

**KNOWLEDGE AND ATTITUDE TOWARDS CONSUMPTION OF
FRUITS AND VEGETABLES AMONG SECONDARY SCHOOL
STUDENTS IN IBADAN NORTH EAST LOCAL GOVERNMENT
AREA, OYO STATE**

BY

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DEDICATION

To the Almighty and Eternal God who has kept me through it all

To Him alone be all the glory.

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ABSTRACT

The consumption of fruits and vegetables plays a significant role in human nutrition. Students are more inclined towards taking empty calorie foods with little consideration for healthy foods, especially fruits and vegetables. This has the tendency of pre-disposing them to obesity, dental caries, and other non-communicable diseases in later years. There is a dearth of information on consumption of fruits and vegetables as part of healthy eating among secondary school students. This study was therefore designed to determine the level of knowledge and attitude towards consumption of fruits and vegetables among secondary school students in Ibadan North-East Local Government Area (IBNELGA).

This cross-sectional survey involved the use of a four-stage sampling technique in selecting 4 out of 12 wards, 6 schools, 6 classes and 400 students who were selected based on their population from four public schools (369 students) and two private schools (31 students) in IBNELGA. Data were collected using a semi-structured questionnaire and a Focus Group Discussion (FGD) guide. The questionnaire contained 20-point knowledge and 16-point attitude scales on consumption of fruits and vegetables. Knowledge scores of ≤ 10 and ≥ 11 were rated as poor and good respectively, while attitude scores of ≤ 8 and ≥ 9 were classified as negative and positive respectively. Questions were also asked on frequency and reasons adduced for consumption of fruits and vegetables. Six FGD sessions were conducted among the students according to their classes and gender. Quantitative data were analysed using descriptive statistics and Chi-square test at 5% level of significance. Qualitative data were content analysed using the thematic approach.

Age of respondents was 14.1 ± 2.0 years. Majority (79.2%) had good knowledge of health benefits of consumption of fruits and vegetables, while 69.8% had positive attitude towards consumption of fruits and vegetables. About 14.0% and 10.0% consumed fruits and vegetables daily respectively. Only 16.2% of the students ate fruits five times or more within the week of the survey, while 9.2% ate vegetables five times or more within that week. Reasons given for consumption of fruits and vegetables by the majority of respondents included taste (78.5%), seasonality (78.2%), knowledge of health benefits (77.5%), knowledge of preparation (72.0%), satisfaction derived from eating (71.0%) and mass media advertisements (67.5%). Students in public schools significantly consumed

more fruits everyday than students in private schools. The major perceived reason for consumption of fruits and vegetables was 'good taste' but there were negative concerns on certain fruits and vegetables like pear and *Vernonia amygdalina* (bitter leaf) because of its bitter taste. There was a consensus that education of the students on the health benefits of consumption of fruits and vegetables would increase the intake level.

Respondents were knowledgeable and had positive attitude towards consumption of fruits and vegetables while the frequency was low. Thus, secondary school students should be further enlightened on the importance of consumption of fruits and vegetables.

Keywords: Fruits and vegetable consumption, Secondary school students, Ibadan.

Word count: 470

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CERTIFICATION

I certify that this project was carried out by Oluwabusayo 'Kemi OLAWALE in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria.

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LIST OF ABBREVIATIONS

CHD	Coronary Heart Disease
CDC	Center for Disease Control
CSFII	Continuing Survey of Food Intakes by Individuals
CVD	Cardiovascular Disease
DALY	Disability Adjusted Life Years
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussion
GSR	Global Status Report
HBM	Health Belief Model
IBNELGA	Ibadan North East Local Government Area
NCD	Non-Communicable Disease
NHANES	National Health and Nutrition Examination Survey
RR	Relative Risk
USDA	United States Department of Agriculture
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Fruits and vegetables are very important components of the diet. Vegetables refer to the edible parts of plants, commonly collected and/or cultivated for their nutritional value for humans. According to this definition, fruits are a sub-set of vegetables, as the term “fruits” refer to the mature ovary of a plant which encloses the seed (International Agency for Research on Cancer, 2003).

Fruits and vegetables are, in general, low in calories and fat but high in vitamins, minerals and dietary fiber. Vegetables are categorised into five subgroups, based on their nutrient content and include: darkgreen, starchy, orange, dried beans and peas, and other vegetables (Turcotte, 2010).Vegetables are sources of many nutrients, especially potassium, folate, the antioxidant vitamins A and E, and dietary fiber. These nutrients help support body function in many ways, which makes vegetables important components of a healthy diet. For example, potassium helps to maintain healthy blood pressure, folate (folic acid) helps with red blood cell production, vitamin A enhances immune function, and vitamin E protects cells from free radicals. Major nutrient contributions of fruits include potassium, folate and dietary fiber. Where vegetables are an excellent food source of vitamins A/beta-carotene and E, fruits offer more substantial amounts of another antioxidant nutrient--- vitamin C. Vitamin C helps heal cuts and wounds and keeps teeth and gums healthy. It also aids in iron absorption, protects the body's cells from oxidative damage due to free radicals, and enhances immune system function (Turcotte, 2010).

Fruits and vegetables play a significant role in human nutrition, especially as sources of vitamins [C (ascorbic acid), A, thiamine (B_1), niacin (B_3), pyridoxine (B_6), folacin (also known as folic acid or folate) (B_9), E], minerals, and dietary fiber (Wargovich, 2000).Diets rich in fruits and vegetables have been shown to be correlated with positive health outcomes, including decreased cardiovascular disease risk, lowered risk for certain cancers (Temple & Gladwin, 2003), and lower body mass index (Charlton et al., 2003).A recent WHO/FAO expert consultation report on diet, nutrition and prevention of chronic diseases, sets population nutrient goals and recommends intake of a minimum of 400g of fruits and vegetables (excluding potatoes and other starchy tubers) per day for the prevention of chronic

diseases such as heart diseases, cancer, diabetes and obesity. The report states that there is convincing evidence that fruits and vegetables decrease the risk for obesity, and evidence that they probably decrease the risk of diabetes. Further, there is convincing evidence that fruit and vegetables lower the risk for Cardiovascular diseases(CVD), and also help to prevent and alleviate several micronutrient deficiencies, especially in less developed countries (WHO 2003). Overall it is estimated that up to 2.7 million lives could potentially be saved each year if fruit and vegetable consumption was sufficiently increased. Recommendations in this direction tend to complement and reinforce other valid messages based on the long known health benefits of consuming vegetables and fruit as dietary sources of fibre, vegetable proteins and protective micronutrients.

Nutrition plays a very important role in the well-being of an adolescent. Nutritional needs during adolescence are increased because of the increased growth rate and changes in body composition associated with puberty (Spear 2002; Jenkins & Horner 2005). The dramatic increase in energy and nutrient requirements coincides with other factors that may affect adolescents' food choices and nutrient intake and thus, nutritional status. These factors, including the quest for independence and acceptance by peers, increased mobility, greater time spent at school and/or work activities, and preoccupation with self-image, contribute to the erratic and unhealthy eating behaviors that are common during adolescence (Spear 2002).

Sound nutrition can play a role in the prevention of several chronic diseases, including obesity, coronary heart disease, certain types of cancer, stroke, and type 2 diabetes (Shepherd & Dennison, 1996; Dauchet et al, 2006). To help prevent diet-related chronic diseases, researchers have proposed that healthy eating behaviors should be established in childhood and maintained during adolescence (Uauy& Solomon 2005).

National and population-based surveys have found that adolescents often fail to meet dietary recommendations for overall nutritional status and for specific nutrient intakes (Cavadini et al, 2000; Kann et al 2013). The low intake of iron and calcium among adolescent girls is of particular concern. Iron deficiency can impair cognitive function and physical performance, and inadequate calcium intake may increase fracture risk during adolescence and the risk of developing osteoporosis in later life (Cavadini et al, 2000; Greer & Krebs 2006).

1.2 Statement of the Problem

Students in middle and high schools (secondary schools) are faced with a plethora of food choices that challenge their ability to consume a healthful diet (Ehrens & Weber, 2009). The impetus for this study was based on the observation that students are more inclined towards taking empty calorie foods with little consideration for healthy foods, especially fruits and vegetables. This has the tendency of pre-disposing them to obesity, dental caries and other non-communicable diseases in later years.

Although prevalence of obesity is increasing worldwide, it is faster in developing countries due to declining levels of physical activity as well as nutrition transition characterized by a trend towards consumption of a diet high in fat, sugar and refined foods and low in fibre (Ogden et al; 2014). Current evidence revealed a clear transition of increasing proportions of overweight/obesity in school-aged children in Sub-Saharan Africa, and a similar, but less prominent trend towards increasing proportions of obesity over time (Muthuri et al, 2014). This transition to higher proportions of overweight/obesity is similar to observed trends in developed countries.

Past studies on fruit and vegetable consumption in Nigeria (such as Ibrahim, 2011, Banwat et al, 2012, Layade, 2014) have been among the adult populace. Ibrahim, 2011, investigated fruit response efficacy and fruit consumption among a group of civil servants of Oyo state; Banwat et al, 2012, considered the knowledge and intake of fruit and vegetable consumption among adults in an urban community in North Central Nigeria and Layade 2014, focused on fruit and vegetable consumption among students of tertiary institutions in Oyo state.

However, limited literature exists on fruit and vegetable consumption among secondary school students in Nigeria. Onyiruka (2013) in his study on Assessment of eating habits among adolescent Nigerian urban secondary schoolgirls, revealed that consumption of fast foods along with soft drinks and low consumption of fruits and vegetables were the main eating habits displayed by adolescent urban schoolgirls in Benin.

Low fruit and vegetable intake is among the top 10 risk factors contributing to attributable global mortality, according to evidence presented in World Health Report 2003. Fruits and vegetables as part of the daily diet could help prevent major non-communicable diseases (NCDs).

1.3 Justification

Over the years, more research focus has been on food consumption pattern of adolescents, and there is limited information on adolescents' eating habits as regards consumption of fruits and vegetables. There is a dearth of information on consumption of fruits and vegetables as part of healthy eating among secondary school students. Moreover the level of knowledge of adolescents on the health benefits of fruits and vegetables and the reasons adduced for consumption of fruits and vegetables among adolescents or young persons in Nigeria are not known, as very few local studies on consumption of fruits and vegetables are available.

Therefore, this study will focus on knowledge and attitude towards consumption of fruits and vegetables among secondary school students, and findings from this study will add to knowledge, and will also be beneficial in forming school health policies that will promote healthy eating behaviour and overall good nutrition among adolescents.

1.4 Research Questions

This study provided answers to the following questions:

1. What is the level of knowledge of secondary school students on the health benefits of consumption of fruits and vegetables?
2. What are the attitudes of secondary school students towards consumption of fruits and vegetables?
3. What is the frequency of consumption of fruits and vegetables among secondary school students?
4. What are the reasons adduced for consumption of fruits and vegetables among secondary school students?

1.5 Broad Objective

The broad objective of this study was to investigate the knowledge and attitude towards consumption of fruits and vegetables among secondary school students.

1.6 Specific Objectives

The specific objectives of this study were:

1. To assess the level of knowledge of secondary school students on the health benefits of consumption of fruits and vegetables.
2. To determine the attitudes of secondary school students towards consumption of fruits and vegetables.
3. To deduce the frequency of consumption of fruits and vegetables of secondary school students.
4. To identify the reasons adduced for consumption of fruits and vegetables among secondary school students.

1.7 Hypotheses

The following hypotheses were tested by this study:

1. There is no association between the class of respondents and knowledge of health benefits of consumption of fruits and vegetables;
2. There is no association between the types of schools and consumption of fruits in the past 24 hours;
3. There is no association between the age of respondents and the knowledge of health benefits of consumption of fruits and vegetables;
4. There is no association between the ethnic groups of adolescents and the frequency of consumption of fruits and vegetables;
5. There is no association between the sex of respondents and knowledge of health benefits of consumption of fruits and vegetables.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Definition of Fruits and Vegetables

In biology (botany), a "fruit" is a part of a flowering plant that derives from specific tissues of the flower, mainly one or more ovaries. Taken strictly, this definition excludes many structures that are "fruits" in the common sense of the term, such as those produced by non-flowering plants (Mauseth & James, 2003). Often the botanical fruit is only part of the common fruit, or is merely adjacent to it. On the other hand, the botanical sense includes many structures that are not commonly called "fruits", such as bean pods, corn kernels, wheat grains, tomatoes, the section of a fungus that produces spores and many more. However, there are several variants of the biological definition of fruit that emphasize different aspects of the enormous variety that is found among plant fruits (Schlegel & Rolf, 2003; Lewis, 2002). Fruits (in either sense of the word) are the means by which many plants disseminate seeds. Most plants bearing edible fruits, in particular, co-evolved with animals in a symbiotic relationship as a means for seed dispersal and nutrition, respectively; in fact, many animals (including humans to some extent) have become dependent on fruits as a source of food (Lewis & Robert, 2002).

