1973).

During the first two thirds of the 20th century, there existed only one generally accepted mode for conducting surveys: the in-person interview (Dillman et al., 2009). Edith DeLeeuw reports that the “first scientific face-to-face survey” was a “study of working-class conditions in five British cities” in 1912 and “the first documented mail survey” was in 1788 sent to “ministers of all parishes of the Church of Scotland” (de Leeuw, 2005). By 1980, the mail survey was commonly used, and by the early 1980s, the phone survey became a dominant mode. By the mid-1990s, another form of surveying had emerged—the web survey (de Leeuw, 2005).

The survey is a popular means of gauging people’s opinion of a particular topic, such as their knowledge about breakfast importance. Yet surveying as a scientific approach is often misconstrued. And while a survey seems easy to conduct, ensuring that it is of high quality is much more difficult to achieve. Often the terms “survey” and “questionnaire” are used

interchangeably as if they are the same. But strictly speaking, the survey is a research approach where subjective opinions are collected from a sample of subjects and analysed for some aspects of the study population that they represent. On the other hand, a questionnaire is one of the data collection methods used in the survey approach, where subjects are asked to respond to a predefined set of questions (Lau and Kuziemy, 2016).

The formatting of the survey question takes into account the research objectives, the characteristics of the respondent, the survey instrument and mode of delivery, and the type of analysis that will be needed to synthesize and explain the survey's results. Broadly speaking, there are two principal types of survey questions: unstructured and structured. *Unstructured questions* are sometimes called *open-ended* because they do not restrict the possible answers that survey respondent may give. The second general question type, *structured*, is commonly referred to as *closed-ended* because the survey participant is limited to responses or response categories preidentified by the researchers.

There are three broad types of survey studies: exploratory, descriptive, and explanatory as described below:

- Exploratory Surveys – These studies are used to investigate and understand a particular issue or topic area without predetermined notions of the expected responses. The design is mostly qualitative in nature, seeking input from respondents with open-ended questions focused on why and/or how they perceive certain aspects of a topic (Greenhalgh, 1987).
- Descriptive Surveys – These studies are used to describe the perception of respondents and the association of their characteristics with a certain topic. The design is mostly quantitative and involves the use of descriptive statistics such as frequency distributions of Likert scale responses from participants (Johnson et al., 1982).
- Explanatory Surveys – These studies are used to explain or predict one or more hypothesized relationships between some respondent characteristics and the topic.

The design is quantitative, involving the use of inferential statistics such as regression and factor analysis to quantify the extent to which certain respondent characteristics lead to or are associated with specific outcomes (Arcoverde et al., 2011).

Within the three broad types of survey studies one can further distinguish their design by time period, respondent group, variable choice, data collection and analytical method (Lau and Kuziemy, 2016).

Surveys are commonly used in social sciences fields through various topics. Results of any survey in research generate representative and generalizable statements that offer an alternative to study the whole population that requires considerable time and huge costs. Surveys allow to study the same hypothesis in different sites among different populations under different circumstances, a term called replication. Survey design has been recognised to be more straightforward compared to other approaches by other research designs (Cowles and Nelson, 2015). On the other hand, one of the fragility points about surveys that they in the majority of them involve structured questions that offer a convenient answer. Being structured in questions allow to hinder the depth and sensitivity of the results. Additionally, using surveys provides limited insight into the correlation between variables or the pattern of relationships between factors without acknowledging the context that may play a great deal in choosing the answer. Therefore, it can be seen that many researchers choose to add other types of methods to reveal that network that link study variables, in particular, qualitative methods (Jennifer, 2002). Extending surveys with a qualitative method has several benefits. It can serve to provide more details and explanations to the initial result of the survey, survey can get an insight into the purposive sampling that is required for qualitative phase, qualitative results explain the analysis of the survey to achieve accurate conclusions and reveal the network between study variables.

On the other hand, the main criticism for using surveys is that they involve structured questions that limit the depth, sensitivity and quality of its results. Additionally, using

survey provides a little insight into the connection between factors or the patterns of relationships between them and limits the opportunity of studying action and context. Thus, linking survey with other types of research designs is a common means to address these weaknesses. Linking qualitative research with a survey is a common combination (Kelley-Quon, 2018).

The aim of this phase was to know the prevalence of skipping breakfast and breakfast composition, a cross-sectional survey was conducted to establish the prevalence of skipping breakfast among the school students and the composition of breakfast for those who took it, where statistical procedures were highlighted through data collection and analysis. The secondary school students between the age of 16 and 18 in three matching schools with a population of 700 students participated in the collection of data.

3.7.1.2 Data collection and administration process

i. Questionnaire design principles.

Data were collected in first phase through Case Report Forms (CRFs) that include consent form (**Appendix 8**) and study survey (**Appendix 9**). Both were coded with the same code to make study questionnaire unrecognisable and anonymised.

The questionnaire was developed after considering other studies in literature on skipping breakfast, several discussions with dieticians, nurses, the questions then were translated from English into Arabic, the native language in SA, by the aid of a specialized translator (Creswell, 2014; ALBashtawy, 2015). The questions followed a comprehensive structure that flow on a smooth methodological basis, beginning with the simplest issues and progressing to the more complex ones. The use of questionnaires was guided by their accuracy as well as fewer complexity issues when it came to causing confusions among the respondents. The fact that they were vital in the collection of consistent quantitative data was additionally the other reason they have been advanced for this study.

The first part identified the factors and sociodemographic characteristics of female's students aged 16-18 years that correlate breakfast skipping practice. This part also estimated the rate of those who skip breakfast and AHB among this population sample. In addition, it asked whether they have had breakfast or not in the previous seven days and where the breakfast took place on each of those days such as home, car, school bus or at school.

The second part asked about the contextual factors around breakfast meal such as the preparation process of breakfast before school, and what type of food they usually have on those days they eat breakfast.

The third part had a list of reasons behind skipping breakfast which were listed in a table to allow participants to choose which reasons apply to their skipping breakfast habit on those days they do not eat breakfast. At the end of the survey, participants were given the chance to write other comments or reasons that were unlisted.

Sample of the questions

Sample questions

- 1 Do you usually eat breakfast?
- 2 How many days of the week did you eat breakfast during this week? Please tick each day you had breakfast:
- 3 Who does prepare your breakfast most of the time?
- 4 Please tell us what is the main composition of your breakfast?
- 5 Who do you eat your breakfast with (most of the time)?
- 6 How many meals do you eat per day usually?
- 7 Which of the following reasons would be most likely to contribute to you missing breakfast on a particular day?

Validity of Data

Three steps were taken to increase the content validity of the study questionnaires. First, a relevant literature review was done with the purpose of choosing a number of variables for the study. Second, the content validity of the study questionnaires was conducted by a panel of three academic staff, the academic panel is from the University of Tabuk, Department of Nutrition and Food Sciences. Questions were sent to them and their opinion was taken in addition to consulting the supervisors and their review. Third, the questionnaire was pretested in a pilot study.

Piloting

Once the initial version was developed, it was sent to other research members for feedback. Then, it was modified to be ready for a pilot phase. The author conducted a pilot study on a convenience sample of girls at the same age category outside school before starting the actual study. The pilot was intended to identify anticipated problems or obstacles to the data collection procedure, and the suitability of the items in the questionnaire. This step helped the author to evaluate and ensure the clarity and familiarity of the questionnaire's words and phrases from the participants' perspective. Their comments revealed that the items were clear, comprehensive, suitable, and were easy to complete.

The same number that we used in the FGD we used in the piloting too, 15 participants of the same age but from a different school than the one in which the research was applied. The modifications of questions were unremarkable whether in the survey or the FGDs.

ii. Questionnaire deployment

The survey was distributed amongst the participants in different classes within the selected schools that coded as school A,B and C to be anonymised. The survey questions were guided by the established research questions and objectives (Creswell, 2014). Study survey took 5-10-minute-long to be completed and contained 10 questions. Each question had a

predetermined list of answers enabling study participants to choose one of these answers. Some questions had the option of choosing “others” and was able to write their answers freely to increase results reliability.

The one who distributed the advertisement was the researcher. The questionnaire was given to the manager of the school on the same day, and she was the one who gave it to the administrative staff to distribute it to the classes after the third lesson and the end of the school break. The reminder was also made by the administrative staff during the rest of the school day with the researcher’s presence at the school to receive the box in which the questionnaire was placed from the students after the end of the school day.

The consent form was torn off from the questionnaire and dropped in a secure drop box in an obvious place for the students in the same office as the manager’s room and the administrators, and it was previously explained to the students.

1. Students was asked and reminded to complete the survey and drop it in a secure drop-box
2. Answering survey questions detected the rate of breakfast skipping and AHB skipping and collected several demographics such as age, weight, height and family income, and questions on their breakfast composition and parent’s level of education.

Posters were displayed around the school to inform the student that there was a research contacted in few weeks (**Appended 10**). Moreover, a Participant Information Sheet (PIS) was sent to home to parents (1 week) prior to the study informing them that their children will be taking part on the research and if they would not be agreeing of that they can contact the head of school (**Appendix 11**).

Next, the questionnaires were given out to all students at a suitable time in the morning of the appropriate day. It was clearly explained that completion of the questionnaires was optional and that it would not affect them in any way if they completed it or not. By

completing the questionnaire, the students were seen to be giving consent to their anonymised data being used. However, 16-18 years old, they were able to consent for themselves. Reminders were given to the classes at specific points during the day.

The consent form was numbered with the same unique identifier as the questionnaire, but this was anonymous and randomised. The survey was distributed amongst the participants in different classes within the selected schools.

The quantitative data

In this study, the first phase was started by collecting the prevalence of AHB skipping and breakfast skipping among adolescent females' students aged 16-18 years old and their demographic, social and economic backgrounds in secondary schools in Tabuk City, SA using a questionnaire survey.

The researchers approached the heads of schools and described the study to them. An envelope was given to them that included a cover letter, the questionnaire, and written informed consents.

After the quantitative data were collected, the descriptive data of the surveyed adolescents including demographic, social and economic characteristics were analysed

These data provided an overview about adolescents' females included in the study which helped in planning and conducting the sampling process of the next qualitative phase and in attaining a representative sample.

iii. Survey parts

3.7.1.3 Exclusion

All the participants who didn't return their questionnaires by the end of the day were considered to be not willing to participate, an attribute that disqualified them from the second part of the study involving the focus group discussion.

3.7.1.4 Data analysis

The data entry was double-checked to prevent data entry errors. After that, the data screened for any missing data or outliers using tendency measure, minimum, maximum, and frequency measures.

To test the data normally distributed of data we used statistically (with tests such as D'Agostino-Pearson and Kolmogorov-Smirnov). Data was analysed using descriptive statistics, relationship test and a comparison test in order to answer the research questions. The relationship between categorical variables (such as: Living with; Both parents, Mother only, and Father only) data was examined using the Pearson's r , also known as the product-moment correlation coefficient (Chi-square test) (non-parametric test). To compare difference numerical data, such BMI, normality testing was first conducted then the Mann-Whitney (non-parametric test) was used for those data which was not normally distributed. Also, a statistician was consulted about the design and analysis of the quantitative data. The statistical analysis programme SPSS 26 was used to analyse the data (IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). The p -value < 0.05 was considered as the level of significance.

3.7.2 Second phase: qualitative

A grounded theory analysis of the qualitative data, collected during semi-structured interviews and small focus groups, revealed a qualitative model for breakfast behaviours.

According to Past studies, a total of eight small focus groups were undertaken with children, and parents. 29 interviews were undertaken with parents and school staff. They concluded that this qualitative model provides a unique qualitative insight into breakfast behaviours, and the internal and external factors that are perceived to influence breakfast behaviours, among children, parents, and school staff in a universal free school breakfast intervention program within the North West of England, UK (Harvey-Golding et al., 2015). Another past study, Tiedje et al. (2014) conducted a qualitative research study with sixteen audio-

recorded focus groups with adults and adolescents who self-identified as Mexican, Somali, Cambodian, and Sudanese. They described the meanings of food, health and wellbeing through the reported dietary preferences, beliefs, and practices of adults and adolescents from four immigrant and refugee communities in the Midwestern United States. They chose FGs to gain insights into shared meanings about food and wellbeing (e.g. community norms) and personal and other influences (e.g. culture, socio-economic status) related to ways of knowing about food, eating practices, and barriers to healthy eating. They chose FGs over individual interviews to reach out to a larger number of community members and allow for discussion among age and gender-specific groups. Also, a six focus groups were held in Manchester, each attended by between six and eight participants to explore how interventions might support individual experimentation with alternative shopping, cooking and eating practices, and in so doing influence the ongoing evolution of food-related routines to the benefit of energy demand management. This study demonstrated how focus groups that balance structured exercises with space for open-ended discussion, can be an effective method for creating a critical space in which to reflect on everyday routines and visions for the future (Hoolohan et al., 2018).

In the present study, six FGDs were conducted with three groups of students and three groups of mothers to elicit their views and perceptions on breakfast skipping practice among students aged 16-18 in Tabuk city, SA. Participant's permission was audio-recorded during FGDs. The Consent Form was sent to them before the questionnaire, and it was explained that there was a second part of the research, which is a FGD, and that we could ask them to participate in it, and therefore approval was taken in advance, whether for students or mothers. The collected data was transcribed and translated verbatim. Participants' identities were protected using codes on their surveys and their interviews audio files. Electronic files and audio-recordings of interviews were stored on password-protected and secure University of Nottingham server via R (Research) drive. The resulting data was stored for

seven years post study in accordance with the University of Nottingham data storage policy. The data custodian was the chief investigator.

The assertion was that offering the respondent with a predetermined list of answers ensured that the researcher had an easy time in computing the rates and percentages. Data that was collected via the focus group discussion was audio-taped, for the researcher to transcribe later. Open-ended questions were used to elicit views and opinions of the participants.

The piloting was done on a group of girls at the same age category outside school and the questions were then rephrased until reach the final FGD questions to be asked finally to the school students. a FGD pilot has been made in a school other than the schools included in the research.

Therefore, it was recommended to conduct six focus groups; three with breakfast skipper and AHB breakfast skippers' students and three with mothers of skippers' students who participated in the survey and to invite eight to ten participants for each providing a total number of 48 to 60 participants in the qualitative phase. It was believed that the involvement of mothers of breakfast skippers' students in focus group discussion was a chance to provide an insight into the breakfast practice within Saudi culture.

Thus, to avoid the effect of having an unequal relationship between the mothers and students in the same focus group, it was decided to conduct three focus group discussions solely for mothers without any student for the same research purpose.

In this study, one of aims was to understand the factors surrounding the AHB skipping phenomenon, thus, those who exercised this practice were the target for focus group discussions. In other words, this approach of selecting specific participants known as purposive sampling where researcher invites those who are experiencing the phenomenon of interest and agree to become informants. Maximum variations in choosing participants for FGDs allow to identify different practiced patterns and trends across those variations (Coyne, 1997).

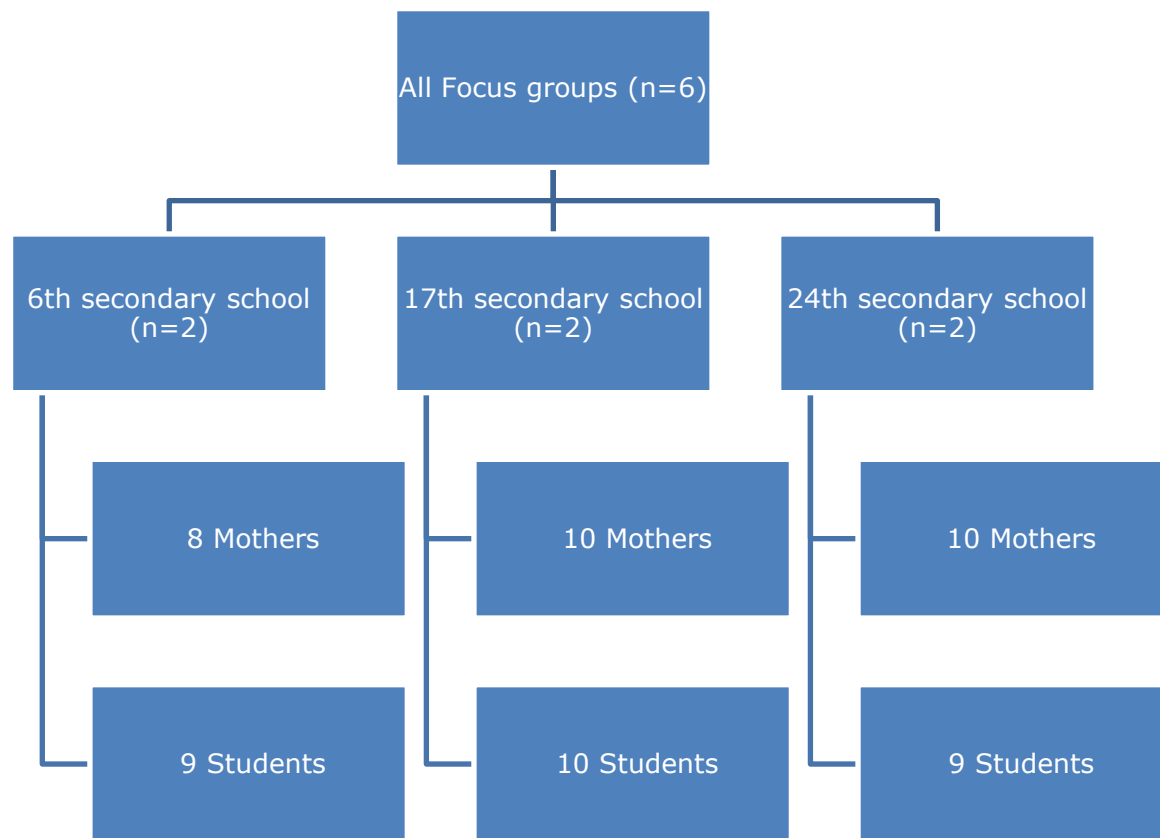


Figure 3.2: Sample of all focus groups for mothers and students from the three schools'

3.7.2.1 Introduction

Qualitative approaches acquire data primarily through interpersonal contact with participants (usually an interview) or, secondly, through the presence of the researcher in proximity to pertinent events (usually observation). This is unlike quantitative research where, frequently, there is no interpersonal contact with participants or events (Manias et al., 2005).

Text as data is often more difficult to reduce and identify patterns than numbers as data. The main advantages that inform the use of focus group discussion is the fact that they will aid in the collection of detailed information about the personal as well as group feelings, opinions and perceptions (Stewart and Shamdasani, 2014). The other advantage is the fact

that they aid in saving on time as well as money compared to the use of strategies as individual interviews.

The individual in-depth interview allows the interviewer to delve deeply into social and personal matters, whereas the group interview allows interviewers to get a wider range of experience but, because of the public nature of the process, prevents delving as deeply into the individual (Ritchie, 1997). Group interviews often take the form of focus groups, with multiple participants sharing their knowledge or experience about a specific subject (Owen, 2001). Each focus group represents a single entity within a sample of groups – it is not an interview with distinct individuals and is not a short cut for collecting data from several individuals at the same time (Duggleby, 2005).

Focus group discussion (FGD) is a form of qualitative research method in which the interviewer (also called the moderator) asks research participants specific questions about a topic or an issue in a group discussion. With FGDs, the researcher or interviewer asks specific questions and collect answers or responses in order to get an explanation for behaviour(s) in an informal group discussion setting. Focus groups, unlike individual interviews, provide the added dimension of the interactions among members. In conducting the focus group, the emphasis should be placed on the interaction among group members. Instead of the moderator asking questions, the group members are encouraged to communicate with one another, exchanging ideas and comments on each other's experiences or points of view (Kitzinger, 1994; O. Nyumba et al., 2018).

FGDs are frequently used to obtain knowledge, perspectives and attitudes of people about issues, and seek explanations for behaviours in a way that would be less easily accessible in responses to direct questions, as in one-to-one interviews (Kreuger, 1988, Kitzinger, 1995). Focus groups use interview schedules but these differ in scope, nature and intention from other research interviews. This is because of the unique nature of group dynamics and insights gained from interaction between participants. In the present study, using the focus groups interview may help to generate new information about potential commonalities and

differences related to breakfast consumption among female adolescent. Also, it is useful in gaining data from various data sources to understand different aspects of the breakfast consumption. Furthermore, the focus group technique allows more abstract and in-depth exploration of nutrition and health issues than is possible with less interactive data collection tools such as structured questionnaires.

One of the main benefits of this method of data collection is that they are often less intimidating than individual interviews. The focus group method allows access to participants who may find individual interviews intimidating or inappropriate (Liamputtong, 2010). They are particularly useful in discovering new information or obtaining different perspectives on the same topic. Focus group interviews are also useful in gaining participants' views, beliefs, values and perceptions on why they think and feel the way they do (Litosseliti 2007). Focus group interviews are usually more economical to conduct than individual interviews.

Focus groups may not explore issues as deeply as one-on-one interviews. At the same time, as they are not as intimate and private as individual interviews, they tend not to uncover sensitive or potentially embarrassing information. Researchers generally need quite high levels of interviewing expertise to conduct focus group interviews. For instance, they require 'gatekeeping' skills to help avoid 'group think' outcomes, prevent any individuals from dominating conversations as well as teasing contributions from quieter members. That said, where the focus group does not present any of these dilemmas the researchers should be mostly anonymous, often only needing to contribute to commence, prompt occasionally and finalise the session (Lopez and Whitehead, 2013).

Focus groups are used for generating information on views, and the meanings that lie behind those views. They are also useful in generating a rich understanding of participants' experiences and beliefs (Morgan, 1998). Suggested criteria for using focus groups include (Bloor et al., 2001):

No qualitative focus group can be completely structured; nor can it be undertaken without any structure, to some extent they are semi structured and more like steered conversations (Whiting, 2008) the researcher is required to develop a discussion guide that offers an outline to probe enquiries during focus group discussion. This guide somehow steers the discussion with participants logically to stimulate further thoughts or rationales that are related to the research question or the behaviour of interest (Onwuegbuzie et al., 2009). FGDs should start with general question and the guide helps the interviewer to reach the required depth where researcher can ask specific and focused questions about the topic to enhance the inclusiveness of the collected data. Questions should be open-ended to allow the flexibility to release unexpected yet related concerns that may be produced during the group discussion (Carter and Henderson, 2005).

The questions of focus group were developed by the research team and were pretested, for clarity, suitability and comprehension, with a group (n=15) of 16-18 years old students from a school that did not participate in the main study. The focus group questions were designed to offer an insight into eating behaviour; about their daily living experience around breakfast meal, recall their Explanations for skipping breakfast, their perception toward the importance of breakfast as a meal, express what food they like or do not like in the morning before going to school. Most of the discussions were around the reasons behind breakfast skipping habits among students and students' mothers' perspectives, routine of daily living that play key factor behind breakfast skipping and the role of mothers in reversing this habit. The focus group session used semi structured open-ended questions to guide the discussion and ensure a consistent of the approach. Focus group participants directed the conversation and the facilitator encouraged elaboration on the issues they raised. During the focus group with students, the researcher will discussed the participants' experience on their breakfast regarding to reasons skipping it. In the focus group with mothers, the researcher will discuss the mothers' views regarding why their children skip breakfast and how they can encourage them to take it regularly.

Examples of Interview questions:

- 1- What is your daily routine in the early morning?
- 2- What AHB as a meal means for you? Do you think it is an important meal? Why?
- 3- How many meals are enough for one day? Did they think they need to drop one of them?
- 4- If it happened and you ate AHB on some days, when did you eat it? And what circumstances that were facilitated to make you eat breakfast?
- 5- if it happened and you skipped breakfast, why did you skip it? Or what circumstances that were facilitated to skip your breakfast?
- 6- How many meals are enough for one day? Did they think they need to drop one of them?
- 7- Did you believe that students who skip AHB need an intervention or help to change?
(see appendix 12).

The overall aim of the second phase, which is qualitative in nature, encompassing the assessment of the reasons for skipping breakfast as indicated by these participants.

3.7.2.3 Interview guide of FGDs for students and mothers

The interview was led by the researcher and started by welcoming and thanking all attendees for their voluntary participation. During opening, participants were reminded they could withdraw at any time during the discussion, research objectives were explained as well as reasons of meeting together as a group to discuss the issue of breakfast skipping among students aged 16-18 during the secondary stage. Once everyone felt settled and comfortable, the discussion started by asking if any participant was willing to talk about their normal daily routine during school days early morning. In each focus group, participants were prompted with the help of probing questions to facilitate further conversations of issues related to breakfast skipping practice. The detailed interview guide for students and mothers are presented in **Appendix 12**.

3.7.2.4 Time Frame

One day was at each school for individual focused group (around 45 minutes for each group). FGDs with students were done during a school day and each school was interviewed separately. FGDs with mothers were done during a school day and each school was interviewed separately. Each FGD took a week (a day in a week determined by school administration to avoid missing of lessons) and each FGD took a day in a separate week equal to six weeks.

3.7.2.5 Thematic analysis (TA)

Qualitative data that was derived from FGDs was transcribed verbatim by the researcher to be familiar with the content and then, was translated to English. A thematic data analysis method was employed (Bryman, 2012). This analysis was assisted by the NVivo software program. Thematic analysis consists of six-stages (Braun and Clarke, 2006), as presented in **Table 3.3**. Though there is a logical process to analysing the data, it often involves constant moving backwards and forwards between the data set, coded extracts and

produced data. Themes identified within the data collected for this study can help inform and refine the student self-evaluation questionnaire content, if needed, for the next stage.

Table 3.3 Stages of the study including thematic analysis

Stage	Description
First stage	Involves the researcher immersing themselves within the data, listening to the audio repeatedly, and reading and re-reading the transcripts, exploring for, and make sense out of them through extracting significant statements.
Second stage	Second stage includes the generation of codes for items within the data that are of interest, or relevance to the research.
Third stage	The different codes will be combined and, arranged into potential themes.
Fourth stage	Involves reviewing and refining the themes.
Fifth stage	Includes defining and additional refining of the themes, and determining the 'real meaning' of each theme.
Sixth stage	The final analysis and the write the report, including data extracts to provide evidence of the themes within the data.

Thematic analysis provided the opportunity to find new themes by taking into consideration all of the varied and rich data gathered from FDGs with students and mothers. These themes and concepts were then linked together to create a meaningful explanation of the topic.

3.8 Ethical considerations

3.8.1 Human and Ethical Precautions

In conducting research, it is always imperative that consider the obligation that the research has on the subjects. It thus follows that there are integral ethical considerations that have to be taken into consideration in this study. It will be imperative to ensure that people are respected and not exploited. The consent forms sent to all the participants and additionally ensures that they are aware of all issues in the study before they can decide to participate. Through the informed consent, these research participants are going to understand all issues relating to their rights (Egan, 2006).The questionnaires further emphasized the fact that participation in the study is voluntary and that the research is for academic purposes.

In ensuring that the privacy of the participants is protected, the researcher ensured that the focus groups take place in a private room far from redundant disturbances (Yin, 2015). The responses of the participants further were kept secret and anonymous. The participants were not required to use their names but pseudonyms in all the transcripts of the interviews.

3.8.2 Ethical and regulatory aspects

This project considered as a low risk study, however, there might be a few issues of concern such as following:

- Participant giving up one and half hour of their time or more during focus group.
- Participants may be sensitive to the discussion related to their experience on their breakfast.
- Participants may feel some coercion that they need to volunteer otherwise their progress on the study will be affected.

However, participants were made to understand that the researcher selected a convenient time for their participation. Moreover, they were made to understand that they have the

right to withdraw from the study at any time they deem necessary. Anonymity, confidentiality and privacy of participants will be ensured. Thus, there was a low risk of harm to participants and no coercion to take part.

Participants may also be involved in the recruitment of others into the study based on the eligibility criteria.

3.8.3 Ethics committee and regulatory approvals

The study was not initiated before the protocol, consent forms and participant information sheets have received approval / favourable opinion from the Research Ethics Committee (REC) at the Faculty of Medicine and Health Sciences, University of Nottingham (**Appendix 13**).

The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki, 1996; the principles of Good Clinical Practice, and the Department of Health Research Governance Framework for Health and Social care, 2005. Moreover, an ethical approval was also sought from the Education Department in Tabuk city prior to data collection.

3.8.4 Ethical approval

The approval to conduct the study was taken from the University of Nottingham and at the study site, which is the department of education at Tabuk and also from the head teacher of each school. After receiving ethical approval from the faculty of medicine and health sciences in the University of Nottingham, ethical clearance was sought in study settings in SA. Once approval and permissions were obtained from Education Department in Tabuk City, administration of schools of interest was contacted to arrange a meeting to explain the research study. Once they agree to proceed with the study, researcher seeks permission to access schools' classes and students' contact details. Following this, advertisements of invitations of study were posted within the corridors of the selected schools and distributed study leaflets to all eligible participants to familiarize themselves with the study purpose and

research regimen. All eligible participants had the chance to think about the participation for one-week prior consenting if they choose to participate. Around 700 students of 16-18 years of age were recruited as participants of the study. The researcher acquired consent from the participants and the confidentiality of the information they provide was guaranteed.

3.8.5 Informed consent and participant information

The process for obtaining participant informed consent was in accordance with the REC guidance, and Good Clinical Practice (GCP) and any other regulatory requirements that might be introduced. The investigator and the participant shall both sign and date the consent form before the person can participate in the study. The participant received a copy of the signed and dated forms and the original was retained in the Study records.

The decision regarding participation in the study is entirely voluntary. The investigator or their nominee emphasized to them that consent regarding study participation may be withdrawn at any time without penalty or affecting the quality or quantity of their future academic performance, or loss of benefits to which the participant is otherwise entitled.

The investigator will inform the participant of any relevant information that became available during the study, and will discuss with them, whether they wish to continue with the study. If applicable they were asked to sign a revised consent form.

Completion and subsequent return of questionnaires may be taken as informed consent and separate written informed consent was not sought.

3.8.6 Informed consent and Recruitment

After one week from distributing study leaflets, researcher visited the school again and gave the PIS for participants who are interested in taking part. Eligible participants were free to ask questions prior to their enrolment to ensure that participants have sufficient time and information before participating. After this, researcher visited the school and handed in CRF that includes the survey and consent form to the students. Consent form seeks permission from students and their mothers to participate.

Based on the SA personal data and scientific research regulations, students aged 16 and older can consent for themselves if they were willing to participate. The researcher's and participants' first language are Arabic; therefore, this research did not include interpreters or translation services during the data collection. The consent forms and information sheets were available printed in Arabic languages.

After analysing survey results and detecting breakfast skipper and AHB students' skippers, researcher purposefully selected and invited 30-45 mixed from both breakfast skipper and AHB skipper to participate in a three students' FGDs. While 30-45 students' mothers were invited to attend three FGDs whom their daughters were consented and completed the surveys in the first phase. Students' mothers were contacted and invited via phone call.

