

**HOUSEHOLDS USAGE OF STAPLE FOODS AND  
DIETARY MODIFICATION ENHANCEMENT  
STRATEGIES IN RIVERS STATE OF NIGERIA**

**BY**

**OLUMATI, Precious Ndidi**

**PG11/12/204676**

**DEPARTMENT OF VOCATIONAL EDUCATION**

**(HOME ECONOMICS UNIT)**

**DELTA STATE UNIVERSITY, ABRAKA**

**MAY, 2017**

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**MATRIC NUMBER: PG11/12/204676**

**NCE, B.ED**

**A DESSERTATION WRITTEN IN PARTIAL FULFILMENT OF THE  
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HOME ECONOMICS EDUCATION (MSc Ed), VOCATIONAL  
EDUCATION DEPARTMENT (HOME ECONOMICS UNIT) FACULTY  
OF EDUCATION, DELTA STATE UNIVERSITY, ABRAKA.**

**MAY, 2017**

## **DECLARATION**

I declare that this is an original research work carried out by me in the  
Department of Vocational Education (Home Economics unit)

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Olumati P.N.

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Date

## CERTIFICATION

This is to certify that this dissertation titled “Households Usage of Staple Foods and Dietary Modification Enhancement Strategies in Rivers State of Nigeria”, was written by Olumati Precious Ndidi of the Department of Vocational Education, (Home Economics Unit), scrutinized and approved by the undersigned persons in partial fulfilment of the requirements for the award of Masters Degree in Home Economics Education

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PROFESSOR (MRS) D.O. ARUBAYI  
PROJECT SUPERVISOR

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Date

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DR. (MRS) E.N. UNOMA  
HEAD OF DEPARTMENT

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Date

## **DEDICATION**

This research work is dedicated to the researcher's beloved husband, Engr. Chibueze Olumati

## **ACKNOWLEDGEMENTS**

The researcher adores the Almighty God with so much gratitude for granting her the grace to complete this work. Indeed the researcher is indebted to her amiable supervisor Professor (Mrs) D. O Arubayi who was a major source of boost and encouragement to the success of this work. The researcher is also full of appreciation for her examiners, Professor Bridget Udubra Imonikebe, Professor (Mrs) B. A. Ukpore, Prof. P. Egbule and Dr (Mrs) Unoma, who took out time to make all necessary corrections and offered professional advice where necessary, to you all the researcher says thank you. To mention also are the researchers parents Sir & Lady Dickson Ordu who vowed to see her aspire higher in their lifetime and for all their prayers, she is grateful. The researcher will not fail to express her gratitude to our children Miss Thelma Olumati, Master David Olumati, Miss Faith Olumati and Miss Peaceful Olumati for their moral support and understanding all through the period of carrying out this research work. Also to the researchers younger brother Mr. Ordu Francis Uchechukwu for his moral support, Mr Ugochukwu Chima Kelechi who drove me to and from school in the course of this research work, the researcher is grateful, to her colleagues at Federal College of Education (Technical) Omoku especially in the Department of Home Economics Miss Gloria Lilly who provided the researcher with some relevant reference material, Mrs Efajemue Omofowe, Mrs Tew Beauty, Miss Igbemi Matilda (Head of Department , Home Economics) she is grateful to all for words of encouragement

## TABLE OF CONTENTS

<b>Page</b>	
COVER PAGE	i
TITLE PAGE	ii
DECLARATION	iii
CERTIFICATION	iv
DEDICATION	v
ACKNOWLEDGEMENTS	vi
APPENDICES	vii
<b>LIST OF TABLES</b>	<b>viii</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
ABSTRACT	x
<b>CHAPTER ONE: INTRODUCTION</b>	
Background to the Study	1
Statement of the Problem	4
Research Questions	4
Hypotheses	5
Purpose of the Study	5
Significance of the Study	6
Delimitation/Scope of the Study	6
Operational Definition of Terms	7
<b>CHAPTER TWO: REVIEW OF RELATED LITERATURES</b>	
Introduction	8
Conceptual Framework	8

Conceptual Framework of Food Security and Nutrition	8
Rural Food System Conceptual framework	9
Conceptual Framework of Nutritional Status at Household Levels	11
The Mediterranean Diet Pyramid	13
Definition and Importance of Staple Foods in the Diet	15
Cereals Group	17
Starchy Roots and Tubers Group	19
Legumes, Nuts and, Seeds Group	23
Fruits and Vegetables Group	25
Meat and Sea foods Group	43
Spices, Flavourings and Condiments	51
Oils (Palm Oil)	53
Water	54
Beverages ( Palm wine)	55
Contemporary Rivers State Food Habits	56
Factors Influencing Adequate Nutrition in Households	61
Dietary Modification	68
Some Recipes with suggestions for Modification	75

### **CHAPTER THREE: RESEARCH METHOD AND PROCEDURE**

Research Design	83
Population of the Study	83
Sample and Sampling Techniques	83
Research Instrument	84
Validity of Research Instrument	85



Reliability of Research Instrument	85
Method of Data Collection	85
Method of Data Analysis	85
<b>CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION</b>	
Discussion of findings	87
<b>CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION</b>	
Summary	106
Conclusion	107
Recommendations	107
Implications of the research findings	107
Limitations	108
Suggestions for further studies	108
Contributions to knowledge	108
<b>REFERENCES</b>	109
<b>APPENDICES</b>	121

## APPENDICES

Appendix 1: Questionnaire	121
Appendix 2: Recommended Number of Food Guide Servings per Day	130
Appendix 3: One Food Guide Serving	132
Appendix 4: For Quick and Easy Estimates, Visualize Each Portion as Being about the Size of a Common Object	134
Appendix 5: How to Count Food Guide Servings in a Meal	135
Appendix 6: One way summary ANOVA of Economic status of households On consumption of staple foods	136
Appendix 7: One way summary ANOVA of Educational background of Households and its influence on purchase and consumption of staple foods	137
Appendix 8: Coefficient correlation of reliability test	138
Appendix 9: S&SS print out of reliability test	139

## LIST OF TABLES

Tables	Page
Table 1: Level of availability of staple foods	87
Table 2: Level of Usage/Consumption of Staple foods	88
Table 3: Major sources of obtaining these staple foods	89
Table 4: Traditional/Cultural belief variables as they influence choice of staple foods	90
Table 5: Influence of economic status	92
Table 6: Influence of Educational background	92
Table 7: Dietary Modification enhancement strategies	94
Table 8: Influence Dietary Modification strategies on nutritional status	96
Table 9: t-test comparison between urban and rural households on staple food availability	99
Table 10: Summary of Analysis of Variance (ANOVA) comparison on influence on economic status of households	100
Table 11: Summary of Analysis of Variance (ANOVA) comparison on influence of educational background of households	101
Table 12: t-test comparison between male and female household care givers on dietary modification enhancement strategies	102

## LIST OF FIGURES

FIGURES	PAGE
Fig. 1: Model of Food Security and Nutrition	9
Fig. 2: Model of Rural Food System Conceptual Framework	11
Fig. 3: Model of Conceptual Framework of the Nutritional Status at Household Level	12
Fig. 4: Mediterranean Diet Pyramid	14
Fig. 5: A model of suggested modified food pyramid for the Rivers people Adapted from Mediterranean diet pyramid	56

## **Abstract**

This study examined households' usage of staple foods and dietary modification enhancement strategies in Rivers State of Nigeria. It was an investigation into the various staple foods available in Rivers State, and the nutritional health benefits of these staple foods. The study also examined some factors that could influence the consumption of these foods, some contemporary food habits of people in the area of study and suggested some dietary modification enhancement strategies. A total of 820 households were randomly selected from twelve (12) local government areas, in the three (3) geopolitical zones with seventy (70) households which was used for the study, with 538 mothers and 302 fathers representing the each household. A self structured validated questionnaire with a reliability coefficient of 0.87 was used for the data collection, t-test and analyses of variance (ANOVA) was used to analyze the hypotheses. The results revealed that though staple foods are readily available, in Rivers State, economic status and educational background of care givers, culture and traditional beliefs are some major factors that influenced the adequate use of the staple foods in Rivers State, some dietary modification enhancement strategies were identified which if adopted can ensure adequate nutrition in families some of these dietary modification strategies includes; consuming less than 2 servings of red meat and processed meats per week, reduced intake of sweets in the form of sugar, candies, pastries, intake of 1 or 2 servings of fruit per meal, substituting commercial flavoured fruit juice with natural homemade fruit juice. The implication of this study is that, if these modification strategies suggested are adopted it will help meal planners plan meals more effectively with little or no stress as any diet can be modified to suit the nutritional needs of every family member, also if these modification strategies are adopted in homes and hospitals, it will help reduce the incidence of some/most life threatening nutritional disorders, thus reducing the double burden of diseases in the homes and communities. It was therefore recommended that good feeding habits needs to be emphasized while ensuring adequate awareness campaigns on the nutritional importance of these staple foods, the rural and urban masses in Rivers State require updated nutrition education that gives information on nutrients and their importance while pointing out the recommended food sources.

## CHAPTER ONE

### INTRODUCTION

#### **Background to the Study**

People eat various foods with the intention to maintain life. The knowledge of the right food to eat depends among other things on one's level of health education in relation to food. Scientists around the world believe and agree that food does broadly influence health and diseases infection in humans. Dozens of international conferences have unveiled astonishing new scientific findings on the healing and preventive powers of food such as garlic, tea, fish oil and so many other natural foods. Many disease conditions apart from those resulting from accidents and surgery are food related or have food implications. Food is the best, safest and cheapest form of alternative medicine and disease prevention. It is indeed ones miracle medicine. Food has the distinction of being the only major determinant of health that is completely under one's control. Consumers have the final say over what should be eaten; one cannot always control the other determinants of health, such as the quality of the air taken in, the noise one is subjected to, the emotional climate of the environment and the person's genotype.

The level of one's nourishment does not depend on the selection of any one food. It depends on the selection of many different foods at numerous meals over days, months and years. Diet planning principles such as adequacy, balance, kilo calories (energy) control, nutrient density, moderation and variety as well as dietary guidelines are key concepts to keep in mind while selecting foods, whether shopping at the grocery store, choosing from a restaurant menu or preparing a home cooked meal (Whitney & Rolfes, 2004). Every family is unique due to the fact that each consists of different grades of family members with different nutritional needs which must be met, therefore in many cases what will be suitable for one family may not be adequate nutritionally for another. "Oftentimes families focus nutritional changes on family members who have a health problem or a certain athletic need. Notably good nutrition is important for everyone and the family unit is the perfect place to build a healthy nutritional foundation for every family member.

Good family nutrition helps everyone in the family to be healthy and happy. Since we know that good nutrition helps prevent disease and increase quality of life, good family nutrition will benefit the whole family. It is also possible that good family nutrition will reduce the incidence of obesity, disordered eating including eating disorders such as anorexia and binge

eating (Family Nutrition, 2013). According to Kloss, (2008), the true science of eating should be thoroughly understood by all, what elements the system requires in order to build, and repair, how best to supply them and how to prepare them in the most appetizing manner without destroying their life giving properties. Kloss, (2008) further stated that the body is a finely constructed machine and transforms the food supplied to it into energy. As the automobile burns gasoline, so does the human body burn food, all the parts on every machine are constantly wearing off and require renewal, hence the body must have proper food to build new tissues and to repair worn out ones.

The best way to obtain the nutrients that are needed by the body is from natural foods, the way nature prepared them and not from pills (Kloss, 2008). In order to ensure the proper functioning of the limitless and complicated reactions that are necessary for our body's optimum health, adequate nutrition is absolutely essential. This means not only supplying the body with sufficient amount of food, but eating the right kinds of food and eating them in the right proportions. Strangely enough, many Nigerians although they seem to look well fed, may not be getting the proper kinds of nourishments they need. Foods whether from plants or animals, contain substances necessary for life and growth. These can be arranged in six (6) basic groups as follows: Carbohydrates, Fats, Proteins, Minerals, Vitamins and Water. One needs a wide variety of different foods to provide the right amount of these nutrients, for good health. Enjoyment of a healthy diet can also be one of the great cultural pleasures of life (Nutrition / National Health and Medical Research Council, 2013).

Nigeria is endowed with a lot of natural staple foods which can supply all of the above mentioned food nutrients with its accompanying numerous health benefits. This was supported by Osuji, (2014) who stated that for Nigerians in Nigeria, it is obvious that they will continue to enjoy the delicacies of their inheritance with its attendant health benefits. They need to be confident that well prepared African food is rich in nutrients and constitutes a very balanced source of Carbohydrates, Proteins, Fats, Minerals and essential Vitamins. According to Delisle, (1990), staple foods are defined as the food group or the specific food items providing the bulk of dietary energy. Staple foods are commonly thought of today in terms of providing calories. Wikipedia, (2013) also defines staple foods as contributing a major proportion of energy and nutrient needs, a mainstay of the diet; commonly consumed year round dietary components; and primary source of calories. In order to buttress this point further, Ifeanacho, (2009) also defined staple foods as the major and commonly consumed foods' by man.

Consequently, the specific Staple foods of different individuals may not be the same but may come from the same groups. These group include: cereals such as maize; starchy roots and tubers such as cassava, yams, potatoes, cocoyam; legumes, nuts and seed such as groundnuts; vegetables such as fluted pumpkin, waterleaf, bitter leaf; fruits such as oranges, pineapples, pawpaw (papaya), mangoes, sour soup; meat such as red meat (for example beef), games example bush meat, snails, poultry (chicken); fish such as catfish; seafood's for example shrimps, oysters, lobsters; eggs; fats and oils such as palm oil; beverages such as fruit juices, fermented drinks example palm wine; spices, herbs, flavorings and condiment such as cooking herbs example curry leaf, scent leaf (basil), melon seeds (egusi), bush mango seed (ogbono).

All the food items mentioned above are examples of some natural staples available in Nigeria particularly in Rivers State of Nigeria, of which with adequate supply, (availability), correct planning, observation of all diet planning principles and dietary guidelines can ensure adequate nutrition in the households. Adequate nutrition can be obtained through the consumption of a balanced diet. Adequate diet according to Ifeanacho, (2009) is a diet that contains the entire food nutrients in appropriate quantities. It is a diet that is so sufficient that it cannot be improved upon by the addition or subtraction of any food item. The crucial part of healthy eating is a balance diet. Supporting this statement, Nutrition/Diet, (2009) also defined a balanced, a good or adequate diet as a diet which contains all the different food groups in the right quantities. Wisconsin, (2013) also views adequate and appropriate nutrition in two dimensions: - adequate nutrition means Food Security: This means that residents have access at all times to nutritious and safe foods. They can obtain these foods in socially acceptable ways that is, through regular sources such as staple foods and through emergency coping strategies such as food pantries; Appropriate nutrition refers to foods that promote overall good health. Nutritious foods contribute to the healthy outcome for all family members, which could include healthy birth outcomes for pregnant women, lactating mothers, elderly grandparents, energetic uncles and aunts, teenagers, sedentary workers, manual workers and the growth and development of growing infants and children.

In another dimension, the researcher is also interested in studying existing diets in the area of study and seeking ways of improving these diets, through dietary modification, which according to Ifeanacho, (2009) is a process of correcting imbalances in diets. The imbalances may be in respect of calculated nutrients intake against recommended intakes. Generally the major aim of this research is to study these staple foods, their nutritional health benefits, find



out ways of effectively utilizing them to achieve adequate or appropriate nutrition in households in Rivers State, and possibly suggest ways of modifying existing diets to meet the nutritional needs of family members in the area of study.

### **Statement of the Problem**

Diet plays a crucial role in helping to prevent unfavorable health conditions. Several studies in the past have been carried out to buttress this point. Wikipedia (2014), states that by practicing a healthy diet, many of the known health issues can be avoided. Studies have also shown that Nigeria is endowed with a lot of natural staple foods which can also help to achieve adequate nutrition in families (Wikipedia, 2014). Consumers in Nigeria particularly in area of study have different perception of the importance and use of these staple foods. Some have put them to good use while others deprived themselves and families of the life giving properties of these foods by relegating them to the background, which ordinarily would have curbed the menace of some unfavorable health conditions where necessary (Osuji, 2014). Research over the last forty (40) years has shown that a healthy diet especially one rich in fruits, vegetables and whole grains coupled with regular prolonged exercise can both prevent and treat many age related diseases (Wardlaw & Smith, 2011). The problem of the present study therefore is to study households' usage of staple foods and suggest dietary modification enhancement strategies for improved nutrition in Rivers State, Nigeria.

### **Research Questions**

The following research questions guided the study:

1. What is the level of availability of staple foods in Rivers State?
2. What is the extent of usage/ consumption of the staple foods?
3. What are the major sources of these staple foods in achieving adequate nutrition?
4. How does the traditional/cultural belief affect the choice of staple foods consumed in area of study?
5. How does economic status influence the consumption of these staples to achieve adequate nutrition?
6. How does the educational background influence staple food selection in achieving adequate nutrition in the family?
7. What are the dietary modification enhancement strategies which can be adopted for adequate nutrition in Rivers State?

8. How can these dietary modification enhancement strategies if adopted influence adequate nutrition in homes in Rivers State?

### **Hypotheses**

The following null hypotheses were formulated for this study and were tested at 0.05 levels of significance:

HO<sub>1</sub>: There is no significant difference between the level of availability of staple foods in urban and rural areas in Rivers state.

HO<sub>2</sub>: The traditional/cultural belief of households does not significantly influence the choice of staple food consumed by urban and rural dwellers in Rivers state.

HO<sub>3</sub>: The economic status of households does not significantly influence the level of consumption of staple foods in Rivers state.

HO<sub>4</sub>: The educational background of households does not significantly influence the consumption of staple foods in urban and rural areas in Rivers State.

HO<sub>5</sub>: There is no significant difference in the perception of male and female household members on the dietary modification enhancement strategies for adequate nutrition in Rivers State.

### **Purpose of the Study**

The general purpose of the study was to examine households' usage of staple foods and dietary modification enhancement strategies in Rivers State of Nigeria

The specific objective was to:

1. Examine the level of availability of staple foods in Rivers State
2. Evaluate the extent of consumption of the staple foods in Rivers State.
3. Examine the major sources of the staple foods for achieving adequate nutrition in Rivers State
4. Find out how traditional/cultural beliefs about these foods can influence the feeding patterns of homemakers and families.
5. Determine how the economic status of the family can influence the feeding pattern and consumption of these staple foods.
6. Investigate the influence of educational background on the awareness and feeding pattern of the people in the area of study.
7. Identify some dietary modification enhancement strategies which could be adopted for adequate nutrition in Rivers State.

8. Investigate how these dietary modification practices if adopted can influence adequate nutrition in the area of study.

### **Significance of the Study**

This study will be of immense help to all food consumers in Nigeria particularly those from the area of study. Lecturers in Universities, Colleges of Education and Polytechnics will find this work as a good teaching aid and a reference material and everyone who believes in the saying “Waste not, Want not” as it will shed more light on the importance of Nigerian staple foods which is readily available, some even in our little gardens. This will create a better understanding on the use of these staples to ensure adequate nutrition.

The outcome of the study will also help meal planners, plan meals more effectively with little or less stress and also know that with effective planning, careful selection and use of what nature has endowed us with in the form of these various staple foods, adequate nutrition and good health can be achieved in our households. To the community nutritionists or extension workers, dieticians whose duty it is to ensure that the community or patient is well fed, this study will help them understand the food available in the area of study, how adequate these foods are to meet with the nutritional needs of the people and help to solve problems related to procurement, consumption and utilization of these available staple foods in the area of study. This study will also enlighten other researchers on our cultural diversities as regards to food, feeding patterns, the uniqueness of our staple foods and the varied cuisines which can be obtained from a combination of foods from various food groups.

The general goal of this research work is to help consumers find the best path to good nutrition with the available income through the appropriate use of our rich staple foods with high nutritional value and also erase the myth that good nutrition can only be obtained through the consumption of expensive imported food and meals. Maximizing the use of these staples will ensure household food security which can be translated into good nutritional status for all family members.

### **Delimitation/ Scope of the Study**

This study is designed to investigate households’ usage of staple foods and dietary modification enhancement strategies for better nutrition in Rivers State. This research work is delimited to twelve (12) Local Government Areas in Rivers State.

### **Operational definition of terms**

1. Anorexia: Is an eating disorder characterized by immoderate food restriction and irrational fear of gaining weight as well as a distorted body self-perception.
2. Binge Eating: A pattern of disordered eating which consists of episode of uncontrollable eating.
3. Maximize: making great use of an item.
4. Modification: To change slightly in order to improve it
5. Glycemic Index (GI): Glycemic Index is a measurement carried out on carbohydrate containing foods and their impact on blood sugar.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURES**

The review of related literatures will be discussed under the following headings:

1. Conceptual Framework
  - The Conceptual Framework of Food Security
  - Rural Food System Conceptual Framework
  - The Conceptual Framework of the Nutritional Status at Household level.
  - The Mediterranean Diet Pyramid
2. Definition and Importance of Staple Foods in the Diet
3. Contemporary Rivers State Food Habits
4. Factors influencing Households Usage of Staple Foods
5. Dietary Modification

#### **2.1 Conceptual Framework**

In every research work, there are various concepts that make up the topic. A concept is an idea or word that is logically arranged to communicate the desired meaning in a research. Eboh, (2009) described a conceptual framework as a schematic illustration of the causative mechanisms deducible from the research problems. It spells out the concepts and forms of relationships or interactions between them as well as the process or flow associated with the interactions. In this study, the conceptual framework shows the different factors influencing the adequate use of food (staple food) and its effect on the nutritional status at household levels.

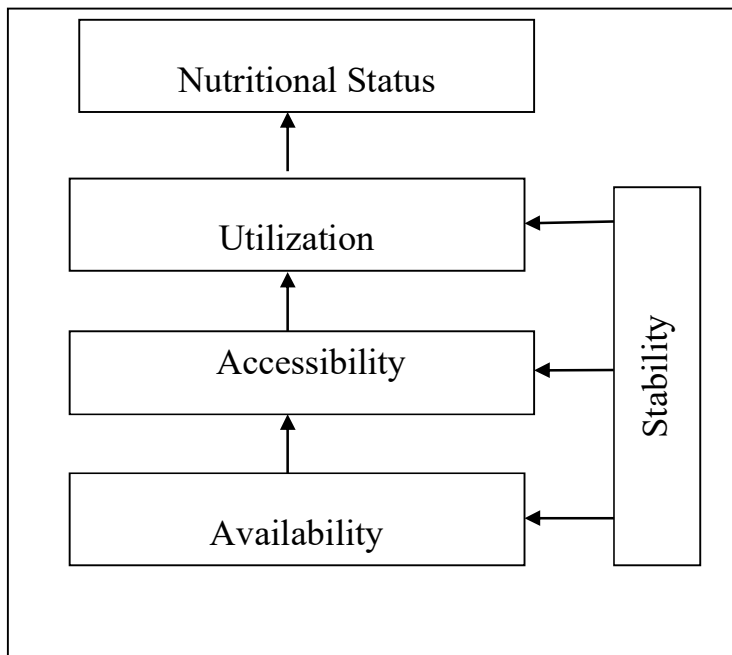
#### **Conceptual Framework of Food and Nutrition Security**

Figure 1: illustrates the relationship among the categorical elements within the conceptual framework of Food Security. Two determinants influence the framework: a physical and a temporal determinant.

The physical determinant is the food flow: Availability, Accessibility, and Utilization.

Availability is achieved if adequate food is ready and at peoples' disposal. Access is ensured when all household and all individual within those household have sufficient resources to obtain appropriate foods (through food production, purchase or donation) for a nutritious diet. Adequate Utilization (Maximization) refers to the ability of the human body to ingest and metabolize food. Nutritious and safe diets, an adequate biological and social environment, a proper health care to avoid diseases ensure adequate utilization of food. In most cases, utilization is only discussed from a biological perspective.

However, food also has an important social role in keeping families and communities together. In situations of food insecurity, this Food and Nutrition Security (FNS) can be achieved only when sufficient culturally adapted food (staple foods) is available within households and communities to meet its biological and social needs. Stability refers to the temporal determinants of Food and Nutrition Security (FNS) and affects all three physical elements. It is important to distinguish between chronic Food and Nutrition Insecurity (for example, repeated food shortages before harvest “seasonality” or lack of caring during harvest) and transitory food and nutrition insecurity (for example due to natural and man-made disasters).



**Fig. 1:** Model of Food Security and Nutrition

Adapted from, Rainer G. Nutrition & Food Security, 2010.

**Rural Food System Conceptual Framework**

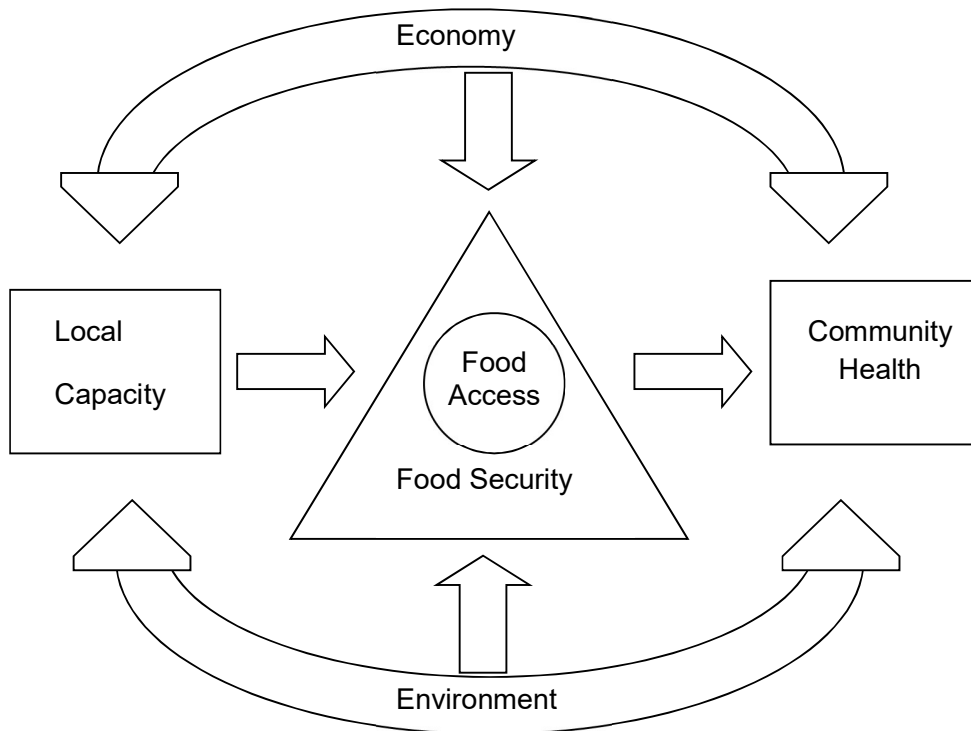
In the far left of the model (Fig. 2), Local capacity for food is written inside a square. This concept can be defined as the ability of the local area to produce, import and process food. There may be certain local products that are produced on a fairly large scale (for example apples, potatoes). There may also be small community and individual household gardens that serve to provide food at a smaller scale. In the model, the local capacity for food directly impacts food security and as a result, Food Access. For example, if you have a place where there is limited local capacity for food, such as occurs in a more urban environment, the food security of the region will be negatively impacted.

Food access was defined as people's ability to access healthy food, including not only the availability of healthy food, but its affordability and cultural appropriateness to the individual. The Food and Agricultural Organization, (FAO) (2006) defined Food security as the access by all people at all times to enough food for an active and healthy lifestyle. Food security and food access are two intertwined concepts. This model assumes that food access is a major component of food security, which is why the circle (Food Access) is set inside the triangle (Food Security) in the model. Food security is a macro-level concept, and food access is an important piece of that larger concept. The definition of food security implies that when food security is strong, so is food access.

Community Health is defined as the general health of the region or area. The Californian Center for Rural Policy (CCRP) takes a broad view of this concept and defined community health as consisting of the physical, social and economic well-being of the community. Ultimately, many factors affect community health. This model indicates that the economy, the environment and food security all have impact on community health. If a region has a solid economy and fertile environment that is conducive to diverse agricultural production, chances are that the food security of the region will also be good. Community health would also be good. Community health also is expected to be good given the influence of the positive economy, environment and food security and food access.

According to this model, two overarching contextual factors influence everything in the model: the Economy and the Environment. The Economy can be described as the general flow of commerce in an area. This consists of the ebb and flow of production and distribution of goods and services and would include things like local jobs, retail establishments, entrepreneurial opportunities and lending institutions. In the model, economy impacts local capacity for food, for example a farmer's access to capacity, marketing opportunities and production choices. The economy of a place influences people's general food security and their access to food. The economy influences things like an individual's purchasing power as well as the types of food available to a particular community. In all, higher income communities are going to have selection of diverse healthy and nutritious foods than poorer areas along with a greater ability to purchase such foods. The other major contextual factor that influences the entire model is the environment. The environment consists of the physical context of the place, including aspects such as: how rural or remote is the community? What is the topography? What prime soils exist in the region? The type of food produced in a region will ultimately be affected

by factors such as the climate, topography and soil type. The model highlights the role of place through the environment variable.



**Fig.2** Model of Rural Food System Conceptual Framework

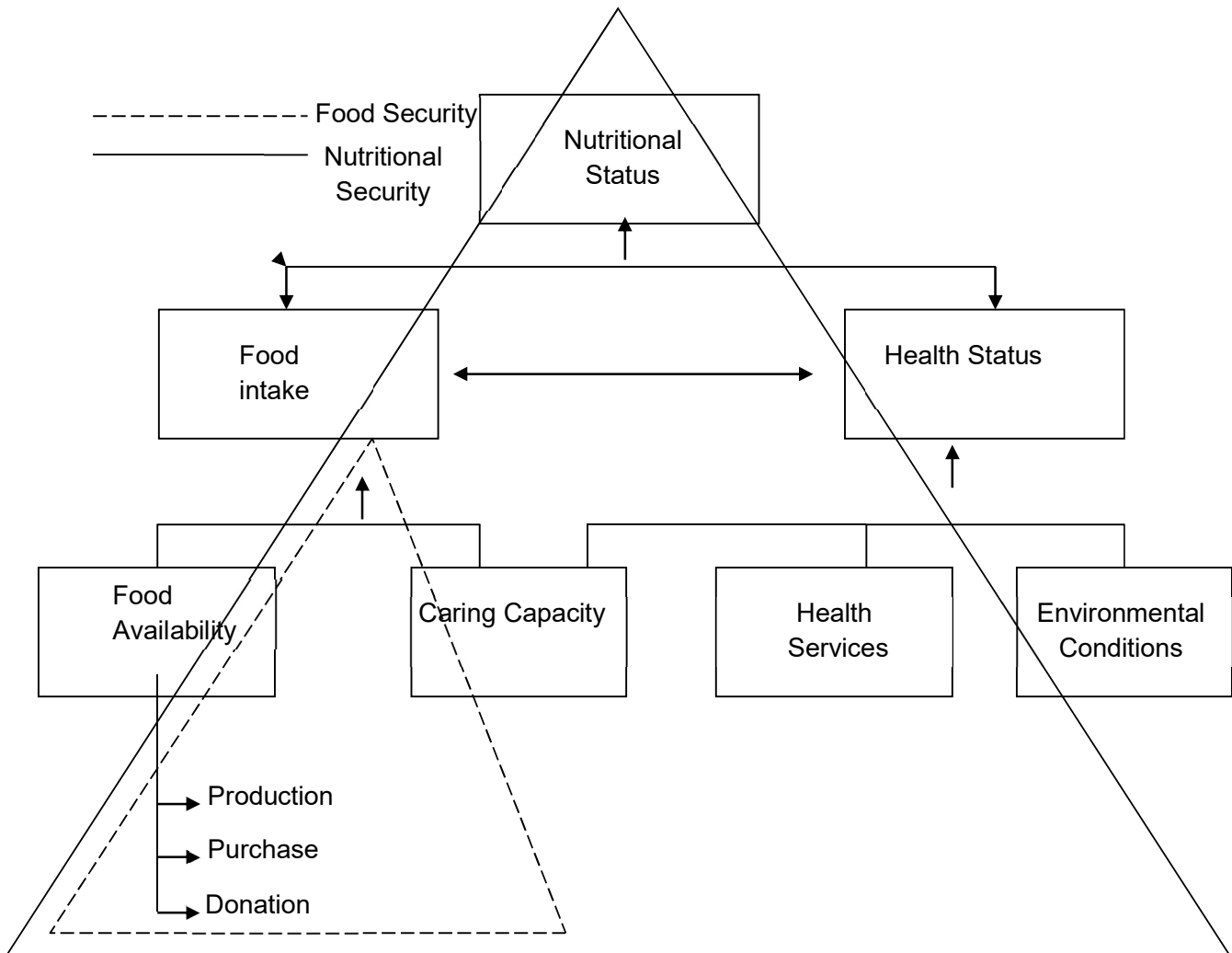
**Conceptual Framework of the Nutritional Status at Household Level**

**Fig 3** depicts a simplified causal model of linking nutritional status with ecological determinants at household level. In this model, the nutritional status is an outcome of food intake and health status. However, the underlying causes of health environmental determinants and health services have been depicted in different boxes due to their different natures. A reduced state of health care, poor housing and environmental conditions is possibly worsened by malnutrition, which predisposes individuals to diseases. The distinction between health services and environment is necessary to select appropriate intervention strategies.

The four underlying determinants of food intake and health status as influenced by four determinants have several contributing factors. For example as shown further in figure 3, food availability is affected by food production purchase and/or donation. This theoretical framework emphasizes the difference between “Food Security” and “Nutrition Security”. The first refers to



the area of causes and effects of food availability, here illustrated as the small dotted triangle. The latter refers to the entire relationships depicts in the large lined triangle.



**Fig. 3:** Model of Conceptual Framework of the Nutritional Status at Household Level (Rainer, FNS, 2010)

Figure 3 suggests a further important fact that should be taken into consideration when designing programs. The less direct the relationship between a causal factor of malnutrition and the nutritional status, the more time is required to improve the situation.

**The Mediterranean Diet Pyramid Theory**

The traditional Mediterranean diet is the heritage resulting from millennia of exchange within the Mediterranean basin region that has defined and characterized the eating habits of the countries in those regions until the mid-twentieth century. It is not a homogeneous model throughout the Mediterranean as it has regional variations, the common features of the Mediterranean diet is the abundance of plant-based foods such as cereals (in the form of bread, pasta, rice), vegetables, legumes, fruits, nuts and seeds, the use of olive oil as the main source of fat, a moderate consumption of fish, shellfish, poultry, eggs, and dairy products (fermented food products like yoghurt, and cheese), a consumption of small amounts of red meat and in the case of adults a moderate daily intake of wine (in permitting cultures).

The Mediterranean dietary pattern has been popularized through a pyramid representation which graphically highlights the frequency of the foods to be consumed. Many pyramids have been created since 1993 and 2009, Old ways Preservation & Exchange Trust updated the Mediterranean diet pyramid and copyrighted it. In response, the Mediterranean diet foundation together with the forum of Mediterranean Food Cultures, with the involvement of other institutions such as the CIISCAM (International Inter-University Center for Mediterranean Food Culture Studies) launched a new revised Mediterranean diet pyramid representation. This pyramid is the outcome of the internal dialogue within the scientific community and discussions at many meetings.