Vegetables refer to the edible parts of plants, commonly collected and/or cultivated for their nutritional value for humans. According to this definition, fruits are a sub-set of vegetables, as the term "fruits" refer to the mature ovary of a plant which encloses the seed (International Agency for Research on Cancer, 2003). As a noun, vegetable means an edible plant or part of a plant, but usually excludes seeds, and most sweet fruits. This typically means the leaf, stem or root of a plant (United States Department of Agriculture, 2011). As an adjective, the word vegetable is used in scientific and technical contexts with a different and much broader meaning, namely of "related to plants" in general, edible or not — as in vegetable matter, vegetable kingdom, vegetable origin, etc. (Swedenborg & Emanuel, 2003).

For the purpose of this study, the term fruit refers to the meaning as used informally by consumers. A fruit normally means the fleshy seed-associated structures of certain plants that are sweet and edible in the raw state such as apples, oranges, grapes, strawberries, juniper

berries, and bananas; or similar-looking structures in other plants, even if they are non-edible or non-sweet in the raw state, such as lemons and olives (Mauseth, 2003; Lewis, 2002). The seed-associated structures that do not fit these informal definitions are usually called by other names, such as vegetables, pods, nuts, pears and cones (Mauseth, 2003; Lewis, 2002).

2.2 Health Benefits of Consumption of Fruits and Vegetables

Fruits and vegetables are very important in the proper functioning of the body, and various literatures attest to this fact. Fruits and vegetables are sources of many vitamins, minerals and other natural substances that may help protect one from chronic diseases. Fruits, nuts, and vegetables play a significant role in human nutrition, especially as sources of vitamins [C (ascorbic acid), A, thiamine (B₁), niacin (B₃), pyridoxine (B₆), folacin (also known as folic acid or folate) (B₉), E], minerals, and dietary fiber (Wargovich, 2000). Their contribution as a group is estimated at 91% of vitamin C, 48% of vitamin A, 30% of folacin, 27% of vitamin B₆, 17% of thiamine, and 15% of niacin in the U.S. diet. Fruits and vegetables also supply 16% of magnesium, 19% of iron, and 9% of the calories.

Fruits are generally considered to be high in dietary fiber, vitamin C and other certain vitamins. Fruits also contain various phytochemicals which research indicates are required for proper long-term cellular health and disease prevention. Regular consumption of fruits is associated with reduced risks of cancer, cardiovascular disease (especially coronary heart disease), stroke, Alzheimer disease, cataracts, and some of the functional declines associated with aging (Liu, 2003).

The nutritional content of vegetables varies considerably, though generally they contain little protein or fat, and varying proportions of vitamins such as Vitamin A, Vitamin K and Vitamin B₆, provitamins, dietary minerals and carbohydrates (Woodruff et al, 1995). Vegetables contain a great variety of other phytochemicals, some of which have been claimed to have antioxidant, antibacterial, antifungal, antiviral and anticarcinogenic properties (Gruda 2005). Vegetables also contain fiber important for Gastro-Intestinal function. Vegetables contain important nutrients necessary for healthy hair and skin as well. Vegetables often also contain toxins and antinutrients such as α -solanine, α -chaconine, enzyme inhibitors (of cholinesterase, protease, amylase, etc.), cyanide and cyanide precursors, oxalic acid, and more. Depending on the concentration, such compounds may

reduce the edibility, nutritional value, and health benefits of dietary vegetables. Cooking and/or other processing may be necessary to eliminate or reduce them (Bertone & Vivanti, 2005).

Many epidemiological studies have been conducted to test the beneficial effects of fruit and vegetable intake on many different disease states such as heart disease, cancer, and stroke (Duyn & Pivonka, 2000). Current scientific evidence also suggests a protective role for fruits and vegetables in prevention of coronary heart disease, and evidence is accumulating for a protective role in stroke. For example diets containing recommended amounts of fruits and vegetables may help lower the risk of heart diseases and type 2 diabetes. These diets may also protect against some cancers and decrease bone loss. The potassium provided by both fruits and vegetables may help prevent the formation of kidney stones (WHO 2003).

There is compelling evidence that a diet rich in fruits and vegetables can lower the risk of heart disease and stroke. The largest and longest study to date, done as part of the Harvard-based Nurses' Health Study and Health Professionals Follow-up Study, included almost 110,000 men and women whose health and dietary habits were followed for 14 years (Joshipura et al., 2001). Results indicated the higher the average daily intake of fruits and vegetables, the lower the chance of developing cardiovascular disease. Compared with those in the lowest category of fruit and vegetable intake (less than 1.5 servings a day), those who averaged 8 or more servings a day were 30 percent less likely to have had a heart attack or stroke. Although all fruits and vegetables likely contribute to this health benefit, green leafy vegetables, cruciferous vegetables, and citrus fruits appear to make the most important contributions (Joshipura et al., 2001).

A study by Tufts University researchers indicates that more attention needs to be paid to the role that fruits and vegetables play in preventing bone loss. Attention has traditionally been given to calcium and vitamin D with regard to bone loss, however, increasing the alkali content of one's diet through fruit and vegetable consumption can have a similar effect. The average older adult consumes a diet that adds acid to the body. However, as the person ages, he become less able to excrete the acid. The body attempts to overcome this diminished ability through a process of bone breakdown called resorption, which has a negative consequence of bone loss. Diets that are high in protein and grains produce an excess of acid in the body, which has negative effect on bones. The research demonstrated that the positive

and negative impact of high protein and grain diets can be balanced by adequate fruits and vegetables consumption (Dawson-Hughes, Harris, Palesano et al., 2009).

Studies also show that diets that include a sufficient amount of potassium from fruits and vegetables also help reduce the chance of developing kidney stones. A study conducted on the Effect of Fruits and Vegetables on Urinary Stone Risk Factors revealed that withdrawal of fruits and vegetables from the diet may expose even healthy subjects to the risk of developing renal calcium stones, whereas supplementing the diet with these food items might be helpful as a preventive measure in renal calcium, stone formers (Meschi, Maggiore, et al., 2004).

Fruits and vegetables are low in calories which would help lower one's calorie intake as part of a weight-loss diet. According to the results of a randomized controlled trial on Dietary Energy Density in the Treatment of Obesity, consuming foods low in calories such as fruits and vegetables is effective in reducing body weights and maintaining weight loss (Ello-Martin, Roe, Ledikure et al., 2007).

Below are tables of nutritive and non-nutritive constituents of fruits and vegetables that have a positive impact on human health.

TABLE 2.1: Nutritive constituents of fruits and vegetables that have a positive impact on human health and their sources

CONSTITUENT	SOURCES	ESTABLISHED OR PROPOSED EFFECT ON HUMAN WELLNESS
Vitamin C (ascorbic acid)	Broccoli, cabbage, cantaloupe, citrus fruits, guava, kiwifruit, leafy greens, pepper, pineapple, potato, strawberry, tomato, watermelon.	Prevents scurvy, aids wound healing, healthy immune- system, cardiovascular-disease.
Vitamin A (carotenoids)	Dark-green vegetables (such as collards, spinach, and turnip greens), orange vegetables (such as carrots, pumpkin, and sweet potato), orange-flesh fruits (such as apricot, cantaloupe, mango, nectarine, orange, papaya, peach, persimmon, and pineapple), tomato.	Night blindness prevention, chronic fatigue, psoriasis, heart disease, stroke, cataracts.
Vitamin K	Nuts, lentils, green onions, crucifers (cabbage, broccoli, brussel sprouts), leafy greens	Synthesis of pro-coagulant factors, osteoporosis
Vitamin E (tocopherols)	Nuts (such as almonds, cashew nuts, filberts, macadamias, pecans, pistachios, peanuts, and walnuts), corn, dry beans, lentils and chickpeas, dark-green leafy vegetables.	Prevents heart-disease, LDL-oxidation, boosts immune-system, prevents diabetes and cancer.
Fiber	Most fresh fruits and vegetables, nuts, cooked dry beans and peas	Prevents diabetes and heart disease.
Folate (folicin or folic acid)	Dark-green leafy vegetables (e.g. spinach, broccoli, brussels sprouts, and okra), legumes (cooked dry beans, lentils, and green peas), asparagus.	Prevents birth defects, cancer heart disease, and improves nervous system.
Calcium	Cooked vegetables (such as beans, greens, okra and tomatoes) peas, papaya, raisins, orange, almonds, snap beans, pumpkin, cauliflower.	Prevents osteoporosis, improves muscular skeletal growth and healthy teeth, regulates blood pressure.
Magnesium	Spinach, lentils, okra, potato, banana, nuts, corn, cashews.	Prevents osteoporosis, improves nervous system, teeth, immune system.
Potassium	Baked potato or sweet potato, banana & plantain, cooked dry beans, cooked greens, dried fruits (such as apricots and prunes), winter (orange) squash, and cantaloupe.	Prevents hypertension (blood pressure) stroke, arteriosclerosis.

Source: Kader et al., 2001.

Table 2.2: Non-nutritive constituents of fruits and vegetables that may be beneficial to human health

Constituent	Compound	Sources	Established or proposed effect on human wellness
PHENOLYTIC COMPOUNDS			
Proanthocyanins	Cyanidin, malvidin, delphinidin, pelargonidin, peonidin, petunidin	Red, blue, and purple fruits (such as apple, blackberry, blueberry, cranberry, grape, nectarine, peach, plum & prune, pomegranate, raspberry, and strawberry).	Prevents heart disease, cancer initiation, diabetes, cataracts, blood pressure, allergies.
Flavan-3-ols	Epicatechin, epigallocatechin catechin, galocatechin	Apples, apricots, blackberries, plums, raspberries, strawberries.	Prevents platelet aggregation and cancer.
Flavanones	Hesperetin, naringenin, eriodictyol	Citrus (oranges, grapefruit, lemons, limes, tangerine).	Prevents cancer.
Flavones	Luteolin, apigenin	celeriac, celery, peppers, rutabaga, spinach, parsley, artichoke, guava, pepper	Prevents cancer, allergies and heart disease
Flavonols	Quercetin, kaempferol, myricetin, rutin.	Onions, snap beans, broccoli, cranberry, kale, peppers, lettuce.	Prevents heart disease, cancer initiation and is capillary protectant.
Phenolic acids	Caffeic acid, chlorogenic acid, coumaric acid, ellagic acid.	Blackberry, raspberry, strawberry, apple, peach, plum, cherry.	Prevents cancer and cholesterol.
CAROTENOIDS			
Lycopene		tomato, watermelon, papaya, Brazilianguava, Autumn olive, red grapefruit	Prevents cancer, heart disease and male infertility
α-carotene		sweet potatoes, apricots, pumpkin, cantaloupe, green beans, lima beans, broccoli, brussel sprouts, cabbage, kale, kiwifruit, lettuce, peas, spinach, prunes, peaches, mango, papaya, squash and carrots	Prevents tumor growth
β-carotene		Cantaloupes, carrots, apricots, broccoli, leafy greens (lettuce, swiss chard), mango, persimmon, red pepper, spinach, sweet potato	Prevents cancer
Xanthophylls	Lutein, zeaxanthin, β -cryptoxanthin	Sweet corn, spinach, corn, okra, cantaloupe, summer squash, turnip greens	Prevents macular degeneration
Monoterpenes	Limonene	Citrus (grapefruit, tangerine)	Prevents cancer
Sulfur compounds	Glucosinolates, isothiocyanates, indoles, allicin, diallylisulphide.	Broccoli, Brussels sprouts, mustard greens, horseradish, garlic, onions, chives, leeks	Prevents cancer, cholesterol, high blood pressure and diabetes

Source: Kader et al, 2001.

2.3 Attitude to Consumption of Fruits and Vegetables

During the 2004-05 school year, the Mississippi Department of Education Child Nutrition Program initiated the Mississippi Fresh Fruit and Vegetable Pilot Program. Of the grades participating, program evaluation data indicated only eighth grade students had significant increases in positive attitudes toward eating fruit and vegetables, in their beliefs that they could eat more fruit, and in their willingness to try new fruit. Degree of preference for fruit increased significantly among eighth grade and tenth grade students, but decreased significantly among fifth grade students. Intention to eat fruit increased significantly among tenth grade students, but not among fifth and eighth grade students (CDC, 2006). Mintah et al. (2012) revealed in a study on consumption of fruits among university students that the attitude of the respondents on the consumption of fruits were significantly positive as most of them (84.2%, 90.1%, and 86.2% respectively) did not agree with the statements that fruits had no nutritional value, and that only the rich, and white people are to eat fruits ($p < 0.05$).

Beech et al., (1998) conducted a survey to assess the level of nutrition knowledge, attitudes and practices related to fruits and vegetables consumption of high school students attending participating parochial school in the New Orleans area. The participants were asked questions regarding the five stages of change related to increased daily consumption of fruits and vegetables, to determine their attitudes towards fruits and vegetables consumption. A scoring algorithm was developed using four items that were intended to ascertain the appropriate stage for each adolescent participant. These items included: "How many servings of fruits and vegetables do you eat each day?;" "About how long have you been eating this number of daily servings of fruits and vegetables?" "Are you seriously thinking about eating more servings of fruits and vegetables starting sometime in the next 6 months?" and "Are you planning to eat more servings of fruits and vegetables during the next month?" Students who ate fewer than five servings of fruits and vegetables each day and who were not thinking seriously about eating more servings in the next 6 months were considered to be in the pre-contemplation stage. Students classified in the contemplation stage were individuals who were thinking about eating more fruits and vegetables. Those students who were eating fewer than five servings per day but who were planning to eat more fruits and vegetables in the next month were considered to be in the preparation stage. Respondents who were eating five servings of fruits and vegetables for 6 months were classified in the action stage. Finally, persons consuming five or more servings for more than 6 months were considered to be in the

maintenance stage. The findings indicated that 32.5% of the students were in pre-contemplation, 4.1% in contemplation, 51.2% in preparation, 3.5% in action, and 8.7% in maintenance.