3.9 Records

3.9.1 Study Forms

The study forms were anonymised for confidentiality and securely stored. The principal investigator was responsible for data entry. Each participant was assigned a study identity code number. Study forms were treated as confidential documents and held securely in accordance with regulations. The investigator made a separate confidential record of the participant's name, date of birth and participant study code to permit identification of all participants enrolled in the study.

3.9.2 Source documents

Source documents were filed at the investigator's site and may include but are not limited to, consent forms, study records, field notes, interview transcriptions and audio records. A CRF may also completely serve as its own source data. Only study staff had access to study documentation other than the regulatory requirements listed below.

The CRF and all source documents were available at all times for review by the Chief Investigator, Sponsor's designee and inspection by relevant regulatory authorities.

3.10 Data protection

All study staff and investigators endeavoured to protect the rights of the study's participants to privacy and informed consent, and adhered to the Data Protection Act, 1998. The CRF only collected the minimum required information for the purposes of the study. CRFs were held securely, in a locked room, or locked cupboard or cabinet. Access to the information was limited to the study staff and investigators and any relevant regulatory authorities (see above). Computer held data including the study database was held securely and password protected. All data was stored on a secure dedicated R drive with in the University of Nottingham network. Access was restricted by user identifiers and passwords (encrypted using a one-way encryption method).

Information about the study in the participant's medical records / hospital notes were treated confidentially in the same way as all other confidential medical information. Electronic data was backed up every 24 hours to both local and remote media in encrypted format.

3.10.1 Adverse Events

The occurrence of an adverse event as a result of participation within this study was not expected, and no adverse event data was collected.

3.11 Conclusion

This chapter has provided the methodological plan that was applied in this study and discussed issues and challenges encountered in its implementation. This study adopted an explanatory sequential mixed methods research design in two phases: a preliminary quantitative cross-sectional survey and a subsequent and complementary qualitative interview phase adopting focus group discussion (FDG) method. The first phase employed a population of female adolescent students aged between 16-18 (N=700) from three main

state schools in Tabuk city (adapted with permission) to identify the prevalence of skipping at home breakfast (AHB) and BS and their demographic, social and economic backgrounds.

In the second phase, FDG qualitative interviews were conducted with 6 FGDs (3 groups of students identified as AHB AND BS skippers; and 3 groups of students' mothers whom their daughters are AHB and BS skippers) to explore the reasons and factors behind skipping AHB, and the perspectives on the importance and knowledge of AHB meal among adolescents' females. The next chapter presents the results from the first phase of the study using the adapted descriptive statistical analysis (SPSS) and the results from the second phase by a six-staged thematic analysis (TA) to provide themes that create a meaningful explanation of the topic with the assistance of NVivo® software program.

Chapter 4: Quantitative results (Survey)

4.1 Rate of Breakfast skipping

Percent of the participants who skipped AHB on four or more days of the week was (48.8%). While the percent of the participants who did not eat breakfast at all, either at home or school, on four or more days of the week was 196 (31.8%). See Figure 4.1 and 4.2

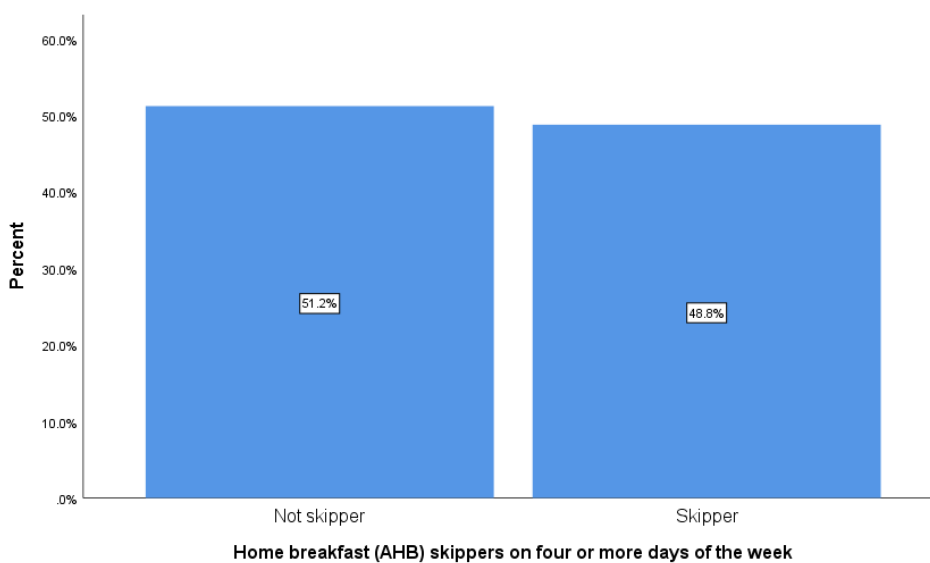


Figure 4.1: Prevalence of AHB skippers on four or more days of the week

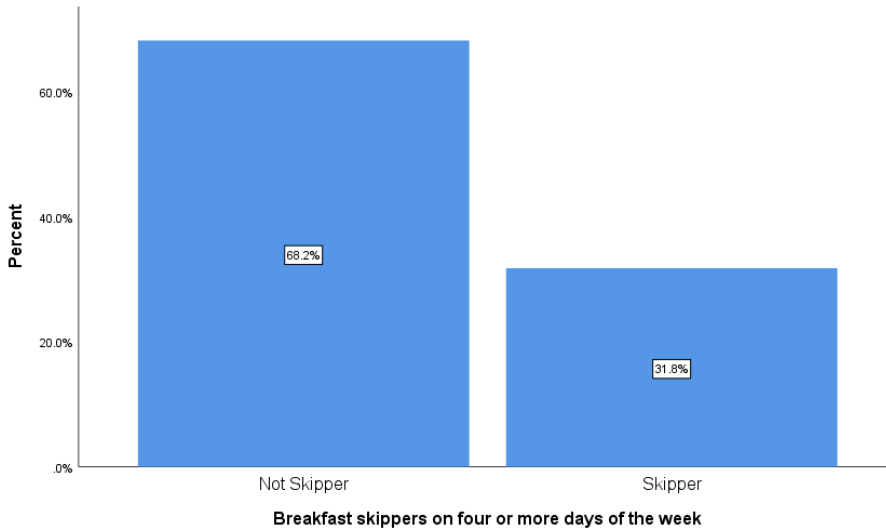


Figure 4.2: Prevalence of breakfast skippers/not skippers on four or more days of the week

4.1.1 Difference between skipping rates through the days of the week

Comparing the skipping score through the seven days of the week, it can be noticed from **Figure 4.3** that there was a regular day-to-day breakfast skipping habit during the week. Table **4.1** showed that the average score is close to 1 for all the days, which was **not** statistically different.

Table 4.1: Skipping score through the days of the week

	Sun Score	Mon Score	Tue Score	Wed Score	Thu Score	Fri Score	Sat Score	Friedman Test	
Mean	1.209	1.158	1.181	1.254	1.192	1.098	1.060	Chi-Square	p-value
standard deviation	1.20	1.25	1.28	1.30	1.28	1.29	1.16		
Median	1.000	1.000	1.000	1.000	1.000	1.000	1.000	9.713	0.137

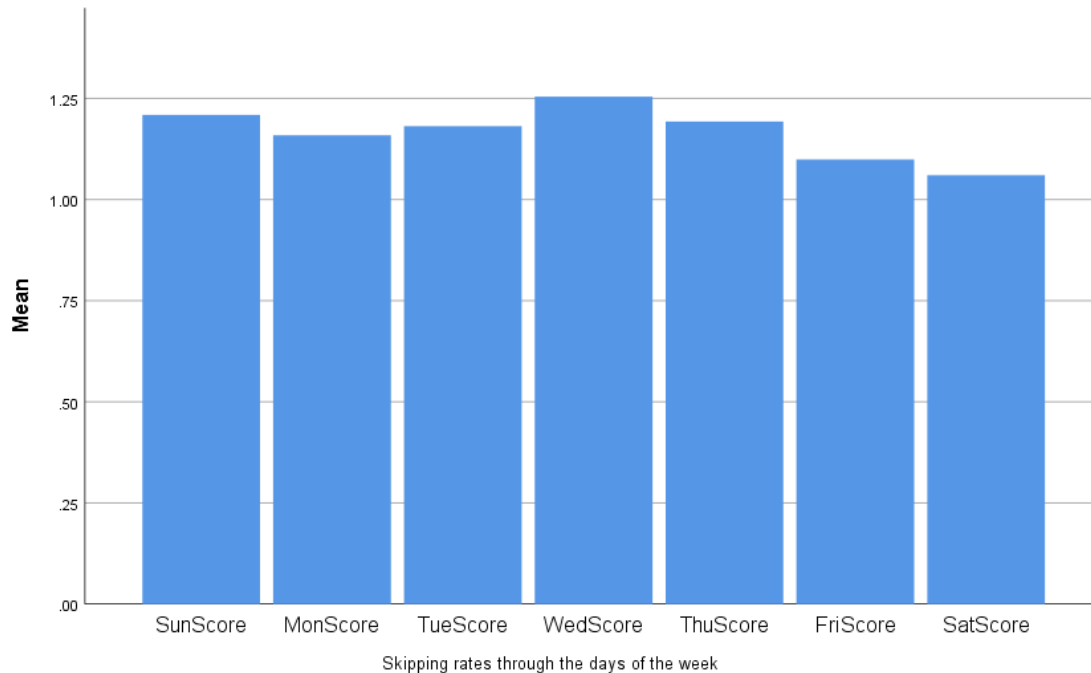


Figure 4.3: Skipping rates through the days of the week

4.2 Characteristics of the students

The study sample consisted of 617 female students with age between 15 and 20 years. About 93.7% of participants's was Saudi nationalliy, who live in Tabuk city and the majority of them were living with both parents. More one third of the participants are at 6th Secondary. The mean of Body mass index (BMI) was 22.6 kg/m^2 . About 72.9% rated their economic status as middle. 74% of adolescents' mothers were not working and 33% of adolescents' fathers were not employed. The illiteracy rate was 0.6 % in both mothers and fathers. However, a small proportion of both were of high education (4% of mothers and 6% of fathers) (See Table 4.2). We introduced the results on demographic and size of sample recruited per school (see **Appendix 14**)

Table 4.2: Characteristics of the adolescents

		<i>Frequency (n)</i>	<i>Percent (%)</i>
Nationality	Saudi	617	93.7
	Else	39	6.3
	17 th Secondary	219	35.5
Affiliation	6 th Secondary	225	36.5
	24 th Secondary	173	28.0
	1 st	260	42.1
Grade	2 nd	181	29.3
	3 rd	176	28.5
	Both parents	543	88.0
Residential status	Mother only	62	10.0
	Father only	11	1.8
	Married	1	0.2
Age	15-16 years	85	13.8
	16-17 years	209	33.9
	17-18 years	182	29.5
	> 18 years	141	22.9
Physical status	Weight*	590	95.6
	Height**	592	95.9
	BMI***	590	95.6
Socioeconomic status	Low income	19	3.1
	middle income	450	72.9
	High income	148	24.0
	Tabuk city	607	98.4

Area	Tabuk Rural Areas	10	1.6
	Full Time	102	16.5
Mother's Work status	Part Time	57	9.2
	Housewife	458	74.2
	Full Time	290	47.0
Father's Work status	Part Time	121	19.6
	Not employed	206	33.4
	Primary	177	28.7
Mothers' Educational Level	Intermediate	122	19.8
	Secondary	157	25.4
	First degree	132	21.4
	Higher Education	25	4.1
	Illiterate	4	0.6
	Primary	84	13.6
Fathers' Educational Level	Intermediate	110	17.8
	Secondary	250	40.5
	First degree	127	20.6
	Higher Education	42	6.8
	Illiterate	4	0.6

*Mean = 54.54, Standard Deviation (SD) = 13.08, Excluded = 27 adolescents (4.4%); **Mean = 155.45, SD = 6.97, Excluded = 25 adolescents (4.1%); and ***Mean = 22.6, SD = 5.4, Excluded = 27 adolescents (4.4%).

4.3 Relationship between prevalence of skippers and demographic variables:

4.3.1 Residential status

For the breakfast skippers for 4 days or more The adolescents living with their mothers showed a higher prevalence of breakfast skipping (46.8%) compared to those living with both parents (30.2%) and father only (27.35), this difference was statistically significant (Pearson Chi-Square=7.151, df=2, p-value=.028) Similar trend were seen for the relationship between AHB skippers for 4 days or more and living with family, where the Rate of skipping for adolescents living with mother/not father were observed to be higher (58.1%) than living with father/not mother (36.4%) and those who living with both parents (48.1%). There was no statistical relationship significance between AHB skippers for 4 days or more and living with family (**Table 4.3**).

Table 4.3a AHB skippers on four or more days of the week compared to living with parent

		Skippers for 4 days or more	
		No	Yes
Living with	Both parents	282 (51.9%)	261 (48.1%)
	Mother only	26 (41.9%)	36 (58.1%)
	Father only	8 (63.7%)	4(36.4%)
Total		316(51.2%)	301(48.8%)
Pearson Chi-Square=2.93., df=2, p-value=.231			

Table 4.3b Breakfast skippers on four or more days of the week compared to living with parent

			Skippers for 4 days or more		
			No	Yes	Total
Living with	Both parents	Count	379	164	543
		% within Living with	69.8%	30.2%	100.0%
	Mother only	Count	33	29	62
		% within Living with	53.2%	46.8%	100.0%
	Father only	Count	8	3	11
		% within living with	72.7%	27.3%	100.0%
Total	Count	420	196	616	
	% within living with	68.2%	31.8%	100.0%	
Pearson Chi-Square=7.151, df=2, p-value=.028					

4.3.2 Age

Adolescents, 15-16 years of age showed lower breakfast skipping (21.1%) compared to other ages (33% for (16-17) years to 34.1% for (17-18) years and 33.3% for above 18 years); nevertheless, there was no significant relationship. For AHB skippers, also, age of (15-16) years showed lower breakfast skipping (36.5%) compared to other ages (53.6% for (16-17) years to 48.9%- for (17-18) and above 18 years), nonetheless there was no significant relationship (Table 4.4).

Table 4.4 AHB skippers on four or more days of the week compared to age

		Skippers for 4 days or more	
		No	Yes
Age	15-16 years	54(63.5%)	31(36.5%)
	16.-17years	97 (46.4%)	112(53.6%)
	17-18 years	93(51.1%)	89(48.9%)
	>=18years	72(51.1%)	69(48.9%)
Total		316(51.2)	301(48.8%)
Pearson Chi-Square=7.09, df=3, p-value=.069			

4.3.3 Socioeconomic status

For those who skipped breakfast over 4 or more days of the week, there were similarity in skipping among the 3 classes of incomes (31.6% for low income, to 31.8% for middle and 31.8% for high income). For those who skipped the AHB, the lower income seemed to have lower percentage (36.8%) than middle (49.6%) and higher income (48.0%); on the other hand, there was no significant association between socioeconomic status and breakfast skippers on four or more days of the week and AHB skippers on four or more days of the week (Table 4.5).

Table 4.5a: AHB skippers on four or more days of the week compared to income

		Skippers for 4 days or more	
		No	Yes
Income	Low income	12(63.2%)	7(36.8%)
	Intermediate income	227 (50.4%)	223(49.6%)
	High income	77(52.0%)	71(48.0%)
Total		316(51.2%)	301(48.8%)
Pearson Chi-Square=1.23, df=2, p-value=0.540			

Table 4.5b: Breakfast skippers on four or more days of the week compared to income

			Skippers for 4 days or more		
			No	Yes	Total
Income	Low income	Count	13	6	19
		% within Income	68.4%	31.6%	100.0%
	Intermediate income	Count	307	143	450
		% within Income	68.2%	31.8%	100.0%
	High income	Count	101	47	148
		% within Income	68.2%	31.8%	100.0%
Total	Count	421	196	617	
	% within Income	68.2%	31.8%	100.0%	
Pearson Chi-Square=0.00, df=2, p-value=1.00					

4.3.4 Parental status data

In terms of mother's work status, adolescents whose mothers were housewives tended to show less breakfast skipping (30.1%) compared to full time (36.3%) and part time (36.8%); nevertheless, there was no statistically significant association. For AHB skippers, adolescents whose mothers were housewives tended to show less breakfast skipping (48%) compared to full time (49%) and part time (54.4%); with non-significant results, (Table 4.6).

Table 4.6: AHB skippers on four or more days of the week compared to mother's work status

		Skippers for 4 days or more	
		No	Yes
Mother Work	Full Time	52(51%)	50(49%)
	Part Time	26(45.6%)	
	Housewife	238(52%)	31(54.4%)
			220(48%)
Total		316(51.2%)	301(48.8%)
Pearson Chi-Square=0.821, df=2, p-value=0.663			

Table 4.6b: Breakfast skippers on four or more days of the week compared to mother's work status

			Skippers for 4 days or more		Total
			No	Yes	
Mother Work	Full Time	Count	65	37	102
		% within Mother Work	63.7%	36.3%	100.0%
	Part Time	Count	36	21	57
		% within Mother Work	63.2%	36.8%	100.0%
	Housewife	Count	320	138	458
		% within Mother Work	69.9%	30.1%	100.0%
Total	Count		421	196	617
	% within Mother Work		68.2%	31.8%	100.0%
Pearson Chi-Square=2.199, df=2, p-value=0.333					

With respect to mothers' educational levels, the breakfast skipping was seen to be lower as education increased (primary=35.6% to higher education=28%), but no significant association was found. Similarly, for AHB skippers, the breakfast skipping was tended to be lower as education increased (primary=50% to high education=44%), but no significant association was found (Table 4.7)

Table 4.7: AHB skippers on four or more days of the week compared to mothers' educational levels

		Skippers for 4 days or more	
		No	Yes
Mother Education level	Primary	88(49.7%)	89(50.3%)
	Intermediate	56(45.9%)	66(54.1%)
	Secondary	85(54.1%)	72(45.9%)
	First degree	70(53.0%)	62(47.0%)
	Higher Education	14(56.0%)	11(44.0%)
	Illiterate	316(51.2%)	1(25.0%)
Total		316(51.2%)	301(48.8%)
Pearson Chi-Square=3.38, df=5, p-value=0.646			

For Father's education, the percent of breakfast skippers Tended to be (26.2%) among those whose father with higher educational level and the highest percent of breakfast skippers was among those whose father with secondary educational level (34%). There was no significant association between breakfast skippers for 4 days or more and the educational level of the father. For AHB skippers, the percent of breakfast skippers was the lowest (42.9%) among those whose father with post graduate level and the highest percent of breakfast skippers was among those whose father with First degree educational level (55.9%). There was no significant association between AHB skippers for 4 days or more and the educational level of father (Table 4.8).

Table 4.8: AHB skippers on four or more days of the week compared father educational level

		Skippers for 4 days or more	
		No	Yes
Father Educational	Primary	43(51.2%)	41(48.8%)
Levels	Intermediate	62(56.4%)	48(43.6%)
	Secondary	127(50.8%)	123(49.2%)
	First degree	56(44.1%)	71(55.9%)
	Higher Education	24(57.1%)	18(42.9%)
	Illiterate	4(100%)	0(0.0%)
Total		361(51.2)	301(48.8)
Pearson Chi-Square=8.162, df=5, p-value=0.145			

4.3.5 Body Mass Index (BMI)

I In terms of the body mass index, there was very little difference in the average BMI between skippers and non-skippers. Using the Mann-Whitney test, there was no significant difference in BMI between breakfast skippers (median=22.09 The mean of Body mass index (BMI) was 22.6 kg/m²) and non-skippers (median=21.68 The mean of Body mass index (BMI) was 22.6 kg/m²), figure 4.3.7., there was very little difference in the average BMI between AHB skippers and non-skippers Figure 4.4, where the BMI of AHB skipper was very similar among skippers (median=21.90 The mean of Body mass index (BMI) was 22.6 kg/m²) and non-skippers (median=21.76 The mean of Body mass index (BMI) was 22.6 kg/m²).

Table 4.9: Difference between skippers and non-skippers in BMI

	yes	No	Mann-Whitney test	
	Median	Median	z	p-value
Breakfast skippers on $\geq$ days / week	22.09	21.68	1.99	0.05
AHB Breakfast skippers on $\geq$ days / week	21.90	21.76	0.723	0.470

4.4 Other lifestyle variables related to breakfast skipping

Table 4.10 presents the different lifestyle variables of the adolescents related to breakfast skipping.

Table 4.10: Adolescents' lifestyle variables related to breakfast skipping

Total (N= 617)			
Variable	Frequency (n)	Percent (%)	Valid Percent (%)
<i>Sharing meals with family*</i>			
<i>Eating Breakfast With</i>			
No one	155	25.1	25.3
With one of the family members	196	31.8	32.0
All family	223	36.1	36.4
Friends	38	6.2	6.2
<i>Sleeping pattern and time management</i>			
<i>No time for breakfast as I oversleep usually**</i>			
No	311	50.4	51.3
Yes	295	47.8	48.7

***I do not have energy to prepare
it******

No	382	61.9	63.1
Yes	223	36.1	36.9

*Willingness to eat****

I do not feel hungry

No	225	36.5	37.2
Yes	380	61.6	62.8

*Weight management****

I am trying to lose some weight

No	444	72.0	73.4
Yes	161	26.1	26.6

*Culture****

***Culturally, we don't eat breakfast
at home***

No	517	83.8	85.5
Yes	88	14.3	14.5

*Breakfast importance****

I do not know why I need to eat

breakfast

No	505	81.8	83.5
Yes	100	16.2	16.5

It will not make a difference in my day

No	362	58.7	59.8
Yes	243	39.4	40.2

Financial status and family issues***

I cannot afford to eat or buy breakfast

No	573	92.9	94.7
Yes	32	5.2	5.3

Our family situation is hard now

No	588	95.3	97.2
Yes	17	2.8	2.8

Availability of food and preferences***

I do not like the breakfast types of food

No	459	74.4	75.9
----	-----	------	------

Yes	146	23.7	24.1
-----	-----	------	------

*Others' Influence****

***My friends do not eat breakfast
as well***

No	568	92.1	93.9
Yes	37	6.0	6.1

*Breakfast preparation role*****

All family	62	10.0	10.1
Servant	39	6.3	6.4
Buying Ready Meal	26	4.2	4.2
Brother or Sister	31	5.0	5.1
My self	197	31.9	32.1
My father	6	1.0	1.0
My mother	229	37.1	37.4
No body	23	3.7	3.8

Disorders*****

No	600	97.2	98.7
Yes	8	1.3	1.3

*Missing values for 5 adolescents (0.8%), n=612, % = 99.2 and valid% = 100; **Missing values for 11 adolescents (1.8%), n=606, % = 98.2 and valid% = 100; ***Missing values for 12 adolescents (1.9%), n=605, % = 98.1 and valid% = 100; ****Missing values for 4 adolescents (0.6%), n=613, % = 99.4 and valid% = 100; and *****Missing values for 9 adolescents (1.5%), n=608, % = 98.5 and valid% = 100.

4.5 Relationship between friend's behaviour and breakfast skipping

Adolescents whose friends did not eat breakfast was likely to be breakfast skippers (51.4%) on four or more days of the week compared to those whose friends ate breakfast (30.5%), this resulted in a significant relationship between friend's behaviour and breakfast skipping (Chi-Square=7.00, df=1, p-value=0.008) (**Table 4.11**).

Table 4.11: Breakfast skippers on four or more days of the week compared to friends'

		Skippers for 4 days or more	
		No	Yes
My friends don't eat breakfast as well.	NO	395 (69.5%)	173(30.5%)
	YES	18(48.6%)	19 (51.4%)
Total		413(68.2%)	192 (31.8%%)
Pearson Chi-Square=7.00., df=1, p-value=.0.008			

For AHB skippers, adolescents whose friends did not eat breakfast was likely to be AHB skippers (64.9%) compared to those whose friends ate breakfast (47.9%), this resulted in a significant relationship between friend's behaviour and AHB skipping (Chi-Square=4.001, df=1, p-value=0.045),

Table 4.12: AHB skippers on four or more days of the week compared to friends'

		Skippers for 4 days or more	
		No	Yes
My friends don't eat breakfast as well.	NO	296 (52.1%)	272(47.9%%)
	YES	13 (35.1%)	24 (64.9%)
Total		309(51.2%%)	296 (48.8%)
Pearson Chi-Square=4.001., df=1, p-value=.0.045			

4.6 Relationship between knowledge about breakfast importance and breakfast skipping

About 46% of skippers had no knowledge of why they needed to eat breakfast compared with 28.9 % of those in the non-skipper group, showing that generally more skippers had no knowledge than non-skippers, this resulted reflected a significant association between knowledge about breakfast importance and breakfast skipping (Chi-Square=11.25, df=1, p-value=0.001) (**Table 4.13**). For AHB skippers, about 60% of skippers had no knowledge of why they needed to eat breakfast compared with 46.7 % of those in the non-skipper group, showing that generally more skippers had no knowledge than non-skippers, this resulted revealed a significant association between knowledge about breakfast importance and breakfast skipping (Chi-Square=5.88, df=1, p-value=0.015).

Table 4.13: Breakfast skippers on four or more days of the week compared breakfast importance

		Skippers for 4 days or more	
		No	Yes
I do not know why I need to eat breakfast.	NO	359 (71.1%%)	146(28.9%%%)
	YES	54 (54%%)	46 (46%)
Total		413(68.3%)	192 (31.7%)
Pearson Chi-Square=11.25., df=1, p-value=.0.001			

4.7 Breakfast composition

4.7.1 Relationship between specific breakfast beverages choices and breakfast skipping

4.7.1.1 Coffee

Table 4.14 indicated that for breakfast skippers on four or more days of the week, of the breakfast skipping group 29.5% drank coffee, while for those who consumed breakfast 70.5% drank coffee. Statistically, there was no association between breakfast beverage (coffee) and breakfast skipping.

While for AHB skippers, of the breakfast skipping group 45.1 % drank coffee whilst in those who consumed breakfast 54.9 % drank coffee. Statistically, there was no association between breakfast beverage (coffee) and AHB skipping (Table 4.15).

Table 4.14 Breakfast skippers on four or more days of the week compared to breakfast beverages (coffee)

		Skippers for 4 days or more	
		No	Yes
Coffee.	NO	296(67.4%)	143(32.6%)
	YES	122 (70.5%)	51 (29.5%)
Total		418(68.3%)	194 (31.7%)
Pearson Chi-Square=0.545, df=1, p-value=0.459			

Table 4.15: AHB skippers on four or more days of the week compared breakfast beverages (coffee)

		Skippers for 4 days or more	
		No	Yes
Coffee.	NO	219(49.9%)	220(50.1%)
	YES	95 (54.9%)	78 (45.1%)
Total		314(51.3%)	298 (48.7%)
Pearson Chi-Square=1.255, df=1, p-value=0.263			

4.7.1.2 Tea

About (21.6%) of the students who consumed tea were breakfast skippers compare with those who did not consume tea (36.9%). Statistically, there was a significant association between breakfast beverages (tea) and breakfast skipping (Chi-Square=14.742, df=1, p-value<.001) (**Table 4.16**).

The same was seen for AHB skippers, about (38.5%) of the students who consumed tea were breakfast skippers, and they were much lesser than those who did not consume tea (54%). Statistically, there was a significant association between breakfast beverages (tea) and AHB skipping (Chi-Square=13.02, df=1, p-value<0.001) (Table 4.17).

Table 4.16: Breakfast skippers on four or more days of the week compared breakfast beverages (tea)

		Skippers for 4 days or more	
		No	Yes
Tea	NO	255(63.1%)	149(36.9%)
	YES	163 (78.4%)	45 (21.6%)
Total		418(68.3%)	194(31.7%)
Pearson Chi-Square=14.742, df=1, p-value<0.001			

Table 4.17: AHB skippers on four or more days of the week compared breakfast beverages (tea)

		Skippers for 4 days or more	
		No	Yes
Tea.	NO	186(46%)	218(54%)
	YES	128 (61.5%)	80 (38.5%)
Total		314(51.3%)	298 (48.7%)
Pearson Chi-Square=13.02, df=1, p-value<0.001			

4.7.1.3 Fizzy Drinks

Table 4.18 illustrated that there was no significant association between breakfast beverages (fizzy drinks) and breakfast skipping, about (40.9%) of students who consumed fizzy drinks and were breakfast skippers compared to 59.1% who took fizzy drinks but were not breakfast skippers. The same scenario was seen with AHB skippers.

Table 4.19 illustrated that there was no significant association between breakfast beverages (fizzy drinks) and AHB breakfast skipping for AHB skippers, about (54.5%) of those who consumed fizzy drinks were breakfast skippers, compared to (45.5%) who consumed fizzy drinks, but were not breakfast skippers. Statistically, there was no association between breakfast beverages (fizzy drinks) and AHB skipping.

Table 4.18: Breakfast skippers on four or more days of the week compared breakfast beverages (fizzy drink)

		Skippers for 4 days or more	
		No	Yes
Fizzy Drink	NO	392(69%)	176(31%)
	YES	26 (59.1%)	18 (40.9%)
Total		418(68.3%)	194(31.7%)
Pearson Chi-Square=1.857, df=1, p-value=0.173			

Table 4.19: AHB skippers on four or more days of the week compared breakfast beverages (fizzy drink)

		Skippers for 4 days or more	
		No	Yes
Tea .	NO	294(51.8%)	274(48.2%)
	YES	20 (45.5%)	24 (54.5%)
Total		314(51.3%)	298 (48.7%)
Pearson Chi-Square=0.650, df=1, p-value=0.420			

4.8 Conclusion

The first phase used a population of female adolescent students aged 16-18 (N=617) from 3 schools to determine the prevalence of skipping breakfast and AHB, as well as the demographic, social, and economic backgrounds of such girls, as well as preliminary factors that contributed to skipping breakfast either at home or at school. The percentage of AHB skippers was 48.8 percent, while the frequency of skipping breakfast among schoolgirls was 31.8 percent. The sociodemographic features of the adolescents were also determined.

In the survey, 74 percent of mothers were unemployed, compared to only 33 percent of unemployed fathers. The bulks of the females were of intermediate income and lived with both parents. Both parents had an illiteracy rate of around 0.6 percent. Age, friend's behaviour, understanding of the necessity of breakfast, and bad food choices such as tea drinking were all shown to be strongly linked with both breakfast and AHB skipping in the study. In addition, breakfast skipping was strongly linked to residential status.

Chapter 5: Qualitative results: Focus Group Discussions (FGDs)

5.1 Introduction

The codes identified from data based on common phrases that closely corresponded with the identified codes were presented at **Appendix 15**. The identified codes made it easier to gain a condensed overview of the main points and common meanings that recur throughout the data. The main themes identified from the identified codes were summarized in **Table 5.1**.

Table 5.1: Main themes identified from the focus group data for students and mothers.

