



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



**Republic of Sudan**  
**Ministry of Higher Education and scientific Research**  
**Shendi University**  
***Faculty of Graduate Studies and Scientific Research***

***Patterns of Eating Behavior among Adolescent***

***At Locality of Sharg Alneel***

Research submitted in partial fulfillment of the requirement for degree of M.Sc.in  
community health nursing

By;

***Esraa Salah AldeenAlhuseenAlfaki***

Supervisor;

***Dr. Amal BadawiBushra Moukhtar***

PHD in community health nursing

November 2018

## *Acknowledgment*

I am very grateful to University of Shendi and those who have supported my effort in completing this project. These include after Allahmy supervisor, Dr. **Amal Badawi**, Dr. Mohammed Jaber Aldar, who has been very helpful and supportive. Thank you for the opportunity to work with you. I would like to thank my colleagues, friends and family.

I am also very grateful to my mother, beautiful daughter Jury, wonderful husband and lovely supportive friend Zomoroda.

*Table of contents*

Items	Page No.
Acknowledgement	I
Table of contents	II
List of figures	IV
List of tables	V
Abstract	VI
<b>1. CHAPTER ONE ; Introduction</b>	
1.1. introduction	1
1.2. statement of the problem	2
1.3. justification	3
1.4. objectives	3
<b>2. CHAPTER TWO; Literature Review</b>	
2.1. literature review	4
<b>3. CHAPTER THREE; Methodology</b>	
3.1. study design	18
3.2. study area	18
3.3. study population	18
3.4. sampling	19
3.5. data collection	19
3.6. data analysis	20
3.7. data presentation	20
3.8. ethical consideration	20
<b>CHAPTER FOUR; Results</b>	
4.1. results	21

<b>CHAPTER FIVE; Discussion</b>	
5.1. discussion	29
<b>CHAPTER SIX; conclusion &amp; recommendation</b>	
6.1. conclusion	31
6.2. recommendation	32
Appendixes	33
References	37

## List of figures

<b>Figure No.</b>	<b>Figure title</b>	<b>Paper No.</b>
4.1	The regularity of meals.	22
4.2.	The preference times for snacks among study population	23
4.3	Frequency of having snacks per day among participants	24
4.4	Frequency of having snacks per day among participants	25
4.5	Obesity perception among study population.	26
4.6	perception of study population about their body image	26

## List of tables

<b>table</b>	<b>Table title</b>	<b>page</b>
4.1	demographic characteristics of the study population	21
4.2	correlation coefficient between adolescent's eating habits and their BMI	28
4.3	correlation coefficient between factors effect adolescent's eating habits and their BMI	28

## Abstract

**Background;** adolescent's eating habits and weight status is a cumulative effect of the health and nutritional problems occurring during early childhood as well as those originating in adolescence.

**Aims and objective;** to assess the eating behaviors among adolescents. To find out common eating behaviors among adolescents. To determine factors that affect adolescent s eating behavior.

**Material and methods;** the research design adopted for the study was descriptive cross-sectional research design. The study was conducted in Sharg Alneelocality. The sample comprised of 150 adolescents of 10-20 years who were selected using multistage simple random technique. Questionnaire on eating behaviors was used to collect the data. Descriptive statistics were adopted to analyze the data.

**Results;** majority (76.4 %) of the adolescents are not following any diet. Also results represent that, adolescents tend to have snacks between meals (53.4%), and most of them have their snacks at afternoon (59%). Majority of adolescents (71.8%) eats breakfast daily and (28.2%) tend to skipped breakfast. there is no significant statistical correlation between eating habits and BMI among adolescents ( $p>0.05$ ). **Conclusion and recommendation;** educational programs can be provided for adolescents to increase their awareness about healthy food and healthy eating habits.

# **1. Introduction**

## **1.1. Background**

Adolescence is a transitional stage of physical and psychological development that generally occurs during the period from puberty to legal adulthood {1}. Major pubertal and biological changes include changes to the sex organs, height, weight, and muscle mass, as well as major changes in brain structure and organization {2}.

### **Adolescents; who are they?**

The term youth encompasses ages 10 to 24 years, while the term adolescents as defined includes persons aged 10-19. Adolescence may be divided into three developmental stages based on physical, psychological, and social changes {3};

- Early adolescence, 10/13-14/15 years;
- Mid adolescence, 14/15-17;
- Late adolescence, 17-21, but variable.

Nutritional needs during adolescent are increased because of the increased growth rate and changes in body composition associated with puberty {4}. The dramatic increase in energy and nutrient requirements coincides with other factors that may affect adolescent's food choices and nutrient intake and thus, nutritional status. These factors, including the quest for independence and acceptance by peers, increased mobility, and preoccupation with self-image, contribute to the erratic and unhealthy eating behaviors that are common during adolescent {5}.

Sound nutrition can play a role in the prevention of several chronic diseases, including obesity, coronary heart disease, and certain types of cancer, stroke and type 2 diabetes. Also dieting is common among adolescents, eating disorders such as



anorexia nervosa or bulimia nervosa can be triggered by weight loss dieting. For these reasons, nutrition remains an important objective for healthy people {6}.

National and population-based surveys have found that adolescents often fail to meet dietary recommendations for overall nutritional status and for specific nutrient intakes {7}. Many adolescents receive a higher proportion of energy from fat and/or added sugar and have a lower intake of vitamin A, folic acid, fiber, iron, calcium, vitamin D, and zinc than is recommended {8}.

Eating habits vary widely between individual adolescents, and also display some general trends over time, reflecting sociocultural trends in food availability and nutritional goals {9}.

## **1.2. Problem statement**

Adolescents make up roughly 20% of the total world population. In developing countries, adolescents have an even higher demographic weight. In 1995, there were 914 million adolescents living in developing world, that is, 85% of the total {10}. Their number expected to reach 1.13 billion by the year 2025.

During recent decades, almost all the Arab countries have witnessed dramatic lifestyle changes including meals pattern which cause significant disability and premature death due to increased prevalence of chronic diseases.

Childhood and adolescence are important times for establishing healthy dietary habits. During adolescence, young people are assuming responsibility for their own eating habits, health attitudes and behaviors.

The health of children and adolescents is dependent upon food intake to promote optimal physical growth, social and cognitive development.

### **1.3. Justification**

- Eating behaviors an important cause of physical and psychological morbidity in adolescent.
- In Sudan there are few studies to my knowledge about the eating behavior among adolescents.

### **1.4. Research questions**

- What are the common eating behavior patterns among adolescent.
- What are the factors that determine eating behavior among adolescent.

### **1.5. Objectives**

#### **1.5.1. General objective**

1. To assess eating behavior among adolescent at locality of sharg alneel

#### **1.5.2. Specific objectives**

1. To find out common eating behaviors among adolescents
2. To determine factors that affect adolescents eating behavior

## **2. Literature review**

The foundation of adequate growth and development is laid before birth, during childhood, and is followed during adolescence. Adolescents are the future generation of any country and their needs are critical for the well-being of society.

Adolescents are usually open to new ideas; they show curiosity and interest. Many habits acquired during adolescence will last a lifetime. Furthermore, with increasing age, adolescent's personal choices and preferences gain priority over eating habits acquired in the family, and they have progressively more control over what they eat, when and where {6}{11}.

In most developing countries, nutrition inactivates have been focusing on children and women, thus neglecting adolescents. Addressing the nutrition needs of adolescents could be an important step towards breaking the vicious cycle of intergenerational malnutrition, chronic diseases and poverty. Epidemiological evidence from both developed and developing countries indicates that there is a link between fetalunder-nutrition and increased risk of various chronic diseases during adulthood.