2.4 Frequency of Consumption of Fruits and Vegetables

Dietary Guidelines for Americans currently recommend the consumption of a minimum of five servings of fruits and vegetables per day (USDA/DHHS, 2010), yet studies show that most populations, including adolescents, consistently do not reach this goal (Casagrande, Wang, Anderson, & Gary, 2007; Kimmons et al., 2009; CDC, 2010).

He, Nowson, Lucas & MacGregor (2007) assessed the relation between fruit and vegetable intake and incidence of coronary heart disease (CHD) by carrying out a meta-analysis of cohort studies. Studies were included if they reported relative risks and corresponding 95% confidence intervals for coronary heart disease with respect to frequency of fruit and vegetable intake. In total, data from 278,459 individuals with a median follow-up of 11 years were analyzed. Compared with individuals who had less than three servings/day of fruit and vegetables, the pooled Relative Risk (RR) of CHD for those who ate between three and five servings/day was 0.93 and 0.83 for those who ate five or more servings per day. Subgroup analyses showed that both fruits and vegetables had a significant protective effect on coronary heart disease. This meta-analysis of prospective cohort studies demonstrated that increased consumption of fruit and vegetables from less than three to more than five servings/day is related to a 17 percent reduction in coronary heart disease risk, whereas an intake of between three to five servings/day is associated with a smaller and borderline significant reduction in coronary heart disease risk. The authors' results provide strong support for the recommendations to consume more than 5 servings/day of fruits and vegetables.

In a study conducted on fruits and vegetable consumption among high school students in the United States, the findings indicated that the median number of times per day that U.S. high school students consumed fruits and vegetables was only 1.2 times for both fruits and vegetables and was no higher than 1.5 for any of the demographic subpopulations studied. In addition, 28.5% of students ate fruit <1 time daily, and 33.2% of students ate vegetables <1 time daily. Consumption of vegetables was lowest among non-Hispanic black students and Hispanic students. These results make it likely that the majority of students are not meeting

the daily fruit and vegetable recommendations for adolescents participating in <30 minutes of daily physical activity: 1.5 cups of fruit and 2.5 cups of vegetables for females and 2 cups of fruit and 3 cups of vegetables for males (CDC 2010).

In a preliminary study on dietary behaviours of adolescents from urban and rural areas in the district of Szamotuły, the aim of the study was to describe the dietary behaviours of two young populations: living in urban or rural areas in the district of Szamotuły (a city with a population of 19,000 inhabitants). When asked about their frequency of fruit and vegetable consumption, both the majority of rural and urban students admitted that they ate fresh fruit and vegetables every day (41.0% of rural subjects and 50.9% of urban subjects). Compared to teenagers from the urban area, twice as many of their rural peers declared that they ate these diet components occasionally, which meant twice a week or even more rarely (18.0 % of rural youths vs. 7.3% of urban subjects). The rural group who answered that they usually ate fresh fruit and vegetables 3-4 times a week was about 1.5 times larger (16.4% vs. 27.3%). There was no statistically significant difference in the medium frequency of fresh fruit and vegetable consumption (5.1 times a week in the rural area vs. 5.4 times a week in the urban area; $p>0.05$) (Hoffmann, 2012).

Another study on consumption of fruits and vegetables amongst Fijian adolescents (Waqab 2010) showed that male adolescents show a higher frequency of fruit consumption than do females. Almost half of the adolescents consumed one serving of vegetables or less each day. Females consumed less vegetable than males.

In a study on fruits and vegetable consumption among Costa Rican adolescents, consumption of fruits and vegetables was examined among 214 urban and rural adolescents in relation to the 5- servings a day recommendation. It was found out that the mean daily servings of fruits (1.7 servings) were not far from the minimum recommendation of 2 daily fruit servings. Mean vegetable intake (1.1 servings, including legumes) was well below the minimum recommendation of 3 vegetable servings per day. Urban adolescents and females consumed significantly ($p = 0.000$) fewer fruits and vegetables servings than did rural youngsters and males. However the mean daily servings of vegetables were higher in urban adolescents ($p = 0.029$). Only 16 from 214 adolescents (6%) consumed five or more servings of fruits and vegetables per day (Rojas 2001).

In a study on knowledge, attitude and practices related to fruits and vegetables consumption of high school students, participants were asked to indicate on average how many servings of fruits and vegetables they ate a day. From 2203 high school students, 118 (5.1%) did not consume fruits and vegetables at all, 1817 students (82.5%) consumed less than five servings of fruits and vegetables every day, and 268 high school students (12.1%) consumed more than five servings of fruits and vegetables every day (Beech et al, 1999).

Studies indicate that the US population is not meeting the recommended levels of fruit and vegetable consumption (Casagrande *et al.*, 2007; Larson *et al.*, 2007). While Casagrande *et al.* (2007) found no statistically significant increase in F&V intake among adults between the years 1988–1994 and 1999–2002, Larson *et al.* (2007) actually found a mean daily decrease in consumption among adolescents.

Kimmons *et al.* (2009) analyzed data from two, 24-hour dietary recalls from the 2003-2004 National Health and Nutrition Examination Survey (NHANES) to determine the median fruit and vegetable consumption from all dietary sources among adolescent and adult consumers, the percentage of adolescents and adults meeting individual recommended intake levels based on caloric requirements, consumption levels among various demographic groups, intake levels from subtypes of fruits and vegetables, and primary contributors to fruit and vegetable intake. Results indicated fewer than one in ten Americans meet their specific MyPyramid fruit or vegetable recommendations. The largest single contributor to overall fruit intake for both adults and adolescents was “orange juice.” “Whole fruits” were the primary contributor to total fruit intake for adults, while “fruit juices” were the primary contributor to total fruit intake for adolescents. “Potatoes” dominated vegetable consumption, particularly among adolescents. The consumption of fried potatoes increased the median vegetable intake of adolescents from 0.72 cups to 1.21 cups per day. Dark green and orange vegetables and legumes accounted for a small portion of vegetable intake, with few people meeting the recommendations. Kimmons *et al.* (2009) noted that few American adolescents or adults reported consuming the recommended amounts of fruits or vegetables. These authors concluded that increasing the consumption of fruits and vegetables will require multifaceted approaches that augment educational campaigns with policy and environmental strategies aimed at the entire food system, from farm to plate, including schools, worksites, and retail establishments.

Krebs-Smith et al (1996) conducted a study to identify major ways fruits and vegetables are consumed by children to provide estimates of their intakes compared with recommendations, and to estimate the percentage of children meeting those recommendations. The authors examined three days of dietary data from respondents in the 1989-1991 Continuing Survey of Food Intakes by Individuals (CSFII). All foods reported in the survey were disaggregated into their component ingredients; all fruit and vegetable ingredients were assigned specific weights to correspond with a serving as defined by current dietary guidance materials; and the number of servings of each fruit and vegetable was tallied. A total of 3,148 children and adolescents aged 2 to 18 years participated in the study. Results indicated that nearly one-quarter of all vegetables consumed by children and adolescents were French fries. Their intakes of all fruits and of dark green and/or deep yellow vegetables were very low compared with recommendations. Only one in five children consumed five or more serving of fruits and vegetables per day. The authors concluded that pediatricians should encourage children to increase their consumption of fruits and vegetables, especially dark green and deep yellow vegetables.

Nti et al. (2011) in a study on knowledge of nutrition and health benefits and frequency of consumption of fruits and vegetables among Ghanaian homemakers revealed that the most frequently consumed fruits among the respondents, at least on a daily/weekly basis, were orange, banana and pineapple. The finding points to the fact that these are the fruits mostly available to consumers. Mango, watermelon, pawpaw, avocado and apple were consumed occasionally/seasonally. With regard to vegetables, the most frequently consumed were onion, tomato, pepper, dark green leaves, garden eggs and okro. These vegetables form part of the main meals of most of the respondents. Cucumber, cabbage, carrot and green pepper, which were considered exotic, were consumed occasionally among respondents. Generally, the consumption of vegetables on a daily basis was higher than that of fruits.

Adu et al. (2009) evaluated the nutritional status and eating habits of undergraduate students in a Nigerian University. One hundred undergraduates (ages 15 to 40 years) of the Lagos State University, Ojo participated in the study. General information, anthropometric data, as well as a 7-day dietary recall were obtained by means of questionnaire. Well over half (55%) of the respondents consumed fruit occasionally, 31% weekly and 11% daily. About 3% of them did not consume fruits at all. Consumption of vegetables was also low among

the students, as 50% of them consumed vegetables occasionally; 39% of them, weekly and only 11% of them daily.

2.5 Reasons Adduced for Consumption of Fruits and Vegetables

Studies have found numerous reasons inhibiting the consumption of fruits and vegetables, such as low socio-economic status, inaccessibility to fresh fruits and vegetables and lack of self-efficacy (Krattet al., 2000; Siega-Riz and Popkin, 2001; Pomerleau et al., 2005). Vereecken (2005) revealed that fruit consumption increased with family's material wealth and higher parental occupational status.

Rasmussen et al. (2006) conducted a review of the literature to identify potential determinants of fruit and vegetable intake in children and adolescents. The result revealed the following potential determinants of fruit and vegetable consumption among children and adolescents which are: gender, age/grade, socioeconomic position, race or ethnicity, urbanization, personal factors (preferences, nutritional knowledge), family-related factors (parental intake, home availability and accessibility, family structure, family size, parenting style, parental support for eating fruits and vegetables), friends-related factors, school-related factors (availability and policy of healthy and unhealthy foods, student-school relation), school type), meal patterns, Television (TV) watching and eating fast food. Girls and younger children tend to have a higher or more frequent intake than boys and older children. Socio-economic position, preferences, parental intake, and home availability/accessibility are all consistently positively associated with intake (Rasmussen et al., 2006).

In a study on "Understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA", which is a qualitative study attempt to illuminate the barriers and facilitators to Fruit and Vegetable consumption among African American, Hispanic and Caucasian populations, focus group discussions were conducted. Results showed no substantial differences by degree of acculturation for Hispanics or other regional differences. The common facilitators of fruit and vegetable consumption across all groups included family traditions, health benefits and advice by physicians. The predominant barriers among all groups included inaccessibility, cost and time (Yeh et al., 2008).

Fiti-sinclair (2004) a consultant for the Food and Agriculture Organisation carried out a survey on Knowledge, Attitudes, Beliefs and Practices related to the Consumption of Fruit and Vegetables in Samoa, on the Pacific Island. The main aim of the study was to find out

why Samoans were not eating much fruit and vegetables, which were plentiful in the country. The two qualitative methodologies of focus group discussions and in-depth interviews were used to investigate Samoan knowledge, attitudes, beliefs and practices relating to fruits and vegetables. The factors that influence the consumption of fruit and vegetables obtained from the focus group discussions and from further probing during the interviews were arranged into two groups: internal and external. **Internal factors** were those which depend on the people concerned, while **external factors** were those which are out of their control. The external factors such as food availability, accessibility, cultural obligations and family income were of primary importance to them because it would be difficult for the people to maintain an adequate diet since the food required would not be available. Internal factors mentioned were knowledge, self-confidence, skills, and habits which determined how the people behave. The findings strongly suggest that for a nutrition promotion campaign to be effective, it must be based on an understanding of knowledge, attitudes, beliefs and practices related to food (internal factors).

2.6 Conceptual Framework

The Health Belief model and the PRECEDE model were used for this study.

2.6.1 The Health Belief Model (HBM)

The Health Belief Model (HBM) is a psychological model that attempts to explain and predict health behaviors. This is done by focusing on the attitudes and beliefs of individuals.

The Health Belief Model is based on the understanding that a person will take a health-related action if that person:

- Feels that a negative condition can be avoided
- Has a positive expectation that by taking a recommended action, he/she will avoid a negative health condition
- Believes that he or she can successfully take a recommended health action.

The HBM was spelled out in terms of four constructs representing the perceived threat and net benefits. It helps in specifying the **Perceived Susceptibility** to cardiovascular diseases, cancers and micronutrient deficiencies; **Perceived Severity** or seriousness to cardiovascular diseases and other non-communicable diseases; the **Perceived Benefits** that will be derived by consuming fruits and vegetables adequately; the **Perceived Barriers** which are the constraints or psychological costs the individual feels may be hindering him/her from consuming fruits and vegetables; the **Cues to action**, which are the reminders that promote the strategies for change and **Self-efficacy**.