Theme	Codes
Sociocultural beliefs	Breakfast meaning
	Breakfast importance
	Influence of parental control
	Sleeping pattern
Work or school day routines	Parents' work and morning preparations
	Time management
	Availability of food
	Willingness to eat
Students' moods or emotions	Stomach ache
	Desire to lose weight / keep healthy
	Influence from friends / social media
	Lack of joint eateries at school

5.2 Main Themes from Students

The students who participated in the FGDs identified different issues that influenced their decision to skip breakfast. The main themes identified included social-cultural beliefs, school routine and moods concerning breakfast. These themes and their sub-themes are summarized in **Table 5.1** above.

5.2.1 Sociocultural beliefs

5.2.1.1 Breakfast meaning and importance

Individual meaning about breakfast informs their choice to take or skip morning meals. Some students shared that they skipped breakfast because they did not consider it important. For example, Students 1 and 2 from B Secondary School (SSB) shared that breakfast was not important and this made them skip it.

Student 1 shared that after 10 am she would accept taking breakfast,

"I prefer eating later in the day after morning lessons than taking early breakfast." — Student 1, SSB

Student 5 from A Secondary school (SSA) added that,

"I do not like breakfast because I don't find it important." — Student 5, SSA

Student 2 from C Secondary School (SSC) also shared that,

"Breakfast is not essential to me. I prefer eating it later in the day but I do not have to take it on a daily basis." — Student 2, SSC

The students especially appeared to lack an understanding of the importance of eating breakfast daily, and how breakfast consumption can have an impact on their day. Students

were not aware of both the physical effects of skipping breakfast, and how it impacted them in school. This finding confirming the quantitative analysis in the current study; that the knowledge about breakfast importance is association with breakfast skipping.

5.2.1.2 Influence from parents and friends

i. Influence from parents

Students also shared that the influence of parents and friends affected their breakfast consumption patterns. Student 1 from the SSB shared that lack of support or encouragement from parents contributed to them skipping breakfast.

The student noted that,

"We do not have to take breakfast because even parent does not." — Student 1, SSB

In addition, Students 4 and 7 from the SSB expressed that

"Mom does not prepare breakfast and this discourages us from taking it... in my family, we do not get together because it is only me and my brother who wake up early." — Student 4, SSB

"Also, for me, we do not prepare breakfast individually and we do not sit as a family...although my mom prepares it, everyone has their time to eat and no motivation when taking it alone." — Student 7, SSB

Student 2 from the SSA added that,

"Mom prepares the breakfast like milk and leave it on the table for you to decide whether you want to eat or not. No one accompanies you to have it." — Student 2, SSA

Student 5 from the SSA also notes that no one encourages her to take breakfast. In most cases, there is no breakfast on the table in the morning and this contributes to skipping breakfast.

Students 3, 7, and 10 from the SS2C also shared that family culture of not having breakfast influenced them to skip their breakfast. Student 3 shared that,

"I think if all the family get together in the morning for breakfast, I may eat because I am alone, I do not eat breakfast. I do not feel the encouragement." — Student 3, SSC

Student 3 from the SSA shared that as a family they do not consider breakfast meal as essential in the morning but *"if my father woke up early, he likes to drink something in the morning"* but the children do not necessarily eat breakfast as *"we are not used to it unless it is a holiday because we all get together for breakfast during the holiday."*

Also, Student 7 from the SSA claimed that

"For us, the lunch is essential as all come after work to eat...but, not the breakfast meal." — Student 7, SSA

Students 8 and 10 from the SSA also made similar remarks in that they did not find breakfast an important meal in their families but preferred snacks and lunch. These insights also support the claim that individuals place different importance on breakfast and this influences their choice to take breakfast.

ii. Influence from friends

In addition to the influence of parents, students also shared that their friends influence their choice to forego breakfast. Student 7 from the SSA noted that,

"My friends are discouraging when we meet they are less interested in taking breakfast at school and I become drawn it to skip it too." — Student 7, SSA

Student 9 from the SSA also shared that,

"My friends do not eat breakfast and I do not as well... we have the same personality of taking lunch to breakfast." — Student 9, SSA

Students 1 and 5 also from the SSB added that they feel friends can have a negative impact on their choice to take breakfast. For example, Student 1 observed that,

"For me, for example, I use the break time after the third lesson for chatting with friends rather than eating...and I do not want to eat just like my friends, all I wanted is to chat." — Student 1, SSB

Student 5 said that *"My friend's food preferences influence me also. I believe you will be happy about it because you will be with your friends. We all affect each other's...and if someone says that she does not want some food, all of us would do the same thing."* — Student 5, SSB

It can be noticed that the choice to take breakfast influence by social influence; lack of support or encouragement from parents and negative impact of friend's contributed to them skipping breakfast. Educating adolescents on how to assess and interpret unhealthy nutritional behaviours that they observe from significant others may be one nutrition promotion strategy to reduce meal-skipping behaviour. The involvement of parents may be

particularly important in such efforts. Encouraging a peer subculture that promotes regular consumption of meals and educates adolescents on the detrimental impact of meal-skipping behaviour on health may also offer a promising nutrition promotion strategy (Pearson et al., 2012)

5.2.2 School day routine

School routines during weekdays also affect students and often encourage them to skip breakfast. Some of the sub-themes related to school day routine include the students' sleeping patterns, time management, and preparation in readiness to go to school. These themes are further presented in the subsequent sections.

5.2.2.1 Sleeping pattern

Students expressed that waking up late and the need to get to school on time means there is no time for breakfast.

Students 1, 2 and 3 from the SSB shared that,

"I stay awake at a late hour and then I wake up late in the morning with no time to eat breakfast." — Student 1, SSB

"Once I woke up late today, I did not eat breakfast due to being late and then dressed and went to school." — Student 2, SSB

"If I sleep early, I wake up late and do not eat breakfast but if I do not sleep, I eat breakfast that day. So, when I wake up, I do not want or have the ability to eat breakfast but when I stay awake all night you eat breakfast." — Student 3, SSB

Students 4 and 6 from the SSA shared that they also find limited time during school days to prepare breakfast. Student 4 noted that sometimes she felt that lack of time in the morning as the main cause for skipping breakfast. Student 6 shared that,

"For me, I do not wake up with energy at all, I need some time to move from bed before I can think about breakfast." — Student 6, SSA

Late sleep and wakeup patterns contributed to high chances of students skipping their breakfast. Student 2 and 3 from the SSA shared that,

"I sleep late most days and wake up without any desire to eat breakfast. I only try and eat afterward at lunch time." — Student 2, SSA

"I wake up and because I am sleepy, I do not like to eat and do not have the appetite or the willing." — Student 3, SSA

Student 4 also agreed that they wake up late and sleepy and this makes them unwilling to eat breakfast. Student 4 from the SSA added that,

"I might be having the sleepy feeling in the morning and my appetite may be to eat later instead of immediately after waking up." — Student 4, SSA

Student 10 from the SSC added that sleeping late means they wake up after 10:00 am and this means they miss breakfast. Students 4 and 7 from the SSC shared that they spent a lot of time on the phone and they ended up sleeping late and waking up late. Due to the late wake-up time, they skip breakfast and prefer taking lunch. The quantitative findings in this study, indicated that about 48.7% of the breakfast skippers stated that there was no time for breakfast as they oversleep usually

5.2.2.2 Time management

Student 5 indicated that,

"I feel the most common factor is the time shortage. Sometimes I feel there is no time." —

Student 5, SSC

Student 8 added that,

"If you wake up at 6:30 am, I feel there is no enough time for breakfast because some drivers come very early as they collect some girls...and when you are busy in the morning and a rush, you cannot find time to make any breakfast." — Student 8, SSC

The rush to prepare and get ready for school also contributed to skipping AHB in some students. Student 4 from the SSA also shared similar reasons for skipping AHB noting that,

"I do not eat breakfast...because I feel in a rush to go to school and that is why I skip breakfast." — Student 4, SSA

Student 6 from the SSA also shared that

"Sometimes when it is the time for final exams, I am the only one who wakes up so there is usually sometime before the exam to prepare and eat breakfast and sometimes I feel lazy to prepare it so my mom does it for me." — Student 6, SSA

The above revelations show that getting ready for school might contribute to students skipping AHB especially when they are running late for school. Student 8 from the SSB also revealed that,

"I usually do not eat breakfast as I am usually in a rush to go to school and some time, I forget to eat it." — Student 8, SSB

The concerns about inadequate time and the need to get ready for school was also shared by other learners such as Students 2, 4, 7, and 8 from the SSB and as well as by Students 1, 3, and 10 from the SSA. A major concern, therefore, was that some students find that there is no time in the morning to take AHB since they prioritize to get ready for school. Some stated that they eat breakfast after arriving to school.

Students 1, 5, and 8 from the SSC shared that they also had difficulties with time management, thereby impacting on their breakfast schedule. Student 1 shared that, *"I leave home very early and can't eat breakfast, but after the second lesson, I feel like eating."* — Student 1, SSC

5.2.2.3 School rules/restrictions

School rules actually don't affect AHB meal. School guidelines on carrying food or specific food that can be availed at school affect student breakfast consumption behaviour. Student 3 from the SSB shared that she prefers sandwiches for breakfast. However, her school did not allow students to carry Sandwiches and this prompts her to skip breakfast. For instance, Student 3 shared that,

"If I bring a falafel Sandwich, the school admin will seize it... even if the Sandwich has been prepared at home. The school punishes us if we bring a falafel Sandwich or other food." – Student 3, SSB

Student 6 from the SSB also confirmed the challenge with school rules and eating home-made breakfast, terming it,

"Annoying and all about the school cafeteria focusing on making profits." — Student 6, SSB

These remarks possibly mean that students are only allowed to purchase school meals, but since some students do not like them, they opt to skip eating them during breakfast.

Students 1, 7 and 9 from the SSC also cited school regulations as a factor that contributes to skipping breakfast. Student 1 shared that,

"Since we are not allowed to carry food from home and the food in school is bad, I end up not eating breakfast." — Student 1, SSC

Students 7 from the SSC emphasized the need to have a variety of food at school as a way of encouraging students not to skip breakfast. According to Student 7,

"Lack of permission to bring food in school and lack of different meal types make me skip breakfast. I hope all schools can agree and make a breakfast club and force the cafeterias to bring healthy food like salads or fruits because it is all about confectionaries nowadays like biscuits or crisps." — Student 7, SSC

Student 8 from the SSA elaborated that,

"The school prevent us from bringing those Sandwiches like falafel." — Student 8, SSA

Thus, these responses reveal that students often skip breakfast because they are not allowed to bring to school their preferred meals.

5.2.3 Moods and emotions

Mood and emotions were a third theme identified by participants regarding their skipping breakfast behaviour. The sub-themes that emerged from these themes included school rules and restrictions, types of foods available and individual preferences, and stomach upsets or medical conditions. Additional sub-themes included poor quality food serviced at the school cafeteria and individual intentions for weight management or healthy eating. The results on these sub-themes are further presented in subsequent subsections.

5.2.3.1 Food preferences

Individual food preferences and available food types affect whether students would skip AHB. Student 1 from the SSB revealed that,

"I cannot imagine myself buying fruit for breakfast and I do not like fruits at all. My family brings fruits home and I do not even try it." — Student 1, SSB

Students 2 and 5 from the SSB also shared similar concerns during the FGD about the home food type and individual preferences. The students shared that,

"I do not like the types of food and when I see them my appetite change on the spot." — Student 2, SSB

Student 8 and 9 from the SSC also made similar observations about food preferences and skipping breakfast at school during the FGDs. Student 8 shared that,

"I hope they change available food types at school to fruits like banana or apples. We also asked the school for a range of Sandwiches because we do not like the current Sandwiches"— Student 8, SSC

"We need loads of variety of food in the school and change it every three months." — Student 9, SSC

Students 2 from the SSB did not prefer school food and hence skip breakfast also at school. The student said that,

"once I arrived at school, I did not eat breakfast because I do not like the food here, and whatever they sell I do not like." — Student 2, SSB

5.2.3.2 Emotional responses

Student 4 from the SSA also shared that emotions influenced her eating habits and when in bad emotions or mood she skips AHB. The student noted that,

"From my emotions, I often feel that I do not want to eat in the morning and do not have the will to do so." — Student 4, SSA

Similar to Student 4, student 5 from the SSB also shared that *"For me, it is up to my mood. I wake up without any problems but if I was in a good mood, I eat my breakfast but if it is not I do not and mostly I don't eat breakfast."* — Student 5, SSB

These insights show that moods and emotions contribute to students skipping their breakfast either AHB or at school. The obtained results reveal that the type of food available and individual preferences influence students to take or skip breakfast. In most cases, students skip breakfast at school because they do not like the available meals at the cafeteria. Students shared the need to have diverse meals and fruits to meet the needs of all students as a way of reducing possible cases of some students skipping breakfast.

5.2.3.2 Stomach upsets/Medical

Some students shared that they skip breakfast because of stomach aches or due to underlying medical conditions. Student 8 from the SSB indicated that,

"For me, I do not like breakfast, and when I eat my stomach hurt...I do not like eating early morning." — Student 7, SSB

In addition, Student 7 from the SSA noted that,

"I skip food because if something happened or someone got gastritis after eating at school, they may say that a student brought food from outside the school. I skip it to avoid any medical problems." — Student 7, SSA

Similar observations were made from the focus group conducted with students from the same school. Students 3, 7, 8, and 10 from this school noted that stomach problems and medical considerations influence them to skip breakfast.

"I fear to get food poisoning problems from a non-clean food that is poorly prepared at school. My stomach is sensitive." — Student 3, SSA

"For me, it is related to medical conditions or disease. I get bloated stomach after I eat breakfast." — Student 7, SSA

"If I eat breakfast in the morning, I will feel dizzy." — Student 8, SSA

"In my cases, if I eat anything, I get stomach-ache...every single day even in holidays. I think it is mental like waking up early and preparing for school gets you sick." –Student 10, SSA

Students from the SSC also shared similar concerns for skipping breakfast. Students 2, 5, and 7 noted that

"I stopped eating breakfast my stomach always aches." — Student 2, SSC

"I feel sick and get stomach upsets maybe because I am not used to it, that is why I skip it." — Student 5, SSC

Student 7 also shared that *"I may feel that I want to throw up if I eat anything, I only take water."* — Student 7, SSC

Student 9 from the same school also expressed similar concerns that they preferred eating at noon instead of morning time to avoid feeling dizzy and tired especially at school. Other students noted that taking up breakfast makes them feel like vomiting.

"If I drink milk, I feel like throwing up and this makes me skip my breakfast." — Student 9, SSC

Students noted that skipping and taking breakfast depended on the associated benefits. An important observation from Student 5 from the SSB who had diabetes. The student shared that, *"I wake up for school and because I am diabetic, so I need to take my insulin dose and eat something light to avoid any complications."* — Student 5, SSB

However, Student 8 also shared that her colon problem informs her to forego breakfast, *"I have a colon problem and when I eat dinner and sleep I feel that my stomach does not want to receive anything else...that is why I do not eat and sometimes I fast...and when I stay up late and then wake up I feel that I do not want to eat."* — Student 8, SSB

These findings indicate that stomach problems and some medical concerns are some of the factors that contribute to breakfast skipping among some student or not skipping in terms of the student who is diabetic.

5.2.3.3 Poor quality food at the school cafeteria

When asked what they envision when they think of school breakfasts, the overwhelming response from students is negative. Common words used to describe the meal included “not good,” “poor,” “bad,” “dry,” “not tasty,” and “bad smell.”

Students also shared that they skip breakfast because of the poor-quality food at school. Student 3 from the SSB shared that,

"Food at the cafeteria is of poor quality and does not smell good." — Student 3, SSB

Students 6, 7, and 9 from the same school complained about the same food quality problem and possible fears of food poisoning. Thus, the students from the SS6 agreed that poor food quality resulted in them skipping breakfast.

Similar insights were also shared by students from the SSA. Students 1 and 5 elaborated that, *"Even if I have time for breakfast, there is nothing nice to buy and eat for breakfast at the school cafeteria."* Student 1, SSA

"Most of the food we are sold at school is dry and not tasty. There is no filling in the Sandwich. The food in school is really of low quality and dry." — Student 5, SSA

Similar complaints by students about the poor food quality and the habit of skipping breakfast were also made by students from the SSA, including students 2, 4, and 8. Student 2 shared that,

"There are cheese and thyme Sandwiches and juices but of poor quality not tasty as one would like it." — Student 2, SSA

Student 4 complained that efforts to have the school change the Sandwiches or bring different food were unsuccessful. When asked whether students attempted to ask for changes in the food sold at school, Student 4 noted that,

"We tried but they said that ministry of health is not allowing them to bring other Sandwiches." — Student 4, SSA

Student 8 also shared that,

"We have proposed some changes in food menu but nothing has changed... they did once a strawberry milkshake but then stopped." — Student 8, SSA

Student 9 from the C school also shared that,

"Because they want the cafeteria to sell other items to make more profit, they end up not giving us the meals we prefer. The food in the cafeteria also has a bad smell and I end up skipping breakfast." — Student 9, SSC

Therefore, these responses reveal that students appear to have limited food choices in the available food and most cases are likely to skip breakfast because they do not have many choices on what to eat and the poor quality of the available choices. Consequently, schools need to make healthy food available with choices and good quality in order to encourage students to take their breakfast.

5.2.3.4 Dieting/Weight Management

Students also shared that they skip breakfast to stay fit or manage their weight. Student 8 from the SSB noted that,

"I think that breakfast helps us to maintain an optimal weight and dinner is the one who making us obese." — Student 8, B

Student 9 from the SSA noted that,

"I skip breakfast because I follow the intermittent fasting approach which prevents me from eating early meals to keep fit." — Student 9, SSA

Student 2 from the SSC added that

"Skipping breakfast for me is related to losing weight because I think I am obese and would want to maintain a low weight." — Student 2, SSC

Therefore, these responses reveal that students appear to skip breakfast in order to lose their weight. According to past studies, breakfast skipping was reported to be associated with weight gain (Song et al., 2005). Therefore, strategies for improving dietary behaviour among adolescent girls are needed.

5.3 Main Themes from Mothers

Table 5.2 summarizes the main themes identified from the mothers' responses. The main themes included socio-cultural beliefs, school day routines, and students' moods or emotions.

Table 5.2: Main themes and sub-themes identified by parents on factors associated with skipping breakfast among students

Theme	Codes
Sociocultural beliefs	Breakfast meaning
	Breakfast importance
	Influence of parental control
School day routine	Sleeping pattern
	Parents' work and morning preparations
	Time management
	Availability of food
	Willingness to eat
Students' moods or emotions	Stomach ache
	Desire to lose weight / keep healthy
	Influence from friends / social media
	Lack of joint eateries at school

5.3.1 Sociocultural beliefs

The sociocultural beliefs were a key theme identified in this study to play an important role in informing why students skip breakfast. Important themes identified in this study included breakfast meaning, breakfast importance, and influence of paternal control. These themes were further supported by the participant responses during the focus group discussions.

5.3.1.1 Breakfast meaning

According to the focus group participants, individual meaning that students attach to breakfast influences their decision to take or skip breakfast. Mothers from the SSB observed that breakfast means any meal or drink consumed between 5:30 am and 9:00 am. Mother 5 from the SSA pointed out that

"As a mother, I think it is the most important meal of the day. But children might have a different meaning or attach less significant importance to breakfast making them skip it." — Mother 5, SSA

Similar observations were made by mother 8 who shared that

"The current generation does not attach importance to eating early morning...and this becomes a routine." — Mother 8, SSA

As evident from Mothers 5 and 8, from the SSA, students might skip breakfast largely because of the meaning they attach to breakfast.

5.3.1.2 Breakfast importance

The level of importance that students attach to breakfast affects their decision to take or skip the first meal of the day. Some parents share that their families did not have a habit of

taking breakfast and this might affect the significance students have towards taking it, especially on weekdays. Mothers 1 and 6 from the SSC shared that,

"It is already not a Saudi habit to eat breakfast, but some girls said that they eat breakfast during the holidays or weekends." –Mother 1, SSC

"It is right, maybe because we do not live in an extended family where breakfast habit is common...and thus, it disappeared to be a habit every day in our house." — Mother 6, SSC

Mother 9 from the SSC also made similar assertions stating because breakfast is not a common habit in SA, this might explain why students do not take it during weekdays.

Mother 9 agreed with Mother 1 that breakfast is not prioritized as important by students although it appears to be "more common in the weekends." Some mothers added that students might not hold similar views about the importance of taking breakfast in terms of being energetic, staying alert, active, and other health benefits. For example, Mother 4 from the SSB shared that,

" as a mother I think it is the most important meal of the day" — Mother 4, SSB

Mother 3 from SSC said, *" for me, it is the one that make me active and alert"*— Mother 3, SSC

Mother 6 from the SSA said that *"breakfast gives you energy up to the launch and launch gives you energy up to the dinner."* — Mother 6, SSA.

Considering the limited significance that students have on breakfast, mothers agreed that there is a need for awareness creation about breakfast importance for students by parents and school. Specifically, students need to be made aware of breakfast and its importance.

Mother 5 from the SSB said that *" we need to increase the awareness..."* — Mother 5, SSB.

Similar observations were made by mother 1 who said that

" we need to raise the awareness of mothers and their daughters about the breakfast and its importance because they do not know a lot..." — Mother 1, SSA

Mother 3 from the SSA expressed concerns that

"Some students are stubborn and do not want to eat breakfast despite its importance." — Mother 3, SSA

Moreover, Mother 7 from the SSA said that students skip breakfast as they lack to consider it as important resulting in the long-term suffering from the child did not take milk or any other drink.

5.3.1.3. Influence of parental control

Unlike when the students were young, mothers expressed concerns that they no longer have strict control over their children. Therefore, they are not able to coerce them to take breakfast if they do not have an appetite for breakfast. For example, Mother 2 from the SSA expressed that,

"Our girls, talking as a mother, stress the importance of breakfast but sometimes I cannot convince them." — Mother 2, SSA

Mother 7 from the SSB added that with the emergency of technology, a lot of aspects regarding breakfast consumption has changed. During the focus group discussions, Mother 7 from the SSB noted that,

"Social media changed everything. Even growing them up is harder than before. We used to enforce them to eat breakfast but today I cannot. Today not you who raise them is social media." –Mother 7, SSB

Mother 1 from the C Secondary noted that girls also take a lot of time in the morning doing personal care like brushing. The need for a personal time also reduces parental control as Mother 1 noted that she could not force her child to leave their personal time for breakfast. These findings show that limited parental control over children as students grow increases the likelihood of skipping breakfast. Students become autonomous and the new-found freedom to choose what to eat increases the possibility of absconding from breakfast eating for some of the students in SA.

Mother 5 also added her frustrations that she is

"Sometimes worn out from convincing them to wake them up to come and eat...smartphones are always their toy and whenever they move, they take it with them." —

Mother 5, SSB

5.3.2. School day routine

The second main theme identified by mothers regarding why students skip breakfast was attributed to dynamics in daily school routines. Specific sub-themes in support of school day routines included the sleeping patterns of students and aspects such as parents' job commitments and morning preparations for work. Additional sub-themes included concerns with time management, stress during exams, and availability of food to eat after waking up. These sub-themes are further presented in subsequent subsections.

5.3.2.1 Sleeping pattern

The focus group participants from the three schools shared that sleeping patterns affect students' breakfast eating patterns. A key aspect of consideration was that students tend to

sleep late and wake up late. Waking up late means that students miss their breakfast and prefer to take other meals of the day especially during weekends and holidays.

Mothers 3 and 9 from the SSB shared these insights. For example, Mother 3 noted that, *"I feel that their sleeping has a major impact on our life...when you sleep early you wake up early and energetic but when you sleep late you wake up in disaster not willing to take breakfast."* — Mother 3, SSB

Further, Mother 9 also elaborated that some of them sleep while they are watching their phones and such behaviours affect their wakeup patterns and routine to eat breakfast. Mothers from the SSA also shared similar concerns regarding how sleeping patterns contribute to skipping breakfast among students. For instance, Mothers 1 and 7 from the SSA noted that,

"Late waking up is a major problem that contributes to skipping breakfast. Even if we try to increase that time for breakfast, it will make them sleep longer." —Mother 1, SSA

"Some of the reasons were the fact that they do not want to eat breakfast because they sleep at late hours. Family traditions also influence the process because they stay awake until a late hour, thereby waking up late." — Mother 7, SSA

Additional information on the sleeping patterns and skipping breakfast was captured during focus group sessions with parents who have children at the SSC. For example, Mother 4 at the SSC noted that,

"Some students sleep while they are full and late into the night. When they wake up, they don't feel like taking breakfast." — Mother 4, SSC

Mother 8 from the SSA also shared that,

"As a mother, I try hard to wake her up, but she refuses, resulting in skipping breakfast."

— Mother 7, SSA

In summary, these insights reveal that sleeping patterns largely contributes to students skipping breakfast.

5.3.2.2. Parents work and morning preparations

Work commitment and morning preparations also contribute to students skipping breakfast.

Mother 2 from the SSA pointed out that,

"For me, we are three at home including my husband. At times leaving early for work means there is limited space to prepare for breakfast especially when running late." —

Mother 2, SSA

Mother 7 from the SSA also noted that due to a busy schedule, at times she may feel lazy or cannot find time to prepare breakfast. Parents from the SSC also shared that morning preparations might contribute to students missing breakfast,

"Sometimes in the morning, I feel less power to make breakfast. At times everybody slept late and feels sleepy in the morning and no one wants to eat or go prepare breakfast." —

Mother 5, SSC

Further, Mother 10 from the SSA shared that some students are largely depended on their parents. That is, the students

"Depend on their parents to make breakfast and they do not prefer to make the breakfast on their own." — Mother 10, SSA

Thus, when parents are not in control of the breakfast preparations, the students might become uninterested and skip their breakfast meals.

Besides, Mothers 6 and 10 from the SSC noted that some mothers' work commitment reflects in their daily routine. Mother 10 shared that some mothers do not care about doing breakfast and end up influencing their children in skipping breakfast. Thus, morning parental commitments related to a work schedule are a potential factor that might influence some students to skip breakfast.

5.3.2.3. Time management

Timing and scheduling were a category discussed throughout the focus groups, and appeared to be the barrier that was most frequently perceived by mothers and students. The pressure to manage time was also another factor that is likely to contribute to students skipping breakfast. The participants were concerned that morning time especially during weekdays or workdays is limited and this means they do not prepare for breakfast. For example, Mother 4 from the SSB noted that,

"The woman who is an employee has no time to prepare breakfast or provide options...time is very tight in the morning...I have a girl who never agrees to have breakfast or drink anything at all." —Mother 4, SSB

Lack of enough time to prepare for breakfast might also explain reasons why Mother 5 from the SSB shared that,

"Girls are likely to wake up and drink only milk because it does not require additional processing. Lack of enough time at school was also another factor contributing to skipping breakfast among students." — Mother 5, SSB

Parents from other schools also shared about the negative impact that lack of time has on students' commitment to take breakfast. In elaboration, Mothers 7 and 8 from the A noted that,

"If students can take some time to eat before going to the school break, they will eat their food before the school break." — Mother 7, SSA

"If students specify or commit sometime before the first lesson in school to eat breakfast...they may eat it. Instead of standing in the queue, they could eat breakfast before anything." —Mother 8, SSA

The above remarks were echoed by mothers from the SS24 who observed that time management affected their routine to prepare breakfast for their children. Mother 2 elaborated that,

"Now I am an employee that has responsibilities and cannot prepare breakfast because of limited time in the morning." — Mother 2, SSC

Mother 4 also added that,

"There is no time in the morning because my child goes to school early with the school driver." — Mother 4, SSC

Many mothers mentioned that due to their mornings being so busy and having little free time, they are often unable to make breakfast for their children. The need to manage time, therefore, is another potential factor that contributes to skipping breakfast among students.

5.3.2.4 Stress during exams

Students' concerns about exams and the pressure likely to result from exam commitments might also have contributed to skipping breakfast among students.

Mother 5 from the SSB shared the concern of stress during the examination period elaborating that,

"Sometimes at days of exams when they are stressed and busy with studying, they prefer to wait until they finish the exam and then buy something to eat." — Mother 5, SSB

Mother 8 from the same school also supported these sentiments by elaborating that,

"My child feels that she is always busy for breakfast and prefer taking it after finishing exams." — Mother 8, SSB

These insights indicate that stress during exams might negatively affect the students' interest in having their breakfast as shared by parents from the SSA. Mother 2 shared that,

"I can remember my daughter who used to cry all the time during the exams and I used to sit next to her and cry...she used to be very stressed during exams... and could not eat anything even breakfast." — Mother 2, SSA

According to Mother 8 from the SSA,

"My children prefer not to eat breakfast during exams to stay alert and avoid being dizzy."
— Mother 8, SSA

5.3.2.5. Availability of food and preferences

Students and parents both perceived the foods being offered as a significant barrier to eat breakfast. The availability of ready breakfast affects students and their intention to skip either AHB and at school breakfast.

Mother 4 from the SSB shared that some students might,

"Wake up but when they find no one interested to contribute or help in preparing breakfast, they become depressed." — Mother 4, SSB

Mother 7 from the SSB also noted that houses these days lack dining tables with breakfast available and when students find no food on the table, they skip breakfast. Mother 9 also shared that,

"Students may not have many food options. Some love specific food and when not available, they tend to skip breakfast." — Mother 9, SSB

Parent 5 from the SSC also noted that,

"... another problem is that everyone needs their food and like specific things. So, you end up with putting everything on the table to meet everyone's need or they will not eat breakfast." — Mother 5, SSC

Most breakfast meals include milk, bread, cheese, juice, or eggs. The choice of these food types might, however, influence students to skip breakfast as noted during the focus group discussions. Mother 3 from the SSB shared that her girl might skip breakfast because,

"It does not have specific importance to her... having cheese, bread, or milk in the morning instead of Sandwiches might prompt her to skip her breakfast." —Mother 3, SSB

Mother 9 from the SSC added that some students might skip breakfast because,

"They become used to it and feel bored about it and want new things...they asked for pancakes one day...and if I did it, I would be sure they would eat it but I do not have time in the morning." — Mother 9, SSC

Parent 1 from the SSA noted that access to healthy food is quite expensive. Overpricing contributed to eating junk foods and,

"...some schools are now reducing their food prices in the cafeterias to motivate healthy eating." — Mother 1, SSA

These responses indicate that the lack of readily available breakfast and lack of preferred food influences students to skip breakfast.

5.3.3. Moods and emotions

Mood and emotions also affect students' willingness to take breakfast. Some of the main sub-themes related to moods and emotions included the willingness to eat, stomach aches, and desire to keep fit by losing weight. Additional aspects related to emotions included individual health habits, influence from friends, and lack of joint eateries at school.

