FOOD HABITS, NUTRITION KNOWLEDGE AND NUTRIENT INTAKES OF ADOLESCENT STUDENTS IN SELECTED BOARDING SCHOOLS IN GHANA

BY

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DECLARATION

I, Eileen Cecilia Hevi Adigbo, hereby declare that, except for references to other peoples work which have been duly cited, this work is the result of my own original research and that this dissertation had neither in whole nor in part been presented for another degree elsewhere.

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DEDICATION

Dedicated to my late Father, Cyprain Hevi, the reasons for remembering are too many to forget, to my Husband; Lt. Col. C. J. Adigbo and my children, Akpene, Sena, and Kafui. Thanks for your patience.

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A B S T R A C T

The eating habits, nutrient intakes and nutrition knowledge of one hundred and forty adolescent students from four secondary schools in the central region of Ghana were investigated.

Instruments used for the data collection included questionnaires, food records, anthropometric measurements and observations.

Data obtained were analysed using a computer and descriptive analysis was used to present the data. Jellife's anthropometric reference data, Kaufman's weight classification and Body Mass Index (BMI) were used to classify respondents as obese, overweight, normal or underweight.

The sample was made up of 52% females and 48% males . Their mean age was sixteen years and most of their parents were highly educated and gainfully employed. Eating habits found to affect nutrient intakes of the respondents include breakfast skipping and snacking. Drug-related habits like alcohol intake was also found among a few. The majority of respondents were taking nutrient supplements. Nutrition knowledge was generally poor.

Meals served in the dining halls of all the schools studied did not meet the energy requirements of the adolescents. Even when the respondents supplemented the dining hall meals with extras from elsewhere, the calories obtained were still below the FAO recommended nutrient

intakes, especially for the 16 to 18 year old males. The weights of the majority of this age group was below that of Jellifes' reference group.

The growth performance of the majority of the students was poor. Respondents were getting one-third of their daily nutrient intakes from extra foods eaten outside the dining hall. There were occurrences of underweight and overweight.

The findings of the study strongly urge school authorities to ensure that meals provided for students are well prepared and served in sufficient quantities. Fly proof nets should also be used in the kitchens. There is also no doubt that nutrition knowledge of adolescents should be improved in order that they would make proper food choices. Food vendors on the school campuses must be screened and supervised so that food bought is wholesome. Education on dangers of drug-related habits like alcohol consumption should be intensified, to forestall the spread of the habit among the adolescents. Parents would either have to agree to pay a higher amount of fees for the improvement of meals in the schools or continue to provide extra food and more pocket money for their wards if they must be well nourished. Schools should intensify their agricultural activities and make school farms where some of the food commodities could be obtained.

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CHAPTER ONE

1.0 INTRODUCTION

Feeding students in secondary schools has been a long standing problem for school authorities in Ghana. As far back as the late 1950s, when the Government Educational Trust (GET) Schools were established, there were lots of student strike actions which were invariably sparked off by students dissatisfaction with the meals which they were provided in the dining halls. Looking back, one would say that those meals were better compared with what students eat today. One study in 1968 by Whitby showed that breakfast in Ghanaian secondary schools then, consisted of fruits, tea, bread, margarine and marmalade in addition to corndough or roasted corn meal porridge. Presently, breakfast is usually made up of only a cereal porridge with or without bread.

The decline started when expansion of education began in the early part of 1960, when more boarding schools were built. Student enrolment increased every year to such extent that by the end of the 1970's some of the GET schools had more students than their facilities could cope with. Feeding these large numbers of students then became a problem. Meals served in secondary schools deteriorated especially when judged by the quantity served.

Until the end of 1991, when the Conference of Heads of Assisted Secondary Schools (CHASS) decided to charge a fee of ¢200 a day per student, parents were paying ¢90.00 a day towards the boarding and lodging of their wards with the

Government adding ¢10.00 as subsidy for each student. The inadequacy of the increase notwithstanding, students are still provided with three meals in a day. The question then arises as to how satisfactorily these meals cater for the nutrient needs of the students.

Most students enter secondary schools at an average age of thirteen years and they might have had a well established pattern of eating based on food habits that have been formed at home. Thus the college kitchen has to cater for students with divergent food habits.

According to Whitney and Cataldo, (1983), the period between ten and nineteen years is also referred to as adolescence. Students in secondary schools are therefore in their adolescent years. The rapidity and extent of growth and maturation during this period of life distinguishes it from both childhood and adulthood. Uddoh, (1980) observed the enormous appetite of this age group and emphasized that it must be satisfied if adolescents are to receive enough food to meet their normal physiological requirements. Optimum nutrition is crucial at this stage if the body is to achieve its maximum growth potential. However, as observed by Oguntona et al., (1978), adolescents in boarding schools are able to a very large extent, to exercise free choice of foods, sometimes for the first time, free of parental guidance.

Parents in Ghana worry a lot over their wards when they are at school. In their bid to ameliorate whatever

inadequacies the school meals might have, they spend huge sums of money on provisions and pocket money for their wards. If these students must benefit from the enormous investments made in their education and have better health in future, they must be provided with adequate diets and helped to make conscious efforts to select foods wisely. In the light of the above problems and concerns, one must seriously consider the nutritional content of the meals students eat in the dining halls and what choices they make when they have to purchase street foods.

1.1 STATEMENT OF THE PROBLEM

Life long health status of the individual depends to a large extent on the food habits and nutrient intakes during the growing years. In Ghana, students spend a substantial part of their adolescent years in boarding institutions. Their nutrient intake is therefore dependent on the meals they eat in the dining halls, their food habits and their nutrition knowledge. There is therefore the need to find out whether the food provided by the boarding schools is adequate in quantity and quality for optimum growth and also to find out the nutrition knowledge and food habits of adolescent students in boarding schools.

1.2 OBJECTIVES

The objectives of the study were :

1. To examine the food habits of the students.
2. To assess the nutrition knowledge of the students and the sources of such knowledge.
3. To evaluate the nutrient content of the meals eaten in the dining halls and to ascertain the adequacy of these meals.
4. To estimate the nutrient contribution of meals eaten outside the dining hall.
5. To compare the contribution of school meals to the total nutrient intake of the students with the contribution of meals obtained from other sources.
6. To measure the growth performance of the students.

1.3 SIGNIFICANCE OF THE STUDY

1. This study has important implications for nutrition education. It will increase the understanding of factors affecting adolescent food habits and nutrient intakes and will be valuable for planning nutrition education programmes for them.
2. The food preference information will greatly assist school administrators in the planning of meals for their students.
3. A knowledge of food and nutrient intakes of adolescents will indicate the possible need for, as well as the level

of nutritional support necessary for this group. This is particularly relevant because the need for good health, including proper nutrition, is great during adolescence and thus early emphasis on good nutrition will lead to an improvement in the feeding of future generations.

4. Currently a National School Health Policy has been promulgated and its guidelines will soon be implemented. This study will certainly create awareness of nutrient intakes of secondary school students and thus help in the planning of realistic implementation strategies.

5. Testing the nutrition knowledge of students will provide information that will reflect the students' accumulated nutrition knowledge from previous years of schooling. In this way the results will serve as a guide for future nutrition education and curriculum development.

6. Adolescents who have poor food habits may not be supplying their bodies with enough of some of the essential nutrients to maintain health and this may affect them in future. The correction of poor food habits among adolescents presents a challenge to nutrition educators and all adults. This study will provide information which will help in this regard.

7. Finally, results from this study will fill the gap in the void of information on adolescent nutrition in Ghana.

CHAPTER TWO

2.0 LITERATURE REVIEW

Many researches have been conducted on adolescent nutrition in several countries especially western countries such as in the United States. There is a large volume of information on nutrient requirements, adequacy of diet, food habits, nutrition knowledge, food preferences and growth patterns of adolescents, (Hueneman et al., 1968; Dwyer, 1980; Duyff et al., 1975). There is however, little scientific information in these areas on Ghanaian adolescents. The review of available literature will therefore be mainly on work done elsewhere.

These include:-

2.1 Developmental Characteristics That Affect Food Habits.

2.2 Nutritional Requirements of Adolescents.

2.3 Food Habits of Adolescents.

2.4 Nutrition Knowledge of Adolescents.

2.5 Nutrient intakes of adolescents.

2.1 Developmental Characteristics That Affect Food Habits.

Adolescence is a range of years during which the individual grows from a child to an adult (Runyan, 1976). Psychologists identify this period as a stage during which the individual attempts to develop an understanding of himself and to find a way of relating to the adult world. The

nutritionist, however, views this period as a time for significant growth in a physical sense rather than the psychological growth involved in the development of self identity (McWilliams, 1975; Hurlock, 1978). According to McWilliams (1975), adults become very concerned about the adolescent period because behaviour patterns at this time are different from other times in the life of the individual. For instance, for many adolescents, the peer group is the dominant influence on thought and behaviour and therefore, most teenagers' food habits are influenced by the peer group. (Runyan, 1976). Again Hamilton and Whitney, (1988), identified adolescence as a well known time of rebellion which extends to all aspects of life styles including feeding. Mead, (1943), noted that adolescents demonstrate their independence by refusing to eat what is good for them. Lavik, (1981), also showed that this period is one of increasing social activity. These activities according to Spindler, (1963), keep them away from home longer. Their need for establishing independence from parents and their mobility lead to some modification in their dietary patterns (Hurlock, 1978), which Spindler, (1963), found to have changed their food habits for the worse.

At this period also, the body image (the total spontaneous inner feelings and concepts of the body), is of special importance to them (Lavik, 1981). Lavik reported that the role played by this body image in the life of the adolescent, serves as an important bridge to food, eating

habits and nutrition and that a kind of equilibrium exists between identity, body image and nutrition. Changes and disturbances in any of these aspects may have a far reaching effect on the other. For instance, an identity crisis in an adolescent provoked by psychological problems in the family may result in either obesity or anorexia nervosa. On the other hand, nutritional deficiencies can burden the adolescent and her family with psychological problems and social conflicts.

The changes in body shape and size and the development of other related structures during adolescence begin in individual girls at any age from eight to thirteen years. In boys such changes occur approximately two years later (Whitney and Cataldo, 1983). Meredith, (1967) noted that in addition to the variation in the timing of adolescent changes, the sequence of these changes is different in each individual. This wide variation, as observed by Dwyer, (1981), causes much concern to the adolescent because he dislikes being too different from his peers. Early as well as late maturation may cause psychological problems too.

2.2 Nutrient Needs of Adolescents

Adolescents vary in their nutritional needs as well as in the timing of growth and maturation. (Basley et al.,) 1968). The most obvious difference is an increased need for nutrients during the adolescent growth spurt regardless of the

age at which this occurs. The increase in girls' nutritional needs is correspondingly early since they generally begin their pubertal changes about two years earlier than boys. The Food and Nutrition Board of the National Academy of Sciences of the United States has given the recommended dietary allowances separately for boys and for girls, with higher figures for boys. Stare and McWilliams, (1977) justified the higher figure for boys by the rapid growth rate, greater ultimate body size and generally greater physical activity of boys during this period. They also observed that males experience very rapid gain in lean tissue and in mineral skeleton with resulting increases in needs for protein, iron, calcium and zinc. which reside in lean body mass or skeleton. Females also experience a smaller increase in lean body mass but greater increase in adipose tissue and thus their needs for these nutrients are less (Dwyer, 1981). The recommended allowances for calories, proteins, calcium and iron for the different age groups are summarised below :

TABLE 1: FAO RECOMMENDED NUTRIENT INTAKES

AGE (YRS)	AVERAGE WT (kg)	CALORIES kcal	PROTEIN g	CALCIUM mg	IRON mg
Males :					
13-15	51.1	2,900	37	600-700	18
16-19	62.9	3,070	38	500-600	18
Females					
13-15	49.9	2,490	31	600-700	24
16-19	54.4	2,310	30	500	24

Source: F.A.O. Recommended nutrient Intakes 1985.

Nutrient requirements in this second decade of life are more closely related to physiological than chronological age since they are affected by growth and the resulting alterations in body composition and physiology. Adolescence is a critical period for proper nutrition. Adequate nutrition during adolescence can improve the lives of tomorrow's children. Adolescent boys and girls who have poor dietary habits may suffer improper growth of body organs and systems and any children born of such boys and girls even in their adulthood may be adversely affected (Mcginly, 1980).

(a) Energy Requirements of Adolescents

According to Dwyer, (1981), the major component of energy requirements are those for maintenance of the body at rest (B.M.R.), and the highly variable component contributed by physical activity. Guthrie, (1971), showed that the metabolic rate reflects the energy consumption of actively metabolizing tissues of the lean body mass especially the brain, liver and muscles. Lean body mass increases dramatically especially during the pubertal growth spurt, therefore metabolic rates increase accordingly. Boys have more lean body mass than girls, therefore their B.M.R. would consequently be higher. B.M.R. accounts for about half or more of the total energy requirements of the adolescent (Guthrie, 1971).

Added to the need of energy for B.M.R. is the need for physical activity. The energy cost of physical

activity which involves moving mass over distance varies with physiological age. As weight increases, so does the energy cost of physical activity. The rapid increase in weight of the adolescent requires increase in energy needs. In addition, a small percentage of the total calorie intake of adolescents is used for growth (Dwyer, 1981). Hamilton and Whitney, (1988) found that although mental activity makes students tired, it requires very little energy. This finding is contrary to popular belief that students expend a lot of energy when studying. The recommended allowance for energy is therefore based mainly on the need for basal metabolism and physical activity.

(b) Iron

During the adolescent period, lean body mass increases dramatically and accounts for a high proportion of the total weight gain particularly in males. Increment in body composition alone increases iron needs greatly since each kilogram of fat free body weight contains a good deal of iron. Furthermore, increases in blood volume and haemoglobin which occur in both sexes but which are greater in males add to iron requirements (Bowering et al., 1976). Added to these uses of iron is the need to replace that lost during menstruation in females (Dwyer, 1981).

Sjoln, (1981) observed that the incidence of iron deficiency anaemia in adolescents is often extremely high in developing countries. Dwyer, (1981) ranks it as the most common nutritional disease among adolescents. This observation is very significant especially when Pollit et al., (1989) and Soematri et al., (1985) found that iron deficiency anaemia can have adverse effect on learning. Anaemia has also been shown to affect psychological and physical health by increasing susceptibility to disease, lowering resistance, increasing fatigue and affecting work capacity (Hamilton et al., 1988).

The sources of iron include liver, beef, eggs and dark green leafy vegetables (Hamilton et al., 1988). Ghanaian adolescents can obtain their iron from 'kwannsusua' (Solanum Nigrum), which although not widely used, contains a substantial amount of iron about 1.09/100g (Nutrition and Food Science Department, Legon, 1992). This fruit which grows wild can be added to palmnut soup or edible leaves stew at negligible cost.

(c) Calcium

Calcium requirements are closely associated with growth of lean mass and the mineral skeleton (Dwyer, 1981). Green et al., (1991) also noted the use of calcium for nerve transmission and muscular contraction.

Factors that encourage positive calcium balance in the body include physical activity and diets containing

adequate levels of biologically available sources of calcium, vitamin D and phosphorus (Recker and Heaney, 1985). Optimal intakes of calcium and Vitamin D coupled with a physically active life style also promote and maintain peak bone mass during childhood and adolescence (Spencer and Kramer, 1986).

A factor generally recognized to promote calcium loss is a high phosphate diet as found in soft drinks (Spencer and Kramer, 1986). Soft drinks contain large amounts of phosphoric acid and no calcium. Incidentally, soft drinks rank high is adolescent snack foods. Again Green et al., (1991) emphasized that adolescents in the United States consume foods low in Calcium and vitamin D, they smoke cigarette and drink alcoholic beverages. These habits, they said, may endanger their normal skeletal, development. Fleck, (1976) cited some investigators who discovered that emotional stress and strain, which are characteristic of the adolescent period, may interfere with the retention of body calcium.

Dwyer, (1981) also found that approximately forty-five per cent of the total adult skeletal mass is laid down during the adolescent period and severe rickets during this period can deform the bony structure of the pelvis which may contribute later to difficulties in child bearing among females and according to Anderson, (1990), to rapid loss of bone calcium following

menopause. No adolescent diet could be described as good if it did not satisfy calcium requirements for bone growth and maturation (Trenholme and Milne, 1963).

Dairy products especially milk are the richest sources of calcium in the American diet (Wallach, 1989 quoted by Green et al., 1991). Milk drinking is not a common habit of adolescents in developing countries such as Ghana where dairy products are expensive,. In view of the critical nature of calcium intake at this period, King et al., (1986) suggested the use of 'Capenta' or sprats and millet. Oranges, apart from their ascorbic acid contribution, also furnish calcium to the diet. Cereals and legumes can also be sources of calcium but they contain phytic acid which combines with the calcium to make it unavailable to the body when ingested.

(d) Protein

One function of protein in the body is to ensure that amino acids are available to build the proteins of new tissues (Hamilton and Whitney, 1988). Gain in body weight represents an increase in protoplasm as well as an increase in fat during growth periods as adolescence. Approximately one-sixth of the protoplasm gained during growth, consists of protein (Runyan, 1976). Fleck, (1976) cited studies of child health and development which have indicated the close relationship between growth in height and protein intake during the entire

childhood and specific periods such as adolescence. Furthermore, Valadin et al., (1981) found that women who had a relatively high concentration of protein in their diet during early adolescence tended to have a more successful reproductive experience.

Adolescent growth therefore requires substantial amounts of protein, iron calcium and calories. It is paramount that their meals are planned in such a way that they are provided with all these necessary nutrients. Adolescents in secondary schools are of particular interest because a greater part of their adolescent years is spent in school. Besides, individual differences are not considered when meals are planned for them, and the students often resort to eating outside the dining hall, a phenomenon which calls for a look at their food habits.

2.3 FOOD HABITS OF ADOLESCENTS

Food is one of the basic needs of existence and it plays a major role in peoples beliefs about life and health. It is very important to life for, without it man will not survive (Guthrie, 1971).