### **Definition of “eating habits”**

The way a person or group eats, considered in terms of what types of food are eaten, in what quantities, and when.

### **Healthy eating;**

Adolescence is a crucial time in which to develop and maintain a healthy diet, especially given the importance of essential nutrients during this period of growth and development. Furthermore, dietary habits formed during adolescence have been

shown to track into adulthood. Establishing healthy eating behaviors among young people, therefore, has both short- and long- term health benefits.

Descriptions of healthy eating tend to describe food in term of border food groups and make recommendations as to the relative consumption of each these groups. Current recommendations are as follows;

- Fruits and vegetables; a wide variety of fruits and vegetables should be eaten, and preferably five or more serving should be eaten per day {12}.
- Bread, pasta, other cereals, and potatoes; plenty of complex carbohydrate foods should be eaten, preferably those high in fiber.
- Meat, fish, and alternative; moderate amounts of meat, fish, and alternative should be eaten, and it is recommended that the low –fat varieties are chosen.
- Milk and dairy product; these should be eaten in moderation, and the low-fat alternatives should be chosen where possible.
- Fatty and sugary foods; food such as potato chips, candy, and sugary drinks should be consumed infrequently and in small amounts.

Many eating habits are established in childhood. They are then further crystallized in the first years of independence when individuals become responsible for their own food choices and food preparation. Research has therefor explored the diets of adolescent. One large-scale study at the beginning of the 1990s examined the eating behavior of 16,000 male and female students aged between 18 and 24 from 21 European countries {13}. During classes, students completed self-report measures of their food intake, resulting in a 90 percent response rate, and were asked about five aspects of their dietary behavior. Overall, the results showed that 39 percent tried to avoid fat, 41 percent tried to eat fiber, 53.5 percent ate fruits daily, 54 percent limited their consumption of red meat, and 68 percent limited their salt intake. These results

suggest that the prevalence of these fairly basic healthy eating practices was low in this large sample of adolescent.

In 2001 a similar large-scale survey was carried out to assess the diets of adolescent aged 19 and 24 years in the UK. The results from this survey indicated that 98 percent consumed fewer than the five portions of fruit and vegetables recommended per day (an average of 1.6 portions). They consumed more saturated fat than is recommended and more sugar, mostly from fizzy drinks. Their diets were also deficient in vitamin D, vitamin A, and iron. Therefore, young people's diets are not matching the recommended intakes and are particularly high in saturated fat and sugar and low in fruit and vegetables.

- **Nutritional needs during adolescence**

The requirement of some of the nutrients is high as, or higher in adolescence than in in any other age groups {14}, and there for many micronutrients, including vitamin A, thiamin, riboflavin, niacin, folic acid, vitamin B 12, vitamin C and iodine, reach levels required by adults.

Adolescence is considered as nutritionally critical period of life for several reasons;

- Firstly, the dramatic increase in physical growth and development put greater pressure on the need for nutrients. During the period, adolescents will experience a weight gain equivalent to 65% of their weight at the beginning of the period or 40% of their final weight, and a height gain equivalent to 15% of their adult height {15}.
- Secondly, there may be socio-cultural factors or change of life-style and food habits of adolescents that can affect both nutrient intake and needs {4}.
- Thirdly, growing adolescents have increased nutrients requirements during pregnancy and illness {16}.

- Fourth, adolescence can be the second opportunity to catch up growth if environmental conditions, especially in terms of nutrient intake are favorable {17}.
- Finally, psychological changes and development of their own personality can impact on their dietary habits during a phase when they are very influence-able.
- **Energy and protein requirements**

Adolescence is important time for gains in height as well as weight. While both muscle and fat increase, girls gain relatively more fat, and boys gain relatively more muscle. Thus, the requirement of energy as well as proteins increases considerably during this period. Energy and protein needs correlate more closely with the growth pattern than with the chronological age {4}. The peak in energy and protein requirements coincides with the peak in growth of adolescents. Actual needs also vary with physical activity. Therefore, monitoring weight and height and body mass index {BMI (weight/height<sup>2</sup>)} is essential to determine the adequacy of energy intake for individual adolescents. Generally, the requirement of protein is met even in economically disadvantage populations if caloric intake is sufficient {4}.

- **Mineral and micronutrient requirements**

Minerals play a crucial role in adolescent nutrition. Adolescents, at the peak of their growth velocity, require large quantities of nutrients. The increment in skeletal mass, Body size and body density, associated with pubescence, highlights the role of minerals in the growth process {18}.

The role of iron, calcium, iodine and zinc in the growth and nutrition of adolescents is explained briefly below.

- **Iron requirements**

Iron requirements peak during adolescence due to rapid growth with sharp increase in lean body mass, blood volume and red blood cell which increases iron needs for myoglobin in muscles and hemoglobin in blood {19}. In boys, there is a sharp

increase in the iron requirement from approximately 10 to 15 mg/day. After the growth spurt and sexual maturation, there is a rapid decrease in growth spurt and need for iron {20}. As a result, there is an opportunity to recover from an iron deficiency that might have developed during this peak growth. In girls, however, the growth spurt is not as great, but menstruation typically starts about one year after peak growth and some iron is lost during menstruation. The mean requirement for iron reaches a maximum of approximately 15 mg/day at peak growth but settles to approximately 13 to 15 mg/day because of the need to replace menstrual iron losses {21}.

Iron requirements in adolescence are greater in developing countries because of infectious disease and parasitic infections that can cause iron loss, and because of low bio-availability of iron from diets {22}.

Other benefits of iron for adolescents; iron helps in improving cognition which leads to better academic performance that may be an incentive for girls to remain in school {23}.

- **Calcium requirement**

Dietary calcium has been identified as a nutrient of great potential concern for adolescents {24}. The adolescent years are a window of opportunity to influence lifelong bone health. Because of the accelerated muscular, skeletal and endocrine development, calcium needs are greater during puberty and adolescence than in any other population age group except pregnant women {4}. At the peak of the growth spurt, the daily deposition of calcium can be twice that of the average between 10 to 20 years. In fact, 45% of the skeletal mass is added during adolescence {4}. By the end of the second decade of life, 90-95% of the total body peak bone mass is attained {25}.bone mineral content must be maximized during puberty to prevent osteoporosis (risk of fracture in later life {26}. Low calcium intake in early life may account for as much as 50% of the difference in hip fracture rates in postmenopausal years {27}. Consumption of calcium rich products with every meal goes a long way towards

ensuring that requirements are met for calcium and many other nutrients e.g. phosphorus, magnesium and vitamin D needed for bone health {28}.

- **Zinc requirements**

Zinc is known to be essential for growth and sexual maturation during puberty. It enhances bone formation and inhibits bone loss. Limited intake of zinc-containing foods may affect physical growth as well as development of secondary sex characteristics {29}.

- **Iodine requirements**

Iodine is important during adolescence for two reasons; these are the high growth velocity of adolescents and the increased iodine requirements during pregnancy. As a large percentage of adolescent girls get married early and bear children during adolescence, their requirements for iodine increase to provide for their own growth as well as for the needs of the fetus. Severe iodine deficiency in children results in learning disability and lowered achievement {30}. In fact, even moderate iodine deficiency can lead to loss of 10-13 IQ points. Iodine deficiency during pregnancy has been associated with increased incidence of miscarriages, still births, birth defects and mental retardation, and if severe, may result in cretinism in the offspring {31}.

