ANALYSIS OF THE FEEDING HABITS AND NUTRITIONAL STATUS OF ADOLESCENTS IN PRIVATE NON-BOARDING SECONDARY SCHOOLS IN BAMENDA II MUNICIPALITY, CAMEROON

ABSTRACT

Thestudy has assessed the feeding habits and nutritional status of adolescents in Bamenda II Municipality. Multi-stage sampling technique was used to select four private non boarding secondary schools in Bamenda II Municipality. Systematic sampling was used to select the respondents from form one to lower-sixth and consent forms were signed. Structured questionnaires were administered to200 adolescents (11-19years).Dietary assessments were also carried out using food frequency questionnaires and 24hr dietary recall. The weight and height of students were taken to determine their body mass indices. The weights and heights of both sexes were taken and the readings were analyzed using standard deviation scores where> median-2SD to + < 1SD= Normal, Median< - 2SD to > - 3SD = moderate of under nutrition, < Median – 3SD = severe under nutrition, + 1SD to < + 3SD= overweight, and greater than + 3SD = obesity.Using BMI- for age boys/girls (Z- score) for assessing nutritional status of adolescents in this study, majority of them were within the normal range. Few were underweight, overweight and obese. For age group 11-14 years, 83.3 % were normal, 16.7% were obese, and 0% for underweight and overweight. For age group 15-17 years, 22.7 % were normal ,25.9 % were obese, 23.5% were under weight and 28.2% were overweight A significant difference ($p<0.05$) was observed between males and females(15-17 years) . For age group 18 and 19 years, 40% were normal ,0 % were obese,14.1 % were under weight and 32.9 % were overweight. A significant difference(X^2 =8.0, d,f=3, p=0.040) was observed between males and females(18 and 19 years) .With respect to waist circumference , a percentage of the respondents fell within the normal range. for males and females.The respondents generally ate twice a day. Forty –one (41%) of the respondents said they consume tubers twice a week, 31.5% consume cereals and their products more than four times a week, 12.5% consume pulses, legumes and products twice a week, 32.5% consume animal products once a week, 36.5% consume eggs and dairy products twice a week and 25% consume fruits and vegetables twice a week . The 24hr dietary recall revealed that the diets were monotonous.Peer group influence affects their food choices, feeding habits and nutritional status.

Keywords: Adolescents, Feeding Habits, Nutritional Status.

1. INTRODUCTION

Adolescence signifies a critical phase of biological transition that is characterized by rapid growth. Malnutrition is common at this stage due to the tremendous pace in growth and development (WHO, 2017).These processes require extra nutrients, making adolescents more vulnerable to nutritional deficiencies (Hamulka .J. *et al.*, 2017; Jillian .T. *et al*., 2013).. Adolescents in developing countries have encountered many nutritional problems such as under-nutrition, which would affect their growth spurt as well as their health (Mulugeta A. *et al* ,2009). In many African countries, adolescents suffer from chronic under-nutrition associated with deficiencies in muscular strength and working capacity (Deshmukh PR *et al*). Although the prevalence of undernutrition is today decreasing, overweight and obesity are becoming more prevalent among adolescents (Lob-Carzilius .T,2009). As key predictors in adulthood, overweight and obesity are associated with severe health problems, such as diabetes mellitus, hypertension, cerebrovascular disease, atherosclerotic coronary heart disease, colorectal cancer, and lower educational attainment (Stray-Pedersen M 2009,).

Adolescents constitute a significant portion (1.2 billion) of the world population, but they are a marginalized and disempowered group in many contexts. They commonly lack a voice on the social stage, have constrained access to resources, are likely to drop out of school, and remain vulnerable to exploitation and violence (Al-Muammar MN *et al* ,2014), Hence, behavioral interventions, especially on dietary issues, at this stage will likely help bring intended change during adolescence and throughout their lifetime (Al-Muammar MN *et al* ,2014). Adolescence also offers a window of opportunity to achieve optimal growth and development and delay or prevent the risk of non-communicable diseases. Therefore, ensuring healthy eating habits has paramount importance during adolescence as a poor diet also predisposes to poor physical and cognitive development (Omobuwa O *et al*.,2014).

Good feeding habits and adequate knowledge of nutrition have been proven to play a very vital role in adopting optimal nutritional practices (Keren, & Linda, 2016). Feeding habits are associated with health and nutritional status. Feeding habits are conscious collective and

repetitive behaviors, which lead people to select, consume, and use certain foods or diets, in response to social and cultural influences. They determine the way a person or group eats, in terms of types of food, quantities and when. Good feeding habits can help to reduce the risk of some diseases including heart disease, diabetes, stroke, some cancers and osteoporosis. They also help to reduce high blood pressure, lower cholesterol levels, improve wellbeing, increase immune system, thus the ability to recover from illness or injury.

Feeding habits influence nutritional status of people in a population.Nutritional status according to Adienbo OM*et al*.,(2012) is the physiological condition of an individual that results from the balance between nutrient requirements and intake, and the ability of the body to use these nutrients. A healthy population is essential for any country in order to be productive and to promote national development. Poor nutritional status is mostly associated with poor food intake.