The way people select, utilize and consume food forms the basis of their food habits. Food habits of any group of people are shaped by several factors. For adolescents, these factors include the influence of the home, the culture, the impact of peers and nutrition knowledge (Fleck, 1976).

(a) Influence of the Home

Uddoh, (1980) found that the family plays a vital role in the shaping of the food habits of its young and Krause et al., (1972) emphasized the role of mothers in the acquisition of food habits. Mothers most often pass on their personal preferences of various foods to their family members, since they are the ones involved with the provision of food for the family. If a mother is ignorant or indifferent about what to provide for her family, the members are surrendered to chance, likes and dislikes which may not help in the development of good eating habits (White, 1972). Emmons and Hayes, (1973) rather thought that attitudes, customs and financial constraints play an important role in food habits formation. They believe that though a mother may be knowledgeable, her knowledge, whatever its scope may not necessarily be applied fully in providing meals which will help in the formation of good food habits.

The attitudes of the family members, customs of the people they belong to, and financial constraints may prevent her from providing what she may know as nutritionally adequate. A 1992 study designed to determine parents' self reported influence over food behaviour of 3-5 year old children revealed that parents believe that their own actions are important in determining the food behaviour of their children.

(Burroughs et al., 1992).

The part played by fathers in the shaping of children's food habits has been studied. White, (1972) realised that it is the father as a rule whose tastes are most influential in deciding a family's food choice. If the father has food prejudices, his children are quick to adopt such prejudices. Lowenberg and Brian, (1952) summarised it this way:

> "The food father did not like and which mother therefore did not serve were not familiar and would not be eaten by the child".

The home is indeed one of the factors that shape the adolescents' food habits. These food habits are carried over to wherever the children go and in the case of the adolescent student they are carried over to their boarding institutions.

(b) Peers

The child learns more aspects of food-related behaviour from other people or institutions outside the home after the initial acquisition of food habits within the home environment. A major force is the school where behaviour can be learned from peers, formal teaching in lessons and through its school meals. All of these will broaden the child's view of food and will contribute to his own food behaviour patterns.

The Peer Group is a major influence on food habits formation. Ohl et al., (1981), noticed that friends or

peers influence one's food decisions as one grows up. Meals eaten by peer groups may be quite different from familiar family meals, hence eating away from home may broaden the awareness of food and influence the food habits of the individual. Queen was quoted by Cosper and Wakefield, (1975) as indicating that individuals accept food advice best from those they consider as friends or allies. If the suggestions made are not based on sound nutritional judgements, poorer food habits may be acquired.

(c) Advertisements

The effect of advertisements cannot be ruled out in food habits formation. Holden et al., (1971) reported that advertising can potentially influence peoples' attitude favourably towards new and better foods or new but nutritionally poor foods. A columnist in the Ghana Weekly Spectator, Albin Korem, (1992) pointed out that perhaps the biggest harm to traditional eating habits is done by food advertisements on television and elsewhere. According to him millions are spent every year to advertise refined foods and sweet drinks which our bodies can do well without. Adolescents are particularly handicapped because they are easily taken in by such advertisements.

(d) Food Availability

Yet another influence on food habits is the

availability of food (Araya, 1981). Usually the geography of an area and variations in climate influence the types of foods that area cultivates and are readily available. This affects the eating patterns of people. However, with improved transportation, it is possible these days to have all types of food all the year round provided money is available for the purchase of these foods. People will buy foods which they can afford irrespective of its nutrient content.

(e) Culture

Another factor that needs consideration in food habits formation is the culture of the people. Although many foods may be accessible to the adolescents, they may not be acceptable to them because they do not fit into their cultural pattern of eating. The culture in which one develops according to Bennion, (1985) determines to a large extent one's food patterns or habits. Foods are eaten in combinations with other foods in ways that are determined by the culture. Again, each culture has clear ideas about what constitutes food and non-food. No group of people ever eats all the potentially edible commodities available to it (Bogert et al., 1973). For various cultural or other reasons, some foods are not defined as food at all even though they may be safely eaten. An example is the way the 'Krobo's' of Ghana look on snails and Moslems on pork. In addition to these

taboos as they are called, many cultures also have food prohibitions associated with gender, age and physiological conditions (Passin and Bennet, 1943). Some of these prohibitions may restrict intakes of foods which provide useful nutrients. In Ghana such prohibitions affect pregnant and lactating mothers, children and adolescent girls.

(f) Physical characteristics of Food

The physical characteristics of food also exert a profound influence on its acceptability and intake (Macfie, 1990). Foods would be acceptable and eaten if they are able to stimulate the chemical senses of taste, smell, vision and touch. Martin et al., (1976) indicated that a meal is often evaluated first on the basis of its appearance on the plate. For most persons and under ordinary circumstances, food must be palatable or have appetite appeal if it is to be eaten. A food is palatable to an individual if it is acceptable and agreeable to taste (Zifferblatt, 1980). Indusogie et al., (1980) also mentioned that the taste of food determines what food and how much of a certain food is eaten during any meal. The colours, shapes and forms of foods may have such eye appeal as to entice one to accept that food even when one is not hungry. An unattractive array of food on the other hand dampens appetite and food may be rejected without tasting (Martin et al., 1976).

The problems we now have in schools where adolescent students do not patronise foods given in the dining halls may be ascribed to the absence of some of the above physical characteristics in the foods provided for them.

(g) Dietary Patterns

Selection and choice of food is determined by an individual's dietary patterns. Dietary patterns are those aspects of food habits which deal with the number of meals eaten, who prepares the food, what time of day the food is eaten and who eats with who (Barasi et al., 1987). The food patterns of a country are moulded by her agricultural resources, technological progress, buying power and cultural patterns (Krause et al., 1972). In addition, the socio-economic conditions, nutrition knowledge and food related attitudes are known to influence food patterns (Sukhumsivum et al., 1988). The number of meals prepared and their timing during the day is also culturally determined. Barasi and Mottram, (1987) found that people in the Western countries such as the United States accept the pattern of three meals a day as normal but in some cultures as found by Uddoh, (1980). As few as one meal a day is eaten in some homes. Messer, (1989) also observed similar patterns in other African societies. She found that for most of the day, such families fed on palatable wild fruits to alleviate the accompanying hunger brought about by this pattern of

eating. As well as prescribing how many times meals can be eaten, cultural identity also determines who should eat with whom and what portion of the food each member should eat.

Unlike the structures of Western meals, Ghanaians do not often differentiate between foods for breakfast, lunch and supper. Left over foods from the previous evening's meal might be eaten for breakfast the following day. Specific foods are not reserved for specific courses within a meal because all dishes are served and eaten simultaneously. Fruits normally do not form part of the normal meals in the Ghanaian home. They are usually eaten as snacks when they are in season and are cheap.

Students from low or middle income families or from families where mothers work outside the home, may have meal patterns similar to the one described above. Even so, Stare and McWilliams, (1977) found that the increasing independence and mobility of adolescents lead to modification of their dietary patterns. The influences of parents no longer completely dominate and determine food consumption.

Guthrie, (1971) has presented factors that may contribute to the poor food habits observed during the teen years as failure to eat breakfast or some other meal of the day, lack of time for regular meals, drinking no

milk, lack of supervision in the selection of meals, eating away from home, an over riding fear of obesity especially among girls and a concern that certain foods will aggravate adolescent acne. Most of these factors may not be applicable to Ghanaian adolescents. Meal skipping, Snacking, Dieting and Drug related habits will be discussed here.

(h) Meal Skipping

Meal skipping habits of adolescents have been documented by Hueneman et al., (1968). They studied 1000 high school students in Berkeley in California and found that dinner was the meal eaten most consistently by the students. Lunch was omitted more than breakfast. Their investigations also revealed that meal regularity tended to increase with rise in socio-economic status of parents. In Ghana, rich families could afford to feed their children with three meals in a day and could afford house helps to prepare meals even when mothers were away at work.

The omission of breakfast by adolescents is a problem of considerable importance (Cooksey and Ojeman, 1963). Several studies have suggested that it may be a contributory factor in dietary deficiencies of this group (Eppright, 1959). When children skip breakfast after fasting overnight, their ability at midday to detect environmental cues necessary to solve simple visual tasks

and attention is affected. The stress response to the induced hunger also results in increased attention to peripheral information not relevant to the problem at hand. Those who miss breakfast are less able to concentrate, tire more easily and are hungry by mid-morning. Broadfoot et al., (1965) recorded studies done by Tuttle et al., on school boys whose attitudes and scholastic attainments were found to be adversely affected when they missed breakfast. Again, Hueneman et al., (1968) emphasized that when breakfast is skipped it meant that during much of the day the body's need for nourishment was likely to have been neglected. Omission of food in the morning or any other time of the day can therefore adversely affect the total nutrient intake for the day. Guthrie, (1971) reported studies which show that the calcium and ascorbic acid intakes of persons who omit breakfast were reduced by about 40 per cent and intakes of iron and thiamin by 10 per cent. Leverton, (1968) also found that 17-19 year old college women who skipped breakfast obtained nineteen per cent of their energy intake from snacks whereas those who ate breakfast snacked less frequently and obtained only seven per cent of their energy intake from snacks. Teenagers need to be encouraged to eat different foods throughout the day if their diets are to supply sufficient amounts of nutrients for their needs (Duyff et al., 1975).

Runyan, (1977) and Guthrie, (1971) gave the reasons for adolescents skipping breakfast, as determined attempts to reduce weight and the desire to spend morning time on sleeping and grooming. Other reasons were lack of appetite, lack of time and fear of becoming fat.

(i) Snacking

The standard meals sometimes omitted are made up for with snacks. Adolescents are seen as eating more of their foods as snacks than adults. Guthrie, (1971) reported that between meal foods provided on the average eleven to nineteen per cent of the energy of adolescents in New York. The study showed that boys had on the average 6.4 day time snacks and 2.9 evening snacks per week while girls had 7.7 day time and 3.8 evening snacks per week. The difference in the number of snacks eaten was probably due to the fact that more females than males skip meals and therefore had to make up with snacks. Leverton, (1968) found that boys ate breakfast more frequently than girls and their choice of breakfast provided more nutrients.

Snacking per se, is not detrimental as it can sometimes provide the nutrients which would help to balance up what is deficient in the main meals. However, Fleck, (1976) emphasized that when snacks are made up of foods providing only calories, they might be detrimental to the health of the adolescent. Unfortunately, one

feature of many foods liked and consumed by adolescents is their mainly high energy content (Fleck, 1976). Stasch et al., (1970), recorded that soft drinks were the most commonly chosen snacks by adolescents both at home and at school. They also noticed a greater use of coffee, candy and hamburgers at school than at home. Milk, cheese and fruits were used more at home than at school. At home the adolescents might have a wide variety of snack foods to choose from and a wise homemaker would fill her ladder or fridge with foods that provide many more nutrients than just calories. At school where adolescents have to purchase snacks themselves, the tendency of choosing foods which will provide mostly calories are high. For adolescents who do not need to watch their weight, these foods may be eaten almost without restriction if foods carrying other nutrients are eaten during normal meals. Snacking however, must be condemned if it constitutes overeating with disregard to the total food pattern (Guthrie, 1971).

(j) Dieting

Dieting is another aspect of adolescent food habits that need to be considered. Dieting means one does not eat the kinds or amounts of foods one likes because one wants to lose or gain weight. Adolescents, according to Guthrie, (1971) are either fat or fear to be fat. Cultural perceptions of appropriate or attractive body

size and shape seem to be the deciding factor in the food intakes of adolescent girls. The impact on the adolescent's health of the "thin is beautiful" norm in Western cultures is attracting serious attention especially as it relates to eating disorders (Leslie et and Jamison, 1988). Because thinness in females is highly cherished in the United States, food habits are altered sometimes with considerable duress because favourite foods which may be nutritious may be foregone. Wakefield and Miller, (1971) cited studies done by Hueneman and Dwyer, on College students, which found that adolescents are sensitive about appearance particularly weight. Hueneman noted that students generally expressed dissatisfaction with both their size and shape. Dwyer in her study found that while 15 per cent of the high school students she studied were really overweight 30 per cent were on a diet and 60 per cent had been on diet prior to the time of the research.

Where the cultural norms dictate that plumpness rather than thinness is what is regarded as attractive, girls may eat a lot in order to be fashionably plump (Fleck, 1976). In Ghana girls and women are fattened when they are going into marriage (Nukunya, 1968).

(k) Alcohol Drinking Habits

The final food-related habit usually acquired by adolescents is their alcohol drinking habit. Hamilton et

al., (1988), observed that the mid-teens is a choice point of whether to drink alcohol or abstain from it. According to them, a survey conducted in 1975 in the United States showed that more than half of all seventh graders nation wide had tried alcohol at least once within the previous year and nine out of ten of all high school seniors had experience with alcohol. These writers contend that alcohol drinking has predictable nutritional effects on the body since its breakdown in the liver is done at the expense of other food nutrients which require the use of thiamin and Niacin for their break down. Apart from this, malnutrition is common in heavy drinkers due to the displacement of nutrients by alcohol.

2.4 FOOD PREFERENCES OF ADOLESCENTS

The preference for certain foods is one aspect of food habits that is an expression of the consumer's attitude towards food. To prefer a food is to choose it over another. Preferences can be genetically determined (Rozin, 1990) or acquired (Ohl et al., 1981). Genetically, humans will accept sweet tastes and avoid bitter tastes (Rozin, 1990). Man has often preferred certain plant and animal products as food to others. Favourite foods may be traced to pleasant circumstances and experiences while disliked foods may be traced to unpleasant experiences. Often when parents force

children to eat certain foods because they were good for them, the children grow up to dislike such foods because they bring back the sad memories of the unpleasant meal times Ohl et al., (1981) rightly observed, that the preferences for certain foods and flavours are related to cultural and childhood experiences.

Researchers have documented several other factors that shape food preferences of children and adolescents. Teachers and parents attitudes towards food can be a major influence in creating children's preferences. In a study by Sanjur and Schorr, (1971) the children surveyed were found to have similar food preferences as their mothers.

Rozin, (1990) also believes that the widespread notion that one takes on the properties of what one eats as in the saying 'You are what you eat', can strongly influence food preferences causing avoidance or acceptance. Foods designated as female foods according to her may not be eaten by some males and people will avoid animal foods on the grounds that they will make them behave like animals.

Rozin, (1990) again noted that food preferences can be determined by the desire to maximize the pleasure of eating. Someone may prefer chocolates to biscuits not because she likes chocolates better but because she derives more pleasure in eating chocolates.

2.5 NUTRITION KNOWLEDGE OF ADOLESCENTS

Indusogie et al., (1980), mentioned that there is a need to develop a level of sound public knowledge and responsible understanding of food that will promote maximum nutritional health. According to them, in order to utilize food to the greatest benefits, the individual must have some basic understanding of food and nutrition.

Even though nutrition is one of the oldest and most practised science by man, many people have no basic understanding of food and nutrition in relation to requirements for health. (Indusogie et al., 1980)

A survey done in the United States indicate that young children have a fairly good grasp of the basic principles of nutrition and are both receptive to and capable of learning more about nutrition and its relationship to health. For instance, surveys conducted by the International Food Information Council (IFIC) of 9-15 year olds show that children in this age group demonstrated a good understanding and awareness of the basic principles of nutrition and health. The majority in the survey were found to be familiar with the basic food groups and could identify all of them.

Also a study of 5116 5-18 year old school children, showed that most of those surveyed were generally aware of the health effects of dietary fat, fibre and cholesterol (Resnicow et al., 1991).

Studies done in Ghana by Agyeman-Mensah, (1980) and Duwuona-Hammond, (1978) showed that the study subjects had only fair knowledge in nutrition.

2.6 NUTRIENT INTAKES OF ADOLESCENTS

Several investigators have looked at nutrient intakes of adolescents all over the world. Throughout all these investigations the revelation was that the recommended allowance of one or more nutrients were not met by adolescents. This phenomena is not a recent occurrence because as far back as 1954 dietary deficiencies have been recorded. The developmental characteristics of adolescents may probably be implicated in this trend of affairs.

The fact that adolescents are becoming mini adults and therefore crave for independence was documented by Hurlock, (1978). This independence no longer places them under the authority of parents and therefore they can no longer be forced to eat certain foods. Again, their social activities and school work keep them away from home so they no longer follow family meal patterns. As one investigator puts it, they eat what they like when they feel like and when they have time. Meal skipping becomes a past time for some of them (Hurlock, 1978) and as they strive to achieve an image pleasing to themselves, they also attempt to be attractive to their peers. As a result of this, they are pre-occupied with achieving a slim body especially the females. This makes them

cut down their food intake and the resulting effect is the deficiency in the various nutrients.

In a co-operative study on the nutritional status of all age groups in the Western Region of the United States, Wilcox et al., (1956) indicated that adolescents comprise the age group least likely to be consuming food which provides the recommended amounts of all nutrients. Emerson, (1967) documented studies of nutritional status of adolescents, which showed that adolescents had poorer diets than younger children and that teenage girls had perhaps the poorest diets of any population group.

In 1950, Blewett and Schuck compared food consumption of men and women college students. They found that generally, the young males consumed more milk, cereal and meat than did the young females who preferred to eat more fruits. They also found that iron was most likely to be inadequate in the diets of the females.

Wilson, (1954) examined representative groups of school girls aged 10-18 years in Northern Nigeria. In all groups the intake of calories was low for poorer members of the group. Three-quarters were short of thiamin and three quarters of folacin and pyridoxine.

Schwartz and Dean, (1955) in their study in Uganda to measure the amounts of food eaten by boys in a boarding school, revealed that the Ugandan boys were receiving 1,500 calories less than their British counterparts. The total

protein and fat were also very much lower. All the food intakes were below 90% of those of British boys of the same age and they all supplemented the school meals with extras.

Again in 1963, a study of nutritional adequacy was conducted by Tabrah and Hauck in Nigeria. They found high incidencies of reduced haemoglobin levels in groups of children. Protein and riboflavin deficiencies were also observed. Mcdonald, (1963) found that 27% of the Navajo Indian adolescents she studied had diets deficient in ascorbic acid.