- **Other minerals**

Although the roles of other minerals in the nutrition of adolescents have not been studied extensively, the importance of magnesium, phosphorus, copper, chromium, cobalt and fluoride is well recognized. The possibility of interaction among these nutrients cannot be overlooked {4}.

- **Vitamins**

The requirements of vitamins are also increased during adolescence. Because of higher energy demands, more thiamine, riboflavin and niacin are necessary for the



release of energy from carbohydrates. The increased rate of growth and sexual maturation increases the demand for folic acid and Vitamin B-12 {4}{24}. With increasing evidence of the role of folic acid in the prevention of birth defects, all adolescent girls of childbearing age should be encouraged to consume the recommended amount of folic acid from supplements in addition to intake of food folate from varied diet {32}. The center for disease control and prevention recommended 400 g of folate for all females of childbearing age. The rapid rate of skeletal growth demands more Vitamin D, Vitamin A, C and E are needed in increased amount for new cell growth. Adolescents vitamin needs are also associated with the degree of maturity rather than chronological age because of demands of growth.

- **Nutritional issues among adolescents**

Based on our review and other documents dealing with nutrition in adolescence {33} the following are seen as the main nutritional issues of adolescents in low- and middle-income countries;

- Under nutrition and associated deficiencies, often originating earlier in life.
- Iron deficiency anemia and other micronutrient deficiencies.
- Obesity and associated cardiovascular diseases risk marker.
- Early pregnancy
- Inadequate or unhealthy diets and lifestyles.

Inappropriate dietary intake during adolescence can have several consequences. For example, it can;

- Potentially retard physical growth, reduce intellectual capacity and delay sexual maturation, as rapid physical growth creates an increased demand for energy and nutrients {34}.

- Affect young people's risk for a number of immediate health problems such as iron deficiency, under nutrition, stunting, bone health, eating disorders and obesity {35}. It may also affect concentration, learning and school performance in school-going adolescents.
- Also have long-term implication. For example, low calcium intake during adolescence is associated with low bone density and increased risk for osteoporosis later in life; being overweight as an adolescent is associated higher risk for diabetes as an adult; and high fat intake during adolescence and into adulthood is associated with an increased risk of heart disease {35}.

Further, stunting and underweight among girls during adolescence, continuing into adulthood, and early pregnancies, increase the obstetric risk for women. Thus, the compromised nutritional status and poor growth in adolescent years affects the reproductive role {17}.

### **Under nutrition, stunting and consequences in adolescence**

- Overview on malnutrition in adolescence

Under nutrition defined as BMI <5<sup>th</sup> percentile of NCHS references values {3} was highly prevalent in three of the 11 studies of ICRW; 53% in India, 36% in Nepal and 23% in Benin. Even where prevalence was high, BMI tended to improve with age. However this may simply reflect a pattern of later maturation. In most studies allowing comparisons of boys and girls, there was twice as much under nutrition in boys as in girls, one possibility is differential maturation in boys and girls; another one, which warrants further investigation, is connected with the high rates of anemia, which could affect body weight of boys more than girls because the former put on more muscle than the latter.

In Nigeria, a study among adolescent girls {22} showed that under nutrition was more widespread in rural than in urban areas; 10% of rural and 5% of urban girls were stunted (2<sup>nd</sup> percentile, British reference values of 1990), and 16% vs. 8% could be

considered thin (9<sup>th</sup> percentile BMI). However, there may be wide infra-urban variation according to socioeconomic status (SES), which is not known.

Stunting is commonly observed among adolescents in undernourished population. In the ICRW studies, stunting (height <5<sup>th</sup> percentile of NCHS/WHO reference data was highly prevalent in nine of the 11 studies, ranging from 27% in urban Guatemala to 65% in rural Philippines {36}. Short stature in adolescence is mainly caused by infection and inadequate dietary intake during the pre-school years, and fetal malnutrition may also be a factor. In undernourished populations, growth rate during adolescence is slower {37}. Using maximum growth spurt or menarche as an indicator, maturation may be delayed in malnourished girls by an average of two years {38}. Growth is delayed, when it is not depressed. There are differences according to socioeconomic level, and there may also be ethnic differences that are not fully accounted for by environmental conditions. In Nigeria, it was found that schoolgirls from the upper socioeconomic class reached menarche 11 months earlier than the lower socioeconomic counterparts {39}.

- **Obesity**

Obesity is ultimately the result of an imbalance between energy consumption and energy expenditure. People gain weight if they eat too much and exercise too little. However, data overwhelmingly suggest that the pattern of population weight gain over the past generation has been due largely to an overconsumption of energy rather than a decrease in physical activity patterns.

According to the United Nations, more people, or roughly the same number, are overweight and more than 400 million are obese, compared with 850 million who are underweight.

Childhood obesity is considered one of the most serious public health challenges of the 21<sup>st</sup> century. Globally, around one in 10 young people aged 5-17 years are

overweight or obese, with levels increasing rapidly in many countries and regions in recent years.

The primary causes of overweight and obesity can be traced to energy-related behaviors-physical activity, sedentary behavior and sleep- which contribute to an energy imbalance between calorie intake and energy expenditure.

- **Body Mass Index**

Obesity is also defined in terms of Body Mass Index (BMI), which is calculated using the equation  $\text{weight (kg)} / \text{height (m}^2\text{)}$ . This produces a figure which is categorized as normal weight (18.5-24.9), overweight (grade 1; 25-29.9), clinical obesity (grade 2; 30-39.9), or severe obesity (grade 3; 40).this is the most frequently used definition of obesity.

- **Eating disorders**

Eating disorders and disturbances have become the third leading chronic illness among adolescents' females in the USA and other high-income countries. The increasing number of adolescents' diagnosed for such disorder may be ascribed to a combination of true increasing incidence, better case finding, improved public awareness and expanded definitions .Anorexia nervosa and other eating disorders are arguably the most complex mental health problems that a child or adolescent may experience. Certain psychological conditions can lead to disordered eating, including behaviors such as extreme dieting, binge eating and bringing up food on purpose. This affects more teenagers than adults and more girls than boys.

- **Dietary behaviors among adolescents**

How do intakes of adolescents compare with those of adults? It may be hypothesized that in most settings, the diet of adolescents is likely less adequate than that of adults, to begin with because of their eating patterns {6}. According to a large body of

dietary survey data collected in the USA, it appears that some dietary patterns are consistently observed among adolescents, and put them at risk of unhealthy eating:

- Missing meals

Breakfast is often missed; more than 50% of respondents in the National Adolescents School Health Survey. Snacking was reported by 90% in the same survey.

- Snacking and consumption of sweets

Snacking is commonly associated with undesirable health outcomes and dietary patterns. Since children and adolescents select snacks based on taste over nutrition, they more often choose salty, crunchy foods as snacks over healthier alternatives {40}.

- Fast and take-away foods

Fast foods are popular choices among adolescents, and this can contribute to high intakes of saturated fat. Based on NHANES and the National Adolescent School Health Survey, it was observed that adolescents who obtained breakfast and lunch foods from sources other than home or school were more likely to consume high-fat, low nutrient-dense snacks, as well as dieting over the previous year {41}.

- Unconventional meals

The family meal is becoming less and less important to the dietary patterns of teenagers. We have considered missing meals, snacks between meals and eating fast foods outside the home. Even when an adolescent does eat a meal in his/her home it is more likely to be unconventional than at other stages of life-unconventional in timing, in what is eaten at the particular meal or in structure.

- Start of alcohol consumption

At an age like 18 years in many countries a young person can go into a bar and order a drink. Alcohol consumption – amount and pattern has been largely ignored in the small literature on adolescent food habits yet it is by far the most important factor in mortality of anything providing nutrients that they ingest. According to the U.S.