Despite the increased focus on adolescent health in recent years globally, adolescence is not considered a high priority life stage for fulfillment of nutritional needs and implementation of necessary nutritional interventions (Patton *et al*., 2016; WHO, 2005). Malnutrition remains a major public health problem among adolescents (Chowdhury ABMA*et al*., 2017). Malnutrition is a global problem with enormous social and economic implications and is the leading cause of illness worldwide. Most countries are trying to reverse the trend of all kinds of malnutrition by 2030, but most of the efforts are not progressing at the appropriate rate (WFP, Cameroon Report,2022). Malnutrition remains an underlying health condition in Sub Saharan Africa requiring more effort to eradicate it (African hunger, famine facts, FAO, 2022). In 2020, it was estimated that about 21% of the African population is malnourished. The percentage continues to increase every year. This implies that it is a greater menace that requires adequate attention and prompt action by all stakeholders (FAO, IFAD,UNICEF,WEP and WHO, 2021). According to FAO, IFAD,UNICEF,WEP and WHO, (2021), 48% of households in Cameroon do not have the means to afford nutritious diets. Worldwide, 10% of adolescents are overweight and 2–3% are obese. The percentage of adolescent girls and boys aged 15–19 years who are thin is 29% and 59%, respectively.

Feeding habits are learned from parents, relatives or friends. Variations in feeding habits, can be brought about by economic factors, religion, occupation, family upbringing and tradition. Adolescents often exhibit unhealthy feeding habits such as meal skipping and snacking on fast foods(Gebreyohannes Y., 2014). These food behaviors may set in unhealthy eating trends for

adult life, and contribute to a number of health problems including overweight and obesity, metabolic diseases, wasting, and some types of cancers. Interventions to lower the burden of malnutrition should tackle the contributory factors. Knowledge of their magnitude and causes among school adolescents is therefore important as it will provide an opportunity for school-based interventions targeting improvement of adolescent health.

2. LITERATURE REVIEW

2.1 Feeding Habits of Adolescents

Feeding habit is define as a preferred food choice by a person day to day life. Optimal dietary practice in adolescent forms good eating habits, provide increased nutrients required for growth, good health, cognation and educational achievements in adolescents. Adolescence is a critical stage of life for establishing good feeding habits and practices that help prevent or delay onset of non-communicable diseases. Eating habits acquired during adolescence can persist to adulthood (Hamulka*et al.*, 2018). Adolescence are at risk of nutrients inadequacies because their body undergo several physiological, emotional and sociological changes, as they are also independent in nature and these factors may affect their eating habits negatively, hence unable to meet increased nutrients requirement (BeLue *et al*., 2016).

Currently, food is associated with lifestyle, economical status as portrayed in commercial advertisement in the media other than source of nourishment and good health. Adolescents are caught in this dilemma of changing world around them and face major challenges making healthy food choices and eating habits (WHO, 2014). Eating habits and lifestyles have changed and is being accelerated by modern lifestyle of less activity, urbanization and consumption of highly processed foods due to industrialization and empowerment.

a. Nutritional needs of adolescents

Nutrition is a critical part of health and development. The growth spurt in adolescence requires rapid tissue expansion with special nutrient requirements, including amino acids for growth of striated muscle, as well as calcium and vitamin D to accommodate bone growth. Energy and nutrition requirements must match the needs of the adolescents as they typically engage in physical work or recreational exercise (boys on average more than girls), which benefits striated muscle mass enlargement. Appetite increases during adolescence, and sedentary individuals are more likely to accumulate fat if they have access to high-energy food. Thus, low

activity levels among adolescents are a key factor that underlies increases in adolescent obesity across the globe. The caloric requirement of adolescent males is higher than that of adolescent females, owing to greater increases in height, weight, and lean body mass. Dietary recommendations suggest that 50% or more of total daily calories should come from carbohydrates, with no more than 10–25% of calories derived from sugars, such as sucrose and high fructose corn syrup. Protein requirements per unit of height are highest for females in the 11 to 14-year age range and for males in the 15 to 18years age range, corresponding to the usual timing of peak height velocity(WHO, 2018).

i. Factors that Influence Feeding Habits of Adolescents

Food choice in general is a complex process that depends on culture and can be influenced by different factors such as personal, social, economic and emotional. Teenagers make many more choices for themselves than they did as children. Moreover, since eating is a social act, social networks and family can affect their food choices even more (Ekim, 2006). In addition, globalization is eroding traditional foods and offering more food choice and availability, all of which could influence their eating patterns.

Additionally, the following factors were examined and analyzed: self-perceived body size, dieting, dietary knowledge, parental control, meal and snack frequency, eating out of home, eating takeaways and precooked meals, eating from the school canteen.

ii. Peer influence

Result have proven that adolescents are being more influenced by peers and self-choices than by parents. These findings are consistent with those of Wood-Wright (2009), who found that parents had little influence on children's eating habits. This finding may be related to, or confounded by, the age of middle school adolescents, where pressure and mass media influences peer may outweigh parental guidance (Boyland & Halford, 2013).

