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DEVELOPMENT, IMPLEMENTATION AND EVALUATION OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OF THE ELDERLY IN ONDO CITY, NIGERIA

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DECLARATION

STATEMENT 1

This dissertation is being submitted in partial fulfilment of the requirements for the degree of Doctoris Technologiae: FOOD SERVICE MANAGEMENT

Signed.....

Date.....26th January, 2021

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The thesis is the result of my own independent work/investigation, except where otherwise stated. Other sources are acknowledged by giving explicit references.

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Date.....26th January, 2021

STATEMENT 3

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This work has not previously been accepted in substance for any degree and it is not being concurrently submitted in candidature for any degree.

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Date.....26th January, 2021

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DEDICATION

This thesis is dedicated to the memory of my wife, the Late Mrs Susan Idowu Oyenike Olomo and my loving children: EngrOlusaanu, EngrOlutola, Olusola and Yetunde.

ABSTRACT

The elderly in Nigeria are used to consuming foods that are inadequate in providing the required amount of nutrients for a healthy living due to uninformed food choices and dietary food intake habits. The main objective of this study was to determine the impact of the developed food and nutrition guidelines on the dietary behaviour of the elderly in Ondo West city Ondo, Nigeria. The developed food and nutrition guidelines were used to generate a training manual for the caregivers' in order to apply and disseminate the correct information about food nutrients and food choices to the elderly through the knowledge acquired in the nutrition education training programme by the caregivers. A baseline study was conducted making use of the measuring instruments namely, socio-demographic questionnaire, 24-hour recall, food frequency questionnaire completed by the elderly attending the old people's home and a nutrition knowledge questionnaire to test the nutrition knowledge of the caregivers.

The methodology for the study was in six phases: Phase 1: is about the baseline survey, involving the training of fieldworkers, administering and completing questionnaires: Socio-demographic, 24-hour recall, food frequency questionnaire (FFQ), by the elderly and the nutrition knowledge questionnaire (NKQ) by the caregivers. Phase 2: It involved the planning and development of food and nutrition guidelines for the caregivers of the elderly. Phase 3: This phase is about the training of the caregivers by the researcher, making use of the developed training manual with information sourced from the developed food and nutrition guidelines. Phase 4 was about the intervention programme in the study, i.e. the nutrition education programme (NEP) using information from guidelines of USA, Europe, New Zealand, South Africa, Nigeria and adapted FAO framework. Phase 5 was about the evaluation of the study, involving the completion of the nutrition knowledge questionnaire (NKQ), by the caregivers on post-test assessment after intervention, conducting observation and group interview. Phase 6 involved determining the impact of the food and nutrition guidelines and conducting a post-test making use of the research instruments, 24-hour recall, and food frequency questionnaires (FFQ) with the main objective drawn and followed up by the conclusion and recommendations in the study. A content analysis of both the observation and focus group discussion resulted in compliance with the food and nutrition guideline specifications and a remarkable improvement on food preparation skills and performance of the old people's homes' personnel.

The main findings in the study revealed that consistent and, full compliance, with effective implementation of the food and nutrition guidelines would improve the older people's dietary behaviour and food consumption patterns. The NEP did not improve the knowledge of the caregivers at the expected rate and level because of the low-level basic scientific background of the caregivers.

The socio-demographic questionnaire revealed that 61.7% of those researched were females and 38.3% males with an average age between 60 and 65 years; 54% were married with a household income between N20001- N50000 and majority of them spending between N10001-N15000 on two meals (40%) and three meals (30%). The result from 24-hour recall and the food frequency (FFQ) questionnaires indicated that, the intake of energy, calcium and fiber were below the recommended daily allowance (RDA), while protein and carbohydrate were higher, with an emphasis on starchy foods. The nutrition knowledge questionnaire (NKQ) identified the need for higher level of food and nutrients by the caregivers in their responsibility to the elderly, for improvement in their healthy dietary habits as indicated in the four sections of NKQ results (A, B, C and D). The consumption of fruits and vegetables were impressively high, after the intervention compared to before. Moreover, there was a drastic reduction in the consumption of carbohydrate-sourced food items, fat, sugar and salt as informed by the developed guidelines.