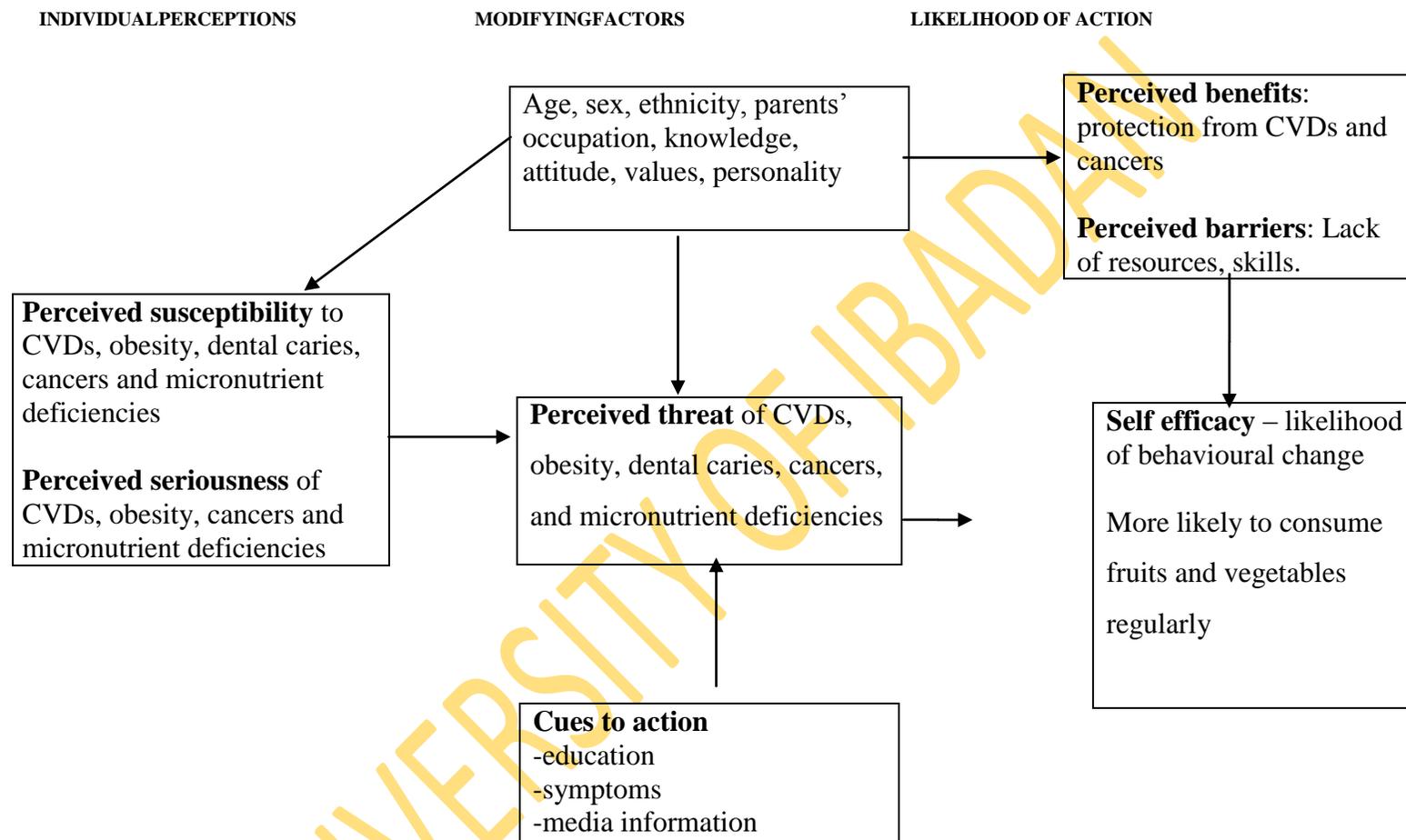


Figure 2.1 Schematic application of health belief model showing perceptions towards fruits and vegetable intake

2.6.2 Precede Model

The model provides a comprehensive structure for assessing health and quality-of-life needs of the populace and for designing, implementing, and evaluating health promotion and other public health programmes to meet these needs.

In using the PRECEDE model, three main factors influence behaviour:

1. Predisposing factors

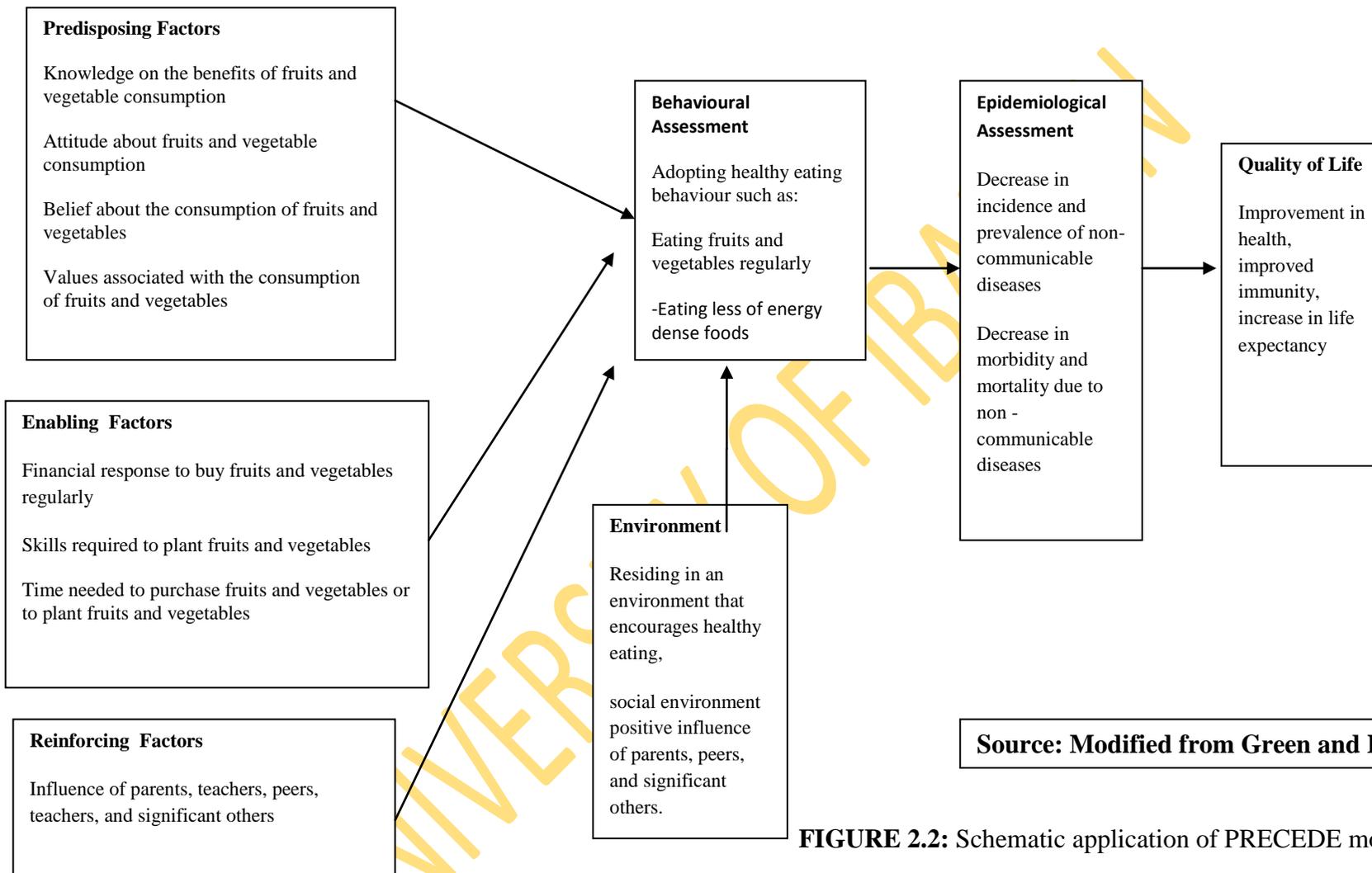
These may be level of the individual's knowledge, attitude, beliefs, values on the health benefits of fruits and vegetables.

2. Enabling factors

These may be the resources available to the individual that could influence or determine the consumption of fruits and vegetables.

3. Reinforcing factors

These may be the influence of parents, friends or peers, and even the media which could influence the fruit and vegetable consumption of the individual.



Source: Modified from Green and Kreuter, 1999

FIGURE 2.2: Schematic application of PRECEDE model showing relationship between the various educational constructs in relation to consumption of fruits and vegetable

CHAPTER THREE

METHODOLOGY

3.1 Study Design

Descriptive cross sectional study design was used for this study.

3.2 Study Area

The study was carried out in Ibadan North East Local Government Area of Oyo State which is an urban area. The Local government has its administrative headquarters in Iwo Road, Ibadan. It has a population of 331,444 people. However, this population has been projected to 419,862 people. (National Population Commission, 2006) and it comprises of 12 wards. Ibadan North East Local Government Area has a number of educational institutions which are estimated to be 19 public secondary schools and 8 private secondary schools, all registered (Handbook on Ibadan North East Local Government, 2007). Therefore, the public and private senior secondary schools in Ibadan North-East local government area were recruited for the study. The wards under Ibadan North East local government are twelve in number, and they are listed below:

Ward 1 – Odo Osun Labiran

Ward 2 - Ogbori Efon, Ita Baale, Oranyan, Beyerunka

Ward 3 - Kosodo, Labo, Alafara

Ward 4 - Adekile, Aremo, OritaAperin

Ward 5 - LabiranAderogba

Ward 6 - OjeAderogba, Alafara

Ward 7 - Oke Offa, Atipe, Oja Igbo, AremoAlafara, Ajegede

Ward 8 - Ode Aje, Padi, Alase, Aremo Ajibola

Ward 9 - Koloko, Agugu, Oke Ibadan, Idi-Obi

Ward 10 - OjeIrefin, ItaAkinloye, Baba Sale

Ward 11 - Iwo Road, Abayomi, Basorun, IdiApe BCOS Quarters

Ward 12 - Parts of Irefin, Agodi Gate, Oluyoro, Gbenla, OkeAdu, Aromolaran,

Onipepeye

3.3 Study Site

The study took place in selected public and private secondary schools in Ibadan North East Local Government, Ibadan, Oyo State. This is shown in table 3.1

3.4 Study Population

The study focused on secondary school students from J.S.S.1 – S.S.S.3 in the selected schools.

3.5 Sample Size Determination

The sample size was calculated using the formula shown below:

$$N = \frac{z^2 pq}{d^2} \dots (\text{Charan \& Biswas, 2013})$$

z = the standard normal deviate set at 1.96 which corresponds to the 95% Confidence Interval

N = desired sample size

p = 31% (Adu et al., 2009)

q = $1 - p$

d = level of precision/sampling error at 5%

$$N = \frac{1.96 \times 1.96 \times 0.31 \times (1-0.31)}{0.05 \times 0.05}$$

$$= 328.69$$

The number was increased to **400** to make room for non-response and increase the generalisability of the data.

3.6 Sampling Technique

Multistage sampling technique involving five stages was used in this study.

Stage 1

The 12 wards in Ibadan North-East local government were stratified according to the type of schools. It was observed that the secondary schools are in clusters and are not evenly distributed in the local government area, and can be found in only four wards.

However the secondary schools were stratified into private and public secondary schools. As a result, only the four wards with secondary schools were used for the study. The stratification by schools in the four wards is shown below (see table 3.1):

Table 3.1: Stratification According to Schools

Ward	Public Secondary Schools	Private Secondary Schools
Ward 4 - Adekile, Aremo, OritaAperin	-Olubadan High School, Aperin -Gbelekale Community High School, Adekunle	
Ward 9 - Koloko, Agugu, Oke Ibadan, Idi-Obi	-Lagelu Grammar School, Agugu -Renascent High School, Agugu -United Secondary School, Agugu -Ayekale Community Secondary School -IMG Grammar School -Lagelu Comprehensive School, Agugu	Bible Life International School
Ward 11 - Iwo Road, Abayomi, Basorun, IdiApe BCOS Quarters	-Army Barracks Grammar School -Bashorun High School	-Frontliners College -Excellences Model College -Bloom Heights College -Olu Royal Academy -Best Brain College -Love Foundation School
Ward 12 – Parts of Irefin, Agodi Gate, Oluyoro, Gbenla, OkeAdu, Aromolaran, Onipepeye	-Queen of Apostles Secondary Community Grammar School, Oluyoro -Holy Trinity Grammar School, Old Ife road -Loyola College, Old Ife road -MufuLanahun Comprehensive High School, Oremeji -Oke Ibadan High School, Oluyoro -Christ the King Secondary School, Oluyoro -Oluyoro Junior Girls Grammar School, Oluyoro -Methodist Model Grammar School, Agodi	Help Line College

Stage 2

Twenty percent (20%) of the schools in the four wards were selected proportionately.