The new Mediterranean diet pyramid is a result of an international consensus and is based on the latest scientific evidence in the field of health and nutrition and hundreds of published scientific papers in the last few decades consequently contributing to the harmonization of educational tools used in the promotion of the Mediterranean diet and responding to the need for a common framework along Mediterranean countries. A broad group of experts in various disciplines such as nutrition, anthropology, sociology and agronomy agreed on a new pyramid that enriches previous designs with the incorporation of various social, cultural and environmental friendly aspects. The new Mediterranean diet pyramid entails this evolution of society and stresses the importance of physical activity, conviviality and consumption of local, seasonal and traditional products (Esruich, Bach-Faig, Stracker, Martinez, Kussman, Kandili, Kolokotroni, Vlachos, Koulochera, Balenzano, Romano, Lumelli, Massoud, Jabri, Adib, Khaldi, Sfayhi, Hsairi, & El Ati (2013).

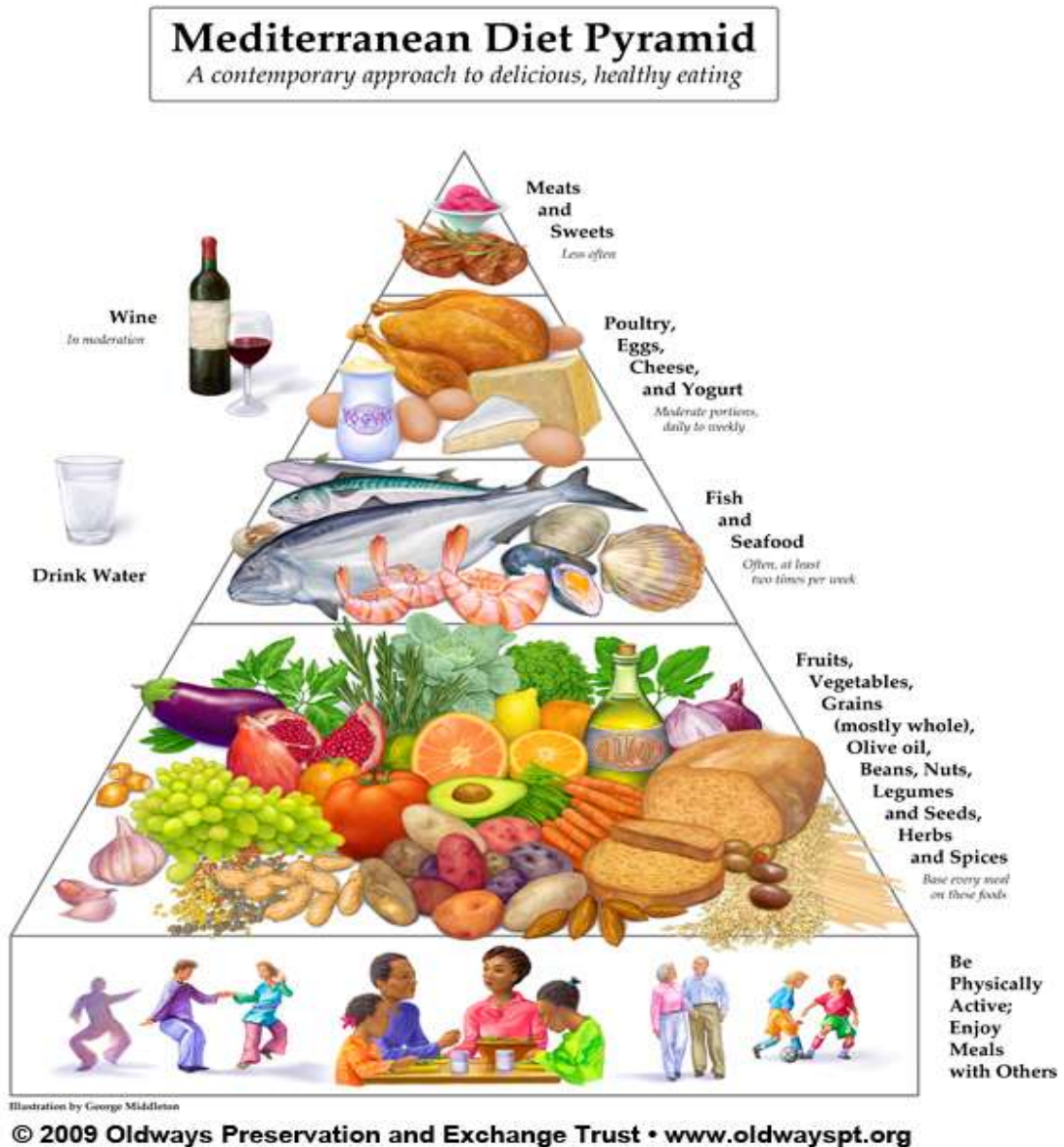


Fig. 4: The Mediterranean Diet pyramid

This work will be hinged on the Mediterranean diet theory because the health benefits and protective effects against chronic diseases of the Mediterranean diet have been well established by scientific community. The pyramid includes all the food groups; a healthy or unhealthy diet relies on its proportions and frequencies. Moreover, social and cultural elements characteristics of the Mediterranean lifestyle are also important. So, it is not just about

prioritizing some food groups over others, but also paying attention to the way they are selected, cooked and eaten. It also reflects the composition and number of servings per meal. Foods that should sustain the diet are located at the base of the pyramid and foods to be eaten in moderate amounts are located in the upper levels. Plant-based foods, positioned at the base of the pyramid, provide key nutrients and protective substances that contribute to general well-being and maintain a balanced diet, and should be consumed in high proportions and frequency. Foods situated in the upper levels such as those from animal origin, rich in sugars and in fat should be eaten in moderation and left for special occasions. The pyramid establishes daily, weekly and occasional dietary guidelines in order to follow a healthy and balanced diet. The Mediterranean diet is a pattern of food proportions, rather than a set list of particular products, ‘super foods’ or recipes. As such, there are many possibilities to be creative using locally sourced and affordable produce, according to one’s taste.

## **2.2 Definition and Importance of staple foods in the diet**

Food is that which nourishes the body .It may also be defined as anything eaten or drunk, which meets the needs for energy, building, regulation, protection and repair of the body. In fact food is the raw material from which the body is made. Intake of the right kinds and amount of food can ensure good nutrition and health, which may be evident in one’s appearance, efficiency, and emotional well-being (Ejiofor, n.d.).

Food serves several functions

(a) Physiological functions of food:

- to provide energy to sustain and continue life activities;
- to build the body from birth to adulthood;
- to repair or replace worn out tissues of the body and
- to regulate activities of the body such as beating of the heart, muscle contraction, removal of waste products.

(b) Social functions of food:

- food is a central part of our social existence;
- it is used for social, cultural and religious purposes;
- it is used in homes, temples and churches for celebrating festivals, birthdays, marriages and
- it has also been used as an expression of love and friendship.

(c) Psychological function of food:

- food can be used satisfy emotional needs;
- it provides one with a sense of security, attention and
- familiar food gives security, while unfamiliar food enlarges our food experiences even though not satisfying.

A staple food, sometimes simply referred to as a staple, is a food that is eaten routinely, and in such quantities that it constitutes a dominant portion of a standard diet in a given population. It supplies a large fraction of the needs for energy – rich materials, and generally a significant proportion of the intake of other nutrients as well (Wikipedia, 2013).

Staple foods vary from place to place, but typically they are inexpensive or readily available foods that supply one or more of the three organic macro nutrients needed for survival and health, (carbohydrates, proteins and fats). Typical examples of staples include: roots or tuber crops, grains, legumes and other seeds. The staple food of a specific society may be eaten as often as every day or every meal. Early civilizations valued the foods that they established as staples because in addition to providing necessary nutrients, they generally are suitable for storage over long periods of time without decay. Such storable foods are the only possible staples during seasons of shortage, such as dry seasons or old temperate winters against which times harvests have been stored; during seasons of plenty wider choices of foods may be available. (Nwokoma, 2003).

Most staple foods are derived from cereals such as wheat, barley, maize or rice or starchy tubers or roots vegetables such as potatoes, yams, cocoyam and cassava, other staple foods include pulses (dried legumes) and fruits such as breadfruit and plantains. Staple foods may also contain sorghum, olive oil, coconut oil, palm oil and sugar depending on the region. Most staples are plant materials but in some communities, fishing is the primary source of nutrition. Nigerian foods are diverse and exciting. They are often unrefined foods rich in dietary fiber, low Glycemic Index (GI) carbohydrates and wide range of highly nutritious and vitamin rich combinations. When people talk about foods eaten in Africa in general and Nigeria in particular, they tend to forget that items highly sought after in Western countries like cassava, yams, plantains, palm oil, coconut and coconut oils, Nigerian brown rice and beans do not grow in the West. Most of these items come from Africa, Asia and South America, yet they make up the bulk of Nigerian and African foods. Tropical fruits such as oranges, tangerines, mangoes, pawpaw, African breadfruit, banana, and African bush mango seed (Ogbono) and, carrots to name but a few, these are everyday items that make up the Nigerian dishes (Osuji, 2014).

For Nigerians in Nigeria, it is obvious that they will continue to enjoy the delicacies of their inheritance with its attendant health benefits. They need to be confident that well prepared African food whether in Nigeria or Ghanaian or Zimbabwean is rich in nutrients and constitutes a very balanced source of carbohydrates, protein, fats, minerals and essential vitamins. For Nigerians in Diaspora, and even more so for their offspring born abroad or living in the West, it is important that they do not relegate their Nigerian food dishes to the background in favour of Western diets. This is strictly for health and nutritional reasons. Medical evidence abound that the unrefined African food is superior in helping to maintain good health (Ajala, 2006).

Below are evidence-based scientific reasons why we should regularly include Nigeria foods items (staple foods) in our menu. The researcher wishes to discuss a few of these African food items especially those available in the area of study, that makes up typical Rivers cuisines under the different food groups / classification, the classification of these food items is essential to the study of nutrition because by grouping together foods with a similar nutrient content, it is possible to choose from a wide variety of alternatives if certain foods becomes scarce.

### **Cereals Group**

This group includes rice, wheat, maize, sorghum or guinea corn, millet and their products. The importance of foods in this group is that they are easy to store and therefore available all the year round, provided there has been a successful harvest. In addition, they are economical sources of energy, b-vitamins, minerals and protein. Whole grains retain the germ, and the b vitamins and minerals are concentrated in the outer layers of the grain. Cereals can lose appreciable amounts of water-soluble vitamins due to the methods of cooking or preparation (Onyebueke & Souzey, 2004).

**Risk of excess consumption:** none known (some people are intolerant to gluten)

One example of cereal that is, home grown by the people in area of study is the maize, others are from neighboring communities.

### **Maize (Corn)**

Maize is a seasonal cereal crop, which grow very well in the Southern states of Nigeria just as millet and guinea corn grow well in the Northern states. Maize is an energy-giving food because of its high carbohydrate content, though it contains other useful nutrients in varying

quantities (Nwokoma, 2003). While it might sound surprising to some people who are used to thinking about corn fiber as a plain staple food, or a snack food, or a summertime party food, corn is actually a unique phyto-nutrient – rich food that provides us with well-documented antioxidant benefits with high digestive benefits. Recent research has shown that corn can support the growth of friendly bacteria in our large intestine and can also be transformed by these bacteria into Short Chain Fatty Acids (SCFA). (Corleone, 2015; Thisday live, 2014). These SCFA's can supply energy to the intestinal cells and thereby help to lower the risk of intestinal problems including a risk of colon cancer... given its good fiber content, its ability to provide many B-complex vitamins including vitamins B1, B5 and Folic acid and its notable protein content, corn is a food that would be expected to provide blood sugar benefits. Fiber and Proteins are key macronutrients for stabilizing the passage of food through our digestive tract. ([The George Matelijan Foundation](#), 2014).

In countries outside of the US, numerous studies have examined the ability of corn to improve overall nourishment, especially when combined with legumes. Maize (Corn) – Bean meals (typically consumed in the form of porridge that combines these foods) have been shown to help improve overall nutrient status and to help provide outstanding nutrient richness in the diet. One fascinating new area of research on corn involves its potential anti-HIV activity. Lectins are special proteins found in virtually all foods (and for that matter in virtually all organisms) that can bind onto carbohydrates receptors that are found on cell membranes. In the case of some micro-organisms (including the HIV virus), the binding of Lectins onto sugars has been shown to help inhibit activity of the virus. One specific Lectin found in corn (called GNA maize) has preliminarily been shown to possess this HIV-inhibiting property. (Hoorelbeke, Van Damme & Rough, 2011; Akkouh, Ng, Singh, Yin, Dan, Chan, Pan & Cheung, 2015).

### **Starchy Roots and Tubers Group**

Starchy roots and tubers are the underground stem starch storage organs of some plants and they belong to several plant families. They are a very important group of staple in the tropics. They include cassava (*Manihot*spp); yam (*dioscora*spp); Irish potatoes (*solanuntuberosum*) and cocoyam (*colocasiaspp* and *xanthesomaspp*).

## **Cassava**

Cassava is a crop of great importance in the food systems in the area of study (Rivers State). About 200 million people in entire African Continent depend on it for their livelihood. Supporting this FAO (2014) reported that no continent depends as much on roots and tuber crops feeding its population as does Africa. Cassava (*Manihot esculenta*) ... is an important source of food in the tropics. Cassava ranks second as the second most important staple food in sub-Saharan Africa, as the root is a cheap source of carbohydrate for human and livestock (Nwokoma, 2003). It is much valued because of its ease of propagation from stem cuttings and its economy of production, normally planted in mounds or ridges. It is one of the best root-crops that give higher yields. As a result, most Nigerian house-wife's no matter how poor is able to cultivate cassava in her farm or backyard garden. Cassava is also valuable to us as a staple food that it provides about 70-85% of the total energy food of our people (Nwokoma, 2003).

Cassava consists of two popular species that are commonly grown in Rivers State. The bitter cassava (*Manihotutilissima*) and the sweet cassava (*Manihotpalmata*), though research has shown that cassava roots contain hydrocyanic acid which is poisonous if the roots are eaten raw, therefore they are subjected to a lot of processing methods so as to remove or reduce this toxin to the barest minimum before consumption. Cassava is so valuable in this part of the country that it is processed and eaten in numerous traditional ways. The sweet cassava has a sweet taste as its name implies, its other names are iwa-panya, or akamiwa (igbo), abruei (ogba). The sweet cassava is recognized through its red leaf stalk and outer cortical layer which has a purple colour. The root contains little hydrocyanic acid because a high concentration is confined to the skin and outer cortical layer; as a result, this specie is safer for consumption (Nwokoma, 2003).

Nutritionally, cassava pulp contains about 62% water (Moisture), 35% Carbohydrates which is mainly starch, 1% protein or 3% fat, 1-2% fiber and 1% ash. It contains calcium, Phosphorus and iron in relatively high amount when compared to other minerals. It is also rich in vitamin C but contains small amounts of niacin, vitamin A, B, and B<sub>2</sub> (Ifeanacho, 2009). Cassava root is processed into various products and is put into several uses in Rivers State. Cassava is almost omnipresent in Africa and certainly in Nigeria. From it comes a vast range of Nigerian food recipes like garri made into eba, lafun, tapioca, cassava dough, cassava foo-foo, boiled cassava, starch served with banga soup, cassava chips, cassava based bread... cassava is world acclaimed to be gluten free. It is a good substitution for bread and wheat product in the diet of those who suffer with Coeliac disease and other related gluten "enteropathies". It



is also very rich in fiber and it is again low in GI Carbohydrates and therefore recommended for diabetic patients (Muanya,2012; Osuji, 2014).

### **Yams (*Dioscorea rotundata* poir) (white yam)**

Yam is the common name for some plant species in the genus *Dioscorea*, (Family Dioscoreaceae) that form edible tubers. These are perennial herbaceous vines cultivated for the consumption of their starchy tubers... there are many cultivars of yam. Yam can be barbecued, roasted, fried, grilled, boiled, baked, smoked and when grated it is processed into a dessert recipe. Yams are staples for the Rivers people of Nigeria, and they commemorate it by having yam festivals known as Egwu-Ogba, Nchaka depending on the community (Ellah, 2014)

Yams are so important for survival in the area of study as some varieties of these tubers can be stored up to six months without refrigeration which makes them a valuable resource for the yearly period of food scarcity at the beginning of wet season. Yam provides around 110 calories per 100 grams. Yam is high in Vitamin C and B6, Potassium, Manganese and dietary fiber while being low in saturated fat and sodium. A product that is high in Potassium and low in Sodium is likely to produce a good Potassium-Sodium balance in the human body and so protects against osteoporosis and heart disease. (Nwokoma, 2003).

### **Potatoes**

There are two common varieties of potatoes, the sweet and the Irish. The sweet variety is a tropical crop grown also in Rivers State. The Irish is only imported to Rivers State because it is a temperate crop that can grow only in regions with high latitude for example in Plateau State, Nigeria (Substantially in Jos). It is a surprise for many to discover one medium potato (5.3 Ounce) with the skins contains:

- 45% of the daily value of Vitamin C
- More Potassium 620milligram (mg) than even bananas, spinach or broccoli.
- 10% of the daily value of Vitamin B6
- Trace amounts of thiamine, riboflavin, foliate, magnesium, phosphorus, iron and zinc... and all this for just 110 calories and no fat, sodium or cholesterol. (Ifeanacho, 2009).

Sweet Potatoes is a very rich food, on the average, it is even richer than the Irish potatoes when compared. The carbohydrate of the sweet potatoes is highly digestible and soluble, In fact between 4-7% of the carbohydrate in sweet potatoes occurs as sugar. This accounts for the sugary taste of the sweet potatoes. The tuber is rich in the enzyme called diastase and most of the starch is converted to maltose during cooking. The protein of sweet potatoes is of high

biological value as it contains all the ten amino-acids in good proportion. As a result, it is a good food for growing children. The carbohydrate of sweet potatoes is highly soluble and easily digestible. It is therefore, very suitable for infants, old people and invalids with weak digestion. (Nwokoma, 2003).

Nwokoma, (2003) stated further that the sweet potatoes are rich in Carotene (which is converted to Vitamin A in the body) especially the yellow varieties. It is also rich in ascorbic acid or vitamin C. The leaves of the sweet potatoes are edible and a very valuable source of vegetable protein. Potatoes are vegetables. The popular tuber counts towards the total recommended serving of vegetables. One medium-size Potatoe (5.3ounce) counts as 1 cup of starchy vegetables. Potatoes can be part of a weight loss regime; potatoes contain antioxidants, the amount and type depend on the variety of potatoes, but the predominant antioxidants are Carotenoids and Anthocyanins (Schoffro, 2014). Among the roots and tubers, potatoes are the only group that have relatively higher amount of other nutrients in addition to carbohydrates. Thus, they are useful sources of protein especially when consumed in large quantities. They contain significant amount of Iron and the B Vitamins and can be good source of Vitamin C when consumed in larger quantity and cooked in jacket. This is because nutrients are concentrated more in the jacket than the inner portions. In addition the sweet variety contains good quantities of minerals like potassium, calcium, phosphorus, sodium, chlorine, copper and marginal potatoes are eaten, boiled made into pottage, with other ingredients and spices, chopped and fried into potatoes chips, roasted and served with tomato sauce, grilled and eaten with palm oil. (Ifeanacho, 2009).

Risk in excess: high available starch content associated with increased risk of type 2 diabetes.

### **Cocoyam**

Cocoyam is a tropical starchy root crop. There are many varieties of cocoyam but the most common are “*Colocasia esculenta*” and *Xanthosomasagittifolium* root”. Cocoyam contains a high percentage of Carbohydrate, Protein, Fat, Calcium, Phosphorus, Iron, Vitamin A, Thiamine, Riboflavin, Niacin and Vitamin C. Just like Yam, the outer peels of the corms and commels contain more Proteins, Vitamins and mineral salts. To derive more and best nutrient from cocoyam, wash and boil the cocoyam with the outer skin, when it is cooked, peel

off the outer skin with hand exposing the greenish slippery brown colored covering which contains most of the Proteins, Vitamins and Mineral salts in the cocoyam. (Nwokoma, 2003).

Nwokoma further stressed that, it was important to note that most of these nutrients are lost when the back of the cocoyam is peeled off with knife before boiling. Comparatively, cocoyam contains more protein than other root crops like cassava, yam and sweet potatoes peeled or unpeeled. The protein of cocoyam is rich in most of the essential amino acids and the sulphur bearing amino acid is greater in cocoyam than in other root-crops.

Although these two varieties are edible, *Xanthosoma sagitifolium* root is usually boiled, roasted, steamed and sometimes pounded to make fufu meals, the leaves are very nourishing if used to prepare food as they are rich in protein, fat, carbohydrate, fibre, iron, very high in vitamin A, phosphorus and vitamin C. Some communities in Cross-River State, Anambra, Imo and Abia States use the cocoyam and its tender leaves to prepare soup. The efik dish, “ekpankwukwu” prepared with grated cocoyam wrapped with the leaves and cooked with fish, crayfish, palm oil and other ingredients in a very rich dish. While *Colocasia esculenta* is used mostly in Rivers State to thicken soups, when made into paste “Colocasia Esculenta” is used for adding viscosity to Nigerian soups such as Bitter leaf soup, Ofe owerri (Nsala soup); oha/ora soup, ofe owerri and a lot more (Nky, 2013)

The nutritional value of cocoyam; Cocoyam is very rich in Vitamin B6 and Magnesium, which help control high blood pressure and protects the heart. It is very rich in dietary fiber too and good for proper glucose metabolism. Popular amongst diabetics in Africa, may be due to its content of loose carbohydrates in form of starch, rather than sugar. This is supported by Nwokoma, (2003). The starchy grains of cocoyam are very small and easily digestible when compared with the starch grains of yams and other root crops. So cocoyam dishes are recommended for children, invalids and people with weak digestive system.

### **Legumes, Nuts and Seeds Group**

Legumes, pulses, peas or beans belong to the family leguminosae. They are plants that bare fruits in pods, which are casings with two halves or hinges. Legumes are a very healthy food because it is low in fat and high in protein, legumes are also very high in fiber and other nutrient, and are made up of beans, lentils, peas, peanuts. Legumes are rich in Calcium, dietary fiber, folate, iron, magnesium, phosphorus, potassium, protein, and riboflavin, Thiamine, Vitamin B6, and Zinc (Dieticians Association of Australia, 2015).

Generally, legumes are a good source of diet protein (17-25%) about twice the levels in cereals except for soybeans that contains about 40%. The protein is rich in lysine and tryptophan (deficient in cereals) but low in the sulphur-containing amino acids (abundant in cereals). This makes the combination of cereals and legumes a good source of good quality protein. Fat content of legumes is low except soya beans and groundnuts which contain 18% and 40% respectively. The fibre content of legumes is relatively high; the presence of fibre in legumes confers some physiological functions on them. Such functions include diet bulking which helps in intestinal motility and consequently helps in preventing intestinal cancer. (Ifeanacho, 2009). Legumes used as food for man include cowpea (*VignaUnguiculata*); soyabeans (*glycine max*); Pigeon Pea (*CajanusCajan*); groundnut (*anachishypogaea*); Lima bean, and so many others, some are used as food, while others are used either as thickeners or condiments.

Risk in excess consumption: are high in energy and therefore traditionally thought to be associated with weight gain in excess. Avoid salted nuts-high salt intake is associated with high blood pressure. People with nut allergy should also avoid nuts.

### **Peanuts**

Also known as Groundnuts, peanuts along with beans and pods are members of the legume family which are the best sources of protein in the plant kingdom. Peanuts are found in a wide variety of products. They can be eaten salted, dry, roasted, boiled and even raw. They can be found in peanut brittle, peanut butter, candy bars and is often a major ingredient in mixed nuts. Peanuts are very nutritious with lots of health benefits. Some of these health benefits as outlined by CNN News, (2007) and other studies include:

- **Helps Promote Fertility (Folate):** Peanuts contain a good amount of folate, repeated studies have shown that women who had a daily intake of 400 micrograms of folic acid before and during early pregnancy reduced their risk of having a baby born with a serious neural tube defect by up to 70%
- **Aids in Blood Sugar Regulation (Manganese):** one fourth cup of peanuts can supply the body with 35% of the daily value (DV) of manganese, a mineral which plays a role in fat and carbohydrate metabolism, calcium absorption and blood sugar regulation.
- **Helps Prevent Gallstones:** It may come as a surprise that peanut can help prevent gallstones; 20 years of studies have shown that eating 1 ounce of nuts, peanuts or peanut butter a week lowers the risk of developing gallstones by 25%. (The New York Times, 2014).

- Helps fight depression (Tryptophan): Peanuts are good sources of Tryptophan, an essential amino acid which is important for the production of Serotonin, one of the key brain chemicals involved in mood regulation. When depression occur a decreased amount of serotonin may be released from the nerve cells in the brain. Tryptophan may raise Serotonin anti-depressant effects when there is an increased amount of Serotonin in the blood. (Richard, Dawes, Mathias, Acheson, Hill-Kapturczak & Dougherty, 2009).

- Boost Memory Power (Vitamin B<sub>3</sub>): Peanuts are tagged “brain food”. This is due to their vitamin B<sub>3</sub> or niacin content whose many health benefits include normal brain functioning and boosting memory power, boosting mood and happiness (Graef, 2009).

- Helps lower cholesterol levels (Copper). The same nutrient which gives peanuts their memory enhancing power also helps lower and control cholesterol levels. Added to that is their copper contents which aids in reducing bad cholesterol and increase good cholesterol levels (The George Matelijan Foundation, 2015)

- Lowers Risk of Heart Disease: Numerous studies have shown that regular nuts consumption is linked to reduced risk of heart disease. Peanuts are rich in heart friendly monosaturated fats and anti-oxidants such as oleic acid. Reach for a handful of peanuts and other nuts at least four times a week to reduce your risk of cardiovascular and coronary heart diseases (American Society for Nutrition, 2008).

- Protect Against Age-related Cognitive Decline (Vitamin B<sub>2</sub>): Study participants have shown that those who have an intake of the most naicin-rich foods like peanuts were 70% less likely to have developed Alzheimers disease. A quarter cup a day of peanuts can already supply almost a quarter of the daily needed value of niacin. (Arya, 2014)

- Cancer Protection: A form of phytosterol called beta-sitoserol (SIT) is found in high concentrations in some plants oils, seeds and legumes including peanuts. Phytosterols not only protects against cardiovascular diseases by interfering with the absorption of cholesterol, they also protect against cancer by inhibiting their growth.

- Lowers Risk of Weight Gain: Surprise: eating nuts regularly is associated with a lower risk of weight gain. Research has shown that people who eat nuts at least twice weekly are much less likely to gain weight than those who almost never eat them. (CNN News, 2007; Mattes, 2014).

### **Fruits and Vegetables Group**

Nigeria is blessed with many seasonal fruits as follows: Oranges, Grapefruits, Guavas, Avocado Pear, native pears, Apples, Pineapples, Cashew, Mangoes, Lemon, Pawpaw (papaya), Tomatoes, Banana, Udara (*Chrysophyllinalbidum*) and so many others. Fruits and vegetables not only taste good/great but researches as we will see below, also proves that they can help promote health and fight diseases. Consider the following by Doles Nutrition (2010).

- The U.S Department of Agriculture (USDA) recommended that eating a minimum of nine (9) Servings of fruits and vegetables a day could possibly cut your stroke risk by half.
- Eating fruit and vegetables books bone-mineral content. “A University of Tennessee study revealed that girls ages 8 to 12 who consumed more than three servings of fruits per day had greater bone mass (and less calcium exertion) than those who consumed fewer than three servings. Fruits and vegetables help the body hold on to calcium as well as supplying many other often over looked nutrients such as potassium, folate, vitamins K and C, which support bone health (Doles Nutrition News, 2007)
- Eating more fruits protects your heart: French researchers analyzed nine studies involving more than 220,000 individuals and found that the risk of cardiovascular problems declined as fruit intake increased. (Doles Nutrition, 2010).
- Fruits are very poor source of protein and fat. Avocado is the exception containing 28 percent fat.
- Fruits contain high amount of moisture hence they are highly perishable. They are also good source of fiber.
- Fruits are not very good sources of calories. Fruits like bananas give fairly good amount of calories. Ripe fruits contains a higher percentage of sugar than unripe fruit and the sugar is chiefly in the form of sucrose, fructose and glucose.
- Generally, fruits are poor source of iron.
- Mangoes are the excellent source of Carotenes. Apart from mango, papayas are good sources of Beta-carotene. Oranges are fairly good sources of Beta-carotene.
- Guavas are the best source of Vitamin C. Citrus fruits are also a very good source, Cashew fruits are inexpensive and rich in vitamin C. Although there is variation of vitamin content from fruit to fruit. Most fruits in the raw state contain some ascorbic acid. (If fruits are bruised, peeled, cooked or exposed to air, alkali or copper, large amount as of the vitamin may be oxidized.

- Apples, pears, cherries, grapes and citrus fruits contain flavonoid which acts as antioxidants. (Srilakshmi, 2009).

## **Bananas**

Bananas are exceptionally healthy food, which produces numerous health benefits. It is a versatile fruit that contains many nutrients including vitamins A, B, C and E along with minerals like Potassium, zinc, iron, manganese. Just as eating a banana helps in utilizing the banana nutrition to keep your body in good health and great shape, while application of this fruit on your hair and skin will help you to keep them in great condition. The banana health benefits are numerous and are outlined and discussed below by Dsouza, (2014) and other related studies.

- It gives instant surge of energy: It does this by converting the natural sugars into energy instantly and this is one of the reasons sportsmen consume it during intervals. Bananas are an excellent breakfast for kids and adults as it provides required energy throughout the day. This is probably the most popular health benefit.

- It helps keep blood pressure under control: A report by British Broadcasting Corporation (BBC) News in (2014) confirms that potassium keeps blood pressure under control and improved consumption of calcium, potassium and magnesium can also help decrease high blood pressure. Bananas are rich in potassium, calcium and magnesium, so it is a healthy option for keeping blood pressure in check. The study further stated that two bananas a day keeps blood pressure at bay.

- It helps lower cholesterol: It is said that pectin which is soluble fibre in bananas helps to lower cholesterol levels (Clacher, 2015)

- It supports renal health: Banana being a rich source of potassium, if consumed regularly in moderation, promotes renal health. The International Journal of Cancer (2014) states that bananas being a rich source of antioxidant phenolic compounds, if consumed together with cabbage and root vegetables protect renal health.

- Banana improves nerve function and enhances brain power: Banana is a rich source of vitamins and therefore perks up nerve functions. Potassium in banana keeps the mental faculties vigilant and boosts learning abilities.

- It decreases the risk of stroke: According to an article published in the Guardian (2013), eating potassium rich foods such as bananas can help keep your blood pressure under control.

- Bananas reduce risk of cancer: Rich in antioxidants and dietary fibre, consumption of bananas reduce risk of various types of cancer especially bowel cancer.

- It helps build healthy bones: Probiotic bacteria present in bananas are said to have astonishing ability to absorb calcium in the body. Hence, consuming bananas helps in building better bones. Banana is extremely rich in a compound called fructooligosaccharides which nourishes the bacteria in the colon allowing for an increase in the production of digestive enzymes and vitamins that helps in the absorption of important bone-strengthening nutrients such as calcium and magnesium.

- Banana enhances digestive ability: It is very rich in the substance known as fructooligosaccharide which acts as a probiotic (friendly bacteria). It stimulates the growth and activity of probiotics in the Colon and produces enzymes that enable absorption of nutrients thus, enhancing the digestive ability and preventing unfriendly bacteria from harming the body. (Goldschmidt, 2014)

### **Pineapple**

This sticky and sweet tropical fruit is a favourite with adults and children of all ages. Pineapple is the second most popular tropical fruit next to banana. Some people find pineapples as a very luxurious and even exotic fruit. Eating this delicious fruit on regular basis provides immense health benefits. Here are a few health benefits as outlined by (Sammy, 2014).

- Loaded with Vitamins and Minerals: The obvious benefits of pineapple are all the vitamins and minerals the fruit is loaded with, some nutrients which includes calcium, potassium, fiber and vitamin C. In addition it is low in fat and cholesterol.

- Strengthens weak bones: One of the benefits of pineapple is that it helps to build healthy bones. Pineapples are rich in manganese, a trace mineral that is needed for your body to build bones and connective tissues. Just one cup of pineapple provides 73% of the daily recommended amount of manganese. The benefits of pineapple can affect the growth of bones in young people and the strengthening of bones in older people.

- Good for Gums: The gums are very important to keep healthy. They gums hold the teeth in place and the teeth would be in bad condition if the gums are unhealthy. By eating pineapple, the gums are strengthened to make it through the hard years later.

- Prevents Macular Degeneration: Pineapples contain a lot of Beta-carotene that is good for the eyes and for good vision. Studies show how that eating three or more helpings of pineapple a day may lower ones risk and progression of age-related macular degeneration, the main cause of vision loss in older folks (Medical News Today (MNT), 2015).



- **Helps Arthritis:** Bromelain is also considered an effective anti – inflammatory. Regular ingestion of at least one half cup of fresh pineapple daily is purported to relieve painful joints common to osteoarthritis, it produces mild pain relief. In Germany, bromelain is approved as a post-injury medication because it is thought to reduce inflammation and swelling.
- **Coughs and colds:** While many people often take extra vitamin C or drink extra Orange juice when they have a cold, few consider eating pineapple. The benefits of pineapple when you have a cold or cough are the same as the benefits of orange juice, but there is an additional benefit of pineapple. bromelain, which is found in Pineapples, has been found to help suppress coughs and loosen mucus.
- **Digestion:** The bromelain found in pineapples aids in digestion. Eating one slice of pineapple after each meal will reduce gas, bloating, nausea, constipation and the symptoms of irritable bowel syndrome. Fresh pineapple juice aids in removing intestinal worms.
- **Sinusitis and Bronchitis:** Bromelain has been shown helpful for upper respiratory tract infections such as sinusitis and bronchitis. bromelain helps to reduce nasal inflammation and breakup the mucus in the nasal, sinus and respiratory area.
- **Blood clots:** Pineapples can help reduce the risk of blood clots due to the bromelain present in the fruit and thereby preventing heart problems.

When one eats pineapples, it creates a better chance of having a healthier life. Doctors have been preaching the eating of fruits for centuries. There are always good things that come from fruits. Being aware of all the benefits of fruits, gives one the knowledge of what to take for the day. By eating fruit, we have a happy, healthier life.

### **Pawpaw (Carica Papaya)**

1. **Papaya contains Antioxidants:** One of the benefits of eating papaya is that it helps to prevent Cancer. Papaya is a rich source of antioxidants that the body needs to fight against cancer-causing cells. Vitamins C, E and beta-carotenes are anti-oxidants, which prevent all kinds of Cancers. So adding a daily serving of papaya to your diets may lessen your risk of developing Cancer. (Hulda, 2008).

2. **Papaya is used to treat digestive disorders:** Papaya is a great source of proteolytic enzymes that are very important in digesting food. The most important of these proteolytic enzymes found in Papaya is Papain. Papain breaks down proteins in food, allowing for better digestion. Papain is used in prescription of digestive enzymes to treat individuals with cystic fibrosis or pancreatic conditions producing for them what the body cannot produce naturally.