Conclusively, the study was able to establish a reliable basis on the improvement of nutrient based dietary intake with the effective utilisation of available information in the guidelines. Also, awareness was created for the elderly to improve their eating habits through the exposure of the caregivers to training on nutrition knowledge. The researcher recommended an in-house organized refresher programme which should take place periodically and consistently on the information in the developed nutrition guidelines along with encouraging the personnel in the handling of foods (caregivers, chefs, cooks) for effective implementation.

Keywords: Food and nutrition guidelines, elderly, caregivers, dietary intake behaviour, old people's homes

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CONCEPT CLARIFICATION AND GLOSSARY OF TERMS

The terms refer to key words that are closely relevant to the research project topic study in providing deep insight information to explore and utilize appropriately.

Old people's homes: Nigerian old people's homes refer to an arranged residential home that fully takes care of the residential and healthy upkeep of old people away from their family home base as a result of age within an agreed period of stay (www.collinsdictionary.com).

Caregiving: Caregiving is the activity or profession of regularly looking after a child, or a sick, elderly, or disabled person (www.meriam-webster.com).

Malnutrition: Refers to a state of nutrition in which a deficiency or excess of energy, protein and micronutrients causes measurable adverse effects on tissues or body system (Academy of Nutrition and Dietetics 2015:255).

Zero hunger: It is a scientific definition of food security and improved nutritional status (WHPF 2010; UNSDG 2015:11).

Osteoporosis: is a systematic skeletal disease identified with low bone mass and micro-architectural spoilage of bone tissue by a consequent increase in bone fragility (Waldrop, Cheng, Delvin, Fehlings & Berven 2015: 546).

Sedentary lifestyle: refers to a type of lifestyle involving little or no physical activity. (Amarasinghe, Balakumar & Arasaratham 2015:61).

Dietary restrictions: It is purposely meant to regularise restricted diets that necessitate increased intake of medicine to control diseases (Dorner, Fredrick & Posthauer 2010:1549).

Risk factors of malnutrition: these are identified as components of medical and social factors, lifestyle and psychological (Mudge, Yung & Ross 2012: 131).

Cancer: this is defined as a disease that involves the uncontrollable growth of a group of abnormal cells, disregarding the rule of cell division signals (Hejmadi 2010:1).

Cachexia: is the weakness and washing of the body due to severe chronic illness. (Fearon, Strasser & Anker 2011: 459).

Oral nutrition supplements are products used for oral nutrition support, with the aim of increasing nutritional intake. They are a treatment option for when support need has been identified. (Straton, Green and Elia 2007:226).

Diabetes mellitus: is commonly known as diabetes, is a metabolic disease that causes high blood sugar. The hormone insulin moves sugar from the blood into cells to be stored or used for energy. With diabetes, the body either doesn't make enough insulin or can't effectively use the insulin it does make. (Nobbs, Yaxley, Thomas, Delaney, Koczwara & Luszez 2016: 528).

Dietary patterns of older adults: Dietary pattern is defined as the quantity, variety, or combination of different foods and beverage in a diet and the frequency with which they are habitually consumed. (Akinoso, Aboaba & Olajide 2011:5300).

Estimated energy requirements (EER): this is the average dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height and level of physical activity consistent with good health (New Zealand dietary guidelines 2006).

Cardiovascular disease: this refers to an imbalance in diet and physical inactivity that affects the elderly leading to heart failure, high blood pressure and hypertension (Mallado-Ferreira, Jane-Betran, Artego-Marzuelas, Redondo-Arriozu & Urbina-Soto 2018:1).

Rheumatoid Arthritis: this is a globally known most common autoimmune disease associated with chronic progression, a systematic inflammatory disorder that affects the synovial joints and produces symmetrical arthritis (Baddack, Frahm, Antolin-Fontes, Grobe, Lipp & Muller 2015:1657).

Parkinson's disease: this refers to malfunctioning of the central nervous system which affects the motor systems within the body (Salah, Krose & Cook 2015:241).

Under-nutrition: it is otherwise known as protein-energy malnutrition (PEM) and refers to a chemical syndrome characterized by weight loss associated with a significant decrease in fat shortage and muscle mass (Seung 2014:4).

Osteoarthritis: it is the most common type of arthritis that affects people on physically demanding job and develop as they age. It is a chronic disease that affects the joints on knees, hips, lower back and neck, small joint fingers, the base of thumbs, big toes and currently no cure (Murphy & Helmick 2012: S13).