Total number of schools = 27

$$\frac{20}{100} \times 27 = 5.4$$

Number of public schools = 19

Therefore, total number of public schools that were used for the study

$$= \frac{19}{27} \times 5.4 = 3.8, \text{ approximately } \mathbf{4 \text{ public schools}}$$

27

Number of private schools = 8

Therefore, the total number of private schools that were used for the study

$$= \frac{8}{27} \times 5.4 = 1.6, \text{ approximately } \mathbf{2 \text{ private schools}}$$

27

Stage 3

Simple random sampling technique using balloting procedure was employed in the selection of the schools. The schools selected were as follows:

Table 3.2: Final Selection of Public Schools using Simple Random Sampling Technique

WARD	PUBLIC SCHOOLS
Ward 4 - Adekile, Aremo, OritaAperin	Olubadan High School, Aperin
Ward 9 - Koloko, Agugu, Oke Ibadan, Idi-Obi	LageluGrammer School, Agugu
Ward 11 - Iwo Road, Abayomi, Basorun, IdiApe BCOS Quarters	Army Barracks Grammer School
Ward 12 – Parts of Irefin, Agodi Gate, Oluyoro, Gbenla, OkeAdu, Aromolaran, Onipepeye	Holy Trinity Grammar School, Old Ife road

The private schools were selected purposively. This was because they were not evenly distributed among the wards. Thus the private schools selected were as follows:

Table 3.3 Selection of Private Schools

WARD	PRIVATE SCHOOLS
Ward 11 – Iwo road, Abayomi, Basorun, Idi-ape, BCOS Quarters	Bloom Heights College
Ward 11 – Iwo road, Abayomi, Basorun, Idi-ape, BCOS Quarters	Front-liners College

Stage 4

Proportionate sampling technique was used to determine the number of students that participated in the study in each school. This was done by first of all determining the number of respondents that will be selected from each school, as shown below:

$$\frac{\text{Number of students in each selected school}}{\text{Total number of students in the all the six schools}} \times \text{Sample Size}$$

Table 3.4: Proportionate Sampling to Select Participants from the Schools

School	No. of Students in each School	No. of Students Selected From Schools	Students Selected From Each Class (JSS1 – SSS3)
Olubadan High School	2944	$\frac{2944}{7959} \times 400 = 148$	25
Lagelu Grammar School	762	$\frac{762}{7959} \times 400 = 38$	6
Army Barracks Grammar School	1933	$\frac{1933}{7959} \times 400 = 97$	16
Holy Trinity Grammar School	1720	$\frac{1720}{7959} \times 400 = 86$	14
Bloom Heights College	250	$\frac{250}{7959} \times 400 = 13$	2
Front-Liners College	350	$\frac{350}{7959} \times 400 = 18$	3
Total number of students	7959	400	

Stage 5

Simple random sampling using balloting procedure was used to select the respondents in a classroom.

3.7 Inclusion Criteria

Every student that willingly gave informed consent was recruited for the study. Only mixed schools were used for the study.

3.8 Exclusion Criteria

Single sex schools were excluded from the study so as to get opinion from both sexes. Students that refused to give informed consent were not recruited for the study.

3.9 Instruments for Data Collection

A validated semi-structured questionnaire was used to elicit information from the study participants (see appendix 1).

The questionnaire contained five sections measuring the students' knowledge, attitude, frequency of consumption and reasons for consumption of fruits and vegetables.

A Focus Group Discussion (FGD) guide was used to elicit information from the participants. The FGD guide explored issues relating to their knowledge on health benefits of fruits and vegetables, attitude, frequency of consumption and reasons for consuming fruits and vegetables(see appendix 2).

3.10 Data Collection Technique

Quantitative and Qualitative methods of data collection were employed.

Quantitative Data Collection

Questionnaire was self-administered. On getting to each school, after meeting with the Vice Principal, the researcher was handed over to the class teacher and who took her to the classes and introduced her to the students. The students that participated were selected by simple random sampling using balloting procedure. Pieces of papers containing '1' and '2' were rolled up together and each student was asked to pick a piece. All the students that picked '1' were selected for the study while those that picked '2' were not selected. Copies of the questionnaire were distributed to the selected students to fill while the researcher stood in front of the class to put them through in case they encountered challenges while completing them. The copies of the questionnaire were filled according to the different sections, starting from the 'socio-demographic characteristics' to the 'reasons for consumption of fruits and vegetables'.

Qualitative Data Collection

The FGDs were conducted first. Students that participated in the FGD were not used for the interview, so as to avoid undue sensitisation of the students on the research topic.

Six Focus Group Discussions were conducted. Student volunteers participated in the FGD. The FGD groups were homogeneous according to sex and class to allow the participants share sensitive issues freely. There were eight participants in each group.

The FGD was conducted as shown in the table below:

Table 3.5. Classification of FGD by Class and Sex

School	Students' Category	Sex
Bloom Heights	J.S.S Students	Males
Army barracks Junior School	J.S.S Students	Females
Holy Trinity Grammar School	S.S.S students	Males
Front Liners College	S.S.S Students	Females
Lagelu Grammar School	J.S.S Students	Males
Olubadan High School	S.S.S Students	Females

3.11 Data Management and Analysis

The FGD data was transcribed and a report of each FGD was written. This report was subject to content analysis which has been presented in quotations. The questionnaire contained 20-point knowledge and 16-point attitude scales on consumption of fruits and vegetables. The copies of the administered questionnaire were collated and edited. They were checked for completeness and a serial number was given to each copy of the questionnaire for easy identification. After the interview, the data was sorted out, cleaned, coded, entered and analysed using SPSS statistical package.

Knowledge scores of ≤ 10 and ≥ 11 were rated as poor and good respectively, while attitude scores of ≤ 8 and ≥ 9 were classified as negative and positive respectively. One medium sized fruit was counted as one serving of fruit, while three heaped tablespoon of vegetable were counted as one serving of vegetables. The variables were analyzed using descriptive, Chi-square and logistic regression. Level of statistical significance was set at 0.05. The results are presented using tables and bar graphs in chapter four.

3.12 Limitations

There was a possibility of recall bias because the students had to recall their intake of fruits and vegetables weekly and 24 hours preceding the survey.

3.13 Ethical Considerations

The study did follow the ethical principles guiding the use of human participants in research. Ethical approval was sought from Oyo State Ethical Review Board. Informed consent was also obtained from all the research participants. With respect to confidentiality, no identifiers like name of respondents were required.

All necessary information on the research that participants may need was provided. All information provided was kept confidential. All completed copies of the questionnaire were kept securely where no other person can have access to them.

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CHAPTER FOUR

RESULTS

4.0 Introduction

The findings of this study are presented in this chapter. They are organized into the following sections: Respondents' socio-demographic characteristics, knowledge on health benefits of consumption of fruits and vegetables, attitude towards consumption of fruits and vegetables, frequency of consumption of fruits and vegetables, and reasons adduced for consumption of fruits and vegetables. The qualitative data from the focus group discussion are also included in the results.

4.1 Respondents' Socio-demographic Characteristics

The age of the respondents ranged from 9 – 19 years, with a mean age of 14.1 ± 2.0 years. The occupation of the fathers of the respondents were traders (45.5%), artisans (18.7%), civil servants (9.0%), professionals (18.1%), others not listed (2.5%) and 1.5% of the respondents did not know their father's occupation; while the occupation of the respondents' mothers were traders (67.2%), artisans (14.3%), civil servants (3.8%), professionals (12.7%) and other occupations not included (1.5%); 0.5% of the respondents didn't know their mothers' occupation. The highest level of occupation of majority of the respondents' fathers was O' level (39.5%); followed by NCE/OND (30.2%), B.Sc/HND (12.5%), Masters/PGD (2.8%). 2.8% of the respondents did not know their fathers' level of education, and 12.2% of the respondents' fathers had no formal education. Also O' level was the highest level of education of majority of the respondents' mothers (44.0%); followed by NCE/OND (29.0%), B.Sc/HND (8.5%) and Masters/PGD (0.5%). From the respondents' mothers, 14.8% had no formal education and 3.2% of the respondents did not know their mothers' level of education. Christianity (59.2%) topped the list of the religions practiced by the respondents and 87.0% were Yorubas.

Table 4.1: Respondents' socio-demographic characteristics (N = 400)

	Frequency (N)	Percentage (%)
Age (years)		
9-12	96	24.0
13-16	261	65.2
17-19	43	10.8
Sex of Respondents		
Male	199	49.8
Female	201	50.2
Class of Respondents		
J.S.S.1	62	15.5
J.S.S.2	66	16.5
J.S.S.3	66	16.5
S.S.S.1	68	17.0
S.S.S.2	68	17.0
S.S.S.3	70	17.5

4.2 Knowledge of Health Benefits of Consumption of Fruits and Vegetables

The first research question examined the nutritional knowledge of the respondents on the health benefits of consumption of fruits and vegetables. The first question asked “fruits and vegetables are not important for healthy living”. Majority of the respondents (89.0%) answered this question correctly. For the next question “fats and protein are found abundantly in fruits and vegetables, a good number of the respondents (67.5%) answered incorrectly. Majority of the respondents (73.8% and 71.8% respectively) also answered the next two questions - “consumption of fruits and vegetables promotes weight gain” and “adequate consumption of fruits and vegetables can help in preventing malaria and typhoid” incorrectly. However, 70.8 percent answered “vitamins are found only in fruits and not in vegetables correctly. The result is further shown in the table below:

Table 4.2: Respondents' knowledge on health benefits of Consumption of fruits and vegetables (N = 400)

STATEMENTS	TRUE N (%)	FALSE N (%)
Dietary fibre in fruits and vegetables can help in digestion of food	*323(80.8)	77(19.2)
Adequate consumption of fruits and vegetables help in strengthening the immune system	*330(82.8)	70(17.5)
Non-communicable diseases like obesity and cancer can be prevented by consuming fruits and vegetables regularly	*272(68.8)	128(32.0)
Vegetables contain important nutrients for healthy hair and skin	*360(90.0)	40(10.0)
Fruits are rich in vitamins, water, minerals and certain sugars	*366(91.5)	34(8.5)

*correct answers

The FGD conducted further attested to the fact that the respondents were knowledgeable about health benefits of consumption of fruits and vegetables. Majority of them, using different expressions said fruits and vegetables give good health.

“Fruits and vegetables stimulate growth and gives good health”; “They stimulate growth and development”; “It make the body healthy; it nourishes the body to look fine”; “It makes the body fresh”.

The discussants also talked about some health benefits that were not mentioned in the questionnaire:

Vegetables give iron for the girls that are menstruating to make blood in their body”;

“Fruits like she said, they all provide the body vitamins and minerals and also vegetables, they help in the provision of blood in the body”.

Some of the FGD discussants expatiated on the benefits of fruits and vegetables in enhancing digestion.

“Fruits aid in digestion, that is when you can’t digest easily, your body system can’t digest, you can use fruits, you can take fruits, and they will aid in digestion, likewise, vegetables too...and vegetables aid easy defecation”. “It helps us to make our faeces easy when passing by”.

“Fruits aid in digestion generally, vegetables, I don’t have an idea about that”.

“The fibrous parts of fruits and vegetables also help in the digestion of foods”.

In the survey, more than half of the respondents (67.5% and 73.8% respectively) answered incorrectly the questions “fats and proteins are found abundantly in fruits and vegetables”, and “consumption of fruits and vegetables promotes weight gain”. This was corroborated by the FGD where participants said *fruits and vegetables gives us protein to work*” and *“it increases body weight”*

The mean knowledge score on a 20 point scale was 13.2 ± 2.8 . Outcome of results showed that most of the respondents (79.2%) had good knowledge and 20.8% had poor knowledge.

4.3. Attitude to Consumption of Fruits and Vegetables

The second research question examined the attitude of secondary school students towards consumption of fruits and vegetables. Several questions were asked to determine the students' attitude towards consumption of fruits and vegetables. The first attitudinal question asked if the respondents "skip meals made up of fruits and vegetables". About half (46.5%) disagreed, 38.2% agreed, and 15.2% could not decide. A second question asked if the students "don't like the taste of some fruits and vegetables". About half of the students (48.5%) agreed to this, almost a half (41.5%) disagreed to this and one-tenth (10.0%) were not sure. A third question asked if the students "were afraid to eat a fruit or vegetable they had never tried before". About half of them (51.2%) disagreed to this, 39.0% agreed, and approximately one out of ten students (9.8%) was not sure. A fourth question asked if the students "don't need fruits and vegetables in their diet as long as they're eating well". Majority (79.8%) disagreed to this, 13.2% agreed, and 7.8% were undecided. This is shown in table 4.4.

Table 4.3: Respondents' Attitude towards Consumption of Fruits and Vegetables**(N = 400)**

Statements	Agree	Disagree	Can't Say
	N (%)	N (%)	N (%)
Consumption of fruits and vegetables gives a healthy feeling	*334 (83.5)	47 (11.8)	19 (4.8)
Consuming fruits and vegetables daily is enjoyable	*338 (84.5)	35 (8.8)	27 (6.8)
Fruits and vegetables are eaten to stay healthy	*360 (90.0)	25 (6.2)	15 (3.8)
Can eat almost any fruit and vegetable	*211 (52.8)	131 (32.8)	58 (14.5)

*Correct attitude

The qualitative result revealed that the discussants' attitude to fruits and vegetables depend on the type. A few of them had a negative attitude towards some specific fruits and vegetables because of its taste.

"I don't like eating pineapple, I don't like the taste". "I don't like pawpaw and water melon because of the taste of the watermelon...,it looks somehow, I just don't like it".

However, majority said they can eat any fruit and vegetable.

Mean attitudinal score on a 16 point attitude scale was 10.6 ± 3.3 . Outcome result showed that more than half (69.8%) had positive attitude about fruits and vegetables, and 30.2 percent had negative attitude.

4.4 Frequency of Consumption of Fruits and vegetables

The third research question examined the frequency of consumption of fruits and vegetables, and also the fruits and vegetables that were most and least consumed.