Surgeon General's Report on Health Promotion and Disease Prevention American aged 15-24 now have a higher death rate than 20 years ago{42}.

- Soft drinks-other fun drinks

Soft drinks, soda pop and cola drinks are high on the lists of foods and drinks liked by adolescents. In a study made by Schorr et al., in western New York state "soda pop" came top of a long list of foods most liked {33}.

- Likes and dislikes

These days it might be possible to suggest the subject's age from a list of likes and dislikes for foods and drinks. Greenwood and Richardson conclude from U.S.A. studies which they review that the most popular food items include milk, ice cream, steak, roast beef, hamburgers, pork chops, ham, chicken, turkey, orange juice, oranges, apples, French-fried potatoes (chips), corn, peas, bread, cake and pie {34}.

- High energy intake

One feature of many of the foods liked and consumption by adolescents is their high energy content. Another is that they are sometimes consumed in huge meals. The FAO/ WHO recommendation for meals are 13-15 years 2900 k Cal; 16-19 years 3070 k Cal; adults 3,000 k Cal.

- Adolescent dieters

Dieting means you do not eat the kinds or amounts of foods you like because you want to lose (or gain) weight.

In Huenemann's study in California about 46% of the 9<sup>th</sup> and 10<sup>th</sup> grade girls wanted to lose weight even though the prevalence of mild and marked obesity were only 11 and 12 % respectively. Adolescent dieters have about the same understanding and misconceptions about fattening foods as the rest of the population. They tend to skip meals more than the other youngsters {35}.

- **Factors influence adolescent's eating pattern**

Nutritional problems of adolescents, whether under nutrition or nutrition-related chronic diseases, are mainly the result of dietary inadequacies, which may be related to a number of factors that can be grouped under physiological, socioeconomic, and psychological factors.

- **Commercial, cultural and psychological influences on eating patterns**

Adolescents are greatly influenced in their eating habits by peers, mass media, social and cultural norms, and lack of nutrition knowledge, while the influence of the family tends to decline {11} {24}. Adolescence is a time of high vulnerability to societal and peer pressure, often reinforced by the media, as may be evidenced by conformity, among other things, in behaviors, attitudes and dietary practices{24}.A study in Nepalese schoolchildren showed that fast foods (ready to eat snacks, chips etc.) were preferred by more than two-third of adolescents. Advertising, probably TV and magazines, influenced preferences in 80% of these Nepalese adolescents.

- **The concept of body image**

The concept of body image has become nearly synonymous with the physical appearance-related aspect of the nation, and it is currently defined as made of three components; perception of body size and its accuracy; a subjective component of feeling satisfied or not with one's body; and a behavioral aspect {36}.Body image is important in adolescence, and disturbance is in relation with obesity, dietary disorders and psychological discontent.

- **Interrelationships of eating and other health-related life style factors**

Studies show that healthy eating and healthy lifestyle are frequently associated. Conversely, adverse behaviors such as drinking, smoking, lack of physical activity, overeating and poor dietary choices tend to cluster together {37}.

- **Socioeconomic factors**

As pointed out by PAHO, many of the factors that underlie unhealthy development in adolescents stem from the social environment, including poverty and unemployment, gender and ethnic discrimination, and the impact of social change on family and communities {38}.



### **3. Methodology**

#### **3.1. Study design**

Descriptive cross-sectional community based study.

#### **3.2. Study area**

The study will be conducted among adolescent resident of Helt Koko at Sharg Alneel locality.

#### **3.3. Study population**

The study population includes the Sudanese adolescent male and female from different ethnic groups resident in Helt Koko.

##### **3.3.1. Inclusion criteria**

The inclusion criteria for personal sampling

1. Age 10 to 20 years.
2. Male and female.
3. Good general health as indicated by medical history.

##### **3.3.2. Exclusion criteria**

The exclusion criteria for personal sampling

1. Pregnancy.
2. Use of medication likely to affect caloric intake.
3. Illegibility.

## **3.4. Sampling**

### **3.4.1. Sample size**

The sample will be selected by simple random sampling (SRS) Sample size = 150 using publish table for calculating sample size.

### **3.4.2. Sample technique**

The sample technique will be multistage simple random technique.

The population was selected by means of multiple steps, simple random sampling, and first sharg alneel locality was divided into 15 administrative units, by simple random Helt Kokowas selected. Then the administrative unit divided into 6 neighborhoods, by simple random southHelt kokowas selected. Then neighborhood was divided into 3 blocks, by simple random block number 10 was selected. The block contains 420 houses with almost 1500 population, I divided the block into 4 quarters and by simple random selection western quarter was selected.

## **3.5. Data collection**

### **3.5.1. Data collection methods**

Data will be collected by interview

### **3.5.2. Data collection tools**

Data will be collected by using questionnaire, which include (demographics information and eating habits) in addition to body mass index (BMI) and weight and height measure results.

### **3.5.3. List of variables**

- Common eating behaviors

Obesity

Under weight

- Factors affecting adolescents eating behaviors

Genetic factors

Gender

Sociocultural factors

Life style

Medical condition

### **3.6. Data analysis**

Data will be analyzed by SPSS program

### **3.7. Data presentation**

The following results show eating behaviors patterns among adolescents at locality of sharg alneel. The data was collected by using questionnaire which includes 24 questions for 150 sample size. The sample include 85 female (56.7%) and 65 male (43.3%).

### **3.8. Ethical consideration**

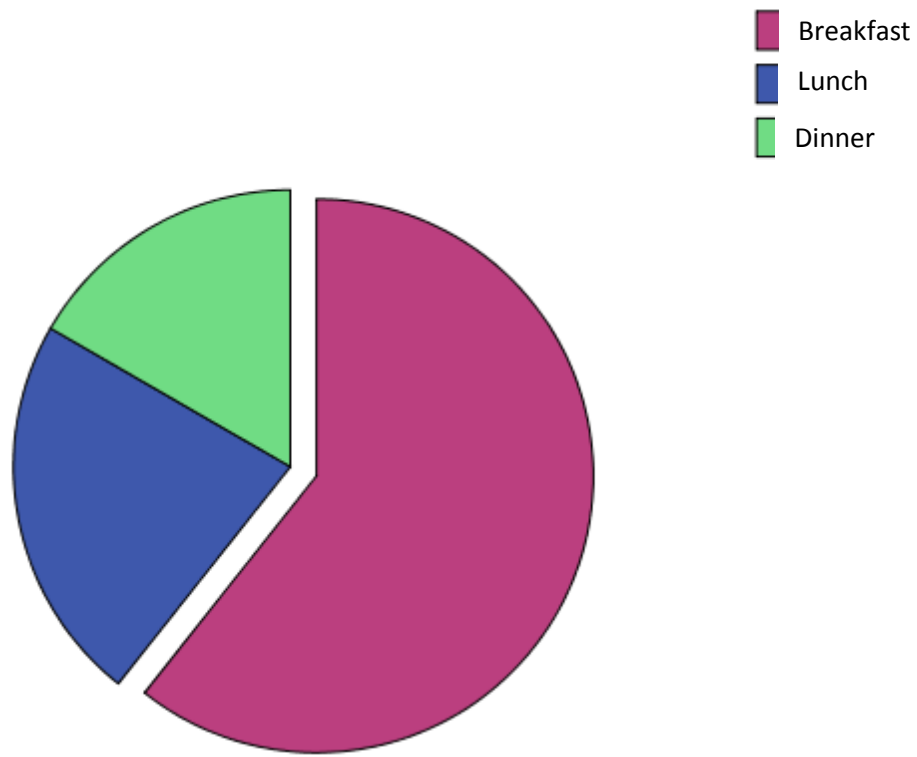
❖ This research approved from Shandi University and approved from community leader of Helt Koko to get permission for taking samples from participants.