The influence of peers is congruent with a survey by Bruening *et al.*, (2012). The authors examined eating behaviors between adolescents and their friends and found peer influence to be a dominant psychosocial issue during adolescence. To students of this age group, the desire to conform can influence the frequency and place of intake of food as well as their food choices.

iii. **The Lifestyle Habits of Adolescents**

Social media and television also tend to influence eating habits and food choices. One study noted that adolescents who watched TV more than 2 hours per day had high intakes of energy-dense snacks and beverages (Pearson*et al.*, 2011). Methods to modify snacking habits as well as encourage participation in other activities, such as sports, should be a parental priority. Although the current study found that more males than females engage in sports both in and out of school, social and cultural norms conceivably restrict females from participating in sports in public (Kanters*et al.*,2013).

iv. **Socio-Economic Factors**

According to WHO (2012), the income growth and urbanization also bring a dietary transition characterized by the expansion of vegetables, fruits and semi processed, and ready-to-eat foods and animal products in the diet. The relative decline of cereals, starchy staples, and pulses in the diet carries significant implication for the environment and global health. This implies increased pressure on cropland, fossil fuel energy and water and a greater incidence of chronic diseases such as cancer, diabetes, and heart diseases. The dietary transition and urbanization also imply a sharp increase in consumer's reliance food distribution channels.

The tremendous opportunities this food security challenge presents and the likely economic, environmental, humanitarian and socio-political consequences of failing to seize those opportunities. The primary constraints natural resources limits related to land, water and water force, as well as growing uncertainty related to climate change. But fiscal constraints on investment in enhancing food systems productivity, both in production and distribution functions, as do the technological constraints imposed by intellectual property regimes.

v. **Educational Factor**

According to Musgrove *et al.,* (2010), explained the way of improving nutritional status of adolescent's, especially females, on nutrition, sanitation, and common diseases prevention strategies would logically reduce malnutrition and other health related challenges. It's the way to the stomach is through our minds. Quality food intake choices and quantity at all discretion of our choices of food. This problem is crucial in Sub-Saharan Africa, where access to formal education in certain communities is still burning, especially for a girl child that can affect her later in life. The burden of malnutrition has been directly linked to poverty, quality of food intake, excessive disease and poor health status. The relationship between poverty and education

is too close, and virtually integrates into the large sizes that are usually seen in most regions of Sub-Saharan Africa. A poor community of certain cultural beliefs might not actually realize that rejecting certain available foods or forbidding women from certain foods will help them improve on their nutritional status and will have adequate and quality nutrition.

Musgrove *et al*., (2010), describes three ways that ignorance and lack of education contributes to inadequate nutrition. The first people may know very little about vitamins or nutrients, and they fail to eat the cheap and available ones. Ignorant causes and its consequences. Treatment and prevention option may be most of the time very accessible and cheap. Poor hygienic condition and the inability to control some intestinal parasites (Ascaris Lumbricodes and hook worms) has serious impacts in competing for with the host, causing aneamia and suppressing appetite. Some traders may be ignorant on how to take care of themselves, as they may undervalue health practices taking care of their environment, eating foods rich in vitamins, and other macro nutrient rich food.

vi. **Beliefs and attitudes**

As well as nutritional knowledge, there are factors, beliefs and attitudes which impact on food choice. These have been proposed in a variety of models. (Sztainer *et al.*, 2009) examined the factors which influence food choice in a group of adolescents ranging from 12 to 19 years of age. It is seen that the factors which influence food choice in this population group can be defined into three levels. The first level included; hunger and cravings of food, the appeal of the food (especially taste and appearance), consideration of time and convenience of the food. Level two included the factors of food availability, effects of foods that may be beneficial, influences on eating behavior (particularly parental influence as well as the influence of religion and culture) and "situation-specific") factors. Level three factors were discussed less frequently and in less depth, and included "mood, body image, habit, cost, media and vegetarian beliefs". It is also known that in addition to these factors; social norms, fast foods and personal experiences, mass media, peer influences and the influence of parents' dietary habits have an effect on food choice in adolescents (Pirounzia, 2001).

b. Influence of food availability on health and nutritional status

According to Belsky *et al* (2010) in their study found out that, children who are brought up in poverty experience poor health outcomes and higher mortality rates later in life. They

added that, children living in food unsecured households experienced greater health problems relative to their peers living in household that were food secured, they suggested that the characteristics of parents and households helping in determining the household food situation. Zaslow *et al* (2009) confirm the importance to promote proper nourishment in terms of quantity and quality, not only to prevent nutritional disorders, but also for children to reach their full growth and development potential.

c. The impact of nutritional knowledge on food choice

Factors which are considered to influence the choice of dietary intake in adolescents are nutritional knowledge, nutritional beliefs and environmental factors which impact on behavior (Pirouznia, 2001). Compared with the still limited cognitive capacity of children, adolescents are already fully capable of reflecting on their dietary practices and food choices (Keller *et al.*, 2003). The available studies suggest that adolescents are becoming more independent in their food choices, more likely to be influenced by their peers, and less likely to pick healthy foods (Huang, 2007). Other factors that affect their overall nutrition include the kinds of foods available at home, amount of time available to make food (Venter& Winterbach,2010), knowledge of food content (Li *et al.*, 2008), and ability to purchase snacks (Ahmed *et al.*, 2006). Research is inconclusive on whether nutritional knowledge impacts on the choice of healthy foods. Have shown that nutritional knowledge has a positive impact on the choice of foods in individuals. (Pirouznia, 2001) found that there is a positive relationship in preadolescent students between nutrition knowledge and eating behavior which indicated that eating choices could be influenced by nutritional knowledge. (Wardle *et al.*,2000) found a positive relationship between nutritional knowledge and the consumption of fruit and vegetables and other healthy foods in adults. They state that nutrition knowledge is an important part of health education and has the capability to contribute to enhancing dietary quality.