5.3.3.1 Willingness to eat

Students skip breakfast when they are not in the mood or willing to eat anything in the morning. Mother 3 from the SSB shared that,

"The main reason for skipping breakfast is that she does not want to eat or does not have the desire." — Mother 3, SSB

Mother 7 from the SSB added that,

"I think once they wake up, they do not have the desire to eat or the willing to it." — Mother 7, SSB

Mother 8 from the SSB noted that

"... if she is hungry, she might eat it. But this depends on their desire." — Mother 8, SSB

Similar concerns about willingness to eat were shared by parents from the SSA where Mothers 2 and 9 noted that,

"I prepare some food and there is always food on the table but she does not accept it or has the willingness to eat, you know they are kids...but as a mom, I prepare it for them and I always prepare a healthy meal for her." — Mother 2, SSA

"I feel that they are not interested in anything even the lunch...so I know from her attitudes if she ate breakfast or not." —Mother 9, SSA

Mothers 4 and 7 from the SSC also noted that students' appetite and willingness to eat contributes to skipping breakfast. Mother 4 shared that some of the reasons for skipping breakfast were that they do not have the desire to eat in the morning and may eat after the third lesson.

Mother 7 also shared that her daughter skips breakfast because her daughter lacks the desire to eat in the early morning, so she eats anything like biscuit and tea later in the day.

Similar observations were made by mother 8 who shared that

"At times my girl might wake up and lack the desire to eat or the willingness to eat available food." Mother 8, SSA

5.3.3.2 Stomach ache

Mothers also shared that issues with a stomach ache to contribute to students skipping breakfast.

Mother 2 from the SSB shared that,

"I think for this age they are all the same and do not want to eat breakfast even if you were very keen...most of them complain about stomach-ache." — Mother 2, SSB

Mother 9 from the SSB added that her a girl experiences stomach-ache whenever she drinks milk and she became afraid of having breakfast. Mothers 2 and 7 from the SSA pointed out that,

"I noticed that honey was the perfect replacement for sugar in milk because my child used to complain of stomach upset. Sometimes they have medical problems that we do not know, and we do not believe them when they complain about the food." — Mother 2, SSA

I have the same as well and my girl always tells me that my stomach hurts...and so many reasons." — Mother 7, SSA

Mothers 6 and 10 from the SSC also agreed that stomach complaints inform students to skip breakfast. Mother 6 shared that it is always a problem and I have a daughter who whomever I tell her to drink milk in the morning she says that her stomach hurt. Mother 10 narrated similar fears where her daughter often says that her stomach hurt once they drink milk in the morning.

"My daughter tells me that she does not want to drink milk because it makes her stomach ache." — Mother 10, SSC

These observations allude that stomach problem are a possible factor that influences Saudi students to skip breakfast.

5.3.3.3 Desire to Lose Weight

Individual desire to cut weight and appear healthy was also a factor that informed students to skip breakfast. Mother 8 from the SSB shared that most of them try to lose some weight as well... and this makes them skip breakfast. Mother 6 from the SSA also shared that, *"... they skip breakfast because they want to lose weight or stay fit like their friends."* — Mother 6, SSA

Mother 9 from the SSA elaborated that

"It might be that she considers her current weight makes her look fat and feel guilty if she eats anything...thus, stop eating breakfast." — Mother 9, SSA

Mothers 2 and 5 from the SSC also noted that students aspire to keep fit and this might inform their choice to forego breakfast. Mother 2 shared that

"My daughter said that she wanted to be like her friends and that she was afraid to gain more weights." — Mother 2, SSC

Also, Mother 5 added that although the sample of children who participated in the focus group sessions was not obese, some hoped to stay fit and not add weight thereby their choice not to take breakfast. Results from these findings added to the additional insights from other parents that the desire to lose weight or stay safe informs students to skip breakfast.

5.3.3.4. Healthy habits

Individual and family habits towards health issues also inform the breakfast trend. Being conscious about health outcomes contributed to food choice. Mothers 6 and 10 from the SSC shared that learners bring *"a fresh pie to the cafeteria and eat them once they arrive at school with juice. But if they lack health meal, they might not take breakfast."*

Mother 4 from SSA added that daily habits influence students when taking breakfast. For instance, some students *"accept corn flakes with milk every day without any problems, but if I change to something else like egg and do it every day, they will not accept it at all."*

Mother 6 from the SSA noted that some students *"prefer specific meals for breakfast and others want a big range of choices. You need to embrace a specific healthy habit that students like or they will not eat breakfast."* Therefore, individual healthy habits and food choice determines whether students will take breakfast. Failure to meet daily health habits increases the chances of students skipping their breakfast.

5.3.3.6 Lack of joint eateries at school

Parents also shared that students do not have common facilities at school to encourage eating. Mother 3 from the SSB shared that lack of breakfast hall demotivates students from taking breakfast. Mother 3 noted that,

"If there is a breakfast hall, it could help in encouraging them to take meals." — Mother 3, SSB

Mother 9 from the SSA noted that,

"Introducing eating clubs in school might increase individual students' interest in taking breakfast." — Mother 9, SSA

Mother 2 from the SSC also supported these remarks in that,

"Introducing eating clubs and creating awareness about the need for breakfast can make them start eating it... sometimes they also listen from others like their best friends who can affect them hugely to start eating." — Mother 2, SSC

Mother 4 from the SSC shared that having common eating areas within the school can encourage students to eat their breakfast. Mother 6 also added the need to resolve the problem of queuing for meals at the school by introducing eating areas that can help address the problem of skipping breakfast. According to Mother 8 from the SSA, student behaviour can be changed through a common approach towards awareness creation and setting aside joint eat-outs in the school.

The findings from these responses support the claim that lack of joint eateries at school may contribute to skipping of breakfast by students. Despite the responses from the mothers, students also shared important insights on some of the factors that influence them to skip breakfast as further discussed in the next section.

Chapter 6: Discussion

The objectives of the present study were to examine the prevalence of AHB skipping and breakfast skipping of adolescents' females' students, and to explore the factors of skipping breakfast among adolescents' females' students aged 16-18 years old in Tabuk city. In this chapter the study sample characteristics are discussed, results of the univariate and bivariate analysis are summarized and discussed in relation to prior studies. The limitations of the study were addressed, and implications and recommendations for future studies and practice were presented.

6.1 Prevalence of skipping breakfast

For adolescents' females' students aged 16-18 years old in Tabuk city, the data showed that the percent of the participants who did not eat breakfast at all, either at home or school, on four or more days of the week was 31.8%. While the percent of the participants who skipped AHB on four or more days of the week was 48.8%. Similarly, in Qatar the percent of the breakfast skipper among 1225 adolescents (625 boys and 600 girls) aged 15 to 18 years was 52.5% (Daradkeh, et al. (2016). In the Netherlands, the percent of adolescents in secondary school skipping breakfast before going to school was 13% (Brugman, 1998). Cheng et al. established a prevalence of 30.5% skippers (Cheng, Tse, Yu, and Griffiths; 2008). In the United States and Europe, the prevalence of breakfast skipping among children and adolescents ranges from 10 to 30% (Rampersaud, Pereira, Girard, Adams, and Metz; 2005). In India, the prevalence of breakfast skipping was 51% in a nursing students sample (Benny, Varghese, Baby, Roy, Brigit, and D'Silva; 2019). In Greece, the prevalence of breakfast skipping was 29.4% in adolescents attending high school (Gikas, Ôriantafillidis, and Perdikaki; 2003).

Research studies and reviews indicate that breakfast skipping is highly prevalent among adolescents in the United States and Europe (Rampersaud *et al.*, 2005) as well as in many Arab countries (Abalkhail and Shawky, 2002; Bin Zaal *et al.*, 2009; Mikki *et al.*, 2010). Though breakfast is considered to be the first and most important meal of the day, very few research studies in SA have focused on this potentially protective behavioural determinant. Skipping breakfast is considered as an unhealthy dietary habit and was reported to be 49% among Saudi adolescents from Abha (Farghaly *et al.*, 2007), about 15% among Saudi secondary school students from Jeddah (Abalkhail and Shawky, 2002), and about 10% among adolescent males and nearly 19% among females in the United Arab Emirates (Bin Zaal *et al.*, 2009). Indeed, the prevalence of skipping breakfast among children and adolescents in SA is high. Food habits and lifestyle in SA have been the focus of a number of studies (Musaiger and Zagzoog, 2013). A recent study in SA reported a predominance of unhealthy behaviours (Al Qauhiz, 2010). Farghaly *et al.*, 2007 reported that breakfast is often skipped by 28% of students in various grades and always skipped by 17% of secondary school female students. Similarly, Alrayes *et al.* 2018 demonstrated that only 39% of female students have their breakfast daily in a secondary female School in Riyadh, SA.

These differences among countries might be explained partially by the criteria that was used for classifying breakfast skipping. Accordingly, attention is required when comparing breakfast skipping with other studies and when assessing the association with different health outcomes (Dialektakou and Vranas; 2008). A major limitation of the literature on breakfast skipping and its correlates, causes, and consequences lies in the absence of a commonly agreed upon definition of breakfast skipping. The literature shows different definitions of breakfast skipping based within four varying timeframes of seven days/one week, three days, one day/24 hours, and “usual” breakfast eating habits (Holtzman, 2010). Within the seven-day category, three distinct definitions were used, ranging from skipping breakfast one time or more in the past seven days (e.g., Dubois, Girard, Potvin Kent,

Farmer, & Tatone-Tokuda, 2009), and missed breakfast at least 4x/week (Pastore et al., 1996), to skipping breakfast at least six out of the past seven days (e.g., Timlin, Pereira, Story, & Neumark-Sztainer, 2008). As can be seen from these two different definitions, there is clearly great variability across studies in what constitutes breakfast skipping.

6.2 Relationship between prevalence of skipping Breakfast and demographic variables

6.2.1 Residential status

Residential status as one of the demographic variables was associated with the prevalence of skipping breakfast. The current study, residential status was significantly associated with breakfast skipping. Jain, et al in (2019) also found higher prevalence of skipping breakfast among subjects living with a nuclear family and those staying away from the family (Jain et al; 2019). In Kuala Lumpur, a study was conducted on undergraduate students found that the frequency of skipping breakfast was about 29%, and the lowest percentage of breakfast meal skipping was among the group remaining in their own home (Isa & Masuri, 2011). With the purpose of facilitating access to breakfast particularly for students living away from their families, collective nutrition systems that offer breakfast services in the university and dormitories should continue and be developed. For students staying at the student house, breakfast service should be offered in school cafeterias and soups should be sold in canteens, particularly in winter (Román, 2021).

6.2.2 Age

Age as one of the demographic variables was associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. This result was similar to that found in a cross-sectional study by Gikas and colleagues (2003). They found that skipping breakfast increases with age (Gikas, Ôriantafillidis, and Perdikaki; 2003). Similarly, a recent study also revealed that the prevalence of skipping breakfast was significantly associated with age among nursing students in selected college aged (Benny, et al. 2019). Specifically,

breakfast skipping was more likely in those aged 15–20 years compared to those aged 21–30 years (Danquah et al., 2010). Consistent with previous studies, that the prevalence of not eating breakfast seems to be greater among older adolescents (Vereecken et al., 2009). This decrease could be related to an increased autonomy in food choices, and to a greater concern for body image, as observed in some past studies (Fletcher, Bonell, & Sorhaindo, 2011).

6.2.3 SES

The SES was not associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. These results do not match the results of the previous studies like Ali et al., (2018) who found that breakfast skipping in the industrialized countries is associated with low family socioeconomic status. Interestingly, in Finland, a study aimed to investigate which sociodemographic factors and behaviours that are associated with breakfast skipping in adolescents found that breakfast skipping was associated with low family SES in adolescent boys, but not in girls (Keski-Rahkonen, Kaprio, Rissanen, Virkkunen, & Rose; 2003). In Iran, a study aimed to assess the socioeconomic inequality in meal skipping patterns among children and adolescents. The findings revealed that low SES level was one of the main predictors of meal skipping patterns in children and adolescents (Qorbani et al., 2021). The inconsistency between the current study findings and prior studies regarding the association between SES and the prevalence of skipping breakfast may be attributed to the income ranges that have been used and discussed among studies and to the cultural influences that affect the application of findings of the studies. To determine the real influence of the SES for breakfast skipping in adolescents, further comparative studies in different countries are needed. Also, for improving the health status of adolescents and skipping reducing meals, changes should also be considered for families, and children from

low socio- economic groups can be considered an important target for interventions to improve dietary behaviour.

6.2.4 Mothers' Educational Level

The mothers' educational level variable was not associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. These results were consistent with a study which was conducted in Iran (Shafiee, et al. 2013). On the other hand, a significant relationship was observed between nutritional status with the mother's educational level among Saudi female adolescents in Arar city (Fatima et al., 2019). In Iran, a recent study found that maternal illiteracy was associated with skipping breakfast, lunch, and dinner (Qorbani et al., 2021). The children of mothers with low educational level have less healthy eating habits than children of mothers with a high educational level (van Ansem, Schrijvers, Rodenburg, & van de Mheen, 2014). Therefore, targeting parental nutritional knowledge (especially among those with a low educational level) may be an effective way to improve the home food environment

6.2.5 Mother's Work Status

In the present study, the mother's work status was not found as a variable associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. On the other hand, a significant relationship was observed between nutritional status with the mother's work status among Saudi female adolescents in Arar city (Fatima et al., 2019). In Iran, a recent study found that maternal unemployment was associated with skipping breakfast, lunch, and dinner (Qorbani et al., 2021). While, children whose mothers work are more likely to participate in school lunch. But, these children are less likely to participate in school breakfast, and more likely to eat breakfast at home with family than are children of nonworking women (Datar & Nicosia, 2012)

6.2.6 Father's Educational Level

With regard to father's education, the father's educational level variable was not associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. These results were inconsistent with a study which found that the prevalence was statistically significantly higher among those with fathers of low educational level compared with those with fathers of a higher educational level among Greek high school adolescents (Gikas, Ôriantafillidis &Perdikaki, 2003).

6.2.7 Body Mass Index (BMI)

This study showed that the BMI was not associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. While finding of some previous studies emphasized the association between skipping breakfast and being overweight or obese (Horikawa et al. 2011; Thompson-McCormick et al., 2010; Marlatt et al., 2016; and Sachithanathan et al., 2012). Breakfast skipping was found to be associated with increased risk of obesity in children and adolescents (Siega-Riz, Popkin, and Carson, 1998). This association can be attributed to mechanisms that are related to the regulation of appetite and diet quality. Omitting breakfast can lead to lower postprandial energy expenditure and contribute to changes in metabolism of carbohydrates and lipids, which can predispose adolescents to obesity and type 2 diabetes (Pereira et al., 2011). In university adolescent girls, skipping breakfast has a significant effect on increasing the BMI. It increases the BMI which leads to overweight and obesity and makes the individual prone to certain obesity-related health problems (Fatima, Noor, & Shafique, 2020). The inconsistency in the findings among studies may be associated with the difference on how to assess skipping breakfast among studies populations.

On the other hand, breakfast skipping was reported to be associated with increase of BMI (Sakurai et al., 2017), weight gain and a higher prevalence of obesity (Song et al., 2005). As a possible explanation, children who regularly have breakfast have been shown to be

more likely to have a better diet quality and a higher intake of key food groups, such as fruit, dairy, and dietary fibers and, furthermore, they are also more likely to meet the recommendations for micronutrients (Utter et al., 2007). Children who skip breakfast, instead, tend to eat more energy-dense food such as fast food leading to excess hunger and overeating (Vereecken et al., 2009). Furthermore, some studies suggest that breakfast skipping is affected by collinearity with confounding factors such as sleep duration and quality, circadian rhythms with more eating in the evening, length of night fasting, and lower physical activity levels (Szajewska & Ruszczyński, 2010). studies would be helpful to standardize the definition and assessment method for breakfast skipping in order to establish the best practice for using it as a tool for assessing obesity risk.

6.3 Adolescents' lifestyle variables related to breakfast skipping

6.3.1 Sharing meals with family

The habit of sharing meals with one's family is a lifestyle factor that is associated with the consumption of breakfast. In the present study, about 68.4% of female adolescents shared meals with all or one of the family members, 25.3% with no one and 6.2% with friends. Among Brazilian adolescents, breakfast skipping was associated with not consuming breakfast with parents (Fiuza et al., 2017). On the other hand, gathering the family to share a meal has become more difficult because of extensive adolescent routines and parents' work schedules (Hamrani et al., 2017). Psychosocial resources (nutrition knowledge, cooking skills, and positive attitudes towards healthy eating) (McKinnon, Giskes, & Turrell, 2014), are known to contribute to healthier dietary behaviour, such as daily breakfast. In this line, eating behaviours are modelled by the family environment that includes not only food availability but also parents' eating behaviours (Ranjit et al., 2015). Besides the family context, socio-cultural environments and peers influence teenagers' lifestyles, play a role in food consumption. Some authors point out that is relevant to focus on modelling healthy

eating behaviours among groups of teenage friends to promote healthy lifestyles among young people (Sawka, McCormack, Nettel-Aguirre, & Swanson, 2015).

6.3.2 Sleeping pattern and time management

In the present study about 48.7% of the adolescents stated that they did not have time for breakfast as they oversleep usually, and 36.9% of them do not have energy to prepare it. Past studies indicated that the lack of time was constantly reported as a significant correlate of meal skipping (Pendergast et al., 2016), and no time was the most reason for meal skipping among college students (Lee, & Yoon, 2014). Also, breakfast skipping was more likely in those experiencing fatigue (Tanaka et al., 2008). On the other hand, breakfast consumption improved appetite, satiety, and diet quality and may support some aspects of sleep health in healthy young adults (Gwin, & Leidy, 2018). Skipping breakfast due to sleeping late or lack of time may also reflect other overlapping risk factors that, in theory, contribute to a more chaotic or disorganized life, and this may also influence study and academic performance (Patte, & Leatherdale, 2017). Addressing social inequalities and providing tools to organize and schedule time for breakfast could produce not only nutritional but also cognitive benefits (Lazzeri et al., 2016).

6.3.3 Willingness to eat

In term of willingness to eat, about 62.8% of the adolescents stated that they do not feel hungry. This finding was in agreement with a cross-sectional study which found that lack of hunger was associated with meal skipping (Danquah et al., 2010). Similar, it was found that Hunger was one of the most important influences on the European adolescents' food choices at breakfast (Hallström et al., 2011).

6.3.4 Weight management

About 26.6% reported that they try to lose some of their weight. According to a previous study, the weight control was one of the strongest perceived correlates of meal skipping

(Danquah et al., 2010). For example, Nigerian adolescent skipping meals to control weight (Ukegbu, Uwaegbute, & Usonka, 2015). Although, many past observational studies suggested that regular breakfast consumption is associated with low BMI and is a protective factor against weight gain, a recent systematic review of randomised controlled trials examining weight change in adults consuming or skipping breakfast found no evidence to support that breakfast consumption promotes weight loss or that skipping breakfast leads to weight gain (Sievert et al., 2019). Future high quality randomised controlled trials are needed to confirm if those individuals seeking to lose weight should skip or consume breakfast and the role of breakfast eating in an overall weight management approach (Sievert et al., 2019).

Existing research suggests that meal skipping is associated with a poorer nutrient intake and with obesity status (Sherwood, Story, & Neumark-Sztainer, 2001). Meal skipping should not be recommended as a weight control strategy. Rather, careful planning of meals with nutrient-dense foods that are low in fat and calories should be encouraged.

6.3.5 Culture

In this study, among 605 adolescents, only 88 (14.5%) of them said that they, culturally, don't eat breakfast at home.. Previous study found that the cultural habits influence breakfast skipping among adolescents in the Netherlands (Raaijmakers et al., 2010). Habits influencing health are established in the family, by the attitudes and beliefs of parents, behaviours significantly affecting the health behaviours of children (Tinsley, 2003). Besides, the food preferences along with food behaviours developed at a young age may strengthen with increasing age (Mikkila et al., 2004). A past review indicated that parental food consumption patterns were persistently and positively linked with both healthy and unhealthy food choices of teenagers. (Pearson et al., 2009). Additionally, there was important indication that family background is a key parameter for influencing the food preferences of teenagers (Shepherd et al., 2006).

6.3.6 Breakfast importance

Low percent (16.5%) of the adolescents do not know why they need to eat breakfast. And, 40.2% of them believed that breakfast would not make a difference in their day. While, a cross-sectional study found that there was sufficient awareness about the effects of skipping breakfast among adolescents, although the adolescents frequently skip their breakfast because of their busy scheduled lifestyle and they skip breakfast as they do not consider it an important meal (Aarthi, Priya, Gayathri, 2018). Consequently, health care providers, including school health practitioners, are recommended to assess children's and mothers' perceived value of breakfast and to include mothers in health promotion interventions on breakfast consumption.

6.3.7 Financial status and family issues

The financial status and family issues as lifestyle variables were not strongly related to the adolescent's breakfast skipping. In this study, around 5.3% of adolescents cannot afford to eat or buy breakfast, and a few of them (2.8%) indicated that their family situation was hard now. Similar to a past study which found that financial reason was one of the reasons for skipping meals among adolescents (Ukegbu, Uwaegbute, & Usonka, 2015). While a recent study found that the risk of skipping breakfast was 30% higher in girls from the most disadvantaged socioeconomic position (SEP), in comparison to those in the most advanced SEP. Also, boys from the most disadvantaged SEP showed 28% higher risk of skipping breakfast than those in the most advanced SEP (Esquius et al., 2021). One possible explanation, persons from a disadvantaged SEP, considering educational attainment, income levels, or occupation status, may lack the material and psychosocial resources that are typical of more advantaged SEP. Future public policies should be adapted considering a SEP and gender perspective to avoid increasing nutritional and health inequalities.

6.3.8 Availability of food and preferences

About (24.1%) of the adolescents indicated that they do not like the breakfast types of food. Adolescent preferences play a role in their breakfast choices. For instance, concerns the palatability of school breakfasts and the arrangement of foods offered with adolescent's taste preferences raised by parents and students (Blondin et al., 2015). Modifying menus to more closely arrange in line with adolescent preferences in combination with reducing time barriers may further reduce breakfast skipping. Parents influence children's nutritional behaviour in a variety of ways: parents actively make food choices for the family, serve as models for dietary choices and patterns, and use feeding practices to reinforce the development of eating patterns and behaviours that they deem appropriate. Parenting practices are also influenced by the child's characteristics, including age, gender, and weight status and nutritional behaviour (Nielsen, Siega-Riz, & Popkin, 2002). Regardless of parents' rationale for controlling their child's nutritional behaviours, excessive control may have negative impacts on child food intake and weight status.

Additional novel implementation of addressing students' breakfast preferences may be necessary to further reduce barriers to students obtaining a free, healthful breakfast. Also, Continued research is needed to understand in greater depth why students make the breakfast food and drink choices they do and to identify whether alternative methods of SBP implementation, such as breakfast in the classroom, are effective in increasing breakfast consumption and improving breakfast quality among the most nutritionally vulnerable children.

6.3.9 Others' Influence

A low percent (6.1%) of the adolescents indicated that their friends do not eat breakfast as well. According to a European study, girls who peers ate healthily were more likely to be regular breakfast consumers (Hallström et al., 2011). Also, adolescents stated that they were more influenced by their parents or guardians in their choices of food for breakfast

(Hallström et al., 2011). Social context has a substantial impact on the amounts and types of food that individuals eat. There are multiple mechanisms explaining social influences on eating, and connecting these influences has great potential in promoting healthier nutrition (Robinson, Blissett, & Higgs, 2013).

6.3.10 Breakfast preparation role

The present study indicated that the high percent of the adolescent breakfast was prepared by their mother (37.4%), followed by themselves (32.1), compared with (4.2%) of the adolescent buy their ready meal, and (1.0%) by their father. According to a cross-sectional study which was carried out to define the pattern of fast food consumption and contribution to nutrient intake of undergraduates. The lack of cooking skills and inability cook was responsible for meal skipping among undergraduates (Afolabi et al., 2013). The consumption of fast food among undergraduates is progressively becoming a developing trend. It is a major source of energy, dietary fat and animal protein, but it was shown to be a poor source of micronutrients which subsequently increases the susceptibility to the already high prevalence of non-communicable diseases particularly in developing countries. Thus, there is a need to include nutrition education into students' curriculum with a view to equipping them with necessary nutritional knowledge on how to make rational and healthy fast food choices (Afolabi et al., 2013).

6.3.11 Disorders

Around (98.7%) of the adolescents stated that they did not have any disorders. However, a past study indicated that concern for health was one of the most important influences on the European adolescents' choice of food at breakfast (Hallström et al., 2011).

6.4 Friend's behaviour and breakfast skipping

The friend's behaviour as a lifestyle variable was associated with the prevalence of skipping breakfast and the prevalence of AHB skipping. Similarly, a past Australian study found that best friend variable was associated with meal-skipping behaviours. For instance, adolescent girls who perceived their best friend skipping meals were more likely to skip breakfast and dinner (Pearson, Williams, Crawford, & Ball, 2012). The influence of peers on nutritional behaviours is well recognized in the literature. Prior study has indicated that the eating attitudes and behaviours maintained by peers and friends may influence adolescents' nutritional behaviours (Littleton & Ollendick, 2003).

In Australia, a study examined maternal and best friends' influences on adolescent meal-skipping behaviours using a Web-based survey among 3001 secondary school's adolescent aged between 7 and 9 years. Best friend and maternal factors were differentially associated with meal-skipping behaviours. Boys and girls who perceived that their best friend often skipped meals were more likely to skip lunch. Boys and girls who perceived that their mother often skipped meals were more likely to skip breakfast and lunch (Pearson, Williams, Crawford, & Ball, 2012).

Teaching adolescents on how to assess and understand unhealthy nutritional behaviours that they observe from significant others may be one nutrition promotion approach to decrease breakfast skipping behaviour. Encouraging a peer subculture that promotes regular consumption of meals and educates adolescents on the detrimental impact of breakfast skipping behaviour on health may also offer a hopeful nutrition promotion approach (Pearson, Williams, Crawford, & Ball, 2012). In addition, adolescents spend more time away from home as a result of social, school, and community activities and jobs; the amount of time an adolescent "has or wants to spend on food" is among the most important factors influencing adolescent food choices (Neumark-Sztainer, 2000). Adolescent eating patterns are established through a complex process involving internal and external factors

such as food preferences and availability, body weight perception, and parental and peer influences (Trahms, 1997; Stockmyer, 2001; Story et al., 2002). Health professionals recognize that poor eating patterns may result in nutritional problems that can impair adolescent growth and development (Rees *et al.*, 2002). Furthermore, poor dietary eating habits formed in adolescence continue into adulthood and have important implications for health and well-being in adulthood (Kemmer, 1987; Nicklas et al., 1988).

6.5 Knowledge about breakfast importance and breakfast skipping

The present study emphasizes the association between knowledge about breakfast importance with the prevalence of skipping breakfast and the prevalence of AHB skipping. Almost half of the adolescents with no knowledge of breakfast importance were more likely to be breakfast skippers compared to a quarter of those with knowledge about breakfast. These results also come similar to those in the literature, a study aimed to identify nutrition knowledge-related, lifestyle and socioeconomic correlates of skipping breakfast and a meal at school in Polish teenagers. The findings indicated that lower nutrition knowledge was a predictor of skipping breakfast and/or a meal at school (Wadolowska et al., 2019). A recent study showed that there was poor knowledge about the importance of breakfast and health problems due to the skipping of breakfast (Benny, et al., 2019).

A mixed methods study in Tabuk City showed that adolescents in general had a low level of nutritional knowledge (Alamri, 2017). This is in agreement with previous studies, which demonstrated that Saudi adolescents (both male and female) in the eastern region of SA had low levels of nutritional knowledge (Al-Almaie *et al.*, 2005). A possible explanation for this is a lack of nutritional education in school, as well as the level of nutritional knowledge of their mothers, since 76% of adolescents received advice only from their mothers; and their answers were correlated with their daughters' answers. However, in the adolescents (24%) who showed higher nutritional knowledge scores, this was attributed to their regular

visits to health centres, where staff provide nutritional information to complement a mother's advice.

In contrast to this study, FGD on adolescents from the south-eastern Alabama public schools, they expressed positive opinions toward breakfast, and frequently talked about the importance of eating breakfast daily. Also, their mothers believed in the importance of their child eating breakfast. It's worth mentioning that south-eastern Alabama public schools offered a School Breakfast Program (SBP), a federally assisted meal program operating in public and non-profit private schools which is administered by the U.S. Department of Agriculture's (USDA) Food and Nutrition Service (FNS) (Sabol, 2011). Also, a qualitative FGDs about breakfast consumption were conducted with adolescents and their parents in Philadelphia, USA. Importance of breakfast was identified among the sub-themes shared with both adolescents and parents. Unlike this study, both parents and adolescents believed eating breakfast was important for learning, being able to focus, having energy, and being alert, as well as for avoiding fatigue, hunger, headaches, stomach aches, grumpiness, and illness; however, personal and social barriers stand in the way of eating breakfast at home (Bailey-Davis *et al.*, 2013).

Such findings indicate the importance of eating a good quality breakfast, rather than just having or not having breakfast (Ferrer-Cascales *et al.*, 2018). Also, this is a hint that alerts us about the necessity of launching awareness campaigns among school students to teach them the right nutrition behaviours. These campaigns are expected to have a strong impact on the overall health of the student and maybe their families as well.

6.5.1 Difference between skipping rates through the days of the week

Comparing the skipping score through the seven days of the week, it can be noticed that there was some little change in the rate during the week. The average score was close to 1 for all the days. In Polish teenagers, approx. 44% of them usually skipped both breakfast and a meal at school a few times a week, while 4.5% frequently skipped both of these meals (Wadolowska et al., 2019). Such result indicated that actually the same factors influencing school based skipping are the same as at home based skipping. Future studies have to look at differences in day-to-day breakfast skipping habit across the socio-demographical factors.

6.6 Relationship between specific breakfast beverages choices and breakfast skipping

There was no association between coffee and fizzy consumption and breakfast and AHB skipping. In contrast, tea consumption was associated with breakfast skipping. Specifically, breakfast skippers consume less tea and tea is more likely to be consumed with breakfast food. Similarly, a recent study found that green tea was significantly higher among breakfast consumers than among breakfast skippers (Matsumoto, Hatamoto, Sakamoto, Masumoto, & Ikemoto, 2020).

Whereas, in Northern Italian, the tea was much less consumed among children admitted to a summer sport school (Vanelli et al., 2005). Where, across sectional study found that breakfast skippers consumed soft drinks more frequently than breakfast eaters among Greek high school adolescents (Gikas, Ôriantafillidis, & Perdikaki, 2003). Additionally, beverage choice patterns for the American differ at breakfast, lunch, dinner, and snacks. At breakfast, the highest percentage of all beverages stated was for coffee (about 44 % of beverage reports) (LaComb, Sebastian, Enns, & Goldman, 2011).