## 4. Results

Table (1); demographic characteristics of the study population (n=150)

Demographic characteristics	Frequency	Percentage
<b>Sex</b>		
- Male	65	43.3
- Female	85	56.7
<b>Educational Level</b>		
- Primary	33	22
- Secondary	68	45.3
- Collage	49	32.7
<b>BMI categories</b>		
- Under weight	19	12.7
- Normal weight	86	57.3
- Over weight	34	22.7
- Obese	11	7.3

(56.7%) of the participants were female and had normal weight (57.3%).



**Fig (1); the regularity of meals**

60.7% of the sample regularly eats breakfast.

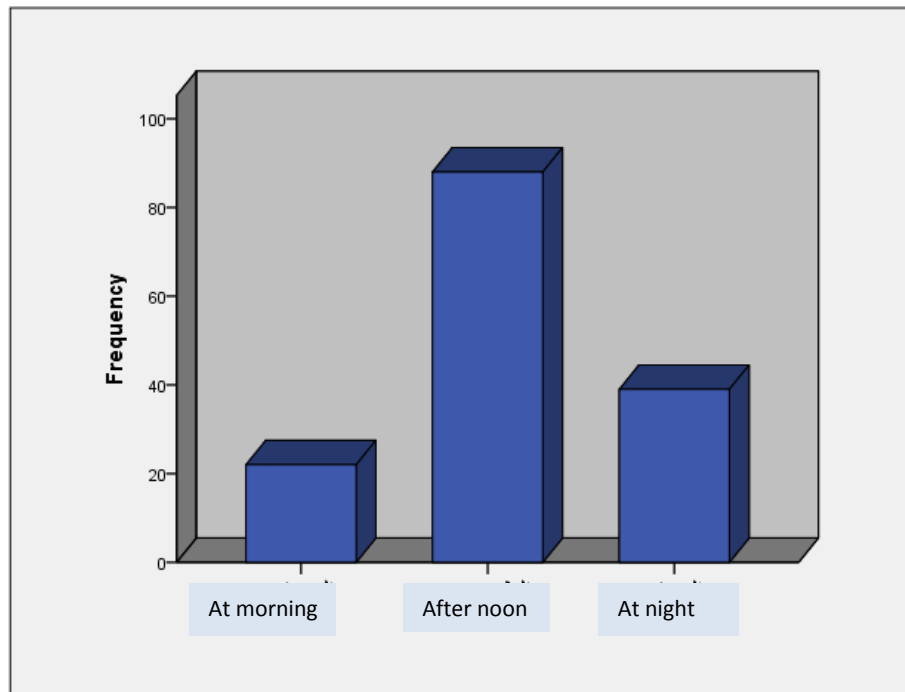


Fig (2);the preference times for snacks among study population

59% of sample eats their snacks at afternoon.

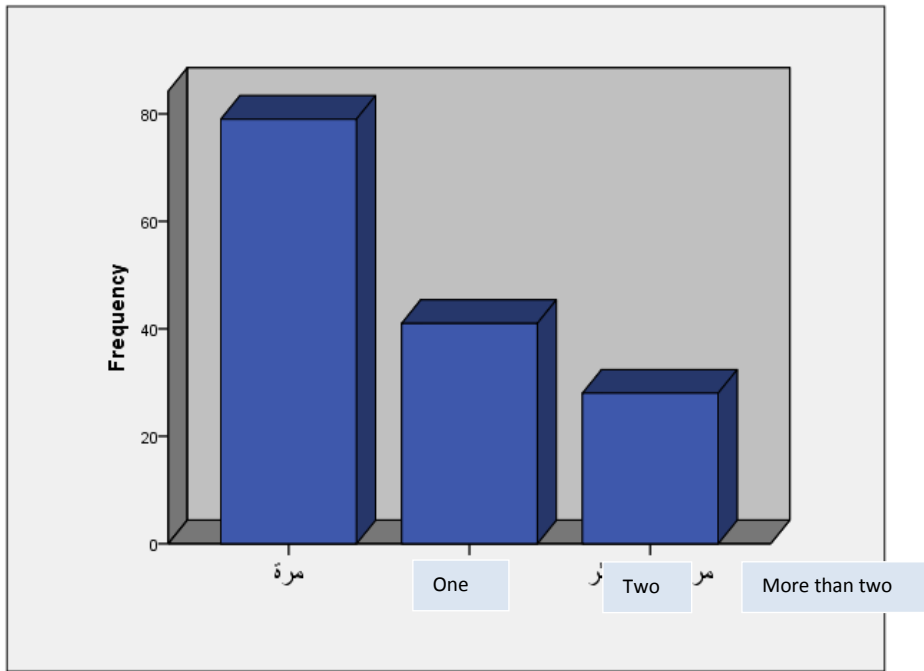


Fig (3); frequency of having snacks per day among participants

53.4% of sample eats snacks once per day.

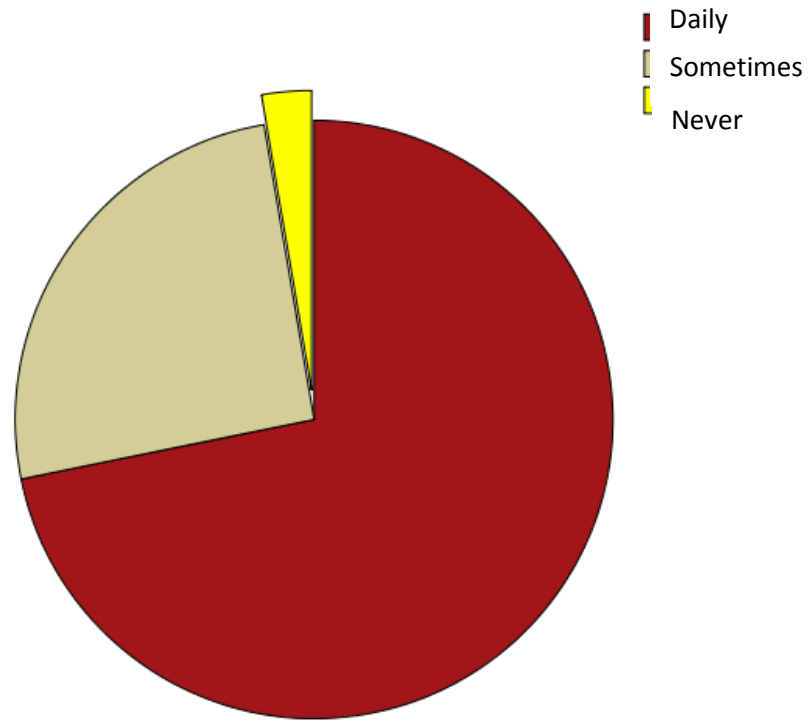


Fig (4);regularity of having breakfast among participants

71.8% of sample does not skip breakfast



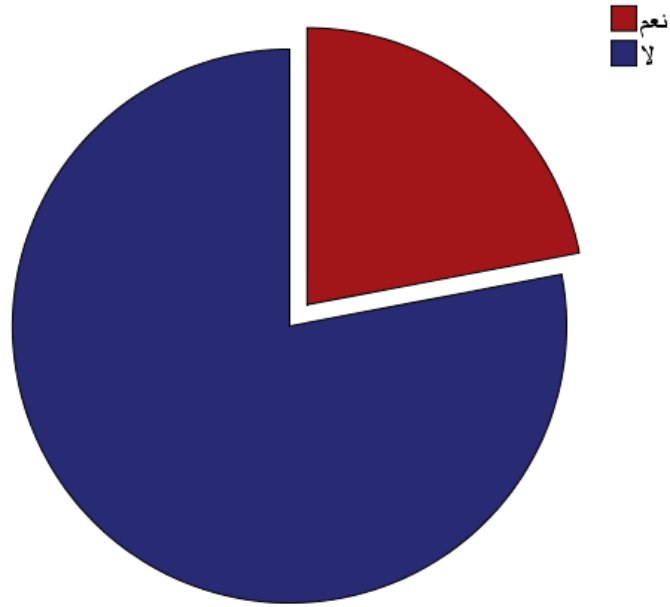


Fig (5); obesity perception among study population.