When asked how often they ate fruits, 55.2% reported eating fruits 2-4 days a week. This was followed by 24.0% who reported eating fruits one day per week, and 1.0% reported never eating fruits. This is shown in the figure below:

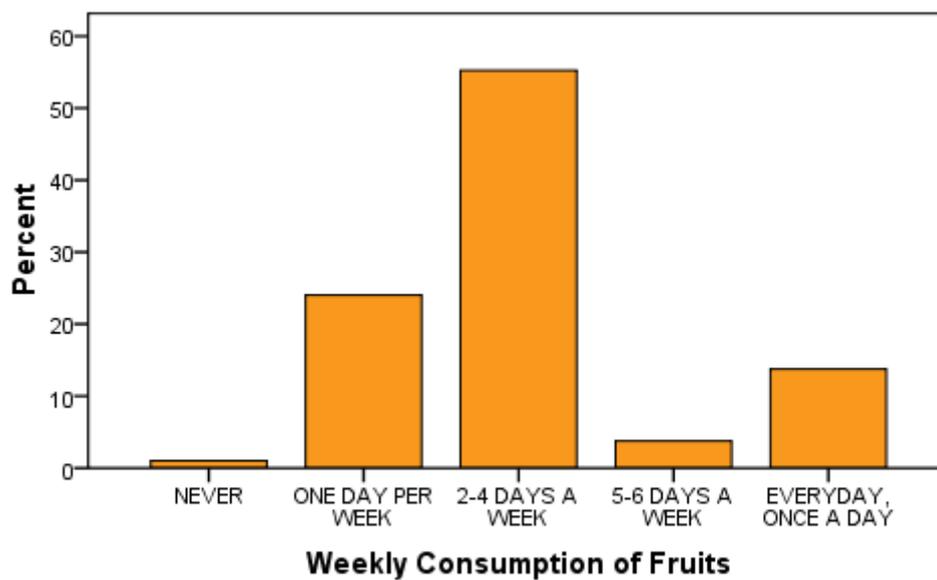


Fig. 4.1: Reported Weekly Frequency of Consumption of Fruits

Majority (92.5%) of the respondents reported to have consumed fruits within the week preceding the survey, while 7.5% reported not to have consumed fruit that week.

Three-tenth (30.0%) of the respondents reported to have consumed fruits twice within the week preceding the survey. A few (18.0%) and (16.2%) consumed fruits once and five or more times respectively within the past week. This is shown in the figure below:

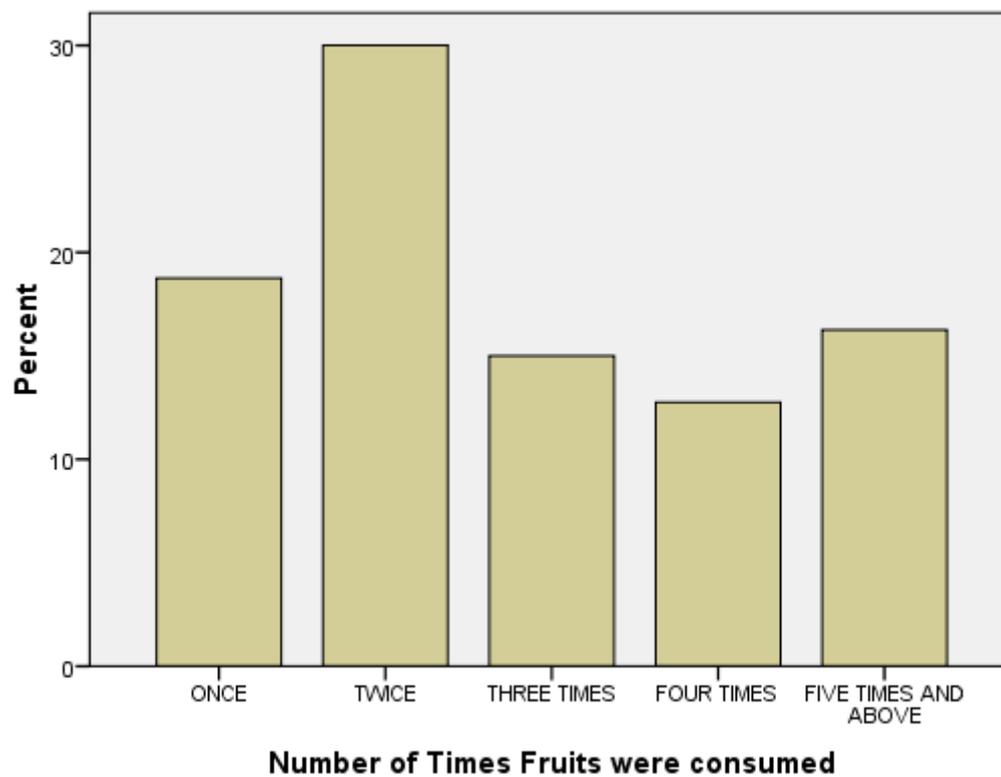


Fig: 4.2: Reported Frequency of Consumption of Fruits within the Week

When asked how often they ate vegetables, about half (52.2%) reported eating vegetables 2-4 days a week, 33.8% reported eating vegetables one day per week, and 0.8% reported never eating vegetables. This is shown in the figure below:

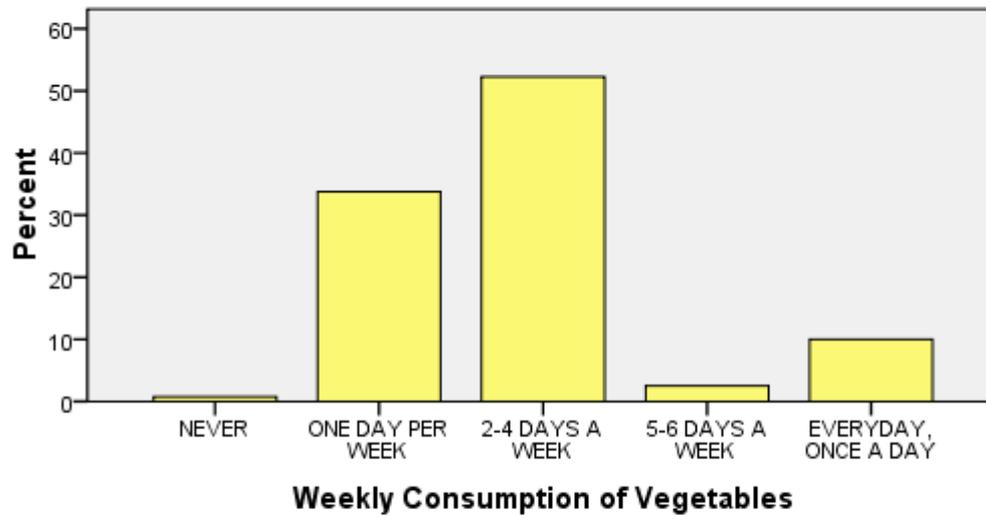


Fig. 4.3: Reported Weekly Frequency of Consumption of Vegetables

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Majority of the respondents (88.2%) reported to have eaten vegetables in the past week. About 30.0 percent of respondents reported to have taken vegetables twice within the week. This was followed by 22.2 percent, who reported to have taken vegetables once within the week; 13.8 percent reported to have taken vegetables three and four times respectively within the week, and almost a tenth of the respondents (9.2%) reported to have taken vegetables five times and above within the week of the survey. This is shown in the figure below:

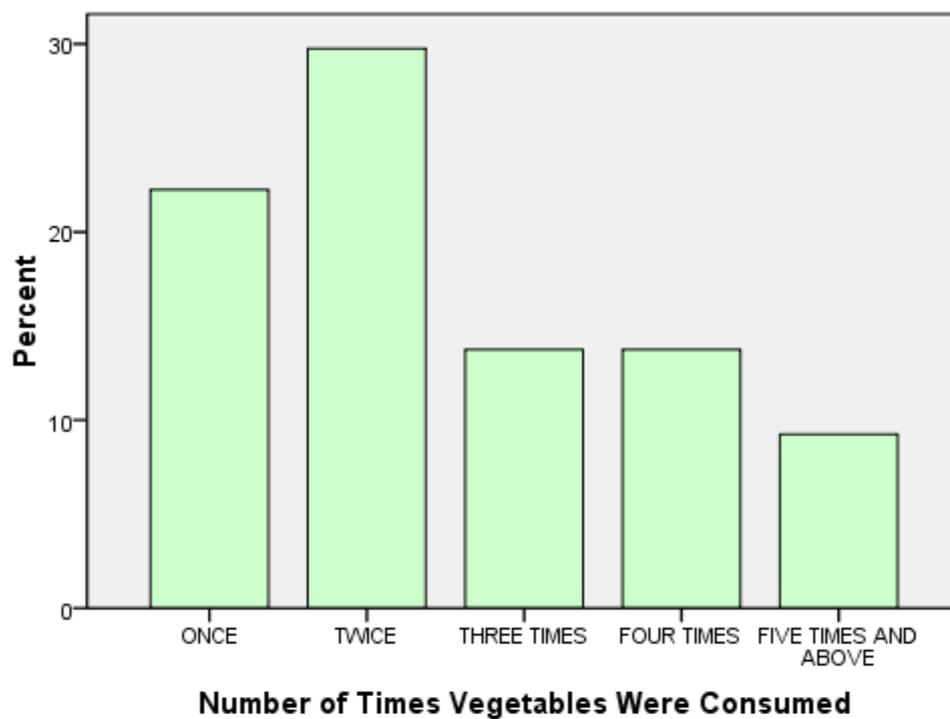


Fig: 4.4: Reported Frequency of Consumption of Vegetables within the Week

When asked how often fruits and vegetables should be consumed daily, the responses of the FGD participants varied from once a day to three times a day, as shown below:

“Fruits should be taken three times a day, after ever meal”.

“Fruits should be eaten twice a day, and vegetable should be eaten once a day, too much is not good”.

“Everyday, but not too much, too much can cause stomach pain”’

“It is ok three times a day, but shouldn’t be excessive because of the sugar content due to diabetes, for the people that have diabetes”

“As much as one could afford the money, one can eat it at anytime”.

Fruits Consumed within the last 24 hour preceding the Study

More than half of the respondents (76.0%) reported to have eaten fruits among those who ate within 24 hours preceding the study. The fruit that was most commonly consumed was orange (50.8%). This was followed by banana (17.8%), apple (12.2%), pineapple (4.2%), orange & banana (3.6%), pawpaw (2.6%), water melon, (2.6%), orange & water-melon (1.3%), orange & pineapple (1.3%), apple & orange (1.0%), tangerine (1.0%), pear (0.7%), grape (0.3%) and guava (0.3%). This is shown in table 4.4 below:

Table 4.4: Fruits Consumed within 24 hour preceding the Study (N = 303)

Fruit	Frequency	Percentage (%)
Orange	154	50.8
Banana	54	17.8
Apple	37	12.2
Pineapple	13	4.3
Orange & Banana	11	3.6
Water Melon	8	2.6
Pawpaw	8	2.6
Orange & Water Melon	4	1.3
Orange & Pineapple	4	1.3
Apple & Orange	3	1.0
Tangerine	3	1.0
Pear	2	0.7
Grape	1	0.3
Guava	1	0.3
Total	303	99.8

*percentage not up to 100 due to rounding

The mean number of portions of fruits consumed was 2.1 portions. Out of the students that ate fruits in the last 24 hours, 40.8% had two portions of fruits, 30.7% had one portion of fruits, 15.4% had three portions, 8.5% had four portions and 4.6% had five or more portions. This is shown in the table below:

Table 4.5: Portions of Fruits Consumed 24hours Preceding the Survey(N = 306)

	Frequency	Percentage (%)
Two Portions	125	40.8
One Portion	94	30.7
Three Portions	47	15.4
Four Portions	26	8.5
Five Or More Portions	14	4.6
Total	306	100.0

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Vegetables Consumed within 24 hour preceding the Study

More than half of the respondents (60.8%) reported to have eaten vegetables within the last 24 hours preceding the study. Dark green vegetable was most commonly eaten by 82.0% of the students that ate vegetables in the last 24 hours of the study. This was followed by okro (11.9%), carrot (2.5%), garden egg (1.2%) and cucumber (0.8%). This is shown in the table below:

Table 4.6: Vegetables Consumed 24hours preceding the Survey (N = 243)

	Frequency	Percentage (%)
Dark Green Vegetable	199	82.0
Okro	29	11.9
Carrot	6	2.5
Spinach	4	1.6
Garden Egg	3	1.2
Cucumber	2	0.8
Total	243	100.0

The mean number of portions of vegetables consumed was 1.8 portions. Almost half (45.0%) of the students that ate vegetables in the last 24 hours had two portions. This was followed by one portion (39.3%), three portions (13.6%), five or more portions (1.2%) and four portions (0.8%). This is shown in the table below:

Table 4.7: Portions of Vegetables Consumed 24hours Preceding the Survey (N = 242)

	Frequency	Percentage (%)
Two Portions	109	45.0
One Portion	95	39.3
Three Portions	33	13.6
Five Or More Portions	3	1.2
Four Portions	2	0.8
Total	242	99.9

*percentage not up to 100 due to rounding

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4.5 Food Frequency Table

The fruits with the highest consumption frequency were orange (78.8%) and banana (66.5%). Fruits mostly consumed occasionally or seasonally include cashew (57.8%), grape (53.85%), apple (50.2%), pineapple (49.5%), pawpaw (47.5%) and water melon (40.2%). Fruits that were least consumed include pear (41.2%).