As part of a longitudinal study of students' nutritional status in the United States, nutrient intakes were calculated from students dietary records by Atkinson and Wyn-Jones, (1972). They reported that most group mean intakes were above the Recommended Dietary Allowances (RDA). Males generally had higher intakes of energy, protein and iron whereas females had higher intakes of ascorbic acid. In the same year Stordy and Cowling, studied the food habits and nutrient intakes of students in different residential accommodation in U.K. In this study women living in flats and bed-sitters and who cater for themselves were receiving less than the RDA of all nutrients. Results from this study seem to point to the fact that self catering in residential accommodation seem to negatively affect nutrient intakes.

Schorr et al., (1972) studied the food habits of teenagers in the United States. They realised that, the extent of the teenagers' social participation affects the

complexity of their diets. Twenty one percent of the students in the study consumed less than 66 per cent of their Vitamin C, 44% Calcium, 51% Vitamin A and 69% Iron. The nutritive intakes of the male subjects was again considerably superior to that of the females.

In 1976, Olusanya did a study of the feeding patterns and nutrient intakes of students in five secondary schools in Nigeria. The results of the study showed that all the students were not getting the F.A.O. recommendation for energy, riboflavin and protein.

Nutrient intakes of University of Ghana students were looked at by Dowuona-Hammond, in 1978. Although calcium, iron, vitamin A and ascorbic acid intakes were greater than the FAO recommended nutrient intakes, the intakes of energy and protein satisfied 70-80% of the R.D.A. riboflavin intakes were found to be very low (only 45-49% of the RDA was met.)

Jakobovits, (1977) studied food intakes of junior and senior female students at Cornell University. It was shown that except for energy, thiamin and iron, all other nutrient recommendations were exceeded. The mean iron intake was however low.

In 1979, Kazimi evaluated the diets of college students in Iraq and found that severe nutritional deficiencies were not prevalent and the protein intake was well over the F.A.O. requirements.

Agyeman Mensah, (1980) observed that all the students he

studied in Achimota school did not meet F.A.O.'s, RNI for calories, calcium and riboflavin. His study also revealed that despite the high preference for local foods, there also existed among the students a taste for imported foods. The mean heights and weights of the students were generally low when compared to American standards but compared to similar data on other children in Ghana the mean weights and heights of Achimota school students were relatively high.

Story et al., (1986) studied anthropometric measurements and dietary intakes of Cherokee Indian teenagers in North Carolina. The purpose of this study among others was to look at physical growth (height and weights) of Native American adolescent population and compare the measurements with national reference data and determine energy and nutrient intakes. Mean intakes for energy, iron, thiamin, protein, calcium and riboflavin were lower for girls than for boys. Females had higher mean intakes of Vitamin A and ascorbic acid. When compared with RDAs, mean intakes of Vitamin A and thiamin were low for males and calcium and iron intakes were low for both sexes.

In all the studies reported so far, three things were evident. The adolescents in all the studies were not receiving the recommended allowances of energy and other nutrients and those especially below the recommended allowances were calories, calcium, iron and vitamin A. It was also evident that male adolescents had better nutrient intakes

than female adolescents and also that adolescents in developed countries fared better than those in developing countries.

In Ghana only few studies have been done on nutrient intakes of adolescents hence the need for a survey of this nature.

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 SITE SELECTION

The study was conducted in some boarding secondary schools in the Central Region. This region was particularly chosen because it has the largest number of boarding secondary schools in the country. According to the West African Examinations Council's Common Entrance School selection list, there are sixteen boarding schools in the Central Region alone with the highest concentration in Cape Coast. Many of the oldest well-established secondary schools are found in this region.

3.2 SAMPLING

The population comprised adolescents between fifteen (15) and nineteen (19) years in secondary schools with boarding facilities in the Central Region. A list of all the boarding secondary schools in the Region was obtained from the West African Examinations Council and stratified into the following categories :

1. Urban Boys' Schools A
2. Urban Girls' Schools B
3. Rural Co-educational Schools - C
4. Urban Co-educational Schools - D

One secondary school was selected from each stratum using the lottery method. In each of these secondary schools, thirty-

five (35) form four students aged fifteen to eighteen years were selected from their class lists using simple random sampling technique. Where a student fell outside the age range being studied the next student in the list was picked instead. Form four was chosen because most of the students in this class were within the age range being studied.

3.3 INSTRUMENTS FOR DATA COLLECTION

Four instruments were used to collect data for this study. These were questionnaires, dietary records, anthropometric measurements and observations.

3.3.1 The Questionnaire (see appendix 10)

A 51 item, self administered questionnaire was the main instrument used to collect information from the respondents between 1st June and 30th June, 1992. The questionnaire covered the following topics:

(i) Demographic and Socio-economic Characteristics

The Demographic and socio-economic data included age, sex, parents' educational background, parents' occupation and the students' activities.

(ii) Food Habits

Questions covered the number of times students ate in a day, meal skipping habits, snacking habits and the types of meals eaten at school and at home.

(iii) Nutrition Knowledge

Since there were no standard tests available for testing nutrition knowledge of Ghanaian adolescents, the researcher designed a ten test question to find out how much an adolescent knew about why he eats and what his basis for choosing foods are.

(iv) Food Preference

Students were asked to indicate their favourite meals for breakfast, lunch and supper at home and at school. They were also given a list of fifty-six (56) food items and asked to indicate whether they liked them very much, disliked them or had never eaten them.

(v) Frequency of Food Consumption

Students were asked to indicate how often they ate the foods that appeared in the food consumption list.

3.3.2 Dietary Assessment

The nutrient intakes of the students were obtained by direct weighing of the meals eaten in the dining halls for three consecutive days to minimize respondent burden. A modified form of the weighed household food record described by Burk and Pao, (1976) and quoted by Gibson, (1989) was obtained for all meals eaten in the dining hall from Thursday through Saturday (Appendix 8). Each dining hall table was taken to represent a household. The two week days were similar to all the other week days and the weekend day

represented the week end days and covered any differences in the types of meals eaten at week ends. Nutrient intake of respondents were obtained by multiplying the weights of the meals served in the dining hall by the corresponding nutrient values obtained from food composition tables and dividing the result by the total number of students on each table.

Respondents were also given food record sheets on which they were asked to indicate, as they ate, the estimated quantity in terms of dessert spoons or cedis equivalent of foods and drinks consumed outside the dining halls (See Appendix 9). This was done within the three days during which the weighed food record was taken. The researcher bought and weighed the food items listed by the students from vendors on the school compounds. Nutrients from these foods were calculated using food composition tables on Ghanaian foods by Ghana Food Research Institute, (1975). The food composition table made by Paul and Southgate, (1979) was also used.

3.3.3 Anthropometric Measurements

The growth performance of the respondents was assessed by means of their weight and height measurements. The weights and heights of the respondents were taken when they were responding to the questionnaire, three hours after their lunch. Weights were taken using a bathroom scale calibrated to the nearest 0.5 kilogram and the standard weighing procedure described by Gibson, (1989) were followed.

Height measurements were taken at the same time using an improvised stadiometer a straight two meter rectangular stick on which was carefully tapped a dressmaker's measuring tape (See Appendix 7). The stick was then tagged to a straight wall in the classrooms. Again standard procedures for measuring height described by Gibson, (1989) was followed to obtain the measurements. A flat plywood specially designed to slide on the stick was used to press the hair down and to facilitate reading. The weights and heights were compared with Jelliffe, (1989) and NCHS growth reference data to ascertain growth performance of respondents.

3.3.4 Observation

The conditions under which the meals were prepared and served and the methods used in preparing the meals for the students were observed. Student patronage of dining hall meals were also observed.

3.4 PROCEDURE FOR DATA COLLECTION

A letter written by the Head of Home Science Department of the University of Ghana introducing the researcher to the Heads of the chosen schools and to obtain permission to use the schools for the research, was distributed to the Headmasters/mistresses between 21st April and 30th April, 1992. The researcher then spent from Wednesday to Saturday evenings each week in each of the schools to collect the

responses for the questionnaire, weights of meals which the respondents ate in the dining halls, respondents weights and heights and types and quantities of foods eaten outside the dining halls. The questionnaires were given to thirty-five (35) respondents in each school in one of their classrooms on Wednesdays at about four o'clock. The purpose of the research was explained to the respondents and the questionnaire items discussed with them to remove any doubts as to the meaning of the questions. The students were then asked to complete the questionnaire while the researcher supervised to make sure that individual answers were written to eliminate the influences of other students. Weight and height measurements were taken at the same time, using a bathroom scale and the improvised stadiometer.

3.5 PRE-TESTING

The Instruments for this study were pre-tested in a boarding school in the Central Region other than any of those used for the study. Six form four students aged between 15 and 18 years responded to the questionnaire. Heights and weights were taken and the meals given to the students were weighed. The pre-testing helped the researcher to rectify problems of ambiguity or clarity of some of the questions and also to ascertain the validity and reliability of the responses. It also helped her to select a 10 kilogram scale for weighing the dining hall foods because the 5kg scale used

during the pre-testing was too small. Her interaction with the domestic bursar gave her an idea of the situation she was likely to meet at the selected schools.

3.6 ANALYSIS OF DATA

3.6.1 Questionnaire

Responses on completed questionnaires were hand coded. Frequency and percentage distributions and cross tabulations were used to analyse the data.

3.6.2 Food Preference Data

The food preference data, the frequency of food consumption data and the nutrition knowledge data in the questionnaire were treated in the following way :

(i) Food preference

The number and percentage of respondents mentioning each food items in each of the four preference classifications were computed. This gave the percentage of respondents who liked or disliked the food items given in the list.

(ii) Frequency of Food Consumption

How frequently food items were consumed was discussed under the various food groups of Ghana.

3.6.3 Nutrition Knowledge

The responses to each of the questions were scored. The scores were then used to rate the nutrition knowledge of the respondents as follows:

TABLE 2: RATING OF NUTRITION KNOWLEDGE

Rating	Nutrition Knowledge Category
Good	Respondents who scored 60-100%
Fair	Respondents who scored 40-59%
Poor	Respondents who scored 0-39%

3.6.4 Nutrient Intake

In designing the study, it was reasoned that insufficient food intake would manifest itself as inadequate nutrient intake, therefore nutrient intake rather than food intake was considered as the independent variable in the data analysis. Each respondent's average daily intake of energy, protein calcium and iron was computed. This was arrived at by calculating the nutrients provided by the meals eaten in the dining hall and that from foods eaten outside the dining hall and adding the two values. Protein values were corrected for N.P.U. using the 0.7 factor. The following results were further calculated from the intake data :

a) The percentage of the Recommended Dietary Allowances of each of the four nutrients met by the dining hall meals. (This will show whether students are receiving adequate levels of nutrients from dining hall meals).

b) The percentage of the RNI, of each of the nutrients met by the total daily intake for each respondent. This was used to find out the proportion that received above or below two-thirds of the RDA.

c) The proportion of the total nutrient intake supplied by the dining hall meals and that supplied by meals eaten outside the dining hall.

d) The mean daily intake and standard deviation of the mean for all respondents for each school and sex.

3.6.5 Weight and Height Measurements

Weight-for-height and height-for-age of the respondent was compared with Jelliffe's and NCHS growth reference data using bar charts.

The weights and heights data were also used to classify the respondents into normal, overweight, underweight and obese categories using Kauffman et al., (1975) classification which stated that if the relative weight is 91-110% of the standard or reference weight the individual has normal weight. When it is less than 90%, he is underweight. From 111% to 120%, the person can be regarded as overweight and from 120% and above the person is obese.

Again, the Body Mass Index of the students was calculated and the classifications used by the Health and Welfare Canada 1988a was employed to classify them as follows :

BMI	Evaluation
<20	Underweight
20-25	Normal
>25<30	Overweight
>30	Obese

3.7 LIMITATIONS OF THE STUDY

1. Food record studies should involve adequate measurements of individual food intake by carefully weighing all the different raw foods that go into the preparation of the meal. Alternatively, the portions per individuals could be analysed in the laboratory to establish the quantities of the various nutrients present in the meal. These methods were however, not used because of the nature of meal service in the institutions and lack of the necessary equipment for laboratory analysis of the food. The calculated values obtained are therefore not absolute.
2. Since all students paid the same amount of money for feeding, the food was shared equally irrespective of gender and age. Some of the students may be receiving adequate amounts of nutrients because of their age and build whilst others would be receiving less than the amount they require. The adequacy or otherwise of dining hall meals is therefore subject to the age and size of the student.

3. Again, the use of food composition tables to calculate nutrients has its limitations. Food compositions are arrived at either using small quantities of raw foods or cooked foods prepared from family recipes. The use of such tables to calculate the nutrient intakes of people whose meals are cooked with large-scale methods and equipment like school meals, may have errors since the recipes used are often different both in ingredients and proportions from family recipes. The duration of cooking may also vary leading to a variation of amounts of nutrients especially the heat labile nutrients. Stock and Wheeler, (1972) found that there was a wide difference between the calculated values of nutrients in foods and the analytical values (the calculated values being higher). So values obtained in this study may be higher than the actual values.

4. The use of recommended nutrient intakes to establish adequacy of a diet is also a limitation because with the exception of energy, the values for all nutrients were inflated to cater for individual differences. Hence, where the values obtained fall below the RNI, it does not necessarily mean that the meals are inadequate.

5. When nutrient intake data are evaluated the bio-availability of the nutrients from the diets must be considered. The calculated nutrient intakes may not be absolutely available for use in the body due to problems of digestion, absorption and assimilation.

6. Although care was taken to make the improvised stadiometer as accurate as possible one cannot rule out errors due to improvisation. For example the dressmakers tape on the stick may move as a result of the movement of the sliding board which could affect the reading of the height of the subject.

7. The data collected for the 3-day food record were based on self-report and is therefore subject to the biases that self-report data involve. Students may be talking the 'good diet' to impress the researcher.

All the above limitations point to the fact that the values obtained for the various nutrients and other measurements could only be approximations and therefore conclusions drawn from them may not be absolute.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

The results and discussions of the study are presented under the following headings:

1. Description of the sample.
2. Food habits of the respondents.
3. Nutrition knowledge of the respondents.
4. Dietary Assessment and Nutrient intakes of Respondents.
5. Growth Performance of the respondents.

4.1 DESCRIPTION OF THE SAMPLE

4.1.1 Age, Gender, Religion and Ethnicity

One hundred and forty adolescent students from four secondary schools, (two co-educational and two single sex) took part in the study. Their mean age was sixteen years with a range between fifteen and eighteen years. The sample comprised 48% males and 52% females. Ninety-five per cent of the respondents were Christians and the rest were Moslems. Fantes dominated the sample forming 71%. The rest were Guans (10%), Ga-Adagbe (9%). Ewes (7.9%) Dagbanis (2.1%).

4.1.2 Educational Backgrounds of Parents

Most of the parents of the respondents had high educational backgrounds. A few of them were however, farmers and artisans whose educational levels were low. Table 3

indicates the level of education of parents or guardians of the students.

TABLE 3: DISTRIBUTION OF PARENTS OR GUARDIANS EDUCATIONAL BACKGROUND

EDUCATIONAL BACKGROUND	FATHER		MOTHER	
	N	%	N	%
No formal Education	4	2.9	3	2.1
Primary School	1	0.7	10	7.1
Middle School	15	10.7	12	8.6
Sec./Com./Vocational	35	25.0	39	27.9
Teacher Trg./Poly/Agric.	18	12.9	25	17.9
University	64	45.7	41	29.3
No Response	3	2.1	10	7.1
Total	140	100.0	140	100.0

Many of fathers 46% and over a quarter of the mothers (29%) were University graduates whilst 13% of fathers and 18% of mothers schooled up to polytechnic level. It is therefore expected that this high educational level of parents would have great influence on respondents' eating habits and their nutrition knowledge.

Mothers especially would want to make sure that their children eat nutritious meals.

4.1.3 Occupational Status or Parents or Guardians

Parents or guardians of all the respondents were employed either in the public or private sector. Table 4 shows the distribution of occupations of parents and guardians.

TABLE 4: DISTRIBUTION OF PARENTS OR GUARDIAN'S OCCUPATION

OCCUPATION OF PARENTS'	FATHER		MOTHER	
	N	%	N	%
Professionals	88	62.8	57	40.7
Businessmen/women	26	18.6	53	37.9
Artisans	4	2.9	11	7.9
Farmers	4	2.9	2	1.4
Housewives	-	-	3	2.1
Others	-		3	2.1
No Response or don't know	18	12.8	11	7.9
Total	140	100.0	140	100.0

Most of the fathers (63%) were professionals such as engineers, bank managers, doctors, lecturers and army officers. Eighteen per cent were business men. Over one third of the mothers (40.7%) held professional positions as doctors, lawyers, and lecturers. About one third (38%) were business women and these were mostly traders. It is anticipated that since most parents are gainfully employed, their children would be well fed because they would have the means to purchase food for the family.

4.1.4 Extra Curricular or Recreational Activities of Respondents

One of the developmental characteristics of adolescence is the increase in activity levels which increases their need for energy. Table 5 gives the different activities in which the students participated at school.

TABLE 5: DISTRIBUTION OF RESPONDENTS BY ACTIVITIES THEY PARTICIPATE IN AT SCHOOL

ACTIVITY	N	%
- Games and Sports	130	93
- Indoor Games	39	28
- Cultural and Club activities	16	12
- No activity	5	3.6
- No response	9	6.4

Activities participated in by the majority of the respondents (93%) were games such as football, tennis, volleyball and sports such as sprints and jogging. These are activities which require the use of the whole body and therefore require a lot of energy. They would therefore require proper feeding if they must obtain enough energy for such activities. Twenty-Eight percent took part in indoor games such as Ludo, cards and weight-lifting. The cultural and club activities mentioned were Red Cross, debates, drama and press conferences which do not require so much energy expenditure.

4.2 FOOD HABITS OF RESPONDENTS

Food habits of adolescents could be quite varied. Meal patterns, food preferences, meal skipping and snacking were aspects of food habits investigated in this study.

a. Meal Patterns

The number of meals eaten daily by the students are presented in Table 6.