2.2. Factors affecting nutritional status

2.2.1. Socio-economic and demographic characteristic of households.

The relationship between socio-economic status and health is complicated and may be influenced by gender, age, culture, environment, social and community networks, individual lifestyle factors and health status (Kana *et al., 2011*).

Population studies show that there are clear differences in social classes with regard to food and nutrient intakes. Low-income groups in popular, have a greater tendency to consume unbalanced diets and have low intakes of fruits and vegetables (Noelle, 2011). This leads to both under-nutrition (micronutrients deficiency) and over-nutrition (energy overconsumption resulting in overweight and obesity) within the members of a community, depending on the age group, gender and level of deprivation. The disadvantaged also developed chronic diseases at an early age compared with socio-economic groups; usually identified by educational and occupational levels.

In a study by Harris *et al.,* (2015), in rural Bangladesh, it was found out that SES and demographic variables were the major determinants of household food access and utilization. They observed a positive association between wealth and dietary diversity scores. Access to media and literacy were linked to a reduced risk of food shortage, higher DDs and less malnutrition. Higher SES was associated with more frequent consumption of most food groups, including in-season fruits and vegetables. Another study stated that, food availability in Cameroon and other parts of the World (Belmondo *et al.,* 2013, &Rebecca *et al.,* 2014) is constrained by population growth, low agricultural productivity, small land holdings, limited capital for farm improvements and factors that inhibits factors to food at the household and the individual levels. Intakes of vegetables and family products were far less frequent, especially with women of lower socio-economic means (Zerida, 2013).

Also, another study carried out in Cameroon by Pongou*et al.,* (2006) suggested that child nutritional status is influenced by household and community factors. They further stated that low nutritional status is more likely in children of low socio-economic and environmental status. They found out that an imbalance in dietary intake and poor health was a reflection of the SES and environmental factors. Hushof*et al.,* (*2003*) in a cross-sectional study based on data of three Dutch National Food Consumption Surveys, studied prevalence of obesity and skipping of breakfast was higher among people with low social economic status (SES). Regarding nutrient intake, in all surveys a higher SES was associated with higher intake of vegetables, proteins, dietary fibers and most micronutrients. The effects of SES dietary intake and anthropometry were analyzed.

2.2.2. Source of water and availability of toilet facility

The nutritional status of an individual depends on the interaction between food that is eaten, the overall state of health and the physical environment. Unfavorable health environment caused by unsafe, inadequate water supply and sanitation can increase the probability of infectious diseases and indirectly cause certain types of malnutrition (Noella *et al.,* 2011).

A comparative study on maternal nutritional status conducted (Wolde, 2002) and a study in the SNNPR of Ethiopia (Teller&Yimar, 2002) showed that rural women are more likely to suffer from chronic energy deficiency than women in urban areas. Similarly, studies on child nutrition (Sommerfelt *et al.,* 1994) also showed significantly higher levels of stunting among rural than urban children.

2.2.3. Physiological states

Diarrhea and other infectious diseases manifested in the form of fiver both dietary intake and utilization, which may have a negative effect on improved child nutritional status. A comparative study on children's nutritional status (Sommerfelt *et al.,* 1994) indicated that stunting was highest among children with recent diarrhea. Undernutrition in developing countries and some poor families in developed countries is now complicated by the HIV/AIDs (Teller &Yimar, 2002).

2.2.4. Educational level

Equally, the educational levels of mothers are very important especially when living conditions are difficult (Djeukeu, *et al.,* 2013). They noted that educational level and income determines food choices and behaviors that can ultimately affects health and nutritional status. Education is one of the most important resources that enable women to provide appropriate care for their children, which is an important determinant of children's growth and development. Studies in the Philippines, Uganda and Ethiopia (Teller &Yimar, 2002) showed a decreased incident of malnutrition among young children with an increase in the level of mother's education. Higher socio-economic level has been associated with healthier dietary patterns whereas poor socio-economic status is linked to poor nutritional patterns. Nutritional status therefore, is influenced by our food habits which in turn are influenced by factors such as income, availability, culture, education, skills, beliefs and knowledge about food composition.

2.2.5. Women's employment

This increases household income with consequent benefits to household nutrition in general and the women's nutritional status in particular. Employment may increase women's

status and power, and may boost a woman's preference to spend her earnings on health and nutrition. Studies in Africa has indicated, at similar levels of income, household in which women have a greater control over their income are more likely to be food secured (Wolde, 2002; Kennedy & Haddad, 1991).

Although women's employment enhances the household's accessibility to income, it may also have negative impact on the nutritional status of children, as it reduces a mother's time for child care. Some studies have revealed that mothers of the most malnourished children work outside their home (Mittal & Megha, 2013).Abdulai &Aubent (2004) also suggested that an increase in income may likely lead to an increase of food intake among the poor households.

2.2.6. Culture and Beliefs

Complex social and cultural beliefs in many developing countries put females at a disadvantage and, stating from very young age; many girls do not get enough to eat (Carolyn, 2012). In communities where early marriages are common, teenagers often leave school and become pregnant before their bodies and inadequate resources and support, these mothers often fail to gain sufficient weight during pregnancy and are susceptible to a host of complications that put themselves and their babies at risk.