Compared to breakfast-eaters, breakfast-skippers tend to have other unhealthy habits, such as consuming too many sugary drinks or high-calorie snacks (Institute of Food Technologists, 2012)

6.7 Qualitative phase

For the second qualitative phase, the main themes and subthemes on factors that are associated with skipping breakfast among students aged 16-18 years in SA were presented and discussed. Focus group discussions from parents revealed that students skip breakfast due to sociocultural beliefs such as breakfast meaning, breakfast significance, and parental influence. Students also skip breakfast due to school routines such as time management and sleeping pattern in addition to moods and emotions resulting from healthy habits, willingness to eat, and desire to lose weight. In contrast, focus group responses from students noted that students skip breakfast due to sociocultural beliefs such as meaning and importance of breakfast, and motivation from friends and parents. School day routing such as preparing for school, time management, and sleeping patterns were noted as important school routines associated with skipping breakfast among students. The study also noted that moods and emotions associated with weight management or dieting, food quality, food preferences, and school rules also result in skipping breakfast among Saudi Students.

It was inferred that the main sociocultural reasons for skipping breakfast among the school girls were the lack of nutritional knowledge about breakfast, preference for lunch and snacking, imitation of parents and friends' behaviour of breakfast skipping. Also, Saudi mothers attributed the skipping behaviour of their daughters to lack of nutritional knowledge about breakfast, difficulty of parental control, adolescent's autonomy, Saudi culture and the influence of social media and smart devices. FGDs indicated that factors such as lack of appetite, bad sleeping pattern and excessive night-time smartphone use contributed with breakfast skipping. Mother's employments and lack of time for preparation of breakfast also lead to skipping AHB. Moreover, the unhealthy school food and

environment in the schools also contributed to skipping breakfast meal. Mothers and students in the current FGDs inferred that stomach aches, medical conditions, and peer pressure to lose weight were also strongly associated to skipping breakfast among students. Lack of breakfast halls, joint eateries and clubs discouraged female students from taking breakfast.

We identified three main themes, which were shared with both students and their mothers, regarding potential factors influence adolescent breakfast skipping studied in the quantitative phase. However, different subthemes were emerged between students and mothers. Almost all the members of all groups were observed to be very active during the debates.

6.7.1 Sociocultural beliefs

The Sociocultural beliefs were a common theme in both the student and Mother's focus groups. This theme first sought to answer how students and parents perceive breakfast meaning and breakfast importance which were identified as common subthemes. However, a disparity in the value of breakfast was expressed for both FGD members. When the students were asked about the breakfast meaning, the researcher noted that they did not give an exact meaning about the meal. Instead of defining breakfast, they gave a negative expression by using words like "not essential", "eating later", and "don't like breakfast". Similar expressions were used when they asked about the importance of breakfast such as "not important", "prefer snacks" and "lunch is essential not breakfast". However, mothers gave a direct meaning of breakfast by defining it as "any meal or drink consumed between 5:30 am and 9:00 am" and they expressed their disappointment about how their daughters or "the current generation" had a different meaning of breakfast and considered it as "a routine", therefore, they eventually skip it. Surprisingly, mothers shared that the breakfast meal was not a culture-oriented meal and claimed that Saudi families didn't consider breakfast as a common habit. Some mothers noted that their daughters didn't find

breakfast important, although, they ate it more in non-school days. Moreover, they thought that their daughters had other food preferences other than the home-made breakfast. Saudi adolescents seemed ignorant to the importance of daily breakfast consumption, and they appear to lack an understanding of the impact that breakfast skipping can have. While, past studies indicated that students reported more positive beliefs, more benefits and fewer barrier were less likely to skip breakfast (Hearst, Shanafelt, Wang, Leduc, & Nanney, 2016). It can be realized that there is a need for more information on adolescents' perception or knowledge of the potential benefits of breakfast consumption and reducing modifiable barriers, and the future intervention research should focus on alleviating barriers and enhancing education around the school related benefits of eating breakfast

Mothers raised ideas about "awareness creation" to their daughter about breakfast meal, which can be achieved by effective school breakfast programs. The school breakfast program plays a dynamic role in supporting children's health and academic achievement. Still, too many students miss out on school breakfast and the positive outcomes that stem from participation. Just over half of low-income children who participate in school lunch also participate in school breakfast. School nurses can help increase student nutritional intake through school breakfast participation by encouraging their school(s) to implement a breakfast after the bell program and to offer nutritious breakfasts at no cost to all students, particularly in schools or school districts with high concentrations of students certified for free and reduced-price school meals (Alaimo, Olson, Frongillo & Briefel, 2001).

One's subjective norms are determined by those who are accepted by him/her regarding the confirmation or rejection of behaviour and the extent to which the person is motivated to obey them. The Saudi students of this study seemed to have independent opinion toward breakfast meal unlike their mothers. This could be attributed to lack of knowledge about breakfast and some physiological aspects like autonomy and the act of independence as adolescence is a critical period in which a growing sense of autonomy and increased socialization may dominate adolescent life (Al-Hazzaa et al., 2012).

As adolescents gain independence and take more responsibility for their own health, preventative healthcare and education become vital to ensure understanding and compliance. Since it is the time when teens want to fit in with their peers. Also, self-image is challenged during this phase of development. All of these changes cause teens to change how they interact with family and friends (Milosavljevic, 2016). According to figures, during the 30 days preceding the survey 13.5% of students went without eating for one or more days and 9.2% had taken diet pills, powders, or liquids without the advice of their physicians to lose or maintain weight (Grunbaum, Kann, Kinchen, Williams, Ross, Lowry & Kolbe, 2001).

Accordingly, healthcare professionals and parents have an additional challenge in dealing with adolescent, because of their developmental stage as well as their tendency for risky behaviour. They need to understand the adolescent's special circumstances when working with an adolescent (Milosavljevic, 2016).

6.7.2 Influence from parents and friends

Students used phrases like "Mom does not prepare breakfast", " we do not sit as a family", and " no motivation when taking it alone" and phrases like "My friends are discouraging", "My friends do not eat breakfast", "chatting with friends rather than eating" and "We all affect each other's" which confirms the great influence of the family and friends.

Socialisation of health-related behaviours occurs within the family, with parents' beliefs, attitudes and behaviours substantially affecting children's health behaviours (Tinsley, 2003). Moreover, there is convincing evidence that the family environment is important in influencing the dietary behaviours of young people (Crockett and Sims, 1995; Patrick and Nicklas, 2005; Shepherd *et al.*, 2006; Story *et al.*, 2002). Recent reviews have found parental nutritional behaviours to be consistently positively associated with both unhealthy (van der Horst *et al.*, 2007) and healthy (Pearson *et al.*, 2009) dietary behaviours of children and adolescents. Adolescents' nutritional behaviours are known to be strongly

influenced by their social environments, which include family, friends and peer networks (Story *et al.*, 2002; Patrick and Nicklas, 2005). The family is a critical context for the development of nutritional behaviours, and parents play a key role in the establishment and maintenance of their child's nutritional behaviours (Story *et al.*, 2002; Tinsley, 2003).

i. Mothers control and breakfast

Mothers expressed that they don't have a strict control over their daughters by using phrases like "I cannot convince them". They justified their lack of control over their daughters with the presence of social media and smart devices. Indeed, adolescents perceived that parents do not play their role properly, while parents blamed their daughters and other factors such as culture and smartphones pressure. Moreover, previous research has suggested that because of low perceived control, parents absolve themselves of personal responsibility for the behaviours of their children (Hart *et al.*, 2003). For example, even parents appeared knowledgeable about nutrition and accessed information about healthy eating across a range of resources, they rarely accessed data about child body image. They desired more practical data about how to avoid encouraging negative body image when promoting healthy eating (Hart, Damiano, Cornell, & Paxton, 2015). Future interventions need to stress the important role positive body image plays in encouraging healthy attitudes to food and weight management, and the benefits positive body image can have on the health and mental health of preschool children (Hart, Damiano, Cornell, & Paxton, 2015).

A study by Al-Hazzaa *et al.*, 2020b concluded that mothers appeared to prepare breakfast most of the time, followed by domestic helpers. However, having domestic helpers prepare breakfast for the child appeared to associate with higher daily breakfast intake. A previous study conducted on Saudi children reported similar findings; mothers generally prepared breakfast at home, followed by domestic helpers. However, having breakfast prepared by a

domestic helper was associated with non-daily breakfast consumption in that study (Al-Hazzaa et al., 2020a).

Similar to this study, Abdelghaffar *et al.* 2020 established a sequential explanatory mixed methods design to study the Social-ecological influences on unhealthy dietary behaviours among Moroccan adolescents. They mainly found skipping breakfast in adolescents was influenced by several individual factors such as sex (females), lack of time (because of waking up late), lack of hungry and appetite in the morning, and environmental factors such as insufficient parental support (e.g. not preparing breakfast or not having breakfast together) and lack of availability of varied foods. Given the importance of breakfast consumption for adolescent health, interventions aimed at improving this dietary behaviour are needed.

Adolescents and young adults are usually open to new ideas; they show curiosity and interest. Many habits acquired during this time will last a lifetime. Furthermore, with increasing age, youth's personal choices and preferences gain priority over eating habits acquired in the family, and they have progressively more control over what they eat (Omidvar and Begum, 2014). The adolescents enjoyed autonomy to a significant extent despite not being the only actor involved in decision-making around household food purchase and food allocation. Such autonomy has been linked to unhealthy eating (Stok *et al.*, 2010). Also, it has been found that the dietary habits of adolescents are formed by the availability of foods at home and the dietary behaviour of parents (Arcan *et al.*, 2007). As children enter adolescence, the frequency of eating dinner with their families' decreases (Gillman *et al.*, 2000). Skipped meals and fewer family meals result in lower intakes of nutrients and food groups (fruits, vegetables, and dairy) (Siega-Riz *et al.*, 1998; Gillman *et al.*, 2000; Neumark-Sztainer *et al.*, 1996; Neumark-Sztainer *et al.*, 1997). In focus groups, adolescents associate eating healthful foods with eating family meals (Neumark-Sztainer *et al.*, 2002; Kelsey *et al.*, 1998) and identify parents as important influences on their consumption patterns (Neumark-Sztainer *et al.*, 1999). A school-based study that utilized

all high schools in the United States concluded that adolescent autonomy was a significant risk for skipping breakfast hence adolescents who made their own decisions of what they ate were 25% more likely to skip breakfast (Videon and Manning, 2003).

An Australian study inferred that the association between mother and adolescent meal-skipping behaviours may be reflective of certain lifestyle patterns whereby mothers who regularly skip meals may have chaotic family schedules where time and availability prevent meals from always being top priority for the family (Pearson *et al.*, 2012). A qualitative work in Minnesota indicates parental rules for eating breakfast are effective. FGDs with the adolescents about being made to eat breakfast by their parents indicated that these rules led to more healthful eating patterns. However, they suggested that a balance was needed, since too many rules could backfire (Neumark-Sztainer *et al.*, 2000). These findings suggest that providing some guidelines for adolescents in lieu of full adolescent autonomy may result in better consumption patterns. Also, encouraging parents of adolescents to emphasize the importance of breakfast and provide guidelines for their children represents a promising intervention for improving adolescent nutrition.

The home environment is where youth learn about food intake and healthful living (Abramovitz and Birch, 2000) and parental presence is vital in constructing that environment (Hodges, 2003). In our study, girls blamed their mothers for not eating breakfast meal at home saying that "*Mom does not prepare breakfast and this discourages us from taking it*". In a Jordanian study, mothers usually prepared breakfast for the majority of the adolescents. The likelihood of skipping breakfast was twice that among adolescents whose mothers skipped breakfast than those whose mothers did not skip breakfast (Ali *et al.*, 2019). The current literature highlights the important role mothers play in influencing their children's eating habits, either positively by providing healthy food and encouraging healthy eating habits or negatively by skipping meals, thereby setting a bad example (Draxten *et al.*, 2014; Giovannini *et al.*, 2008; Hebestreit *et al.*, 2017; Pearson, Williams, Crawford, and Ball, 2012; Winkler *et al.*, 2017). Our findings are consistent with earlier

research that confirms this maternal influence over adolescent eating habits (Loth, MacLehose, Larson, Berge, and Neumark-Sztainer, 2016; Schnettler *et al.*, 2017).

A cross-sectional study on Lebanese adolescents inferred the frequency of parents preparing breakfast was strongly associated to breakfast skipping (El-Chami *et al.*, 2017). Thus, parents could play an important role in adolescents' dietary behaviour. Parental breakfast eating and living in two parent families were found to be positively associated with adolescent breakfast consumption (pearson *et al.*, 2009). The results suggest that parents should be encouraged to be positive role models to their children by targeting their own dietary behaviours. Other than parental and peers influence, culture has been identified as a possible reason for skipping breakfast. As the cultural habits in the Gulf countries are nearly identical, skipping breakfast is a known practice by some individuals in this area of the world due to late waking, not being accustomed to having breakfast, not being hungry in the morning or disliking the food served (Musaiger and Gregory, 1992; Musaiger, 1994). Saudi culture and socioeconomic profile are characterised by the sedentary lifestyle and high economic level allowing pocket money to facilitate and encourage unhealthy food choice and lifestyle (Aljaaly *et al.*, 2012).

ii. Friend's influences

Here, girls shared the same thoughts about being influenced by their friend's attitudes toward breakfast. Most of them said that *"My friends are discouraging me to eat breakfast"*, *"My friends do not eat breakfast and I do not as well"* and *"We all affect each other's"*.

Adolescents spend a substantial amount of time with friends, and some research has shown that adolescents reported that the attitudes, encouragement and behaviours of friends and peers influence their food choice and nutritional behaviours (O'Dea, 2003; Contento *et al.*, 2006; Eisenberg *et al.*, 2005; Farrow *et al.*, 2011). West and others have argued that as teens spend less time in the home during adolescence, the influence of peers and school environment outweighs the impact of the family (West, 1997; West and Sweeting, 2004).

Adolescent Australian girls who perceived their best friend to skip meals were also more likely to skip breakfast and dinner.

This is perhaps unsurprising given research has demonstrated adolescent friendship groups often share similar beliefs and behaviours surrounding food (O'Dea, 2003; Contento *et al.*, 2006; Eisenberg and Neumark-Sztainer, 2010; Eapen *et al.*, 2006).

Rosenrauch *et al.*, 2017 reported that Friends eating healthy foods together may serve to reduce breakfast skipping during early adolescence, possibly due to the influence of directly observable behaviour and shared beliefs held by those in the same friendship group. Verbal encouragement or discouragement from friends may be less impactful an influence on meal skipping (than directly observable behaviours) in Australian adolescents.

6.7.3 School day routine

The school day routine was a common theme in both the student and mothers focus groups. As presented, multiple subthemes related to school day routine were emerged. Students and mothers almost shared common subthemes, except for the work routine for the employed mothers. For students, unsurprisingly and in line with literature, late-sleeping pattern was negatively associated with willingness to eat breakfast. In support to mothers' perspectives in the previous theme, students shared that they spent a lot of time on the smartphone and they end up sleeping late and waking up late with no appetite to eat breakfast. Consequently, the three subthemes of "Sleeping pattern", "Time management" and "Readiness to go to school" seemed to be closely related. Students shared almost same expressions and words such as "I sleep late", "no appetite to eat", "no desire to eat", "no time to eat", and "I wake up late". As for mothers, they ensured that sleeping patterns and time management, for both students and mothers, especially employed mothers, largely contributed to student breakfast skipping. Lack of time, sleeping late and not being hungry were reported as reasons for adolescent's breakfast skipping in Jeddah, SA (Washi and Ageib, 2010). Also, Alrayes *et al.*, 2018 inferred that possible reasons of skipping breakfast

were either lack of time to eat breakfast or not feeling hungry for Saudi female adolescent school in Riyadh, SA.

However, these studies did not identify the reasons behind the skipping of breakfast meal, which is presumably because they did not have a qualitative component. A mixed method study such as the current one would have provided more practical insights into the behaviour of the subjects. During the FGDs of the current study, participants stated that one of the common reasons for skipping breakfast was the early morning school. Time was considered a barrier to adopting healthful eating practices for different reasons. The adolescents discussed the fact that because classes start very early, they have to leave for school very early and cannot spend any time on breakfast. When they do eat breakfast, they eat something quick. To arrive at school on time at 7 am, several participants reported having to leave home as early as 6 am to catch the school bus, which left them with little time for breakfast. Also, Mothers shared the same concerns about lack of time to prepare breakfast due to waiting of driver or school bus. The same reasons for skipping breakfast were given by Costa Rican adolescents during FGD (Monge-Rojas *et al.* 2005). Terry-McElrath *et al.* (2009) reported that the earlier the school started, the less likely the breakfast.

This could be attributed to altered circadian rhythms in adolescents where early school start time was associated with sleep deprivation and daytime sleepiness. Psychosocial influences and changes in bioregulatory systems controlling sleep may limit teenagers' capacities to make adequate adjustments to an early school schedule (Carskadon *et al.*, 1998). Because of the change in circadian rhythm, adolescents go to bed later and want to get up later, which means that they shift more toward the evening chronotype (Carskadon *et al.*, 2004; Roenneberg *et al.*, 2004). This may affect breakfast consumption, because adolescents who go to bed later and want to get up later may not have enough time or be hungry enough to eat breakfast (Alexy *et al.*, 2010; Keski-Rahkonen *et al.*, 2004).

Our quantitative and qualitative findings seem reasonable; we found that the most common reasons given by the girls for breakfast skipping were not feeling hungry (62.8%) that has a large endogenous circadian rhythm (Scheer, Morris, & Shea, 2013), and lack of time (48.7%). Also, FGDs with both students and mothers indicated lack of appetite, bad sleeping pattern and excessive night-time smartphone use. The overuse of smartphones would dictate that the student is up late, and thus may get up too late for breakfast. Thus, the sleep quality due to smartphone use might have been associated with skipping breakfast. The National Sleep Foundation (NSF) for the adolescent aged 18-25 years old, has recommended an average of eight hours a day of sleep and nine hours for 14-17 years old (NSF 2015). The use of electronic media at night has been shown to delay sleep onset and stimulate systems promoting wakefulness, resulting in poor quality sleep (Touitou *et al.*, 2016). Poor quality sleep is associated with an increased risk of poor appetite (Mhurchu *et al.*, 2010). Previous studies have shown that increased screen time has an adverse effect on lifestyle in adolescents and can result in irregular dietary habits.²⁹ Several studies have suggested that sleep problems related to night-time internet overuse are associated with the habit of skipping breakfast among young people (Tsai *et al.*, 2009; Kojima *et al.*, 2019). With technology advancement, the smartphone has become a common device to access the internet. However, a few studies have specifically examined the relationship between breakfast consumption and smartphone use among adolescents. A Korean study performed on high school adolescents also indicated that unhealthy lifestyle including smartphone overuse negatively affects breakfast eating in adolescents and also low parental monitoring of smartphone use was significantly associated with skipping breakfast (Lee *et al.*, 2020).

The prevalence of sedentary behaviours (>2 hours/day of screen time) found among Saudi adolescents (88%) was remarkably high (Al-Hazzaa *et al.*, 2013). In Jeddah, screen time had significantly affected Saudi adolescent girls' sleep hours and girls who had longer TV time were more likely to have fewer sleeping hours, compared to those who were watched

screen for shorter time (Aljaaly, 2012). Such prevalence is much higher than what was reported for Greek-Cypriot adolescents (52.4%) (Loucaides *et al.*, 2011), Finnish boys (48%) and girls (44%) (Tammelin *et al.*, 2007), American youth (65% to 71%) (Fulton *et al.*, 2009) and Canadian boys (34%) and girls (41%) (Mark *et al.*, 2006). Saudi females spent more time on computer games and internet use than males, this was partially explained by the fact that females, due to cultural and social reasons, have generally fewer opportunities compared with males to engage in leisure-time physical activity, both inside and outside the school. Thus, they may have more time that can be spent on surfing the internet and connecting with their friends (Washi and Ageib, 2010).

Several studies have suggested that sleep problems related to night-time internet overuse are associated with the habit of skipping breakfast among young people (Tsai *et al.*, 2009; Kojima *et al.*, 2019). A qualitative FGDs about breakfast consumption were conducted with adolescents and their parents in Philadelphia, USA. This study identified oversleeping as a common barrier to eating AHB and prompted consumption of breakfast (Bailey-Davis *et al.*, 2013).

Abdelghaffar *et al.* 2020 reported that "lack of time" is the first subtheme which was considered as real barrier to healthy eating in Moroccan adolescents. Thus, good time management seemed to positively affect adolescent eating habits especially breakfast consumption. A mixed method study on Omani female adolescents also found that digital screen time and sleeping less was correlated with breakfast skipping (Al-Mahrouqi, 2019).

During the FGD in the current study, the mothers came up with a suggestion of allowing students a short time at the beginning of the first period to eat breakfast. In SA, some primary schools allowed children to bring dates and milk and gave them 5 minutes to eat their healthy snacks before first lesson. Similarly, some of the primary schools in Ibri, Oman were already allowing small children to bring from home a few dates as a morning snack (Al-Mahrouqi, 2019). This facility needs to be extended to older students as well in Saudi and Arabian schools, who need to be encouraged to bring from home healthy snacks.

The Kingdom of SA, similar to the other Arabian Gulf Countries has been witnessing a rapid economic growth during the past four decades and major changes, including changes to the education system accompanied the growth of the oil industry, such as expanded job opportunities that enabled more women to work. Employment opportunities for women are no longer restricted to teaching, medicine or jobs in girls' schools and women's sections of universities, and in recent times their employment has expanded to social work, banks that cater to female clients, television and radio programming, and computer and library work. Additionally, sections of markets are set aside for women sellers, and many women can run their private business and organize their own investments (Aljaaly, 2012). However, SA is a salient example of a country with a low rate of female labour force participation (Bursztyn *et al.*, 2020). Less than 15% of the Saudi female population aged 15 and above were employed in 2017 (a labour force participation rate of around 18%). The share of women working outside the home, an action that others can easily observe, is substantially lower (Statistics, 2018). Regarding FGDs with mothers, employed mothers raised concerns about their limited time and responsibilities, which, consequently, leading to lack of proper care and attention to the preparation of breakfast meal. Busy work schedules of parents and lack of time prompted adolescents to eat outside the home. In addition, parental work schedules contributed to decreased supervision of adolescents' dietary habits, thereby allowing adolescents to eat unhealthy foods. Students, with mothers who work, skip meals less than those with mother who do not work (Ali *et al.*, 2019). In this study, the mother's employment has an impact on breakfast skipping. Similarly, a cross-sectional study indicated that children whose mothers work are more likely to participate in school lunch. But, these children are less likely to participate in school breakfast, and more likely to eat breakfast at home with family than are children of nonworking women (Datar & Nicosia, 2012).

Although Siega-Riz *et al.*, 1998 reported that maternal employment was not associated with meal pattern; these findings were similar to a study by Johansen *et al.*, 2006 which showed that the adolescents of non-employed mothers have a significantly higher risk of not eating breakfast every day than those of employed mothers. Also, Gikas *et al.*, 2003 reported that the status of employment of both parents was not related to skipping breakfast.

While, in the longitudinal analyses, the associations between maternal employment and adolescent dietary behaviour were evident for adolescent girls. For instance, compared to Australian girls whose mothers worked full-time, those whose mothers worked part-time or were not in paid employment showed positive changes in their dietary behaviours (Pearson *et al.*, 2009). Neumark-Sztainer *et al.*, 2003 found that family meals were less frequent when mothers worked outside the home.

In a mixed methods study, FGDs with Moroccan adolescents inferred that working parents' status is a barrier related to breakfast consumption. The adolescents skipped breakfast and as a result they felt hungry later and had to eat unhealthy food outside home e.g. fast foods and soft drinks (Abdelghaffar *et al.*, 2020).

Also, during the FGDs with the students, they all shared same annoyance about school guidelines, rules and restrictions about bringing food like falafel Sandwiches, donuts, fizzy drinks and other snacks, and this left them with no choice but purchasing food from the inside-school canteens which is, in turn, of a bad and poor quality. Girls shared words like "school punishes us" and "school cafeteria focusing on making profits". Some students suggested the establishment of "breakfast clubs" in the school which provide healthy and good quality and value food types and encourage them to take breakfast meal. These findings are similar to a school-based FGDs with Omani female adolescents, who also stated that most school canteen food was unhealthy and unclear. The participants of this study voiced their opinions regarding school meals and suggested that the school should take the students' opinions on canteen food seriously (Al-Mahrouqi, 2019). However, Omani schools permitted the students to bring food from home unlike the Saudi ones.

In comparison, in Scotland, some schools run breakfast clubs that provide morning nourishment for students who are not able to eat breakfast at home. The aim was to decrease the number of breakfast skippers in order to improve student's engagement in educational activities and contribute to the improvement of students' general health (Harrop and Palmer 2002).

Breakfast clubs are not a new resource for parents and children. Breakfast clubs are organized in ways to suit individual schools and their facilities. There are a range of different models used by schools and community settings. Clubs are given clear guidance to ensure that they observe safe food handling and preparation, and staff undertakes validated food safety and hygiene training to support this. Staff or organizers of breakfast clubs are often members of school or wider workforce staff, and may include parents or teachers who otherwise have little involvement with food provision in schools. Many school breakfast clubs offer breakfast and provide opportunities for children to socialize with children from different age groups (Greenhalgh et al. 2007), and they are effective intervention in terms of improving overall nutrition and academic performance in poor schools in developing countries (Del Roso & Marek 1996).

In Scotland, students' feedback and opinions are taken seriously (The Scottish Government, 2014). This ethos empowers and motivates students to express their concerns and views openly regarding school's food and catering services. It also motivates the staff and other concerned authorities and encourages them to be self-critical about the quality of the services provided to the youth. The positive outcome of a long-term public investment in students' nutrition and health includes increased consumption of healthy food and a better understanding of the benefits healthy food has on the student's body and mind. By spending now on healthy nutrition for children and imparting them nutrition education, the Scottish authorities seek to improve the long-term physical and mental health of the Scottish population. Lower diet-related health problems and chronic diseases such as overweight and obesity will also save future healthcare costs (The Scottish Government, 2014).

The education system in SA is primarily under the authority of the Ministry of Education, the Ministry of Higher Education, and the Technical and Vocational Training Corporation. The Ministry of Education supervises primary, intermediate, secondary, elderly education, and literacy education (International Bureau of Education, 2011). Education and healthcare sectors are the priority of the country's budget, receiving up to 44% of the total spending. In 2015, education sector's share of the budget was at 25% (U.S - Saudian Business Council, 2016). School canteens in SA provide students with breakfast and snacking options during school hours (Al-Jaaly *et al.*, 2016). Canteens can be managed by either caterers or by schools (self-managed). Eighty per cent of the self-managed canteens' profits go to the school fund, 5% salaries for the canteen staff. The school fund allocates 15% as subsidies to students of low-income status, 50% extracurricular activities, 5% staff that contributed to the educational process in the school, 10% school supplies, 10% support for excelling students, and 10% for the Ministry of education's fund. Whereas the amount paid by caterers to rent the canteens go to the school fund (General Education Department of Taif, 2017).

The purpose of school canteen foods in SA is to supplement foods that students bring from home (Al-Jaaly *et al.*, 2016). However, in most cases, they are considered the students' actual meals as schools prevent bringing home-made food to the school (Al-Jaaly *et al.*, 2016; Togoo *et al.*, 2012). The School Healthcare Department established guidelines for items that can and cannot be sold in the school canteens. The School Healthcare Department stated that the guidelines were establish to emphasize the main objectives of school canteen, which are to deepen the meaning of nutrition among students by providing them with nutritious foods at a reasonable price, and considered the different nutritional requirements and physiological needs for the students of each educational level (School Healthcare Department, 2007). Also, through satisfying the canteen users by providing desirable, healthy, and affordable items, it will compete with the appeal of local shops

(Chortatos *et al.*, 2018), and attending the school canteen was related to a lower rate of skipping breakfast in school children (Dubuisson *et al.* 2012).

The implementation of nutrition policies in schools has been recommended as a strategy to improve child dietary intake and to modify the availability of healthy and unhealthy foods (WHO, 2013). However, Internationally, research suggests that the majority of schools do not implement these policies (Yoong *et al.*, 2016). For examples, a study in Mecca, SA, found that the nutritional composition of school breakfast meals served in Saudian female intermediate and secondary public schools in Mecca City indicated school canteen foods to be nutritionally poor and of high sugar content, and low content of calcium, iron, and vitamin D (Yahya *et al.*, 2019). Coincided with other studies that indicated school canteen foods to be nutritionally poor in Jeddah (Al-Jaaly *et al.*, 2016; Togoo *et al.*, 2012). Yahya, 2017 reported that the instructions stated by the ministry are not followed, indicating that the current guidelines either did not provide precise guidance or did not have the needed authority on canteen managers and staff to follow. It inferred that the canteen managers were responsible for planning food list and items, however, they lack a nutrition-related educational background as it was not a requirement to cater for the school canteen, indicating that the schools do not do educational screening for caterers before hiring them or do not require attending educational workshops for the current caterers and canteen supervisors who plan the food lists. Different results were found in the United States, where the USDA, 2015 established minimum occupational and annual training standards that are required to hire new school nutrition professionals and for the current school nutrition professionals who direct and run the lunch program (SLP) and school breakfast program (SBP). The USDA indicated that developing specific standards ensured that the staff have minimal knowledge and training to plan and prepare meals, and purchase healthy and fresh food items to make healthy meals that the students like.

Nelson *et al.*, 2007 study in the United Kingdom assessed primary and secondary level meals content and found that school meals contributed poorly to the nutrients' daily

recommendations especially among girls. It was reported that 44% of intermediate level canteens and 33% of the secondary level canteens in Mecca never changing their food lists, low micronutrient composition of the breakfast meals could significantly affect the health of adolescents (Yahya *et al.*, 2019). This indication is in concordant with previously mentioned studies from SA and other GCC countries that reported adolescents and adults' daily intake of nutrients such as calcium, iron, and vitamin D failed to meet the daily recommendations (Al-Assaf, 2007; Al-Musharaf *et al.*, 2012; Gharib and Rashed, 2011; Musaiger and Miladi, 1996; Sawaya, Tannons and Othiameen, 1988).

A survey was done to assess school canteens in Dubai city, UAE. The survey covered 216 schools (public and private schools) and concluded that almost half the numbers of schools did not offer fresh fruits to students as a food choice and some schools offered carbonated drinks, energy drinks and processed foods. Only 45% of schools follow nutritional guidelines issued by Dubai Municipality that mainly concerns food safety and hygiene (Zain, 2008). also, about 12.9% of school students frequently skipped a meal at school (3–5 school days/week) ((Wadolowska *et al.* 2019).

However, the type of school has affected the consumption of breakfast where adolescents that attend public schools tend to skip breakfast more than adolescents studying in private schools. These results might be explained by less quality of education regarding healthy lifestyle in public schools (El-Chami *et al.*, 2017). In Jeddah, SA, Washi and Ageib, 2010 showed that the poor dietary habits among schoolgirls aged 13-18 years were related to the impaired nutritional status of these girls. Nevertheless, almost all the published studies related to food habits and lifestyle in this country have been carried out in government schools. It is worth mentioning that the three schools under study are, in fact, government schools. Al-Hazzaa *et al.*, 2011 investigated some dietary habits and the lifestyle of schoolchildren aged 14-19 years in three regions of SA by including a sub-sample from private schools, but they did not study the differences in these habits between adolescents in the government and private schools. Musaiger and Zagzoog, 2013 also reported that girls

in private schools generally had better eating habits and lifestyle than girls in government schools.