TABLE 6: DISTRIBUTION OF STUDENTS BY THE NUMBER OF MEALS EATEN DAILY AT HOME AND IN SCHOOL

NO. OF MEALS EATEN DAILY	IN SCHOOL		AT HOME	
	N	%	N	%
One	1	0.7	0	0
Two	8	5.7	7	5.0
Three	94	67.2	91	65.0
More than three	37	26.4	42	30.0
Total	140	100	140	100

Most respondents ate three meals a day at home. This is not surprising because as has already been indicated, parents or guardians of the majority of respondents are highly educated and gainfully employed and therefore can afford to feed their children three meals a day.

A similar meal pattern was found in school.

b. Types of Meals Eaten

At home, a wide variety of meals were eaten by respondents for breakfast, lunch and supper. The majority (63.4%) consumed light breakfasts, mostly cereal dishes. Thirty-six per cent ate heavy breakfasts comprising rice or '*kenkey*' or '*banku*' or yam served with a stew or soup. Beans and fried plantain or 'gari' were also eaten.

Meals for lunch varied from very light meals such as pie and soft drinks to heavy meals like '*fufu*' and palmnut soup. Cereal-based meals dominated what respondents ate for lunch. It is not surprising that '*kenkey*' and '*banku*' were common meals consumed because most of the respondents were Fantes from the coastal plains where the staple food is corn. Meals eaten for supper were similar to those eaten for lunch.

In school, breakfast consists mainly of rice porridge or corndough porridge with or without bread and with no protein rich food. Lunch and supper were mainly rice, '*kenkey*' or '*gari*' served with stew or soup.

A close look at the meals consumed at School especially showed breakfasts consisting of foods which provide mainly carbohydrate. This suggests that some of them probably do not obtain adequate amounts of proteins and other nutrients.

When asked what respondents' favourite meals were, about half of them (51%) said they liked 'Gari' and Beans and '*kenkey*' and stew for breakfast. Twenty six percent preferred beverages like horlicks, cocoa or tea and the rest liked cornflakes and oats. For some of the respondents therefore, the breakfasts provided in the schools are not meals they liked. It is therefore likely that they would not eat such breakfast. This could further compound the problem of low nutrient intake envisaged.

Students' preference for imported foods like cornflakes and oats was documented in 1987 by Agyeman-Mensah in his study at Achimota School in the Greater Accra Region. Almost eight years after, similar preferences were found among respondents in four Secondary School in the Central Region. It could be said that students prefer these foods because of the convenience in storing and preparing them or because it showed how affluent they are since most of them come from affluent backgrounds.

c. Persons Who Determine What Should be Cooked at Home

Persons who determine what should be cooked at home are shown in Table 7.

TABLE 7: DISTRIBUTION OF WHO DETERMINES WHAT SHOULD BE PREPARED FOR FAMILY MEALS

PERSON WHO DETERMINES MEALS	BREAKFAST %	LUNCH %	SUPPER %
Mother	53.0	53.4	56.4
Self	35.7	30.9	24.3
Father	9.3	12.9	13.6
Others	1.4	1.4	3.6
No response	1.6	1.4	2.1
Total	100	100	100

Lewin's channel theory (1943) indicates that the mother or homemaker is often the gatekeeper of the household. It is not surprising therefore that in this study, the mother was the one who most often determine what to cook for the family. Its been over fifty years ago when Lewin's theory was promulgated and one would have thought that this trend would change drastically. This study has shown that this theory has had very little change probably because of our cultural and traditional norms. It is however, encouraging to note that inspite of these norms, the gate-keeper responsibility of mothers is being shared by other members of the family especially fathers.

d. People Who Eat With the Respondents

Concerning whom the respondents eat their meals with they gave the responses outlined in Table 8.

TABLE 8: DISTRIBUTION OF RESPONDENTS ACCORDING TO WHO EATS WITH THEM AT HOME AND AT SCHOOL

PERSONS WHO EAT WITH RESPONDENTS	AT HOME %	IN SCHOOL %
Alone	54.3	26.5
Friends	0	70.0
Brothers	12.9	1.4
Sisters	9.3	2.1
Mother	14.3	0
Father	7.1	0
Others	2.1	0
Total	100	100

It was evident from the study that most of the respondents (54%) ate individually at home rather than sharing with other family members. In many homes in Ghana especially in the rural areas, fathers share meals with their sons, mothers with their daughters, sisters with their sisters and brothers with brothers. In more affluent homes, meals are eaten individually at the family table. Since most of the respondents come from homes where parents are highly educated, their mothers would probably see to it that they are served with individual portions, hence the large percentage that ate

meals alone at home. Again, it may also be that the adolescents themselves were away from home when meals were served and therefore, they came back to eat alone.

At school, most respondents (70%) ate their meals with friends and only 27% ate alone. These meals can only refer to those eaten outside the dining hall since only individual portions are served in the dining halls. It is likely that most respondents would like to eat with their peers so that they can stretch the provisions that they take to school. In this case unfamiliar foods may be introduced by friends and this could influence their eating habits. Good or bad eating habits can be cultivated.

e. Food Preferences of the Students

Details of foods liked or disliked by the students are given in Appendix 1. The discussion of food preferences was done in the food groups.

The protein rich foods the respondents liked include eggs, chicken, milk, beef and fish. Fruits and vegetables liked are pineapples, oranges, '*nkontomire*' and cabbage.

In the root and tubers' group respondents said they like yam, sweet potatoes and plantain. The cereals liked are wheat in the form of bread, oats, rice and corn. Respondents do not like millet and sorghum. In the legume group they prefer groundnuts and cowpeas and

disliked bambara beans and soya beans. Respondents liked all types of oils except Palm kernel oil.

Each of the 51 food items listed for respondents to indicate preference (see appendix 2) were cross-tabulated with the gender of respondents. Most of the preferences or dislikes did not favour any gender. However, it was seen that more female respondents preferred toffee and alcoholic beverages than males. This is indicated in tables 9 and 10.

TABLE 9: PREFERENCE FOR TOFFEE BY GENDER OF RESPONDENTS

GENDER	NO RESPONSE	LIKE VERY MUCH	DISLIKE	NEVER EATEN	ROW TOTAL
Male	2.1	37.9	7.2	0.7	47.9
Female	2.3	49.1	0.7	0	52.1
COLUMN TOTALS	4.4	87	7.9	0.7	100

The high preference for toffee is quite alarming because eating too many sweets have been implicated in the problems of tooth and gum decay. According to Garn et al., (1980), sugar is the best energy source for the bacteria that cause tooth decay and that when eaten continuously, over several hours or in sticky forms, they can produce dental caries.

The respondents are therefore at risk of developing dental problems. Besides, they may be using the food

money given them to buy sweets and this is likely to lower their nutrient intake.

TABLE 10: PREFERENCE FOR ALCOHOLIC BEVERAGES BY GENDER OF RESPONDENTS

GENDER	NO RESPONSE %	LIKE VERY MUCH %	DISLIKE %	NEVER EATEN %	ROW TOTAL %
Male	2.9	12.9	18.5	13.6	47.9
Female	5.0	22.1	8.6	16.4	52.1
COLUMN TOTALS	7.9	35	27.1	30	100

Table 10 shows that (35%) of respondents indicated that they liked alcohol very much. More females than males showed preference for alcoholic beverages. This is an alarming revelation especially since the respondents are students.

Drug-related habits among the youth of today had been the subject of concern for both school authorities and the general public. Hamilton et al., (1986) have indicated that a couple of drinks set in motion, many destructive processes in the body. Repeated onslaughts of alcohol gradually takes a toll on the body. For example, nutrient deficiencies are virtually inevitable because the more alcohol a person drinks, the less likely it is that he or she will eat enough food to obtain adequate nutrients. Alcohol displaces food and at the same time interferes with the body's use of nutrients.

When alcohol flows to the brain it sedates the reasoning part and interferes with reasoning and judgement. Hooliganism and violence that leads to destruction of school property, disrespect for authority and all other forms of deviant behaviour could be triggered off by the intake of alcohol. If over a third of the respondents indicate that they like alcohol, it is likely that they would spend their pocket money to purchase the drinks and therefore would not be eating well which would affect their nutrient intakes. Again there is no guarantee that this group of students would not go on to use other forms of drugs. Worst still, they may grow to become alcoholics, a problem for the family and a drain on the human resources of this country. These are the reasons why we should be concerned with this revelation. There is the need to intensify education on drug-related problems in our schools to protect our children, for, they are the parents of tomorrow.

f. Food Restrictions

Although the respondents seemed to like a wide variety of foods, there were a few restrictions as to what they could or could not eat. Sixty-seven per cent had no food restrictions or taboos in their families. They were free to eat any food of their choice. However, 30% were not allowed to eat some plant and animal foods like pork, snail, grasscutters, crabs, mushrooms, sorghum

and beans. Incidentally, these were foods which are not served in the schools so the restrictions would have no effect on their food intake at school. The majority of those who have food restrictions did not know the reasons why they were restricted from eating the foods. Moslems however, gave religious reasons for not eating pork. The other (15%) attributed the restrictions to ethnic taboos observed by their parents. Snails and beans are however sources of protein, which could improve the diets of the adolescent if they are allowed to eat them.

g. Dietary Diversity of Students Based on the Frequency of Food Consumption

The frequency of consumption of various foods would be used here to describe dietary diversity of respondents. (see appendix 2).

Animal Products

Fish and meat were eaten daily by 67.9% and 26.4% of the sample respectively. Fifty-two percent of them also ate meat a few times a week. Other animal products consumed weekly or a few times a week included chicken, sardines, eggs and milk. It will be recalled that these were the animal products liked by the respondents.

Legumes

Beans and groundnuts were eaten a few times a week by 42.1% and 39.3% respectively. Bambara beans and soya beans were not popular among the adolescent respondents hence most of them never ate them.

Roots Crops and Plantain

The most frequently consumed root crops were plantain, yam and cassava, consumed on a daily basis by 49.9%, 42.9% and 29.3% of respondents respectively.

Fruits

The majority of the respondents ate bananas, oranges and pineapples often. Pawpaws, mangoes and watermelons were eaten seasonally by most respondents.

Vegetables

Forty percent and 46.4% of respondents ate garden eggs, *nkontomire* and other leaves a few times a week respectively. In Ghana vegetables always form part of the stews and soups that accompany the staple foods. This is why tomatoes and pepper were omitted from the list of foods.

Fats and Oils

Refined vegetable oil, palm oil, margarine and groundnut oil were popular among the respondents. Coconut oil and palm kernel oil were not eaten as much.

Cereals

Among the cereals mostly consumed daily by the respondents were wheat as bread (52.9%) Rice (42.9%) and corn (35.7%). Corn flakes was eaten a few times a week by 43% of the respondents. Cereals such as millet and sorghum were never eaten by 37% and 47% of the respondents respectively, probably because they were not familiar foods.

Miscellaneous food items like sweets such as Toffees and chocolate bars are consumed daily by 21% and 15% of the students respectively and few times a week by 55% and 56% respectively. As discussed earlier the proportion of respondents who consumed sweets is quite high and needs to be addressed considering the damage sweets could cause to the teeth and to body weight.

Alcohol

Hamilton and Whitney, (1978) reported that alcohol drinking was becoming very common among adolescents, in the U.S. About 3.6% consumed it daily and 14.3% a few times a week. Twenty-four percent said they consume alcohol on daily to monthly basis. This seems to confirm an earlier discussion which indicated that 35% of respondents said they liked alcohol very much. This study probably suggests that alcohol consumption among adolescents is real and could become a social problem if not handled early enough.

Nutrient Supplements

Most of the respondents took nutrient supplements. Twenty-six per cent took it daily and 24% a few times a week. Only 7% of the respondents said they did not take nutrient supplements. Nutrient supplements can never replace a well balanced diet. They may even be dangerous especially if they are not taken on medical advice. As

much as respondents may need these supplements to augment those obtained from foods, they should not abused. It could be said that respondents consume a variety of food items. Comparing the food consumption with food preferences, the majority of respondents consumed foods they liked. Therefore food preferences do dictate what foods are consumed.

h. Meal Skipping Habits of the Respondents

Respondents' meal skipping habits are given in Table 11.

TABLE 11: PERCENTAGE DISTRIBUTION OF FREQUENCY OF MEALS SKIPPED AT HOME AND AT SCHOOL BY RESPONDENTS

MEALS	AT HOME			IN SCHOOL		
	ALWAYS	SOMETIMES	NEVER	ALWAYS	SOMETIMES	NEVER
Breakfast	12.1	45.7	42.2	24.3	43.6	32.1
Lunch	11.4	37.1	51.5	10.7	40.3	40.0
Supper	8.6	34.2	57.2	12.9	42.9	44.3

Meal skipping habits of adolescents have been documented by several researchers (Hueneman et al., 1966; Eppright et al., 1963; Shapiro et al., 1963; White, 1972). The adolescent respondents in this study also skipped meals both at home and in school.

Breakfast was the meal skipped most and supper was eaten most consistently at home and in school. Table 11 suggests that the eating patterns followed at home were carried over to school. For example, 35.7% of

respondents sometimes skip breakfast at home and 43.6% sometimes skip it at school. These are quite close. It is therefore important that parents of adolescents should help their children to form good eating habits from childhood so they can pass it on to their children and peers.

Skipping meals especially breakfast could have an adverse effect on respondents academic performance, especially in school, since the ability to work physically and mentally, the attention span and the attitude towards work are lowered when breakfast is missed.

Respondents mentioned several reasons why they skipped meals at home and in school. These include:-

1. Respondents did not like the food served
2. Some respondents were too tired or too lazy to walk to the dining hall.
3. Respondents have provisions which they ate when they were hungry.

Where market facilities were not available meal skipping was not common. In one of the schools for example, only fruits and groundnuts were sold on the school compound. Attendance at meals was also compulsory so there was no way one could skip dining hall meals.

At home, the reasons given for skipping meals included :

- The fact that the student did not feel like eating.
- Over sleeping.
- Students were absent from home.

i. Snacking Habits

The meals skipped by the respondents were sometimes replaced with snacks. Table 12 shows the number of snacks respondents ate in a day both at home and in school.

TABLE 12: DISTRIBUTION OF NUMBER OF SNACKS EATEN DAILY AT HOME AND AT SCHOOL

NUMBER OF SNACKS	AT HOME		AT SCHOOL	
	N	%	N	%
- None	0	0	10	7.1
1 - 2	92	65	85	60.7
3 or more	48	35	45	32.2
Total	140	100.0	140	100.0

Almost all the respondents ate one or two snacks at home and at school. Only 7.1% of the respondents did not eat snacks at school. Though this percentage is small, it needs to be looked at since it could have nutritional implications. If the normal school meals are not nutritionally adequate, it might affect the nutritional status of such respondents. Besides, Hamilton et al., (1988) realised that about ¼ of the teenagers' total daily nutrient intake comes from snacks.

Generally, snacking habits at home were not

different from snacking habits at school.

TABLE 13: FOODS USUALLY EATEN BETWEEN MEALS

FOOD	N	%
AT HOME		
Soft drinks and cakes or pies	72	51.4
Fruits	52	37.1
Heavy meals (e.g. Kenkey)	7	5.0
AT SCHOOL		
'Soaked Gari'	89	63.5
Soft drinks, cakes or pies	52	37.1
Fruits with groundnuts	38	27.1
Sweets e.g. toffee	5	3.5

About half and one third of respondents consume soft drinks at home and at school respectively. The soft drinks usually contain phosphates which Spencer and Kramer, (1986) found to promote calcium loss. The more soft drinks teenagers consume, the less likely they are to meet their recommended nutrient intakes (RNI) for Calcium (Guenther, 1986).

It is interesting to note that at school, well over half of the respondents consume '*gari*' either mixed with sugar and milk or with '*Shitto*'. Gari is the food normally taken to school and it is the cheapest supplement for dining hall meals.

4.3 NUTRITION KNOWLEDGE OF RESPONDENTS

Nutrition knowledge of respondents was categorized into good, fair and poor using the criteria described in the methodology. Students who scored 60 100% were regarded as good, 40 59 as fair and below 40 as poor, Table 15 shows the distribution of the nutrition knowledge by these categories.

TABLE 14: DISTRIBUTION OF NUTRITION KNOWLEDGE OF RESPONDENTS

KNOWLEDGE CATEGORIES	N	%
- Good	1.0	0.7
- Fair	38.0	27.9
- Poor	61.0	71.4
Total	140	100

It is evident from Table 14 that the majority of the respondents had little or no knowledge of nutrition as far as the questions asked were concerned. This is disappointing especially because the syllabus for Home Economics for secondary schools required that students are taught some basic nutrition concepts during their first three years in school. All the female students should have at least had some exposure to basic knowledge in nutrition since they were required to do home economics in their first three years in secondary school. This did not reflect in the answers given in the test.

4.3.1 Nutrition Knowledge and Gender of Respondents

Table 15 shows the distribution of nutrition knowledge by Gender of respondents.

TABLE 15 : NUTRITION KNOWLEDGE OF RESSPONDENTS BY GENDER

NUTRITION KNOWLEDGE CATEGORIES	MALE %	FEMALE %	TOTAL %
- Good	0	0.7	0.7
Fair	5.0	22.9	27.9
Poor	42.8	28.6	71.4
Total	47.8	52.2	100

Female respondents appeared to be more nutritionally literate than males. Of the proportion of respondents who performed poorly in the in the nutrition knowledge test 42.8% were males. The poor knowledge of nutrition exhibited by male respondents could be due to the fact that formal classroom foods and nutrition lessons do not feature in the curriculum for boys' schools in Ghana. In addition, in co-educational institutions, boys who did Home Economics did so only by choice. However, looking at the educational background of most of the parents of these respondents, one would have expected the respondents to have a fair knowledge concerning the nutrition questions asked. Since this was not the case one is inclined to think that the parents were also not nutritionally literate. Being highly educated does not necessarily mean being nutrition literate then.

4.3.2 Nutrition Knowledge by Types of Schools

The nutrition knowledge of respondents was also looked at by types of schools in Table 16.