Eating Papaya is also a benefit because Papain taken orally treats less serious digestion disorders such as bloating and chronic indigestion. In these cases papain is extracted, dried and sold as tablets (Case, 2010)

3. Papaya boost male virility: Another great benefit of papaya is to boost male virility. Papaya contains an enzyme called arginine which is known in the medical community to boost blood flow around the man-hood. Arginine boosts nitric acid in the body to relax the muscles surrounding the blood vessels that supply the man-hood. These blood vessels then dilate and increase blood flow. A more concentrated form of arginine is used to treat erectile dysfunction, this supported by Hobs & Haas (2014).

4. Papaya prevents premature Aging: Many alternatives, medical practitioners believe that one of the benefits of papaya is to control premature aging. Papaya helps the body to properly digest food and when the body digests all the nutrients it needs, the body will remain vital for a long time. (Harald, 2000).

5. Papaya is used as a cleanser: Taking a quarter pint (150ml) of papaya juice, cucumber juice and green bean juice in alternating hours for 12 hours can be a benefit to your Colon. These juices work as potent natural cleansers when combined. Papaya is also rich in fibers which travels through the body and binds itself in cancer-causing toxins in the colon, and so one of the benefits of papaya is that it helps prevent colon cancer especially, due to its antioxidant and its fiber content.

6. Papaya prevents Heart Attacks and Strokes: The antioxidants in papaya prevent cholesterol from oxidizing. When cholesterol becomes oxidized it forms plaque in the blood vessel wall that can eventually build up and cause a heart attack or stroke. Also fiber is known to lower cholesterol. The fiber in papaya converts a substance called homocysteine into harmless amino acids that the body can process, but without the breakdown, homocysteine can eventually damage blood vessels walls causing strokes or heart attacks (Marie, 2013).

7. Papaya treats inflammation: Papain and Chymopain, protein– digestive enzymes found in papaya lowers inflammation, and improves healing from burns. Papain breaks down the inactive proteins in the skin, removing dead tissue from burns. This benefits the body as it helps heal injuries psoriasis, removes warts, treats ringworms and cold sores. Also Vitamin C, E and beta – carotenes are good at reducing inflammation and as such these nutrients are used to treat asthma, osteoarthritis and rheumatoid arthritis among other inflammatory ailments. (Information Nigeria, 2012; Case, 2010).

### **Sour-Sop “*Annona muricata*” (Graviola)**

In many countries, people use the bark, leaves, root and fruits of this tree for traditional remedies. The active ingredients are thought to be a type of plant chemical (phytochemical) called annonaceousacetogenins. The nutritional content of sour-sop fruit includes the following:

- Vitamin C: Sour-sop is very high and rich in Vitamin C, a natural and potent antioxidant to enhance the immune system and slow the aging process.
- Phosphorus: These minerals are essential for the formation of bone mass, which is useful to form strong bones and prevent osteoporosis.
- Potassium: Beneficial in the prevention of hypertension.
- Rich in fibre – the fibrous content of sour-sop is delightful and nutritious. Helps with bowel regularity and lowering cholesterol.
- Iron: A natural source to supplement our daily iron needs and help prevent anemia.
- High in vitamins B1, and B2 (Wikipedia, 2015)
- Medicinal Benefits: sour-sop is a delicious and healthy fruit and it is used medicinally to treat illnesses ranging from stomach ailments, to worms.
- The seeds which have anti-emetic properties can be used in the treatment of vomiting and intestinal worms.
- Sour-sop leaves are the most beneficial part of this tree. They have the Acetogening containing compounds namely bulatin, asimism and squamosin. The leaf decoction is effective for hair lice, bedbugs and killing of other insects and pests.
- The crushed fresh leaves can be applied on skin eruptions to promote healing.
- The juice of the fruit can be taken orally as a remedy for urethritis, hematuria and liver ailments.
- The juice, taken when fasting is believed to relieve ailment and leprosy.
- To speed the healing of wounds, the flesh of the sour-sop is applied as a poultice unchanged for 3 (three) days.
- Mashed leaves are used as a poultice to alleviate eczema and other skin problems and rheumatism. (Saba, 2015)

- A decoction of the young shoots or leaves is regarded as a remedy for gall bladder trouble, as well as coughs, catarrh, diarrhea, dysentery, fever and indigestion (Felix, 2012)
- The root bark is used as an antidote for poisoning.
- Sour-sop flowers are believed to alleviate catarrh.
- Decoction of leaves is used as compress for inflammation and swollen feet (Agu, 2012)

Other benefits of sour-sop fruit include its effect as anti-tumor (anti-cancer). In addition to cancer benefits, sour-sop fruit acts as an anti-bacterial, anti-fungus (Fungi), anti-parasitic/worms, anti-high blood pressure, anti-depressant and anti-stress and helps the nervous system. As the leaves contains lots of tannins that are great in suppressing cancer cells and also immune boosting compounds such as ananol, gentistic acid, annonacin, annocatalin and many more powerful chemicals. (Haider, 2013). A few different ways one can enjoy sour sop are as a whole fruit; add to fruit salad, soursop juice, soursop ice-cream, soursop yogurt, jams.

### **Mango (MagniferaIndica)**

Mango fruit is one of the most popular, nutritionally rich fruits with unique flavour, fragrance, taste and health promoting qualities making it a common ingredient in new, functional foods often labeled ‘super fruits’. Mango is one of the delicious seasonal fruits grown in the tropics (Rivers State, 2013).Some health benefits of mango include:

- Prevents Cancer: A Research by the University of Florida’s Institute of Food and Agricultural Sciences in 2001, has shown that mango contain some unique antioxidant compounds which have been found to protect against cancers like colon, breast, leukemia and prostate cancer. These compounds include quercetin, isoquerattin, astragalm, fistetin, gallic acid and methylgallat as well as the abundant enzymes. This was supported by [CBS news, 2010](#); Texas Agrilife Research Food Science Communication, 2010).
- Lowers Cholesterol: The high levels of fiber pectin and Vitamin C help to lower serum cholesterol level. Specifically, low-density lipo-protein the (bad stuff).
- Clears skin: Mango can be used both internally and externally for the skin. Mangoes clear clogged pores and eliminate pimples.
- Eye health: One cup of sliced mango supplies 25% of the needed daily value of vitamin A which promotes good eye sights and prevents night blindness and dry eyes.
- Alkalizes the whole body: The tartaric acid, malice acid and a trace of citric acid found in the fruit, helps to maintain the alkali reserve of the body.

- Helps in Diabetes: The delicate and tender leaves can be used to treat diabetes by regulating insulin levels in the blood. They can also help improve blood lipid profiles. Mango fruits also have a relatively low glycemic index (GI), so moderate quantities will not spike your sugar levels.

The traditional home remedies involve:

- Soaking 10 to 15 tender mango leaves in a glass of water overnight. In the morning, filter the water and drink it on an empty stomach. The leaves can also be dried in the shade and grinded. Eat one-half teaspoon of powdered mango leaves two times daily (for diabetes) (Information Nigeria, 2013).

- Improved sex: Mango contains Vitamin E in abundance which helps to regulate sex hormones and boosts sex drive! Men and women with low libido should eat a lot of mangoes (Mayenne, 2012)

- Improves digestion: Mangoes play a prominent role in eliminating problems such as indigestion and excess acidity. The digestive enzymes in mangoes help to promote natural, efficient digestion. The bioactive ingredients in mangoes like esters, terpenes and aldehydes contribute in enhancing appetite and also improve the function of the digestive system.

- Cures Anemia and helps in pregnancy: Mangoes are rich in Iron, which makes them beneficial for people suffering from anemia. A regular, moderated intake of mangoes can help eliminate anemia by increasing the red blood cell count in the body. Mangoes are also very beneficial for pregnant women, since the iron requirement during pregnancy is extremely essential. Doctors often prescribe iron tablets during pregnancy, but instead of supplementation, you can enjoy a healthy iron-rich diet with juicy mangoes. The taste buds during pregnancy usually lose some of their sensitivity, so mangoes will surely prove to be the delight.

- Slows the signs of Aging – Mangoes contain high amounts of Vitamin A and Vitamin C, which both help to produce collagen proteins inside the body. Collagen helps to protect blood vessels and the body's connective tissues thereby slowing down the skin's natural aging process. Therefore, mangoes can rightly be called an "anti-aging food" 'Dietary supplementation is the best way to restore your youth in a natural and delicious way'.

- Cancer Prevention and Heart Health: Mangoes have high amounts of pectin a soluble dietary fiber that effectively contributes to lower cholesterol levels in the blood. Pectin can also help prevent one from developing prostate cancer (Sample, 2004).

- Boost the immune system: The generous amount of vitamin C and vitamin A in mangoes plus 25 different kinds of carotenoids keeps your immune system healthy and strong (Fritz, 2012).
- The remedy of heart stroke: Juicing the fruit from green mango and mixing with water and a sweetener (honey), helps to cool down the body and prevents harm to the body.

**Risk in consumption and potential for contact dermatitis:** contact with oils in mango leaves, stems, sap and skin can cause dermatitis and anaphylaxis in susceptible individuals. Mango oil contains mangiferin and a resinol called magniferol. Those with a history of contact dermatitis induced by urushiol (an allergin found in poison ivy, poison oak or poison sumac) may be most at risk of mango contact dermatitis. However sensitive individuals are still able to safely eat peeled mangoes or drink mango juice (Wikipedia, 2015).

### **Watermelon**

- Source of Energy Production: Watermelon is concentrated with B-vitamins. B Vitamins are responsible for a lot of the body's energy production. This means eating watermelon can give you substantial energy; it also has high amounts energizing nutrients of magnesium and potassium. Eating watermelon is a safe alternative to taking energy drink prior to exercise. It also hydrates the body due to its high water content as opposed to caffeine filled energy drinks that dehydrates the body.
- Antioxidants – Watermelon is a natural source of nature's most powerful antioxidants. It is a good source of the antioxidants, Vitamins C and A. it is also a good source of powerful antioxidants, beta-carotene. Watermelon's antioxidants can help prevent a number of things: It reduces the risk of colon cancer, asthma, heart disease, osteoporosis, rheumatoid arthritis and prostate cancer.
- Kidney Disorder: Watermelon contains a lot of potassium, which is very helpful in cleaning or washing off the toxic depositions in the kidneys. Moreover, it is helpful in reducing concentration of uric acid in the blood thereby reducing the chances of kidney damages and formation of renal calculi in it. Added to these, being high in water content, it induces frequent urinating, which is again helpful for cleaning of kidneys. Also, the antioxidants present ensure good health of kidneys for a long time.
- High Blood Pressure: A good amount of potassium and magnesium, present in watermelons are good in bringing down the blood pressure. The carotenoids present in them prevent hardening of walls of arteries and veins, thereby helping reduce blood pressure.

- **Diabetes:** Diabetic patients who are supposed to have low energy and low sugar diet, often complain about starving since they do not get to eat their staple diet to their full, giving them a feeling of keeping half fed. Watermelons can be a good supplement for them.

In spite of being sweet in taste, a thick wedge will give you very few calories. Since ninety nine percent (99%) of its total weight is composed of water and roughage. Moreover, the various Vitamin and minerals such as potassium and magnesium help in proper functioning of insulin in the body, thus, lowering the blood sugar level. Arginine another component found in watermelons is very effective in enhancing impact of insulin on sugar (Daily Newswatch, 2014).

- **Heart Care:** Lycopene a carotenoid found in abundance in watermelon improves cardiac functions. Beta Carotene, known for its remarkable antioxidant and anti-aging properties also keeps you young at the heart and prevents age related Cardiac problems. The roughage in watermelon and its very low energy, with the help from vitamin C, Carotenoids and Potassium (Potassium cuts the risk of a heart attack) help reduce cholesterol and keep your heart safe.
- **Impotence:** Arginine present in watermelon is beneficial in curing erectile dysfunctions. Arginine seems to improve intimate function in men with impotence. Arginine boosts nitric oxide which relaxes blood vessels. A study of 50 men with impotence carried out by Chen, Wollman, Chernichovsky, Liana, Sofer & Matzkin in (1999) reported significant improved intimate functions after arginine supplementation.
- **Macular Degeneration:** Eating watermelon can protect against negative effects of macular degeneration. Macular degeneration is just a fancy word for loss of vision. Leave your worry of eyes on that beta carotene, Vitamin C and those Lutein and Zeaxanthin. They will ensure protection of your eyes from macular degeneration. They are experts in that these antioxidants will protect your eyes from other eye related ailments such as drying up of eyes and optical nerves, glaucoma and so on.
- **Cancer Prevention:** Watermelon is a rich natural source of lycopene a carotenoid of great interest because of its antioxidant capacity and potential health benefits. Dietary consumption of carotenoid lycopene has been associated with a lower risk of prostate cancer. A study published by the American Cancer Society in 2010, stated that a major claim for lycopene's benefits is in the prevention and treatment of cancers of the lung, prostate and stomach. Lycopene is an antioxidant compound that gives tomatoes and certain other fruits and vegetables their rich dark colours. Also lycopene and lycopene-rich foods have been studied as a potential therapy for breast cancer (Komen, 2014)

## Oranges

Citrus fruits health benefits begins the moment you put them in your mouth. Australian research report in 2014, have linked high citrus consumption to a lot of health benefits. They stated that oranges:

- Are rich in antioxidants that help maintain brain function and keep bones and joints in tip top shapes as one gets older.
- Are the richest fruit sources of the anti-oxidant hesperetin, which protect cells as one ages
- May reduce the damaging effects of cholesterol and heart disease by protecting the inside of artery walls.
- reduce the risk of developing a range of cancers
- Boosts the immune system with the entire recommended Vitamin C intake in just one orange.
- Are high in folic acid and ideal for pregnant women with one orange providing 18% of the recommended daily intake.
- Are high in dietary fiber and help prevent bowel problems, improve cholesterol levels and reduce risk of heart disease.
- Are natural sources of sweetness and provides just 2% of your daily energy needs in one medium orange. (Citrus Australia, 2014).
- An excellent source of vitamin C: Just one large orange or one cup of orange juice contains a full day's dose. Vitamin C is critical for producing white blood cells and antioxidants that help protect cells from free radical damage and play a key role in producing skin forming Collagen. Oranges are high in fibre and folate (Asale, 2013)
- The orange oil is used to treat chronic bronchitis: Tea made from dried orange flowers, stimulates the nervous system. Orange peel is traditionally used to treat sleeping problems. The phytochemicals Limonene and flavonoids appear to have anti-carcinogenic properties. They can block the carcinogenesis by acting as a blocking agent... Limonin and limonene can induce the enzyme activity of glutathione s-transferase, which is an important detoxifying enzyme. Feeding of orange oils, rich in limonene seemed to inhibit tumors of fore stomach, lung and mammary tumors (Phytochemicals, 2015).

## Guava



The white – fleshed guava is high in antioxidants and the red – fleshed variety is even higher. Red and pink fleshed guava gram for gram, have more Lycopene than even Watermelon and Tomatoe. A study from the Heart Research Laboratory in India in (2010) found that people who ate five(5) to nine (9) guavas per day for three (3) months reduced their cholesterol levels by 10%, their triglycerides by 8% and their blood pressure by 9.0/8.0mm Hg, while also boosting the High Density Lipoprotein (HDL (good)) Cholesterol by 8%. Along with the antioxidant phytochemicals and Vitamin C that prevent the oxidation of Low–density Lipoprotein (LDL). Guava also offers fibre and potassium, which makes it especially healthy for the heart (Vaidyanathan, 2014)

### **Plantains**

Plantains or cooking bananas, as they are often called are longer, thicker–skinned and starchier in flavour than bananas. Unlike bananas, however, they are loaded with the Carotenoid antioxidants Alpha and Beta-carotene. British research reports published in Doles Nutrition, (2010) show that the phytochemical leucocyanidin in unripe plantains have heart healthy combo nutrients including Vitamin B6, Vitamin C, Potassium and fibre. They also contain resistant starch which acts as a probiotic, selectively nourishing the “good gut” bacteria that line the intestinal tract and protect against food borne illness. The bacterial by-products of resistant starch called butyrate, increase fat metabolism and boost calcium absorption (Dole Nutrition, 2010).Plantain is a carbohydrate source. Its utilizable protein content as percentage of calorie ingestion is higher than cassava, but is much lower than other staples such as yam, maize, rice, potatoes’ and wheat. On per gram consumed basis, plantains essential amino acids concentrations are very low, even lower than cassava. The low fat content of plantain, coupled with its high starch content makes it a possible food for geriatric patients. It may also be a possible food alternative for people suffering from gastric ulcer, coeliac disease and in the relief of colitis (Wikipedia, 2013).

### **Almond (TerminaliaCatapaCombreta)**

This fruit is believed to have great medicinal value, the leaves, bark, roots, fruit and seeds of almond have been used to effectively reduce blood sugar, regulate functions in damaged pancreas of diabetics, prolong ejaculation, and stop the spread of lung cancer and sickle cell anemia. When consumed in adequate quantities, essential fatty acids can help to boost the levels of good cholesterol in the body. Additionally, almonds are a great source of omega–3 fatty acids for those who have a primarily vegetarian diet, (Paleo & Zone Nutrition, 2011). Almonds

contain a substantial amount of Vitamin E. An ounce of Almonds contains up to 35% of the body's daily requirement of Vitamin E. Vitamin E is an antioxidant that helps to prevent damage by the free radicals in the body.

Additionally, they also help to prevent aging and have beneficial effects on the skin and hairs. The health benefits of almond nuts also include prevention of diabetes as it is rich in dietary fibre. Dietary fibre provides roughages for the body and therefore also helps to regulate bowel movements and prevent constipation. Almonds contain many medicinal qualities that can help to dramatically improve our health when eaten in proper quantities. As it is high in fat, health conscious folks initially avoided eating almond and other nuts. Almonds today are considered a healthy snack. It is also used in other forms to improve functions of the body. Healthy hair is an important part of a person's personality as it is a prominent and highly visible part of the body... Almonds are good for the hair as they, contain magnesium, an important mineral that helps to keep the hair healthy and robust, A lot of people may suffer from magnesium deficiency due to an improper diet, eating almonds in moderate quantities can help the hair regain its natural shine (Hopkins, 2012).

All parts of the plant (leaves, bark, roots, fruit and wood) are used in traditional medicine such as dressing of rheumatic joints, treating coughs, asthma and dysentery. The fruit may be helpful in the treatment of leprosy, headaches and in reducing travel nausea. The leaves have been used to get rid of intestinal parasites; treat eye problems; rheumatism; wound, and stop bleeding during tooth extraction. The leaves also have antioxidants as well as anti-clastogene properties. Researches by Elist, (2013) & Boldsky, (2013) suggests that moderate consumption of the seed kernel may be useful in the treatment of men with sexual dysfunctions, (erectile dysfunctions), primary premature ejaculation as it contains high quality proteins. The leaves macerated in palm oil have been used as a remedy for tonsillitis. (Nigeria Liquefied Natural Gas Limited (NLNG), 2010).

### **Avocados**

Rich, creamy and flavorful, avocados are a versatile fruit that add heft and health to many dishes. While avocados have a high fat content, they are also packed with nutrients and are a great way to add healthy fat to the diet. Avocados are high in omega 3 fatty acids, the good kind of fat, in the form of alpha-linolic acid. It accounts for about three-quarters of the calories in an avocado. Monosaturated fats can help lower cholesterol and improve heart health.

Avocados also have a higher percentage of protein-about 4 grams-than other fruits. The sugar levels in avocados are comparatively low (Szalay, 2014).

Avocados contain many essential vitamins and minerals. They are a good source of pantothenic acid (vitamin B5), vitamin K and fiber, which aids digestion and helps maintain regularity. Additionally, avocados are high in magnesium, phosphorus, iron and potassium, containing even more potassium per gram than bananas, according to the New York University Langone Medical Center (). Fresh avocados contain lycopene and beta-carotene, which are important carotenoid antioxidants. The highest concentration of these antioxidants is located in the dark green flesh closest to the peel, antioxidants help reduce cell damage, according to the California Avocado Commission (2014).

### **Vegetables**

Leaves are the manufacturing organs of the plant where the life-giving process of photosynthesis takes place. In the cells, photosynthesis transforms elements into carbohydrates which are carried to other parts of the plant. The leaves in consequence are low in carbohydrates and energy but they are good sources of Beta-carotene, calcium, riboflavin, folic acid, ascorbic acid, iron and vitamin K. (Srilakshmi, 2009). Generally green leafy vegetables are good sources of vitamins and minerals. They are excellent in carotenes which are converted to vitamin A... the greener the leaves, the higher the carotenes. B-carotenes are also good anti-oxidants. Green leafy vegetables also contain vitamin C and can be used as substitute for fruits if needed.

- Eating more than four servings (that's 2 cups) of vegetables per day could yield a nearly 40 percent decrease in the rate of age related mental deterioration.

- A study on almost 30,000 men including less than 1,300 cases of prostate cancer ... revealed that those who consumed the most vegetables were 18% less likely to develop prostate cancer than those who ate fewest vegetables (American Association of Cancer Prevention (AACP),2015)

- Eating more vegetables protects reproductive health...

- Eating fruits and vegetables can also protect your health by keeping you trim. Fiber triples weight loss, filling you up and reducing fat absorption... Nutrient – dense produced May also curb deficiency – fueled cravings. Many fruits and vegetables contain resistant starch, which boosts fat metabolism. While the rich vitamin, mineral and phyto-chemical content of fruits and vegetables is what makes them nature's nutrition stars. (Doles Nutrition, 2010).

### **Okra**

Okra is one of the highly nutritious vegetables, usually eaten while the pod is green, tender and immature. It contains nutrients that may confer (contribute) a number of health advantages, including a decreased risk of several serious medical problems. Also known as lady fingers, okra are a common vegetable and can be fried, boiled or pickled. Regardless of the cooking method, Okra is a good low-calorie, fat-free, nutrient-dense addition to any diet. The following are several benefits of eating Okra as outlined by Victoria (2014)

- **Dietary fiber:** A ½ cup serving of sliced, cooked okra provides 2 grams of dietary fiber. This amount supplies the approximately recommended daily allowance of fiber for healthy adult men and women adhering to a 2,000 calorie diet. Okra's fiber content is made up of both soluble and insoluble fibre, soluble fiber may help prevent diabetes and high blood cholesterol, while insoluble fiber regulates digestive system functions. A 2009 "Nutrition Reviews" article adds that fiber may also lesson your risk of obesity, stroke, heart disease and hypertension.
- **Vitamin C:** Each ½ cup of cooked okra contains 13.04milligrams of Vitamin C, or 17% of the Recommended Dietary Allowance (RDA) of Vitamin C for women and nearly 15% of the RDA for men. Vitamin C has powerful antioxidant properties that may help it lessen the risk of Cancer, age-related macular degeneration, heart diseases and hypertension. Vitamin C is also required for bone, skin, blood vessel and immune system health. The Vitamin C content of okra will diminish the longer the vegetable is exposed to light, heat, and air. Use okra within three to four days of purchase and cut it only just before cooking to maximize the amount of vitamin C you receive.
- **Folate:** Okra contains 37 micrograms of folate in each ½ cup, cooked serving. Folate which is also known as Folic acid or Vitamin B9 is essential for the metabolism of protein, fat and carbohydrates. It is also required for the nervous system to function properly and for the synthesis of red blood cells and genetic material like Deoxyribonucleic acid (DNA) and Ribonucleic acid (RNA). Adequate folate intake may help lower your risk of depression, Cancer and heart disease. Eating folate rich foods like okra is especially important for pregnant women. The University of Maryland Medical Center reports that women who consume plenty of folate during pregnancy are less likely to have a child with birth defects.
- **Antioxidants:** Okra has a higher concentration of anti-oxidant compound than other high-antioxidant vegetables, as well as many high-antioxidant fruits. Antioxidants are able to

inhibit the ability of free radicals to damage DNA and cellular tissues. It is a known fact that a diet incorporating, lots of antioxidants may help prevent heart disease, cancer and neurological disorders such as Alzheimer's disease. Okra is readily found in our markets and it is affordable, one can make okra soup for sound health (Umesh, 2014).

### **Tomatoes**

Tomatoes are one of the best sources of Lycopene, a potent antioxidant which studies by the American Cancer Society in 2010 show may reduce the risk of heart disease and a range of cancers, including prostate, Ovarian, Cervical, Oral, Pharyngeal, Esophageal, Stomach, Colorectal, lung and Pancreatic. A University of Manchester and Newcastle Study in 2008 found that eating Lycopene rich tomatoes gave more protection against Sunburn. Cooking tomatoes helps to maximize these benefits, because it releases Lycopene from their cell walls, making it more available to the body. (Doles Nutrition, 2010; Wikipedia, 2014).

### **Bitter leaf (VernoniaAnygdalina)**

Bitter leaf (VernoniaAnygdalina) is a vegetable used for preparing the popular bitter leaf soup. It is also known as onugbu, shiwaka and ewuro by the Ogbas, Igbos, Hausa and Yorubas in Nigeria. Although this plant has been around for hundreds of years, only a few people know of its medicinal and healing properties. Bitter leaf plant as the name implies is actually a bitter plant whose leaves, extracts, stems and barks are used for culinary, medicinal and curative purposes. Vitamins in Bitter leaf include: Vitamin A, Vitamin C, Vitamin E, Vitamin B, and Vitamin B<sub>2</sub>.

Bitter leaf juice on its own, is quite bitter and this taste might be unbearable for a lot of people. So to reduce the bitterness of the bitter leaf juice, simply blend it with Uguwu (fluted pumpkin), if one still finds it extremely bitter, then add some sweet fruit to it, such as pineapple, apples or oranges. Dry bitter leaf is also potent, but has to be properly cleaned before use (Nky, 2013)

Some health benefits of bitter leaf include:

- It speeds up metabolism and therefore is great for weight loss.
- Bitter leaf juice relieves fever and feverish conditions: Take the squeezed juice, 3 times daily until the symptoms disappear, because it contains anti-bacteria properties that are needed to cure malaria.
- It also helps to reduce high sugar level in the blood, and great for diabetic patients.

- Squeeze the fresh leaves on your palm and apply the juice on skin rashes, eczema, ring worms and any superficial skin ailments, changes will be noticed in few days. It is not advisable to apply to open wounds (Undiluted extract).

- Bitter leaf is said to soothe and cure pile
- Taking a cup of bitter leaf juice a day, is a great way to detoxify the body of harmful toxins. The bitter leaf protects the liver from drug induced damage. (Okafor, 2014)
- Bitter leaf juice nourishes the skin
- Bitter leaf also cures mild stomach ailments; indigestion and scurvy.
- Bitter leaf juice is said to increase breast milk production in nursing mothers.
- Bitter leaf roots are useful in the treatment of tooth ache and as well prevent gum decay due to its bacterial and anti-microbial activities. (Samuel, 2014)
- Bitter leaf an ingredient of cuisine, the leaf extracts reduce LDL (low-density lipoprotein) cholesterol by 50% while also boosting good HDL (High-density lipoprotein) cholesterol (Raiyemo, 2013)

- Consuming bitter leaf may combat breast cancer cell growth, in a test tube study of human breast cancer cells, scientists from Jackson State University study in 2014, "Experimental Biology and Medicine", found that bitter leaf inhibited the growth and proliferation of breast cancer cells. (Jackson State University Study, 2014).

- Bitter leaf stem can be used as chewing stick
- The washed roots and stalks of bitter leaf are boiled and the infusion is taking as a worm expeller.

- Bitter leaf juice is used by local women in Guinea Bissau to contract the uterus after childbirth and therefore should not be taking during pregnancy because it can cause miscarriage.( Nigerian Food Recipe TV, 2013)

### **Fluted Pumpkin (*Telfaria occidentalis*)**

*Telfaria occidentalis* is a tropical vine grown for its edible seeds. Common names for the plant include fluted gourd, fluted pumpkin and ugwu. The fluted gourd grows in many nations of West Africa but is mainly cultivated in various parts of Southern Nigeria. It is widely cultivated for its palatable and nutritious leaves which are used mainly as vegetables. The seeds are also nutritious and rich in oil which may be used for cooking and soap manufacture (Wikipedia, 2015). Although the fruit is inedible, the seeds produced by the gourd are high in protein and fat, and can therefore contribute to a well-balanced diet. The plant is a drought

tolerant dioecious perennial plant that is usually grown trellised. The junior shoot and leaves of the mother plant is the essential ingredient of the popular Nigeria soup Edikang Ikong. Ugwu leaf can be taken when cooked as a soup, but it is best taken and highly nutritious when it is in a liquid form, all that is needed is juicing it. However the dark red seed that is up to 5cm long is rich in protein and fat thus might be eaten raw or cooked. It can also be ground into powder for a different sort of soup or eaten as potherb (fermented porridge) (Wikipedia, 2014).

Some health benefits of fluted pumpkin (*Telferia Occidentalis*) include;

- **Rich Source of Dietary Fiber:** Fluted pumpkin is very rich in dietary fiber. It contains Vitamin A, for clear vision and also protects and keeps the skin fresh. It also contains Vitamin C that helps to heal wounds and scar. It also contains some minerals such as calcium for strong teeth and bones, Iron for the muscles.
- **Increases Blood Volume and Boost Immune System:** It is always prescribed by doctors for pregnant women, patients that have lost much blood because it will raise the blood level, in a matter of days.
- **It treats sudden attack of convulsion, Malaria and Anemia.** (Akorodu, 1990). When this plant is prepared traditionally as herbs, it is used to treat sudden attack of convulsion, malaria and anemia. In addition it also plays a vital and protective role in cardiovascular diseases. (Giami, 2013).

## **Meat and Seafood's Group**

### **Meat**

Meat is animal flesh that is eaten as food. Humans are omnivorous, and have hunted and killed animals for meat since prehistoric times. The advent of civilization allowed the domestication of animals such as chickens, sheep, pigs and cattle, and eventually their use in meat production on an industrial scale. Meat is mainly composed of water and protein and is usually eaten together with other food. It is edible raw, but is normally eaten after it has been cooked and seasoned or processed in a variety of ways. Unprocessed meat will spoil within hours or days, Spoilage is cause by the practically unavoidable infection and subsequent decomposition of meat by the animal itself, by the people handling the meat and by their implements. (Wikipedia, 2014).

Examples of Meat include Domestic goats, Birds for example (Domestic duck, Domestic turkey, Chicken), Amphibians for example Edible frog, Fish, for example Carp, Catfish, Salmon, Tilapia, Crustaceans; for example Crayfish, Lobster, Shrimp, Prawns, Mollusks for

example Oyster, Snail; Reptiles, for example Alligator, Crocodiles, Turtles; Games: for example Grasscutter (Wikipedia, 2014).

### **Bush Meat**

Terrestrial Wildlife is the primary source of meat for hundreds and millions of people throughout the developing world. Despite widespread human reliance on wildlife for food, the impact of wildlife depletion on human health remains poorly understood. The study carried on preadolescent children (under 12 year of age) in rural Northern Madagascar showed that consuming more wildlife was associated with significantly highly hemoglobin concentrations. Their empirical modes demonstrated that removing access to wildlife would induce a 29% increase in the numbers of children suffering from anemia and a tripling of anemia cases among children in the poorest households. (Golden, Fernald, Brashares, Rodolph, Ofoniana & Kremen, 2011). According to Shephard (2011), consuming bush meat is a requirement for populations without enhanced supplement program to maintain proper iron levels and that wildlife sometimes round out their diets, especially in locations where access to domesticated meat is less than readily available or is otherwise too expensive for the poor to eat frequently enough. The study focused on bush meat as it is eaten as a subsistence food by poor people rather than a luxury cuisine for the rich.

Bush meat and domesticated meat have comparable nutritional contents, but bush meat is often the main source of the meat in developing countries, particularly in the rainforest. By most accounts, the availability of game meat has declined in most part of the West African region because of dramatic changes in the rural wildlife habitual and over-hunting. Although taboos and restrictions prevent consumption of specific species by certain groups over the region as a whole all types of animals are exploited for food. The most commonly consumed species are small mammals such as the grasscutters and other rodents, antelope's monkeys, bush fowl and reptiles (Food and Agricultural Organization, 2014).

FAO, (2014) also added that wild animals are good sources of carbohydrates, compared with domesticated animals from similar environments (in pork, beef, and mutton). He adds that the protein content of bush meats ranges from 16–55% compared to 11-20% for domestic animals. In addition, bush meat is often a good source of Minerals and Vitamins. Generally, however, wild animals foods are consumed in very small quantities, thus their contribution to overall protein needs may be minimal.

### **Snails (Congo Meat)**



Snails are perhaps the most popular and widely consumed forest animal throughout the West African forest zone. They command high market prices in Nigeria (FAO, 2014). In the Southern part of Nigeria snails are the most popular “meat” consumed. They are generally consumed during the rainy season by households in communities; snails are consumed regularly (several times a week) by more than a third of the households and monthly by more than two thirds of the households (FAO, 2014).

Snails provide a good source of protein and are low in fat, are exceptionally high in iron, calcium. An average snail is comprised of 80% water, 15% protein and 2.4% of fat which is primarily healthy fat. A snail contains essential fatty acids, calcium, iron, selenium and magnesium. They are rich source of vitamins too and highly and incredibly packed with Vitamins E, A, K and B<sub>12</sub>. Snails are alleged to contain a copper peptide which is thought to be the only natural source of a substance usually manufactured to assist in making creams which helps minimize scarring.

An average snail also contain cancer fighting properties: The mucous exuded by these creatures contains a copper compound which help in healing after an injury or scalding and also help in preventing heart diseases. In addition to all these health benefits, snails are tasty, juicy, delicious, nutritious and cheaper than any red meat (Robin, 2014). Snail meat could be a cheap, tasty and nutritious food which helps to reduce anemia caused by a lack of iron in the diets. Snails have a higher protein and iron content and lower fat content than beef as well as containing many essential nutrients such as calcium, magnesium and Vitamin A. (Udofia, 2009).

### **Sea foods**

Seafood is any form of sea life regarded as food by humans. Seafood’s prominently includes fish and shellfish, shellfish include various species of Mollusks, Crustaceans (for example Crabs, Lobsters, Crayfish, Shrimps) and Echinoderms, Oysters.

### **Fish**

The most common types of fish available in Rivers State are the Catfish, Tilapia and frozen fish such as Salmon. Many people enjoy the flavour of catfish and it offers a variety of health benefits, such benefits as high protein content which help to boost the intake of Vitamins and healthy Fats and Fatty acids. Some other health benefits as outlined by Harvard School of Public Health, (2014) include:

- Low in calories and fat: An ounce (Oz) serving of catfish introduces 122 calories and 6g of fat into your diet. The low amounts of calories in this fish make it a popular choice for a

healthy meal plan. Women generally require approximately 300–500 calories per meal and men need about 400–600 calories per meal, so it fits in well. The fat content is relatively low and little of it is saturated fat – 2g (Leech, 2015).