6.7.4 Moods and emotions

For all FGD participants, moods and emotions emerged as common theme. As presented, multiple subthemes related to moods and emotions were emerged. Students and mothers shared quite different subthemes, except for medical conditions and stomach aches, and weight management regimens subthemes. For students, unsurprisingly and in line with literature, type of food and preferences were strongly associated with desire to eat breakfast. Students shared nearly same impressions by using words like "it is up to my mood", "I don't like food types", "we love confectionaries", "we need variety of food", and "I don't like fruits". As for mothers, they confirmed that their daughters eat breakfast according to their mood or desire and they usually lack the desire or willingness to eat, thus, they finally skipped breakfast. In our study, in Tabuk, not feeling hungry (62.8%) was the most common reason given by the female adolescents for skipping breakfast meal, while not liking the food served (24.1%) was the least common one. Similar to our study, not feeling hungry was reported as a reason for adolescent's breakfast skipping in Jeddah, SA (Washi and Ageib, 2010). Also, Alrayes *et al.*, 2018 inferred that possible reason of skipping breakfast was not feeling hungry (37%) for Saudi female adolescent school in Riyadh, SA. In comparison, a qualitative FGD was conducted with adolescents and their parents in USA identified food preferences as a theme acting as a barrier to breakfast consumption (Sabol, 2011). In a sequential explanatory mixed methods study, Moroccan adolescents identified lack of hungry and appetite in the morning and lack of availability of varied foods as an individual factor and environmental factor, respectively, for skipping breakfast (Abdelghaffar *et al.*, 2020). Similar factors were observed for northern and central European adolescents (Hallström *et al.*, 2011), Turkish adolescents (Soyer *et al.*, 2008), Greek adolescents (Kapantais *et al.*, 2011).

The preference for eating habits or foods in humans is established by the influences from socioeconomic level of household, religion, tradition, regional characteristics, educational level of parents, public media, and long-term education at home, school, and the society (Omidvar and Begum, 2014). Musaiger, 1994 stated that many factors determine food preferences. Religion, sex, age, physiological changes, psychological factors, symbolic use of foods, taboos, social prestige and economic factors affect food preferences in all cultures (Musaiger and Gregory, 1992). Musaiger, 2011 found that there are some factors that affect food choices in the Eastern Mediterranean Region. These factors are changes in lifestyle, income, urbanization, demographic changes, food price changes as well as improvements in food processing, food subsidy policies, migration and the influence of the mass media.

Neumark-Sztainer *et al.*, 2000 found that adolescents choose unhealthy food because it is convenient and easy for them to access. Likewise, they do not choose fruit and vegetables because they are less convenient and more difficult to access. Also, adolescents said that in the presence of multiple options, they would likely choose fast food for its convenience. This is related to our study, girls shared phrases like *"I cannot imagine myself buying fruit for breakfast"* and *"I do not like the types of food"*, while others said that they like fruits like *banana and apples*. The consumption of few vegetables and fruit, as well as fast foods, sweets and chocolates reported by adolescent girls in this study is consistent with other studies in SA (Al-Hazzaa *et al.*, 2011; Al Muammar and El Shafie, 2014). It was found that, of girls aged 14-19 years, 62 and 69 percent did not consume vegetables or fruit, respectively; and, also that the proportion of girls who consumed sweets and chocolates or fast foods more than three times per week was 53 and 25 percent, respectively. These tendencies towards unhealthy diets have also been reported among girls in Bahrain (Musaiger *et al.*, 2011a, b), Kuwait (Honkala *et al.*, 2006), Syria (Nasreddine *et al.*, 2009), and Palestine (Al-Sabbah *et al.*, 2007). The traditional Saudian diets, which consisted of fruit, vegetables, foods low in fat, and whole grains, have changed to more westernized diets, which are high in fat, sugar, and salts (Musaiger and Al-Hazzaa, 2012). The rapid

spread of supermarket chains, food courts in commercial malls, and various fast-food restaurants has strengthened the consumption of Western diets in this country. Musaiger and Zagzoog, 2013 suggested that the unhealthy dietary and lifestyle habits of adolescent girls in SA could be associated with the occurrence of chronic non-communicable diseases during adulthood.

The healthy eating starts in school. The school meals should be part of the educational process, providing a valuable opportunity to practice what children learn in the school setting, combined with other policies that facilitate a positive school environment (Centers for Disease Control and Prevention(CDC), 2019; Chan, Siu, & Lee, 2020; Pérez-Rodrigo, & Aranceta, 2001). This includes a pleasant room, nice atmosphere and plenty of time to enjoy healthy food in the school, either food provided by the school or brought from home (Perez-Rodrigo *et al.*, 2001). Overall, Centres for Disease Control and Prevention (CDC), 2015 touted the positive effects of school health programs on both academic and health outcomes. Educators must encourage adolescents to eat healthy and increase their access to healthy food as well as equip them with the resources to choose healthy food.

According to WHO, 2016, the high availability and accessibility of energy-dense foods with lack of supportive policies increase the consumption of these foods (Muammar and El Shafie, 2014). In SA, the Ministry of Education (MoE) established the “Regulations of Health Conditions for School Canteens” in 2004 and updated the regulations in 2013 (Amin *et al.*, 2008). This policy falls under the responsibilities of the General Administration of School Health (Collison *et al.*, 2010). One of the five chapters is concerned with food offered in school canteens (Bauhoff, 2014) and contains a list of banned food items, namely: confectioneries, chocolates, chips, soda, sport drinks, sweetened beverages, all meat products, and fried foods (Cullen and Watson, 2009). Nutrition food policies could help in creating healthy school environments by providing healthy food choices. In the United States, several studies demonstrated the importance of a school nutrition policy that

decreases the availability of energy-dense foods and increases the availability of healthy foods (Bauhoff, 2014; Merlo *et al.*, 2014).

A school-based study in Al-Qassim, SA on Saudi adolescent girls and boys concluded that girls were more often than boys to skip breakfast and more often to consume unhealthy diets and wrong food choices. Girls reported eating Sandwiches, pizza, chips, cookies, fast food and french fries in school hours more often than boys did. This is problematic, as these types of food choices prevented female adolescents from AHB consumption in Al-Qassim. However, as previously mentioned, foods available in Saudi school canteens were high in sugar, saturated fat, and salt and did not include fruits and vegetables (Aldulaylan, 2016). Aldubayan and Murimi, 2019 found that that most pre-packaged foods offered as breakfast in the selected boys' public high schools in Riyadh were energy-dense snacks such as cakes and muffins (98.7%), confectionaries (96%), biscuits and cookies (93.4%), and chips (52.6%). These results confirm the findings of a study conducted in the southern region of SA, which found that 87% of the food items available in the school canteens in Abha were energy-dense foods such as confectionaries, chips, cakes, cookies, pudding, and ice cream (Togoo *et al.*, 2012). Similarly, in the United States, a study found that 44%, 23%, and 20% of 494 high schools offered doughnuts, biscuits, and muffins, respectively for breakfast (Condon *et al.*, 2009).

The Saudi Ministry of Education needs to improve compliance of public schools in Riyadh with other banned food items and increase the availability of nutritious foods such as whole grains, fruit and vegetables. The selected schools in Riyadh have a low alignment with Institute of Medicine (IOM) standards (Aldubayan and Murimi, 2019). This is to be expected, since the Saudi policy regarding "Meals and beverages offered in school canteens" lacks detail on nutritional content of food items allowed in school canteens compared to IOM standards.

In this study, the quantitative phase did not identify stomach aches and medical conditions as a reason for skipping. Mothers and students in the current FGDs inferred that stomach

aches and medical conditions, which emerged as a common theme, contributed to skipping breakfast among students. Students shared same expressions about their health status and its association with breakfast meal skipping. Common phrases and words like "when I eat my stomach hurts", "I skip it to avoid any medical problems", and "My stomach is sensitive". Some students shared that they fear from medical complications if they eat the bad food from the canteens. Moreover, Mothers stated that their daughters always complained about stomach aches and especially when specific food or drink types were offered in the morning e.g. milk. However, Mothers stated that they usually did not believe their daughters' complaints. Similar findings were reported for Kuwaiti breakfast skipping adolescents; the majority reported not having milk and milk products, vegetables and fruits (Allafi *et al.*, 2014). A school-based study on Iranian adolescents reported symptoms of gastrointestinal disorders such as nausea, bloating, abdomen pain and stiffness, headache and fatigue and diarrhea following the consumption of milk. It was attributed to lactose intolerance issues in those adolescents since the prevalence of milk intolerance among Iranian students was 51.1% (Adibi *et al.*, 2009; Sharifi-Zahabi *et al.*, 2019).

In SA, a large study cross-sectional school-based study was carried out on adolescents in all 13 regions of SA reported that 28% of adolescents reported having a chronic health condition, 14.3% reported having symptoms suggestive of depression, 30.0% were overweight/obese, and 95.6% were vitamin D deficient (AlBuhairan *et al.*, 2015). A research study in 19 countries in Europe and in the USA revealed that health complaints such as: headache, stomach-ache, difficulties in getting to sleep, and nervousness were common among adolescents (Gobina *et al.*, 2011). The association between meal skipping and some somatic symptoms like stomach-ache, reflux (Seremet *et al.*, 2015) and, the most prevalent complaints, headache has been reported (Casucci *et al.*, 2014). Similar to this results in Italy, which showed a positive association between headache and meal skipping (Moschiano *et al.*, 2012). It has been demonstrated that habits pertaining to breakfast consumption are significantly associated with all health status dimensions

(physiological, psychological and social) (Chen *et al.*, 2014). A population-based study in Italy showed a positive association between headache and meal skipping especially irregular intake of breakfast (Moschiano *et al.*, 2012). Another population-based study on Iranian school adolescents indicated that irregular breakfast, lunch and dinner eating is associated with myriad psychological and somatic symptoms. Breakfast skipping was associated with increased odds of stomachache, backache, difficulty in getting to sleep, feeling nervous and irritability (Azemati *et al.*, 2020).

Through the FGDs with mothers and students they claimed that students usually skip breakfast to keep fit and to lose weight. Mothers noted that peer pressure made their daughters skip the morning meal as they thought it would help them lose some weight and be thin like their friends. Diet and nutritional behaviours can have a profound impact on growth and development (Eden, 2005; Skalicky *et al.*, 2006). Deficiencies of certain nutrients can have serious consequences for the developing brain; while dietary patterns such as breakfast-skipping contribute to excess weight gain and obesity (Alaimo *et al.*, 2001; Basch, 2011). In previous research, meal skipping (particularly breakfast) has been used as a weight management strategy by adolescents, which can have negative consequences on diet quality (Neumark-Sztainer *et al.*, 2003; Woodruff and Hanning, 2009). As the adolescents get older, they are more and more concerned about their image and falsely believe that by skipping breakfast they may reduce their energy intake. Furthermore, a clearer understanding of the weight-related research is important because overweight females tend to believe that skipping breakfast is a useful strategy for weight loss (Hearst *et al.*, 2016; Rampersaud, 2009; Rampersaud *et al.*, 2005; Reddan *et al.*, 2002), when in fact it is the opposite, and could further increase weight gain leading to obesity and obesity-related health issues (Cohen *et al.*, 2003), that can have a lifelong impact on the individual's health as well as on the health of her children (Balen and Anderson, 2007; Boney *et al.*, 2005; Drake and Reynolds, 2010; Kushner, *et al.*, 2013; Must *et al.*, 1999). Some authors reported that adolescents tend to be self-conscious about

their appearance enough that skipping breakfast could be practiced as a measure to lose weight (Garg *et al.*, 2014).

In Western countries, skipping breakfast is associated with a high prevalence of overweight and obesity. While in SA the 2010 estimated prevalence of overweight and obesity among school-aged children was 19.6% and 7.9%, respectively, higher rates were reported for adolescents, with 26.6% overweight and 10.6% obese (El Mouzan *et al.*, 2010). In Tabuk city, a school-based mixed method study found that about 34% of adolescents to be classified as overweight or obese (Alamri, 2017), in agreement with other studies reporting that 15-47% of adolescents in the SA were overweight or obese (Al-Hazzaa, 2007; Al Herbish *et al.*, 2009; El Mouzan *et al.*, 2012; Al-Hazzaa *et al.*, 2013; Al-Muammar and El Shafie, 2014). Saudi culture is strongly religious, conservative, and family oriented. While women's status is high in the family, especially in the roles of mothers and sisters, women usually remain out of public view and contact only with their related men. In the public restaurants, women are required to use specially designated family sections. Consequently, for women, eating in restaurants means more than consuming a meal for hunger. It is an opportunity to go outside the home and gather with family or female friends. In addition, female students reported a higher prevalence of dieting, greater positive attitudes toward healthy eating, and greater interest in their health, body weight, and body image than their male counterparts (AlFaris *et al.*, 2015). Also, it has been concluded in several studies in SA that female adolescents are more sedentary and less physically active than male adolescents (Al-Hazzaa *et al.*, 2011; Al-Hazzaa *et al.*, 2012).

Increased weight status of 13- to 18-year-old Saudi adolescents was related to their inadequate dietary habits (Washi and Ageib, 2010). In Asian and Pacific regions, a meta-analysis was performed for observational studies using a cross-sectional design suggested a positive association between skipping breakfast and overweight and obesity is globally observed regardless of cultural diversity among countries (Horikawa *et al.*, 2011). In Jeddah, SA, adolescent girls' overweight status is significantly related to unhealthy habits

such as breakfast skipping (Aljaaly, 2012). Similar observations were reported in Al-Qassim, SA (Al-Rethaiaa *et al.*, 2010), Al-Hassa, SA (Amin *et al.*, 2008), Riyadh, SA (Al-Jaaly *et al.*, 2016), and also for Turkish adolescents (Soyer *et al.*, 2008), and Greek adolescents (Kapantais *et al.*, 2011).

Mothers in the FGDs said that lack of breakfast halls, clubs and joint eateries demotivated their daughters from taking breakfast. They all shared same suggestions about establishment of joint eateries to raise awareness and help to overcome breakfast skipping problem among female adolescents in Tabuk secondary schools. School environment is considered an important place to learn healthy eating habits as most children and adolescents get half of their daily intake at school (CDC, 2009). The concept of adopting programmes and activities with the view to promoting healthy living and practices in schools was implemented, to some extent, by many Arab countries, including SA (Aljaaly, 2012).

In the current study, according to FGDs, it seemed that Saudi female adolescent schools in Tabuk city failed to meet the instructions or policies for creating healthy environment for the students. In comparison, in Riyadh, a questionnaire-based study on adolescent boys' public schools showed that the schools had a moderate compliance to the Saudi policy regarding "Meals and beverages offered in school canteens". The Saudi Ministry of Education was effective in banning soda and sports beverages in Riyadh, since none of the selected public schools offered these drinks.

Although the foods that the adolescents can access near the school appeared to match their taste-driven food choices, these foods are of poor nutritional quality. The range of foods to choose from was quite narrow-mostly cheap, fried items or finger foods with low nutrient content. Such poor-quality food environment combined with peer influence nurtures a pattern of dietary behaviour that is inclined toward street foods rather than healthier alternatives. It was not possible for the adolescents to access nutrient-rich foods, even if they opted for, in the vicinity of the schools because of the lack of availability. Islam *et al.*

2019 conducted qualitative FGDs with Bangladesian adolescents and their mothers to explore the sociocultural Influences on dietary practices. The participant mothers claimed that the adolescents have a dislike of vegetable and fish, and a remarkably taste-driven food preference as well.

Strategies need to be adopted to improve adolescents' nutritional status, such as improving their dietary knowledge, improving their dietary intake, promoting healthy eating habits among them, and establishing a healthy lifestyle via an increase of physical activity and exercise. Families and schools should collaborate to correct the unhealthy eating habits of adolescents despite the fact that this age group is not easily convinced to change.

In Saudi Arabia, as elsewhere in the world, the enhancement of lifelong health promotion throughout society, beginning with youth and the family, is a key issue for the government. Therefore, further studies should attempt to educate adolescents, parents, teachers and schools about the importance of eating breakfast. Health education programmes are therefore needed to encourage breakfast-eating, targeted at special groups at risk. These programmes should take into account the different reasons for skipping breakfast.

6.8 Limitations

As with all studies, the present study had certain limitations that should be recognized and discussed. First, we used the cross-sectional nature of the study, which does not allow a causal relationship between breakfast consumption and factors to be confirmed. Second, we did not assess the other important factors that affect breakfast skipping, such as behavioural (hours of sleeping at night, time of waking up in the morning, and level of physical activity), environmental (influence of parents and presence of siblings, younger older and multigenerational families), and cognitive factors (perceived barriers, self-efficacy, and attitudes). Third, because of time and financial restrictions, it was impossible to include all the areas located within the Kingdom of Saudi Arabia for the purpose of this study. Therefore, the results cannot be generalized to other areas or in the entire country. Also, a limitation of the literature on breakfast skipping and its correlates, causes, and consequences lies in the absence of a commonly agreed upon definition of breakfast skipping.

6.9 Strengths

In spite of these limitations, the present study had the following numerous strengths. First, the present study provides data that is helpful to health care providers, researchers, and policy decision makers. Second, to our knowledge, this study is one of the few studies that examined the prevalence of skipping breakfast and examined the relationship between skipping breakfast and the associated factors among adolescents' females' students aged 16-18 years old in Tabuk city, Kingdom of Saudi Arabia.

6.10 Conclusion

Direct comparisons between the present study findings and prior studies were difficult because of the inconsistencies in measurement tools and definitions of meal skipping.

In terms of skipping breakfast, the prevalence of skipping breakfast was found to be significantly associated with residential status, age, friend's behaviour, knowledge about breakfast importance, and tea consumption. Whereas, the prevalence of skipping breakfast was not associated with SES, mother's work, mother's education, father's education, BMI, days of the week, coffee consumption, and fizzy drinks consumption.

Regarding AHB skipping, the prevalence of AHB skipping was found to be significantly associated with age, friend's behaviour, knowledge about breakfast importance, and tea consumption. However, the prevalence of AHB skipping was not associated with residential status, SES, mother's work, mother's education, father's education, BMI, days of the week, coffee consumption, and fizzy drinks consumption.

Chapter 7: Conclusion and Recommendations

7.1 Conclusion

This study implemented an explanatory sequential mixed methods design in two phases: a preliminary quantitative self-developed questionnaire and a complementary subsequent qualitative interviewing phase adopting focus group discussion (FDG) method. In the second phase, FDG qualitative interviews were performed with 6 FDGs (3 groups of students known as AHB skippers; and 3 groups of students' mothers whose daughters are AHB skippers) to investigate the reasons and causes for skipping AHB, as well as perspectives on the relevance and awareness of the AHB meal among female adolescents. The key sociocultural factors for school girls skipping breakfast were a lack of dietary awareness about breakfast, a desire for lunch and snacking, and the imitation of their parents' and friends' breakfast skipping behaviour. Saudi mothers have blamed their daughters' breakfast skipping on a lack of dietary awareness, parental management challenges, teen autonomy, Saudi society, and the power of social media and smart devices. Breakfast skipping was linked to causes such as a loss of appetite, a poor sleeping schedule, and frequent night-time mobile use, according to FDGs. AHB is often skipped due to mother's work schedules and a lack of time to prepare breakfast. Furthermore, the unhealthy school food and environment led to students' skipping breakfast. In the present FDGs, mothers and students concluded that stomach aches, medical problems, and social pressure to lose weight were all closely linked to students' missing breakfast. Female students were discouraged from eating breakfast due to a lack of breakfast clubs, shared eateries, and halls.

The aim of this study was to add something new to the status of adolescent nutrition in Tabuk. The findings must be properly discussed within potential solutions by identifying the key characteristics that cause female students to skip breakfast.

A lot of limitations hindered the author from deeply discovering the factors associated with AHB among adolescent females in Tabuk City specifically. Mainly a lack of studies either quantitative or qualitative regarding the breakfast meal skipping overall in the city. However, many future research points and several recommendations were emerged from the study and would be illustrated in the next chapter.

7.2 Strengths of the study

1. The current research was structured as an explanatory sequential mixed methods design, in which the quantitative and qualitative components were complementary. This offered a wealth of information about Saudi female adolescent breakfast intake. This is also the first research of its kind in Saudi Arabia, with this age group, area, and subject. As a result, this research would greatly contribute to the body of information about Saudi adolescent dietary behaviours. Furthermore, the methodology, accuracy, and removal of questionable data that characterized this work will ideally serve as a base for future lifestyle studies in the Kingdom of Saudi Arabia.

2. The participants were chosen randomly and the sample size was relatively high (N=617), allowing the results to be applied to a comparable demographic and age group within Saudi Arabia.

3. During the present research, teenage girls participated in a face-to-face FGDs to share their real-life experiences about their breakfast and school routine. This strengthened Saudi adolescent girls' understanding of their personal desires and wishes, as well as their confidence to share their opinions about their lifestyles. They have made a number of suggestions to help them develop their breakfast eating habits.

4. This thesis spotted this issue because we were unaware of certain influences of the north side of SA culture; hence, the study is special because it was conducted in Tabuk city. The findings of this study are useful to stakeholders in the Ministry of Health's (MoH) educational

and nutritional sectors, since they have previously found reasonable options for coping with this problem.

5. Several recommendations emerged from the process of analysing the research results, linking it to other experiments, and exploring the consequences. The researcher has attempted to formulate these recommendations in such a way that they are realistic, low-cost, quick to execute, and culturally and politically feasible in Saudi Arabia and its GCC peers.

7.3 Recommendations

Based on findings of the present study, the following recommendations for researchers, nurses and other health care providers were made with the intent of promoting dietary education and health of adolescents' females' students aged 16-18 years old in the Kingdom of Saudi Arabia.

From the current findings, the problems have become clear and some practical solutions have emerged all of which have been discussed in detail in the previous sections. The researcher of the current study seeks to start with simple changes that can be readily introduced, cost very little, are easily enforceable, culturally appropriate, and climate-friendly. Schools and homes are where changes should begin. Also suggested are more strategic long-term changes that transform the ground reality, encourage voluntary relaxation of some cultural barriers to promote female empowerment, and seeking long-term changes that ultimately impact the lifestyle habits of the female population of Saudi. Such strategic reforms may need to be made by public policy, whose implementation should be persistently monitored and periodically audited:

Design a future intervention programme

- To encourage the social element – good and healthy peer to peer interactions. Also, involving the students in the design of programmes, the redesign of canteens and support family meal structures are also important.
- Introduce intervention programmes in girls' schools in Saudi Arabia, both governmental and private. These could include improving adolescent knowledge and skills regarding the importance of breakfast consumption and improving time management skills.
- Parents need to be involved in such interventions to provide family support (e.g. preparing breakfast, providing various items, acting as a role model, controlling pocket money).

- Teachers must be informed and properly prepared about the breakfast skipping consequences so that it becomes a part of their professional engagement.
 - To avoid late night sitting, school teachers must be required to reduce the amount of homework assigned. teenagers who have enough sleep and eat breakfast are more alert and learn more during the school day and this would compensate for the reduced homework.
 - Give Nutrition Education the status of a required course rather than a choice.
- 1. Parental authority:** Around 8–9 p.m., parents can enact a stringent 'lights-out, screens-off' law, banning all cell phones and tablets from their child's bedside. To inspire parents to follow the discipline, they and other elders should first be enlightened on the importance of enforcing an early dinner and strict bedtime so that teenagers get at least eight hours of sleep, wake up rested, and have time to eat AHB before going to school.
 - 2.** Saudi homes need to advise and negotiate with their children about breakfast meal benefits and dangerous consequences related to skipping it.
 - 3.** Allowing young girls to eat breakfast for a brief period of time at the start of the first class.
 - 4.** Regarding school canteen, repurpose school canteens as model nutrition and nutrition education centres. The health and education ministries should keep a close eye on school canteens. It is possible to identify the foods that are permitted and how they can be presented. Posters with nutrition information material may be shown on the walls of the canteen. Letter boxes in canteens can be given to collect input from students and their guardians, which should be read by school committees on a regular basis and action taken.
 - 5.** Breakfast clubs, similar to those in Scotland, may be launched in Saudi Arabian secondary schools to compensate for breakfast skipping.

6. Encourage school adolescents to take a breakfast bag containing nutritious homemade snacks, yogurt, fruits, and vegetables to aid in the modification of eating patterns. The school should educate mothers about the value of allowing their children to bring a bag full of nutritious snacks to school.
7. Organize competitions for children and teens that improve their nutritional knowledge about breakfast. MOE and MOH should work together to supervise this.
8. Incorporate nutrition education into the standard school curriculum by engaging and immersive programs that span the whole academic year.
9. This study suggests that the school canteen scheme, architecture, contracts, and regulations be re-evaluated to ensure that they are supportive to students' health needs. As well the importance of educating parents to help adolescents to develop healthy eating habit nutrition.

7.4 Recommendations for Health Practice and Education

1. The adolescent population has become a global phenomenon, and the world now has more young people, and a health care service for this population is a constant challenge for nurses, as health care providers. So, health care providers need to be prepared well to address the adolescent's population health needs.
2. Educational programs are needed to increase the awareness of health care providers regarding the adolescent's population, their dietary patterns and associated factors.
3. Awareness programs about the importance of the breakfast meal are needed for adolescents.
4. There is a need to build a supportive social environment to influence parents and peers to promote breakfast consumption.

7.5 Implications

The findings of the current study offer a representative picture of breakfast-related habits of adolescents and represent a basis for designing and implementing appropriate measures in order to promote dietary education and health in adolescents.

7.6 Future research

- 1.** There is a shortage of studies from Saudi Arabia regarding the factors associated with AHB breakfast skipping during the adolescence stage especially in Tabuk city.
- 2.** To study how the type of school (private or public school) could affect the consumption of breakfast and if the type is really associated with breakfast skipping in among female adolescents in Tabuk city.
- 3.** Follow-up qualitative studies, such as FGDs, are required to recognize barriers to adopting and applying the Saudi policy in Tabuk secondary schools.
- 4.** To study the composition of canteen food in Tabuk secondary girls' school and how it contributes with discouraging girls from eating breakfast.
- 5.** To evaluate the presence of health topics in the school curriculum, and how the curriculum can help students understand healthy food.
- 6.** To find out why there is a lack of contact between schools and students' families around school canteens and nutritious meals, and how this contributes to students skipping breakfast.

- 7.** It appeared that Saudi female teenage schools in Tabuk city struggled to follow directives or strategies aimed at providing a safe atmosphere for students. The explanations for this inability to follow dietary requirements must be investigated.
- 8.** Future comparative studies may be conducted to permit for comparisons based on skipping breakfast definition, setting and demographic factors.
- 9.** In future studies, other lifestyle factors (such as alcohol consumption, physical activity, diet quality, and smoking) may be addressed, in addition to the factors at the individual level (maternal influences on meal-skipping behaviours, and area of residence), as an important input for greater understanding of the skipping breakfast, and for future planning of health promotion services for adolescents.
- 10.** Future studies may utilize models of health and social behaviour (such as theory of planned behaviour (TPB) and the health action process approach (HAPA) in assessment of breakfast consumption and directly compare these models.
- 11.** Future interventional studies are needed to introduce and examine breakfast programmes to look at its impacts.

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Appendices

Appendix 1: table of studies defined breakfast

Reference and country	Definition of breakfast	Actual foods consumed	Context	Results	Limitations
Aranceta et al. (2001) Spain	Any intake of food or beverage between 6 am and 10 am during weekdays and between 6 am and 11 am for the weekends and holidays	Percentage contribution to breakfast energy intake Milk and dairy: 34% Buns, cookies, croissants , etc.: 24.6% Other cereal products: 20.2% Sugar: 5.25% Fats and oils: 4.45% Fruit: 3.4%	Children having breakfast alone classified as having a "poor quality" breakfast (48%) on the QBS. This proportion was significantly lower for those having breakfast with someone else (40%). 8% of children	Of the sample: 91.2% of males and 92.2% of females usually had breakfast Males >18 and 14-17 years old females showed lowest consumption rates Low socio-economic	24 h re-call methods may not reflect "true" breakfast consumption of the sample over longer term period Low generalisability due to specific target sample

		Breakfast cereal: 5.2%	having breakfast with their family were classified in the "good quality" breakfast group	backgrounds and low educated parents had lower quality breakfast scores	No discussion of cultural issues
Ruxton,C. H. et al. Scotland	Solid item of food taken before attending school or before 1100 h on Weekends	Breakfast cereal: 77.2 Bread: 14.7 Cooked: 1.5 Other (includes confectionary, soup and milky drinks – with or	Not discussed	Breakfast contributed 14% of energy and 9-36% of Micronutrient intakes to the overall diets.	Percentage of children participating in weighed intake was low Self-report questionnaire may have caused bias

		without bread):6.6			
Barton et al. (2005) USA	Eating between 5 am and 10 am on weekdays or 5 am and 11 am on weekends	Not defined	Not discussed	Frequency of breakfast and cereal consumption decreased with age Days eating breakfast were associated with higher calcium and fibre intake in all models Days eating cereal was predictive of lower BMI	3-day recall method may not be representative of average breakfast consumption Self-report nature of recall may have caused a social desirability bias Focus on cereal consumption only
Sungsoo et al. (2003)	Any food or beverage consumed in a meal occasion named by the respondents as breakfast	Percentage belonging to each breakfast category (categories are mutually exclusive) Breakfast	Not discussed	20.05% of the sample were breakfast skippers Subjects who ate RTEC, cooked cereal or quick breads for breakfast had	Self-report nature of study may cause a bias in the results

		skipper: 20.05 Fats and sweets: 4.23 Dairy: 4.55/ Fruit and veg: 4.48/ Cooked cereal: 4.76 Ready to eat cereal: 17.14% Breads: 27.86 Meat and eggs: 10.87% Beverages: 6.06		a sig. lower BMI to those who skipped and meat and egg eaters. Breakfast skippers and fruit/vegetable eaters had the lowest daily energy intake The meat and egg eaters had the highest daily energy intake The less common breakfast types included fats and sweets (3.2%) and fruit and vegetables (4.5%)	Lack of definition for breakfast categories
Vanelli, M. et al. Italy	Any food or beverage between 6 am and 8 am before going to summer sports school	Frequency of daily consumption Age 11-14 Boys Girls Biscuits: 29 30 Snack	48% ate and drank in silence 26% played with siblings 18% watched television	78% usually ate breakfast 22% reported skipping breakfast	Results focused on children attending summer sports school – results may vary from when

		cakes 8 17 Cereal 18 16 Cakes 9 11 Bread 5 6 Fruit/ fruit juice 19 19 Milk/ milk with cocoa 66 66	8% talked with parents		attending regular school or weekends
Haines et al. (1996) US	Consumption of food and/or beverage between the hours of 5 am and 9 am	Mean grams of food consumed at breakfast from 1989-1991 (breakfast eaters only) Low fat milk: 73.0/ Whole milk: 44.1/ Bacon: 1.1 Eggs: 12.3/ All bread: 22	Not discussed	Breakfast consumption declined from 1965 (86%) to 1991 (75%) Breakfast consumption increased with age Urban-rural and south- non-south differences in	IV were statistically significant; however, effects were small

		RTEC: 14.4 Fruit and fruit juice: 68./ Butter and margarine: 2.6. This study does distinguish between high and low fibre cereal and breads		breakfast consumption narrowed over time, whereas black-non-black and college-non-college differenced increased slightly or remained constant	
Wilson, N. C. et al.	Consumption of at least one item between 6 am and 9am	Items consumed at breakfast Breakfast cereal: 56.9 Bread: 35.1 Choc flavoured drinks: 13.9/ Milk: 8.2 Eggs: 3.3/ Fruit/juice: 16.6 Muffins/cake: 4.7 Confectionary: 2.2		84% report eating breakfast Habits differed between Maori, pacific and other children	24 h recall data may not be representative of regular breakfast intake Limited generalisability

Siega-Riz et al. (1998) USA	The consumption of food, beverage, or both between 5 am and 10 am	Grams of food consumed at breakfast (1991) Milk: 178.9 Eggs: 11.5 Bread: 22.1 Pasta, rice, cooked cereal: 21.5 RTEC: 19.5 Fruit and juice: 70.5 Butter/ margarine: 2		Decline in breakfast consumption from 1965 to 1991, particularly for 15-18 years old Rates for boys and girls declined from 89.7% and 84.4% in 1965 to 74.9% and 64.7% in 1991 Breakfast consumption declined because of behavioural changed not sociodemographic patterns Nutritional quality of foods consumed has improved since 1965	Ability to explain the decline in breakfast consumption limited by the data available
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Appendix 2: Table of Characterisers of studies looking for breakfast skipping (Pendergast et al., 2016).