Vegetables with the highest consumption frequency were tomato (77.0%), dark green vegetables (72.2%), okro (63.8%) and garden eggs (59.0%). Vegetable consumed occasionally or seasonally include carrot (53.2%). Vegetables with the least consumption frequency were lettuce (94.5%), cabbage (91.0%) and cucumber (73.0%). Tables 4.6 and 4.7 further explain this.

Table 4.8: Food Frequency Table - Fruits (N = 400)

Fruit	Frequency	Percentage (%)
Pawpaw		
Frequently	172	43.0
Ocasionally/Seasonally	190	47.5
Never	38	9.5
Orange		
Frequently	315	78.5
Ocasionally/Seasonally	83	20.8
Never	2	0.5
Grape		
Frequently	31	7.8
Ocasionally/Seasonally	215	53.8
Never	154	38.5
Pineapple		
Frequently	180	45.0
Ocasionally/Seasonally	198	49.5
Never	22	5.5

Table 4.9 Food Frequency Table – Vegetables(N = 400)

Vegetable	Frequency (N)	Percentage (%)
Lettuce		
Frequently	1	0.2
Occasionally/Seasonally	21	5.2
Never	378	94.5
Dark Green Vegetables		
Frequently	289	72.2
Occasionally/Seasonally	107	26.8
Never	4	1.0
Okro		
Frequently	255	63.8
Occasionally/seasonally	100	25.0
Never	45	11.2
Garden eggs		
Frequently	236	59.0
Occasionally/Seasonally	126	31.5
Never	38	9.5

The FGD discussants suggested ways of increasing the consumption of fruits and vegetables to answer the question: “what can encourage regular consumption of fruits and vegetables among adolescents? What would make it easier to eat fruits and vegetables every day?”

Majority suggested that adolescents should be educated on the health benefits of fruits and vegetables. Some of the responses were as follows:

“by instructing some people to eat it”

“you can announce it anywhere”

“you can instruct your classmate”

Other suggestions that were given were:

“they should sell at a reduced price. If they reduce the price of fruits and vegetables, I will eat it as my breakfast, lunch and dinner”.

“it should be made available by farmers and government”

On Probing on what parents can do to encourage consumption, the following suggestions were given:

“by telling us to eat it and forcing us to eat it”

“by giving us, after we finish eating our food”

“by telling us to eat it in their front”

Further probing on what can be done in school, the following were suggested:

“by telling us to eat it on the assembly or by giving it us”

“or when we are sick, they should give us”

“by using it as a advertising”

“by teaching us in school”

“by telling us the work that it do in the body”

“by teaching us how to eat it”

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4.6 Reasons Adduced for Consumption of Fruits and Vegetables

The fourth research question examined the reasons adduced for consumption of fruits and vegetables. The reasons given for consumption of fruits and vegetables of majority of the respondents include taste (78.5%), seasonality (78.2%), knowledge of health benefits (77.5%), knowledge of preparation (72.0%), satisfaction derived from eating (71.0%), media advertisements (67.5%) and cost (66.0%). Their responses are classified as “Reasons to Consume Fruits and Vegetables” and “Reasons not to Consume Fruits and Vegetables” as shown in tables 4.7 and 4.8 below:

Table 4.10: Reasons for Fruits and Vegetable Consumption (N = 400)

	Frequency (N)	Percentage (%)
Taste	314	78.5
Seasonal Availability	313	78.2
Knowledge of Health Benefits	310	77.5
Knowledge of preparation	228	72.0
Satisfaction derived from eating	284	71.0
Home Availability	269	67.2
Likes of Household	268	67.0
Cost	264	66.0
Cultural beliefs	228	57.0

*multiple response

4.7 Test of Hypotheses

Hypothesis 1: The first null hypothesis states that there is no association between the class of respondents and knowledge on health benefits of fruits and vegetables.

Table 4.11:

Knowledge of Health Benefits of Fruits and Vegetables by Class of Respondents

Class	Good N (%)	Poor N (%)	Total N (%)
J.S.S.1	40 (64.5)	22 (35.5)	62 (100.0)
J.S.S.2	53 (80.3)	13 (19.7)	66 (100.0)
J.S.S.3	52 (78.8)	14 (21.2)	66 (100.0)
S.S.S.1	55 (80.9)	13 (19.0)	68 (100.0)
S.S.S.2	62 (91.2)	6 (8.8)	68 (100.0)
S.S.S.3	55 (78.6)	15 (21.4)	70 (100.0)

$X^2 = 14.3$

df = 5

p = 0.01

The result showed a significant association between the class of respondents and their knowledge on health benefits of fruits and vegetables ($p < 0.05$). This means that the class of respondents has a role to play in their knowledge of health benefits of fruits and vegetables. Senior students had more knowledge of health benefits of fruits and vegetables than junior students. The null hypothesis was therefore rejected and the alternative that there is a significant association between the class of the students and their knowledge of health benefits of fruits and vegetables failed to be rejected.

Hypothesis 2: The second null hypothesis states that there is no association between the type of schools and daily intake of fruits

Table 4.12: Fruits Consumed 24 Hours Preceding the Study by Type of School

Type of School	Yes N (%)	No N (%)	Total N (%)
Public	286 (77.5)	83 (22.5)	369 (100.0)
Private	18 (41.9)	13 (58.1)	31 (100.0)

$X^2 = 6.0$

df = 1

p = 0.01

The result showed a significant association between the type of school and their intake of fruits in the last 24 hours preceding the survey ($p < 0.05$). Students attending public schools are better in eating fruits than students attending private schools. This means that the type of school the respondents attend has a role to play in their daily intake of fruits. The null hypothesis was therefore rejected and the alternative that there is a significant association between the type of school and their daily intake of fruits failed to be rejected.

Hypothesis 3: The third null hypothesis states that there is no association between the age of respondents and the knowledge on health benefits of fruits and vegetables.

Table 4.13: Knowledge of Health Benefits of Fruits and Vegetables by Age

Age (years)	Good N (%)	Poor N (%)	Total N (%)
9 – 12	70 (72.9)	26 (27.1)	96 (100.0)
13 – 16	214 (82.0)	47 (18.0)	261 (100.0)
17 – 19	33 (76.7)	10 (23.3)	43 (100.0)

$$X^2 = 3.7$$

$$df = 2$$

$$p = 0.1$$

The result showed that there was no significant association between the age of respondents and their knowledge on health benefits of fruits and vegetables ($p > 0.05$). This means age has no role to play in respondents' knowledge of health benefits on fruits and vegetables. The null hypothesis was therefore failed to be rejected.

Hypothesis 4: The fourth null hypothesis states that there is no association between the ethnic groups of adolescents and the frequency of consumption of vegetables.

Table 4.14: Weekly Consumption of Vegetables by Ethnicity

Ethnicity	Never	1 day/wk	2-4 days/ week	5-6 days /week	Everyday once a day	Everyday > twice a day	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Igbo	0 (0.0)	14 (31.8)	24 (54.5)	1 (2.3)	5 (11.4)	0 (0.0)	44(100.0)
Yoruba	3 (0.9)	117(33.6)	181(52.0)	9 (2.6)	35 (10.1)	3 (0.9)	348(100.0)
Others (Edo, Efik)	0 (0.0)	4(50.0)	4 (50.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (100.0)

$X^2 = 6.4$

df =20

p = 0.9

The result showed that there was no significant association between the ethnic groups of respondents and frequency of consumption of vegetables ($p > 0.05$). This means that ethnic group has no role to play in the respondents' frequency of consumption of vegetables. The null hypothesis was therefore failed to be rejected.

Hypothesis 5: The fifth null hypothesis states that there is no association between the sex of respondents and knowledge of health benefits of fruits and vegetables.

Table 4.15: Knowledge of Health benefits by Gender

Gender	Good Knowledge N (%)	Poor Knowledge N (%)	Total N (%)
Male	152 (76.4)	47 (23.6)	199 (100.0)
Female	165 (82.1)	36 (17.9)	201 (100.0)

$$X^2 = 2.0$$

$$df = 1$$

$$p = 0.1$$

The result showed that there is no significant relationship between sex of respondents and knowledge of health benefits of fruits and vegetables. This means that sex has no role to play in the respondents' knowledge of health benefits of fruits and vegetables. The null hypothesis was therefore failed to be rejected.

CHAPTER FIVE

DISCUSSION

The purpose of this study was to investigate the knowledge and attitude towards consumption of fruits and vegetables among secondary school students in Ibadan North East local government, Oyo state. This section will discuss the results of the study in context with the current literature.

5.1 Knowledge of Health Benefits of Consumption of Fruits and Vegetables

The mean knowledge on a 20 point scale was 13.2 ± 2.8 . The results showed that majority of the respondents (79.2%) had good knowledge of the health benefits of fruits and vegetables. There was a significant relationship between the class of the respondents and their knowledge of health benefits of consumption of fruits and vegetables. Senior Secondary School students were significantly more likely to have good knowledge of health benefits of consumption of fruits and vegetables than the Junior Secondary School students. The higher the classes, the higher their knowledge scores. This could be attributed to the content of their lessons which will be more detailed as the classes are going higher. This is at variance with a study by Beech et al 1999 in which on average, adolescents reported 39% correct knowledge scores. The good level of knowledge of the students in this research may be due to the lessons received in school.

5.2 Attitude towards Consumption of Fruits and Vegetables

Mean attitudinal score on a 16 point attitude scale was 10.6 ± 3.3 , and the result showed that more than half (69.8%) had positive attitude about fruits and vegetables. In a similar study, during the 2004-05 school year, the Mississippi Department of Education Child Nutrition Program initiated the Mississippi Fresh Fruit and Vegetable Pilot Program. Of the grades participating, program evaluation data indicated only eighth grade students had significant increases in positive attitudes toward eating fruit and vegetables, in their beliefs that they could eat more fruit, and in their willingness to try new fruit. Degree of preference for fruit increased significantly among eighth grade and tenth grade students, but decreased significantly among fifth grade students. Intention to eat fruit increased significantly among tenth grade students, but not among fifth and eighth grade students (CDC, 2006).

5.3 Frequency of Consumption of Fruits and Vegetables

According to the 24 hour dietary recall from the results, mean daily serving (portion) of fruits consumed was 2.1 servings, and the mean daily serving of vegetables consumed was 1.8 servings (about two cups). The mean daily serving of fruits and/or vegetables per day was 3.9, which is below the recommended five servings a day target.

This is consistent with a study involving students aged 13 to 15 years from five Southeast Asian countries. In all, most students 76.3% consumed less than the recommended five servings of fruits and/or vegetables. Only few(28.0%) of the participants reported consuming less than one fruit per day and even less (13.8%) indicated consuming less than one portion of vegetable per day. The mean number of fruits consumed per day was 1.3, far below the recommended two fruits a day target while the mean number of vegetable consumption was 1.9, also far below the recommended three portions of vegetables a day target. The mean daily servings of fruits and/or vegetables per day was 3.2, far below the recommended five servings a day target (Peltzer&Pengpid, 2012).

However in this study, the students met the recommended daily servings for fruits but they did not meet the recommended daily servings for vegetables. This may be because vegetables are found more in markets than in any other place, whereas fruits are seen almost everywhere; on the streets, in traffic as well as in markets too. Results also showed that public school students significantly consumed more fruits 24 hours preceding the study than private school students. This may be due to the effect of some confounders. For example fruits are more easily accessible than vegetables. Another explanation for this could be that majority of the students in public schools walk to school, and therefore have more access to these fruits - could easily buy fruits on their way to school or on their way back home.

The findings are also similar to a study by Rojas (2001) in which the consumption of fruits and vegetables in 214 urban and rural adolescents in relation to the 5-A-DAY recommendation was examined. The result showed that mean daily servings of fruits were not far from the minimum recommendation. However the mean vegetable intake was well below the minimum recommendation. The study also revealed that urban adolescents and females consumed fewer fruits and vegetables than those residing in rural areas and the males.

5.4 Reasons adduced for Consumption of Fruits and Vegetables

The reasons given for consumption of fruits and vegetables by the students from the result of the study were classified as internal factors and external factors, as listed by the students. The internal factors are the factors that depend on the students and under this are: taste, likes and dislikes and knowledge of health benefits. The external factors are the factors that are out of their control and under this are: cost, availability, size of family, state of health of consumer and spoilage. This is similar to the findings by Krolner et al. (2011) who identified the following potential determinants for fruit and vegetable intake which supplement the quantitative knowledge base. In the study, the determinants were classified under socio-demographic factors, personal factors, family – related factors, friend - related and school - related factors.