- **Contains healthy fatty acids:** Eating catfish is a tasty way to boost intake of Omega 3 and Omega 6 Fatty acid. I serving of this fish provide 220mg of Omega 3 fatty acid and 876mg of Omega 6. Consumers will not find federal guidelines on the consumption of these fatty acids, although the American Hearts Association (AHA) (2014) suggests including fish in the diet several times each week to increase the amount of fatty acids consumed. Both of these nutrients play a part in heart and cognitive health.
- **Provides Complete Protein:** The 15.6g of protein in a serving catfish provides you with all the amino acids your body needs. This high quality complete protein helps your body build lean muscle mass and it also helps improve the effectiveness of the body's immune functions. One may also rely on protein to provide energy especially the body has used all the carbohydrates available for fuel.
- **Source of Vitamin B<sub>12</sub>:** Consume a serving of catfish and one takes in 40% of the daily recommended intake of Vitamin B<sub>12</sub>, As a B Vitamin, the vitamin B<sub>12</sub> in catfish is critical in aiding the body in the breakdown of foods consumed into useable energy, but this Vitamin has other functions as well, without enough vitamin B<sub>12</sub> in the diet, the nerve functions suffers and might become lethargic.
- **Low in Mercury:** Almost all types of fish contain mercury, a contaminant that may imparts the nerve system, but one may safely eat catfish unless the waters in which it is caught are particularly high in mercury. The Environmental Protection Agency lists catfish as one of the mostly consumed low mercury fish despite this, limiting consumption of fish, to 120 ounce per week is recommended to decrease exposure. This is especially important if the consumer is pregnant since high level of mercury may harm the fetus

### **Crabs**

Crabs are very low in calories and fat, are healthy for the heart. Despite their low calorie content, crabs make for a filling main course dish. A 4ounce serving of crabmeat contains on 98 calories and under 2g of Fat.

- Crabs are very rich source of lean protein, which makes them a perfect high protein alternative for athletes and body builders. They are also a good option for diabetics, they are free of carbohydrates.

- Crabs are a good source of Omega 3 fatty acid, which are necessary for heart health and help to lower triglycerides and blood pressure, thereby reducing the risk of heart disease. The Omega 3 fatty acids contained in crabs are believed to boost immune system.
- Crabs are a source of Chromium, which helps in the metabolism of sugar; it helps the body to maintain normal blood glucose level. Chromium basically works with insulin to regulate the sugar level of the body.
- Crabs contain Selenium and trace minerals that help to reduce oxidative damage to cells and tissues. A diet containing Crabs provides enough selenium to the body to keep the system functioning (Salcombe, 2012).
- Crab meat is a rich source of Vitamins and Minerals especially Vitamin B<sub>12</sub>, one of the vitamins that are critical for healthy nervous function. Also, it is a good source of minerals such as Zinc and Copper which helps to support the immune system. (The Guardian (2013).

### **Lobsters**

The amazing shellfish is not only tasty and expensive but is packed with healthy benefits:

- Since lobsters contains very low amount of carbohydrates, it forms a perfect ingredient in no low carbohydrate diet.
- Lobsters are beneficial for both heart and brain, since it contains a high constitution of Omega 3 fatty acid.
- High in Selenium: Lobsters help in aiding the immune system and thyroid gland and preventing heart disease (Christina, 2013).
- Iodine: One of the best ways to get iodine is to eat seafood. Iodine is needed for proper metabolism. Potential shortage may cause metabolic disorders, goiter and hypothyroidism.
- It contains copper that helps in avoiding bone and tissue diseases.
- The high amount of phosphorus present in lobsters helps in proper functioning of the kidneys and reduces arthritis pains, aids in the formation of teeth and bones.
- Zinc found in organic lobsters is beneficial for increasing activities of the brain, boost immune system, and preventing vision loss. In addition this mineral also effectively heals injuries in the body tissues and helps to maintain healthy reproductive system.
- Lobsters helps in avoiding various health disorders such as osteoporosis, rheumatoid arthritis, cardiovascular diseases, chronic conditions involving bones, connective tissues, heart and blood vessels, and colon cancer (Wintergreen Organics &Naturals (2015).

### **Oysters**

Oysters can be eaten raw, baked, boiled, grilled, and fried. Oysters are a nutritional power house. Some nutritional health benefits of eating oysters as outlined by Cultured Palate (2013) include:

- Oysters contain more zinc than any other food. Zinc is necessary for proper growth and development, strengthens the immune system and promotes healing.
- Oysters are heart healthy. They are high in Omega 3 fatty acids; potassium and magnesium which can help reduce your risk of heart attack, stroke and lower blood pressure.
- Oysters can help one lose weight. They are low in calories, low in fat and a good source of protein which makes you feel fuller after eating.
- Oysters are a good source of other essential nutrients. These include vitamins A, E, and C, zinc, iron, calcium, selenium and vitamin B<sub>12</sub>.
- Oysters can help improve your energy. They are a good source of iron which helps the body transport oxygen to individual cells giving one, more energy.
- Oysters can help lower your cholesterol. A study done by the University of Washington found that eating oysters can raise the HDL<sub>s</sub> (good Cholesterol Levels) and lower the LDL<sub>s</sub> (Bad Cholesterol Levels) (Cultured Palate, 2013).

### **Shrimps (Prawns)**

Shrimps are the most popular seafood's... They are tasty prawns. They can be a healthy addition to one's diet. Shrimps are low in fats and calories and have a relatively neutral flavour that makes a natural addition to salads, pastas, soups and stir fried dishes. (Andrea, 2013)

- Macro nutrients and calories: 4 ounces of boiled or steamed shrimps contains just 112 calories this serving provide nearly 24 grams of protein and 1.2 grams of fats only 0.3g of which is saturated. Shrimps contain no carbohydrates, like all seafood's shrimp contain heart healthy Omega 3 fats.
- The US department of Agriculture recommends that all adults should consume 8 ounce of seafood's like shrimp a week. A serving of shrimp provides about 15% of your daily need for Omega 3 fatty acids,
- Amino Acids: Shrimps are an excellent source of essential amino acid tryptophan. This amino acid is important in maintaining balanced sleep patterns and helps stabilize mood by affecting neuro-transmitters in the brain (LIVESTRONG.com, 2013).

- Other Nutrients: A 4 ounce serving of shrimp is also a good source of vitamin B<sub>12</sub>, which can help protect against heart disease, shrimp also provides more than 60 percent of your daily needs for the trace mineral selenium, which enhances immunity, thyroid function and reproduction. (Medical Research Council, 2013).

## **Chicken**

The health benefits of eating chicken are enormous it is a rich source of a variety of essential nutrients and vitamins which assist in strengthening the immune system of the body. Chicken is also reputed to be one of the safest meats available as it is least associated with any side effects of consumption. Many scientific studies have been conducted on chicken to access its healthy properties and most of the researchers have found very positive effects of the meat on human health. Some of these positive effects as outlined by Lounge, (2014) include:

- Chicken is a very good source of lean, high quality protein. Protein is an essential nutrient for growth and development and also plays an important role in assisting over weight and obese people in losing weight fast.
- In older people, the proteins present in chicken also help against bone loss. Even 100g of chicken breast accounts for more than half of the recommended dietary intake of protein.
- Chicken is a rich source of niacin, a B – Vitamin that protects the body against cancer. A deficiency of niacin can be directly associated with genetic (DNA) damage. Around 72% of the daily niacin requirement of the body can be fulfilled by a four (4) Ounce serving of chicken.
- The trace mineral selenium is found in good quantities in chicken. It is an essential component required by many major metabolic pathways, which include thyroid hormone, metabolic antioxidant defense system, and immune function of the body.
- Vitamin B<sub>6</sub>, present in chicken, plays a crucial role as a methyl donor in the basic cellular process of transferring methyl group from one molecule to another, leading to the formation of a wide range of important active molecules, this process is known as methylation. The availability of methyl groups is lessened due to the inadequacy of B<sub>6</sub> which can result in damage to the blood vessels.
- Vitamin B<sub>6</sub>, along with niacin, makes chicken a favourable food in supporting the energy metabolism of the body. Both these B – Complex Vitamins help the enzymes throughout the body to guide the metabolic reactions.

- Chicken meat is a good source of phosphorus, which is a very essential mineral for the body. Phosphorus maintains the health of teeth and bones, and also ensures healthy functioning of the kidneys, liver and the central nervous system. (Lifestyle lounge, 2014).

Risk in excess consumption: mainly from ingesting too much saturated fat.

## **Red Meat**

Red meat in traditional culinary terminology is meat which is red when raw and not white when cooked. Red meat also includes the meat of most adult mammals. In gastronomy red meat is darker – coloured meat, as contrasted with white meat. The exact definition varies by time, place and culture, but the meat from adult mammals such as cows, sheep's and horses is invariably considered red, while chicken and rabbit meat is considered white. The meat from the young mammals such as the milk fed veal, calves, sheep and pigs is traditionally considered white; while the meat from ducks and goose is considered red (Simpson, 1989).

Game is sometimes put in a separate category. Veal calves is traditionally a red meat if it is naturally fed. The old determinant of the nutritional definition of the colour of meat is the concentration of myoglobin (an iron and oxygen binding protein found in the muscle tissue of vertebrates in general and in almost all mammals. It is related to hemoglobin which is the iron and oxygen binding protein in blood specifically in red blood cell. Myoglobin is only found in the blood stream after muscle injury). The white meat of chicken has under 0.05%, Pork and Veal have 0.1 – 0.3; young beef has 0.4 – 0.1% and old beef has 1.5 to 2.0% (Iowa State Animal Science, 2009). All meats obtained from livestock's (that is from mammals) are red meat, because they contain myoglobin than chicken or fish. Red meat contains large amounts of iron, creatine and minerals such as zinc and phosphorus and B vitamins (niacin, vitamin B12, thiamine and riboflavin). Red meat is the richest source of lipoic, a powerful anti-oxidant. Red meat contains small amount of vitamin D, the liver contains much higher quantities than other parts of the animal (Wikipedia, 2014)

A lot of potential health risk about when consumed in large quantity, Red meat is not a uniform product, and its health effects can vary based on fat content, processing and preparation. Processed red meat is strongly linked to higher mortality, mainly due to cardiovascular diseases (heart diseases) (Hazen, 2014). Many studies like that of Chan, Lau and Aune, (2011); Kin, Coello & Blachier, (2013) confirmed this, findings from this group reveals a link between red meat intake and colorectal cancer. This is attributed to the hemoglobin and myoglobin which

are found in red meat. These molecules when ingested trigger a process called nitrosation in the gut which leads to the formation of carcinogens. Also a 2011 study of 17,000 individuals found that people consuming the most grilled and well done meat had a 56% and 59% higher rate of cancer. (Wikipedia, 2014).

Others have suggested that it is due to the presence of carcinogenic compound called heterocyclic amines which are created in the cooking process. Pendick, (2012), reported that the new warning on red meat comes from a study of nearly 125,000 female nurses and male health professionals, whose diet and health have been followed by Harvard School of Public Health researchers for more than two decades. During this period, about 24,000 of the participants died from cardiovascular diseases or cancer. People in the study who ate the most red meat tended to die younger or die more often from cardiovascular disease and cancer. They also tended to weigh more, exercise less, smoke more, and drink more alcohol than those who ate less red meat. Yet even when the researcher compensated for healthy lifestyle factors, mortality and meat remained associated.

According to Kloss, (2008), Exclusion of meat from diets of patients who suffered from severe headaches, resulted in gratifying relief from the ailments where other remedies failed. Other effects of eating meat (excess proteins) as outlined by Kloss, (2008) include:

- An increased risk of colon, breast and possibly prostate cancer.
- Increases the formation of atherosclerosis in the arteries.
- Causes softening of the bones by increasing the excretion of calcium.
- Altering the normal immune mechanism,
- Decreasing stamina and depleting energy reserves.
- A low – fiber diet results in constipation, diverticulosis and hemorrhoids,
- Toxins found in the animals before they are slaughtered are eaten with the meat.
- Increasing the blood cholesterol and triglyceride levels

### **Spices, flavorings and condiments**

Spices and flavorings are pure natural vegetable parts or substances used for seasoning foods. Condiments are also seasonings but are usually added to food at the table. A variety of plants have been cultivated for this purpose. They are gotten from different parts of the plants which include leaves, roots, flowers, fruit, seeds, bark, pods, and rhizomes and so may many others. They add flavour, fragrance, relish and warmth to food; they therefore act to stimulate the appetite and consequently aid digestion. Some of these spices that are grown and used locally

in the area of study includes Egusi (Melon), Red Pepper (Chili), Peppercorn seed/leaves (Uziza Leaves/seeds), Scent leaf (Basil, also called Nchanwu), Ogbono (Seed of African bush mango), Alligator pepper.

### **Chili Powder (Pepper).**

This is a very good source of Vitamin A and C, and dietary fiber, good source of potassium and iron. Chili Powder improve circulation, clear congestion, fights inflammation, acts as a pain reliever, lowers cholesterol, boost immunity, helps treat certain types of cancers, prevent ulcers, speed metabolism, significantly aiding in weight loss and lowers the risk of diabetics. Other spices containing capsicum like chili powder such as red pepper, cayenne and other pepper based spices have similar benefits.

### **Egusi (CitrullusColocynthis)**

Egusi is a melon that looks exactly like water melon on the outside, but completely different on the inside, with this bitter white flesh and seeds... Egusi (melon) can grow just about anywhere: humid gullies, dry savannahs, tropical highlands. This makes it a great source of food for farmers in even the worst condition. Egusi (melon) is rich in protein, fats and vitamin A, B1, B2, C and alpha tocopherol, a component of vitamin E. This alpha tocopherol helps to maintain young looking skin and good fertility. It is made up of 30-40% protein and about the same proportion to fats or oil. 78% of the fat is unsaturated fatty acid which is free of cholesterol and protective to the heart. It also contains palmitic, stearic, linoic and oleic acids which helps to protect the heart and a very small amount of carbohydrate and calcium.

While the seeds are often shelled and eaten as a snack, many processed forms of the seeds have made their way into common cooking practices. After soaking, fermenting or boiling, the seeds take on different flavours and are frequently added to thicken soups and stews. The seeds can also be roasted and ground into spread like peanut butter. With further preparation, egusi-seed meal can be pressed into patties to be used like a meat substitute and its oil can be used for cooking. The egusi can be an important supplementary baby food, help prevent malnutrition. Blending the seeds with water and honey produces a milky liquid that can be used as formula if breast milk is unavailable; making the plant as diverse in its uses as it is easy to grow (Davert, 2010).

### **Ogbono (African bush mango):**



Ogbono is derived from the African bush mango extract .Ogbono seed is said to possess some health benefits as it contains high protein content and essential fats. (The Punch, 2013). Ogbono seed is said to promote weight loss in various ways, according to Ogolo (2013), One of the methods by which it does so is through inhibition of the enzyme called amylase. Amylase is responsible for absorption of sugar in the body. By decreasing the level of amylase, less sugar is absorbed by the body.

The second method by which it does this is to increase the level of a hormone known as adiponectin. Ogbono helps weight loss by also increasing the levels of leptin in the body, a hormone that reduces the appetite. Lastly, Ogbono seed helps weight loss by inhibiting an enzyme called glycerol 3 phosphate dehydrogenase and by doing this, it reduces the amount of blood sugar converted to fat (Ogolo, 2013)

### **Scent leaf (*Ocimumgratissimum*).**

*Ocimumgratissimum* is known as a food spice and traditional herb, commonly known as scent leaf or clove basil is found in many tropical countries. Some of its vernacular names in Nigeria include Nchanwuor Ahuji in Igbo; Efinri in Yoruba; Aramogbo in Edo and Daidoy in Hausa. Scent leaf has numerous medicinal uses and nutritional importance, in culinary uses. Nutritional importance of this plant centers on its usefulness as a seasoning because of its aromatic flavor. The dried leaves of a scented geranium can also make wonderful flavoured teas. In folk medicines, *Ocimumgratissimum* is extensively used as febrifuge, anti-malarial and anti-convulsant. The crushed leaf juice is used in the treatment of convulsion, stomach pain and catarrh. Oil from the leaves have been found to possess antiseptics, anti-bacterial and anti-fungal activities (Ameen, 2014).

### **Palm oil**

Palm oil is an edible vegetable oil derived from the mesocarp (reddish pulp) of the fruit of the oil palm; primarily the African oil palm....Palm oil is naturally reddish in color because of its high beta-carotene content. It is not to be confused with palm kernel oil derived from the kernel of the same fruit... palm oil is a common cooking ingredient in the tropical belt of African... Its use in the commercial food industry in other parts of the world is buoyed by its lower cost and by the high oxidative stability (saturation) of the refined product when used for frying. (Wikipedia, 2014).

According to Bruce, (2014) Red palm oil not only supplies fatty acids essential for proper growth and development, but it is packed with an assortment of Vitamins, antioxidants

and other phytonutrients important for good health. Red palm oil gets its name from its characteristic dark red color, the color comes from carotenes such as beta-caroten and lycopene the same nutrients that give tomatoes and carrots and other fruits and vegetables their rich red and orange colours. Bruce (2014) further stated that Carotenes are valuable nutrients and powerful antioxidants. They are also important because our body can convert them into Vitamin A, an essential nutrient. Vitamin A deficiency can cause blindness, weakens bones, lowers immunity, and adversely affect leaning ability and mental friction... Red palm oil provides a perfect solution. It supplies the needed fat and vitamin A precursors. Some other health benefit of eating palm oil as outlined by Fife (2014) includes:

- Improved blood circulation
- Protects against heart disease
- Protest against cancer
- Boosts immunity
- Improves blood sugar control
- Improves nutrient absorption, Vitamin and mineral status
- Aids in the prevention and treatment of malnutrition.
- Supports healthy lung function
- Supports healthy liver function
- Helps strengthen bones and teeth
- Supports eye health
- Highest natural source of health promoting tocotriends
- Help protect against mental deterioration, including Alzheimer's disease
- Richest dietary source of Vitamin E and beta-carotene

### **Water**

Water is the most abundant of the essential nutrients in our body. Water is present in all the tissues of the body as well as in every cell. Even our bones are made up of nearly one third water, while our muscles and our 10 to 12 billion brain cells contain 71%water. It is possible to live for several weeks without food, but we can survive for only a few days without water, next to oxygen, it is the most essential substance for the preservation of life. None of the nutrients eaten would be of any value without the presence of water. (Kloss, 1998).

The two most important functions of water according to Kloss, (1998) are: to act as solvent for the essential nutrients, so that they can be used by the body; and the transportation of nutrients and oxygen from the blood to the cells and the return of waste materials and other substances from the cells back to the blood so they can be removed from the body. Water is essential for the human body to function. The body cannot store water and must have fresh supplies every day to perform virtually every metabolic process. Babies and the elderly are vulnerable to lack of water or dehydration. Not drinking enough water increases the risk of kidney stones in men and in women, urinary tract infections (Mercola, 2011).

Water is needed for most body functions, including to:

- Maintain the health and integrity of every cell in the body.
- keep the bloodstream liquid enough to flow through blood vessels
- help eliminate the byproducts of the body's metabolism, excess electrolytes (for example, sodium and potassium), and urea, which is a waste product formed through the processing of dietary protein
- Regulate body temperature through sweating moisten mucous membranes such as those of the lungs and mouth.
- lubricate and cushion joints
- reduce the risk of cystitis by keeping the bladder clear of bacteria
- aid digestion and prevent constipation
- moisturize the skin to maintain its texture and appearance
- carry nutrients and oxygen to cells
- Serve as a shock absorber inside the eyes, spinal cord and in the amniotic sac surrounding the fetus in pregnancy (Better Health Channel, 2014). Kloss, (1998) also added that water is a body builder and helps to maintain peak physical performance. A loss of only 5% of body water, results in a 30% decrease in work performance.

## **Beverages**

### **Palm Wine**

Palm wine is the sap/juice of some varieties of palm trees, including the African oil palm, the Raphia palm, and the date palm.... Palm wine has a strong cultural significance among Africans. It is used at important traditional ceremonies like marriages, worship rites and other festivals. Although other types of wine are available, palm wine is irreplaceable for its cultural significance among Africans, especially the people of West African (Ekinsanmi, 2010). It is not

thoroughly bad to drink palm wine as stated by Oduro (2013), provided one is not drinking the chemicalized or adulterated type, that is palm wine whose taste has been enhanced with artificial sweeteners, some eye doctors and optometrists say as yeast is good for the eyes, likewise palm wine helps in enhancing sight. A word of caution was given that fermented palm wine should not be taken as it contains high quality of alcohol which is detrimental to organs of the body such as liver, kidney and eyes.

Palm wine has many benefits that differ if consumed fresh or fermented, among other benefits are that:

- It is high in amino acids, Potassium, Magnesium, Zinc and Iron and has some Vitamin B1, B2, B3 and B6.
- Unfermented palm wine contains good amount of Yeast, though there are other formulated yeast tablets, it is beneficial to the body (Agbogun (2011); Oduro, 2013)

### **2.3 Contemporary Rivers State Food Habit**

# Olumati's Pyramid (2017)

Adapted from  
Mediterranean Diet Pyramid

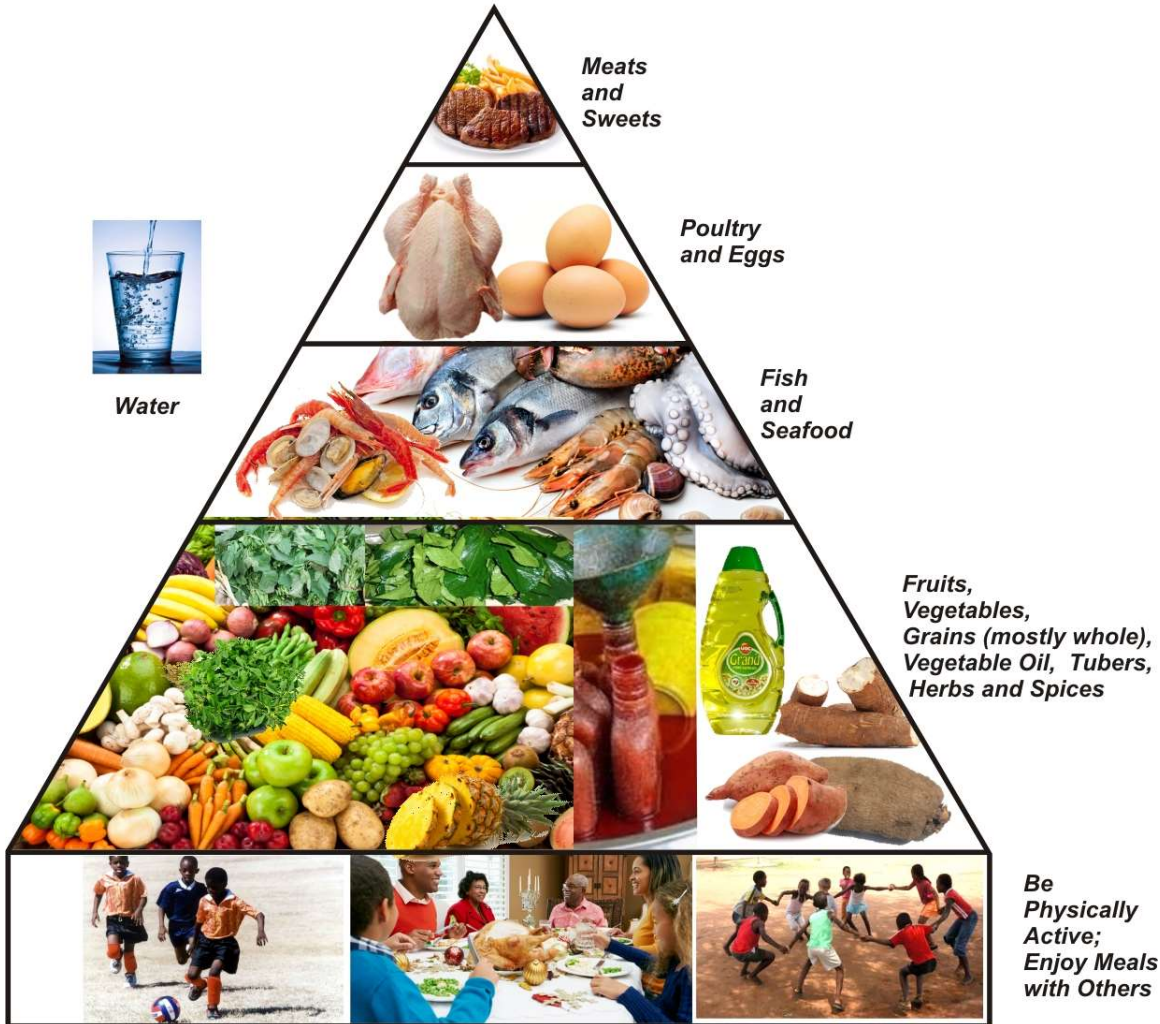


Fig. 5 A model of the contemporary food habit of the Rivers people (Olumati, 2017) Adapted from the Mediterranean Diet Pyramid (2009)

What the communities in Rivers State eat can be viewed in the context of the diverse socio-cultural and economic environments. The food consumed is not the same throughout, although there are some striking similarities. Higher income and education almost directly translate into enhanced dietary practices. Generally, the Rivers people eat more tubers, but most of them consume less than one serving of fruits per day. Locally available staples generally form the basis of a meal, but the meal becomes nutritionally adequate and tasty if a relish or soup (consisting of beans, vegetables, fats or oils, condiments and spices) and fruits are eaten with the staple. In most Rivers communities people rely on one or two staple crops. Most common

are maize, cassava, yam, sweet potato, plantain. These crops provide the bulk of energy intake of household members. To balance the diet, consumers complement staple foods with legumes or foods from animal sources that are rich in proteins and fats/oil. Apart from animal products, most of the ingredients used to prepare a relish in Rivers state soups or other accompaniments are provided by a variety of vegetables such as egusi, ogbono, ofor, achi with green leafy vegetables such as fluted pumpkin, water leaf, spinach (green), herbs and spices such as bitter leaf, curry leaf, scent leaf. All of Rivers cuisine has the basic format that consists of a starchy food eaten with a sauce soup or dip, which may or may not be spicy. Main dishes are made from starchy roots and tuber crops (cassava, cocoyams, yams, and potato), cereals (maize, rice), bananas or plantains. If the staple is low in certain nutrients, nutritional deficiencies may result.

The accompaniment which is known as relish, sauce or soup depending on the part of the state, may consist of a vegetable dish (green leafy vegetables) or dish made from legumes, meat or fish, where and when available. Main dishes are also made from a combination of cereals and legumes or seeds. For example maize is eaten with groundnuts, coconut, and pear. In some other parts of the state, the abundant green bananas and plantain are used as the base of the main dish for example Polofiyai: A very rich soup made with yams and palm oil. Kekefiyai: A pottage made with chopped un-ripened (green) Plantains, fish, other sea foods or game meat (bush meat) and palm oil; Fried or Roasted Fish and Plantain – fish fried in palm oil and served with fried plantains; Onunu: very ripe plantain pounded together with yam and palm oil and eaten with peppery fresh fish sauce; Buro–fulo: (fresh fish pepper-soup cooked with yam at the same time). The main dish may be eaten with a relish made from pumpkin, cowpea or waterleaves, with addition of tomato sauce or red palm oil. The nutritional value of a meal made from a cereal and legume mixture can be modified by adding seasoned fruits that are good sources of vitamin A and C. main dishes commonly eaten in different parts of Rivers State include: Cassava: made into garri, cassava chips (tapioca) and fufu; Yam: made into yam porridge, yam pepper soup, pounded yam, fried yam, boiled white yam served with fish/beef stew; Cocoyam; potato; plantain; rice; maize.

Relishes or accompaniments include: vegetable soup, native soup made with assorted sea foods, egusi soup, ogbono soup; fresh fish/beef stew, okro soup, yam/cocoyam soup. Snacks and sauces include: fried plantain, roasted sweet potatoes and yam served with tomatoe sauce, akara (bean cakes), and palm oil sauce. Other examples include: Jollof rice, palm oil rice, moin-moin (steamed beans), corn pudding made from grated corn and ripe plantain wrapped and

steamed. The earliest fishermen in Rivers State discovered the bounty of the seas. Though the fishing population is almost exclusively dominated by artisanal fishermen, the State also provides such valuable seafood's as Crab, Oysters, Shrimps, Fishes, Periwinkles, Snails as well as mammals and birds. These provide the main animal proteins in Rivers dishes. These various proteinous foods are used to prepare several soups and stews. Some of the most popular fish dishes are fish stews prepared with fish fillets, fresh tomatoes, pepper, palm oil or vegetable oil also Rivers native soup prepared with seafood's such as periwinkles, soft-roasted fish, Cray fish, Oysters, fresh prawns/shrimps, Water-snail, pepper, Peppercorn leaf.

Due to the close boundaries with Akwa-Ibom and Cross Rivers State, soups like Afang soup a delicacy of the Ibibios and the Efiks and Edikanikong soup has found their ways in the cuisine and homes of the Rivers people. These are made with a combination of different types of vegetable like Afang leaves, fluted Pumpkin, Water leaf (*Calcium triangulare*), assorted selection of smoked fish, Meat and Crayfish, Palm oil served with Fufu, Garri or Pounded yam. In Rivers State, steamed / seasoned snails are also included to add variety. Farmers in Rivers State produce many vegetables. Traditionally, vegetables available in area of study include: Okra, Pumpkin leaves (Fluted Pumpkin), Melons, Water leaf, Basil, Spinach. Other ingredients added during cooking includes: Salt, Pepper, Onions (Imported) now seasoning cubes most times in place of crayfish/shrimps. Locust beans, Ogiri, Achi, Offor, Ukazi leaves (*GretumAfricanum*), Uziza leaves and seeds (Peppercorn leaf and seed), fresh tomatoes. The diet of the Rivers people is simple. Cassava, Yams, Maize, Cocoyam, Sweet potatoes, Palm oil, Goats, Fish and Pumpkin amongst others can be easily obtained from the land and sea. These foods form the staple food in the Rivers cuisine.

**Cassava** is so important to the Rivers diet because it can be prepared in various forms and served to suit every occasion.

- The sweet cassava variety (*Manihot palmata*) can be simply peeled, boiled and eaten as food, it is sometimes roasted in the fire, scrapped and eaten with a sauce of palm oil, pepper and salt (Nwokoma, 2003).
- It could also be boiled and pounded into foo-foo and eaten with any type of soup.
- Cassava leaves are also eaten as leafy vegetables
- Fermented cassava foo-foo
- Cassava flour, which can easily be made into foo-foo and served with any type of soup

- Cassava starch
- Garri which is one of the easiest ways Cassava is eaten especially when there is not enough time; it is simply prepared by mixing the granules with boiled water.
- Wet and dry cassava chips are eaten as snack with groundnut, coconut, palm nut and dry fish and due to boundaries with the Igbo's, sometimes the wet cassava chips is also used with fermented oil beans slices (imported), stockfish or dried fish or fried meat and a sauce made with Crayfish, Pepper, shredded garden egg leaves and palm oil, (sometimes a little potash) is added to prepared native salad just as the Igbos (Nwokoma, 2013)

**Yam:** Is another very important staple, it is used in many different forms, the people honor yam more than Cassava or Cocoyam as indicated by the celebration of Yam plating season, New yam festivals before eaten new yam, this festival is called Egwu Ogba by the Egi's in Ogba, and Nchaka by the Igburu people of Rivers State.

- Yam is eaten in various ways: the white yam (*Dioscorea Rotundata*) is the most popular, it can be boiled and pounded into foo-foo and served with different types of soup. It is also boiled and eaten with meat (beef) stew, fish stew or a mixture of fish palm oil, crayfish pepper and salt. (Nwokoma, 2003).
- It is also peeled, sliced and fried into yam chips served with stew or fried eggs.
- It is also used in making yam flour.
- Yam is also boiled pounded and added to soups to act as a thickener to prepare yam soup especially during the new yam festivals.
- Also, yam pepper-soup with dried fish, crayfish salt, peppers.

**Cocoyam:** is another root crop that is a staple used in various forms, it is sometimes substituted for yam because it is cheaper than yams and easily grown even in gardens around the house.

- Cocoyam is boiled or roasted and served with raw palm oil, pepper and salt, sometimes prepared in a mortar and combined with a special wooden spoon.
- cooked with the jacket and eaten with raw palm oil.
- Cocoyam is also used as soup thickener to prepare cocoyam soup
- Boiled to prepare cocoyam pottage
- The corm could be boiled soft and pounded into fufu and served with rich beef-melon soup or other types of soup.

Cocoyam is used to prepare cocoyam flour which could be used to prepare cocoyam fufu,



Cakes, biscuit and chin–chin dishes. Cocoyam can be used to brew wine and the starch used to synthesize alcohol” (Nwokoma, 2003).

**Sweet Potatoes:** are also prepared in various ways for food, they could be boiled, (preferably in its jacket or skin to save food value) peeled and eaten with meat or fish stew, prepared with palm oil. The palm oil sauce is sometimes enriched with crayfish and blanched sweet potato leaves. Sweet potatoes can also be prepared and fried with palm oil or groundnut oil (Vegetable oil) and served with egg sauce.

**Plantains:** Plantain is another popular food eaten in Rivers State. The ripe or unripe plantain is sometimes peeled and cut into short lengths, boiled and served with meat or fresh fish stew or sauce. Plantain pottage is also a delicious dish prepared with legumes such as beans. Flour prepared from unripe plantain is normally mixed with ripe plantain, corn flour to prepare a steamed dish (pudding) called “Ikpa” in Ogba Rivers State. Ripe plantain could be sliced and fried to produce the popular “dodo” eaten at breakfast time. Sometimes peeled and fried whole and serve with sauce made with palm oil, crayfish, salt and pepper.

In recent times, unripe plantain flour has found its way into the cuisines due to its health benefits, this is used to make a variety of products like plantain cake, plantain bread, plantain pan–cake, plantain pudding, plantain biscuits, plantain chin–chin and plantain foo–foo served with beef (meat) vegetable soup. The flour is sometimes also used as composite with wheat flour to prepare the above named products for better results.

**Rice:** Though not produced in Rivers State, has also formed part of the staple. It is also prepared in various forms especially during occasion such as weddings, meetings, burial ceremonies and at home. In fact there is an increasing popularity of rice as a local food. Boiled rice is served with meats or fresh fish stew. Casserole dishes prepared with rice are chicken/beef jollof rice, coconut rice a rice delicacy made with rice cooked in coconut milk, fried rice (Vegetable rice), sometimes rice is cooked with legumes like beans and served with stew.

According to Ifeanacho, (2009) Rice flour can be produced from rice grains. Its use as flour is very versatile as it could be used alone or in combination with many foodstuffs to provide delicious and nourishing dishes that can be used for breakfast, main meals, sweets or desserts and snacks. Making more use of rice flour according to Nwokoma, (2003) is one way of introducing more variety in the Nigerian diet. The dishes made from rice flour as outlined by her includes Rice pap, Rice custard, Rice pudding, Rice pancake, Rice foo–foo, Rice biscuit,

Rice-bread and, Rice-cake. Rice flour can be used as composite flour to wheat flour to produce good baked rice foods like cakes.

**Maize:** Maize is eaten best when it is fresh and in season, this is because at this stage it is juicy and sweet, it is also the best time to use them to prepare many corn dishes, like Corn fritters, Beans and Corn casserole. Maize is also roasted or boiled on the cob and eaten with pea or coconut as accompanying snack, it is also eaten with dried fish or groundnut, maize (corn) is also used to prepare cornmeal, corn flour and corn starch.

**Cooking Methods:** People in Rivers State cook food in quantities suitable for the size of their families, they are hospitable people and try as much as possible to cook foods in quantities so that even an unexpected visitor can be fed whenever such occasion arises, they boil, steam, fry and broil foods, and they also roast and sometimes bake.