Studies that examine the complete issues of cultural and religious beliefs and practices related to food and health (Brione, 2015) generally conclude that certain beliefs and practices may be beneficial while others might be harmful depending on the specific diet and the social, economic and ecological environment (e.g. labor division, local food availability). Culture, religion and traditional knowledge affect food and nutrition security by shaping a community's diet, food preferences, intra-household food distribution patterns, child feeding practices, traditional medicine and the accessibility and use of biomedical public health services. Cultural food selection affects nutrition sometimes negatively. Culture has tremendous influence on health and nutritional status. The impact of culture, and religion on food intake and health is inherently localized (Brione, 2015). Since reproductive women and infants are particularly vulnerable groups in terms of food intake, the impact of beliefs and practices related to pregnancy, childbirth and the postpartum period have received a prominent place.

The above author further cautioned that, where culture is the main determinant of food, the implications are that people tend to shy away from some foods, thus restricting their food

selection and in areas where these cultural food preferences are deep rooted, people are likely to be malnourished.

3.MATERIAL AND METHODS

This study involved the use of a school-based cross- sectional descriptive/quantitative design to assess the feeding habits and nutritional status of adolescents in Bamenda II Municipality.The sample population for the study is 200 adolescents between the ages of 11-19years who are residing in Bamenda II municipality. Only adolescent in four private non boarding secondary schools in Bamenda II Municipality aged 11-19years. Children in residential care have standard nutritional regimen which are strictly adhered to and Both sexes who gave their consent to participate in the study. Those with pre-existing medical conditions were not included. Sickness affects food intake and metabolism in those with pre- existing medical conditions. The study applied quantitative research approach using the structured questionnaire and oral discussions to collect data. Information on the demographic characteristics of students, feeding habits , anthropometric measurements, BMI and 24hr dietary recall/dietary diversity wereobtained using questionnaire.A portable Salter scale (Mode 180-England) was used for weight determination. Height was measured using a portable Harpenden Stadiometer (Holtain Ltd, UK) having a movable headboard, fixed baseboard with a precision of 0.1cm. A flexible measuring tape was used for measuring the waist circumference.

Data generated were entered and analyzed using Statistical Package for Social Science (SPSS) 25.0. Results were presented in percentages, frequency tables, and histogram. The weights and heights of both sexes were highlighted following standard deviation score where> median-2SD to + < 1SD= Normal, Median< - 2SD to > - 3SD = moderate undernutrition, < Median – 3SD = severe undernutrition, + 1SD to < + 3SD= overweight, and greater than + 3SD = obesity.

Quantitative data are expressed as mean ± standard deviation (SD), and qualitative data are expressed as numbers and percentages.

4.0. RESULTS

4.1.Nutritional status of adolescents

Table 1 shows the chi square analysis of the relationship between BMI and gender of the students

Age		Gender		Total
		Male	Female	
	Normal	5(16.7%)	20(66.7%)	25(83.3%)
	Obese	0(0%)	5(16.7%)	5(16.7%)
11-14 years	Total	5(16.7%)	25(83.3%)	30(100%)
		X^2 =1.1	d.f=1	P=.237
	Moderate Underweight	15(17.6%)	5(5.9%)	20(23.5%)
	Normal	0(0%)	19(22.4%)	19(22.4%)
	Overweight	4(4.7%)	20(23.5%)	24(28.2%)
	Obese	5(5.9%)	17(20%)	22(25.9%)
11-18 years	Total	24	61	85
		X^2 =30.97	d.f=3	P=.000
	Moderate Underweight	0%	12(14.1%)	12(14.1%)
	Normal	15(17.6%)	19(22.4%)	34(40%)
	Overweight	10(11.8%)	18(21.2%)	28(32.9%)
	Obese	5(5.9%)	6(7.1%)	11(12.9%)
18-19years	Total	30	55	85
		X^2 =8.20	d.f=3	P=.040

Table 1 presents the BMI of students, for the age group 11-19 years. This result was significant at ($p<0.05$) for age group 11-14 years. For the age group 18-19 years, a significant difference was observed between males and females (X^2 =8.0, d,f=3, p=0.040).

4.2 Feeding habits of adolescents

Table 2 shows the feeding habits of adolescents

	Once a week	%	Twice a week	%	Thrice a week	%	Four and above	%
Intake of tubers and products (yams, garri, sweet potatoes)	58	29	82	41	30	15	30	15
Intake of cereals, grains and products (rice, maize pap, bread,	15	7.5	59	29.5	63	31.5	63	31.5

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Intake of pulses, legumes and products (beans)	86	43	84	42	25	12.5	5	2.5
Intake of fish, meat and products (poultry, sausage, fish liver oil)	65	32.5	58	29	18	9	59	29.5
Intake of eggs and dairy products (milk, yogurt, ice cream, cheese)	43	21.5	73	36.5	45	22.5	39	19.5
Intake of fruits and vegetable (pawpaw, carrots, huckleberry, pineapple, oranges, pear, plums, berries, mangoes, tomatoes, beetroot)	33	16.5	50	25	29	14.5	88	44

4.3. Factors influencing feeding habits of adolescents

The study revealed that (80%) of the respondents sometimes skipped meals while (20%) said they don't. Twenty –seven (27%) of the respondents strongly agreed that they skipped meals due to lack of time, (12%) agreed, (19%) were neutral, 30 (15%) disagreed while 53(26%) strongly disagreed with the statement. Of those who skipped breakfast, (30%) strongly agreed that they stopped eating breakfast because it makes them to sleep at school, (17%) agreed, (18%) were neutral, (23%) disagreed while (12%) strongly disagreed with the statement The study revealed that (29%) of those who skipped launch indicted that they did so because of no cooked food available, (23%) said they are busy at school, (16%) said they prefer snack, (18%) stated that they do so because of weight control while (14%) stated other reasons.