Reference, year	Country	Design	Sample characteristics, N (% women)	Participants; age, years (mean $\pm$ SD)	How was meal skipping measured?	Definition of meal skipping	Frequency of meal skipping	Correlates of meal skipping
Chung et al. 2003 [37]	Korea	Cross-sectional	College students; 180 (100% F)	20.41 $\pm$ 1.82 years	Q: what is your breakfast status? (Rarely eating, Frequently eating or Daily eating)	"Rarely eating" or "Frequently eating"	74.4% skipped B	BMI: (0 TMS)
Danquah et al. 2010 [39]	Ghana	Cross-sectional	University students; 150 (75% F)	64.6% 21–30 years	Q: Do you eat breakfast? (Yes/No)	"No"	25% skipped B, 8% skipped L, 5% skipped D	ETHNIC: (Caucasian -BS) SEX: (F + BS) AGE: (15–20 years -BS) COURSE TYPE:

								(Science students + BS) Reasons for skipping B: -No time (57%), -Not hungry (22%), - Eat late at night (5%), -Busy schedule (3%), - No reason (13%).
Sakamaki et al. 2005 [52]	Japan and Korea	Cross-sectional	University students (141 Korean), 124 Japan); 265 (100% F)	(20 ± 1.8 years)	Q: Do you always take breakfast? (Daily/3-4 times per week/ Once or twice per week/ Rarely)	Everything except "Daily"	21% Japanese skipped B, 64% Korean skipped B	ETHNICITY: (Japanese –BS)
33. Yahia et al. 2008 [58]	Lebanon	Cross-sectional	University students; 220 (56.4% F)	(20 ± 1.9 years)	Q: Do you take breakfast? Daily/3-4 times (p/w(1-2 pw/Rarely)	"Rarely"	67% skipped B	SEX: (M + BS)

Appendix 3: Sample Size Calculation

STATISTICS SESSION 14: SAMPLE SIZE AND POWER

Aims

This session main aims are:

- to be aware of the importance of pre-study sample size calculations
- to understand the two approaches to sample size calculation: precision and power
- to understand what factors affect sample size calculation
- to be able to carry out simple sample size calculations for different study designs, by hand and using the computer.

Introduction

Before starting any study, it is essential to decide how many people you need in the study in order to answer the question of interest. If the study is **too small**, you may fail to detect an important effect on the outcome of interest, or estimates of effect may be too imprecise (i.e. wide confidence interval). On the other hand, a study that is **larger than necessary** will be a waste of resources.

Example of inadequate sample size

A study was carried out to determine whether a new drug to treat malaria was better than an existing drug. The results were as follows:

	No of cases	No of successes	Success rate (%)
Old drug	172	121	70.3%
New drug	106	83	78.3%

Whilst the success rate was higher for those on the new drug (an absolute difference of 8%), the significance test on the difference between these proportions (chi-squared test) resulted in a **P value of 0.14**. This is interpreted as 'no significant difference', ie the difference could have occurred by chance. But whilst we cannot conclude there **is a difference** between the drugs, we also are unable to conclude that there is **no difference**. This can be seen from the 95% confidence interval of (-2.7%, 18.6%) which suggests the success rate for the new drug may be anywhere between 19% higher and 3% lower than that for the old drug.

So at the end of this study, we do not know whether the two drugs have similar success rates, or whether the new drug is substantially better than the old drug. Clearly in this example the sample size was not large enough to answer the question of interest. The

solution is to choose a sample size such that if the new drug **truly is** substantially better, we would be fairly certain of getting a **significant** result.

Precision vs power

There are two approaches to sample size calculation that depend on the study's objectives. These are based on the two different ways in which we can judge results using statistical methods, namely

1. to evaluate the **precision** of our estimated effect using a confidence interval. If this is the objective, then we compute how many subjects are needed to estimate the effect of interest (eg prevalence or mean) with a specified degree of precision.
2. to carry out a hypothesis test to evaluate the strength of evidence (P-value) of a true effect. In this case, we compute the number of subjects needed to test the hypothesis of interest with certain **power**. The power of a study is the probability of getting a significant result when the true size of effect is as specified.

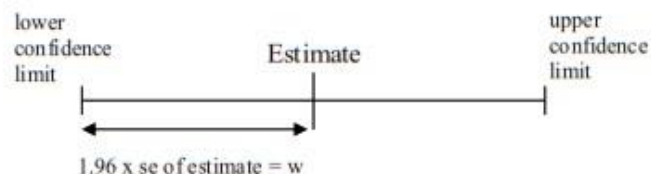
Computing sample size to achieve adequate precision

This approach is based on considering the size of the confidence interval for the effect. In many situations, eg for estimating a single proportion, a single mean, or the difference in two proportions or two means, the 95% confidence interval is given by:

$$\text{estimate} \pm (1.96 \times \text{standard error of estimate})$$

for example: $\text{proportion} \pm (1.96 \times \text{standard error of proportion})$

The width of the confidence interval (the bit that we add on to and take away from the estimate) shall be denoted by **w** and this represents the **precision**. Clearly the smaller **w** is, the narrower the confidence interval and the more precise the estimate.



Estimating a single proportion

We shall look at the situation where we want to estimate a single proportion. This assumes the sample is a simple random or otherwise representative sample and the outcome of interest is binary. Eg we may design a random cross-sectional study to determine the prevalence of a certain condition or disease.

For a single proportion the standard error is given by $\sqrt{\pi(1-\pi)/n}$, where π is the population proportion and n is the sample size. Therefore, for a 95% confidence interval

$$w = 1.96 \times \sqrt{\pi(1-\pi)/n}$$

Clearly the larger the sample size n is, the smaller w and hence the narrower the confidence interval. Rearranging we get a formula for computing the sample size:

$$n = \frac{3.84\pi(1-\pi)}{w^2}$$

From this formula, we can see that n is large when w is small, ie when we want a very precise estimate with a narrow confidence interval, and when the disease prevalence is close to 50%.

To decide on the appropriate size of n :

1. choose a **maximum width w** for our confidence interval. There is no set precision you should select for a study and your choice may depend on the purpose of the study.
2. put a value of π , the population proportion, into the equation. Of course we don't know π at this stage of the study, so we must estimate or guess the value of π . We may do this by looking at previous studies, or using our common sense. If we really don't know, we can use 0.5 which is what we call the 'safe value' of π as it gives the most conservative sample size estimate (ie the biggest).

Example

Suppose we want to carry out a study to estimate the prevalence of lung cancer in people aged 65 and over in the UK. We think the prevalence will be somewhere between 5% and 8% and we want to estimate it to within 2% (w) with 95% certainty. Using $\pi=0.08$ (safest bet), and $w=0.02$ we get,

$$n = \frac{3.84 \times 0.08 \times 0.92}{0.02^2} = 706$$

In other words, we would need to study over 700 people to be confident (95% confident) that our sample prevalence is estimated to within 2% of the true prevalence.

Other estimates

The same ideas of estimating an effect with a certain degree of precision can be applied to a single mean, an incidence rate, or the difference between 2 means, rates or proportions. The sample size formula for estimating a **single mean** is

$$n = \frac{3.84 \sigma^2}{w^2}$$

where σ is the standard deviation of the outcome variable in the whole population. Here, n is big when w is small, and when σ (ie the variation in our outcome) is large. As before we must decide on a value of w and make a rough guess of the population parameter, σ .

Formulae for other situations can be found in Statistics textbooks eg Essential Medical Statistics by Kirkwood and Sterne.

Factors that affect sample size calculations based on precision

The factors that effect the above sample size calculations are:

1. desired **precision w**. If we were happy with less precision, say estimating the prevalence to within say 10%, then we would need fewer people, whereas if we require a very precise estimate, say to within 1%, we would have to study more people.
2. desired **confidence**. The above calculations are based on a 95% confidence interval. We would need more people in the study to obtain the same precision but with greater confidence. Eg based on a 99% CI, instead of using 3.84 we would use $2.58^2 = 6.66$ in the formula.
3. the **outcome** of interest. Where the outcome is a binary variable, the closer the prevalence is to 0.5, the more people are needed. Where it is a continuous variable, the bigger the population standard deviation, the greater the sample size.

Testing a hypothesis with certain power

Often the study aim is to compare two groups with respect to some variable, and a **hypothesis test** is used to assess the evidence against the null hypothesis of no difference between the groups. When we carry out a hypothesis test, two types of **error** can occur which will give us the wrong result:

1. We reject the null hypothesis when it is actually true (**Type I error**). We have met this error before - the probability of it occurring is simply the **significance level** of the test. We shall denote the probability by α .
2. We fail to reject the null hypothesis when it is false (**Type II error**). The probability of this occurring is denoted by β .

	<i>No true difference</i>	<i>True difference</i>
Accept null hypothesis	Probability = $1-\alpha$	Type II error Probability = β
Reject null hypothesis ($P < \alpha$)	Type I error Probability = α	Probability = $1-\beta$ = power

Clearly we want both α and β to be small. If we want β to be small, then it follows that $1-\beta$ needs to be large. This probability $1-\beta$ is known as the **power** of the study and can be thought of as the probability of detecting an effect as significant if it really exists. The bigger the sample size, the greater the power. If a study is under-powered and it yields a non-significant difference between groups, we do not know whether this is because there really is no true difference, or because the study failed to detect a true difference that exists. It is therefore essential to choose an adequate sample size so that the study has a small probability of type I error (usually 5%) **and** sufficient power (usually 80-90%).

The basic steps to compute the sample size based on power are:

1. make a guess of the prevalence/mean in the baseline group.
2. decide what is the minimum effect/difference you want to be able to detect. Think about what is clinically important.
3. specify the significance level you want the study to have, eg 5%.
4. specify the power you want the study to have, eg 90%.
5. plug these values into the appropriate formula.

Comparing two proportions

We shall illustrate this by looking at how to compute the sample size for a study which aims to determine whether the proportion of a particular outcome differs between two groups. This may be the proportion with disease in the exposed compared with unexposed group in a cross-sectional or cohort study, or the proportion of people exhibiting the outcome of interest in the treatment group compared with placebo group in a clinical trial. This is not suitable for case-control study designs (this will be covered later).

Let π_1 be the true proportion in group 1

π_2 be the true proportion in group 2

$D = \pi_1 - \pi_2$ is the true difference between the two groups.

The formula for the sample size for comparing two proportions is

$$n = \left[\frac{\pi_1(1-\pi_1) + \pi_2(1-\pi_2)}{D^2} \right] \times F$$

where n is the number **in each group** and

where F depends on the power and significance level, and can be obtained from the following table:

		Power			
		50%	80%	90%	95%
significance level	0.10	2.7	6.2	8.6	10.8
	0.05	3.8	7.9	10.5	13.0
	0.01	6.6	11.7	14.9	17.8

We do not know π_1 and π_2 , so we have to make a guess as to the prevalence in the baseline group (say π_1) and decide what difference we want to be able to detect (this is D). The value to put in for π_2 can then be deduced ($\pi_1 - D$).

Example

We want to determine whether the prevalence of lung cancer in the UK elderly population differs between men and women. We guess the prevalence in women will be about 4% and we would consider a 3% higher prevalence in men (ie 7%) to be a clinically important difference. We want to be 90% sure of getting a significant result if such a difference really existed (i.e. 90% power), and we define 'significant' by the 5% significance level (ie 5%

probability of a type I error is acceptable). Then $F=10.5$, and the number of subjects **in each group** will be:

$$n = \left[\frac{0.04(1-0.04) + 0.07(1-0.07)}{0.03^2} \right] \times 10.5 = 1208 \text{ in each group}$$

Note: this formula is only suitable for studies with the same number of people in each group.

Other measures of effect

The same ideas can be applied to other study designs. When the measure of effect is the **difference in two means**, the following formula (based on 95% confidence or $\alpha = 5\%$) is used:

$$n = \frac{2\sigma^2(1.96 + \varepsilon_\beta)^2}{D^2}$$

where

σ = standard deviation of the outcome variable in the whole population

ε_β = 1.282 for power of 90% or 0.842 for power of 80%

D = difference in means between two groups

For study designs where your measure of effect is a risk ratio (cross-sectional or cohort study) or odds ratio (cross-sectional, cohort or case-control), sample size calculations can be carried out in the package EpiInfo (see below). For rate ratios (cohort study), see Essential Medical Statistics by Kirkwood and Sterne.

Factors affecting sample size calculations based on power

The factors which affect the sample size calculations in this section are

1. the **power**: the greater the required power (ie smaller probability of type II error) the more people are needed.
2. the **significance level**: the smaller the significance level (ie smaller probability of Type I error), the more people are needed
3. the **outcome** of interest. For binary outcomes, the closer the population proportions π 's are to 0.5, the more people needed. For continuous outcomes, the bigger the variation in the outcome, represented by σ , the bigger n .

4. the **size of the difference** between the groups, D. The smaller the difference you want to detect, the more people are needed.

General Points about sample size calculations

- Sample size calculations are only **rough** estimates of how many people you need as they are based on some degree of guessing of the size of parameters.
- Try working out sample size for a number of **different scenarios** to give an idea of the possible scope of the study. It will help you decide whether the study is both feasible and worth doing.
- Remember to increase the sample size obtained from the calculation to allow for **non-response**, drop-outs etc.
- **Matching** in a case-control study can increase your power if you match on strongly confounding variables.
- The examples given have all assumed the comparison of two equal sized groups. However in some situations we may have **different sized groups** eg 1 case to 2 controls. In a case-control study, inclusion of more controls will give you more power, but little is to be gained by going beyond 4 controls per case.

Sample size calculations using a computer package

The software package **EpiInfo** is useful for sample size calculations for epidemiological studies. EpiInfo can be obtained free by downloading from the internet (<http://www.cdc.gov/epiinfo/>). **Nquery Advisor** is a specialist sample size software package that is available on UoN applications under School of Medicine, and can be used for precision and power calculations for proportions and means, as well as for more complicated analyses (eg sample size for when carrying out regression analyses). Other packages include Stata (also available under UoN applications), SamplePower, PASS and GraphPad StatMate, amongst others.

Sample size calculations in EpiInfo

1. Estimation of a single proportion with a required precision

- Choose Statcalc.
- Then choose sample size and power, followed by population survey.
- Leave the top box as 999999. In the second box put in your estimate of π expressed as a percentage, i.e. 0.08 would be entered as 8% (remember err to 50% if in doubt).
- In the third box, put in the value of w. For our example, put 2%.

- Leave design effect and cluster boxes as 1 (these only change if doing clustered sampling rather than simple random sampling).
- Read off the sample size (total sample size column and 95% confidence level row)

2. Comparison of two proportions with required power

- In statcalc, choose 'cohort or cross-sectional'
- In the top box put in desired confidence level $1 - \alpha$ (usually 95%)
- In next box put in desired power, eg 90%
- Put in desired ratio of unexposed to exposed (1 for equal sized groups)
- In the next box put in your guess for the prevalence in group 1 (eg 4%)
- Skip past the risk ratio and odds ratio boxes and in the last box put in the prevalence you would like to be able to detect (eg 7%)
- Read off sample size from the table displayed (note three different results are displayed for three slightly different methods; Fleiss is fine to use and similar to that computed in the example earlier by hand).

In EpiInfo, we can alternatively express our desired difference in outcome (ie the effect we wish to detect) as a ratio (**risk ratio or odds ratio**) rather than an absolute difference. Follow the same instructions as above but put in the risk ratio or odds ratio you wish to detect instead of the proportion in group 2. Note, this is only appropriate for cross-sectional or cohort studies. For case-control studies see below.

3. Unmatched case-control study

- In statcalc choose 'unmatched case-control study'
- In the top box put in the desired confidence level $1 - \alpha$ (95%), in the next box put in the desired power, then put in the ratio of controls to cases you want, then your guess for the percentage of controls exposed, and finally the odds ratio you would like to be able to detect (or percent of cases exposed).
- Read off the sample size in the table displayed

Sample size calculations in Nquery Advisor

1. Estimation of single mean or proportion with a required precision

- Select File & New
- Under Goal, select proportions or means as appropriate
- Make sure under Number of groups, 'One' is selected, and under Analysis Methods, 'confidence interval' is selected

- In the box at the bottom, select 'confidence interval for mean' (or proportion) and press ok
 - A new screen will open and in column 1, enter 0.95 for 'confidence level' and 2 for '1 or 2-sided'. Enter your estimated standard deviation σ (or expected proportion π) and your desired width of confidence interval w .
 - The required sample size will appear next to n .
 - Use other columns to try different scenarios.
2. *Comparison of two unpaired means with required power*
- In the study goal and design window (under file, new), choose means as goal, two as number of groups, and test as analysis method.
 - Select Students t-test from the bottom box (assuming the outcome variable is expected to follow a roughly Normal distribution) and press OK.
 - Under column 1, enter 0.05 for significance level and 2 for 1 or 2 sided. Then enter the expected mean in the baseline group (group 1), the difference in means you wish to detect (group 2 mean will be then calculated automatically), and the estimated standard deviation σ .
 - Finally enter the desired power (80 or 90) and the sample size per group will be displayed (note this is NOT the total sample size but the sample size per group).

Note: If the 2 groups are **paired**, choose one instead of two under 'number of groups' and then select paired t-test.

3. *Comparison of two proportions with required power*
- Follow the same instructions as above for two means, but choose proportions under goal, and under 'Chi-squared test to compare two proportions' select 'Compute power or sample size'. Then instead of entering the baseline mean and mean difference, enter the baseline proportion and either group 2 proportion or the odds ratio.

Appendix 4: Setting of the study



Location of Saudi Arabia on world map



Location of Tabuk on map of Saudi Arabia

Appendix 5: School calendar in Saudi Arabia

Semester	start	End
Semester 1 2017/2018	18/09/2017	18/01/2018
Semester 2 2017/2018	21/01/2018	15/05/2018
Semester 1 2018/2019	02/09/2018	27/12/2018
Semester 2 2018/2019	06/01/2019	02/05/2019

Appendix 6: letter approval from department of education in Tabuk City.

الرقم : ٤٠١٩٥٩٣٨٢٢
التاريخ : ١٦ / ١ / ١٤٤٠ هـ
المرفقات : استبانة

وزارة التعليم
Ministry of Education

المملكة العربية السعودية
وزارة التعليم
الإدارة العامة للتعليم بمنطقة تبوك
إدارة التخطيط والمعلومات
قسم البحوث التربوية

إلى : سعادة قائدة المدرسة الثانوية
من : مدير التخطيط والتطوير
الموضوع : تسهيل مهمة الباحثة/ نوال عبدالله بيشي أزيبي
السلام عليكم ورحمة الله وبركاته

إشارة إلى إفادة الملحق الثقافي بسفارة المملكة العربية السعودية لدى المملكة المتحدة، بأن الباحثة/ نوال عبدالله بيشي أزيبي سجل مدني ١٠٢٧٤٢٨٦٥٣ المسجلة بملف رقم TBU263 "مبتعثة من قبل جامعة تبوك لنيل درجة الدكتوراه من جامعة نوتنغهام "Nottingham" تخصص (علوم صحية / قسم تغذية) وترغب في تطبيق دراستها ذات العنوان (العوامل المرتبطة بإهمال طالبات المرحلة الثانوية لوجبة الافطار في منطقة تبوك)، وحيث أنه لا مانع لدينا من تطبيق الدراسة في المدارس الثانوية بنات في منطقة تبوك.

نأمل تسهيل مهمة الباحثة لتطبيق أداة رسالتها إذ تستهدف الدراسة طالبات المدارس التالية : الثانوية السادسة بتبوك ،الثانوية السابعة عشر بتبوك ،والثانوية الرابعة والعشرون بتبوك) .
والسلام عليكم ورحمة الله وبركاته ،،،

عبدالرحمن بن ناصر الناصر
عن
م/عادل

ص/ إدارة التخطيط والتطوير

Appendix 7: Data Collection period Letter



Faculty of Medicine and Health Science
University of Nottingham
School of Health Sciences
The University of Nottingham
C Floor, South Block Link,
Queen's Medical Centre
Nottingham
NG7 2HA
Tel: +44(0)115 8230901
Tel: +44(0)1159 516193
Fax: +44(0)115 8230999

Email: Gary.Adams@nottingham.ac.uk

Royal Embassy of Saudi Arabia
Cultural Bureau in London
630 Chiswick High Road London
W4 5RY
United Kingdom

18 July 2018

To whom it may concern

Re: Nawal Ozaybi – PhD Studies in Health Sciences, University of Nottingham

Nawal Ozaybi is registered in the School of Health Sciences, University of Nottingham, UK as a PhD student and is approaching her second year of study. As academic PhD supervisor for Nawal, I can confirm that subject to ethical approval, it is anticipated that Nawal will begin recruitment and data collection as part of her PhD studies between 10th of October 2018 to 10th of January 2019.

Nawal intends to undertake a mixed method study for her PhD to estimate and explore the reasons and factors which determine why adolescent female students, aged 16-18 years old in Tabuk city, miss breakfast. As such, she intends to recruit participants and collect data in Saudi Arabia during the abovementioned time-period. Study participants will be recruited through three secondary state schools in Tabuk city, Saudi Arabia.

Data collection will be in the form of quantitative survey and qualitative focus groups and it is anticipated that these will take place at secondary schools in Tabuk. During the period of data collection, Nawal will continue to have active supervision from her supervisors in Nottingham and for the time when she is in Saudi Arabia.

I am writing to ask if you would be willing to give permission for Nawal to conduct her PhD study as outlined above. Full ethical approval for this research will be obtained in the UK,

from the Faculty of Medicine and Health Sciences Research Ethics Committee at the University of Nottingham.

Thank you in advance for your consideration of this project. If further information is required, please do not hesitate to contact me.

Yours faithfully,

A handwritten signature in blue ink, appearing to be 'G. Adams', with a stylized flourish at the end.

Dr Gary Adams BSc (Hons) RGN PGDipAdEd PhD FRSC FRSB FHEA
(Principal Supervisor to Ozaybi Nawal)

Appendix 8: consent form



CONSENT FORM FOR PARENTS

(Draft Version 1.0 27/04/2018)

Title of Study: Factors associated with breakfast intake and skipping among adolescent Saudi girls in Tabuk City, Saudi Arabia

Name of Researcher: Nawal Ozaybi

Name of Parent:

Name of Participant (Child):

Please initial box

1. I confirm that I have read and understand the information sheet version numberdated for the above study and have had the opportunity to ask questions.

☐

2. I understand that my child's participation is voluntary and that they are free to withdraw at any time, without giving any reason. I understand that should they withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis.

☐

3. I understand that relevant sections of my child's data collected in the study may be looked at by responsible individuals from the University of Nottingham, the research group. I give permission for these individuals to have access to these records and to collect, store,

☐

analyse and publish information obtained from my child's participation in this study. I understand that my child's personal details will be kept confidential.

4. I understand that the e focus group will be audio recorded using an audio recorder, and that anonymous direct quotes from the think-aloud session and focus group may be used in the study reports.

☐

5. I agree that the information gathered about my child can be stored by the University of Nottingham, for possible use in future studies. I agree to my child's data being shared with other researchers including those working outside the University. Any data used will be anonymised, and my child will not be identified in anyway.

☐

6. I agree for my child (named above) to take part in the above study.

☐

Name of Parent Date Signature

Name of Person taking consent Date Signature

(OPTIONAL) Section for children to give assent

I agree to take part in this study

Name of Child (for assent) Date Signature

Appendix 9: Study Survey

Participant code.....

Date:..... /...../.....

Please circle the option that is apply to your condition:

1- Which one is your school:

a-17th secondary school

b-6th secondary school

c-24thsecondary school

2- **Grade:** a- 1

b- 2

c- 3

3- **Age...**.....

4- **Weight:**.....

5- **Height:**.....

5- living with

a- Both parents

b- Mother only

c- Father only

d- Other. Please explain.....

6- **Family income:**.....

7- **Religion:**.....

8- **Area:**

a- Rural

b- Urban.

9- Working Mother:

a- Full time.

b- Part time.

c- Not working.

d- Housewife.

10- Mothers' level of education

a-Elementary

b-Intermediate

c-Secondary

d-bachelor's degree

e-Professional degree

11- Fathers' level of education

a-Elementary

b-Intermediate

c-Secondary

d-Bachelor degree

e-Professional degree

12- Do you usually eat breakfast?

a- Yes.

b- No

13- How many days of the week did you eat breakfast during this week? Please tick each day you had breakfast:

School days	Breakfast	No Breakfast	Where did you eat your breakfast?! (Choose one of the listed options)
Sunday			Home – Car or bus - Before 1 st lesson – In break after 3 rd lesson
Monday			Home – Car or bus - Before 1 st lesson – In break after 3 rd lesson
Tuesday			Home – Car or bus - Before 1 st lesson – In break after 3 rd lesson
Wednesday			Home – Car or bus - Before 1 st lesson – In break after 3 rd lesson
Thursday			Home – Car or bus - Before 1 st lesson – In break after 3 rd lesson
Week end	breakfast	No breakfast	<u>Where did you eat your breakfast</u>
Friday			Home– Restaurant
Saturday			Home– Restaurant

14- Who does prepare your breakfast most of the time?

- a- All the family. b- Housekeeper c- I buy a ready-made breakfast
d- My brothers-sisters e- Myself f- My father
g- My mother - H- No one.

15- Please tell us what is the main composition of your breakfast? (Tick where appropriate)

- a-Cereals b-Eggs c-Milk
d-Bread with cheese e- Bread with Jam f-Fruits
g-Fresh Juice h- Falafel sandwich i-Coffee
j-Tea k- Vegetables l- Beans.
m- Hummous. n- Tuna o- Mortadella
p- I do not eat breakfast. q- Fizzy drink. r- Donut.
s- Others. Tell us what you eat for breakfast usually:

.....
.....

16- Who do you eat your breakfast with (most of the time)?

- a- On my own b- With one of family members c- All my family
d-Friends.

17- How many meals do you eat per day usually?!

- a- 1 b- 2 c- 3 d- 4 e- 5
f- More than 5

18- Which of the following reasons would be most likely to contribute to you missing breakfast on a particular day?

No time for breakfast as I oversleep usually.	Yes	No
I don't feel hungry	Yes	No
I am trying to lose some weight	Yes	No
Culturally, we don't eat breakfast at home	Yes	No
I don't know why I need to eat breakfast.	Yes	No
I cannot afford to eat or buy breakfast	Yes	No
I don't like the breakfast types of food	Yes	No
Our family situation is hard now	Yes	No
My friends don't eat breakfast as well.	Yes	No
I don't have energy to prepare it.	Yes	No
It will not make a difference in my day.	Yes	No

Others.

.....

.....

End of Survey

Appendix 10: Study Advertisement



The University of
Nottingham

UNITED KINGDOM • CHINA • MALAYSIA

**Are you interested
to join us ?**

If you are healthy and aged 16-18 years,
you can help by joining us in a study about
morning breakfast over the next 2 weeks.

Please come and ask your head teacher
about it or contact me on:

Nawal Ozaybi 0500384862
E-mail: ntxno2@nottingham.ac.uk

Please note: participants will not get any inconvenience allowance for participation.

Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk	Name: Nawal Ozaybi 05 0038 4862 E-mail: ntxno2@nottingham.ac.uk
--	--	--	--	--	--	--

Appendix 11: Participant Information Sheet (PIS)

Title of Study: Factors associated with breakfast intake and skipping among adolescent Saudi girls. In Tabuk City, Saudi Arabia

Name of Researcher(s): Nawal Ozaybi, postgraduate research student. Dr. Gary Adams. Dr. Richard Windle

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. The researcher will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Ask us if there is anything that is not clear.

What is the purpose of the study?

The aim of the study is to explore the reasons of breakfast skipping among adolescents in Tabuk City, Saudi Arabia

Why have I been invited?

Participant information sheet for the students. You are being invited to take part because I would like to know and hear from you about your intake and your eating habit with breakfast. There are more around 700 students will be participate.

Participant information sheet for the mothers: You are being invited to take part because you have experienced with your child breakfast habit and would like to know from you about some factors relating to that.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You will be invited to take part in survey. The researcher will explain all aspects of the study to participants. You will be given this information sheet to read and keep and will be asked to sign a consent form. The researcher is bilingual and therefore the consent forms and information sheets will be available in both Arabic and English languages.

Then you will be invited to take a part in second phase for focus group a focus group discussion will be run for 45-90 minutes and will be taken by the researcher. FG will be audio-recorded by the researcher using an audio recorder. Participation in the study is entirely voluntary and you may withdraw at any time. In the event of their withdrawal data collected so far cannot be erased, and we will seek consent to use the data in the final analyses, where appropriate.

Expenses and inconvenience allowance

We will not be able to pay you for taking part as this is research, I am undertaking as part of my doctoral studies, but will arrange the meeting so that you do not have to travel and will incur no expense.

What are the possible disadvantages and risks of taking part?

There will be no risk on participation on this phase of the project. The participation has no effect on students' grades and all volunteer participants can withdraw from the study at any time they deem necessary.