Boiling can be used for a variety of foods like yam, Rice, Cassava, Potatoes, Plantain, Beans, Soup can be prepared also in this way. Steaming is another cooking method used in the area of study. Meat, Poultry, Seafood's are prepared in this way. The cooking liquid is seasoned as the broth or stock is used during soup and stew preparation. Meat and fish are sometimes dried in an open fire under strict supervision for easy preservation. Frying method is used to prepare foods like fried fish, meat, plantain (Dodo), yam chips, potatoes, eggs. Frying is cooking in oil. Sometimes two or all of these cooking methods are combined during food preparation.

#### **2.4 Factors Influencing Households Usage of Staple Foods.**

Many factors influence household's usage of these staple foods. According to Ajala, (2006) early childhood experiences greatly influenced one's eating habits. What one ate as a child, what one liked or did not like, when one ate meals can influence ones current habits and preferences. Ajala further added that family customs, ethnic backgrounds, economics (economic status), geography and climate (Location), availability of certain foods and convenience also have an impact on food choices, personal preferences based on taste, texture, colour, and smell strongly influence what you choose to eat, your friends in certain ways may influence your food choices.

#### **Influence of Availability of Food Products**

Western influences, especially in urban centers have transformed Nigerian eating habits in many ways. City dwellers are familiar with the canned frozen and prepackaged foods found in most Western style supermarkets. Most Urban Nigerians for instance some people in parts of

the area of study seem to combine traditional cuisine with a little western- style foods and conveniences. Rural dwellers in the area of study tend to stick more with traditional foods and preparation techniques. Our diets are restricted to the types of foods and amounts of food allotted by the food supply. Depending on where consumers live, they may find a surplus of certain kinds of food they may not find in another part of the world. For example, the climate one lives in has a huge influence on what is available to him/her, what foods are in season during that climate and the climate even affects the price of that food at that time. (The Fitizen, 2014).

The influence of the environment on food habits derives from a composite of ecological and social factors. Foods that are commonly and easily grown within a specific region frequently become a part of the local cuisine. However, modern technology, agricultural practices and transportations methods have increased the year rounds availability of many foods and many foods that were previously available only at certain seasons or in specific areas are now available almost anywhere at any time. Another aspect of availability is trade many of our food products are imported from other countries and this greatly affects the price and availability of these food products. Although the majority of food is eaten in the home, an increasing proportion Food is eaten outside the home, for example in schools (lunch in schools, at work during break and in restaurants). The venue in which food is eaten can affect food choice, particularly in terms of what foods are on offer. The availability of healthy foods at home and away from home increases the consumption of such food. However, access to healthy food options is limited in many work / school environments. This is particularly true for those with irregular hours or with particular requirements for example vegetarians (Fauguier, Lancaster, Pickles & Dobson, 2001). Some foods are available in rainy season while some in the dry season. The off season foods are expensive and less nutritious while those in season are fresh, nutritious tasty and cheap. Hence while planting meals; it may be important and more economical to plan around seasonal foods.

### **Cultural / Traditional Influences**

Culture can be defined as a set of pattern of human activity within a society or a social group and the symbolic structures that give such activity significance, customs, laws, dress, architectural style, social standard, religious beliefs and traditions are all examples of cultural elements. Wikipedia (2014) describes culture in a different light using different elements as it concerns food:-

- Gastronomy is an element of culture which is described as the art and science of good eating, including the study of food and culture.

- Food preparation another element of culture is the act of preparing foodstuffs for eating. It encompasses a vast range of methods, tools and combinations of ingredients to improve the flavour and digestibility of food.

Food and drink – Cuisine: a cuisine is a specific set of cooking traditions and practices, often associated with specific culture. Cultural influence leads to the differences in the habitual consumption of certain foods, these habits tend to be fully formed in an individual; however, some of them can be narrowed down to the eating habits of the ancestors that have being adapted from generation to generation. In Nigeria for instance, Nigerian food embellishes a rich blend of traditional African carbohydrates such as yams and cassava, as well as vegetable soups made from native green leaves. Garri is a powdered cassava grain that can be readily eaten as a meal and its quite cheap, Yam is either boiled and eaten with pepper soup, fried in oil or mashed potatoes like fufu, yam pottage, Nigerian beans quite different from green peas is widely popular, Meat is also popular and Nigerian suya, a barbecue like method of roasting meat, is a well known delicacy. Bush meat, meat from wild game like deer, grasscutters, and porcupines are also popular. (Wikipedia, 2014).

Fermented palm products are used to make traditional liquor (palm wine) as in fermented Cassava. Some more examples of their traditional dishes are soups like Okra, Ogbono, Egusi (Melon) and even some light soups prepared with Yam, Cocoyam (as thickeners). Cultural influences impact on these diet choices and food preparation. According to Social Health Knowledge, (2014) evidence has shown that traditions, beliefs and values are among the main factors influencing preference, mode of food preparation, and nutritional status.

Rivers State has such a variety of people and cultures that it is difficult to pick one national dish each area has its own regional favorite that depends on customs, tradition and religion. Supporting this, Rodriguez (2014) stated that a cultural group provides guidelines regarding acceptable foods, food combinations, eating pattern and eating behaviors. Compliance with these guidelines creates a sense of identity for the individual. Within large cultural groups subgroups exist that may practice variations of the groups existing behaviors though they are still considered part of the larger group.

According to Joel, (2011), there is a very close link between cultural backgrounds and food choices, food passes great importance in expressing the cultural values of certain groups of people or communities. Most of the discussions of food choice organic, local or vegetarian as well as food related diseases such as obesity, diabetes and various eating disorders give evidence

of the complex relationship between food, physiological factors and social values. Joel (2011) further stated that humans interact with the environment and each other through culture in socially constructed systems. Culture forms the medium through which these interactions are organized. Socio-cultural beliefs and customs have significant influence on family nutritional well-being. In terms of food choice, some foods are more prized than others and a meal is never complete until they are included. Should the favorite food be a root or tuber, the children are most disadvantaged because a weaning diet based on roots and tubers is bulky and has low concentration of nutrients unless enriched with additional foods such as vegetables, legumes and fruits.

Some communities/religion in area of study considers it a taboo to consume certain foods not giving consideration to nutritional value though vital, in the health of the individuals. These foods taboos according to Onyebueke & Souzey, (2004) have no scientific basis they have been handed over from generation to generation, these also affect nutritional status. There are beliefs concerning certain foods which make some people avoid eating them, unfortunately according to Oniang, Mutuku & Malaba, (2003), cultural food beliefs and taboos are often related to foods of animal origin and mainly affect women and children. For example the taboo connected with the eating of egg by young children and women..., there is also a taboo about the eating of the flesh of certain animals such as snails, monkeys by expectant mothers. This was also supported by Ejiofor, (n.d.) who also stated that tradition or custom makes people eat or avoid certain foods irrespective of its nutritional value. It passes from one generation to another. Some could be rational, irrational, beneficial and injurious for example snail, Indian hemp, and periwinkle.

Cultural influences may also include attitude towards certain foods, food preparation, breast feeding and infant feeding practices. It may also influence systems of food sharing and distribution within the family. Intra-family food distribution is often related to hierarchical position with the head of the family receiving priority in eating, while mothers and children receive a smaller share of the family's food, relative to their needs. Most communities need to evolve methods of dealing with health and nutrition problems with seasonal foods, hence the need for dietary modification (Oniang, Mutuku & Malaba, 2003).

European Food Information Council, (2005) also stated that Cultural influences lead to the difference in the habitual consumption of certain foods and can lead to restrictions such as exclusion of meat and milk from the diet. Cultural influences are however amendable to

change when moving to new country individuals often adopts particular food habits of the local culture.

### **Influence of Socio-Economic Status**

The economic level of an individual (or family) determines the type and quality of food he/she or they purchase (Onyebueke & Souzey, 2004). The relationship between low-socio economic status and poor health is complicated and is influenced by gender, age, culture, environment, social and community networks, individual lifestyle factors and health behaviors (Acheson, 1998). According to Ejiofor, (n.d.) income is a key factor that determines eating habit. A demand for food is effective if and only if it is backed by purchasing power (money), income or affluence makes one develop a negative or positive eating habit for example, butter/margarine, ice-cream/yoghurt, meat/fish and this in turn affects health. Income also affords one the opportunity to make choices.

Population studies show there are clear differences in social classes with regards to food and nutrient intakes. Low-income groups in particular have a greater tendency to consume unbalanced diets and have low intake of fruit and vegetables (Delrala, Groth, Johanson, Ottersdorf, Prattala & Martinez, (2000). This leads to both under-nutrition (micro nutrients deficiency) and over-nutrition (energy over consumption resulting in overweight and obesity) with the members of a community, depending on the age group, gender and level of deprivation. The disadvantaged also develop chronic, diseases at an earlier age compared with higher socio-economic group: usually identified by educational and occupation levels. Low-income groups find it difficult to achieve a balanced healthy diet and are often referred to as experiencing food poverty or food insecurity (Riches, 1997).

There are many aspects of Food poverty, but three of the main barriers to eating a balanced healthy diet include accessibility, and knowledge (Dibsdall, Lambert, Bobbin & Prewer, 2003). These factors have led to the development of areas known as food deserts. A reliance on energy-rich, nutrient poor foods is a consequence of lack of money to buy wholesome foods. The price premium on healthy food also appears to be greater in low-income areas. Moreover, a lack of proper cooking facilities in the home increases the need to eat convenience or take-away foods that have potentially higher energy-density. (Dibsdall et al, 2003).

Living on a low income can also present logistical obstacles to eating well such as lack of transportation. Public transport is not a viable solution for many, particularly those with

young children or mobility difficulties. Finally a lack of knowledge or too much conflicting information on diet and health, lack of motivation and the loss of cooking skills can inhibit buying and preparing meals from basic ingredients. Experimenting with cooking is a luxury that low-income groups can ill-afford.

For low-income families, food pricing plays a larger role than taste and quality in whether the food will be purchased (Steenhus, Waterlands, Wilma & Demul, 2011). This according to Hjelma, (2011) may partly explain the lower life expectancy of lower income groups, compared to conventional foods, organic foods have a higher cost and people may have limited access but price of a food however, is not an indicator of its nutritional value, cost is a complex combination of a foods availability status and demand. Onyebueke & Souzey, (2004) supported this by stating that expensive foods are not necessarily the most nutritious and by wise selection from less expensive, easily available foodstuffs, low-income groups can be well fed within their limited financial resources.

### **Influence of Educational Background (Nutritional Knowledge)**

The level of education an individual has (nutrition education) determines the type of food he/she eats. Knowledge of the nature and value of different foods provides the basis for choice, and people without this knowledge may choose unwisely (Onyebueke & Souzey, 2004). Supporting this Ejiofor (N.D.) stated that formal and informal education has a strong influence on food habits. Education makes one innovative, swift to change in terms of new products and increases acceptability of unfamiliar foods. According to Kearney, Jearney, Dunne & Gibney (2000), studies indicate that the level of education can influence dietary behavior during adulthood, Ajala, (2006) supported this by stating that how much good information already acquired and understanding of nutrition can serve as a basis for one to improve knowledge of nutrition.

In contrast, nutrition knowledge and good dietary habits are not strongly correlated. This is because knowledge about health does not lead to direct action when individuals are unsure how to apply their knowledge. Furthermore, information disseminated on nutrition comes from a variety of sources and is viewed as conflicting or is mistrusted, which discourages motivation to change (De Almeida, Graca & Lappalained, 1997). Thus, it is important to convey accurate and consistent messages through various media on food packages, and of course through health professionals. Similarly higher levels of education, information awareness equates to higher

expectations from functional foods and avoidance of food additions. (Dogan, Yildiz, Eydurak & Kose, 2011).

### **Influence of Usage/Consumption**

Rivers State is one of the 36 states of Nigeria. Its capital is Port Harcourt. It is bounded on the South by the Atlantic Ocean, to the North by the Anambra, Imo and Abia States, to the East by Akwa-Ibom State and to the West by the Bayelsa and Delta States. The inland part of Rivers State consist of tropical rain forest, towards the coast the typical river delta environment features many mangrove swamps.... Rivers State has tremendous natural resources potentials, but a sizeable proportion of these has been quantified or exploited. Given the abundant cultivable land in the upland area of the State and adequate rainfall, the potential for crop production is very substantial for agriculture, forestry and other basic facilities: An overwhelming, majority of the people of Rivers State are involved in two primary activities: Farming and Fishing.

Urbanization has greatly influenced the Rivers feeding habits. In most parts of the area of study, food habits consist of high consumption of processed foods and snacks that may be prepared and marketed under unhygienic conditions leading to food contamination. Many Rivers indigene especially those in the urban areas, have taken up untraditional food as part of their daily diet. Majority of these foods are snacks that are consumed as meals during lunch or supper. Changes in lifestyles and eating habits have led to a demand for more 'snack foods', consequently, snacking has become a regular feeding habit. Snack foods have been found to have high proportion of fat, starch and high sugar content. An excess of fats and starch is stored as body fat, sugar accelerates tooth decay and excess sugar is also stored as body fat. This scenario has seen a rapid growth of fast food restaurants in major Rivers communities. Fries and soda, a common meal in urban cities today, presents a diet high in fat, carbohydrates and sugar (Oniang, Mutuku & Malaba, 2003)

### **2.5 Dietary Modification**

Modern feeding habits/diets have brought a number of life threatening nutritional disorders to Africa. These include: obesity, hypertension, diabetes mellitus, cancer and cardiovascular disorders. For example, obesity is becoming more common as the African population leave their traditional feeding habits to embrace the modern ones. Due to urbanization people have changed their lifestyles and feed mostly on snacks. In addition they use high amounts of fat and sugar, which predisposes them to obesity. The traditional diet is



high in complex carbohydrates, as well as pulses and vegetables, lowering the risk of obesity (Oniang, Mutuku & Malaba, 2003). Oniang, Mutuku & Malaba further stated that the packaged snacks such as crisp, peanuts and chips contain a lot of salt, which is a risk factor for hypertension. Taking reduced fat dairy foods, cutting down visible fats and oils, eating more fruits and vegetables, reducing fatty nutrient poor snack foods and reducing alcohol intake will help reduce the chances of developing diabetes mellitus.

Diet modification is a process of correcting imbalances in diets. The imbalances may be in respect of calculated nutrient intakes against recommendation intakes. In this case, a particular nutrient may be taken in a relatively lower quantity. (Ifeanacho, 2009).Ifeanacho, further stated that to correct the imbalance, bigger quantities of the food item containing the nutrient is taken or a new but familiar food item known to be a better source of the nutrient in question is introduced in the diet, Depending on the types imbalance observed in the diets of persons of different age groups, diet modification can take other forms such as change in the consistency of food, variation in the method of individual food preparation or processing, change in the number of meals per day and introduction of varieties of foods in the diets . Dudek, (2010) opined that a modified diet can also be described as any diet altered to include or exclude certain components, such as calories, fat, vitamins and minerals she further stated that diets are typically modified for therapeutic reasons, including treatment of high blood pressure, low body weight or vitamin and mineral deficiencies.

Any diet can be modified, but Dudek, (2010) explained that common therapeutic modifications include lowering fat intake, increasing or decreasing caloric intake depending on weight, and increasing certain nutrients such as iron, calcium or potassium. Modified diets can also be used to treat food allergies. Supporting the above statement, Ajala, (2006) suggested that home cooking is the best option. According to him there are many advantages in home cooking if diets must be adequately modified, even though it is not our only food style. For one, it is more economical than eating out; it allows us to choose the kinds of foods we eat, such as fresh fruits and vegetables. Though this preparation takes time and skill, Vitamin C and Riboflavin can be lost of too much heat is applied for too long or if the food is overcooked, also home cooking allows us control over fat intake.

### **Importance of Dietary Modification**

In the past few years, professionals such as nutritionists have concluded that, we can maintain good health, and even improve it by modifying our diets. Many experts, like many

nutritionists recommend that some prudent changes be made in our diets based on the best available knowledge and resources. (Ajala, 2006). For instance, there's need to eat a wide range of nutrients to maintain good health and there's also a relationship between obesity and eating more calories than we need (Lau, Douketis, Morrison & Sharma, 2007). Between hypertension and eating a lot of salt ([www.webind.com](http://www.webind.com), 2014) and the presence of these two and many other nutritional disorders can increase the likelihood of various diseases. (Wikipedia, 2014). Whereas traditional feeding habits may have been associated with some nutritional deficiencies, modern feeding habits have also brought a number of life-threatening nutritional disorders, thus presenting the double burden of disease in the continent. It is important to point out that African communities have developed diets that maximize the use of local foodstuffs, given their limitations of resources and access to different foods.

Dietary deficiencies, therefore often result from lack of money, resources, including labour and land, and of time, especially for women. In addition, good feeding habits need to be emphasized while ensuring adequate awareness campaigns. Both the rural and urban masses in Africa require updated nutrition education that gives information on nutrients and their importance while pointing out the recommended food sources. Integral family-oriented approaches for the long term dietary change seems to be the way forward in ensuring a step up consumption early and through life (Oniang, Mutuku & Malaba, 2003). Diet modification is important for the following reasons:

- Dietary modification is another important approach to cancer control. There is a link between overweight and obesity to many types of cancer such as esophagus, colorectal, breast, endometrium and kidney. Diets high in fruits and vegetables may have a protective effect against many cancers. Conversely, excess consumption of red and preserved meat may be associated with a risk of colorectal cancer. In addition, healthy eating habits that prevent the development of diet associated cancers will also lower the risk of cardiovascular disease. A modified diet is important in the prevention of disease such as cancer, coronary heart disease, birth defects and cataracts (Willet, 1994; World health Organization, 2014).
- A calorie and nutrient controlled diet is shown to have a positive effect on reducing body composition, the diet plays a very important role regardless of activity (Freedman, King & Kennedy, 2001).
- According to the U.S. Department of Health and Human services (2014) what you eat affects your chances of developing high blood pressure (hypertension). Research shows that high

blood pressure can be lowered by following dietary approaches... and a (modified healthy eating plan), that includes foods lower in salt and sodium. High blood pressure is dangerous because it makes the heart work too hard, hardens the walls of the arteries, and can cause the brain to hemorrhage or the kidneys to function poorly or not at all, if not controlled, high blood pressure can lead to heart and kidney disease, stroke, and blindness.

- Age related Macular Degeneration, or AMD, is the leading cause of blindness in people over the age of 60. It affects the macula, the central portion of a specialized lining of the eye called the retina which is responsible for our reading and distance vision. As AMD progresses, people are forced to give up driving, and must rely on low vision aids to assist reading... but the good news according to Loma Linda University Health (2014) is that with some simple dietary and lifestyle modifications, most adults can prevent vision loss from macular degeneration.
- Boosts infertility: A modified diet may help to prevent infertility for both men and women: eating a natural fertility diet is something anyone can do regardless of location, fertility issue, age time and money. According to Dobbyn (2014) “Optimum Fertility” begins with the nutrients that go into the body, the best way to give a couple the best possible chance of increasing their fertility, overcoming any problems and having the healthiest possible baby is to ensure they are at optimum health at time of conception she states. What changes need to be made, she summarizes by stating in a nut shell , “Toxins out, and Healthy Organic Foods is In” Alcohol, Caffeine, Drugs, Junk Foods and, smoking need to be eliminated, and replaced with fresh, wholesome foods and lots of filtered water.
- Helps Prevent Memory loss: A healthy diet does more than benefit ones waistlines. It improves our heart health, lowers risk for cancer, diabetes, and other diseases, and keeps minds healthy. According to Alzheimers.net (2014) research has shown that a poor diet impacts memory and increases a person’s chances of developing Alzheimer’s disease. The Brain needs its own brand of fuel. It requires healthy fats, fruits, vegetables, lean proteins, and adequate vitamins and minerals. Consuming too little of these foods and too many complex carbohydrates, processed foods and sugar stimulates the production of toxins in the body. Those toxins can lead to inflammation, the build-up of plaques in the brain and as a result, impaired cognitive function. Hence the need for diet modification.
- Helps provide change in consistency as in fluid and soft diets.
- Helps to increase or decrease the energy values reducing diets.

- To include greater or lesser amounts of one or more nutrients—high protein and low fiber diets.
- To provide foods blend in flavor
- To include or exclude specific foods as in allergic conditions.
- To modify the intervals of feeding (Ifeanacho, 2009)

According to Ajala, (2006), Nutritionists also recognize that people do not eat for nutritional benefits alone, food must be appealing and enjoyable or no one will eat it. He further stressed that moderation is the best guide in eating to maintain health, However foods alone cannot make one healthy, but good eating habits based on moderation and variety along with regular physical activity will certainly help.

### **Dietary Modification Enhancement Strategies for Adequate Nutrition**

Menu means putting together nutritious meals and snacks for health and wellness. Each person should choose foods from the four food groups and be varied in choice. The menus should stress three concepts: Moderation, Variety and the avoidance of imbalanced or excessive consumption (Ajala, 2006). Favourite and traditional recipes can often be modified to include more fruits, more fibre and vegetables and less saturated fat, added sugars, added salt and fewer kilojoules. As a way of modifying the diets the following tips are suggested:

1. People in the area of study have different types of fish including locally harvested and imported such as Mackerel, Catfish, Herrings, Eels, Shrimps, Prawns, Tuna, Salmon, Cods as well as other seafood's like Oysters and Crabs. Eating more fishes than red meat because fishes are beneficial to the body. Fish protein is high in quality and contains sufficient amount of all essential amino acids the body requires for growth and maintenance of lean muscle tissues. The oil in fishes like mackerel is wonderful; it can equally enrich as well as nourish our brains and skins. There are new regular supply and sales of fresh fishes ever since the rise of home based fish farmers. This industry is growing very fast indeed and fresh fishes are easily available even in rural areas of the country. An average Rivers indigene is encouraged to eat these fresh fish as part of healthy eating diets.

2. Adding more fibre, more fruit and vegetables: Fiber is that part of food or diets that our body cannot digest. It is an ideal healthy diet for every human being. But most importantly, for pregnant and nursing mothers as well as vegetarians, weight-watchers, diabetics and growing children, Diets rich in fiber have healthy eating qualities second to none. Fruit /Vegetables are high in fiber contents. Fiber can be called roughages and the diets that contain them are highly

recommended as strong eating diets. Fiber helps to keep our bowel movement regular. It helps us to avoid constipation, gall stones as well as diseases such as diabetes. It equally help to slow down the harmful effects of high cholesterol and most importantly it helps to reduce our risk of contracting heart diseases. (Kannal, 2014).

3. Vegetables and fruits are lower in kilojoules than most other foods, so adding more to a recipe will lower the kilojoules content of a total dish. Also adding more fibre will also make you fuller, without adding extra kilojoules therefore swap some meat or chicken for cooked legumes, chopped or grated vegetables both in soups and other dishes.

4. An average Rivers household cannot possibly avoid eating foods or diets rich in starch (Carbohydrates) examples include foo-foo, Garri from cassava, Pounded Yam. Many root vegetables such as Cocoyam, Potatoes, Cassava and Yams are the major rich sources of carbohydrates for people in the area of study. For example Potatoes are equally very high in starch and have a high glycemic index. Reduce foods or diets rich in starch and carbohydrates or eat lots of vegetables and fruits.

5. Eat less sugar or sugary diets, substitute sweetened sugar content drinks with fresh fruit juice, if possible avoid sugar at all cost because sugar tastes good, but it feeds Candida (a yeast), robs your energy and contributes to a whole host of health problems, it lowers immunity and also robs bones of mineral. Some reasons why sugar should be avoided, as outlined by Body Ecology, (2014). Includes: Promoting wrinkling and aging skin; it makes blood acidic; it can lead to osteoporosis; it rots the teeth; it raises blood sugar level; it contributes to obesity; it is addictive (almost as much as drugs); can create the urge to binge; provides empty calories with no nutritional value; contributes to diabetes; contributes to heart problems; can cause cancer; contributes to ulcers; can cause gall stone; contributes to adrenal fatigue; raises the level of neurotransmitters called serotonin; weakens eyesight; sugar can cause hypoglycemia (low blood sugar levels); can cause arthritis. Adding a fruit to a recipe can add sweetness and flavor and reduce the need to add sugars, fruits and vegetables are all organic.

6. Try to eat less fat or fatty diets (fried foods) or as these are dangerous to health and can cause all sorts of illnesses, including cancer as fried foods for example fried potatoes chips contains tobacco chemicals

7. Instead of Red meat which includes goat, pork, lamb, cow (beef), eat or switch to less fatty proteinous meats such as chicken and rabbits. Poultry which includes chicken and turkey are better choices for healthy eating because red meats in general have more cholesterol and

saturated (bad) fat than chicken, fish and vegetable proteins such as beans. Cholesterol and saturated fat can raise blood cholesterol and make heart disease worse. Chicken and fish have less saturated fat than most red meat. (American Heart foundation, 2014).

**8.** Over cooked foods and vegetables should be avoided too as Riboflavin and Vitamin C can be lost if too much heat is applied for too long or if the food is overcooked. Microwave cooking and stir frying are modern methods that can be used to prevent Vitamin loss in the process of preparing food (Ajala, 2016).

**9.** Alcoholic drinks and beverages such as alcoholic wines, beer, spirits and liquors should also be avoided as it also contains carbohydrates.

**10.** Use less salt and drink liquids moderately: Salt is Sodium Chloride. Individuals need a certain balance of sodium and water in our body at all times to work properly. Too much salt or too much water in the system will upset the balance. When one is healthy, the kidneys get rid of extra sodium to keep the correct balance. Too much salt (sodium) in the system causes the body to retain (hold on to) water. This puts an extra burden on the heart and blood vessels. In some people it may lead to or raise high blood pressure. Having less salt in the diet may help lower or avoid high blood pressure. People with high blood pressure are more likely to develop heart disease or have a stroke. Taste buds will adapt to less salt added recipes. Again it will often work well to reduce added salt gradually. Most of the salt in a recipe actually comes from the ingredients rather than by adding table salt, therefore use no added salt products when you can for example, no added salt tinned tomatoes. Also use smaller amounts of salt ingredients such as sauces and add more low salt flavours instead such as herbs, spices, garlic or ginger (Podder, 2013).

**11.** There are many cooking herbs and spices grown in the area of study which are used to flavour foods and also for their medical qualities. These herbs and spices should also be harnessed for healthy eating as it helps to stimulate digestive juices in the body.

**12.** One study estimated that substitution of one serving of nuts; low-fat dairy and whole grains per day for one serving of red meat per day were associated with a 16-35% lower risk of type 2 diabetes. (Pan, Bernstein, Schulze, Manson, Willet & Hu, 2011).

**13.** Conscious Eating: According Mehmet, (2014) conscious eating means thinking about what you put in your body, that is giving your body the nutrition it needs for optimal health, function and, energy (nothing more, nothing less). "Taking note of your current eating habits and vowing to modify them for the better is the first step in improving one's diet" (Ajala, 2006).

14. Eat as recommended
15. Proper chewing is important for good digestion and assimilation of nutrients.
16. One may eat regularly two or three times per day as much as one wants, provided the proportion is generally correct and each mouthful is thoroughly chewed. It is best to leave the table satisfied but not full.
17. Cook foods with right temperature
18. Eat regularly: small, frequent meals may be best. Use nutrient dense foods as a basis for menus.
19. Try new foods, new seasonings, and new ways of preparing foods, as it adds a variety of vitamins and minerals to your diet, broadens your food spectrum, so you are not eating the same foods all the time.
20. Use canned foods in moderation.
21. For older relation, when necessary chop, grind or blend hard-to-chew foods (for example shredded meats, eggs) can be substituted for meat when poor dental function limits normal food intake. Prepare soups, stews cooked whole grains cereals and casseroles.
22. Eat in a well-lit or sunny area; serve meals attractively, use foods with different flavours, colors, shapes, textures and smells. (Wardlaw & Smith 2009).
23. Selection of recipes that can be easily prepared according to seasonal availability of raw materials (food products)
24. Selecting menus which use ingredients that are easy to utilize hygienically.
25. Using a variety of foods and yet maintaining consistency in quality (Shubbangini, 2010).

### **Some selected Recipes to be modified**

The quantity for modification suggested in this work is for one (1) serving and should be multiplied by the number of people in the family. These suggestions are according to the recommendations in the Mediterranean diet pyramid, these consumption frequencies and servings expressed in the pyramid are for the healthy adult population (people between 18 and 65 years of age) and should be adapted to the specific needs of children, pregnant women and other health conditions.

#### **Local Jollof Rice (With Palm Oil)**

Ingredients	Quantity	Modification strategies	Quantity for modification
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Rice	3-4 cups	Use but do not parboil	60g or half a cup
Meat of choice		Substitute with fish	60g
Palm oil	15cl	Use but do not bleach	2 tablespoons
Tin tomatoes (tomato paste)	1 small tin	Use moderately, or eliminate and use enough fresh tomatoes	2 table spoons
Onions	2 small bulbs	Use	1 medium size
Seasoning cube of choice		Use moderately as it also contains some quantity of salt	1 small cube
Pepper		Use just enough	1 teaspoon
Salt		Use sparingly	Measure in pinch
Crayfish		Use	¾ cup
Fresh tomatoes (sliced)		Use, stir fried fluted pumpkin or other mixed vegetables can be served as a side dish.	½ a cup, add 1 cup of other vegetables

#### Method of Preparation

- Wash and season meat or fish with seasonings and other spices of choice and steam,
- Do not parboil the rice, wash and sets aside
- Rinse and set cooking pot on fire, allow to dry add the palm oil allow to heat up but not bleached, pour in the sliced onions, stir, add the tin tomatoes stir for another 3 minutes, add the chopped fresh tomatoes, stir for another 5 to 10 minutes.
- Add the steamed meat or fish including the stock, add pepper, salt, crayfish allow to boil, then add the parboiled rice stir and taste for salt and other seasonings, cook till the rice is soft for consumption and stock dried. Serve Warm. (Chy, 2014)

Modification Methods: Rice is not to be parboiled as many nutrients will be lost in during washing and parboiling. Any available green vegetable can be served as accompaniment for example fluted pumpkin or spinach or green peas can be added to improve the nutrient density.

- Fruits should also be served alongside as dessert

#### Plantain Porridge

Ingredients	Quantity	Modification strategies	Quantity for modification
Unripe plantain	300g	Use: peel and wash before slicing	50g
Ripe plantain	200g	Use	50g



Scent leaf	2tbsp finely chopped	Use but wash before chopping, more vegetables should be added for example fluted pumpkin, water leaf, spinach	2 tablespoons for scent leaf, 1 cup for other leafy vegetables shredded
Chili pepper		Use sparingly	
Onion	1 large bulb	Use	
Cray fish	1 cup ground	Use	¾ cup
Palm oil	1½ cup	Use but do not bleach	2 tablespoons
Seasoning cubes	2	Use sparingly	To taste
Smoked fish	400gs flaked	Use	75gs
Meat (dried)	500gs	Do not add, because healthier proteins can be supplied by the fish	

#### Method of Preparation

- Peel and wash the plantain (Ripe / Unripe)
- wash and season meats, and steam till soft
- dice the plantain scrapping sides of each unripe plantain before dicing to get a thickener
- With the meat stock, cook the plantains adding salts, Cray fish, pepper, palm oil and seasoning cubes.
- Add water to the pot enough to cover the plantain level in the pot.
- Add the dried or smoked fish
- Cook until plantain is soft, mash slightly with a wooden spoon in the pot, the chopped vegetables will be the last ingredients to be added stir and serve hot.

#### Yam Porridge

Yam porridge can be prepared in the same way as the plantain porridge; the only difference is that yam is used instead of plantain. Yams are peeled and cut into large cubes. Method of preparation and ingredients are the same

#### Pounded yam

Ingredients	Quantity	Modification strategies	Quantity for modification
Yams (peeled)		Use: peel and wash before cutting into chunks	100g
Water		Use just enough to cook the yam	Just enough to cook yam
Salt	To taste	Do not add	

#### Method of Preparation

- Peel and rinse yams in water, slice and cut them into chunks. Place chunks in a large pot or saucepan
- Bring to a boil and cook uncovered for about 20 minutes or until soft enough that a fork is easily inserted.
- Drain the yams and place them into a mortar, pound using a pestle until smooth and slightly elastic in texture
- Season with salt if preferred and serve with any soup or stew of choice.

#### Stews

Ingredients	Quantity	Modification strategies	Quantity for modification
Fish fillets	2 pounds	Use fish. White meat (poultry) can also be used as substitute	60g
Curry leaves		Use: but wash before chopping	1 teaspoon chopped
Tomato paste		Use moderately, or replace with enough fresh tomatoes	2 tablespoons
Onion	1 medium size chopped	Use	1 medium size
Water		Use just enough to cook the food	Just enough to cook the food
Vegetable oil		Replace with olive oil, or unbleached palm oil. Or use peanut oil sparingly	2 tablespoons
Chicken bouillon		Use sparingly as it also contains some quantity of salt	1 small cube
Salt	To taste	Use sparingly	To taste (preferably in pinches)
Fresh tomatoes		Use	½ cup
Pepper	To taste	Use	1 teaspoon blended
Thyme leaves	A pinch	Use	A pinch because it also contains salt

#### Method of Preparation

- Season fish fillets with salt, thyme and set aside
- Place the pepper, tomato paste, onion and water in a large pot.
- Cook for 10 minutes over medium heat
- Add the oil and bouillon cube simmer over low heat for 15 minutes.  
If palm oil is used, it had to be heated but not bleached before adding it.
- Add the seasoned fish fillets and simmer for 10 minutes (if using chicken, simmer for 20 minutes) serve with Rice, Boiled yam, Boiled potatoes, Boiled plantain).

#### Yam Pepper soup

Ingredients	Quantity	Modification strategies	Quantity for modification
Yams		Use: peel and wash before cutting into chunks	100g
Fish (dried or smoked)		Use the right serving	60g
Goat meat		Do not use, the fish will supply the needed protein	
Onions		Use	1 medium size
Pepper		Use	1teaspoon
Salt		Use sparingly	To taste
Seasoning cubes		Use sparingly	To taste
Palm oil		Use the right quantity, and do not bleach	1 tablespoon
Crayfish/dried shrimps		Use	¾ cup
Scent leaf		Use: wash before chopping. Mixed fruits can be served as dessert	1 tablespoon chopped scent leaf/ 1 cup of other vegetables

#### Method of Preparation

- Peel, wash and cut yam into chunks.
- Put in a pot, add some water just enough to cover the yams, and bring to boil.
- Wash dried fish with warm water and salt, debone (remove the bones) and add to the boiling yam.
- Add the other ingredients except the palm oil and scent leaf and cook until yam is soft, do not allow drying, as the stock is also served with the yam.
- Palm oil may be added into the yam and pepper soup (the stock).

Traditional Serving Method: the yam is served in a flat or oval shaped plate, the stock is served in a deep bowl with the fish inside usually eaten with a spoon. In some cases, the fresh palm oil is poured over the yam, or served in a different bowl, or some of it added into the pot while the yam is still cooking, traditionally it is eaten by hand. Another way of eaten yam pepper-soup is that, the cooked yam is scooped into a clean mortar, fresh palm oil and salt is sprinkled over it , it is stirred with a wooden spoon until the yam absorbs all the oil add, and served from the mortar.

#### Unripe Plantain, Pepper-soup.

The ingredients and Method of preparation are the same as that of yam pepper-soup. The only difference is that plantain (Unripe) is used in place of yams.