Of those that skipped dinner, (26%) said they do so because of they are too tired to cook, (31%) said they close late from school, (20%) said because of weight control, (15%) said they prefer snack while (8%) said because of other reasons.

4.4. Consumption of snacks in school

Seventy-- five percent (75%) of the respondents stated that they eat snacks at school while (25%) don't.

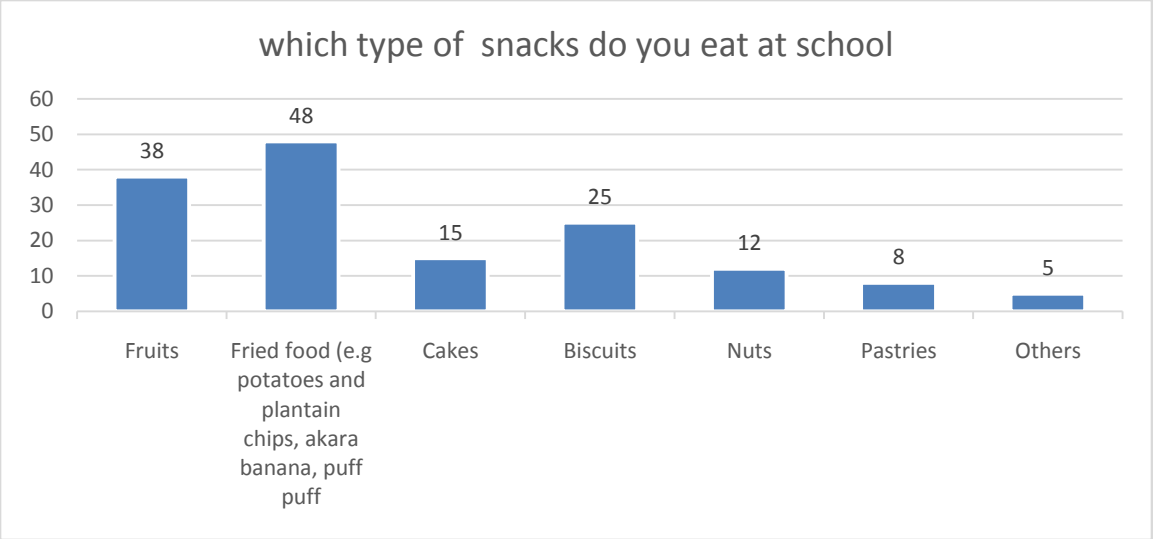

Figure I: Type of snacks consumed in school

In terms of feeding habits (38%) consumed fruits, (48%) consumed fried food, (15%) consumed cakes, (25%) consumed biscuits, (12%) consumed nuts while (8%) consumed pastries.

The study also revealed that (7.5%) of the respondents ate once a week, (56.0%) ate twice a day, (31.5%) ate thrice a day while (5%) ate four and above. Among those who eat less than three times a day, (25%) stated that they do so because they don't want to get fat, (29%) said they don't like the food, (21%) said they can't afford enough food while (25%) say they do so because of weight control.

With regards to Peer group influence 25(%) of the respondents strongly agreed that they like to eat whatever their friends are eating, (10%) agreed, (15%) were neutral, (29%) disagreed while (34%) strongly disagreed with the statement. The study revealed that (39%) of the respondents said they have been eating in the canteen for the past 7 days while (61%) said no. The information on socio-demographic characteristics of respondents revealed that (15%) of the respondents were between 11-13 years, while (42.5%) were between 14-15 years while (42.5%) were between 15-19 years. Gender distribution of the respondents revealed that (29.5%) were males while (70.5%) were female. The result shows that (36.5%) of of the fathers were civil servants, (27.0%) self-employed, (31.5%) farmers while (5%) were unemployed. Thirty –five percent (35%) of the mothers were civil servants, (36.5%) self-employed, (19%) farmer while (9.5%) were unemployed

4.5.Nutritional status of adolescent

Table 3:Indicates the nutritional status of adolescents and chi square analysis of the relationship between BMI and gender of the students

Age		Gender		Total
		Male	Female	
	Normal	5(16.7%)	20(66.7%)	25(83.3%)
	Obese	0(0%)	5(16.7%)	5(16.7%)
11-14 years	Total	5(16.7%)	25(83.3%)	30(100%)
		X^2 =1.1	d.f=1	P=.237
	Moderate Underweight	15(17.6%)	5(5.9%)	20(23.5%)
	Normal	0(0%)	19(22.4%)	19(22.4%)
	Overweight	4(4.7%)	20(23.5%)	24(28.2%)
	Obese	5(5.9%)	17(20%)	22(25.9%)
11-18 years	Total	24	61	85
		X^2 =30.97	d.f=3	P=.000
	Moderate Underweight	0%	12(14.1%)	12(14.1%)
	Normal	15(17.6%)	19(22.4%)	34(40%)
	Overweight	10(11.8%)	18(21.2%)	28(32.9%)
	Obese	5(5.9%)	6(7.1%)	11(12.9%)
18-19years	Total	30	55	85
		X^2 =8.20	d.f=3	P=.040

Table 1 explains the BMI of students, for the age group 11-14 years, This result was significant at ($p<0.05$).For the age group 18-19 years, a significant difference was observed between males and females (X^2 =8.0, d,f=3, p=0.040). 6(7.1%) for females.