TABLE 16: NUTRITION KNOWLEDGE BY TYPE OF SCHOOLS

KNOWLEDGE CATEGORIES	SCHOOL A BOYS ONLY	SCHOOL B GIRLS ONLY	SCHOOL C RURAL MIXED	SCHOOL D URBAN MIXED
- Good	0	0.9	0	0
- Fair	2.9	58.1	22.8	28.6
Poor	97.1	40.0	77.2	71.4
Total	100	100	100	100

As has already been indicated, males fared poorly in the nutrition knowledge tests hence the male school and mixed schools in this study had higher percentages in the poor knowledge categories.

There was not much difference between the performance of respondents in the co-educational schools in the rural area and that in the urban area. This indicates that in this study, location of school may not be a factor as to how much nutrition knowledge students have.

4.3.3 Sources of Nutrition Knowledge

Sources of nutrition knowledge were mainly from tutors (44.3%) books, pamphlets and the media (26.4%) and from parents (22.1%). This indicates that tutors, parents and the

media have a crucial role to play in the shaping of food behaviour of students. Irresponsible media advertisements could therefore be misleading and detrimental to the uninformed adolescent. The family also plays a vital role in the shaping of the food habits of its young (Uddoh, 1981). Parents should therefore upgrade their knowledge in nutrition so that they could provide good guidance for their children. It is also important that tutors give accurate and practical information to their students because any misinformation on their part would lead to problems for the adolescent in future.

4.4 DIET QUALITY ASSESSMENT

4.4.1 Assessment of Quality of Dining Hall Meals

Using literature values, the calorie, protein, calcium and iron contents of dining hall meals were calculated. These are presented in table 17. (See also appendix 3).

TABLE 17: ENERGY, PROTEIN, CALCIUM AND IRON CONTRIBUTION OF MEALS EATEN IN THE DINING HALLS PER PERSON PER DAY IN THE SCHOOLS

SCHOOL	ENERGY kcal	*PROTEIN gm	CALCIUM mg	IRON mg
School A (Males only)	1507	25.9	882	22
School B (Females only)	1301	25.9	422	18
School C (Rural mixed)	1885	31.5	567	19
School D (Urban mixed)	1627	37.1	1116	55

* Corrected for N.P.U.

The figures in table 17 were used to compute the percentage of recommended energy and nutrient intakes provided by dining hall meals and presented in table 18.

TABLE 18: PERCENTAGE OF RNI OF ENERGY AND THREE NUTRIENTS MET BY DINING HALL MEALS IN THE SCHOOLS STUDIED

ENERGY & NUTRIENTS	AGE RANGE OF RESPONDENTS (YRS.)	RNI[1]	PERCENTAGE RNI MET BY RESPONDENT IN THE SCHOOLS			
			A %	B %	C %	D %
		MALES				
ENERGY (KCAL)	13-15	2,900	52.9		65	56
	16-19	3,070	49.0		61	53
PROTEIN* (g)	13-15	37.0	70		85	100
	16-19	38.0	68.2		82.9	97.6
CALCIUM (mg)	13-15	600-700	126		81	159
	16-19	500-600	176		114	186
IRON (mg)	13-15	18	122		107	307
	16-19	18	122		107	307
		FEMALES				
ENERGY	13-15	2,490		52	76	65
	16-19	2,310		56	82	70
PROTEIN*	13-15	31.0		83.5	101.6	119.6
	16-19	30.0		86.3	105	123
CALCIUM	13-15	600-700		70	81	159
	16-19	500-600		84	114	186
IRON	13-15	24		74	80	230
	16-19	24		74	80	230

[1] FAO/WHO 1985

* Corrected for N.P.U.

The above figures show that the energy values of the meals for the day were rather low in all schools. Calcium and iron values were high in school D probably because of the predominantly cereal dishes served.

Energy values were low ranging from 49% to 65% of the RNI for male respondents and 52% to 82% for females respondents in all the schools studied. Sixteen to nineteen year old male respondents had the lowest energy intakes (49% of RNI). Adolescents, as observed in this study, are very active and must therefore be provided with food to augment that given them in the dining halls. This low level of calorie intake

could jeopardize their development since it has been documented that nutritional deficiencies, either of individual nutrients or of total energy intake, retard physical growth and maturation (Read, 1973). It could also be responsible for the loss in weight of students, usually observed when they return home from school. The low calorie content of the meals was mostly the result of the small quantity of food given to respondents. For those respondents who did not eat any snacks at school, this low calorie intake could affect their growth.

When protein values are corrected for N.P.U, 3 Schools (A,B & C) did not meet the RNI for protein. However, respondents in school C, exceeded the RNI for protein. The sources of protein in the meals were mainly from legumes and cereals. Very little animal protein if any was served in the dining halls.

The calcium and iron values in all the schools were high except in the exclusively female school and the urban mixed school where levels were below the RNI. The high values of calcium and iron were due to the predominantly cereal and legume diets of those schools. However cereals and legumes are known to contain phytates which often make calcium and iron unavailable to the body (Bingham, 1978) Even though calcium and iron values were high, some of it may not be available for use in the body.

Looking at the overall picture of nutrients provided by the schools studied, it could be said that except for energy,

all the schools provided more than 2/3 of the recommended nutrient intakes for protein, calcium and iron. According to Gibson, (1989) this would be regarded as adequate since RNI of all nutrients are inflated to cater for individual differences. She however, cautioned that the more habitual the low intakes and the longer the duration, the greater the risk of nutrient deficiency.

Since the quality and quantity of the meals eaten by respondents remain the same throughout the term, the respondents may be at risk.

4.4.2 Nutritional Contribution of Foods Eaten Outside the Dining Hall

Literature values obtained from the 3 day estimated food records were used to calculate the means and standard deviations for energy, protein, calcium and iron. The values obtained are shown in table 19.

TABLE 19: MEAN INTAKES OF CALORIES, PROTEIN, CALCIUM AND IRON OBTAINED FROM FOODS EATEN OUTSIDE THE DINING HALLS

SCHOOL AND GENDER	ENERGY Kcal	PROTEIN gm	CALCIUM mg	IRON mg
School A (Males only)	853±268*	22 ± 13*	383±183*	5 ± 2*
School B (Females only)	732±319	17 ± 8	374±187	5 ± 3
School C (Rural mixed)	912±469	24 ± 12	543±366	9 ± 5
School D (Urban mixed)	953±383	26 ± 19	321±218	5 ± 2
Males of Total Sample	887±359	22 ± 11	419±393	6 ± 3
Females of Total Sample	882±406	23 ± 15	446±282	6 ± 4

* Standard deviations from mean.

Respondents in the two co-educational schools have higher intakes of most of the nutrients than respondents from the single sex schools. The exclusively girls school (B) had the lowest mean energy intake. Respondents in the co-educational schools ate mostly '*gari*' and foods sold by food vendors in the schools hence, the nutrients provided by the meals eaten outside the dining hall were higher. In school (B) for example, market facilities were not available for respondents to buy food to supplement dining hall intakes and therefore meals eaten outside the dining hall comprised, biscuits, bananas and groundnuts. Hence the low calorie contribution of such meals.

Respondents in this school said they received food from home frequently but they were unable to estimate the quantities they really ate because they shared the food with their friends. Consequently, these were not included in the

estimates of quantities of food consumed outside the dining hall. It is obvious than that their intakes would be more than what has been reported here.

4.4.3 Total Estimate of Energy and Nutrient Intakes of Respondents

Total daily estimates of Energy and the other nutrients was computed by adding values obtained from dining hall meals to that eaten outside the dining hall. This is presented in table 20.

TABLE 20: MEANS AND STANDARD DEVIATION OF TOTAL DAILY ENERGY, PROTEIN, CALCIUM AND IRON INTAKES OF RESPONDENTS

SCHOOL AND GENDER	ENERGY Kcal	PROTEIN g	CALCIUM mg	IRON mg
School A (Males only)	2360±268*	59 ± 13*	1265±183*	27±2*
School B (Females only)	2033±219	54 ± 8	778±177	21±3
School C (Rural mixed)	2845±469	70 ± 12	1124±363	28±5
School D (Urban mixed)	2580±383	79 ± 19	1437±212	60±2
Males of total Sample	2611±358	68 ± 14	1274±260	36±14
Females of total Sample	2379±479	64 ± 17	1073±377	35±25

* Standard deviation

Values given in Table 20 still show that there is some deficit in the calorie intakes of respondents. Mean calorie intakes are lowest for fifteen to nineteen year old females, when compared with the FAO/WHO (1985) recommended intakes.

The male respondents had higher energy protein, calcium and iron intakes than the female respondents. This was because male respondents consumed larger quantities of heavier meals and not the chocolate and biscuit type of snacks eaten by the females.

This finding seems to support that of Atkinson and Wyn-Jones, (1972) who also found that, male adolescents had higher nutrient intakes than the females indicating that adolescents seem to have similar behaviour across countries. The low calorie intakes of adolescents in this study seem to suggest a need for serious attention concerning the deficiency especially since Dowuona-Hammond, (1978) and Agyeman Mensah, (1980) also found in their studies in Ghana, that students did not meet the FAO/WHO recommended intakes for calories. The attendant hunger associated with the small amounts of food served in the dining halls could lead to apathy, inability to pay attention, disruptive behaviour patterns and over concern about food (Read, 1973). This could adversely affect learning.

4.4.4 Percentage of Daily Intake of Energy, Protein, Calcium and Iron Provided by Meals Eaten Outside the Dining Halls

The percentage of the daily energy, protein, calcium and iron intake provided by meals eaten outside the dining halls was assessed and shown in Table 21.

TABLE 21: PERCENTAGE OF DAILY INTAKE OF ENERGY AND THREE NUTRIENTS PROVIDED BY MEALS EATEN OUTSIDE DINING HALLS

SCHOOL TYPE AND GENDER	ENERGY %	PROTEIN %	CALCIUM %	IRON %
School A (Males only)	37	38	30	18
School B (Females only)	36	31	48	17
School C (Rural mixed)	32	53	48	30
School D (Urban mixed)	37	33	22	8
Males of total Sample	33	32	33	15
Females of total Sample	37	35	43	16

It is clear from the table that meals eaten outside the dining hall provided a significant proportion (over one-third) of the total daily intakes of energy and the nutrients assessed except for iron which is 18%.

The choices that the respondents make, as far as between meals foods are concerned, are crucial in their total nutrient intake. Since parents of most of the respondents are highly educated, it is expected that food habits of the respondents would be good. On the contrary this was not evident in the types of snacks they chose.

4.4.5 Percentage of Respondents Who Did Not Meet the Recommended Intakes of Energy, Protein, Calcium and Iron

Table 22 shows the percentage of respondents who did not meet the RNI for energy and the selected nutrients evaluated. These percentages were arrived at by taking the number of respondents whose nutrient intakes fell below the RNI in each school and for each gender, as a percentage of the total number of respondents in the school and for each gender.

TABLE 22: PERCENTAGE OF RESPONDENTS WHO DID NOT MEET THE RNI OF ENERGY, PROTEIN, CALCIUM AND IRON BY SCHOOL TYPE AND GENDER

SCHOOL TYPE AND GENDER OF RESPONDENTS	ENERGY %	PROTEIN %	CALCIUM %	IRON %
School A (Males only)	100	0	0	0
School B (Females only)	89.6	0	0	86.2
School C (Rural mixed)	35.4	0	0	0
School D (Urban mixed)	48	0	0	0
Males	49.3	0	0	0
Females	42.5	0	0	34.2

As evident in Table 22, none of the respondents in the all males school, met the RNI for energy. Over 3/4 did not meet it in the all females school and about 1/3 of the respondents in the mixed schools did not meet the RNI for energy. All respondents met the RNI for protein and calcium. Eighty-two percent females in school B did not meet their iron requirements inspite of the extra meals they ate outside the dining halls. The data further emphasise that a large proportion of respondents experience energy shortages. The exclusively male and female schools tend to suffer most. It is also important to note that a large proportion of the females did not receive adequate amounts of iron which should be a cause for concern for those who feed adolescent females in order to avert iron deficiency anaemia which has been found to be particularly widespread in developing countries among women of reproductive age (DeMaeyer & Adiels - Tegman, 1985).

4.4.6 Respondents' Comments About Dining Hall Meals

When respondents were asked whether their dining hall meals were adequate or inadequate, over 57% said their meals were inadequate.

When asked to comment or give reasons why they said the meals were inadequate, comments shown in Table 23 were given.

TABLE 23: PERCENTAGE DISTRIBUTION OF RESPONDENTS COMMENTS ABOUT DINNING HALL MEALS

COMMENTS	% OF RESPONDENTS
Quantity is too small.	63.5
Food not tasty.	48.5
Meals are monotonous.	45.0
Food is not clean.	14.2
Food contains too much carbohydrate and little protein.	13.5
Sanitary conditions around the kitchen are poor.	11.3
Food is sometimes not well cooked.	10.6
No response.	10.6

The most common reason given for the inadequacy of dining hall meals were the quantity being too small, the food not being tasty and the food being monotonous. Only a few students (14.2%) considered the nutritional value of the meals.

Certainly, these are clear reasons why students' intake of nutrients were low. Since only few of them considered the nutrient content of the meals, it reflects their nutrition

knowledge as well. It must be emphasized that it is only when students are able to relate their food intakes to their general health and well being, that the nutritional considerations for eating food would outweigh considerations of palatability and likes or dislikes.

4.5 GROWTH PERFORMANCE OF THE STUDENTS

4.5.1 Anthropometric indices of height-for-age and weight-for-height were used to measure the growth performance of the study group. Weights and heights were compared with Jellife et al.'s, (1989) reference data and Fiawoo's weights for urban adolescents. Kaufman's weight classification was also used to classify the students into various weight categories. The Body Mass Index (BMI) was employed to classify respondents as normal, overweight or underweight.

4.5.2 The mean weights and heights of respondents were compared with Jellife et al.'s anthropometric reference data (1989) and presented in Table 24.

TABLE 24 : COMPARISON OF MEAN WEIGHTS AND HEIGHTS OF RESPONDENTS WITH JELLIFE'S REFERENCE DATA*

AGE (YEARS)	NO. OF RESPONDENTS	WWEIGHTS		HEIGHTS	
		MEAN WEIGHT OF RESPONDENTS (kg)	JELLIFES REF. MEAN WEIGHT (kg)	MEAN HEIGHTS OF RESPONDENTS (CM)	JELLIFFE'S REF. MEAN HEIGHTS (CM)
FEMALES					
15	16	50.6	53.7	160.7	161.8
16	26	52.2	55.9	160.9	162.4
17	17	59.2	56.7	160.8	163.1
18	14	55.4	56.6	163.9	163.7
MALES					
15	2	63.5	56.7	171.2	169.0
16	19	59.4	62.1	168.4	173.5
17	21	61.0	66.3	172.7	176.2
18	25	61.2	68.9	171.4	176.8

* Source: Jellife et al., 1989

The weight range of the male respondents was between 38kg and 91kg and for the female 34kg and 93kg. These extremes in weights were not taken into consideration in calculating the mean because the figures would unnecessarily inflate or deflate the average weight of respondents. In order to show a clearer comparison of weights and heights, bar graphs are used.

FOR AGE OF FEMALE
RESPONDENTS COMPARED WITH JELLIFE'S REFERENCE

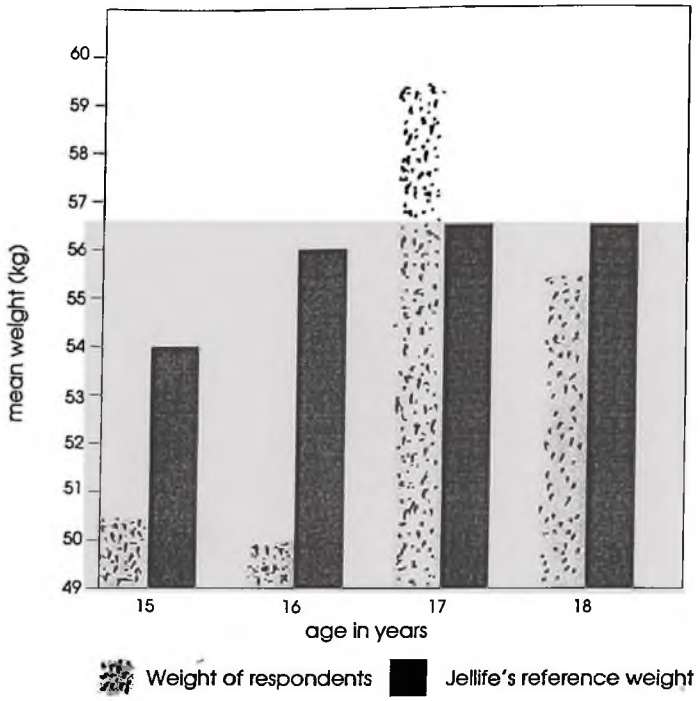
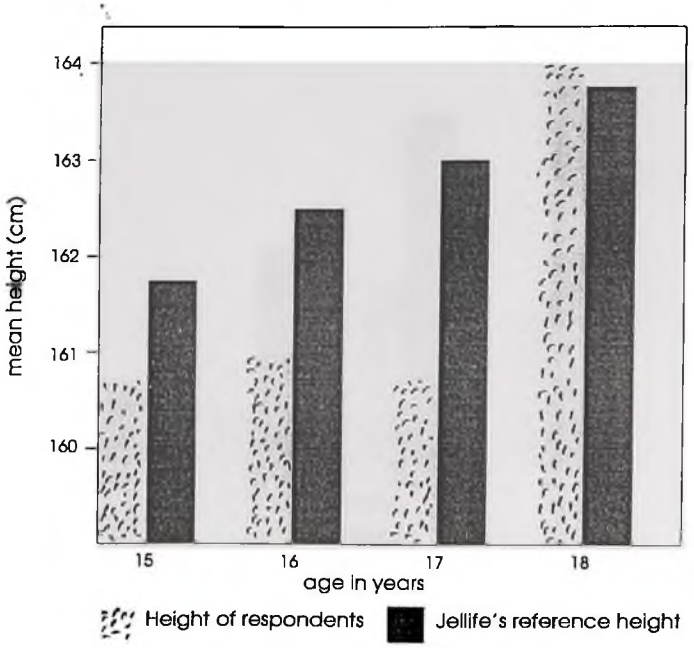


FIG. 2.