#### Soups

##### Rivers State Native Soup

Ingredients	Quantity	Modification strategies	Quantity for modification
Periwinkle (shelled)	1 cup	Fish and shell fish are good sources of healthy proteins and lipids	10g
Soft-roasted fish	2-4 medium size	White meat can also be used as substitute as they are also good sources of animal proteins	10g
Cray fish			10g
Oysters			10g
Fresh prawns			10g
Water (for stock)		Use just enough for stock	1 1/2 cup
Ngolo or mgbe (water snail)			10g
Achi (grounded) as thickner		Use just enough to thicken soup	1 tablespoon
Salt	To taste	Use sparingly	
Pepper	To taste	Use	1 teaspoon
Palm oil		Use but do not bleach	2 tablespoons

Uziza leaf	Optional	Use enough, other vegetables like bitter-leaf, fluted pumpkin can also be used	2 tablespoons or 1 cup for other shredded leafy vegetables
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#### Method of preparation

- Put the quantity of water you want in a pot and put on the fire bring to boil add palm oil, salt, pepper, soft roasted fish and seasoning cubes, allow to boil for at least 5 minutes.
- Add ground achi (as the thickener), stir until you get your desired thickness, stir for a while using a wooden spoon so as to prevent the thickener from forming lumps and getting burnt at the base of the pot, after 3 minutes add the water snail (Ngolo or Mgbe), Periwinkles, Fresh prawns, Oysters and cook for another 3 minutes.
- Add the uziza (pepper corn) leaf and cook for another 2 minutes, turn heat off the soup is ready. Serve with Pounded Yam, Garri, Fufu, (Cassava) or Semovita. (Anegbu,2014)

#### Egusi Soup

Ingredients	Quantity	Modification strategies	Quantity for modification
Smoked beef		Do not use, substitute with poultry	
Smoked fish		Use	50g
Stockfish		Use	20g
Egusi (blended)		Use just enough for soup	½ cup
Ukazi leaves (shredded and pounded with a mortar)		Leaves should be washed before shredding and pounding	1 cup
Salt		Use sparingly	Measure in pinch to taste
Pepper		Use	1 teaspoon
Ofor		Use just enough to thicken soup	1 tablespoon
Seasoning cube		Use sparingly	1 small cube
Palm oil		Use just enough and do not bleach	2 table spoons

#### Method of Preparation

- Put water in a pot, add palm oil and bring to boil
- Add washed stockfish
- De-bone smoked fish and add

- Wash smoked meat (beef), salt and pepper to taste. Boil for another 15 minutes
- Add the grounded egusi, ofor (thickener)
- Allow to boil for another 5 minutes and turn off the fire
- The ukazi is usually added when the soup is warm and out of the fire.

### Ogbono (African bush mango seed) Soup

Ingredients	Quantity	Modification strategies	Quantity for modification
Assorted meat (beef, offal's, dried fish, stockfish)		Substitute beef with chicken or other white meat, or use only fish	
Ogbono (ground)			½ cup
Palm oil		Use but do not bleach	2 tablespoons
Spinach (chopped)			1 tablespoon
Pumpkin/bitterleaf/uziza leaf (chopped)		Wash before shredded	1 cup of shredded leafy vegetables
Crayfish ground			10g
Pepper			1 teaspoon
Salt			To taste. Measure in pinch
Seasoning cubes			1 small cube
Water (for stock)			Just enough to cook soup

#### Method of Preparation

- Steam choice of meat with a seasoning cube, salt, pepper and spices, then add water to get stock for the soup
- Into a clean pot, add the palm oil and heat on very low heat but not bleached.
- Reduce heat and add the grounded ogbono stir until completely blended with the oil and a few or no grains left.

- Add the stock, a cup at a time and stir into the soup until it is completely incorporated. It would start to have some viscosity (drawing) continue adding the stock until you get a consistency that you desire.
- Bring to boil and cook on low heat for 5 -10 minutes stirring every few minutes to ensure that soup does not get burnt at the base of the pot.
- Add the steamed assorted meat and fish grounded Cray fish, salt and pepper to taste.
- Add more stock if needed and boil for 5-10 minutes more.
- Add the chopped vegetables if in use, stir into the soup, boil for another two minutes. Serve with pounded Yam, Garri, FuFu.

### **CHAPTER THREE**

#### **RESEARCH METHODS AND PROCEDURES**

This chapter presents the procedure that was adopted in conducting this study. The procedure was organized under the following sub – headings:

- Research Design
- Population of the Study
- Sample and Sampling Technique for the Study
- Instrument for Data Collection
- Validation of the Instrument
- Reliability of the Instrument
- Administration of Research Instrument
- Method of Data Analysis

#### **Research Design**

This study adopted a survey research method and the design of the study was an expostfacto research design, because according to Nworgu (2006) "...the researcher usually has no control over the variable of interest and therefore cannot manipulate them" this design is therefore suitable for the research because it seeks to establish the availability and level of households usage of staple foods and dietary modification strategies in Rivers State using some already existing effects or observations to the variable as causative agents.

#### **Population of the study**

The target population was all households in Rivers State. According to the Census data released in 2006, the state has a total population of 5,185,400, With a Population distribution of Regular households by type of housing unit, at 1,123,998 households in 2006. (National Bureau of Statistics, Annual Abstract of Statistics, 2010)

**Sample and Sampling Technique**

The household survey was carried out in Rivers State, Nigeria. The State is divided into three (3) Senatorial Districts namely; Rivers East Senatorial District, Rivers West Senatorial District and Rivers South East Senatorial District. The districts are further sub-divided into twenty-three (23) Local Government Areas. Four local government areas were selected using the stratified random sampling technique from each senatorial district, making a total of twelve (12) local government areas which was used for the study. These local government areas include:

Local Government Areas	Senatorial districts
Eleme	Rivers East
Etche	Rivers East
Emohua	Rivers East
Port Harcourt (PHALGA)	Rivers East
Andoni	Rivers South East
Khana	Rivers South East
Ogu-Bolo	Rivers South East
Opobo-Nkoro	Rivers South East
Abua-Odual	Rivers West
Ahoada East	Rivers West
Bonny	Rivers West
Ogba/Egbema/Ndoni	Rivers West

The major occupations of the inhabitants of these local government areas are fishing and farming, seventy (70) households was randomly selected from each LGA with no particular reference to educational or economic status bringing the sample size to a total of eight hundred and forty (840) households, which was used for the analysis in the study, with a mother or father representing each household as the caregivers.

**Research Instrument**



A structured questionnaire tagged ‘Staple Food Diet Modification Questionnaire for Adequate Nutrition in Households’ (SFDMQANH), containing two (2) sections was developed and used for the data collection. The questionnaire items were generated based on the information gathered from the research question and review of related literature. Section A elicited information on the personal data of the respondents while section B consisted of seventy nine (79) closed ended questionnaire items with a four (4)/five (5) point scale questions of Strongly Agree (SAG) (4), Agree (AG)(3), Disagree (DA)(2) Strongly Disagree (SDA)(1) for some of the questionnaire items, and Very High (VH)(5), High (H)(4), Average (A)(3), Low (2) and Very Low(VL)(1) due to the nature of the questionnaire items. To arrive at a cut-off point, the researcher summed up the scores, thus  $(4+3+2+1=10/4)$  to arrive at 2.50, and  $(5+4+3+2+1=15/5)$  to arrive at 3.00 respectively, any score 2.50, 3.00 and above were accepted while scores below the cut off points of 2.50 and 3.00 were rejected. The questions in Section B were structured to answer all research questions guiding the study. The instrument was a dietary assessment questionnaire, where respondents were guided on how well to answer the questionnaire items.

### **Validation of the instrument**

The instrument was validated by the project supervisor and two Food and Nutrition lecturers from Federal College of Education (Technical) Omoku, Rivers State. The Validators were given a copy of the questionnaire each and were requested to read the competency of the items developed for the study. Their observations, corrections and suggestions were effected to ensure face and content validity for the questionnaire. The final draft of the questionnaire was developed based on these suggestions and used in collecting data for the study.

### **Reliability of the instrument**

The level of reliability of the instrument was obtained by administering the test-retest reliability method through administration of instrument to thirty (30) randomly selected lecturers in the Department of Home Economics Education, fifteen (15) from Ignatius Ajuru University of Education and fifteen (15) from Federal College of Education (Tech) Omoku with a time interval of two weeks; this method addressed the stability aspect of reliability principle. The two scores were correlated using the Pearson product-moment correlation to determine coefficient of reliability. The correlated data gave a reliability coefficient of 0.87 (appendix 8). Thus the instrument was considered suitable and reliable for the study. According to Eboh

(2009), any correlation coefficient less than 0.80 is considered very low for reliability of measurement.

### **Administration of Research Instrument**

Copies of the questionnaires was administered to the respondents with the help of five (5) research assistants who went through some form of training by the researcher, and also personally by the researcher. This enabled the researcher more coverage, with one week interval between Local Government Areas, so that research instruments were retrieved on the spot for collation.

### **Method of Data Analysis**

The data collected was analyzed using descriptive statistics. The mean scores and standard deviations were used to analyze the research questions. To arrive at a cut off mean for the modified four-point scale, the researcher computed the scores in this manner,  $1+2+3+4=10/4=2.5$  and for the five point likert scale,  $1+2+3+4+5=15/5=3$ . T-test was used to test the null hypotheses 1, 2, and 5, and Analysis of Variance (ANOVA) for hypotheses 3&4 because the mean responses of more than two groups were being compared.

## CHAPTER FOUR

### PRESENTATION OF DATA, ANALYSIS AND DISCUSSION

The results and analysis of the data collected are presented in this chapter. The presentation follows in order of the research questions and the generated null hypotheses.

#### Research Question 1

What is the level of availability of staple foods in Rivers State?

**Table 1**

Staple foods readily available

S/N	Food groups	Examples	VH	H	A	L	VL	X	SD	Rmks
1.	Starchy roots and tubers	Yams, cocoyam, sweet potatoes and cassava	250	308	280	2	-	3.95	0.65	Accept
2.	Cereals	Maize Rice	308	255	257	20	-	4.01	0.32	Accept
3.	Legumes, nuts and seeds	Groundnuts Beans	333	219	276	12	-	4.03	0.12	Accept
4.	Fruits	Banana, pineapple, pawpaw, ranges, mango, sour sop and guava	205	357	251	27	-	3.88	0.54	Accept
5.	Vegetables	Okra, tomatoes, bitter leaf,	250	308	280	2	-			Accept

		water leaf, and fluted pumpkin						3.96	0.64	
6.	Meat and Seafoods	Games, snails, fish, crabs ,lobster, oyster, shrimps, periwinkle, poultry (chicken), Red meat	333	219	276	12	-	4.03	0.12	Accept
7.	Spices and flavourings	Chili pepper, Onions, Scent leaf	309	323	178	30	-	4.08	0.21	Accept
8.	Thickeners	Egusi Ogbono	325	306	198	11	-	3.72	0.52	Accept
9.	Oils	Palm oil Groundnut oil	250	308	280	2	-	3.96	0.64	Accept

Table 1 show that items 1 – 9 with an average mean value of between 3.7 and 4.0it therefore implies that the respondents agreed that staple foods are often available for consumption in their homes, because this mean values fall above the cut of point of 3.00.

## Research question 2

What is the extent of usage/consumption of the staple foods?

**Table 2**

Extent of usage/consumption of the staple foods

s/no	Food groups Level of usage	Examples	Daily	weekly	Monthly	Occasionall y/never
10	Starchy roots and tubers	Yam Cocoyam Sweet potatoes Cassava	- (-) - (-) - (-) 566(67%)	653 (77%) - (-) - (-) 258(31%)	109 (13%) 568 (68%) 770 (92%) 16 (2%)	78 (10%) 272 (32%) 70 (8%) - (-)
11	Cereals	Maize Rice	- (-) 565 (67%)	-(-) 258 (31%)	79 (9%) 17 (2%)	761 (91%) -(-)
12	Legumes, nuts and seed	Groundnut Beans	607 (72%) 595 (71%)	230 (27%) 220 (26%)	25 (3%) 25 (3%)	-(-) - (-)
13	Fruits	Banana Pineapples Pawpaw Oranges	-(-) - (-) - (-) 697 (83%)	767 (91%) 758 (90%) 758 (90%) 84 (10%)	73 (9%) 82 (10%) 82 (10%) 59 (7%)	-(-) - (-) - (-) - (-)
14	Vegetables	Okra Tomatoes Bitter leaf Fluted pumpkin	-(-) 600 (71%) -(-) -(-)	39 (5%) 199 (23%) -(-) 700(83%)	678 (80%) 41 (5%) 255 (30%) 140 (17%)	123 (15%) -(-) 585 (70%) - (-)

15	Meat and sea foods	Games	-(-)	-(-)	255 (30%)	585 (70%)
		Snails	- (-)	- (-)	75 (9%)	765 (91%)
		Fish	580 (69%)	250 (30%)	10 (1%)	-(-)
		Crabs	- (-)	-(-)	75 (9%)	765 (91%)
		Lobsters	- (-)	308 (37%)	489 (58%)	43 (5%)
		Oyster	- (-)	- (-)	208 (25%)	632 (75%)
		Shrimps	- (-)	308 (37%)	489 (58%)	43 (5%)
		Perewinkle	- (-)	159 (19%)	653 (78%)	28 (3%)
		Poultry	- (-)	580 (69%)	250 (30%)	10 (1%)
		Red meat	- (-)	650 (77%)	169 (20%)	21 (3%)
16	Spices and flavourings	Chili pepper	286 (34%)	498 (59%)	56 (7%)	-(-)
		Onions	286 (34%)	499 (59%)	55 (7%)	- (-)
		Scent leaf	-(-)	-(-)	75 (9%)	765 (91%)
17	Thickeners	Egusi	508 (60%)	276 (33%)	56 (7%)	-(-)
		Ogbono	470 (56%)	280 (33%)	90 (11%)	- (-)
18	Oils	Palm oil	713 (85%)	127 (15%)	-(-)	-(-)
		Groundnut oil	714 (85%)	126 (15%)	- (-)	-(-)

The main foods available which dictate consumption patterns are presented in table 2, under nine (9) groups as items 10 – 18, the main starchy staples consumed are yam, cocoyam, sweet potatoes, plantain and cassava with cassava being the most frequently consumed. 67% of respondents indicated that they consumed cassava on daily basis in various forms. Cocoyam does not form a major part of the normal diet of most people. With regards to the consumption of cereals, rice was found to be the most frequently consumed, with 67% of the respondents consuming rice daily, maize was consumed occasionally mainly because it was a seasonal food. Legume consumption in the area was really high as 72% and 71% of the respondents reported that they consumed groundnuts and beans respectively on daily basis. For fruits oranges had the highest percentage of consumption with 83% consuming oranges on daily basis, with respect to vegetables, tomatoes were found to be consumed on daily basis with 71% of the respondents, closely followed by fluted pumpkin with 83% on weekly basis. On meat and sea foods, fish was found to be the main source of animal protein for the respondents with 69% consumption on daily basis, closely followed by red meat and poultry with 77% and 69% on weekly basis. Spices and flavourings such as chilli pepper and onions were consumed on daily basis as reported with 34% and 34% consumption as these are mainly used to flavor almost type meals in area of study. Respondents also reported using thickeners such as egusi and ogbono on daily basis with 60% and 56% consumption daily. Among the fats and oils groundnut oil and palm oil were the most frequently consumed as reported with 85% and 85% consumption on daily basis.

### Research question 3

What are the major sources of these staple foods in achieving adequate nutrition?

**Table 3**

#### Major sources of staple foods

S/N	Items	SAG	AG	DAG	SDA	X	SD	Rmks
		4	3	2	1			
19	Staple foods are home grown in our farmlands	285	302	209	44	2.98	1.40	Accept
20	We obtain these staple foods from my personal garden	-	64	318	458	1.53	1.16	Reject
21	We obtain these staple foods from the local market because they are commonly and easily grown in my area	286	301	209	44	2.98	1.40	Accept
22	We obtain these foods from neighboring states due to boundary ties with them	322	285	228	5	3.10	1.18	Accept
23	We eat whatever is available	276	298	206	60	2.94	1.37	Accept
24	The riverine terrain has made staple foods easily accessible	286	302	209	43	2.98	1.40	Accept

Items 19, 21-24 in table 3 on major sources of staple foods had average mean values between 2.9 and 3.1, which is above the cutoff point of 2.50. These depict that the respondents all agreed that they get their staple food from neighboring communities. The above also denote that the respondents eat whatever is available and their closeness to riverine area has also made it easier for them to get seafood easily. While item 20 on the same table that deals on obtaining staple foods from personal garden had a mean score of 1.5, below the cutoff point of 2.50. It implies that the respondents do not have maximum land that could be used for garden close to the house for the planting of these staple foods

#### Research question 4

How does the traditional/cultural belief affect the choice of staple foods consumed in the Rivers State?

**Table 4**

s/no	Traditional/cultural belief variables as they influence choice of staple foods	SAG 4	AG 3	DA 2	SDA 1	X	SD	Remarks
25	Our culture provides guidelines (taboos/rules) regarding the eating pattern of these staple foods	285	302	209	44	2.98	1.40	Accept
26	We must always comply with these guidelines	285	302	209	44	2.98	1.40	Accept
27	Compliance with these guidelines creates a sense of identity to us as a people	300	399	139	2	3.19	1.25	Accept
28	Methods of food preparation and combination of these staple foods are also guided by these cultural guidelines	308	309	218	5	3.10	1.20	Accept
29	Some of these cultural food taboos prevent us from eating some of these staple foods irrespective of its nutritional values	321	286	228	5	3.09	1.18	Accept
30	Certain foods (for example some portions of meat, snails) due to these	388	326	124	2	3.31	1.52	Accept

	traditional/cultural guidelines are not given to certain groups of people in the family (for example: women and children)							
31	We obey these cultural guidelines simply because it is part of our tradition/culture	285	302	209	44	2.98	1.40	Accept

Items 25-31 in table 4, on how culture provides guidelines (taboos/rules) regarding the eating pattern of these staple foods had average mean values and standard deviation between 2.9 and 3.3 which is above the cutoff point of 2.50. This implies that tradition influenced the consumption of these staple foods in the area of study as indicated by the respondents.

### Research Question 5

How does economic status influence the consumption of these staple foods to achieve adequate nutrition?

**Table 5**

Economic status and the influence on the consumption of staple foods to achieve adequate Nutrition

S/N	Items	VI (4)	I (3)	U (2)	VU (1)	X	SD	Rmks
32	The money available to spend on food(cost)	340	279	209	12	3.13	1.21	Accept
33	Selection of menus which use ingredients that are easy to utilize economically and hygienically (ease of preparation)	321	286	228	5	3.09	1.01	Accept
34	Personal taste and quality of these staple foods	308	309	218	5	3.10	1.20	Accept
35	Likes and dislikes of family members when it comes to these staple foods (comfort in consumption)	285	302	209	44	2.98	1.40	Accept



36	Access to these staple foods (any food available within walking distance)	388	326	124	2	3.31	1.52	Accept
37	The use of canned, frozen and prepackaged foods, because they are more convenient and easy to prepare	321	286	228	5	3.09	1.18	Accept
38	Selection of recipes that can be easily prepared according to seasonal availability of these staple foods	285	302	209	44	2.98	1.40	Accept

Items 33-38 in table 5 on economic status and the influence on the consumption of staple foods to achieve adequate Nutrition had a mean scores and standard deviation between 2.9 and 3.3 which is above the cutoff point of 2.50. Since all the mean scores and standard deviations on the tables are above the cut-off point of 2.50, it thus imply that economic status of the family determine what they buy and consumed.

### Research Question 6

How does the educational background variable (nutrition knowledge) influence staple food selection in achieving adequate nutrition in the family?

**Table 6**

Influence of Educational Background variable (nutrition knowledge) on food selection in achieving adequate nutrition in the family.

S/N	Items	VI (4)	I (3)	U (2)	VU (1)	X	SD	Remarks
39	The nutritional values and health benefits of these Staple foods (nutritional knowledge )	388	326	124	2	3.31	1.52	Accept
40	Knowledge about the best ways to combine these Staple foods and create new recipes and dishes (innovation )	286	301	209	44	2.98	1.40	Reject
41	Skill on individual methods of preparation of these Staple foods with reference to food characteristics such as smell, taste, texture...(food characteristics)	321	286	228	5	3.09	1.18	Accept

42	Knowledge of the recommended frequency of consumption of these Staple foods, portion sizes of different food groups	300	399	139	2	3.19	1.25	Accept
43	Family's dietary habits and interests in activities related to food (behavior)	365	289	179	7	3.20	1.25	Accept
44	Ability to try new recipes, new seasonings and new methods of preparing these staple foods (culinary preparation and presentation)	286	302	208	44	2.98	1.40	Accept
45	Health and nutritional needs of family members (nutritional and health motivation)	388	326	124	2	3.31	1.52	Accept
46	Ability to restructure and modify these foods to suit individual nutritional needs	321	286	228	5	3.09	1.18	Accept

Items 40-46 on influence of educational background on food selection in achieving adequate nutrition in the family in table 6, had mean values and standard deviation between 2.9 and 3.3 which was above the cutoff point of 2.50, this also implies that educational background (nutritional knowledge) influences food selection.

### Research Question 7

What are dietary modification enhancement strategies which can be adopted for adequate nutrition in Rivers State?

**Table 7**  
Dietary Modification Enhancement Strategies

S/N	Items	SA	A	D	SD	X	SD	Remarks
		4	3	2	1			
47	Consuming less than 2 servings of red meat (preferably lean cuts) and processed meats (less than one servings per week)	485	315	40	-	3.51	1.49	Accept
48	Reduced intake of sweets in form of sugar, candies, pastries, and beverages such as sweetened fruit juices and soft drinks to small amounts and left for special occasions	397	367	76	-	3.40	1.48	Accept
49	Eating 2-4 servings of eggs weekly	300	298	199	43	3.02	1.03	Accept
50	Consuming 3 servings of potatoes weekly and 3 servings weekly of starchy roots and tubers crops for example cassava, yam, and cocoyam	365	289	184	2	3.21	1.03	Accept
51	Taking 3-4 servings weekly of oils, legumes (pulses), nuts, and seeds as good sources of healthy lipids, protein, vitamins and fiber	258	289	293	-	2.95	1.01	Accept

52	Eating 4 servings of white meat such as poultry, turkey, rabbits weekly than red meat (beef)	485	315	40	-	3.52	1.68	Accept
53	Consuming 5-6 serving of fish and other sea foods weekly, as fish contains healthy fatty acids and proteins	300	298	199	43	3.01	1.42	Accept
54	Eating 2 serving of dairy products for example milk daily	397	367	76	-	3.40	1.51	Accept
55	Use olive oil as the main added oil	184	289	365	2	2.78	1.33	Accept
56	Intake of 1 or 2 servings of fruit per main meal daily	300	298	202	40	3.02	1.42	Accept
57	Ensuring that vegetables should be present at lunch and dinner or more than 2 servings per meal, at least one serving should be served raw	485	315	40	-	3.50	1.54	Accept
58	Eating at least 1 or 2 servings per main meal daily of none refined cereals and products in the form of whole grain bread whole gain pasta, rice	300	298	199	43	3.01	1.42	Accept
59	Drinking at least 8 (eight) glasses of water daily for body to function well and transport nutrients	397	367	76	-	3.40	1.57	Accept
60	Avoid excessive salt intake both in pot and on the table	485	315	40	-	3.51	1.54	Accept
61	Substituting commercial flavored fruit juice with natural homemade fruit juice	379	392	69	-	3.40	1.51	Accept
62	Reducing intake of foods containing large amounts of fat (reducing the consumption of fried foods)	484	315	40	1	3.50	1.54	Accept
63	Conscious eating and using more fresh foods for food preparation, than the use of convenient foods	485	315	40	-	3.51	1.54	Accept
64	Moderate use of spices, and herbs for example; garlic, chili peppers and onions	365	289	186	-	3.21	1.33	Accept

Items 48 - 64 in table 7 on some suggested dietary modification strategies which could be adopted for adequate nutrition all had average mean values and standard deviation between 2.7 and 3.5 which is above the cutoff point of 2.5. This implies that respondents agreed to adopt these dietary modification strategies suggested for adequate nutrition in homes.

### **Research Question 8**

How can these dietary modification enhancement strategies if adopted, influence adequate nutrition in homes in Rivers State?

**Table 8:** Influence of Dietary Modification Enhancement Strategies Adopted Households in Rivers State

S/N	Items	SA 4	AG 3	DA 2	SDA 1	X	Std	Remarks
65	Reduced intake of red meat also reduces the risk of cardiovascular diseases.	365	289	186	-	2.30	1.01	Reject
66	Reduction of sweets also helps to reduce the damaging effect of sweet foods on the teeth, reduced risk of heart and vascular disease, type 2 diabetes, obesity	397	367	76	-	3.41	1.50	Accept
67	Eggs	370	299	168	3	3.21	1.06	Accept
68	Moderate consumption of potatoes will reduce the risk of type 2 diabetes as it contains high available starch content	383	350	107	-	3.30	1.09	Accept
69	Moderate consumption of legumes (beans, peas and peanuts) as it is associated with reduced risk of heart and cardiovascular diseases because they contain healthy lipids, protein, vitamins, minerals and fibre	397	367	76	-	3.41	1.51	Accept
70	Lean white meat (chicken, turkey and other poultry) without skin is high in protein, vitamins (including Vitamin B <sub>12</sub> ) and minerals, but with much less saturated animal fat than red meat	379	368	90	3	3.31	1.09	Accept

71	White oily fish and other sea foods. A combination of oily and white fish in the diet is an alternative sources of protein that reduces the risk of heart diseases and heartbeat irregularities	300	298	199	43	3.01	1.42	Accept
72	Milk and other dairy product contains calcium which is needed for strong bones and teeth	485	315	40	-	3.51	1.52	Accept
73	Olive Oil also found in olives, nuts and seeds, avocados. High in mono-saturated fat, high in kilo calories which help protect against heart disease, some cancers (example breast ) and assist in lowering blood pressure	485	315	40	-	3.51	1.52	Accept
74	Moderate consumption of vegetable such as onions, okra, pumpkin leaf, water leaf, fruits such as oranges, bananas, pears, pineapples are high in fiber , antioxidants and vitamin C, will help to reduce risk of heart and vascular diseases, cancer and bowel problems	383	350	107	-	3.30	1.09	Accept
75	Consumption of cereals such as wheat, barley, oats, corn, rice are associated with decreased bowel problems, including cancers, lowered 'bad' blood fat and decreased heart diseases	300	298	199	43	3.01	1.42	Accept
76	A daily intake of 1.5-2.0 litres (8 glasses ) of water guarantees good hydration which is essential to maintain the corporal water equilibrium and aid transportation of nutrients in the body	378	369	90	3	3.31	1.09	Accept
77	Consumption of too much salt causes the body to retain water and puts extra burden on the heart and blood vessels, causing high blood pressure	397	367	76	-	3.40	1.50	Accept
78	Conscious eating of more homemade foods than convenience foods helps one have control over spices and flavors used in the food preparation	300	298	199	43	3.01	1.42	Accept
79	Moderate use of spices, herbs, garlic, chili peppers and onions is a way to introduce a variety of flavors and palatability to dishes and contribute to the reduction of added salt.	397	367	76	-	3.41	1.51	Accept

Item 66 in table 8 on influence of dietary modification enhancement strategies if adopted had average mean and standard deviation score of 2.30 which is below the cutoff point of 2.50, while items 67 – 79 in the same table had average mean scores between 3.0 and 3.50 which is above the cutoff point which is 2.50. Since the mean scores and standard deviations of the item are more than the cut-off point of 2.50, it implies that the respondents agreed on the statements on the items.

### Tests of Hypotheses

HO<sub>1</sub> There is no significant difference between the level of availability of staple foods in urban and rural areas.

#### Table 9:

t-test Comparison Between Urban and Rural Households on Staple Food Availability and Nutrition

Achievement

Respondents	X	SD	DF	T-cal	T-crit	Rmks
Urban Households	1.63	2.410	839	1.16	1.96	NS
Rural Households	2.27	1.920				

Table 9, revealed that t-call value is 1.16, while t-crit for 839 degree of freedom at 0.05 level of Significance is 1.96 higher than the t-cal. Since the calculated is less than the t-crit, the null hypothesis of no significance difference is thus accepted. This implies that there is no significant difference in the opinions of the respondents on the extent of staple food availability and nutrition achievement.

HO<sub>2</sub> The traditional/cultural belief of households does not significantly influence the choice of staple food consumed by urban and rural dwellers in Rivers state

**Table 10:**

t-test Comparison of influence of traditional/cultural belief between Urban and Rural Households on Staple Food consumption in Rivers state.

Respondents	X	SD	DF	T-cal	T-crit	Rmks
Urban Households	1.66	2.419	839	1.19	1.96	NS
Rural Households	2.27	1.921				

Table 10, revealed that t-call value is 1.19, while t-crit for 839 degree of freedom at 0.05 level of Significance is 1.96 higher than the t-cal. Since the calculated is less than the t-crit, the null hypothesis of no significance difference is thus accepted. This implies that there is no significant influence of traditional/cultural on the extent of staple food consumed in Rivers state.

HO<sub>3</sub> The economic status of households does not significantly influence the level of consumption of staple foods.

**Table: 11**

Summary of Analysis of Variance (ANOVA) Comparison on Influence of economic status of households and its influence in consumption of staple foods

Source of variance	Sum of Squares	Degree of Freedom	Mean Square	F	Sig.	Decision
Between Groups	19.513	20	.976	2.33530	.000	Reject
Within Groups	.000	288	.000			
Total	19.513	308				
Between Groups	3.172	20	.159	2.758	.000	
Within Groups	16.562	288	.058			
Total	19.734	308				
Between Groups	3.056	19	.161	2.803	.000	
Within Groups	11.188	195	.057			
Total	14.244	214				

The result in Table shows ANOVA statistical analysis of economic status households in the consumption of staple food. The table shows that ANOVA statistical values F-call 2.80, F-crit 1.96 at Df=3/837. As the F-call is higher than F-tab value, the null hypothesis of no significant difference among upper, middle and low is therefore rejected. In other words, the economic status of high, middle and low households influence their daily consumption of households' staple food.

HO<sub>4</sub> The educational background of households does not significantly influence the consumption of staple foods.

**Table: 12**



Summary of Analysis of Variance (ANOVA) Comparison on Influence of educational background on consumption of households and its influence in consumption of foods

	Sum of Squares	Df	Mean Square	F	Sig.	
Source of variance	Sum of Squares	Degree of Freedom	Mean Square		Sig.	Decision
Between Groups	14.818	56	.265	1.827	.034	Reject
Within Groups	4.635	32	.145			
Total	19.454	88				
Between Groups	14.655	56	.262	2.989	.000	
Within Groups	3.765	43	.088			
Total	18.420	99				
Between Groups	92.206	110	.838	6.93630	.000	
Within Groups	.000	229	.000			
Total	92.206	339				
Between Groups	15.674	104	.151	1.692	.001	
Within Groups	18.344	206	.089			
Total	34.018	310				

The result in Table shows ANOVA statistical analysis of educational background of households in the consumption of staple food. The table shows that ANOVA statistical values F-call 2.99, F-crit 1.96 at Df = 3/837. As the F-call is higher than F-tab value, the null hypothesis of no significant difference among FSLC, SSCE/NECO, OND/NCE, and HND/

B.Sc/B.Ed is therefore rejected. In other words, the educational background households influence their daily consumption of households' staple food.

HO<sub>5</sub> There is no significant difference in the perception of male and female household members on the dietary modification enhancement strategies for adequate nutrition in Rivers State.

**Table: 13**

t-test Comparison on the perception of male and female household members on the dietary modification strategies for adequate nutrition in Rivers State.

Respondents	X	SD	DF	t-cal	t-crit	Rmks
Female 538	1.67	2.319	389	1.18	1.96	NS
Males 302	2.19	1.786				

Table 13, revealed that t-cal value is 1.18, while t-crit for 839 degree of freedom at 0.05 level of Significance is 1.96 higher than the t-cal. Since the calculated is less than the t-crit, the null hypothesis of no significance difference is thus accepted. This implies that there is no significant difference in the opinions of the respondents on the extent of dietary modification strategies on achieving adequate nutrition.

## DISCUSSION OF FINDINGS ON RESEARCH QUESTIONS

The findings of the study are discussed based on the research questions answered and hypotheses tested.

The results of the study in table one (1) showed that all the staple foods listed were accepted by the respondents above cut off point. This means that the respondents agree that these staple foods were readily available in area of study. This finding agrees with Osuji, (2014) who posited that when people talk about foods eaten in Africa in general and Nigeria in particular, they tend to forget that items highly sought after in Western countries like cassava, yams, plantains, palm oil, coconut and coconut oils, Nigerian brown rice and beans do not grow in the West. Most of these items come from Africa, Asia and South America, yet they make up the bulk of Nigerian and African foods. Tropical fruits such as oranges, tangerines, mangoes, pawpaw, African breadfruit, banana, and African bush mango seed (Ogbono) and, carrots to name but a few, these are everyday items that make up the Nigerian dishes (Osuji, 2014).

Findings from research question two (2) revealed that generally for most of the staple foods, less than 1% of the studied population did not consume them at all daily. Most of the foods were usually consumed between daily and weekly, and up to three to four times in a month. Consumption over four times a week which could indicate that the foods were consumed almost daily, weekly or monthly substantially reflected foods most preferred by households or those that were available to them and affordable and of the utmost important for their food security. This is in agreement with Osuji (2014) & The Fitizen, (2014) that stated that Nigeria is endowed with a lot of natural staple foods, for Nigerian in Nigeria; it is obvious that they will continue to enjoy delicacies of their inheritance with its attendant health benefits. Most Urban Nigerians for instance some people in parts of the area of study seems to combine traditional cuisine with a little western- style foods and conveniences. Rural dwellers in the area of study tend to stick more with traditional foods and preparation techniques. Our diets are restricted to the types of foods and amounts of food allotted by the food supply. Depending on where consumers live, they may find a surplus of certain kinds of food they may not find in another part of the world. For example, the climate one lives in has a huge influence on what is available to him/her

The study in research question three (3) revealed that people in area of study possess vast landscape as farmlands to grow these foods, but do not have maximum lands that could be used for garden close to the house for the planting of these staple foods, due to urbanization, houses has been built on these land, therefore, most of these staple foods are sourced from neighboring communities, due to boundary ties. The other alternative is to eat whatever there is available. Rivers State is one of the 36 states of Nigeria. Its capital is Port Harcourt. It is bounded on the South by the Atlantic Ocean, to the North by Anambra, Imo and Abia states, to the East by Akwa-Ibom state and to the West by Bayelsa and Delta states. The in-land parts of Rivers State consist of tropical rain forest, towards the coast the typical river delta environment features many mangrove swamps. Rivers State has tremendous natural resource potentials, but a sizeable proportion of these has been quantified or exploited. Given the abundant cultivatable land in the up-land area of the state and adequate rainfall, the potential for crop production is very substantial for agriculture, forestry and other basic facilities.

Culture is the people's way of life. Findings from data presented in table 4 revealed that though there are traditional/cultural beliefs guiding the consumption/choice of some of these staple foods, it really influences the consumption of these staple foods in Rivers State. This

finding is agreement with the statement of Social health knowledge (2014), that evidence has shown that traditions, beliefs and values are among the main factors influencing preference, mode of food preparation and nutrition status. Also supports Joel (2011) who stated that humans interact with the environment and each other through culture in socially constructed systems, culture forms the medium through which these interactions are organized.