4.6. Feeding habits of adolescents

Table4: Explainsfeeding habits of adolescents

	Once a week	%	Twice a week	%	Thrice a week	%	Four and above	%
Intake of tubers and products (yams, garri, sweet potatoes)	58	29	82	41	30	15	30	15
Intake of cereals, grains and	15	7.5	59	29.5	63	31.5	63	31.5

products (rice, maize pap, bread, indomie)								
Intake of pulses, legumes and products (beans)	86	43	84	42	25	12.5	5	2.5
Intake of fish, meat and products (poultry, sausage, fish liver oil)	65	32.5	58	29	18	9	59	29.5
Intake of eggs and dairy products (milk, yogurt, ice cream, cheese)	43	21.5	73	36.5	45	22.5	39	19.5
Intake of fruits and vegetable (pawpaw, carrots, huckleberry, pineapple, oranges, pear, plums, berries, mangoes, tomatoes, beetroot)	33	16.5	50	25	29	14.5	88	44

Table 5: WAIST CIRCUMFERENCE

	NORMAL	Increased Risk of metabolic Complications (IRMC).	Substantially Increased Risk of Metabolic Complications (SIRMC).
Male	55(93.2%)	2(3%)	2(3%)
Female	111(78.7%)	24(17.25%)	6(4.2%)

Table 6. Dietary recall by respondents (N=200)

Food Group	Food Item	No of Respondents	% of Respondents
Starchy Root			
Tubers	Cocoyam	78	39
	Plantains	40	20
	Sweet Potatoes	78	49
	Irish potatoes	144	72

Cereal	Corn flour	163	81.5
	Rice	89	44.5
	Pap	40	20
	Maize on Cop	130	65
Legumes	Lima Beans	150	75
	Groundnut	88	44
Animal products	Meat	110	55
	Frozen fish	169	84.5
	Milk	50	25
	Egg	79	39.5
	Cray fish	148	74
Oil seed	Melon seed	29	14.5
Fats/Oils	Palm oil	200	100
Fruits	Mangoes	107	53.5
	Oranges	93	46.5
	Pawpaw	90	45
Vegetables	Cabbage	75	37.5
	Garden eggs	98	49
Beverages	Huckleberry	200	100
Tea	Tea	67	33.5
Beer	Beer	/	/
Soft drinks	Soft drinks	88	44
Palm wine	Palm wine		
Malted milk	Malted milk	75	37.5
Spirit	Spirit	/	/

Table 7Dietary Diversity Score (DDS)

Dietary Diversity Score (DDS)			
	Low DDS <4	**Medium DDS 5-8**	**High DDS 9-12**

Male	**3(5.5%)**	**48(81.3%)**	**8(13.5%)**
Female	**10(7.0%)**	**107(75.8%)**	**24(17.0%)**

4.7. DISCUSSION OF FINDINGS

Using the scientific based criteria (BMI) for assessing nutritional status , majority of the adolescents were within the normal range.Few were underweight, obese and overweight. Theseresult area reflection of availability and affordability of food.Childhood and adolescence are periods of growth.Inadequate food intake and/or debilitating diseases such as chronic parasitic infestations may seriously affect laying down of tissues. This may result in stunting or underweight. Besides nutritional factors , genetic and endocrine mechanism can also contribute to low height for age/ low weight for age.

The percentages of overweight and underweight were higher in the females than in the males.Considering that environmental factors were the same for both sexes, this observation might be due to genetic factors. Most of the students also had waist circumference within the normal range (93.2% for males and 78.7% for females).Factors such as lifestyle, health status, culture and socio-economic status of the parents also influence food intake and nutritional status. This opinion is in agreement with the finding of Hamulka .J.*et al*., 2018, Noella .N.*et al.*, 2013, that high socio-economic status (SES) was associated with increased food intake. The parents in this study were either civil servants, self- employed, or farmers. Some of them combined occupations. They were therefore able to provide the basic needs (food, clothing, shelter) for their children. Majority of the children lived with both parents .

Fruits and fried foods were the major snacks consumed. This shows that adolescents consumed healthy and unhealthy snacks. The consumption of unhealthy snacks (48%) was high. Unhealthy snacks are high in sugar, salt and unhealthy fats which contribute to obesity and overweight. A relatively small percentage (38%) consumed healthy snacks(fruits). These results are in accordance with the studies by Soares. D. *et al*., 2014; Jillian.T.*et al*., 2013) where it was found that food consumed by children and adolescents were characterized by high levels of carbohydrates, fats and fast foods. However,snacks help to manage adolescents hunger and boast nutrition. They also rejuvenate students and give them energy to learn.