78% of study population doesn't feel obese

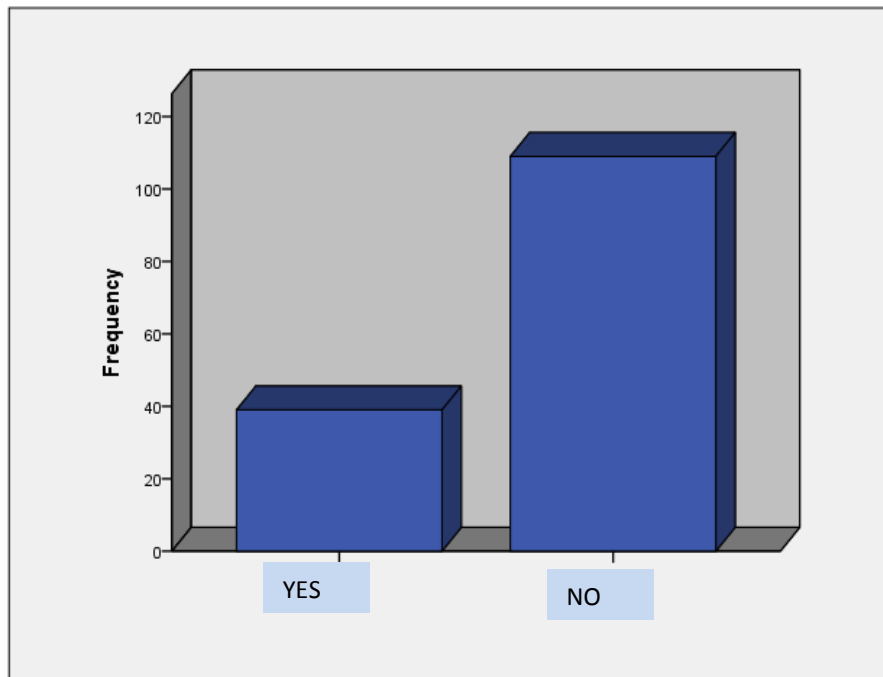
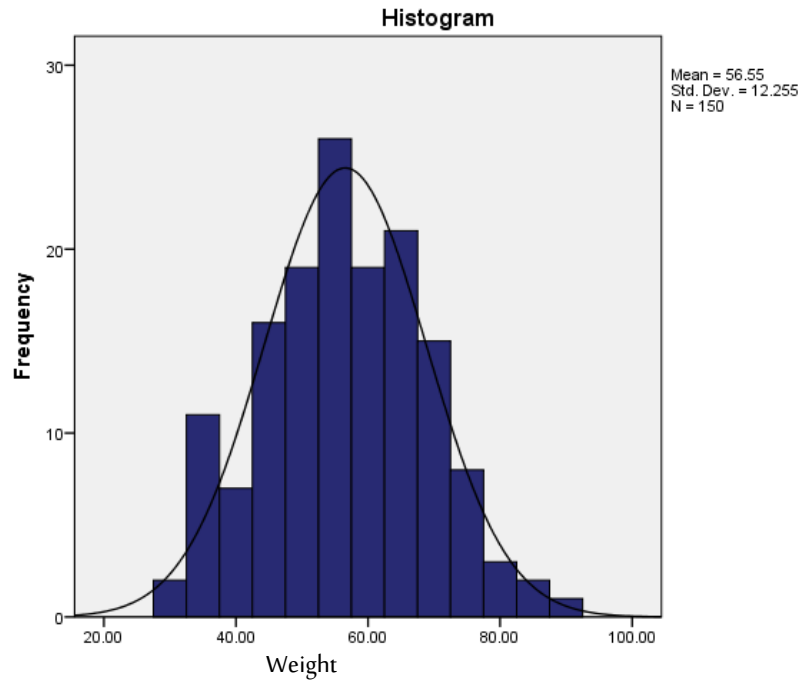
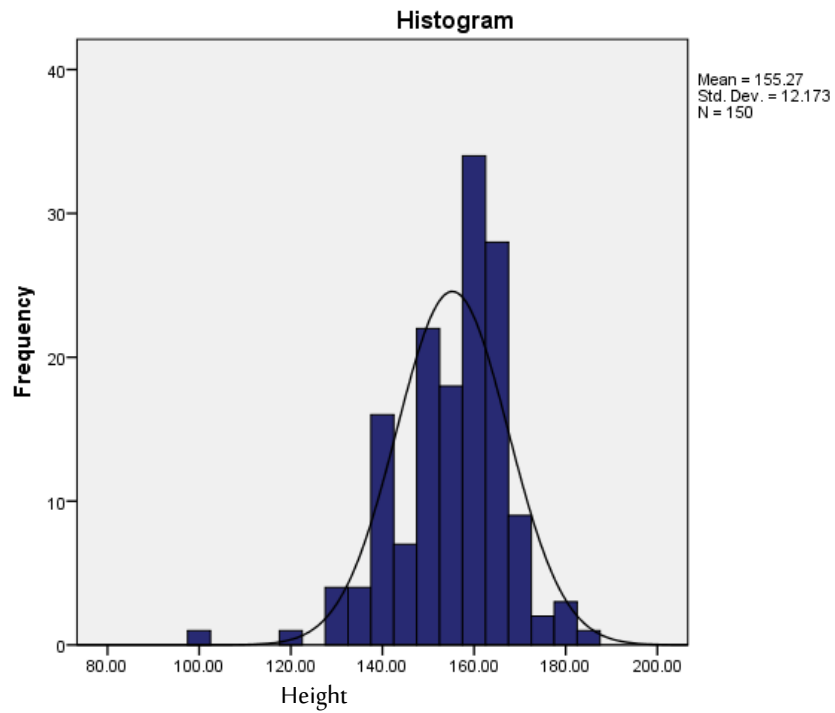


Fig (6); perception of study population about their body image

73.6% of study population does not affected by their body shape.



The weight of the study population is within the normal range.



The height of study population is within the normal range.

Table (2); correlation coefficient between adolescent's eating habits and their BMI (n=150)

Population's eating habits	BMI	
	Sig.	P value
Following any diet	0.916	> 0.05
Performing physical activity	0.869	> 0.05
Frequency of Meals per day	0.689	> 0.05
Times of eating snacks per day	0.082	> 0.05
Skipping breakfast	0.215	> 0.05

There is no significant statistical correlation between eating habits and body mass index (BMI) among the adolescents in this study.

Table (3); correlation coefficient between factors effect adolescent's eating habits and their BMI (n=150)

Factors effects population's eating habits	BMI	
	Sig.	P value
Chronic diseases	0.014	< 0.05
Chronic medication	0.797	> 0.05
Body image	0.217	> 0.05

There is significant statistical correlation between chronic diseases and body mass index (BMI) in his study.