Malnourishment: it refers to lack of proper nutrition, caused by not having enough to eat, not eating enough of the right things or being unable to use the food that one does eat (Ramya, Ranganath, Jyothi & Swetha 2017:1727).

LIST OF ABBREVIATIONS

AD	Alzheimer's disease
A-fib	Atrial fibrillation
AI	Adequate intake
AMDR	Acceptable macronutrient distribution range
ANZSGM	Australian and New Zealand Society of Geriatrics Medicine
AOA	Administration on Aging
ASN	Aging Service Network
BMD	Body mineral Density
BMI	Body Mass Index
CBC	Communication for Behavioural Changes
CHF	Congestive heart failure
COPD	Chronic obstructive pulmonary disease
CVD	Cardiovascular disease
DDS	Dietary diversity score
DGA	Dietary Guidelines for Americans
DoH	Department of Health
DRIs	Dietary reference intakes
EAR	Estimated average requirement
EER	Estimated energy requirement
EFBDG	European Food-Based Dietary Guidelines
EFSA	European Food Safety Authority
EUFIC	European Food Information Council
ENACT	Education for Effective Nutrition Action
EU	European Union
FAO/WHO	Food and Agricultural Organization/World Health Organization
FAO	Food Agriculture Organization
FFM	Free and fat mass
FFQ	Food frequency questionnaire
FGD	Focus group discussion
FGDS	Food group diversity score
FVS	Food variety score
HCL	Hydrochloric acid
HHOME	Hospital to Home Outreach for Malnourished Elders, Brisbane, Australia.
IDA	Iron deficiency anaemia

IFICF	International Food Information Council Foundation
IFPRI	International Food Policy Research Institute
IYCF	Infant and Young Child Feeding
LDL	Low-density lipoprotein
NAPN	National Action Policy on Nutrition, Abuja, Nigeria
NCA	National Council on Aging
NCD	Non-communicable diseases
NEP	Nutrition education programme
NKQ	Nutrition knowledge questionnaire
NFBDG	Nigerian food-based dietary guidelines
NFCT	Nigerian food composition table
NFNHPP	National Food Nutrition, Health, Policies and Programmes
NG	Nutrition guidelines
NGOs	Non- government organizations
NHMRC	National Health and Medical Research Council
NIAID	National Institute of Allergy and Infectious Disease
NIH	National Institute of Health
NKQ	Nutrition knowledge questionnaire
NPAFN	National Plan of Action on Food and Nutrition
NPC	National Population Commission
NRVs	Nutrient reference values
NSC	National Security Council
NSLPSS	National School Lunch Programme Special Supplementation
NZDG	New Zealand Dietary Guidelines
OAA	Older American Act
OAANP	Older American Act Nutrition Programme
OCD	Obsessive compulsive disorder
ONS	Oral nutrition supplements
OPTIFEL	Optimized Food Products for Elderly Population
OP	Osteoporosis
PD	Parkinson Disease
PEM	Protein-Energy Malnutrition
PNF	Polish Nutrition Foundation, Poland
RA	Rheumatoid Arthritis
RDA	Recommended Dietary Allowance

RDI	Recommended Dietary intake
SAFBDG	South African Food-Based Dietary guidelines
SANHANES	South African National Health and Nutrition Examination Survey
SD	Standard Deviation
SDQ	Socio-Demographic Questionnaire
SPSS	Statistical Package for Social Sciences
SUN	Scaling Up Nutrition
TECCOD	Obesity Disease in Japan
UL	Upper-Level Intake
UNDESAPD	United Nations Department of Economics and Social Population Division
UNESCO	United Nations Educational Scientific and Cultural Organization
UNICEF	United Nations International Children Education Fund
UNSCN	United Nations Standing Committee on Nutrition
UNSDG	United Nations Sustainable Development Goal
UNWFP	United Nations World Food Programme
USDA	United States Department of Agriculture
USDHHS	United States Department of Health and Human Services
VA	Visual activity
VUT	Vaal University of Technology
WFP	World Food Programme
WHPF	World Hunger and Poverty Facts
WHO	World Health Organization
WHONIA	World Health Organization National Institute of Aging
WUSTO	Wesley University of Technology, Ondo, Nigeria

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION TO THE STUDY

Nutrition is an integral factor in determining good, sustainable, healthy living among the elderly universally (Shisana 2013:1). The National Population Commission (NPC) (NPC 2014:25) in its population survey of 178 million people for the millennium revealed statistically that five million of those surveyed were classified as elderly which implied an increased demand for social and health services to address food insecurity that was caused by lack of income (Poulia, Yannakoulia & Karageorgou 2012:378; NPC 2014:23). Obesity and being overweight are health problems that are common with the elderly in Nigeria, because of their associated sedentary lifestyle and consumption of foods that are deficient in nutrients, resulting in malnutrition (Lee & Niemann 2010:22; Adegoke 2013:1758; WHO 2013:10).