In this study adolescents usually eat twice a day with regular snacks notably fruits and fried foods.The meal pattern was greatly influenced by culture. The results of 24hr dietary recall confirms this.The frequency of consumption of cornfufu and huckleberry was high.The number of meals eaten per day, the quantity and quality of foods involve in meal preparation in a particular community determine to a great extent the nutritional status of the inhabitants.It is known that if only one meal is eaten each day, food intake especially for vulnerable groups (children, pregnant and lactating women) is likely to be inadequate regardless of the preparation pattern ,amount and quality of food.

Majority of them skipped break-fast regularly due to the fear of sleeping during classes. Those who skipped lunch and dinner gave lack of time to prepare foods and tiredness as their reasons. It was observed that Peer groups influence their feeding habits. This is consistent with the earlier report relating to the feeding habits of adolescents by Kotecha *et al*., (2011). They found out that the food habits during adolescents were affected by the opportunities they had of eating with peers away from their families. Most of the respondents strongly agreed that breakfast and healthy snacks are the most important meal of the day and thus also agreed that proper meal planning is essential to achieve adequate nutrition. Eating breakfast is important for all ages especially for children and adolescents. This habit of skipping breakfast should be discouraged. Some people even experience headaches, blood sugar drips, faintness and difficulty in concentrating when they skip breakfast. Several studies suggest that eating breakfast may help children to do better in school by improving memory, alertness, concentration, problem solving, ability, test scores, school attendance and mood.

The results also revealed that majority of the students ate in the canteen daily. This may predispose them to the consumption of low quality monotonous diets. This is similar with the report of Thomas. R.*et al.,* (2013), which explains that cafeteria system and availability of junk food may compromise the health of adolescents. Most of the parents in the study were civil servants, farmers, or self-employed, so they had money to give their children to eat at school. This agrees with the study of Thomas. R.*et al.*,(2013) which stated the increase income may lead to increase in food accessibility. Socio-economic background of parents, lack of time to prepare food, tiredness from school, culture, and availability of food were the factors influencing the feeding habits of adolescents in the study.

Dietary diversity score in this study was generally medium(81.3% for males and 75.8% for females) for adolescents. This was not surprising because the frequency of consumption of various classes of food during the research seems to be adequate. There were no significant ($P<0.05$) differences between males and females. Positive correlations were observed between the dietary diversity scores and the nutritional status of adolescents. Most of them consumed at least foods from five food groups daily. The contribution of food groups other than cereals and starchy roots is low, a reflection of the dietary diversification index.

Previous studies in Cameroon have indicated that the diets in general are not balanced (Nola et al.2013). A strong association has been reported between dietary diversity and children's nutritional status. In rural Bangladesh evidence showed a positive correlation between dietary diversity with child stunting among infants and pre-school children, 11-59 month of age (Rah, Akhter, Semba, De pee, Bloem and Campbell, 2010).

5. Summary, Conclusions and Recommendations

5.1. Summary

The region has diverse food resources sufficient to feed its population. However adolescents in the study generally eat twice a day , skipping mostly breakfast. Snacks were regularly consumed. Majority of them have knowledge of adequate nutrition but do not put in practice partly due to social factors. Using BMI for age boys/girls (Z-Scores) and waist circumference , most of the students were within the normal range. The results of the 24hour recall showed that food is available and culture influenced food selection and choice. Monotonous diets and medium dietary diversity were observed.

5.2. Conclusion.

The results of our findings in table 1 shows that the female adolescents were more obese and under weightthan the males. Genetic rather than nutritional factors alone might be responsible .Both sexes practiced the same unhealthy eating habits which includes meals skipping and daily snacking. Lack of time for regular meals, inability to supervise meals eaten away from home and overriding fear of obesity especially among girls are some of the reasons for poor feeding habits in this study.The peer group relationship has great influence in the diet of teenagers .To be accepted the teenager must comply with the food habits of those in the group to which

she/he belongs. They are inclined to eat mainly snacks , the effects of which may be loss of appetite for the main meal. Poor feeding habits contribute to malnutrition. Early nutritional screening and interventions are recommended to improve the nutritional status of adolescents.

5.3 Recommendations

- it is imperative that frantic efforts are made to help adolescents cultivate an interest in eating healthy foods and developing healthy feeding habits. This will go a long way to help reduce the incidences of diet-related conditions such as hypertension, stroke, and diabetes, the prevalence which is increasing especially during the later stages of adulthood in Cameroon particularly in Bamenda II Municipality . Further research is recommendedto determine blood levels of some nutrients (Iron, Zinc , Calcium and Vitamin A and C-reactive protein)
- There's also need to educate the parents and children on the need to take breakfast in the morning.
- There is need for nutrition counseling to bridge the gap between the acquisition of nutrition knowledge and practice.
- Food Vendors on school premises should be encouraged to provide at affordable prices a wild variety of healthy foods such as appealing fresh fruits and vegetables for students to buy.
- Physical activities should be encouraged at early age in school so as to address the issue of overweight in adolescents.
- There is also a need for further studies to obtain the views of secondary school adolescents on factors (barriers and promoters) at home and in school which affects their desires to eat healthy foods.

Finally, Government should invest in effective nutrition intervention targeted to parents and children during the window of opportunity in other to break the vicious cycle of intergenerational malnutrition.

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