HEIGHT FOR AGE OF FEMALE
RESPONDENTS COMPARED WITH JELLIFE'S REFERENCE



T FOR AGE OF MALE
RESPONDENTS COMPARED WITH JELLIFE'S REFERENCE

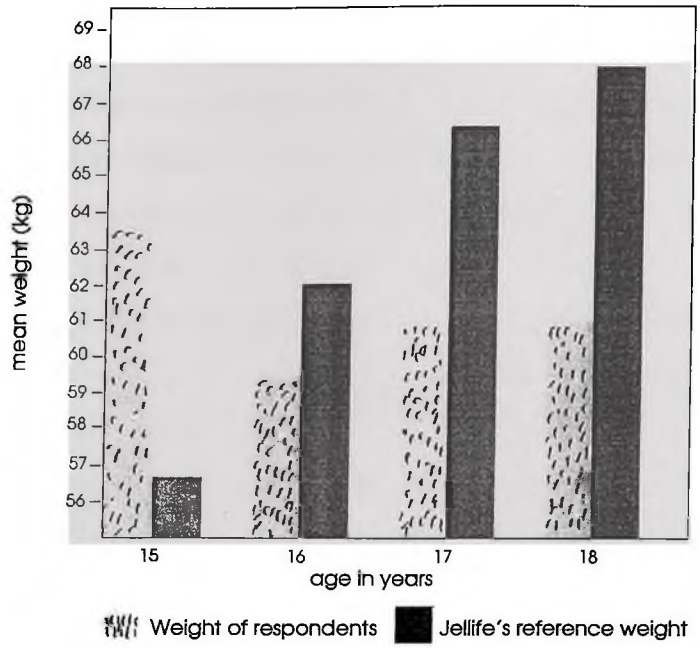
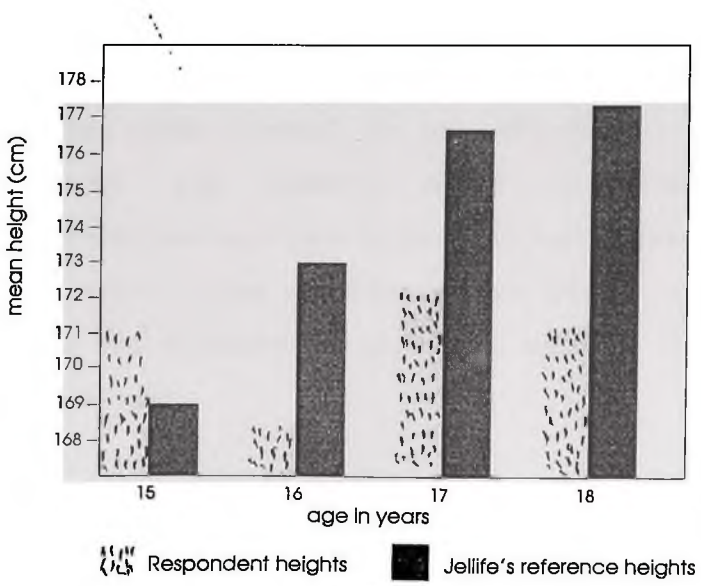


FIG. 4

HEIGHT FOR AGE OF MALE
RESPONDENTS COMPARED WITH JELLIFE'S REFERENCE



From Fig. 1, it is observed that the younger age groups fell well below Jellife's reference group. However, for the older females especially the 17 year olds, the mean weight-for-age was higher than Jellife's reference, suggesting probably a catch up growth. The heights also showed similar trends. It was therefore evident that the majority of respondents have weights-for-age and heights-for-age which were below that of the reference group, an indication that they were not following their normal growth.

The below average growth performance as represented by weights and heights of most of the respondents, especially the low weight-for-age, could be attributed to their low energy intakes. The majority of male respondents seem to be below the reference group (fig 3). This is cause for concern (especially when no catching up growth occurred among the older ones) if our males should reach the standard weights and heights expected of them.

4.5.3 Use of Kaufman and Co-Worker's Criteria to Classify Respondents as Underweight, Normal, Overweight and Obese

The study looked at the occurrence of underweight, overweight and obesity among respondents using the classification employed by Kaufman and co-workers (1975). It stated that if the relative weight of the respondent is 91-110% of the standard or reference weight, the individual has normal weight.

111% 120% is overweight

121% and above is obese

below 91% is underweight.

The percentages were calculated for each student using Jellife's standard as follows:-

$$\frac{\text{Respondent's weight}}{\text{Jellife's standard weight-for-age}} \times 100$$

Table 25 gives the percentage distribution of respondents under the various classifications.

TABLE 25 : CLASSIFICATION OF RESPONDENTS INTO VARIOUS WEIGHT CATEGORIES (IN PERCENTAGES)

STUDENT AND SCHOOLS	KAUFMAN'S CLASSIFICATION			
	UNDER-WEIGHT 90% OF REF	NORMAL 91-110% OF REF.	OVER WEIGHT 111-120% OF REF.	OBESE 120% OF REF.
All Students	23.6	61.4	8.6	6.4
All Males	24.2	65.2	9.1	1.5
All Females	23.0	58.1	8.1	10.8
School A (Males only)	40.0	51.4	8.6	0
School B (Females only)	22.9	57.1	8.6	11.4
School C (Rural mixed)	40.0	51.4	5.7	2.9
School D (Urban mixed)	5.8	61.4	11.4	11.4

* **Source: Jellife et al., (1989)**

Nearly two-thirds of the respondents (61.4%) were of normal weight according to Kaufman's classification. However, quarter were underweight. More of the underweight respondents were found in the exclusively boys' school and rural mixed

school. Even though the respondents in the rural mixed school had one of the highest calorie intakes, a lot more of them classified as underweight probably because they might have come from poor homes and hence might have been underweight, before coming to school. The percentage of underweight respondents by this classification seems to confirm the earlier indication of low calorie contents of the total daily meals consumed.

4.5.4. Body Mass Index (BMI)

Table 26 gives the percentage distribution of respondents in the various classifications using the body mass index. To calculate the BMI, the formula below was used.

$$\frac{\text{wt (kg)}}{\text{height}^2\text{(m)}} = \text{BMI}$$

The BMI for each respondent was calculated and the results categorised into the following:

20 and below = Underweight

20 25 = Normal Weight

26 - 30 = Overweight

30^{+} - Obese

TABLE 26: PERCENTAGE DISTRIBUTION OF RESPONDENTS BY THEIR BODY MASS INDEX

RESPONDENTS GENDER AND SCHOOLS	UNDER WEIGHT BMI 20	NORMAL WEIGHT BMI = 20- 25	OVER-WEIGHT BMI 25-30	OBESE BMI >30
Total Sample	42.9	50.7	5.0	1.4
All Males	44.2	53.8	1.5	1.3
All Females	40.0	49.0	9.3	1.7
School A (Males only)	51.4	48.6	0.0	0.0
School B (Females only)	37.1	54.3	8.6	0.0
School C (Rural mixed)	54.3	42.9	2.8	0.0
School D (Urban mixed)	28.6	60.0	8.6	2.8

About one half of the sample (50.7%) could be classified as of normal weight. This is almost similar to what was obtained using Kaufman's classification. However, in using the BMI, the proportion of underweight respondents seem to be high (42.9%). This probably indicate that some respondents were indeed not meeting their daily calorie needs as was evident in table 19.

It looks like the BMI gave a better picture of the respondents growth performance especially because it was arrived at using the weight and height of the respondents and did not depend on any standard.

4.5.5 Weights and Heights of Respondents Compared with Those recorded by Fiawoo

The weights and heights of the respondents were compared with those recorded by Fiawoo as quoted by Kpedekpo. The

original weights and heights recorded were in pounds and inches. These have been converted into kilograms and centimetres.

TABLE 27: COMPARISON OF MEAN WEIGHTS AND HEIGHTS OF STUDENTS WITH THOSE RECORDED BY FIAWOO

	WEIGHTS (kg)		HEIGHTS (cm)	
AGE (YEARS	MEAN WEIGHT OF RESPONDENTS	RECORDED BY FIAWOO*	MEAN HEIGHT OF RESPONDENTS	RECORDED BY FIAWOO*
FEMALES				
15	50.6	47.2	160.7	159.4
16	50.2	49.1	160.9	161.5
17	59.2	53.9	160.8	164.8
18	55.4	57.7	163.9	167.7
MALES				
15	63.5	41.8	171.2	158.3
16	59.4	46.6	168.4	160.7
17	61.0	50.6	172.7	165.6
18	61.2	55.0	171.4	169.3

Source: *Fiawoo as quoted by Kpedekpo (1970)

Bar charts are used to givge a clearer presentation of the comparisons.

OR AGE OF FEMALE
RESPONDENTS COMPARED WITH FIAWOO'S REFERENCE

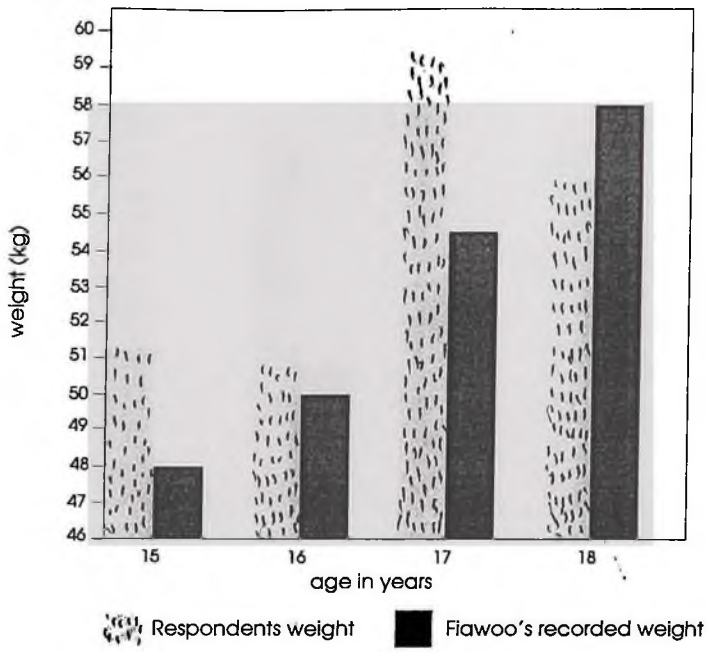
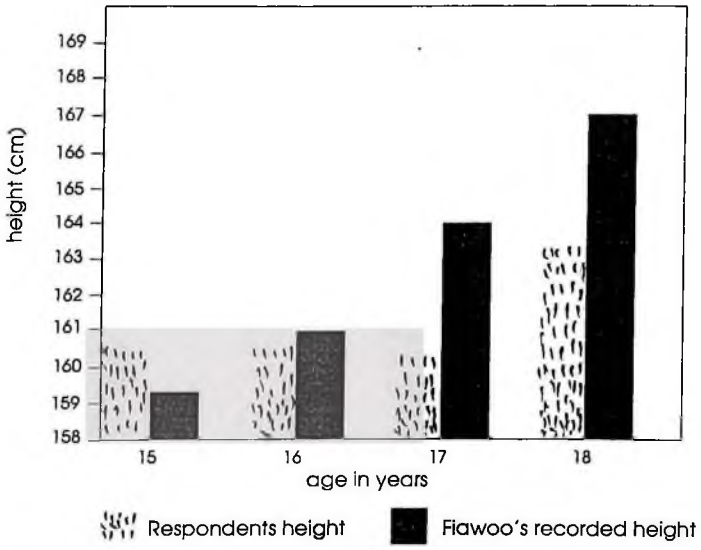


Fig. 6

HEIGHT FOR AGE OF FEMALE
RESPONDENTS COMPARED WITH FIAWOO'S RECORDED HEIGHT



FOR AGE OF MALE
RESPONDENTS COMPARED TO FIAWOO'S RECORDED WEIGHT

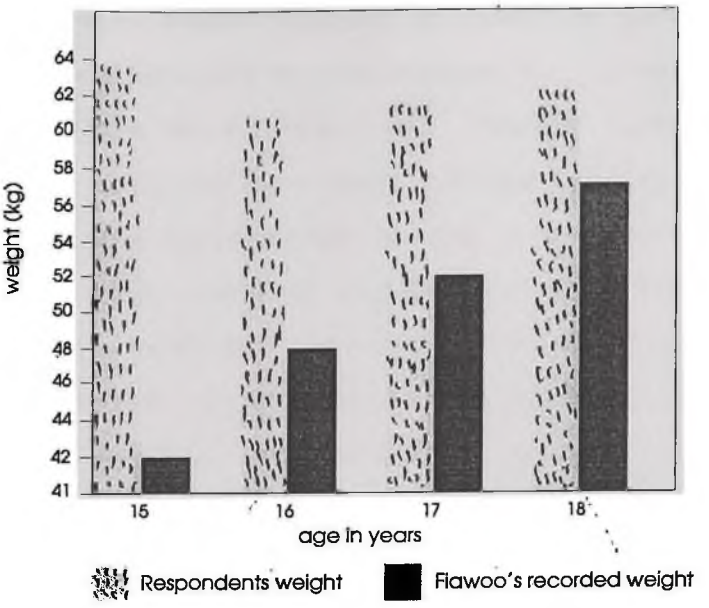
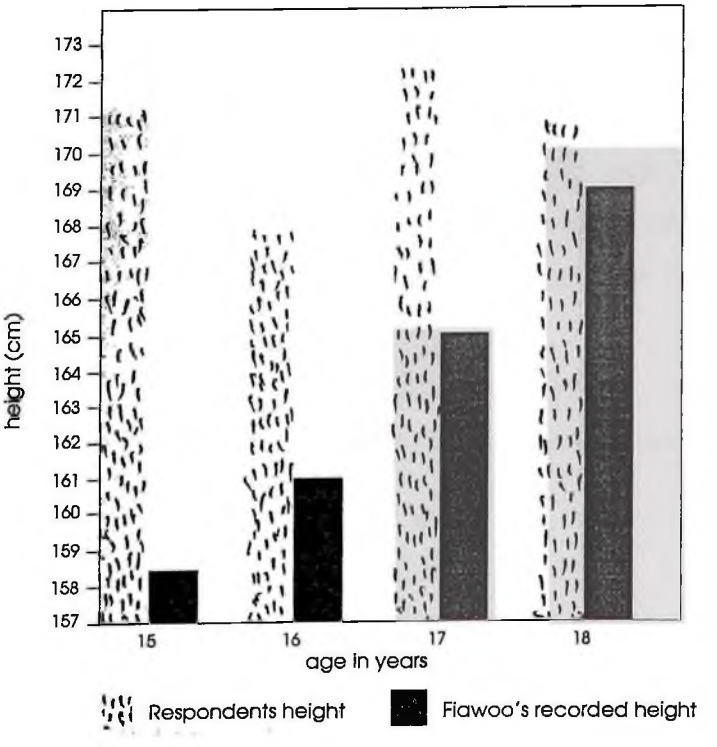


FIG. 8.

HEIGHT FOR AGE OF MALE
RESPONDENTS COMPARED TO FIAWOO'S RECORDED HEIGHT



When the mean weights and heights of the respondents were compared with those recorded by Fiawoo as quoted by Kpedekpo (1970) (See Appendix 4), the values for the study group, were higher (Table 28 and Figs 5-8). Tanner, (1981), has pointed out that children have been getting bigger and growing to maturity more rapidly than before, a phenomenon known as the secular trend. Weights of respondents in the present study taken two decades later are generally higher especially for 15 year olds even though the growth performance of the study group was found to be below that of Jellife's reference group. Heights for the 16,17 and 18 year old females however, was seen to be below Fiawoo's group, probably because of previous nutritional status. Nevertheless, there seems to be gain in weight and height among adolescents over the years probably reflecting improvement in nutrition generally. If Ghanaian adolescents should grow up to reflect weights and heights comparable to reference standards, there would be the need for improvement in the quality and quantity of meals prepared in the school dining halls, since most adolescents spend a significant period of their growing years in school. This calls for vigilance and honesty on the part of the college bursars and the domestic bursars so that every cedi paid as fees is utilised judiciously for the benefit of the students.

4.5.6 Student's Perception of Themselves

The respondents' perception of themselves with regards to

being either overweight or underweight is summarised in tables 28 and 29.

TABLE 28: DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR PERCEPTION OF THEIR BODY WEIGHTS

RESPONSE	OVERWEIGHT %	UNDERWEIGHT %
Yes	10.7	45.7
No	85.0	43.6
No Response	4.3	10.7
TOTAL	100	100

TABLE 29: RESPONDENTS' WISH TO LOSE OR GAIN WEIGHT

RESPONSE	TO LOSE WEIGHT %	TO GAIN WEIGHT %
Yes	11.4	42.1
No	37.2	25.7
No Response	51.4	32.2
TOTAL	100	100

Whereas an earlier classification (table 26) showed that 15% of the sample was overweight and obese only 10.7% of respondents perceived themselves as being overweight. Even though Kaufman's classification showed it was found that 23.6% were underweight, (table 25), the 45.7% perceiving themselves as underweight seem to be close to the percentage found using the Body mass index (42.9). The BMI probably gives a better picture since respondents themselves felt that they were underweight. Some of those who were really overweight did not see themselves as such. This was probably due to the cultural

dimension to the perception of overweight. A plump figure is regarded not as overweight but perceived as a sign of good living or richness. Maybe this also accounts for many of the respondents wishing to gain weight.

CHAPTER FIVE

SUMMARY

The purpose of this study was :

To examine the food habits of the respondents.

To find out the nutrition knowledge of the respondents and the sources of such knowledge.

To evaluate the energy and nutrient content of the meals eaten in the dining halls and to ascertain their adequacy.

- To estimate the energy and nutrient contributions of meals eaten outside the dining halls.
- To compare the contribution of school meals to the total daily energy and nutrient intake of the respondents with the contributions of meals obtained from other sources.
- To measure the growth performance of the respondents.