According to Charlton, Ferreira and du Plessis (2001:1), in a study done in India, confirmed that 70% of the elderly population there suffer from diseases leading to a reduction in body mass index (BMI) <18.5kg/m^2 because of poor food intake habits. The less nutritious foods consumed by the elderly, the more unbalanced and energy-dense their diets become, and this subsequently leads to malnutrition (Ulasi, Chinwuba & Onodugo 2010). Furthermore, in another study, Gomez-Olive (2012:225) indicated that psychosocial stress and trauma leads to inadequate dietary intake, diseases and death in the aged persons.

Food is essential to life for promoting good health leading to efficient productivity and creation of desired satisfaction when available in nutritious quality, for example, at community social gathering like festivals and celebrations (Mulassi, Haded, Borroacci, Picarel, Robilotte, Redruello & Mosoli 2010:45; Babatunde 2013:220). Good health is guaranteed by choosing food products that are enriched in nutrients with balanced amounts of vitamins, minerals, protein, carbohydrates and a small number of fats (Ganasegeran, Al–Dubai, Qurechi, Al-Abed, An & Gianna 2012:1). This emphasises the need to consume all the foods in adequate quantities as assigned or suggested by a dietician or health practitioner (Ogah, Madukwe, Chukwuonye, Onyeonoro, Ukegbu, Akhimiem, Onwubere & Okpechi 2013:16; Onyeonoro, Ogah, Ukegbu, Chukwuonye, Madukwe & Akhimiem 2016:29; Lin, Watson & Wu 2010:1).

According to a recent global study, nutrition was defined as basically what people eat, how they eat it and the use of food by the body for the processes of growth and repair (Aina 2015:220). In the United States in 2015, research conducted by the National Institute of Allergy and Infectious Disease (NIAID), National Institute of Health (NIH) and 34 professional organisations demonstrated in their report that nutrition guidelines are information tools for families and caregivers to understand how to manage food allergies (NIAID 2015:4; Olayiwola, Olanrewaju, Adelekan & Arigbede 2013:365).

1.2 BACKGROUND TO THE PROBLEM

According to a survey carried out by the International Food Information Council Foundation (IFICF) in the United States of America (USA), protein-enriched foods were confirmed as a choice priority for the elderly. Hence the need for protein ranked in the top three for diet desirability after fibre and whole grain in America (IFICF 2014:250). A study carried out by the European Union's (EU) project, Optimized Food Products for Elderly Populations (OPTIFEL) in Finland, specified the necessity for good nutrition as an important factor in enhancing the quality of life of the elderly through consumption of nutrient-dense foods (Kautola, Pirttijärvi, Mäenpää, Tahvonen & Järvenpää 2015:245). Additionally, a related study carried out in South Africa (SA) by Rossouw, Grant and Viljoen (2012:6), revealed that elderly people had deficient micronutrient consumption patterns and were plagued by obesity, hypertension and raised total serum cholesterol levels, all of which increase the dangers of coronary heart disease. The results of the above study can be effectively countered by making use of well-developed nutrition guidelines.

The South African National Health and Nutrition Examination Survey (SANHANES), at the 8th WHO Global conference held in Helsinki, Finland in 2013 on the health status of non-communicable diseases, recommended the following strategies: alleviate food insecurity, counteract poor nutritional status, increase nutrition education, create public awareness on micronutrients and dietary diversity, attend to psychological distress trauma and address quality of health care, research and monitoring of health resources (Labadarios, Shisana & Simbayi 2013:38; Olasumbo & Ayo 2013:219). In a related report of the United Nations at the Third International Conference on Financing for Development, "Addis Ababa Action Agenda" in 2015, the 17 sustainable development goals were arrived at which constitute an integral part of the 2030 Agenda for Sustainable Development. The agenda emphasised nutrition as a vital

precaution for achieving these goals and hence actively supported the drive. For the purpose of this research, the following goals are relevant:

Goal 1: No poverty: this implies that good nutrition will improve general health in that people will be healthy and energetic to work, thereby increasing earning capacity and being able to procure nutritious foods.