What are the possible benefits of taking part?

The study is going to be very beneficial to the diverse stakeholders as students, school administration, nutritionists as well as the overall policymakers in general. Students can use the findings of this study to formulate better breakfast consumption strategies. Parents will be able to assess the reasons that lead to their children skipping breakfast and consequently implement strategies that will address the situation. The school administration will have access to information on the rates of breakfast skipping and consequently address how they can teach their students to observe breakfast consumption. Nutritionists, on the other hand, will access information concerning the nutritional attributes contributing to breakfast skipping and ways of improving the situation. On the case of the policymakers, the rate of skipping breakfast among adolescents will form an integral foundation for them to develop interventions that will resolve the situation in all the age groups.

Will my taking part in the study be kept confidential?

We will follow ethical and legal practice and all information about you will be handled in confidence.

If you join the study, some parts of the data collected for the study will be looked at by authorised persons from the University of Nottingham who are organising the research. They may also be looked at by authorised people to check that the study is being carried out correctly. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and on a password protected database. Any information about you which leaves the institution will have your name and address removed (anonymised) and a unique code will be used so that you cannot be recognised from it.

Your personal data (email, and telephone number) will be kept for two years after the end of the study so that we are able to contact you about the findings of the study and possible follow-up studies (unless you advise us that you do not wish to be contacted). All other data (research data) will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken by all those involved to maintain your confidentiality, only the researcher have access to your personal data.

We would also like to seek your consent so that the data may be stored and used in possible future research during and after 7 years– this is optional (please indicate you agree to this on the consent form).

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time, without giving any reason.

What will happen to the results of the research study?

The study being a requirement for the award of a doctoral degree, it is anticipated that findings from the study will be disseminated at various stages of the study (from pilot to the conclusion of the main study) in appropriate scientific journal in open access journals for wider coverage, poster and oral presentations in SA and at international conference. You can send the researcher to have a copy of the publication and you will not be identified in any report/publication.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is being funded by the Saudi Arabian Cultural Bureau in London.

Who has reviewed the study?

All research in the University of Nottingham is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the Faculty of Medicine & Health Sciences (FMHS) Research Ethics Committee.

What if there is a problem?

If you have a concern about any aspect of this study, you should contact the Chief investigator e-mail: ntzga@nottingham.ac.uk or nxzrw@nottingham.ac.uk. The full contact details of the research team are given at the end of this information sheet. If you remain unhappy and wish to complain formally, you should then contact the FMHS Research Ethics Committee Administrator, c/o The University of Nottingham, Faculty PVC Office, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH. E-mail: louise.sabir@nottingham.ac.uk.

Further information and contact details

Investigators	Name	Emails
Principle investigators	Nawal Ozaybi	ntxno2@nottingham.ac.uk
Chief investigators details	Dr Gary Adams	ntzga@nottingham.ac.uk
	Dr Richard Windle	nxzrw@nottingham.ac.uk

Appendix 12: The detailed interview guide for students and mothers

Overview:

- 1- Thank participants for taking part in the group discussion.
- 2- Read the research information sheet to revisit research objectives and the reasons for conducting this research.
- 3- Signing the consent form.
- 4- Stating that participants are free to interrupt and comment or give statements anytime during the discussion.

Interview questions:

- 8- What is your daily routine in the early morning?
- 9- What AHB as a meal means for you?, Do you think it is an important meal? Why?
- 10- How many meals are enough for one day? Did they think they need to drop one of them?
- 11- If it happened and you ate AHB on some days, when did you eat it? And what circumstances that were facilitated to make you eat breakfast?
- 12- if it happened and you skipped breakfast, why did you skip it? Or what circumstances that were facilitated to skip your breakfast?
- 13- Whether you skip or eat AHB occasionally, what were your perceptions toward your practice? why?
- 14- Did you skip breakfast due to food choices that were available early morning? Did you prefer other food choices early morning before school? What if these food choices were available? Would you eat AHB then?
- 15- Did you feel hungry at morning when you woke up? If not, why? Was it because of a late dinner the day before? Do you go to bed to sleep in

hunger?

- 16- When do you sleep usually? If you slept early, would you eat breakfast next morning? What if you slept at late hour, would you tend to eat or skip AHB more often?
- 17- Did you skip breakfast because no one care to prepare breakfast at home? What if you found a prepared breakfast, would you eat it?
- 18- Did you skip AHB even if you were awake a while before school time? Or did you skip breakfast because you woke up late and found no time to eat?
- 19- If you chose to skip breakfast, did you drink milk, tea, coffee or water early morning before attending school?
- 20- Did you think that breakfast may affect weight? Could it be a reason to skip breakfast?
- 21- When you eat breakfast on some days, did you find any change in your activity level, thinking process or alertness?
- 22- What about school exams, did you intentionally tend to skip or eat AHB during exams period?
- 23- Relating to your families, were you the only family members who skipped AHB? What about your family members such as your brothers or sisters who go to school?
- 24- When you eat breakfast, did you eat breakfast alone or with others such as friends?
- 25- Did friends affect your habit to eat or skip AHB?
- 26- Were you willing to change their skipping habit to eat breakfast on most
Did friends affect your habit to eat or skip AHB?
- 27- Were they willing to change their skipping habit to eat breakfast on

most days? Why? What you need to change?

28- Did you use to eat breakfast more frequent when you were younger? If yes, why that routine had changed?

29- Did you feel any unwanted discomfort when you eat or skip AHB? Were there any medical reasons for their practice regarding AHB?

30- Did you believe that students who skip AHB need an intervention or help to change?

Conclusion:

1- Participants were offered the chance to ask any questions as the discussion was coming to an end.

2- Thank participants for their voluntary participations and confirm that their responses are anonymised in this research study.

3- Participants were provided with school contact numbers if they wanted to discuss any issue related to the research study.

Appendix 13: Research Ethics Committee Approval

Application form

FACULTY OF MEDICINE & HEALTH SCIENCES

RESEARCH ETHICS COMMITTEE

Application for approval of all studies involving **Healthy Human Participants only conducted by Staff and Students of the University of Nottingham**

1 **Title of Project:**

Factors associated with breakfast skipping among adolescent aged 16-18 Saudi girls in Tabuk City, Saudi Arabia

Short title Factors associated with breakfast skipping among adult girls in Saudi Arabia

2 **Names, Qualifications ,Job Title, School/Divisional/Unit/Address, email of all Researchers:**

Nawal Ozaybi, PhD Student, a lecturer in Tabuk university and was work as a teacher at secondary school for five years, will give the verbal explanation and obtain consent from participant.

Chief Academic/Supervisor: Dr Gary Adams BSc (Hons) RGN PGDipAdEd PhD FRSC
FRSB FHEA
Co-Director NCMH
Associate Professor/Reader in Applied Health and
Therapeutics
University of Nottingham
School of Health Sciences
The University of Nottingham
t: +44 (0) 115 82 30901

ntzga@exmail.nottingham.ac.uk

Other key researchers/collaborators: No other researchers/collaborators.

Students name and course: Nawal Ozaybi

PhD Nutrition studies

Faculty of Medicine & Health Sciences,

The University of Nottingham

Phone: +44(0) 7951826349

ntxno2@exmail.nottingham.ac.uk

3 Type of Project:

PhD Student project (Nutrition studies)/ mixed methodology

4 Location of study:

3 Secondary schools at Tabuk city, Saudi Arabia

Start date: September 2018

End date: May 2019

Length of study: October 2016 – October 2020 (duration of PhD registration)

Data collection approximately 6-9 months.

5 Description and number of participants to be studied:

Phase 1:

Description: questionnaire

Sample size: Around 380 secondary students aged 16-18-year-old

Justification: The sample size was calculated by statistician at Nottingham University and based on the power calculation the sample size was around 380 students, by targeting 700 students at three school, we will be sure that we will get the appropriate sample size.

Phase 2:

Description: six Focus Group Discussions (FGD); three with students and the other three with students' mothers.

Sample size: 10 -15 participants on each focus group.

Justification: Based on results of a literature review.

6 Summary of Experimental Protocol

Background

Breakfast consumption is considered as the most important meal of a day (Rampersaud, 2009), with recent debates addressing the issues that are contributing to adolescents skipping this important meal prior to going to school (Gong and Heald, 1994). The prevailing assertion has been that breakfast is critical to adolescent's development with health and academic performance being examples of this. The reasons that contribute to skipping, as well as the rate of skipping breakfast, will be examined in this study and include such issues as BMI, education levels of the parents, peer pressure, socioeconomic factors among others. While it is evident that breakfast skipping has been addressed in some studies (Sun et al., 2013), it is evident that no studies have been carried out in Tabuk City, Saudi Arabia in trying to explain this trend. Through this study, therefore, it will be possible to evaluate the reasons that account for adolescents in Tabuk City, Saudi Arabia skipping breakfast consumption as well as the prevailing rate. The results obtained will be valuable to stakeholders in the education as well as nutrition sectors as they seek to deal with the situation.

Aim

The aim of the study is to estimate AHB skipping rate and explore the reasons and factors behind this practice among adolescents' females' students aged 16-18 years old in Tabuk city.

PRIMARY OBJECTIVE

4. To identify the rate of skipping AHB among adolescents' females' students aged 16-18-years-old in Tabuk city.

5. To explore the reasons and factors behind skipping AHB in this age group.
6. To provide an insight on the knowledge that adolescent females aged 16-18 years old possess about AHB and its importance.

SECONDARY OBJECTIVE:

Following the study results, researcher will develop recommendations for educational intervention-based research to explore the impact of addressing the practice of skipping AHB in this age group in Tabuk city.

Research protocol and methods

The study will adopt a mixed methods study design, encompassing the use of qualitative and quantitative research approaches used together in the research project (Elo and Kyngäs, 2008). In this study, the quantitative component of the design will act as the foundation of the qualitative section in dealing with the set research questions. A mixed methods approach is necessary in order to be able to achieve the main objectives of the study – firstly to look at the prevalence of breakfast skipping (quantitative) and then to look qualitatively at the reasons for breakfast skipping in this age group. Therefore a sequential mixed methods approach will be adopted (Hall, 2012).

Measurable end points/statistical power of the study

There will be two measureable end points, (1) Data from questionnaires will be entered into Statistical Package for Social Sciences (SPSS, v.22); descriptive statistics and a frequency table will be calculated which is expected to commence in September 2018 (after ethics approval from study sites) (2) Focus groups with the participant (students and mothers) which is expected to commence in February 2019.

Key references

- Elo, S. & Kyngäs, H. 2008. The qualitative content analysis process. *Journal of advanced nursing*, 62, 107-115.
- Gong, E. & Heald, F. 1994. Diet, nutrition and adolescence. *Modern Nutrition in Health and Disease*. Philadelphia, Lea & Febiger, 7759, 7769.
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- Sun, J., Yi, H., Liu, Z., Wu, Y., Bian, J., Wu, Y., Eshita, Y., Li, G., Zhang, Q. & Yang, Y. 2013. Factors associated with skipping breakfast among Inner Mongolia Medical students in China. *BMC Public Health*, 13, 42.

7 Lay Summary of project.

The study will examine the reasons that account for secondary school students to skip a breakfast meal, the sequential explanatory design will be used, and it is divided into two phases during the mixed research. Firstly, a survey will be conducted to establish the

prevalence of skipping breakfast among the school students and the composition of breakfast for those who take it.

Statistical procedures will be highlighted through data collection and analysis. Then, by using focus groups the overall aim of the second phase, which will be qualitative in nature, encompasses the assessment of the reasons for skipping breakfast as indicated by these participants. This study seeks to gain an understanding of reasons that result in adolescents in Tabuk City, Saudi Arabia skipping breakfast before going to school.

8 Will written consent be obtained from all volunteers?

Yes

Please give the name, status and relevant qualifications of the person who will give a verbal explanation and obtain consent.

Please include flowchart to show the process from recruitment to informed consent for this study.

Posters will be located around the school to inform the students that there will be research conducted over several weeks. Moreover, a leaflet will be distributed to students (1 week) prior to the study informing them that they will be taking part in the research. Moreover, questionnaires will be given out to all students and it will be clearly explained that completion of the questionnaires is optional and that it will not affect them in any way if they complete it or not. By completing the questionnaire, the students are seen to be giving consent to their anonymized data being used and any child whose parent objected, they will not be issued with a questionnaire. However 16-18 years olds they are able to consent to for themselves (University of Nottingham). Student will be also invited to participate in the second phase and a letter will be sent to them and their mothers once they will be identified as "skipper" to be participated on focus group.

9 Will an inconvenience allowance be offered?

No, unless they will be asked to make any travel arrangements.

10 FUNDING

Will there be any material benefits from the study for the Department or individual investigator? (E.g. equipment, research salaries, consumables etc.)

No

11 Studies involving NHS Staff, organisations, Services

Does the study involve any premises, services staff who hold a contract with a hospital, Primary Healthcare or Social Care T

No

12 How will the subjects be chosen?

First Phase (questionnaire)

Eligibility criteria	Description
Inclusion criteria	• Female secondary students in Tabuk city, Saudi Arabia. • Age between 16-18 year • Ability to give informed consent.
Exclusion criteria	• Any other nationality than Saudi

	student. • Those who are not willing to participate
--	--

Second Phase (FG)

Eligibility criteria	Description
Inclusion criteria	• Female secondary students in Tabuk city, Saudi Arabia. • Participant who's identified as breakfast skipper. • Age between 16-18 year • Ability to give informed consent.
Exclusion criteria	• Any nationality other than Saudi students as we are looking for participants with similar backgrounds. • Those who are not willing to consent.

Please include a copy (as a separate attachment) of your proposed poster or advert, e-mail/letter of invitation text to be posted on social media sites.

An advert will be placed across the schools.

13 Describe how possible participants will be approached.

Posters will be located around the school to inform the students that there will be research conducted over several weeks. Participant will then be given the study information sheet and invitation letter and consent obtained on the day of questionnaire. Students will be assured that their participation has no effect on their grades and all volunteer participants can withdraw from the study at any time they deem necessary.

14 What sources of information will be included? i.e, pre-existing research database, student records, visits to other organisation, online resource

This study is explanatory mixed methods, it will begin with a quantitative study and then the qualitative study. Thus, the final version of the qualitative topic guide will be completed after the first phase ends. However, a copy of adapted questionnaires and FG guideline are attached to the proposal.

15 Whose permission will be sought to access this information (eg GP, consultant Head of Organisation)?

An ethical application will be submitted to the ethical committee in education department in Tabuk city, Kingdom of Saudi Arabia, in order to obtain access to study area if approved.

16 For interview/focus groups:

Nawal Ozaybi, a PhD student will conduct the focus group in the second phases. They will take place on school, and it will last 45-90 minutes for each group. During the focus group with students, the researcher will discuss the participants' experience on their breakfast regarding to reasons skipping it. In the focus group with mothers, the researcher will discuss the mothers'

views regarding why their children skip breakfast and how they can encourage them to take it regularly.

Responses from the focus group will be audio-recorded, transcribed and translated from Arabic to English language by the researcher, anonymously and confidentially. They will be stored in a locked filing cabinet, and the electronic copy and audio- recording will be stored in a personal file space on the university server. This data will be kept securely for seven years following publication of results.

Only the resercher (Nawal Ozaybi) and supervisors (Dr. Adams Gary and Dr. Richard Windle) will have access to the data. Time will be used as criteria for stopping the focus group sessions unless requested by a participant who will be assured at the start of the study that they can withdraw at any time.

In case of participants become angry, upset, or in any discomfort situation during the focus group, discussion will be interrupted, and researcher will provide more clarification and the participant will be requested for re-scheduling of the appointment considering the study timeframe. If something of concern arises, this will be referred to an appropriate senior manager within the organization and reported to the Faculty Research Ethics Committee. Participants will be made aware of this in both the information and consent forms.

17 What ethical problems do you foresee in this project?

This project considered as a low risk study, however, there might be a few issues of concern such as following:

- Participant giving up one and half hours of their time or more during focus group.
- Participants may be sensitive to the discussion related to their experience on their breakfast.
- Participants may feel some coercion that they need to volunteer otherwise their progress on the study will be affected.

However, participants will be made to understand that the researcher will select a convenient time for them and refreshment and vouchers will be provided at the end of the day. Moreover, they will be made to understand that they have the right to withdraw from the study at any time they deem necessary. Anonymity, confidentiality and privacy of participants will be ensured. Thus, there will be a low risk of harm to participants and no coercion to take part.

18. What are the possible limitations of the proposed design of this study?

DECLARATION: I will inform the Medical School Ethics Committee as soon as I hear the outcome of any application for funding for the proposed project and/or if there are any significant changes to this proposal. I have read the notes to the investigators and clearly understand my obligations as to the rights, welfare and dignity of the subjects to be studied, particularly with regard to the giving of information and the obtaining of consent.

Signature of Lead Investigator:

Date:

****Nb** If you are student your supervisor must sign this form otherwise it will be rejected

Name and address for correspondence with applicant:

Nawal Ozaybi

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Appendix 14: Result in demographic per school

		17th Secondary	6th Secondary	24th Secondary
School age	15	30	43	12
	16	89	67	53
	17	68	59	55
	18	29	52	48
	19	3	3	5
	20	0	1	0
Nationality	Saudi	191	215	172
	Egyptian	17	1	1
	Syrian	4	4	0
	Yemen	3	4	0
	Sudan	3	1	0
	Mauritania	1	0	0
Religion	Muslim	219	225	173

School Stage	First	100	92	68
	Second	59	71	51
	Third	60	62	54
Living With	Both parents	197	198	148
	Mother only	18	23	21
	Father only	4	4	3
	Married	0	0	1
income	Low income	6	4	9
	Intermediate income	158	172	120
	High income	55	49	44
Area	Tabuk city	212	223	172
	Tabuk Rural Areas	7	2	1
Mother work	Full Time	37	44	21
	Part Time	15	21	21
	Housewife	167	160	131
Father work	Full Time	123	111	56
	Part Time	38	51	32
	Not	58	63	85

	employed			
Mother education	Primary	54	56	67
	Intermediate	45	48	29
	Secondary	56	60	41
	First degree	54	56	22
	Higher Education	10	5	10
	Illiterate	0	0	4
Father education	Primary	23	30	31
	Intermediate	33	45	32
	Secondary	99	82	69
	First degree	52	52	23
	Higher Education	121	161	14
	Illiterate	0	0	4

Appendix 15: Codes identified from data and the example phrases associated with the codes.

Codes	Phrases
Breakfast meaning	"It depends on the type of meal available", "I prefer Milk", "Bread and cheese", "juice or eggs"
Breakfast importance	"Consider its healthy benefits", "It makes one active, alert", "It makes you stay energetic"
Influence of parental control	"Persuasion from my mom", "food availability after waking up", "forcing my daughter to take breakfast", "encourage her to eat"
Sleeping pattern	"they sleep late", "waking up late", "spending more time on phone"
Parents' job commitment	"Job commitment", "early job preparation", "tight schedule for work", "less time for breakfast due to workload"
Time management	"limited time in the morning", "the school bus arrives early"
Availability of food	"Healthy meals are expensive", "lack of good food at school", "the type of food available is of poor quality"
Lack of willingness to eat	"Lack of interest to eat", "don't feel like eating because of weight", "
Stomach ache problems	"Taking breakfast increases stomach upsets", "Gets stomach ache taking milk"
Desire to lose weight / keep healthy	"she desires to stay fit and healthy", "focuses on cutting weight", "being diabetic limits food choice"
Influence from friends / social media	"Influence from friends who take similar food," "influence from friend who don't love some food," "food advertised on social media"
Lack of joint eateries at school	"Lack of eating clubs", "no common dining halls at school,"

Appendix 16: Explanation and Definition of Terms

The meaning of terms is clarified in this section to avoid confusion and to establish a common understanding of how terms are to be used in this thesis.

Public schools (governmental sponsored schools): Public schools are schools sponsored by the government under the supervision of Ministry of Education that provide general education for Arabic-speaking Saudis and non-Saudi students who are willing to study. Education is provided free of charge. It includes education from kindergarten up to and including secondary schools (Al Rawaf and Simmons 1991).

Private schools: Private schools are independent schools or non-state schools. The national government does not administer them. However, the Ministry of Education supervises them.

Intermediate schools: schools for girls from 12-15 years and include grade level 7 to 9. An intermediate school certificate is required to enter secondary or high school.

High schools (secondary schools): schools for girls from 15-18 years and include grade level 10 to 12. A high school certificate is required to enter university.

The School Healthcare Department (SH): The SH department in SA was established in 1964; it provides medical services for students, teachers, and the other education staff through healthcare units. The department provides medical care and treatment for general check-up, emergency cases, and referral cases for serious health problems. In addition, the department is responsible for health school environment and school foods that are provided by canteens. Besides, the department is conducting some periodic health and nutrition surveys in order to investigate, evaluate and control the prevalent health and nutrition-related problems (Al-Shehri, 2008). However, the author did not have a chance to access any of these surveys while conducting the present study.

Breakfast skippers: participants who did not eat breakfast for four or more days of the week.

At home breakfast (AHB) skippers: participants who did not eat AHB for four or more days of the week.

Fast food: Food stuffs have higher energy densities and poorer nutritional quality than foods prepared at home and in comparison, with dietary recommendations such as French fries.

Socio-cultural: a term related to social and cultural factors, which means common traditions, habits, patterns and beliefs present in a population group. The term is mostly used in sociologic and marketing contexts and refers to the most remarkable drivers behind the way people makes decisions in a society.

Appendix 17: Composition and types of breakfast food

Food type	NO			YES			Total			Missing	
	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent	Frequency	Percent	Valid Percent	Frequency	Percent
Cereals	419	67.9	68.5	193	31.3	31.5	612	99.2	100.0	5.0	0.8
Eggs	399	64.7	65.2	213	34.5	34.8	612	99.2	100.0	5.0	0.8
Milk	328	53.2	53.6	284	46.0	46.4	612	99.2	100.0	5.0	0.8
Bread and Cheese	255	41.3	41.7	357	57.9	58.3	612	99.2	100.0	5.0	0.8
Bread and Jam	556	90.1	90.8	56	9.1	9.2	612	99.2	100.0	5.0	0.8
Fruits	538	87.2	87.9	74	12.0	12.1	612	99.2	100.0	5.0	0.8
Fresh Juice	511	82.8	83.5	101	16.4	16.5	612	99.2	100.0	5.0	0.8
Falafel Sandwich	487	78.9	79.6	125	20.3	20.4	612	99.2	100.0	5.0	0.8

Coffee	439	71.2	71.7	173	28.0	28.3	612	99.2	100. 0	5.0	0.8
Tea	404	65.5	66.0	208	33.7	34.0	612	99.2	100. 0	5.0	0.8
Vegetables	581	94.2	94.9	31	5.0	5.1	612	99.2	100. 0	5.0	0.8
Beans	472	76.5	77.1	140	22.7	22.9	612	99.2	100. 0	5.0	0.8
Hummus	567	91.9	92.6	45	7.3	7.4	612	99.2	100. 0	5.0	0.8
Tuna or Mortadella	531	86.1	86.8	81	13.1	13.2	612	99.2	100. 0	5.0	0.8
Fizzy Drinks	568	92.1	92.8	44	7.1	7.2	612	99.2	100. 0	5.0	0.8
Donut	577	93.5	94.3	35	5.7	5.7	612	99.2	100. 0	5.0	0.8

Appendix 18: Quality assurance and audit

Indemnity

The University of Nottingham as research Sponsor indemnifies its staff, research participants and research protocols with both public liability insurance and clinical studies insurance. These policies included provision for indemnity in the event of a successful litigious claim for proven non-negligent harm.

Study conduct

The principal investigator under the guidance of the chief investigator was responsible for securing permission to conduct the study at the study area, application for ethical approval at the study site, consent procedures and recruitment of participants and also adherence to the procedures within the study protocol.

Study data

The principal investigator was responsible for confirmation of informed consent and source data verification. Data storage and quality check was done by the chief investigator and the co-investigator. The Study Coordinator/Academic Supervisors, carried out monitoring of study data as an ongoing activity.

Study data and evidence of monitoring and systems audits were made available for inspection by the REC as required.

Record retention and archiving

In compliance with the ICH/GCP guidelines, regulations and in accordance with the University of Nottingham Code of Research Conduct and Research Ethics, the Chief or local Principal Investigator maintained all records and documents regarding the conduct of the study. These were retained for at least 7 years or for longer if required. If the responsible investigator was no longer able to maintain the study records, a second person was nominated to take over this responsibility.

The study documents held by the Chief Investigator on behalf of the sponsor finally archived at secure archive facilities at the University of Nottingham. This archive included all anonymised audio recordings, study databases and associated meta-data encryption codes.

Statement of confidentiality

Individual participant personal information obtained as a result of this study are considered confidential and disclosure to third parties is prohibited with the exceptions noted above.

Participant confidentiality was further ensured by utilising identification code numbers to correspond to treatment data in the computer files.

Such medical information may be given to the participant's medical team and all appropriate medical personnel responsible for the participant's welfare. If information is disclosed during the study that could pose a risk of harm to the participant or others, the researcher will discuss this with the chief investigator and where appropriate report accordingly.

Data generated as a result of this study was available for inspection on request by the participating physicians, the University of Nottingham representatives or local departments and the regulatory authorities.

Publication and Dissemination policy

The study being a requirement for PhD award, it is anticipated that the study will be published as series of research articles in appropriate scientific journal in open access journals for wider coverage and accessibility. However, participants will not be identified in any of the publications. The study was disseminated through poster, oral presentations, symposium and workshops in SA and at international conferences (nutrition, public health or educational conferences).

Contribution

The study was very beneficial to the diverse stakeholders as students, school administration, nutritionists as well as the overall policymakers in general. Students can use

the findings of this study to formulate better breakfast consumption strategies. Parents were able to assess the reasons that lead to their children skipping breakfast and consequently implement strategies that addressed the situation. The school administration had access to information on the rates of breakfast skipping and consequently address how they can teach their students to observe breakfast consumption. Nutritionists, on the other hand, accessed information concerning the nutritional attributes contributing to breakfast skipping and ways of improving the situation. On the case of the policymakers, the rate of skipping breakfast among adolescents formed an integral foundation for them to develop interventions that resolved the situation in all the age groups.

Appendix 19: Attended events and conferences

Attended events	Date
Orientation	29/09/2016
Doctoral Lunch Session	03/10/2016
Doctoral Lunch Session (Survival tips for the first year including how to survive the "Philosophy of Social Sciences" module!	25/10/2016
Doctoral Lunch Session (Getting started on writing: putting your literature review together)	01/11/2016
Doctoral Lunch Session (Which epistemology? Can you justify your project and call it "scientific knowledge.	15/11/2016
Doctoral Lunch Session(Philosophy of Social Sciences: Tips for getting a good mark in your assignment)	22/11/2016
UON Global health conference	26/11/2016
PhD showcase seminar	08/12/2016
Endnote training	02/02/2017
Pebblepad training/refresher	02/02/2017
IHPE Conference (promoting health	
04/07/2017	
Allied Health Research Conference	
2019	19/09/2019

Appendix 20: Taught modules attended

Modules	Credit hours	Grade
M14150: Philosophy of	10 credits	50%
Research/Social Sciences		
M14152: Foundations in	10 credits	50%
Qualitative Methods		
Total accumulated credits	20	

Appendix 21: Personal development courses

Online Course	2 hours	RA	0.00	Attended	E-learning
Getting Started with Mixed Methods Research (webinar)	23/06/2021	1 hour	0.0	0.00	Attended
Getting Started with Mixed Methods Research (webinar)	12/04/2021	1 hour	0.0	0.00	Attended
Preparing for the Viva (webinar)	26/11/2020	0.5 Days	0.0	0.00	Attended
60 Second Skills - Leadership & Management - Team ActivitiesOnline (Online Course)		60 Seconds worth of content	0.0		Confirmed
Microsoft Word Module 2: Work effectively with margins, breaks, headers and footers	17/08/2020	2 Hours	0.0	0.00	Attended
Getting Started with Mixed Methods Research	17/06/2020	0.5 Days	0.0	0.00	Attended
Research Interview Skills	03/04/2020	1 Day	2.0		Cancelled
Microsoft Word: Creating and Managing Long Documents	01/04/2020	1 Day	2.0		Cancelled
Shut up and Write	28/02/2020	0.5 Days	0.0		Confirmed
Shut up and Write	18/09/2019	0.5 Days	0.0	0.00	Attended
60 Second Skills - First Aid - Primary Survey (Online Course)	Online	60 Seconds worth of content	0.0	0.00	Attended
Microsoft PowerPoint: Advanced	05/08/2019	1 Day	2.0	2.00	Attended
Communicating - using NLP to understand others and get your message across	16/07/2019	0.5 Days	0.0	0.00	Attended

Qualitative Observational Studies	05/03/2019	0.5 Days	1.0	1.00	Attended
Preparing to use NVivo® (standalone online learning course)	01/10/2018	0.5 Days	1.0	1.00	Attended
How do I know I am measuring what I think am measuring in my questionnaire	04/05/2018	0.5 Days	0.0	0.00	Attended
Introduction to Research Data Management	30/04/2018	0.5 Days	1.0	1.00	Attended
Drafting a Chapter of your Thesis	08/03/2018	0.5 Days	1.0		Confirmed
Research ethics and the ethics review process for doctoral research	06/02/2018	0.5 Days	1.0	1.00	Attended
Doing Focus Group Research	16/01/2018	0.5 Days	2.0	2.00	Attended
Qualitative methods tutor (a moderated online learning course)	27/11/2017	5 Days	2.0	2.00	Attended
Introduction to quantitative research	03/11/2017	2 Days	4.0	4.00	Attended
Preparing for your confirmation review	25/04/2017	1 Day	0.0	0.00	Attended
Writing an Impact Statement (Medicine and Health Sciences)	14/03/2017	1 Day	0.0	0.00	Attended
Planning your research	03/03/2017	1 Day	1.0		Cancelled
Introduction to the literature review process (moderated online learning course)	14/11/2016	10 Days	3.0		Confirmed

Appendix 22: A statement of supervision sessions

The University of Nottingham

Faculty of Medicine and Health Sciences

School of Health Sciences

Confirmation Review

Supervisor's Statement of Supervision & Student Progress

Name of PhD Student:

Nawal Abdullah Ozaybi

Principal Supervisor's Statement Please comment on the following:

- The required number of supervision meetings – has this been met?
Nawal has had the required number of supervisions and met with both Dr Windle and myself.
- Your opinion on the progress of the student
Nawal has made good progress over the last year. She is very assiduous and dedicated to her project.
- Please identify any areas of concern
None to be highlighted

I confirm that the above named student has received the required level of supervision¹ and that signed copies of these supervision notes are available in the student's files.

Signed (Principal Supervisor):

Name: Dr.Gary Adams

Date: 24/11/2017

¹ The Quality Manual stipulates that full time students receive a *minimum* of 10 supervisions per year. Part-time students should receive a *minimum* of 6 supervisions per year.