The populatiom comprised of adolescents between fifteen and nineteen years in secondary schools with boarding facilities. Four schools were selected from a list of schools supplied by West African Examinations Council (W.A.E.C.) using the lottery method. In each of the selected schools, thirty-five form four students were selected from their class list using simple random sampling.

Instruments used for collecting the data included :

- Questionnaire.
- Anthropometry.
- Dietary records.

Observations.

The questionnaires were given to thirty-five students in each of the schools and their weights and heights were taken. A three-day estimated food intake record sheet was given to each student to complete. Foods eaten in the dining halls were also weighed.

Descriptive analysis and cross-tabulations were used for the analysis. Anthropometric indices of height-for-age and weight-for-age were used to describe the growth performance of the study group. Kaufman's weight classification and Body Mass Index were also used to classify students as normal, overweight, obese or underweight.

Forty-eight per cent of the students were males and 52% were females. The mean age of the students was sixteen years and about 90% came from homes where parents were highly educated and gainfully employed.

The results showed that about two-thirds of the students ate three meals both at home and at school. There was a wide variety in the types of meals eaten for breakfast, lunch and supper. These meals were mainly cereal dishes like boiled rice, '*kenkey*' and '*banku*', which were made from the staple foods available in the study area.

The students liked a wide variety of both local and foreign foods. More females than males said they liked toffee and alcoholic beverages very much. Students preferences for foods were reflected the type of meals they consumed.

Most students took nutrient supplements daily or a few times a week. It was found that the students skipped meals both at home and in school.

All respondents ate snacks in school and at home. More females than males ate two or more snacks daily. Foods mostly eaten between meals were soft drinks, pies, fruits, *'gari'* and *'shitto'*, sweets and chocolate.

Respondents demonstrated a poor understanding and awareness of the basic principles of nutrition. Sources of nutrition knowledge for most respondents were from tutors, books and magazines, the media and parents.

The dietary analysis showed that meals served in the dining halls in all the four schools did not meet the Recommended Nutrient Intakes (RNI) for energy. Protein values exceeded the RNI in all the schools except for school A (males only). But when corrected for N.P.U. the values for schools B (Females only) and C (Rural mixed) fell below the RNI. Calcium and iron levels were also exceeded except for school B (Females only). None of the schools served fruits as part of their meals. The majority of the students described dining hall meals as inadequate.

Nutrients provided by meals eaten outside the dining halls supplied about one-third of the total daily intake of

calories, protein and calcium. It also provided about twenty per cent of the daily iron intake. The mean daily intakes of these nutrients were higher for the male students than for the female students.

When compared with the FAO/WHO, (1985) nutrient intakes mean intakes of calories were very low for fifteen to nineteen year old males and fifteen year old females. For all other nutrients assessed, the mean intakes exceeded the RNI.

The weight and height measurements were used to assess growth performance. In comparing mean weights of the students with Jelliffe's et al., reference data (1988), distinct differences were found in the mean body weights. Female respondents had lower mean body weights at all ages except at fifteen years. The male students also, fell slightly below the reference group at all ages except at fifteen years. By Kaufman et al.'s (1975) criterion, most of the students (61 per cent) were of normal weight. Occurrence of overweight was more among the female students than the male students and the prevalence of underweight was more evident than overweight in the sample. When the Body Mass Index (BMI) was used, 43% of the respondents were underweight and five per cent overweight.

When the mean weights and heights of the students were compared with those recorded by Fiawoo as quoted by Kpedekpo (1970), the present sample were generally taller and heavier than their age mates in that study. Female respondents however were shorter at 17 and 18 years.

CHAPTER SIX

CONCLUSIONS

The following conclusions have been drawn based on the findings of this study.

1. Some characteristic features of the eating habits of the students studied included breakfast skipping and regular snacking.
2. Drug-related habits like alcohol intake seems to be practiced among the study group and the majority were taking nutrient supplements.
3. Nutrition knowledge of the respondents was poor.
4. Meals served in the dining halls of all the schools was not enough to satisfy the energy requirements of the adolescent respondents and even when they supplemented the dining hall meals with extras from elsewhere, the calories obtained were still below the RNI especially for the sixteen to nineteen year old males. Thus the weights of the majority of this age group was below Jellife's reference group. Iron levels were also low. However all other nutrients assessed were adequate.
5. The growth performance of the majority of the students was poor and this may be attributed to their diets which did not meet the RNI for energy. The respondents obtained about one-third of their daily nutrient intakes from the extra food they ate outside the dining halls.

6. It was apparent that food eaten outside the dining hall meals made an immerse contribution to the total nutrient intake of the respondents. Respondents who do not take food or money to school stand at a disadvantage and this must be closely looked at.

CHAPTER SEVEN

RECOMMENDATIONS

From the foregoing conclusions it is recommended that:

1. Since students were found to miss meals in the dining halls, school authorities would have to ensure that there is enough discipline in the schools so that students patronize dining halls meals. At the same time the quantity and quality of meals must be improved. Students should be allowed to form committees to monitor the planning and preparation of their meals.
2. The energy content of the dining hall meals were low because of the quantities given to the students. The schools should discourage breakfasts that consists of a beverage and bread because this meal provide very little energy. The quantity of bread ought to be increased above what is given currently, to increase the energy value of breakfast.
3. The poor growth performance of the study group needs to be addressed. Heads of boarding schools may have to apply for food aid to supplement what the fees can buy as an interim measure and then embark on some farming activities to help provide more food for the students.
4. Parents would have to continue to provide their wards with extra food and pocket money, if they want them to be well nourished, until such time that the quality and quantity of meals in the school are improved.

5. The nutrition knowledge of the students was found to be poor. Teachers, parents and the mass media have a task of helping adolescents to improve their knowledge in nutrition. Nutrition lessons should be taught using the integrated approach so that individuals can easily link it with health. It is a subject that must be lived and not just learnt to pass an examination. It must be taught in all subject areas and taught to all students irrespective of gender.
6. Since students depend on food vendors around their campuses for some of their meals, the latter must be screened by the school authorities so that food brought to the schools for sale would be wholesome.
7. The sanitary conditions of some of the kitchens was poor. Kitchens and dining halls need to be insect proof.
8. Since this study investigated the food habits adolescents in boarding schools, it is suggested that a further study be carried out using adolescents who are day students and those who are not in school to find out whether their eating habits are different and whether their nutrient intakes are adequate. Assessment methods like clinical observations and laboratory tests and skinfolds measurements which were not used in this study should be employed, in combination with the diet survey to get a more accurate assessment of their nutritional status.
9. The alcohol intake of female students also need further investigation.

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APPENDIX 1

PERCENTAGE DISTRIBUTION OF RESPONDENTS ACCORDING TO THE DEGREE OF PREFERENCE OF SELECTED FOODS

FOOD	NO RESPONSE	LIKE VERY MUCH	DISLIKE	NEVER EATEN
Animal Products				
Beef	1.4	78.6	19.3	0.7
Mutton	5.0	60.0	26.4	8.6
Pork	2.1	52.9	34.3	10.7
Chicken	4.3	84.3	10.7	0.7
Turkey	5.0	63.6	26.4	5.0
Bush Meat	4.3	38.6	39.3	17.9
Corned Beef	8.6	72.1	17.1	2.1
Sardine	7.9	69.3	21.5	1.4
Eggs	6.4	85.0	8.6	0
Milk	6.4	80	13.6	0
Cheese	2.9	55	35.7	6.4
Legumes				
Beans	5.7	42.9	43.6	7.9
Groundnut	7.1	52.1	40	0.7
Bambara Beans	4.3	32.9	40.7	22.1
Soya Bean	7.1	31.4	37.9	23.6

APPENDIX 1 (CONTD.)

FOOD	NO RESPONSE	LIKE VERY MUCH	DISLIKE	NEVER EATEN
Starchy roots and Plantain				
Plantain	5.0	69.3	23.6	2.1
Cassava	7.9	42.9	47.2	2.1
Cocoyam	4.3	43.6	50.7	1.4
Sweet Potato	6.4	72.9	18.6	2.1
Yam	2.9	79.3	17.9	0
Water yam	6.4	19.3	52.9	12.4
Fruits				
Orange	3.6	84.3	12.1	1.4
Pineapple	2.1	85.7	12.2	0
Pawpaw	2.9	50.7	42.1	4.3
Mango	4.3	62.1	32.9	0.7
Watermelon	4.3	52.1	38.6	5.0
Banana	3.6	69.3	26.5	0.7
Vegetables				
Garden Eggs	5.0	54.3	40.0	0.7
Okro	5.0	59.3	35.7	0
Kontomire Leaves	2.9	72.1	24.3	0.7
Cabbage	7.1	65.0	26.4	1.4
Lettuce	7.9	55.7	26.5	10.0
Cucumber	7.1	40.7	36.5	15.7

APPENDIX 1 (CONTD.)

FOOD	NO RESPONSE	LIKE VERY MUCH	DISLIKE	NEVER EATEN
Vegetables (Contd.)				
Carrots	5.7	57.9	28.6	7.8
French beans	8.5	36.4	32.2	22.9
Fats and Oils				
Groundnut oil	6.4	23.6	54.3	15.7
Palm Kernel oil	0.7	25.0	55.7	8.6
Refined vegetable oil	8.6	62.8	25.0	3.6
Margarine	2.9	65.7	29.2	2.2
Butter	3.6	65.7	27.9	2.8
Palm oil	5.0	68.6	25.7	0.7
Cereals				
Corn	10.7	44.3	44.3	0.7
Rice	7.1	80.7	12.1	0
Wheat	7.9	43.6	47.2	1.4
Oats	7.9	66.4	21.5	4.3
Millet	8.6	17.1	42.9	31.4
Sorghum	7.1	14.3	42.8	35.7

APPENDIX 1 (CONTD.)

FOOD	NO RESPONSE	LIKE VERY MUCH	DISLIKE	NEVER EATEN
Miscellaneous				
Toffee	4.3	60.0	35.0	0.7
Chocolate bar	3.6	75.0	20.7	0.7
Jam/ Marmalade	5.0	59.3	27.1	8.6
Coffee	3.6	37.9	52.8	5.7
Tea	5.0	75.7	17.8	1.5
Milo	2.9	67.9	8.6	0.6
Corn Flakes	2.9	67.1	25.0	5.0
Alcoholic Beverages	7.9	15	47.1	3.0
Soft drinks	2.9	82.1	14.3	0.7

APPENDIX 2

PERCENTAGE DISTRIBUTION OF FREQUENCY OF FOOD CONSUMPTION

FOOD ITEM	NO RESPONSE	DAILY	A FEW TIMES A WK.	FORTH-NIGHTLY	MONTHLY	SEASO-NALLY	NEVER
Animal Products							
Meat	2.9	26.4	62.8	2.9	36	0.7	0.7
Corned beef	2.9	5.0	40.0	16.4	12.1	20.7	2.9
Fish	2.9	67.9	26.4	1.4	0.7	0.7	0
Sardine	3.6	12.1	72.2	2.1	3.6	4.3	2.1
Eggs	1.4	27.1	62.2	2.1	2.1	4.3	0.7
Milk	4.3	57.9	30.7	1.4	1.4	4.3	0
Chicken	4.3	5.7	42.2	12.9	16.4	16.7	2.9
Cheese	5.0	10.0	42.8	10.7	6.4	14.3	10.7
Legumes							
Beans	2.1	17.1	61.4	7.1	2.1	2.1	7.9
Ground-nuts	2.9	13.6	60.7	7.1	5.0	6.4	4.3
Bambara beans	6.4	2.9	27.1	6.4	9.3	17.1	30.7
Soybeans	6.4	1.4	22.1	3.6	14.3	10.7	31.4

APPENDIX 2 (CONTD.)

FOOD ITEM	NO RESPONSE	DAILY	A FEW TIMES A WK.	FORTH-NIGHTLY	MONTHLY	SEASO-NALLY	NEVER
Cereals							
Corn	2.9	35.7	49.2	2.9	3.6	2.9	2.9
Rice	1.4	42.9	54.3	0.7	0	0.7	0
Bread	3.6	52.9	40.7	1.4	0.7	0.7	0
Millet	4.3	4.3	24.3	5.7	5.0	19.3	37.1
Sorghum	7.9	2.9	18.5	4.3	4.3	15.0	47.1
Plantain and Starch roots							
Plantain	3.6	10.7	67.9	5.0	2.9	7.1	2.9
Cocoyam	5.0	5.7	42.9	12.9	7.1	20.0	6.4
Sweet potato	2.9	5.7	42.9	11.4	12.9	21.4	2.9
Yam	2.1	15.0	59.0	7.1	5.0	7.9	3.6
Wateryam	9.3	2.1	25.7	8.6	4.3	16.4	33.6
Cassava	5.7	9.3	55.7	5.7	8.6	8.6	6.4
Fruits & Vegetables							
Banana	1.4	25.7	49.3	1.4	4.3	5.7	2.1
Orange	3.6	25.0	57.8	2.9	3.6	6.4	0.7
Pineapple	5.7	12.1	51.4	8.6	7.9	12.9	1.4
Pawpaw	7.9	7.1	35.0	5.0	5.7	26.4	12.9
Mango	7.9	13.6	30.0	1.4	7.9	33.6	5.7

APPENDIX 2 (CONTD.)

FOOD ITEM	NO RESPONSE	DAILY	A FEW TIMES A WK.	FORTH-NIGHTLY	MONTHLY	SEASO-NALLY	NEVER
Water-melon	5.0	8.6	25.7	7.1	9.3	28.6	15.7
Garden eggs	5.0	7.9	55.7	6.4	10.0	10.7	4.3
Kontomire	7.9	8.6	67.8	5.7	4.3	4.3	1.4
Okro	4.3	7.9	57.1	10.0	9.3	7.9	3.6
Fats and Oils							
Ground-nut oil	7.9	18.6	45.0	12.1	4.3	9.3	12.9
Coconut oil	13.6	5.0	35.0	7.1	7.9	13.6	17.9
Palm Kernel oil	10.0	5.7	35.0	10.0	5.7	13.6	20.0
Refined vegetable oil	11.4	20.7	50.7	4.3	4.3	5.0	3.6
Margarine	5.0	25.7	5.0	7.9	7.9	3.6	2.1
Butter	9.3	20.0	47.1	6.4	6.4	4.3	6.4
Palm oil	9.3	17.9	60.0	5.7	3.6	2.1	1.4
Miscella-neous							
Toffee	4.3	20.7	55.0	5.7	4.3	6.4	3.6
Choco-late	5.0	15.0	55.7	7.9	5.0	8.6	2.9
Jam	5.7	13.6	40.7	9.3	7.1	15.7	7.9
Coffee	7.9	10.0	37.2	6.4	3.6	13.6	21.4

APPENDIX 2 (CONTD.)

FOOD ITEM	NO RESPONSE	DAILY	A FEW TIMES A WK.	FORTH-NIGHTLY	MONTHLY	SEASO-NALLY	NEVER
Milo	4.3	38.6	50.0	1.4	2.9	1.4	1.4
Tea	8.6	34.3	45.7	5.0	1.4	2.1	2.9
Corn-flakes	9.3	9.3	43.6	9.3	9.3	7.9	11.9
Alcohol	10.0	3.6	14.3	2.1	4.3	13.6	52.1
Soft-drinks	13.6	6.4	48.5	7.1	5.0	7.1	2.1
Vitamin Supple-ments	14.3	6.4	34.3	5.0	6.4	6.4	7.9

APPENDIX 3

a. **ESTIMATED NUTRITIVE VALUE OF MEALS EATEN IN THE DINING HALL PER PERSON PER DAY FOR SCHOOL A (MALES ONLY)**

MEAL	ENERGY Kcal	PROTEIN g	CALCIUM mg	IRON mg
Breakfast	379	5.4	246.0	4.8
Lunch	587	13.5	109.4	3.7
Supper	541	17.7	524.0	13.4
Total for day	1,507	36.6	882.0	21.9
% RDA				
13-15 years	51.9%	98.9%	126.0%	121.7%
16-19 years	49.1%	96.3%	176.0%	121.7%

b. **ESTIMATED NUTRITIVE VALUE OF MEALS PER PERSON PER DAY FOR SCHOOL B (FEMALES ONLY)**

MEAL	ENERGY Kcal	PROTEIN g	CALCIUM mg	IRON mg
Breakfast	449	10.8	77.0	2.27
Lunch	422	14.9	145.8	4.5
Supper	410	11.6	199.3	10.9
Total for day	1,301	37.3	422.0	17.8
% RDA				
13-15 years	52.2%	120.3%	40.3%	73.6%
16-19 years	56.3%	124.0%	84.4%	73.6%

c ESTIMATED NUTRITIVE VALUE OF MEALS PER PERSON PER DAY FOR SCHOOL C (RURAL MIXED)

MEAL	ENERGY Kcal	PROTEIN g	CALCIUM mg	IRON mg
Breakfast	335	8.03	36.1	4.05
Lunch	730	16.3	261.2	4.6
Supper	820	20.9	270.1	10.6
Total for day	1,885	45.2	567.4	19.3
% RDA				
Males				
13-15 years	65.0%	122.0%	81.1%	107.2%
16-19 years	61.4%	118.8%	113.5%	107.2%
Females				
13-15 years	75.7%	145.8%	81.1%	80.4%
6-19 years	81.6%	150.7%	113.5%	80.4%

d. ESTIMATED NUTRITIVE VALUE OF MEALS PER PERSON PER DAY FOR SCHOOL D (URBAN MIXED)

MEAL	ENERGY Kcal	PROTEIN g	CALCIUM mg	IRON mg
Breakfast	269	9.7	74.6	4.0
Lunch	662	17.9	201.0	28.4
Supper	669	25.4	840.0	23.2
Total for day	1,627	53.0	1115.4	55.4
% RDA				
Males				
13-15 years	56.0%	143.0%	159.4%	307.0%
16-19 years	53.4%	139.8%	185.9%	307.0%
Females				
13-15 years	65.3%	170.9%	159.4%	230%
16-19 years	70.4%	176.6%	185.9%	230%