Yeh et al., (2008) in their study on understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA discovered some factors that influenced the fruit and vegetable intake of the study group. 12 focus group discussions, ranging from 9 to 16 participants were conducted. The barriers (factors that negatively influenced their fruit and vegetable consumption) mentioned by the discussants include cost, lack of energy and preparation time, media advertising (of fast foods), inaccessibility to grocery stores, shelf -life/spoilage, customs and fear of adverse health effects (from fruits and vegetables that might have been contaminated with pesticides). The key enabler to fruit and vegetable intake reported across all ethnic groups was knowledge level about the health benefits of fruits and vegetables. Another important enabler was concern over the children's health: The family habit – according to one of the discussants “is one very important factor, because if you have younger ones, you, keep a basket of fruits, the kids get used to that, and if you keep a basket of cookies, they get used to those cookies”. This is similar to the findings of this research in which cost, home availability and cultural beliefs and past bad experience on consumption were among the reasons determining their fruit and vegetable intake.

5.5 Implication for Health Promotion and Education

Adolescents exert their independence by the choices of foods eaten away from home or the snacks and meals they prepare for themselves. Therefore, there is need for an avenue for them to be guided on making good decisions concerning their health, which includes their choices of food and eating habits. Discussed below are the avenues in which they could make these choices:

1. **Health Promotion policies should be set up:** Evidence from this and other studies should be presented to policy makers to tackle micronutrient deficiencies and to encourage healthy eating among young people. Such policies should address:
 - Inclusion of teachings on the importance and health benefits of consuming diets rich in fruits and vegetables in the school curriculum.
 - Fruits and vegetables being included as part of school feeding programmes to secondary schools.
2. **Intervention through the school as a setting:** the school as a setting should be an avenue for students to be guided on making good decisions concerning their health, which includes their eating habits and their choices of food.
 - School feeding programmes providing free nutritious school meals to students will be an effective intervention which will tackle important nutrition deficiencies impacting on adolescent development and learning abilities which are commonly found among students in low and middle income countries.
 - Nutritionists should be invited to educate students on the importance of consuming diets rich in fruits and vegetables with practical demonstrations and examples.
 - Fruits and vegetables should be planted in school gardens and farms, and the same proceeds should be used to serve the students.
 - Educational programmes like Intra and Inter-school debates, quiz competitions, essays and symposiums should be organised on topics related to healthy eating among secondary school students.
3. **At the home level:** the parents should be educated on the benefits of making fruits and vegetables available for their children through the Parents-Teachers Association (PTA).

4. **Media Intervention:** the media should be encouraged to come out with special programmes targeted towards enlightening secondary school students on the importance of consuming diets rich in fruits and vegetables. This could be achieved through television programmes, radio jingles and newspaper articles on fruits and vegetable consumption.

5.6 Conclusion

The results of this study indicated that secondary school students had good awareness of the health benefits of fruits and vegetables as their level of knowledge was high. They also had positive attitudes on consumption of fruits and vegetables. However, the frequency of consumption was not up to the recommended frequency of 5 servings per day. Reasons like financial constraints to purchase fruits and vegetables due to their high costs, home availability, taste, past bad experience on consumption were given by the students among others. Thus, there is the need to identify acceptable ways in which consumption will be increased among secondary school students.

5.7 Recommendations

Based on the result of this study, the following recommendations were made:

1. Innovative school-based nutrition education programmes are needed to further encourage and educate secondary school students to consume more fruits and vegetables.
2. Media advertisements and public campaigns are also needed to educate parents or guardians of these students on the importance of fruit and vegetable consumption so as to make them available to their children or wards.

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APPENDIX I
KNOWLEDGE AND ATTITUDE TOWARDS CONSUMPTION OF FRUITS AND VEGETABLES AMONG SECONDARY SCHOOL STUDENTS IN IBADAN NORTH EAST LOCAL GOVERNMENT, OYO STATE

Dear Respondent,

I am a postgraduate student of the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan. The purpose of this study is to investigate the knowledge and attitude of consumption of fruits and vegetables among secondary school students in Ibadan North East Local Government. The findings from this study will help in the design of programmes aimed at nutrition intervention. Your responses and opinions will be kept strictly confidential and will be used for the purpose of this research only. Please note that you do not have to write your name on this questionnaire, also try to give honest answers to the questions asked, as much as your maximum co-operation will assist in making this research a success.

Would you want to participate in the study? (1) YES (2) NO

Serial No _____

Thank you very much.

SECTION A: Socio Demographic Characteristics

Instruction: Please answer the following questions by ticking as appropriate.

1. Age as at last birthday (in years) _____
2. Sex (1) Male (2) Female
3. Class _____
4. Educational Qualification of Father (1) No education (2) O' level
 (3) NCE/OND (4) B Sc. /HND (5) Masters/PGD
 (6) Others _____ (7) Don't know
5. Educational Qualification of Mother (1) No education (2) O' level
 (3) NCE/OND (4) B Sc. /HND (5) Masters/PGD
 (6) Others _____ (7) Don't know

6. Father's Occupation: (1) Civil servant (2) Health Practitioner
 (3) Lawyer (4) Engineering (5) Accounting (6) Banking
 (7) Business man/Trading (8) Teaching
 (9) Driving (10) Tailoring (11) Carpentry
 (12) Brick layering (13) Other _____ (14) Don't know

7. Mother's Occupation: (1) Civil servant (2) Health Practitioner
 (3) Lawyer (4) Engineering (5) Accounting
 (6) Banking (7) Businesswoman/Trading (8) Teaching
 (9) Hairdressing (10) Tailoring (11) Other _____
 (14) Don't know

8. Ethnicity: (1) Igbo (2) Yoruba (3) Hausa
 (4) Other _____ (5) Non-Nigerian (name country) _____

9. Religion: (1) Christianity (2) Islam (3) Traditional (4) Other

SECTION B: Knowledge on the Health Benefits of Consumption of Fruits and Vegetables

Answer the following questions by ticking either True ‘T’ or False ‘F’

S/N	QUESTIONS	T	F	SCORE
10.	Fruits and vegetables are not important for healthy living			
11.	Fats and protein are found abundantly in fruits and vegetables			
12.	Consumption of fruits and vegetables promotes weight gain			
13.	Adequate consumption of fruits and vegetables can help in preventing malaria and typhoid			
14.	Vitamins are found only in fruits, and not in vegetables			
15.	Dietary fiber in fruits and vegetables help in digestion of food			
16.	Adequate consumption of fruits and vegetables help in strengthening the immune system			
17.	Non-communicable diseases like obesity and cancer can be prevented by consuming fruits and vegetables regularly			
18.	Vegetables contain important nutrients for healthy hair and skin			
19.	Fruits are rich in vitamins, water, minerals and certain sugars			

SECTION C: Attitude towards Consumption of Fruits and Vegetables

Tick as appropriate whether you agree, disagree or can't say your attitude about the following:

S/N	ATTITUDE	AGREE	CAN'T SAY	DISAGREE
20.	I skip meals made up of fruits and vegetables			
21.	I donot like the taste of some fruits and vegetables			
22.	I am afraid to eat a fruit or vegetable I have never tried before			
23.	I donot need fruits and vegetables in my diet as long as I am eating well			
24.	I feel healthy when I eat fruits and vegetables			
25.	I enjoy eating fruits and vegetables everyday			
26.	I eat fruits and vegetables because they help to stay healthy			
27.	I will eat almost any fruits and vegetable			

SECTION D – Frequency of Fruit and Vegetable Consumption

28. How often do you eat fruits? (1) Never (2) One day per week
 (3) 2-4 days a week (4) 5-6 days a week (5) Everyday, once a day
29. How often do you eat vegetables? (1) Never (2) One day per week
 (3) 2-4 days a week (4) 5-6 days a week (5) Everyday, once a day
30. Have you eaten any fruit in the past one week? 1. Yes 2. No
31. If 'Yes', how many times within the week? _____ if 'NO', skip to No. 32
32. Have you eaten any vegetable in the past one week? 1. Yes 2. No
33. If 'Yes', how many times within the week? _____ if 'No', skip to No. 34
34. Have you eaten any fruit in the last 24 hours? 1. Yes No No', skip to no 37
35. If yes to the above question, which fruit did you eat? _____

36. If yes to question 34, how many portions of fruits did you eat?

Examples of one portion of fruits is one: (1) One portion (2) Two portions

Medium size of fruit – orange or banana (3) Three portions (4) Four portions

(5) Five or more portions

37. Have you eaten any vegetable in the last 24 hours? 1. Yes 2.No if 'No', skip to No. 40

38. If yes to the above question, which vegetable did you eat? _____

39. If yes to question 37, how many portions of vegetables did you eat?

Example of one portion of vegetables is: (1) One portion (2) Two portions

(3) Three portions

3heaped tablespoons ofvegetables(4) Four portions (5) or more portions

40. Below is a list of fruits and vegetables. Tick as appropriate the frequency of consumption

	Fruits/vegetables	I eat frequently	Occasionally/ seasonally	Never
A	Banana			
B	Pawpaw			
C	Orange			
D	Grape			
E	Pineapple			
F	Apple			
G	Cashew			
H	Water melon			
I	Pear			
J	Carrot			
K	Lettuce			
L	Cabbage			
M	Cucumber			
N	Tomato			
O	Dark Green Vegetables			
P	Okro			
Q	Garden eggs			
R	Others (Mention)_____			

SECTION E: Reasons Adduced for Consumption of Fruits and Vegetables

Answer 'Yes' or 'No' to the following factors that may influence your consumption of fruits and vegetables.

S/N		YES (1)	NO (2)
41.	Cost of Fruits and vegetables		
42.	Home availability		
43.	Knowing how to prepare vegetables		
44.	Likes of my household		
45.	Dislikes of my household		
46.	Seasonal availability of fruits and vegetables		
47.	Cultural beliefs		
48.	Taboo		
49.	Effects on stomach, e.g. purging		
50.	Taste		
51.	Knowledge of health benefits		
52.	Past bad experience on consumption		
53.	Satisfaction derived from eating		
54.	Poor shelf life/spoilage		
55.	T.V or media advertisements		

APPENDIX II
FOCUS GROUP DISCUSSION GUIDE
DETERMINANTS OF FRUITS AND VEGETABLES CONSUMPTION AMONG
SECONDARY SCHOOL STUDENTS IN IBADAN NORTH EAST LOCAL
GOVERNMENT, OYO STATE

INTRODUCTION

Good day, I thank you all for agreeing to participate. My name is OlawaleOluwabusayo 'Kemi, and my colleagues are _____. We are postgraduate students of the Department of Health Promotion and Education in the faculty of Public Health, College of Medicine, University of Ibadan.

This discussion is being conducted in order to be able to get your view on the determinants of fruits and vegetables consumption. Your input will be of immense benefit to this study and also be useful in recommending programmes, interventions, policies that will help in improving nutrition and wellbeing among adolescents now and later in life. This discussion will last between 45-60 minutes. We would like to tape record the focus group discussion so that we can be sure to capture the thoughts, opinions and ideas we hear from the group. No names will be attached to the focus groups, and the tapes will be destroyed as soon as they are transcribed. You may refuse to answer any question or withdraw from the study at any time. We understand how important it is that information is kept private and confidential. We will ask participants to respect each other's confidentiality.

Do you agree to participate in this study? Yes No

	Focus Group Discussion Questions	Probes/Follow Up Questions
1.	What are the types of food available in the community	<ul style="list-style-type: none"> • Ask for examples, seasonality of various foods
2.	These foods that have been mentioned, how often are they eaten, and in what pattern?	<ul style="list-style-type: none"> • Probe into eating habits(in-betweens and snacks)
3.	What kinds of foods are important for health and well-being?	<ul style="list-style-type: none"> • Ask for names of these foods and classes.
4.	Let's talk about fruits and vegetables. What is their importance in the diet?	<ul style="list-style-type: none"> • Probe for the health benefits (advantages) of eating fruits and vegetables • Probe for examples of nutrients found in fruits and vegetables
5.	a.What are the likely reasons people consume fruits and vegetables? b.What are the likely reasons people don't consume fruits and vegetables?	
6.	What are the things or factors that determine how much one eats fruits and vegetables? (Determinants)	<ul style="list-style-type: none"> • Probe for factors like culture, ethnicity, taboo, time, cost, influence of parents, background, season of the year, availability, taste, past bad experience, likes or dislikes of household
7.	How often should a person eat fruits and vegetables?	<ul style="list-style-type: none"> • Probe for how many times a day, week and the quantity that should be taken everyday
8.	Let's talk about what can encourage regular consumption of fruits and vegetables among adolescents. What would make it easier to eat fruits and vegetables everyday?	<ul style="list-style-type: none"> • Probe for suggestions on what can be done generally or in schools to encourage consumption of fruits and vegetables

APPENDIX III

TELEGRAMS.....

TELEPHONE.....



MINISTRY OF HEALTH
DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION
PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No.

All communications should be addressed to

the Honorable Commissioner quoting

Our Ref. No. AD 13/ 479/ 212

5th November, 2012

The Principal Investigator,
Department of Health Promotion and Education,
Faculty of Public Health,
College of Medicine,
University of Ibadan.

Attention: Olawale Oluwabusayo 'Kemi

Ethical Approval for the Implementation of your Research Proposal in Oyo State

This acknowledges the receipt of the corrected version of your Research Proposal titled: "Determinants of Fruits and Vegetable Consumption among Secondary School Students in Ibadan North East Local Government, Oyo State."

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey, to you, the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the committee will monitor, closely, and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4. I wish you all the best,



Director, Planning, Research & Statistics

Secretary, Oyo State, Research Ethical Review Committee