## 5.1. Discussion

The present study aimed to explore the patterns of eating behaviors among adolescents. Discussion the findings of this study will cover the main areas; demographic characteristics, eating habits, and relation between eating habits and body mass index among adolescents.

Regarding demographic characteristics of the participants; the current study demonstrated that the majority of the study subjects were females (56.7%). These findings agreed with {39}, in their study about 'Relation between eating habits and a high body index among Freshman Students' found that more than half of the study subjects were female students.

Regarding Body Mass Index; results of current study revealed that, the majority of adolescents were in normal weight category (57.3%). This would be explained to the fact that, the willingness of adolescence to keep their weight within normal range. These results going in line with the similar studies; {40} represented that, about half the participants were within normal weight, while more than one fourth of them were underweight.

Regarding eats snacks between meals; the current study findings indicated that the majority of the adolescents ate snacks between the meals most likely at afternoon (59%). This probably due to factors related to changes in adolescents' lifestyle, such as lack of time for eating, influence of the media, and preference for the taste, together with the habit of eating out home and the utilization of increasingly large food portions. According to the study {41}, the majority of adolescent students consumed snacks between breakfast and lunch as well as between lunch and dinner.

About eat breakfast daily; the current study reported that more than half of the adolescents were regularly eat breakfast daily (71.8%). This may be due to most of them are having the breakfast at schools on break times, so there is sufficient times to

take breakfast. Supporting to these study findings, {42}, revealed that greater than half of the total number of respondents ate breakfast.

About correlation between adolescents' eating behaviors and their BMI; findings of the current study demonstrated that there is no significant statistical correlation between eating behaviors and BMI among the adolescents( $p>0.05$ ). These results may be due to increasing the proportion of adolescents meeting recommended dietary and physical activity guidelines and the adolescents had increased awareness on the importance of their weight control. In agreement with these study results {40}, found that, there is no importance statistical correlation between the dietary habits and body mass index of the chosen adolescents( $p>0.05$ ). In contrast to current study, a study conducted by {43}, in Bangalore to co-relate the dietary habits and body mass index of the adolescents. The finding discovered that there is a co-relation between eating habits and body mass index of the adolescents.

## **6.1. Conclusion**

- Most of the adolescents in this study had a neutral eating habit.
- There was no association between eating behaviors and body mass index among the study group.
- There is significant statistical correlation between chronic diseases and body mass index.

## **6.2. Recommendations**

- Sufficient knowledge about healthy food assortment and food safety can be prejudice factors for enhancing eating habits and implementing a good healthy diet, so motivations required for adolescents to enhancing eating habits.
- Education programs can be provided to adolescents to increase their awareness about healthy food and encouraging them to practice healthy eating habits.
- Further studies can be carried out to explore factors affecting eating habits.

## 1. Appendix (1); patient consent inform

### اقرار موافقة الشخص المشارك في البحث

انا الباحثة اسراء صلاح الدين الحسين الفكي طالبة دراسات عليا بجامعة شندي كلية علوم التمريض،نقوم ببحث او دراسة عن انماط سلوك الاكل لدي المراهقين بحلة كوكو مربع 10 يسعي بحثنا لمعرفة انماط سلوك الاكل والعوامل التي تؤثر علي سلوك الاكل لدي المراهقين.

لقد تم اختيارك لتشارك في هذا البحث انت ومعك عدد من سكان حلة كوكو مربع 10 نتوقع بمشاركتك انت والمشاركين الاخرين ان نتحصل علي نتائج تمكن من حل معظم المشاكل التي تواجهكم مستقبليا

خلال هذه الدراسة ساقوم بطرح عدد من الاسئلة عليط وساقوم بتدوين اجابتك علي الاستمارة المرفقة وساقوم بقياس الوزن والطول هذه المعلومات ستحفظ بطريقة سرية ولن يظهر اسمك في اي استمارة ونود ان نشير كذلك الي ان المشاركة في البحث طوعية وان رفضك للمشاركة لن يوتر نهائيا. كما نوكد لك امكانية الانسحاب من البحث في اي وقت تشاء ودون ابداء اسباب للانسحاب ويتم ذلك بالتوقيع علي طلب الانسحاب

انا ..... اقر بالموافقة علي المشاركة في البحث بعد ان تم شرح طبيعة الدراسة كاملة بواسطة الباحثة واعطيت فرصة كافية للاستفسار عنها وقد تم الاجابة عن جميع اسئلتي بصورة واضحة وفهمت ان لدي الحق في التوقف عن هذه الدراسة في اي وقت من غير ان افقد اي حقوق لدي

اوافق طوعية علي المشاركة في هذه الدراسة

اسم المشارك ..... التوقيع.....

التاريخ ..... الهاتف.....



## Appendix (2);questionnaire

### جامعة شندي

#### كلية الدراسات العليا والبحث العلمي

استبيان عن انماط سلوك تناول الطعام لدي المراهقين في محلية شرق النيل.

استبيان رقم ( )

#### البيانات الديموغرافية :

العمر

النوع

انثي ( ) ذكر ( )

المستوي التعليمي

ابتدائي ( ) ثانوي ( ) جامعي ( )

#### البيانات الطبية :

هل تعاني من اي مرض مزمن ؟

نعم ( ) لا ( )

اذا كان نعم اذكره: .....

هل تستعمل/ي ادوية مستديمة ؟

نعم ( ) لا ( )

هل تتبع/ي حمية غذائية معينة ؟

لا ( ) قليلة دهون ( ) قليلة صوديوم ( ) نباتية ( )  
اخرى ( )

هل تمارس/ي التمارين الرياضية بانتظام

نعم ( ) لا ( )

### بيانات سلوك تناول الطعام

اي وجبة تتناول بانتظام؟

الافطار ( ) الغداء ( ) العشاء ( )

كم عدد الوجبات التي تناولها في اليوم؟

وجبة واحدة ( ) وجبتان ( ) ثلاثة او اكثر ( )

متي تتناول/ي الوجبات الخفيفة؟

الصباح ( ) بعد الظهر ( ) المساء ( )

كم مرة غالبا؟

مرة واحدة ( ) مرتين ( ) اكثر من مرتين ( )

كيف هي سرعة تناولك/ي الطعام مقارنة بالآخرين؟

سريعة ( ) متوسطة ( ) بطئية ( )

هل تتناول/ي الطعام حتي الامتلاء؟

نعم ( ) لا ( )

كم مرة تتناول/ي الافطار؟

يومية ( ) احيانا ( ) لا اتناول ( )

هل تشعر/ي بالرضي من شكل جسدك؟

نعم ( ) لا ( )

هل تشعر/ي بالذنب بعد اكل وجبة كاملة خلال اليوم؟

نعم ( ) لا ( )

هل تشعر/ي انك سمين؟

نعم ( ) لا ( )

هل لديك رغبة قوية في فقدان الوزن؟

نعم ( ) لا ( )

هل ياثّر وزنك وشكل جسمك علي طريقة تفكيرك في نفسك؟

نعم ( ) لا ( )

هل تشعر/ي بالراحة عندما تنظر لجسمك؟

نعم ( ) لا ( )

هل تشعر/ي بالراحة عندما ينظر الاخرين لجسمك؟

نعم ( ) لا ( )

كم وزنك الحالي؟ .....

كم طولك؟ .....

كتلة الوزن .....