APPENDIX 4

MEAN WEIGHTS (LB) ACCORDING TO AGE AND SOCIO-ECONOMIC GROUPS (10)

Age in years	5	6	7	8	9	10	11	12	13	14	15	16	17	18
BOYS														
Rural		40.7	45.4	50.5	55.0	57.8	63.5	71.2	76.1	81.1	88.7	99.2	109.9	114.8
Urban	35.0	40.6	44.0	48.4	53.9	66.2	63.1	71.3	77.1	83.8	92.0	102.5	111.3	121.0
Urban Priviledged	45.9	51.9	57.7	62.2	69.5	75.0	83.2	86.1	88.0					
Expatriate	45.5	50.4	59.4	66.0	69.4	71.7	87.7	91.5	91.0					
GIRLS														
Rural	41.5	40.7	45.0	51.6	53.3	60.8	67.2	73.4	78.1	85.0	96.3	104.5	106.8	114.7
Urban	43.0	45.7	49.7	52.1	57.2	62.6	69.8	83.0	91.1	99.2	103.8	109.8	118.5	127.
Urban Priviledged	45.7	49.6	55.8	64.1	72.7	78.2	88.6	95.5	99.0					
Expatriate	44.4	48.7	56.6	65.8	67.1	74.5	89.7	94.3						

MEAN HEIGHTS (IN.) ACCORDING TO AGE AND SOCIO-ECONOMIC GROUPS

BOYS														
Rural		45.2	47.1	49.2	51.0	52.0	53.6	55.9	57.2	58.4	60.5	62.4	64.1	65.2
Urban	42.0	44.6	46.5	48.4	50.3	52.3	53.6	56.0	57.4	59.1	60.9	61.8	63.7	65.1
Urban Priviledged	45.0	48.1	49.2	51.2	53.7	55.4	57.1	58.1	59.0					
Expatriate	44.8	46.3	48.4	52.1	54.4	55.2	58.1	58.9	59.0					
GIRLS														
Rural	44.5	44.5	47.1	49.7	51.1	52.7	55.0	56.7	58.8	59.4	61.0	61.8	62.7	63.9
Urban		45.9	48.2	49.7	51.3	53.5	55.6	58.2	59.7	61.9	61.3	62.1	63.4	64.5
Urban Priviledged	44.5	46.7	48.4	51.4	53.7	56.0	58.2	61.5	62.7					
Expatriate	44.7	45.9	49.1	51.7	53.3	53.3	59.1	60.7						

Source: Kpedekpo 1970

APPENDIX 5

Table AP 9-8 Weight-for-age (kg) of children aged 10-18 years (sexes separate) as standard deviations from reference (NCHS/WHO data)

	Weight (kg)					
	Boys			Girls		
Age (years)	+2SD	Mean	-2SD	+2SD	Mean	-2SD
10.0	46.0	31.4	22.1	49.2	32.5	21.9
10.5	49.3	33.3	23.1	52.8	34.7	23.1
11.0	52.7	35.3	24.1	56.4	37.0	24.5
11.5	56.3	37.5	25.4	60.0	39.2	25.9
12.0	59.9	39.8	26.8	63.3	41.5	27.4
12.5	63.5	42.3	28.4	66.5	43.8	29.1
13.0	67.2	45.0	30.4	69.4	46.1	30.8
13.5	70.9	47.8	32.5	72.1	48.3	32.5
14.0	74.6	50.8	34.9	74.5	50.3	34.2
14.5	78.2	53.8	37.4	76.5	52.1	35.9
15.0	81.6	56.7	39.9	78.3	53.7	37.4
15.5	84.9	58.5	42.4	79.6	55.0	38.7
16.0	87.9	62.1	44.7	80.6	55.9	39.8
16.5	90.7	64.4	46.8	81.2	56.4	40.7
17.0	93.2	66.3	48.6	81.5	56.7	41.3
17.5	95.3	67.8	49.9	81.5	56.7	41.8
18.0	97.0	68.9	50.9	81.3	56.6	42.1

Source: Jellife et al., 1989

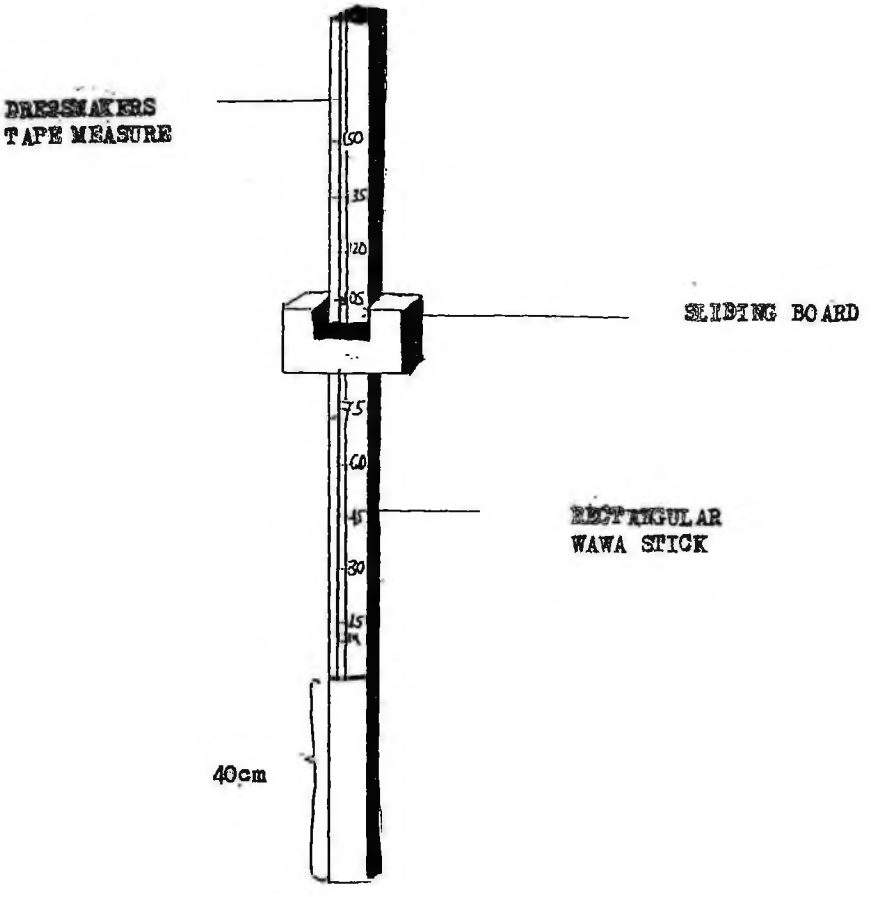
APPENDIX 6

Table AP 9-8 Height-for-age (kg) of children aged 10-18 years (sexes separate) as standard deviations from reference (NCHS/WHO data)

	Height (kg)					
	Boys			Girls		
Age (years)	110%	Reference	90%	110%	Reference	90%
10.0	151.3	137.5	123.8	152.1	138.3	124.5
10.5	154.3	140.3	126.3	155.7	141.5	127.4
11.0	157.6	143.3	129.0	159.3	144.8	130.3
11.5	161.0	146.4	131.8	163.0	148.2	133.4
12.0	164.7	149.7	134.7	166.7	151.5	136.4
12.5	168.3	153.0	137.7	170.1	154.6	139.1
13.0	172.2	156.5	140.9	172.8	157.1	141.4
13.5	175.9	159.9	143.9	172.9	159.0	143.1
14.0	179.4	163.1	146.8	176.4	160.4	144.4
14.5	182.8	166.2	149.6	177.3	161.2	145.1
15.0	185.9	169.0	152.1	178.0	161.8	145.6
15.5	188.7	171.5	154.4	178.3	162.1	145.9
16.0	190.9	173.5	156.5	178.6	162.4	146.2
16.5	192.7	175.2	157.7	179.0	162.7	146.4
17.0	193.8	176.2	158.6	179.4	163.1	146.8
17.5	194.4	176.7	159.0	179.7	163.4	147.1
18.0	194.5	176.8	159.1	180.1	163.7	147.3

Source: Jellife et al., 1989

APPENDIX 7



APPENDIX 8

Weight of food eaten in the Dining Halls.

School:

Day:

Date:

Meal	Weight of Bowl	Weight of Bowl and Food	Weight of Food
Breakfast			
Lunch			
Supper			

APPENDIX 9

WEIGHT OF FOOD EATEN IN THE DINING HALL

FORMAT FOR RECORDING WEIGHTS OF FOOD EATEN OUTSIDE THE DINING HALL

Name of Student:

School:

Please record as you eat all foods and drinks taken outside the dining hall on the sheet provided. Give estimates of quantities or cedis equivalents.

FOOD OR DRINK	QUANTITY OR CEDI EQUIVALENT	TIME OF DAY

APPENDIX 10

GLOSSARY

1. Kenkey — A steamed dish made from fermented corndough.

2. Gari — A grit-like convenience food made by roasting grated cassava.

3. Banku — Boiled fermented corndough

4. Shitto - — A kind of preserved stew usually containing hot pepper.

5. Nkontomire — Tender cocoyam leaves.

APPENDIX 11

STUDY QUESTIONNAIRE

Questionnaire on Food habits, Nutrition knowledge and Food intakes of Adolescent in selected Secondary Schools in the Central Region.

INTRODUCTION

This is a study being carried out by the Department of Home Science; University of Ghana to find out the food habits, nutrition knowledge and food intakes of adolescents. I shall be grateful if you would kindly and carefully complete this questionnaire. Opinions expressed on this questionnaire would be treated confidentially.

1. **DEMOGRAPHIC AND SOCIO-ECONOMIC DATA:**

    1. Age of student (at last Birthday): _____

2. Sex: Male [ ] Female: [ ]

    3. Weight: .....

    4. Height: .....

    5. Religion (Tick)

        a. a. Christian [ ]

            b. Moslem [ ]

            c. Other specify.....

                .....

                .....

    6. Ethnic Origin: .....

7. Number of siblings (brothers and sisters):

.....

.....

8. Educational level of Parents Highest level attained:

	Father	Mother
(a) Primary	[ ]	[ ]
(b) Middle/JSS	[ ]	[ ]
(c) Secondary/ Commercial/ Vocational	[ ]	[ ]
(d) Teacher Trg./ Polytechnic/ Agriculture	[ ]	[ ]
(e) University	[ ]	[ ]
(f) None	[ ]	[ ]

(g) Other (specify) .....

9. Occupation of Parents:

Father: .....

Mother: .....

10. What other types of activities do you participate in at School eg. games.

(a) .....

(b) .....

(c) .....

11. Do you consider yourself overweight:

Yes [ ] No [ ]

12. If yes would you want to lose weight

Yes [ ] No [ ]

13. If no do you consider yourself underweight

Yes [ ] No [ ]

14. If yes would you want to gain weight

Yes [ ] No [ ]

15. Are you satisfied with your height:

Yes [ ] No [ ]

16. If no which of these would you want

To be shorter [ ]

To be taller [ ]

II. **Food Habits**

17. How many times do you normally eat in a day?

(a) at school: .....

(b) at home: .....

18. What meal do you normally eat at home for:

(a) Breakfast (list)

i. .....

ii. .....

iii. .....

iv. .....

(b) Lunch:

i. .....

ii. .....

iii. .....

iv. .....

(c) Supper:

i. .....

ii. .....

iii. .....

iv. .....

19. What meals do you normally eat at school for:

(a) Breakfast (list)

i. .....

ii. .....

iii. .....

iv. .....

(b) Lunch:

i. .....

ii. .....

iii. .....

iv. .....

20. How often do you eat between meals daily?
(Tick where appropriate)

	Once	Twice	3 or more times	Never
a. at home	....	.....	.....	.....
b. at school	...	....	.....	.....

21. What foods do you normally eat between meals? (list)

a. at home .....

.....

b. at School:.....

.....

22. Do you skip any of the following meals at home? (tick)

	Always	Sometimes	Never	Reasons
Breakfast	.....	.....	.....	.....
Lunch	.....	.....	.....	.....
Supper	.....	.....	.....	.....

23. Do you skip any of the following meals at school? (tick)

	Always	Sometimes	Never	Reasons
Breakfast	.....	.....	.....	.....
Lunch	.....	.....	.....	.....
Supper	.....	.....	.....	.....

24. What foods do you eat outside the dining hall?

a. .....

b. .....

c. .....

d. .....

25. Who normally eats with you at home? (Tick)

alone [ ] mother [ ] sisters [ ]

brothers [ ] father [ ]

Others specify: .....

26. Who normally eats with you at school (outside the dining hall)? (tick)

Brother [ ]

Sister [ ]

Friends [ ]

Alone [ ]

Other specify: .....

27. How often do you receive food outside campus? (tick)

everyday [ ] once a week [ ]

week ends [ ] not at all [ ]

Other specify: .....

28. If you receive food from outside, who sends the food? (tick)

Mother [ ] Aunt [ ]

Sister [ ] Guardian [ ]

Other specify .....

29. How much pocket money do you spend on food including sweets and drinks per week?

.....

30. Who determines what should be eaten at home for- (tick)

	Mother	Father	Self	Others Specify
(a) breakfast	.....	.....	.....	.....
(b) lunch	.....	.....	.....	.....
(c) supper	.....	.....	.....	.....

31. Is there any foods that your family does not take?

Yes [ ] No [ ]

32. Name it and give the reason why members of your family are not allowed to take this foods?

Name of food	Reason
.....	.....
.....	.....
.....	.....
.....	.....

III. Food Preference Data

33. What is your favourite breakfast?

a. at home: .....

b. at school: .....

lunch

a. at home: .....

b. at school: .....

Supper

a. at home: .....

b. at school: .....

34. What food do you dislike most?

a. at home: .....

b. at school: .....

35. **Food Preference data**

Indicate in the columns provided which of these foods you like very much, like least, dislike or you have never eaten.

Foods	in what form	like very much	likes least	dislikes	has never eaten
Beef					
Mutton					
Pork					
Chicken					
Turkey					
Bush Meat					
Corned Beef					
Sardine					
Eggs					
Milk					
Beans (cowpea)					
Ground-nuts					
Bambara beans					
Soya beans					

Foods	in what form	like very much	likes least	dislikes	has never eaten
Corn					
Rice					
Wheat					
Oats					
Millet					
Sorghum					
Plantain					
Cassava					
Cocoyam					
Sweet potato					
Yam					
Water yam					
Banana					
Orange					
Pine-apple					
Pawpaw					
Mango					
Water melon					

Foods	in what form	like very much	likes least	dislikes	has never eaten
Garden eggs					
Okro					
Kontomire leaves					
Cabbage					
Lettuce					
Cucumber					
Carrots					
French beans					
Ground-nut oil					
Kernel oil					
Refined Vegetable oil					
Margarine					
Butter					
Palm oil					
Toffee					
Chocolate bar					
Cheese					

Foods	in what form	like very much	likes least	dislikes	has never eaten
Palmnuts Jam/ Marmalade					
Coffee					
Tea					
Milo					
Corn-flakes					
Alcoho-lic beverages					
Soft drinks					

Other (specify)

IV. Nutrition Knowledge

36. What is the use of food in the body?

.....

.....

.....

37. What is the most important thing you would consider when choosing what to eat?

.....

.....

38. Which is better? (tick one)

a. a variety of foods for a meal [ ]

b. single food item for a meal [ ]

39. Name all the food groups you know. Giving two examples

.....

.....

40. Name 2 foods that would help you build up your blood

.....

.....

41. Do you think teenagers should eat a lot of energy giving foods?

Yes [ ] No [ ]

42. If Yes why?.....

.....

43. If No, why not? .....

.....

44. Do you think eating once a day is adequate?

Yes [ ] Reason:.....

.....

45. No [ ] Reason:.....

.....

46. Why should children be given a lot of milk?

.....

.....

.....

47. Do all people require the same quantity of food daily?

Yes [ ] Reason:.....

.....

No [ ] Reason:.....

48. Do you think the meals you eat in the dining hall are adequate for good health? Yes [ ] No [ ]

49. If No, why? Reasons: .....

.....

.....

Suggestions for improvement: .....

.....

.....

Sources of Nutrition Knowledge

50. From which of these sources do you receive your nutrition knowledge?

(a) Books, Pamphlets, news papers [ ] (b) Tutors [ ]

(c) Parents [ ] (d) Talks [ ]

FREQUENCY OF FOOD CONSUMPTION

51. How often do you eat the foods listed below? (tick)

Food Group & Food Item	Daily	Few Times a week	Weekly	Fort-nightly	Mon-thly	Seaso-nally	Never
Animal Products							
Meat							
Corned beef							
Fish							
Thinned Fish (Sardine)							
Eggs							
Milk							
Chicken							
Legumes, Oil Seed & Nuts							
Beans (cowpea)							
Groundnuts							
Bambara beans							
Soybeans							
Cereals & Grains							
Corn							
Rice							
Bread							
Millet							
Sorghum							

FREQUENCY OF FOOD CONSUMPTION (CONTD.)

Food Group & Food Item	Daily	Few Times a week	Weekly	Fort-nightly	Mon-thly	Seaso-nally	Never
Root Tubers & Plantain							
Plantain							
Cocoyam							
Sweet potato							
Yam							
Water Yam							
Cassava							
Fruits and Vegetables							
Banana							
Orange							
Pineapple							
Pawpaw							
Mango							
Watermelon							
Garden egg							
Kontomire/ leaves							
Okro							
Fats and oils							
Groundnut oil							
Coconut oil							

FREQUENCY OF FOOD CONSUMPTION (CONTD.)

Food Group & Food Item	Daily	Few Times a week	Weekly	Fort-nightly	Mon-thly	Seaso-nally	Never
Fats and oils (contd.)							
Palm kernel oil							
Refined vege-table oil							
Margarine							
Butter							
Palm oil							
Miscellaneous							
Toffee							
Chocolate bar							
Cheese							
Jam							
Coffee							
Milo							
Tea							
Cornflakes							
Soft drink							
Vitamim Supple-ment							
Others (specify)							