Data presented in table 5 revealed that the economic status of the households can greatly influence the consumption of these staple foods. Seven (7) items such as money available to spend on food, ingredients that are easy to utilize economically, personal taste and quality, comfort in consumption, foods available in walking distance, use of convenience foods, seasonal availability of these staple were all used to make this assessment. This implies that economic status of the family determines what they buy and consume. This finding is in consonance with Onyebueke & Souzey (2004), who stated that the economic level of an individual (family) determines the type and quality of food purchased, also in agreement are reports of Ejiofor, (n.d.) & Delrala et al (2000) that income is a key factor that determines eating habits and low income groups in particular have a greater tendency to consume unbalanced diets and have low intake of fruits and vegetables.

Data in table 6 considered items such as nutritional knowledge, knowledge about the best ways to combine these staple foods and create new recipes, knowledge of food characteristics, knowledge of recommended frequency of consumption of these staple foods in relation to portion sizes, family's dietary habits and interests, ability to try new recipes, knowledge of the health and nutritional needs of family members and ability to restructure and modify these foods to suit individual nutritional needs were used to assess this questionnaire item. Findings from the study revealed that educational background (nutritional knowledge) can greatly influence food selection and achieving adequate nutrition in the family. This is supported by Onyebueke & Souzey (2004) who stated that the level of education an individual has (nutritional education) determines the type of food eaten. Knowledge of the nature and value of different foods provides the basis for choice and without this knowledge may choose unwisely. In agreement Ejiofor (n.d.) opined that formal and informal education has a strong influence on food habits. Ajala (2006) also agrees that how much information already acquired; understanding of nutrition can serve as a basis for one to improve one's knowledge of nutrition

Findings from data presented in table seven (7) on some suggested dietary modification enhancement strategies which could be adopted revealed that, respondents were willing to adopt

most of the dietary modification enhancement strategies suggested in the work, though slowly (table 7). This supports the view of Oniang et al, (2003) that Food habits are slow and difficult to change because food has important psychological associations with the family and the community. Familiar food is satisfying and reassuring particularly the traditional foods of childhood, which evoke deep-seated emotional response.

Investigation into the influence of dietary modification on adequate nutrition in Rivers State was considered in table 8, data presented revealed that respondent agreed to statements on the items. This is important because according to Oniang et al (2003), Nutritional needs change throughout the lifecycle, requiring adjustments in the types and amounts we eat to maintain optimal health

### **Discussion of hypotheses**

**HO<sub>1</sub>:** Findings in hypothesis one revealed that there was no significant difference in the opinions of the respondents on the extent of staple foods availability in urban and rural areas and nutritional achievement. Urbanization has greatly influenced feeding habits. In most parts of the area of study, food habits consist of high consumption of processed foods and snacks that may be prepared and produced under unhygienic conditions leading to food contamination. Many indigenes especially those in the urban areas have taken up untraditional food as part of their daily diets (Oniang, Mutuku & Malaba, 2003)

**HO<sub>2</sub>:** The result of the null hypothesis 2 (table) revealed no significant difference in the mean responses of urban and rural dwellers on the influence of tradition/cultural beliefs on the choice of staple foods consumed in Rivers state. This implies that tradition has no significant influence in the choice of staple food. This supports EFIC, (2005) Cultural influences lead to the difference in the habitual consumption of certain foods and can lead to restrictions such as exclusion of meat and milk from the diet. Cultural influences are however amendable to change when moving to a new country individuals often adopt particular food habits of the local culture

**HO<sub>3</sub>:** Findings in hypothesis three shows that the economic statuses of households between the three variables under consideration influence their daily consumption of staple foods. This finding aligns with the findings of Onyebueke & Souzey, (2004), who posited that the economic level of an individual (family) determines the type and quality of food purchased.

**HO<sub>4</sub>:** Findings in hypothesis four reveals that the educational background of households influence their daily consumption of household's staple foods, this finding agrees with Kearney

et al (2000) whose findings indicated that the level of education can influence dietary behavior during adulthood, Ajala (2006), also supported this by stating that how much good information already acquired and understanding of nutrition can serve as a basis for one to improve knowledge of nutrition.

**HO<sub>5</sub>:** There is no significant difference in the opinions of the respondents on the extent of dietary modification strategies on achieving adequate nutrition. The implication of this finding is that there is a need for dietary modification at one point or the other and these strategies if adopted can culminate into good family health.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATION**

#### **Summary**

Healthy and balanced diet is important for every one as food is essential for the body to develop. Eating well means eating a variety of foods; no single food contains all the nutrients that the body needs except for breast milk for babies up the age of six (6) months. Eating a variety of different foods will supply the nutrients that are essential for the body. With careful selection from locally produced foods in season, eating can be enjoyable, healthy and affordable. The study therefore sought to look into household's usage of staple foods and suggested some

dietary modification enhancement strategies for improved nutrition in Rivers state. The study specifically sought to ; examine the level of availability of staple foods in rivers state, evaluate the extent of consumption of these staple foods, examine the major sources of these staple foods, examine some factors influencing the choice and consumption of theses staple foods and suggest some dietary modification enhancement strategies, that could result in adequate nutrition in homes.

In carrying out the study, the researcher adopted the survey design. The study was an expost-facto research carried out in Rivers State, seventy (70) households were randomly selected from twelve (12) local government areas, four (4) from each senatorial district, therefore a total of 840 households were used for the study. Relevant literatures were reviewed for the development of the instrument for collecting data. A structured questionnaire was developed to elicit information on households' usage of staple foods and some suggested strategies for dietary modification where necessary. Pearson's product-moment correlation was used to determine the internal consistency of the items. The reliability coefficient of 0.87 was obtained for the instrument. Five (5) trained research assistants helped to administer the questionnaire to respondents. The data collected were analyzed using the descriptive statistics which included frequencies, percentages, mean and standard deviation, while t-test and analyses of variance (ANOVA) were used to test the hypotheses at 0.05 level of significance.

Some major findings of the study were that these staple foods were readily available in Rivers state, traditional and cultural beliefs do not influence the consumption of these staples, economic status of a family determines what they buy and consume, dietary modification strategies suggested will be adopted and this could in turn result in adequate nutrition in these households. Major findings of the hypothesis were that, there was no significant difference in the opinions of the respondents on the extent of staple food availability and nutrition achievement, the economic status of high, middle and low households influence their daily consumption of these staple foods. It was also observed that there was no significant difference in the opinions of the respondents on the extent of dietary modification strategies on achieving adequate nutrition, based on these observations, the recommendations were made.

## **Conclusion**

It is the desire of every one whether as an individual, family or community to live a healthy life especially when it comes to nutritional health. One is more comfortable when foods from ones locality are served whether eating at home or outside the home. Staple foods should

make up the largest part of a meal. These foods are relatively cheap and supply a good amount of energy and other nutrients needed for a healthy living. A good combination of legumes, animal and milk products, vegetables and fruits, drinking plenty of clean safe water and moderate use of fats, sugar and sugary drinks are just the right recipe for adequate nutrition (balanced nutrition).

### **Recommendations**

Based on the findings of the study, the following recommendations were made;

1. Dietary deficiencies, often results from lack of money, resources, including labour, land, and time. Good feeding habits needs to be emphasized while ensuring adequate awareness campaigns on the nutritional importance of these staple foods. The rural and urban masses in Rivers state require updated nutrition education that gives information on nutrients and their importance while pointing out the recommended food sources.
2. Integral family-oriented approaches for the long term dietary changes should be adopted as a way ensuring a step up to consumption of these staple foods early in life.

### **Implication of the Research Findings**

The findings of the study have implications for consumers in Rivers State, lecturers in various tertiary institutions, meal planners and other researchers in nutrition from the study it implies that:

1. If these modification strategies suggested are adopted it will help meal planners plan meals more effectively with, little or no stress as any diet can be modified to suit every member of the family.
2. If these modification strategies are adopted, in homes and hospitals, it will help reduce the incidence of some/most life threatening nutritional disorders, thus reducing the double burden of disease in the homes and communities.
3. If the dietary modification strategies are adopted can also help to reduce bad food choices.

### **Limitations of the study**

Due to the security challenges which existed as at the time of the research, the field work was carried out with so much anxiety; finance was another challenge as so much was needed to carry out this research work. The attitude of some of the respondents was also a major challenge as most of them were not willing to share their experiences

### **Suggestions for further studies**



Evaluating the Efficiency of Applying the Recommended Dietary Allowances, to Menu and achieving Adequate Family Nutrition in Rivers State.

### **Contributions to Knowledge**

The study had therefore made the following contributions to knowledge. Adequate meals can be planned, using foods that are available.

1. The study provided information to meal planners/consumers on the nutritional values of these staple foods and the uniqueness of each of the staple foods. Consumers by this knowledge can now plan more healthy meals and modify existing ones where necessary.
2. The study provided information on the various staple foods available in Rivers State. Available staple foods could be integrated into menus in the hospitals, homes, cafeterias, which will help meal planners create new healthy recipes and dishes.
3. The study provided information on the need for dietary modification as a way of correcting imbalances in diets, emphasizing on the fact that any diet can be modified.
4. Fruits and vegetables are often times neglected in meals, the study also emphasized the need for the consumption of fruits and vegetables as, it adds fiber to foods, low in kilojoules,

### **REFERENCES**

- Acheson, D. (1998): *Independent Inquiry into Inequalities in Health*. The Stationary Office, London.
- Agbogun, J. (2011): Palm wine – Uses and Importance of Palm wine. Retrieved from [jamesagbogun.hubpages.com/hub](http://jamesagbogun.hubpages.com/hub) on 7<sup>th</sup> August. 2015
- Agu, O. (2014): *16 Amazing Benefits of Sour sop Juice for Skin, Hair and Health*. Retrieved from [www.kamdora.com/.../16-amazing-benef...](http://www.kamdora.com/.../16-amazing-benef...) on 5<sup>th</sup> august, 2015
- Ajala, J.A. (2006): *Understanding Food and Nutrition*. May Best Publications, Ibadan Nigeria.
- Akkouh, O., Ng, T.B., Singh, S.S., Yin, C., Dan, X., Chan, Y.S., Pan, W. & Cheung, R.C. (2015): *Lectins and Anti-HIV Activity: A Review*. Retrieved from [www.ncbi.nlm.gov](http://www.ncbi.nlm.gov) on 5<sup>th</sup> August, 2015

- Akorodu, M.O. (1990): *Ethanobotany of Telfaria Occidentalis (Curbitache) Among Igbos in Nigeria*. Economic Botany: 29-30.
- All Nigerian Recipes Cookbook (2014): *Nigerian food, Nigerian recipes/ Learn How to Cook Nigerian...* retrieved from [allnigerianrecipes.com](http://allnigerianrecipes.com) on 2<sup>nd</sup> January 2014.
- Ameen, A. (2014): *Medicinal Benefits of Scent Leaves....* Retrieved from <https://www.facebook.com> on 7<sup>th</sup> August, 2015
- American Association of Cancer Prevention (AACR) (2015): *Cancer Epidemiology, Biomarkers & Prevention*. Retrieved from [m.cebp.aacrjournals.org/content](http://m.cebp.aacrjournals.org/content) on 5<sup>th</sup> August, 2015.
- American Heart Foundation (2014): *Eat More Chicken, Fish and Beans than Red Meat*. Retrieved on 19<sup>th</sup> February, 2014, from [www.heart.org/.../GettingHealthy/.../Health...](http://www.heart.org/.../GettingHealthy/.../Health...)
- American Heart Association (2014): *Fish and Omega 3 – Fatty Acids*. Retrieved from [www.heart.org/.../GettingHealthy/Nutrition](http://www.heart.org/.../GettingHealthy/Nutrition) on 14<sup>th</sup> May 2014.
- American Society for Nutrition (2008): *The Role of Tree Nuts and Peanuts in the Prevention of Coronary Heart Disease: Multiple Potential Mechanisms*. Retrieved from [mijn.nutrition.org/content...](http://mijn.nutrition.org/content...) on 5<sup>th</sup> August 2015.
- Anegbu, C. (2014): *The Ultimate Nigerian Cookbook*. Port Harcourt, Some Dez Maryorz Entertainment.
- Arya, J. (2014): *Food Is Your Medicine*. Retrieved from <https://books.google.com.ng/books?> On 5<sup>th</sup> August 2015
- Asale, E. (2013): *Vitamins that Produce Collagen*. Retrieved from [www.livestrong.com/article/...vitamins](http://www.livestrong.com/article/...vitamins) on 6<sup>th</sup> August, 2015
- Australian Government National Health and Medical Research Council (2015): *Serve Sizes*. Retrieved from [www.eatforhealth.gov.au/food-essentials/how](http://www.eatforhealth.gov.au/food-essentials/how) on 17<sup>th</sup> August, 2015.
- British Broadcasting Cooperation News (2014): *BBC News/Health/Two bananas a day keep Blood Pressure at Bay*. Retrieved from [www.news.bbc.co.uk/2/hi/health/264552.stm](http://www.news.bbc.co.uk/2/hi/health/264552.stm) on the 1<sup>st</sup> September, 2014.
- Better Health Channel, (2014): *Water: A Vital Nutrient*. Retrieved on, the 20<sup>th</sup> September 2014 from [www.m.betterhealth.Vic.gov.au/.../water\\_a\\_vit...](http://www.m.betterhealth.Vic.gov.au/.../water_a_vit...) State Government of Victoria.
- Body Ecology (2014): *Sugar – 25 Reasons to Avoid Sugar*. Retrieved on 10<sup>th</sup> November, 2014, from [www.bodyecology.com...](http://www.bodyecology.com...)

- Boldsky, .O. (2013): *Erectile Dysfunction; Nut to Cure You*. Retrieved from [www.m.boldsky.com](http://www.m.boldsky.com), on 30<sup>th</sup> September, 2014.
- Bruce F. (2014): *RED PALM OIL a Daily Dose of Vitamins from cooking oil*. Retrieved on 8<sup>th</sup> October 2014 from [www.coconutresearchcenter.org/article%...](http://www.coconutresearchcenter.org/article%...)
- California Avocado Commission (2014): *Avocados as a Butter or Fat Substitute*. Retrieved from [www.californiaavocado.com/nutrition/smart-](http://www.californiaavocado.com/nutrition/smart-) on 11<sup>th</sup> august, 2015
- Cancer Prevention and Heart Health (2014): *Health Benefits of Mangoes /Organic Facts*. Retrieved on 29<sup>th</sup> April, 2014 from [www.organicfacts.net.../benefits/...](http://www.organicfacts.net.../benefits/)
- Case, D. (2010): *Papaya Promotes Healing and Aids Digestion*. Retrieved from [forahealthyfuture.com/vitamins-supplements](http://forahealthyfuture.com/vitamins-supplements) on 5<sup>th</sup> August, 2015.
- CBS News (2010): *Study; Mango Prevents Certain Cancers*. Retrieved on 4<sup>th</sup> September, 2014. From [www.cbsnews.com/.../study-manago-prev...](http://www.cbsnews.com/.../study-manago-prev...) January 11, 2010.
- Chan, D.S., Lau, R. & Aune, D. (2011): *Red and Processed Meat and Colorectal Cancer Incidence: Meta Analysis of Prospective Studies*. Retrieved from [www.medpagetoday.com/.../ColonCancer](http://www.medpagetoday.com/.../ColonCancer) on 20<sup>th</sup> May, 2014.
- Chen, J., Wolman, N., Chernichovsky, H., Liana, A., Sofner, Z. & Matzkin, H. (1999): *Effect of Oral Administration of High – dose Nutric Oxidedonor L – arginine, in Men with Organic Erectile dysfunction; results of a double – blind randomized, Placebo – Controlled Study*. Retrieved on 19<sup>th</sup> September, 2014 from [www.ncbi.nlm.nih.gov/m/.../10233492.tina](http://www.ncbi.nlm.nih.gov/m/.../10233492.tina)
- Christina, L. (2013): *Lobster is Healthy Seafood and a Source of Iodine, Benefits*: Retrieved from [www.thoughtforce.hub](http://www.thoughtforce.hub) on 29<sup>th</sup> May 3, 2013
- Chy, A. (2014): *Delicious Rice et al, All About Rice & its Accompanying Delicacies*. Port Harcourt, Some Dez Maryorz Entertainment.
- Citrus Australia (2014): *Health Benefits of Citrus*. Retrieved on 19<sup>th</sup> September 2014 from [www.citrusaustralia.com.au/.../health-bon...](http://www.citrusaustralia.com.au/.../health-bon...)
- Clacher, S. (2015): What Are the Benefits of Bananas. Retrieved from [www.quora.com/what-are-the-benefits-of-banana](http://www.quora.com/what-are-the-benefits-of-banana) on 5<sup>th</sup> August, 2015
- CNN News (2007): *5 Foods that should have a place in your Diet*. Retrieved on 16<sup>th</sup> January, 2014 from [www.cnn.com/2007/HEALTH/diet.fitness...](http://www.cnn.com/2007/HEALTH/diet.fitness...)
- Corlene, J. (2015): *What Is the Nutritional Value of Corn?* Retrieved from [www.livestrong.com](http://www.livestrong.com) on August, 5<sup>th</sup> 2015

- Cultured Palate (2013): *Benefits of Eating Oysters*. Retrieved from, [www.rodalenews.com/benefits.eating...](http://www.rodalenews.com/benefits.eating...) on 13<sup>th</sup> January, 2014.
- Daily Newswatch (2014): *The Healthy Power of Watermelon*. Retrieved from [www.mydaily-newswatchng.com/healing...2014](http://www.mydaily-newswatchng.com/healing...2014) on 19<sup>th</sup> September, 2014.
- Davert, E. (2010): *Seed, Seeds, Seeds: Egusi, the Miracle Melon/Nourishing*. Retrieved from [blogs.worldwatch.org](http://blogs.worldwatch.org) on 7<sup>th</sup> August, 2015
- De Almeida, M.D.V., Grace, P. & Lappalainen (1997): *Sources used and Trusted by National Representative Adults in the European Union for Information on Health Eating*. European Journal of Clinical Nutrition, 51: 08-15.
- Delisle, H. (1990): *Patterns of Urban Food Consumption in Developing Countries: Perspective from the 1980's*. In Consultation with the Food Policy and Nutrition Division! (FAO). Rome.
- Delrala, E., Groth, M., Johanson, L., Ottersdorf, U., Prattala, R. & Martinez-Gonzalez, M. A. (2000): *A Systematic Review of Socioeconomic Differences in Food Habits in Europe; Consumption of Fruits and Vegetables*. European Journal of Clinical Nutrition 54: 706-714.
- Dibsdall, L. A., Lambert, N., Bobbin, R. F. & Prewer, L. J. (2003): *Low-Income Consumers Attitudes and Motivation to Eat Fruits and Vegetables*. Public Health Nutrition 6(2): 159-168.
- Dieticians Association of Australia (2015): *Legumes*. Retrieved from [www.glnc.org.au/legumes/legumes](http://www.glnc.org.au/legumes/legumes) on 5<sup>th</sup> August, 2015
- Dobbyn, S. (2014): *Boost Your Fertility by Eating Well – Body+Soul*. Retrieved from [www.mums.bodyandsoul.com.au/.../](http://www.mums.bodyandsoul.com.au/.../) on 9<sup>th</sup> October, 2014
- Dogan, I.S., Yildiz, O., Eydurah, E. & Kose, S. (2011): *“A Study on Determination of Functional Food Consumption Habits and Awareness of Consumers in Turkey*. Bulgarian Journal of Agricultural Science 17(2): 246-57.
- Doles Nutrition Institute (2010): *The Dole Nutrition Handbook, What to Eat and How to Live for Longer Healthier Life*. Rodale Inc., United States of America.
- Doles Nutrition News (2007): *Bone Up On Fruit & Veggies*. Retrieved from [dnndev.thenpost.com](http://dnndev.thenpost.com) on 5<sup>th</sup> August, 2015
- Dsouza, G. (2014): *Health Benefits of Banana*. Retrieved From [www.gracydsouza.com/health-benefits/](http://www.gracydsouza.com/health-benefits/) on 5<sup>th</sup> August, 2015

- Dudek, S. (2015): *Definition of Modified Diet*. Retrieved on 29<sup>th</sup> April 2014 from [www.livestrong.com/.../](http://www.livestrong.com/.../).
- Eboh, E. C. (2009): *Social and Economic Research Principles and Methods*. Enugu: African Institute for Applied Economics.
- Ejiofor, J. (n.d.): *You are what you eat*. (Unpublished Manuscript).
- Ejiofor, J. (n.d.): *What you eat, is it right?* (Unpublished Manuscript).
- Ekinsanmi, T. (2010): *African Palm Wine – A Different Type of Wine*. Yahoo Voices. Retrieved from [www.voices.yahoo.com/African-palm-wine...](http://www.voices.yahoo.com/African-palm-wine...) on 21<sup>st</sup> May, 2014.
- Ellah, F. J. (1995): *Ali Ogba; A History of Ogba People*. Retrieved from [www.worldcat.org/.../aliogba](http://www.worldcat.org/.../aliogba) on 29<sup>th</sup> May 2013 .
- Elist, D. (2013): *Eat Nuts and Go Nuts... Dr. Elist Advice for Erectile Dysfunction*. Retrieved from, [www.drelist.com/eat-nuts-and-go-nuts](http://www.drelist.com/eat-nuts-and-go-nuts) on the 30<sup>th</sup> September, 2014.
- Esruch, R., Bach-Faig, A., Stracker, D., Martinez, N., Kussmann, M., Kandili, Y., Kolokotroni, T., Vlachos, I., Koulochera, A., Balenzano, A., Romano, F., Lumelli, A., Massoud, E., Jabri, S., Adib, R., Khaldi, R., Sfayhi, D., Hsairi, M., & El Ati, J. (2013): *Guidelines for the Organization of events in promoting the Mediterranean diet*. Retrieved from [www.med-diet.eu](http://www.med-diet.eu) On 1<sup>st</sup> September, 2015.
- European Food Information Council (EUFIC) (2005): *The Determinants of Food Choice*. Retrieved from [www.eufic.org>reviewfood.choice](http://www.eufic.org>reviewfood.choice) on 22<sup>nd</sup> November, 2015.
- Family Nutrition (2013): *Healthy Diets for Adults and Children*. Retrieved on 4<sup>th</sup> April, 2013 from [www.shapefit.com/family-nutrition.htm](http://www.shapefit.com/family-nutrition.htm).
- Faugier, J., Lancaster, J., Pickles, D. & Dobson K, (2001): *Barriers to Health Eating in the Nursing Profession*: Nurse Stand. 15(37): 33-5.
- Felix, K. (2012): *Amazing Health Benefits and Nutrition Fact of Soursop*. Retrieved from [www.healthable.org/soursop-and-its-benefits](http://www.healthable.org/soursop-and-its-benefits) on 5<sup>th</sup> August, 2015
- Fife, B. (2014): *The Palm Oil Miracle*. Retrieved on, 21<sup>st</sup> May, 2014 from [www.piceadillybooks.com/palm-oil-miracle](http://www.piceadillybooks.com/palm-oil-miracle).
- Food and Agricultural Organization, (FAO) (2006): Socio-Political and Economic Environment for Food Security. *World Food Summit*, 1(4).
- Food and Agricultural Organization (FAO), (2014): *Household Consumption of Forest Resources*. Retrieve from [www.fao.org/docrep/49450e/+9450e04](http://www.fao.org/docrep/49450e/+9450e04) on 5<sup>th</sup> May, 2014

- Freedman, M., King, J. & Kennedy, E.K, (2001): *Popular Diets: A Scientific Review*. Obesity Results, 1-40.
- Fritz, R. (2012): *10 Health Benefits of Mangoes / Care 2 Healthy Living*. Retrieved on 14<sup>th</sup> January, 2014 from [www.care2.com/greenliving/10-health...](http://www.care2.com/greenliving/10-health...)
- Giami, S. Y. (2003): *Effect of Germination on Bread Making Properties of Fluted Pumpkin (Telfaria Occidentals) Seed Flour Blends*'. Plant Foods for Human Nutrition Journal 58(1-9)
- Golden, C.D., Fernald, L.C.H., Brashares, J.S., Rodolph, B. J., Ofoniana, R. & Kreman, C. (2011): *Benefits of Wildlife Consumption to Child Nutrition in a Biodiversity Hotspot*. Retrieve from [www.pnas.org/content/108/49/19653](http://www.pnas.org/content/108/49/19653) on 10th January, 2015
- Goldschmidt. M. A. (2014) *Boost Calcium Absorption with Bananas*. Retrieved from [saveourbones.com/calcium-absorption...](http://saveourbones.com/calcium-absorption...) on 5<sup>th</sup> August, 2015
- Graef, N. (2009): *Best B Vitamins to Boost Mood, Brain Power and Happiness*. Retrieved from [extrahappiness.com/happiness/?](http://extrahappiness.com/happiness/?) On 5<sup>th</sup> August, 2015.
- Haider, P. (2013): *Sour Sop- a Powerful Treatment for Many Modern Day Health Challenges*. Retrieved from [www.community.ourtimes.com](http://www.community.ourtimes.com) on 16<sup>th</sup> February, 2013.
- Harald, T. (2000): *Papaya Skin Care*. Retrieved on April 29<sup>th</sup> 2014 from [www.alive.com/article/.../papaya skin\\_...](http://www.alive.com/article/.../papaya%20skin_...)
- Healthy Eating (2012): *The Health Benefits of eating Lobster/ Healthy Eating*. Retrieved on 13<sup>th</sup> January, 2014 from [Diet](http://Diet), 2014.
- Hjelma, W.F. (2011): "Consumers Purchase of Organic Food Products. A matter of Convenience and Reflective Practices" *Appetite* 56(2), 336-44.
- Hobbs, C. & Haas, E. (2014): *Arginine: The Amino Acid for Male Fertility*. Retrieved from [m.dummies.com/how-to/content](http://m.dummies.com/how-to/content) on 5<sup>th</sup> August, 2015
- Hoorelbeke, B., Van Damme, E.J., & Rough, P. (2011): *Differences in the Mannose Oligomer Specificities of the Closely Related Lectins from Galanthus Nivalis and Zea Mays strongly determine their Eventual Anti-HIV activity* *Retrovirology*. 2011 Feb. 20; 8(1): 10
- Hopkins, S. (2012): *Benefits & Medicinal Uses of Almonds Nuts*. Retrieved on 20<sup>th</sup> September, 2014 from [www.diethealthclub.com/article11/diet-and...](http://www.diethealthclub.com/article11/diet-and...)
- Ifeanacho, M.O. (2009): *Fundamental Nutrition*. Masterpiece Publishing, Port Harcourt.

- Information Nigeria (2012): *7 Health Benefits of Eating Pawpaw*. Retrieved on 4<sup>th</sup> September, 2014 from [www.informationng.com/2012/10/7-hea...](http://www.informationng.com/2012/10/7-hea...)
- Information Nigeria (2013): *10 Wonderful Health Benefits of Mangoes*. Retrieved from [www.informationng.com/.../10-wonderful...](http://www.informationng.com/.../10-wonderful...) retrieved on 6<sup>th</sup> August, 2015
- Jackson State University (2014): *Benefits – of – Bitter leaf*. Retrieved on 19<sup>th</sup> September, 2014 from [www.livestrong.com/article/456748-thebenefits-of-bitterleaf/#ixzz24m8hxa40](http://www.livestrong.com/article/456748-thebenefits-of-bitterleaf/#ixzz24m8hxa40)
- Joanne, M. (2014): *The Benefits of Sour Sop*. Retrieved on April 29<sup>th</sup>, 2014 from [www.healthyeating.sfgate.com/benefits\\_soursop](http://www.healthyeating.sfgate.com/benefits_soursop)
- Joel, R. (2011): *Effects of Cultural and Religious Beliefs on Food Choices!* Yahoo... Retrieved from [www.voices.yahoo.com/effect\\_cultural](http://www.voices.yahoo.com/effect_cultural). On 27<sup>th</sup> November, 2014
- Kannal, E. (2014): *Roughages – What are the Functions of Roughages*. Retrieved on 10<sup>th</sup> of November 2014, from [www.healthyeating.sfgate.com>Diet>Digestion](http://www.healthyeating.sfgate.com>Diet>Digestion).
- Kearney, M., Jearney, J.M, Dunne A. & Gibney M. J. (2000): *Socio-demographic Determinants of Perceived Influences on Food Choice in a Nationally Representative Sample of Irish Adults*. *Public Health Nutrition* 3(2): 219-226.
- Kim, E., Coelho, D. & Blancher, F. (2013): *Review of the Association between Meat Consumption and Risk of Colorectal Cancer*. *NUTR RES.* 2013, DEC: 33(12): 983–94. Retrieved on 19<sup>th</sup> September, 2014 from [www.medscape.com/viewarticle/806573](http://www.medscape.com/viewarticle/806573).
- Kloss, J. (2008): *Healthful Foods*: San Diego, California. Baker & Taylor .Ivy Press
- Komen, S.G. (2014): *Lycopene for the Cure*. Retrieved from [ww5.komen.org/Breastcancer/lycopene...](http://ww5.komen.org/Breastcancer/lycopene...) on 6<sup>th</sup> August, 2015
- Lau, D.C, Douketis, J.D., Morrison K.M., Sharma A.M, Hramiak, I.M. and Ur, E. (2007): *2006 Canadian Clinical Practice Guideline on the Management and Prevention of Obesity in Adults and Children Summary*". *CMAJ* 176 (8).
- Leech, J. (2015): *11 Amazing Health Benefits of Eating Fish*. Retrieved from [ecowatch.com/2015/05/28.benefitseatingfish](http://ecowatch.com/2015/05/28.benefitseatingfish) on 6<sup>th</sup> August, 2015
- Lifestyle Lounge (2014): *Benefits of Eating Chicken – Health Benefits of....* Retrieved on 21<sup>st</sup> May, 2014 from [www.lifestyle.iloveindia.com/loung/ben...](http://www.lifestyle.iloveindia.com/loung/ben...)
- Loma Linda University/ Health (2014): *Eating Yourself Blind Macular Degeneration and Nutrition*. Retrieved on 17<sup>th</sup> November, 2014, from [www.lomalindahealth.org/.../eatin...](http://www.lomalindahealth.org/.../eatin...)
- Marie, J. (2013): *Papayas &Cholesterol/LIVESTRONG.COM*. Retrieved on April 29<sup>th</sup>, 2014 from [www.livestrong.com](http://www.livestrong.com)



- Mattes, P. (2014): *Eating Peanuts helps keep Heart Healthy without Weight Gain*: Retrieved from [www.purdue.edu/.../030731](http://www.purdue.edu/.../030731) on 1<sup>st</sup> September, 2014.
- Mayenne, C. (2012): *Mangoes Boost Sex Drive*. Retrieved from [www.philstar.com/health-and-family/2012](http://www.philstar.com/health-and-family/2012) on 6<sup>th</sup> August, 2015
- Medical Dictionary (2014): *HDL Cholesterol* Retrieved on 19<sup>th</sup> September, 2014 from [www.medicinenet.com/.../mobileart.asp...](http://www.medicinenet.com/.../mobileart.asp...)
- Medical News Today (2015): *Pineapple: Health Benefits, Recipes, and Health Risks*. Retrieved from [www.medicalnewstoday.com](http://www.medicalnewstoday.com) on 5<sup>th</sup> August, 2015
- Medical Research Council, 2013: *Why Nutrition is Important*. Retrieved on 15<sup>th</sup> February, 2013 from [www.nhmic.gov.au/your-health](http://www.nhmic.gov.au/your-health).
- Mehmet, O. (2014): *What does Conscious Eating Mean?* Retrieved from [www.sharecare.com/...](http://www.sharecare.com/...) On 16<sup>th</sup> December, 2014.
- Mercola, D. (2011): *Six Ways to Keep Kidney Stones at Bay*. Retrieved from [articles.mercola.com/.../six](http://articles.mercola.com/.../six) on 7<sup>th</sup> August, 2015
- Muanya, C. (2012): *Furore over Cassava Flour, Diabetes Link*. Retrieved from <http://groups.google.com/forum> on 5<sup>th</sup> August, 2015
- National Bureau of Statistics (NBS) (2010): *Annual Abstract of Statistics, Federal Republic of Nigeria*. Retrieved from [www.nigerianstat.gov.ng/](http://www.nigerianstat.gov.ng/) on 15<sup>th</sup> February, 2015.
- Nigerian Food Recipes T.V (2013): *Health Benefits of Bitter Leaf (Vernonia amygdalina)* Retrieved on 10<sup>th</sup> October, 2013 from [www.nigeriafoodtv.com/2013/06/heal...](http://www.nigeriafoodtv.com/2013/06/heal...)
- Nigerian LNG Limited (Calendar) (2010): *Nigeria's Exotic Fruits*, LNG 2010 Edition Lagos. Nigeria. [www.nigeria/ng.com](http://www.nigeria/ng.com).
- Nky, L.L. (2013): *Nigerian Food Recipes. How to Cook Nigerian Foods, How to make Cocoyam Paste, Ede ofe*. Retrieved on 19<sup>th</sup> August, 2013 from [www.nigerianfoodtv.com/2013/05/cocoyam](http://www.nigerianfoodtv.com/2013/05/cocoyam)
- Nky, L.L. (2013): *Health Benefits of Bitterleaf (Vernonia Amygdalina)*. Retrieved from [www.nigerianfoodtv.com](http://www.nigerianfoodtv.com) on 6<sup>th</sup> August, 2015
- Nwokoma, S. (2003): *Nigeria's Staple Foods*: Springfield Publishers Ltd, Owerri, Imo State.
- Nutrition/Diet (2009): *What is a Good Diet?* Retrieved on 3<sup>rd</sup> April, 2013 from [www.medicalnewstoday.com/.../153998.php](http://www.medicalnewstoday.com/.../153998.php).
- Nutrition/National Health and Medical Research Council (2013): *Why Nutrition is Important*; Retrieved on 5<sup>th</sup> February, 2013 from [www.nhmic.gov.au/your-health](http://www.nhmic.gov.au/your-health).