## ● References list

1. Macmillan Dictionary for students Macmillan, pan ltd. (1981), page 14, 456. Retrieved 2010-7-15.
2. Cote, J. E. (1996). Identity; A multidimensional analysis. In G. R. Adams, T. Gullotta & R. Montemeyer (Eds.), *issues in Adolescent Development* (Vol. 6, pp. 130-180). New York, NY; Sage Publications.
3. Spear BA, *Adolescent growth and development*. J Am diet assoc 2002; 102; s23.
4. Jenkins S, Horner SD. *Barriers that influence eating behaviors in adolescents*. J pediatr Nurs 2005; 20; 258.
5. Shepherd R, Dennison CM. *Influences on adolescent food choice*. Proc Nutr Soc 1996.
6. Neumark-Sztainer D, Story M, Hannan P J, Croll J. *overweight status and eating patterns among adolescents; where do youth stand in comparison with the healthy people 2010 objectives?* Am J public Health 2002; 92; 844.
7. Stang J, Story MT, Haranack L, Neumark-Sztainer D. *relationships between Vitamin and mineral supplementuse, dietary intake, and dietary adequacy among adolescents*. J Am Diet Assoc 2000; 100; 905.
8. Slining MM, Mathias KC, Popkin BM. *Trends in food and beverage sources among US children andadolescents; 1989-2010*. J Acad Nutr Diet 2013; 113; 1683.
9. Huenemann, R.L., Hampton, M.C., Shapiro, L.R. & Bekucke, .A.R., (1968) *Adolescent food practicesassociated with obesity*. Federation Proceedings, 25, 4-10.
10. Greenwood, C.T., & Richardson, D.P. (1979) *Nutrition during adolescence in Bourne, G.H.* (ed.) World review of Nutrition & Dietetics, 33, 1-41.
11. *Problems of children of school age (14-18 years)* (1978) Report of a Working Group, Amsterdam 6-10 June 1977. WHO Regional Office for Europe, Copenhagen.
12. Healthy people (1979) *The Surgeon General's Report on Health Promotion and Prevention*. U.S. Department of Health, Education & Welfare. PHS Publication No. 79-55071.
13. Schorr, B.C., Sanjur D. & Erickson, E.C. (1972) *Teen-age food habits*. A multi-dimensional analysis. J. Amer. Dietetic Association, 61, 415-420.
14. Report of the Commission on Ending Childhood Obesity. Geneva; World Health Organization; 2016 (<http://www.who.int/end-childhood-obesity/news/launch-final-report/en>).
15. Cross AT, Babicz D, Cushman LF. *Snaking patterns among 1,800 adults and children*. J Am diet Assoc. 1994; 94; 1398-1403.
16. American School Health Association. *The National Adolescent Student Health Survey; a report on the health of American youth*. Oakland, CA; Third Party Purplish Co. 1989
17. Spear B. *Adolescent growth and development*. In; Rickert VI (ED). *Adolescent nutrition. Assessment andmanagement*. New Yurok; Chapman & Hall, 1996; 1-24
18. PAHO. *Nutrition, health and child development. Research advances and policy recommendations*. Washington; PAHO, 1997.
19. Kaufman, N.A., Poznanski, R., Guggenheim, K. (1975) *Eating Habits and opinions of teen-agers on nutritionand obesity*. J. Amer. Dietetic Assn., 66,264.

20. Ahmed F, Zareen M, Khan MR, et al. *Dietary patterns, nutrient intake and growth of adolescent school girls in urban Bangladesh*. *Pup Health Nutr* 1998; 1;83-92
21. Abioya-Kuteyi EA, Ojofeitimi EO, Aina OI, et al. *The influence of socio-economic and nutritional status on menarche in Nigerian school girls*. *Nutr Health* 1997; 11;185-95
22. Brabin L, Brabin BJ. *The cost of successful adolescent growth and development in girls in relation to iron and vitamin A status*. *Am J Clin Nutr* 1992; 55;955-8
23. Centers for disease control and prevention (CDC). *Guidelines for school health programs to promote lifelong healthy eating*. *MMWR* 1996; 45 (No.RR-9).
24. Story M, French SA, Rensick MD, et al. *Ethnic/racial and socioeconomic differences in dieting behaviors and body image perceptions in adolescents*. *Int J Eat Disord* 1995; 18;173-9
25. Strasburger VC, Donnerstein E. *Children, adolescents, and the media; issues and solutions*. *Pediatrics* 1999; 103;129-39
26. Beard JL. *Iron requirements' in adolescent females*. *J Nutr*. 2000 feb; 130;440s
27. Brasel J. *changes in body composition during adolescence*. In; Myron Wied, ed. *Adolescent nutrition*. New York; John Wiley & Sons, 1982.
28. Burner AB, Joffe A, Duggan AK, Casella JF, Brandt J. *Randomized study of cognitive effects of iron supplementation in non-anemic iron-deficient adolescent girls*. *Lancet*. 1996 Oct 12; 348;992-6
29. Cadogan J, Eastell R, Jones N, Barker ME. *Milk intake and bone mineral acquisition in adolescent girls; randomized, controlled intervention trial*. *BMJ*. 1997 Nov 15; 315;1255-60
30. Dallman PR. *Iron deficiency; does it matter?* *J intern Med*. 1989 Nov; 226;367-72
31. Daniel WA. *Adolescents in health and disease*. St. Louis, CV Mosby, 1977.
32. Gopalan C. *growth of affluent Indian girls during adolescence*. NFI scientific paper no. 10. New Delhi; Nutrition Foundation Of India, 1989; 22-23
33. Haddad E H, Johnston PK; Research; current and future, In; Story M and Strang J, eds. *Nutrition and pregnant adolescent; a practical reference guide*. Minnesota; the Let Program, Division of Epidemiology, School of Public Health, University of Minnesota, 1999.
34. Kurz KM. *adolescent nutritional status in developing countries*. *Proc Nutr Soc*. 1996 Mar; 55; 321; 31.
35. Lytle LA. *Related nutritional issues for adolescents*. *J Am Diet Assoc*. 2002 Mar; 102;58;12
36. Matkovic V, ilich JZ, Skugor M, Sarcoglu M. *primary prevention of osteoporosis*. *phys Med Rehabil Clin North Am*. 1995; 6;595;627
37. Gillespie S. *improving adolescent and maternal nutrition; an overview of benefits and options*. UNICEF Staff Working Papers, Nutrition SERIES. 1997.
38. Levander OA, Whanger PD. *Deliberation and evaluations of the approaches, endpoints and paradigms for selenium and iodine dietary recommendation*. *J Nutr*. 1996 Sep; 126; 24275-2434s.
39. Scholl TO, hedgier ML, *Anemia and iron-deficiency anemia; complication of data on pregnancy outcome*. *AM J Clin Nutr*. 1994 Feb; 59;4925-500

40. Thompson P, Roseborough R, Russek E, Jacobson M, Moser PB. *Zinc status and sexual development in adolescent girls*. J AM Diet Assoc. 1986
41. Alizadeh, M. and Ghabili, K. (2008) *Health related lifestyle among the Iranian medical students*, Res Biol Sci; 3(1); 4-9.
42. Hemati, A., Moghadasi, M. and Azizi, F.(2014). *Association among lifestyle status and body mass index in Yasuj adolescents*. Int.J.Curr.Res.Aca. Rev; (8); 19-24.
43. Nur Syuhada Zofiran, M. j., Katrini, I., Siti Sabariah, B. and Ajau, D. (2011). *The relationship between eating behaviors, body image and BMI status among adolescence age13 to 17 years in Meru, Klang, Malaysia*. Am, j. food. Nutr; 1(4); 185-192.