- Oduro, A.S. (2013): *Health Benefits of Palm Wine*. Retrieved from [omgbana.com](http://omgbana.com)>Home>LIFESTYLE>FOOD>HEALTH on 21<sup>st</sup> May, 2014.
- Ogolo, F. (2013): *Traditional Settlement of Dispute amongst Ikwerre Ethnic Nationally in Rivers State, Nigeria: An Appraisal*. African Research Review, An International Multidisciplinary Journal, Ethiopia 7(1):
- Oniang, R.K., Mutuku, J. M., & Malaba, S.J. (2003): *Contemporary African Food Habits and their Nutritional and Health Implications*. Asia Pacific Journal Clin Nutrition 2003; 12(3): 231-236
- Onyebueke, D.O. & Souzey J.A (2004): *Nutrition for the Tropics*. Solig Limited, Warri, Delta State.
- Okafor, C. (2014): *The Wonders of Bitter leaf*. Retrieved from [www.realnewsmagazine.net/health/the\\_wonders...](http://www.realnewsmagazine.net/health/the_wonders...) On 29<sup>th</sup> may 2013.
- Okoli, B.E. & Mgbeogu, C.M. (1983): *Fluted Pumpkin (Telfaria Occidentalis)*. West African Vegetable Crop. *Journal of Economic Botany*.37(2) 145-149. Retrieved from [www.linkspringer.com](http://www.linkspringer.com) on 13<sup>th</sup> April 2014.
- Osuji, I. (2014): *Why Nigerian Food, Nigeria the Giant of Africa*: Retrieved on 10<sup>th</sup> January, [www.osujinnocent.wordpress.com/Nigeria](http://www.osujinnocent.wordpress.com/Nigeria).
- Paleo, Julianne's & Zone Nutrition (2010): *Omega 6 & 3 in Nuts, Oils, Meat and Fish, Tools to get it Right*. Retrieved from [www.paleozonenutrition.com/.../omega-6-and...](http://www.paleozonenutrition.com/.../omega-6-and...)
- Pan, A., Bernstein, Schulze M.B, Manson J.E, Willet & Hu, E.B. (2011): "Red Meat Consumption and Risk of Type 2 Diabetes; 3 Cohorts of US Adults and an updated Meta-analysis. *American Journal of Clinical Nutrition*, 94 (4).
- Pendick, D. (2012): *6 Healthy Protein Choices when Cutting Back on Red Meat*. Harvard health Publications, Harvard Medical School. Retrieved from [www.harvard.edu/blog/6-healthy...](http://www.harvard.edu/blog/6-healthy...) on 7th August, 2015.
- Phytochemicals (2015): *Lycopene*. Retrieved from [www.phytochemicals.info](http://www.phytochemicals.info) on 6<sup>th</sup> August, 2015
- Podder, T. (2013): *You are what you eat*: Beulah land Publications, Benin City.
- Rainer, G., Hans, S., Hans, P. & Hans-Joachim, A.P (2010): *The Four Dimensions of food and Nutrition Security: Definitions and Concepts* Retrieved
- Raiyemo, D. (2013): *Medical Importance of Bitter leaf (Locally Called Ewuro)*. Retrieved from [www.enduresourceworld.com/2013...](http://www.enduresourceworld.com/2013...) on 6th August, 2015

- Riches, G. (1997): *Hunger, Food Security and Welfare Policies Issues and debates in First World Societies*. Proceedings of Nutrition Society 56(IA): 63-74.
- Rivers State Nigeria (2013): Retrieved on 8<sup>th</sup> August, 2013 from [www.ngex.com/nigeria/places/Zstates/rivers.htm](http://www.ngex.com/nigeria/places/Zstates/rivers.htm).
- Rivers State Cuisine (2014): *Food Nairaland*. Retrieved from [www.nairaland.com/79932/Rivers-State](http://www.nairaland.com/79932/Rivers-State) . On 5<sup>th</sup> May 2013.
- Robbin, S. (2014): *Nutrition of Eating Snails*. Retrieved on 5<sup>th</sup> May, 2014 from [www.healthyeatingsgate.com/HealthyEating/Nutrition/Nutritioninfoods](http://www.healthyeatingsgate.com/HealthyEating/Nutrition/Nutritioninfoods)
- Robert J, (2011): *Effects of Cultural and Religious Beliefs on Food Choices! Yahoo...* Retrieved from [www.voices.yahoo.com/effects-cultural...](http://www.voices.yahoo.com/effects-cultural...) on 29<sup>th</sup> November, 2014.
- Rodriguez, J.C. (2014): *Eating Habits*. Retrieved from [www.diet.com/g/eating-habits](http://www.diet.com/g/eating-habits) on 17<sup>th</sup> August, 2015
- Saba (2014): *Top 10 Amazing Benefits of Soursop Leaves for Skin, Hair and Health*. Retrieved from [www.stylecraze.com...](http://www.stylecraze.com...) On 15<sup>th</sup> March 2013.
- Salcombe, F. (2012): *Top 5 Reasons Why Eating Crab Is Good For You*. Retrieved from [www.salcombest.com/news](http://www.salcombest.com/news) on 7<sup>th</sup> August, 2015
- Sammy, D. (2014): *Health Benefits of Pineapple – Chiropractic and Natural Functional...* Retrieved from [www.tugunchiro.com.au/articles/health.b...](http://www.tugunchiro.com.au/articles/health.b...) on 16<sup>th</sup> January, 2014.
- Sample, I. (2004): *Do Mangoes Help Fight Cancer?* Retrieved from [www.theguardian.com/new/2004/oct/](http://www.theguardian.com/new/2004/oct/) on 6<sup>th</sup> August, 2015
- Samuel, A. (2014): *Health Benefits/Medicinal Value of Bitter leaf (Ewuro & Omugbu)*. Retrieved from [www.nairahealth.blogspot.com/.../healthbenefits](http://www.nairahealth.blogspot.com/.../healthbenefits) on 16<sup>th</sup> February, 2013.
- Sarah, Y. (2011): *Taking Bush meat off the Menu could Increase Child Anemia*: Retrieved from [www.newscenter.berkeley.edu/2011](http://www.newscenter.berkeley.edu/2011) on 10<sup>th</sup> January, 2014.
- Schoffro, M.C. (2014): *9 Health Benefits of Sweet Potatoes*. Retrieved from [www.care2.com/.../9-reasons-to-love-sweet](http://www.care2.com/.../9-reasons-to-love-sweet) on 5<sup>th</sup> August, 2015
- Shepherd, W. (2011): *Bush meat is an Important Part of Diet for People in Rain forests*. Retrieved from [www.envirochronicle.com/bushmeat](http://www.envirochronicle.com/bushmeat) on 2<sup>nd</sup> February, 2014
- Shubhangini, A.J. (2010): *Nutrition and Dietetics with Indian Case Studies*: Yata McGraw Hill Education Private Limited, New Delhi.

- Srilakshmi, B. (2009): *Human Nutrition (for B.Sc) Nursing Students*. New Age International Publishers. New Delhi. First edition
- Steenhuis, Waterlander, Wilma, E., & DeMul, A. (2011): *Consumer Food Choices: "The Role of Price and Pricing Strategies"* Public Health Nutrition 14(12).
- Sweet Oranges (2014): *Phytochemicals* Retrieved from [www.phytochemicals.infor.../orange.php](http://www.phytochemicals.infor.../orange.php) on 19<sup>th</sup> September 2014
- Szalay, J. (2014): *Avocados: Health Benefits, Risks & Nutrition Facts*. Retrieved from [m.livescience.com/45209-avocado-nutrition-facts](http://m.livescience.com/45209-avocado-nutrition-facts) on 11th august, 2015
- Texas Agrilife Research Food Scientists (Texas A&M Agrilife Communications) (2010): *Mango Effective in Preventing Stopping Certain Colon, Breast Cancer Cells, Food Scientists Food*. Retrieved from [www.sciencedaily.com/.../100111154926...](http://www.sciencedaily.com/.../100111154926...)
- The Fitizen (2014): *6 Factors that Affect Our Food Choices*. Retrieved from [www.the-fitizen.com/6-factors-that-a...](http://www.the-fitizen.com/6-factors-that-a...) on 8<sup>th</sup> October 2014.
- The George Matelijan Foundation (2015): *Corn the World's Healthiest Foods*. Retrieved from [www.whfoods.org](http://www.whfoods.org) on 5<sup>th</sup> August 2015
- The George Matelijan Foundation (2015): *Copper*. Retrieved from [www.whfoods.org](http://www.whfoods.org) on 5<sup>th</sup> August 2015
- The Guardian (2003): *Can Potassium in Bananas. Cut your Stroke risk? Health News* Retrieved from [www.nhs.uk/.../can-potassium-in-banana](http://www.nhs.uk/.../can-potassium-in-banana) on 1st September, 2014
- The Guardian (2013): *Why Crab is good for you*. Retrieved from [www.theguardian.com/.../crab-good-for...](http://www.theguardian.com/.../crab-good-for...) On 13<sup>th</sup> April, 2013.
- The New York Times (2014): *Gallstones Prevention*. Retrieved on 1<sup>st</sup> September, 2014 from [www.nytimes.com/gallstones/prevention...](http://www.nytimes.com/gallstones/prevention...)
- Simpson, J.A. (1989): *The Oxford English Dictionary*. Retrieved from [www.worldcat.org/.../oxford-english...](http://www.worldcat.org/.../oxford-english...) ESC Weiner, Oxford University Press
- The Punch (2013): *Ogbono Soup*. Retrieved on 20<sup>th</sup> May, 2014 from
- Tenassy Study – *Why Should I Emphasize Fruits and Vegetables in My Diet? – Health*. Retrieved from [www.sharecare.com/.../www.linkedin.com](http://www.sharecare.com/.../www.linkedin.com), on 2<sup>nd</sup> January, 2014.
- Udofia, U. (2009): *Snail Provide a Tasty Source of Iron, Study Finds* – Sci Dev. Net. Retrieved on 5<sup>th</sup> May, 2014 from [www.scidev.net/global/food](http://www.scidev.net/global/food) - security...
- Umesh, R. (2014): *Nutrition and You: Okra Nutrition Facts and Health Benefits*. Retrieved from [www.nutrition-and-you.com/okra](http://www.nutrition-and-you.com/okra) on 5th May, 2014.

- Universities of Manchester & Newcastle Study (2008): *Tomatoes can fight Sun's....* retrieved on 1<sup>st</sup> September, 2012 from [www.timeshighereducation.co.uk/...](http://www.timeshighereducation.co.uk/)
- U.S. Department of Health & Human Services (2014): *Dietary Modifications*. Food and Nutrition Information Center. Retrieved on 29<sup>th</sup> October, 2014, from [www.fnic.nal.usda.gov/diet.../dietary-...](http://www.fnic.nal.usda.gov/diet.../dietary-...)
- Vaidyanathan, S. (2014): *What are the Health Benefits of Guava?* Retrieved from [www.researchgate.net/.../what\\_are\\_the](http://www.researchgate.net/.../what_are_the) on 6<sup>th</sup> August, 2015
- Vegetarian Restaurants Spain (2012): *Papaya Boosts Male Virility*. Retrieved from [www.vegetarian-restaurants-spain.com/papaya...](http://www.vegetarian-restaurants-spain.com/papaya...) on 16<sup>th</sup> February, 2012.
- Victoria, I. (2013): *Why You Should Eat Okra*. The Microscope News Paper, Vol.2 No. 15
- Wikipedia (2013): *Wikipedia the free Encyclopedia*. Retrieved on 12<sup>th</sup> August, 2013 from <http://en.m.wikipedia.org/wiki/food-styaple>.
- Wardlaw, G.M. & Smith, A. (2011): *Contemporary Nutrition* (8<sup>th</sup> Edition). McGraw Hill Companies, New York.
- Whitney, E. & Rolfes, S.R. (2004): *Understanding Nutrition*. National Academics Press.10<sup>th</sup> Edition, United States of America.
- Wikipedia the free Encyclopedia (2013): *Rivers State*. Retrieved on 10<sup>th</sup> January, 2014. From [www.en.wikipedia.org/wiki/Rivers State](http://www.en.wikipedia.org/wiki/Rivers_State).
- Wikipedia, the Free Encyclopedia (2015): *Soursop*. Retrieved from <http://en.m.wikipedia.org/wiki/soursop...> on 5<sup>th</sup> august, 2015
- Wikipedia the Free Encyclopedia (2015): *Mango*. Retrieved from <http://en.m.wikipedia.org/wiki/mango> on 6<sup>th</sup> August, 2015
- Wikipedia the Free Encyclopedia (2015): *Telfaria Occidentalis*. Retrieved from <http://en.m.wikipedia.org> on 6<sup>th</sup> August, 2015
- Willacy, H. (2013): *How to Follow the Mediterranean Diet*. Retrieved from [patient.info/health/how-to-follow-the -Mediterranean-diet](http://patient.info/health/how-to-follow-the-Mediterranean-diet) on 20<sup>th</sup> August, 2015.
- Willet, W. (1994): *Diet and Health: What should we eat?* Science Pages 532-536.
- Wintergreen Organics & Naturals (2015): *Health Benefits of Lobster*. Retrieved from [wintergreenorganics.com/http://](http://wintergreenorganics.com/http://) on 7<sup>th</sup> August, 2015
- Wisconsin (2013): *Adequate and Appropriate Nutrition Polk Country*. Retrieved on 3<sup>rd</sup> April, 2013 from [www.dhs.wisconsin.gov/.../nutrition.pdf](http://www.dhs.wisconsin.gov/.../nutrition.pdf).

World Health Organization (WHO) (2014): *Cancer Prevention*. Retrieved from [www.who.int/cancer/prevention/en](http://www.who.int/cancer/prevention/en) on 29<sup>th</sup> October, 2014.

Wolf, N. (2011): *Health Benefits of Catfish*. Retrieved from [www.livestrong.com/foodanddrink](http://www.livestrong.com/foodanddrink). On 13<sup>th</sup> January, 2014.

Your Health Information Center (2013): *Protect Your Sight with Palm Wine*. Retrieved from [www.healthcenter001.blogspot.com/protect...](http://www.healthcenter001.blogspot.com/protect...) on 30<sup>th</sup> November 2014.

## **APPENDIX 1**

**DELTA STATE UNIVERSITY ABAKA,  
FACULTY OF EDUCATION,  
DEPARTMENT OF VOCATIONAL EDUCATION  
HOME ECONOMICS UNIT**

Dear Sir/Ma

### **REQUEST FOR VALIDATION OF RESEARCH QUESTIONNAIRE**

I am a post graduate student in the department of Vocational Education in the above named institution, currently undertaking a research project aimed at ensuring adequate nutrition

in households through the adequate consumption of staple foods and diet modification in Rivers State.

Attached is a draft copy of the questionnaire for the study, you are most respectfully requested to validate the items for clarity, relevance and total coverage for use in collecting data for the study. You are also requested to put down your comments and suggestions for improving the quality of the questionnaire.

Thank you for your anticipated co – operation

Yours Sincerely,

**Olumati Precious Ndid**

(Researcher)

**DELTA STATE UNIVERSITY ABRAKA  
FACULTY OF EDUCATION  
DEPARTMENT OF VOCATIONAL EDUCATION  
HOME ECONOMICS UNIT**

Dear Respondent,

I am a post graduate student of the above named institution, undertaking a research work on “HOUSEHOLDS USAGE OF STAPLE FOODS AND DIETARY MODIFICATION ENHANCEMENT STRATEGIES IN RIVERS STATE, NIGERIA” I humbly appeal that you contribute immensely to the success of this research work through your response to this

questionnaire items, which will be treated with strict confidence. No attempt will be made to analyze the data on individual basis.

Please respond to each item freely as you consider it fit on the point addressed

Thank you for your anticipated co-operation.

Yours Sincerely

**Olumati Precious Ndid**

(Researcher)

## **QUESTIONNAIRE**

### **Project Topic**

“HOUSEHOLDS USAGE OF STAPLE FOODS AND DIETARY MODIFICATION  
ENHANCEMENT STRATEGIES IN RIVERS STATE, NIGERIA”

### **Section A**

#### **Personal Details**

- What is your Local Government Area:
- What is your gender: Male ( ) Female ( )
- Where is your Location: Urban ( ) Rural ( )

- Socio-economic status: High ( ) Middle ( ) Low ( )
- Tick your highest qualification  
 FSLC ( ); SSCE/NECO ( ); NCE/OND ( ); BA/BSc/BEEd and above ( )  
 Please specify any other -----

**Section B**

Instrument: please check (√) the response options that best represents your opinion on the level at which you agree or disagree, how important or unimportant, or how high or low the statement in the questionnaire are to you where applicable. The responses are:

Very high (VH), High (H), Average (A), Low (L), Very Low (VL)

Or

Strongly Agree (SAG), Agree (AG), Disagree (DA), Strongly Disagree (SDA)

Or

Very Important (VI), Important (I), Unimportant (U), Very Unimportant (VI)

(1) What is the level of availability of staple foods in area of study?

s/no	Food groups Level of availability	examples	VH 5	H 4	A 3	L 2	VL 1
1.	Starchy roots and tubers	Yams Cassava Sweet potatoes Cassava					
2.	Cereals	Maize Rice					
3.	Legumes, nuts and seeds	Groundnuts Beans					
4.	Fruits	Banana Pineapple Pawpaw					



		Oranges Mango Sour sop Guava Almonds					
5.	Vegetables	Okra Tomatoes Bitter leaf Water leaf Fluted pumpkin					
6.	Meat and Sea foods	Games (bush meat) Snails Fish Crabs Lobsters Oyster Shrimps Periwinkle Poultry (chicken) Red meat					
7.	Spices and flavorings	Chili pepper Onions Scent leaf					
8.	Thickeners	Egusi Ogbono					
9.	Oils	Palm oil Groundnut oil					

(2) What is your level of usage/consumption of the following staple foods?

s/no	Food groups Level of usage/consumption	examples	daily	weekly	monthly	Occasionally/ Never
10	Starchy roots and tubers	Yams Cocoyam Cassava Sweet potatoes				
11	Cereals	Maize Rice				
12	Legumes, nuts and seeds	Groundnuts Beans				
13	Fruits	Banana Pineapple				

		Pawpaw Oranges				
14	Vegetables	Okra Tomatoes Bitter leaf Fluted pumpkin				
15	Meat and Sea foods	Games (bush meat) Snails Fish Crabs Oyster Shrimps Poultry Beef				
16	Spices and flavourings (cooking herbs, spices)	Chili pepper Scent leaf				
17	Thickeners	Egusi Ogbono				
18	Oils	Palm oil Groundnut oil				

(3) What are the major sources of these staples in area of study and achieving adequate nutrition?

s/no	Major sources of obtaining staple foods	SAG 4	AG 3	DAG 2	SDA 1
19	Staple foods are home grown in our farmlands				
20	We obtain these staple foods from my personal garden.				
21	We obtain these staple foods from the Local Market because they are commonly and easily grown in my area.				
22	We obtain these staple foods from neighboring States due to our boundaries with them.				
23	We eat whatever is available				
24	The Riverside terrain has made staple foods easily accessible				

(4) How important are the traditional/cultural beliefs as factors influencing choice of staple foods consumed in the area of study?

s/no	Traditional/cultural belief variables as they influence choice of staple foods	SAG	AG	DA	SDA
25	Our culture provides guidelines (taboos/rules) regarding the eating pattern of these staple foods				
26	We must always comply with these guidelines				
27	Compliance with these guidelines creates a sense of identity to us as a people				
28	Methods of food preparation and combination of these staple foods are also guided by this cultural guidelines				
29	Some of these cultural food taboos prevent us from eating some of these staple foods irrespective of its nutritional values				
30	Certain foods (for example some portions of meat, snails) due to these traditional/cultural guidelines are not given to certain groups of people in the family (for example: women and children)				
31	We obey these cultural guidelines simply because it is part of our tradition/culture				

(5) How can economic status variables influence the consumption of these staple foods to achieve adequate nutrition?

s/no	How important are the following factors to you in deciding how much of these staple foods are consumed in your home? (Choose one answer in each line)	VI 4	I 3	U 2	VU 1
32	The money we have available to spend on food (cost)				
33	Selection of menus which use ingredients that are easy to utilize economically and hygienically (ease of preparation)				
34	Personal taste and quality of these staple foods				
35	Likes and dislike of my family members when it comes to these staple foods (comfort in consumption)				
36	Access to these staple foods (Any food available within walking distance)				

37	The use of canned, frozen and prepackage foods, because they are more convenient and easy to prepare				
38	The selection of recipes that can be easily prepared according to seasonal availability of these staple foods				

(6) What is the Influence of Educational background (nutrition knowledge) on food selection in achieving adequate nutrition in the family?

s/no	How important are these factors to you in deciding how much of these staple foods your family eats.	VI 4	I 3	U 2	VU 1
39	The nutritional values and health benefits of these staple foods (Nutritional knowledge)				
40	My knowledge about the best ways to combine these staple foods and create new dishes (Innovation).				
41	My knowledge on individual methods of preparation of these staple foods with reference to food characteristics such as smell, taste, texture... (food characteristics)				
42	My knowledge of the recommended frequency of consumption of these foods, portion sizes of different food groups				
43	My family's dietary habits and interests in activities related to food (behaviors)				
44	My ability to try new recipes, new seasonings and new ways of preparing these staple foods (culinary preparation and presentation)				
45	The health and nutritional needs of my family members (nutritional and health motivation)				
46	My ability to restructure and modify these foods to suit individual nutritional needs.				

(7) What are Some Dietary Modification Enhancement strategies which could be adopted by people in Rivers State for adequate nutrition?

s/no	Dietary modification enhancement strategies	SAG 4	AG 3	DA 2	SDA 1
47	Consuming less than 2 servings of red meat (preferably lean cuts) and processed meats (less than one serving) per week				
48	Reduced intake of sweets in form of sugar, candies, pastries, and beverages such as sweetened fruit juices and soft drinks to small amounts and left for special occasions				
49	Eating 2-4 servings of eggs weekly				
50	Consuming 3 servings of potatoes weekly and 3 servings weekly of starchy roots and tuber crops for example cassava, yam, cocoyam, sweet potatoes				

51	Taking 3-4 servings weekly of olives, legumes, (pulses) nuts and seeds as good sources of healthy lipids, proteins, vitamins, minerals and fiber.				
52	Eating 4 servings of white meat (poultry, turkey, rabbit) weekly than red meat (beef)				
53	Consuming 5-6 servings of fish and other seafood's weekly, as fish contains healthy fatty acids (lipids) and proteins.				
54	Eating 2 servings of dairy products for example milk daily.				
55	Using olive oil as the main added oil				
56	Intake of 1 or 2 servings of fruit per main meal daily				
57	Ensuring that vegetables are served at lunch and dinner or more than 2 servings per meal, at least one to be served raw.				
58	Eating at least 1 or 2 servings per main meal daily of none refined cereals and products in form of whole grain bread, whole grain pasta, rice				
59	Drinking at least 8 (eight) glasses of water daily for body to function well and transport nutrients				
60	Avoiding excessive salt intake both in the pot and on the table				
61	Substituting commercial flavored fruit juice with natural homemade fruit juice				
62	Reduced intake of foods containing large amounts of fats (reducing the consumption of fried foods)				
63	Conscious eating and using more fresh foods for food preparation, than the use of convenient foods.				
64	Moderate use of spices and herbs (for example garlic, chili peppers and onion				

(8) How can dietary modification enhancement strategies if adopted, influence adequate nutrition in households in Rivers State?

s/no	Dietary modification can help to improve nutritional status in the following ways	SAG 4	AG 3	DA 2	SDA 1
65	Reduced intake of red meat also reduces the risk of cardiovascular diseases and raised bad cholesterol				
66	Reduction of sweets also helps to reduce the damaging effect of sweet foods on the teeth, reduce risk of heart and vascular disease, type 2 diabetes, obesity				
67	Eggs				
68	Moderate consumption of potatoes will reduce the risk of type 2 diabetes as it contains high available starch content.				

69	Moderate consumption of legumes (beans, peas, and peanuts) as it is associated with reduced risk of heart and vascular diseases because they contain healthy lipids, protein, vitamins, minerals and fiber.				
70	Lean white meat (chicken ,turkey and other poultry) without skin is high in protein, vitamins (including vitamin B12) and minerals, but with much less saturated animal fat than red meat.				
71	White and oily fish (and Sea foods). A mix of oily and white fish in the diet is an alternative source of protein that reduces the risk of heart disease and heartbeat irregularities.				
72	Milk and dairy products contains calcium which is needed for strong bones and teeth				
73	Olive oil also found in olives, nuts and seeds, avocados. High in mono-saturated fat, high in (kcal) which help protect against heart disease, some cancers (for example, breast) and assist in lowering blood pressure.				
74	Moderate consumption of Vegetables such as onions, okra, pumpkin leaf, waterleaf; fruits such as oranges, bananas, pears, pineapples are high in fiber, antioxidants and vitamin C, which help reduce risk of heart and vascular disease, cancers and bowel problems.				
75	Consumption of cereals such as wheat, barley, oats, corn, rice are associated with decreased bowel problems, including cancers, lowered 'bad' blood fat and decreased heart disease.				
76	A daily intake of 1.5-2 litres (8 glasses) of water guarantees good hydration which is essential to maintain the corporal water equilibrium and aid the transportation of nutrients in the body				
77	Consumption of too much salt causes the body to retain water and puts extra burden on the heart and blood vessels, causing high blood pressure.				
78	Conscious eating of more homemade foods than convenience foods helps one have control over spices and flavors used in the food preparation				
79	Moderate use of spices, herbs, garlic, chili peppers and onions is a good way to introduce a variety of flavors' and palatability to dishes and contribute to the reduction of added salt				

## APPENDIX 2

### Portion sizes and Number of servings

Staples Food groups	Monthly or Occasionally No of servings	Weekly No of servings	Daily No of servings
Red meat		(Less than 2 servings, preferably lean cuts) and processed meats (less than one serving) should be consumed in smaller quantities and less frequently	
Sweets (sugar, candies, pastries and beverages)	Should be consumed in small amounts and left for special occasions.		

such as sweetened fruit juices and soft drinks			
Eggs		2-4 servings	
Potatoes		3-4 servings preferably fresh potatoes	
The combination of legumes for example beans, pulses, nuts		More than 2 servings (3-4 servings)	
Poultry (white meat)		2 servings	
Fish		2 or more servings	
Dairy products			2 servings
Olive oil (as the main added oil/lipid)			
Fruit			1 or 2 servings per meal. Should be chosen as the most frequent dessert
Vegetables			Present at lunch or dinner, or more than two servings per meal, at least one should be served raw.
Non-refined cereal products (preferably whole grain since some valuable nutrients (magnesium, phosphorus) and fibre can be lost during processing			1 or 2 servings per meal in the form of bread, pasta, rice and others

A guide to portions or servings described in the pyramid is as follows:

- Vegetables: a cup of raw leafy vegetables or half a cup of other vegetables
- Potatoes: 100g
- Legumes: one cup (100g) of cooked dry beans
- Nuts: 30g. eat as a snack or sprinkle on food for added taste
- Fruits: one apple, banana, one orange, 200g of melon or watermelon, 30g of grapes
- Meat: 60g of cooked lean meat or fish
- Grains: half a cup (50-60g) of cooked pasta or rice; one slice of bread (25g)
- Dairy: one cup of milk or yoghurt; 30g of cheese
- Eggs: one egg
- Wine: 125ml glass of average-strength red wine

(Willacy, 2013)

### **APPENDIX 3**

#### **What is One Food Guide Serving?**

##### **What is a serve of vegetables?**

A standard size is about 75g (100-350kj) or:

- ½ cup cooked green or orange vegetables (for example, spinach, broccoli, carrots, or pumpkin, waterleaf)
- ½ cup cooked dried or canned beans, peas or lentils
- 1 cup green leafy or raw salad vegetables
- ½ cup sweet corn



- ½ or medium potato or other starchy vegetables (sweet potato, taro or cassava)
- 1 medium tomato

### **What is a serve of fruit?**

A standard size is about 150g (350kj) or:

- 1 medium apple, banana, orange or pear
- 2 small apricots, kiwi fruits or plums
- 1 cup diced or canned fruit (no added sugar)
- 125ml (½ cup) fruit juice (no added sugar)
- 30g dried fruit (for example, 4 dried apricot halves, 1½ tablespoons of sultanas)

### **What is a serve of grain (cereal) food?**

A standard serve is 500kj or:

- 1 slice (40g) bread
- ½ medium (40g) roll or flat bread
- ½ cup (75-120g) cooked rice, pasta, noodles, barley, buckwheat, semolina
- ½ cup (120g) cooked porridge
- 2/3 cup (30g) wheat cereal flakes
- 3 (35g) crisp breads
- 1 (60g) crumpet
- 1 small (35g) English muffin or scone

Grain (cereal) foods, are mostly wholegrain and/ or high cereal fibre varieties

### **How much is a serve of lean meat and poultry, fish, eggs, nuts and seeds, legumes/beans?**

A standard serve is (500-600kJ) or:

- 65g cooked lean red meats such as beef, lamb, veal, pork, goat or kangaroo (about 90-100g raw)
- 80g cooked lean poultry such as chicken or turkey (100g raw)
- 100g cooked fish fillet (about 115g raw) or one small can of fish
- 2 large eggs
- 1 cup (150g) cooked or canned legumes/beans such as lentils, chick peas or split peas (preferably with no added salt)
- 30g nuts, seeds, peanut or almond butter or other nut or seed paste (no added salt)

Australian Government National Health and Medical Research Council (2015)

#### APPENDIX 4

#### For Quick and Easy Estimates, Visualize Each Portion as Being about the Size of a Common Object

- 1 Cup cooked vegetables = a fist
- $\frac{1}{2}$  cup cooked rice, pasta or potato =  $\frac{1}{2}$  baseball
- 1oz slice of bread = 1 cassette tape
- 1 pancake = 1 compact disc
- 1 medium fruit = a baseball
- 1 tsp margarine, butter, spreads = 1 dice
- $\frac{1}{4}$  cup dried fruit = a golf ball

- 3 Oz meat = a deck of cards
- 3 oz grilled/backed fish fillet = 1 checkbook
- 2 tablespoons peanut Butter = a marshmallows
- 1 ½ Oz cheese = 6 stacked dice
- ½ cup ice cream = a racquetball
- 4 small cookies = 4 poker chips
- 1 baked potato = 1 fist
- 1 cup of salad = 1 baseball

(Whitney & Rolfes, 2005).

- Fist = 1 cup
- Thumb = 1 Oz of cheese
- Thumb tip to first joint = 1 tsp
- Palm of hand = 3 Oz
- Handful = 1 or 2 Oz of a snack food

(Wardlaw & Smith, 2011)

## APPENDIX 5

### How to Count Food Guide Servings in a Meal?

Here is an example: Vegetable and Beef stir-fry with Rice, a glass of milk and an apple for dessert.

<b>Food items</b>		<b>Food Guide Servings</b>
250ml (1 cup) mixed vegetables		
Carrot, sweet red pepper	=	2 Vegetables and fruit
75g (2 ½ Oz) lean beef	=	1 meat and Alternatives

250ml (1 cup) brown rice = 2 Grains products  
 5ml (1 tsp) canola oil = part of your oils and fats  
 250ml (1 cup) 1% milk = 1 milk and alternatives  
 1 apple = 1 vegetable and fruit  
 (Wardlaw & Smith, 2011)

## APPENDIX 6

### Oneway

### Economic Status

### ANOVA

	Sum of squares	df	Mean squares	F	Sig.

<b>VAR00001 Between</b>	<b>19.513</b>	<b>20</b>	<b>.976</b>	<b>2.33530</b>	<b>.000</b>
<b>Groups</b>	<b>.000</b>	<b>288</b>	<b>.000</b>		
<b>    Within Groups</b>	<b>19.513</b>	<b>308</b>			
<b>    Total</b>					
<b>VAR00002 Between</b>	<b>3.172</b>	<b>20</b>	<b>.159</b>	<b>2.758</b>	<b>.000</b>
<b>Groups</b>	<b>16.562</b>	<b>288</b>	<b>.058</b>		
<b>    Within Groups</b>	<b>19.734</b>	<b>308</b>			
<b>    Total</b>					
<b>VAR00003 Between</b>	<b>3.056</b>	<b>19</b>	<b>.161</b>	<b>2.803</b>	<b>.000</b>
<b>Groups</b>	<b>11.188</b>	<b>195</b>	<b>.057</b>		
<b>    Within Groups</b>	<b>14.244</b>	<b>214</b>			
<b>    Total</b>					

## APPENDIX 7

### Oneway

### Educational Background

## ANOVA

	Sum of squares	df	Mean Squares	F	Sig.
<b>VAR00001</b> Between Groups	14.818	56	.265	1.827	.034
Within Groups	4.635	32	.145		
Total	19.454	88			
<b>VAR00002</b> Between Groups	14.655	56	.262	2.989	.000
Within Groups	3.765	43	.088		
Total	18.420	99			
<b>VAR00003</b> Between Groups	92.206	110	.838	6.93630	.000
Within Groups	.000	229	.000		
Total	92.206	339			
<b>VAR00004</b> Between Groups	15.674	104	.151	1.692	.001
Within Groups	18.344	206	.089		
Total	34.018	310			

## APPENDIX 8

### Correlations

[DataSet 4]

## Correlations

	VAR00001	VAR00002
<b>VAR00001 Pearson Correlation</b>	<b>1</b>	<b>.051</b>
<b>Sig. (2-tailed)</b>		<b>.867</b>
<b>N</b>	<b>17</b>	<b>13</b>
<b>VAR00002 Pearson Correlation</b>	<b>.051</b>	<b>1</b>
<b>Sig. (2-tailed)</b>	<b>.867</b>	
<b>N</b>	<b>13</b>	<b>13</b>

## APPENDIX 9

```
CORRELATIONS  
/VARIABLES=VAR00001 VAR00002  
/PRINT=TWOTAIL SIG  
/MISSING=PAIRWISE.
```

## Correlations

[DataSet 0]

### Correlations

	VAR00001	VAR00002
<b>VAR00001 Pearson Correlation</b>	<b>1</b>	<b>.051</b>
<b>Sig. (2-tailed)</b>		<b>.867</b>
<b>N</b>	<b>17</b>	<b>13</b>
<b>VAR00002 Pearson Correlation</b>	<b>.051</b>	<b>1</b>
<b>Sig. (2-tailed)</b>	<b>.867</b>	
<b>N</b>	<b>13</b>	<b>13</b>

```
CORRELATIONS  
/VARIABLES=reliability VAR00002  
/PRINT=TWOTAIL SIG  
/MISSING=PAIRWISE.
```

## Correlations

[DataSet 0]

### Correlations

	reliability	VAR00002
<b>Reliability Pearson Correlation</b>	<b>1</b>	<b>.051</b>
<b>Sig. (2-tailed)</b>		<b>.867</b>

### Correlations

	reliability	VAR00002
<b>Reliability N</b>	<b>17</b>	<b>13</b>



<b>VAR00002 Pearson Correlation</b>	<b>.051</b>	<b>1</b>
<b>Sig. (2-tailed)</b>	<b>.867</b>	
<b>N</b>	<b>13</b>	<b>13</b>

NEW FILE.

DATASET NAME DataSet 1 WINDOW=FRONT.

ONEWAY VAR00001 VAR00002 VAR00003 VAR00004 BY VAR00005

/MISSING ANALYSIS.

## Oneway

[DataSet 1]

### ANOVA

	Sum of squares	df	Mean Square	F	Sig.
<b>VAR00001 Between Groups</b>	<b>19.454</b>	<b>45</b>	<b>.432</b>	<b>2.083E32</b>	<b>.000</b>
<b>Within Groups</b>	<b>.000</b>	<b>43</b>	<b>.000</b>		
<b>Total</b>	<b>19.454</b>	<b>88</b>			
<b>VAR00002 Between Groups</b>	<b>11.459</b>	<b>45</b>	<b>.255</b>	<b>1.803</b>	<b>.027</b>
<b>Within Groups</b>	<b>6.072</b>	<b>43</b>	<b>.141</b>		
<b>Total</b>	<b>17.532</b>	<b>88</b>			
<b>VAR00003 Between Groups</b>	<b>31.685</b>	<b>45</b>	<b>.704</b>	<b>3.267</b>	<b>.000</b>
<b>Within Groups</b>	<b>9.267</b>	<b>43</b>	<b>.216</b>		
<b>Total</b>	<b>40.952</b>	<b>88</b>			
<b>VAR00004 Between Groups</b>	<b>1.865</b>	<b>45</b>	<b>.041</b>	<b>.571</b>	<b>.967</b>
<b>Within Groups</b>	<b>3.123</b>	<b>43</b>	<b>.073</b>		
<b>Total</b>	<b>4.988</b>	<b>88</b>			