Goal 2: Zero hunger: to end hunger, achieve food security and improved nutritional status.

Goal 3: Good health and well-being: ensure healthy lives and promote well-being for all at all ages.

Goal4: Quality education: to ensure inclusive and equitable quality education and promote life-long learning opportunities for all.

Goal 5: Gender equality: achieve gender equality and empower all women and girls. There is inequality in work and wages, many women do unpaid work such as childcare, domestic work, and there is discrimination in public decision-making.

Goal 6: Clean water and sanitation: ensure availability and sustainable management of water and sanitation for all. Water scarcity will affect more than 40% of people globally by 2030. Many take clean drinking water and sanitation for granted, whereas others do not have access to clean water and sanitation.

Goal 12: Responsible consumption and production: where reliable food supplies help stabilise food prices (WHPF 2010:1; UNSDG 2015:11).

In Nigeria, there are no nutrition guidelines available for the caregivers of the elderly. Hence, the need exists to develop dietary strategies for the elderly, based on the Nigerian Food-Based Dietary Guidelines (NFBDGs). In addition to the NFBDGs, this project utilised the South African Food Based Dietary Guidelines (SAFBDGs), the European Food-Based Dietary guidelines (EFBDG), as well as the Dietary Guidelines for Americans (DGA) and the New Zealand Dietary Guidelines (NZDGs). The nutrition guidelines developed for the caregivers utilised information from the related guidelines as mentioned above based on the following criteria, namely: formulated for understanding by people of diverse cultures and literacy levels; simply stated and positive; devoid of confusion; in line with eating patterns of different cultures and target population or groups; based on cost-effective and readily available foods; sustainable at all times; and encouraging and promoting environmentally friendly agriculture (Yaxley, Miller, Fraser, Cobiac & Crotty 2012:336). In its global programme on poverty reduction, the Food and Agriculture Organisation purposefully emphasised the provision of nutrient-dense foods for the elderly (FAO 2011:28).

1.3 RATIONALE AND MOTIVATION

This research study aimed to develop nutrition guidelines for the caregivers of the targeted elderly population in Ondo West. Ondo city, Nigeria. The information provided by the nutrition guidelines could be to the advantage of the elderly in combating health problems that arise from consuming nutrient-poor meals which in turn leads to diseases (Oladapo, Salako, Sodiq, Adedapo & Falase 2010:26). In its global programme on poverty reduction, the FAO purposefully emphasised the provision of nutrient-dense foods for the elderly (FAO 2011:22). According to the USDA, the nutrition guidelines should be formulated based on available and scientific evidence and ideal characteristics and communicated to the target population using marketing skills to influence their knowledge, perception, attitudes and their behaviour (USDA 2015:12).

The Department of Health (DOH) SA states that nutritional knowledge is a vital tool for correcting dietary intake in the elderly and such knowledge is acquired through the information provided by the developed nutrition guidelines for the caregivers (DOH 2004:1). Thus, the researcher acknowledges the importance of developing and implementing a nutritional education programme in order to assist all elderly persons in making informed decisions about food choices (Skate & Anthony 2012:18). The research findings from the study could empower the caregivers of the elderly in Ondo West, city of Ondo, Nigeria to make informed choices and to change their food consumption behaviour in the pursuit of longevity as suggested by Adelekan (2013:756). According to a study carried out in South Africa, nutrition education can assist the caregivers to apply FBDGs appropriately in terms of identifying the most suitable foods and drinks, accordingly to the food categories (Love & Maunder 2008:9; Mansah & Mayosi 2013:77). A related study in Legon, Ghana by Lartey (2013:105) revealed that nutrition guidelines are useful in the assessment of nutrition knowledge of caregivers aged 21-29 years to improve the micronutrient intakes. Nutritional assessment of the elderly is necessary to correct the health problems they encounter as a result of malnutrition. The poverty statistics of Nigeria in 2006 indicate that 40.5% of Nigeria's population could not obtain at least N5000 (R277.78) per month for essential daily nutritious food items (Arulogun & Owolabi 2011:89).

1.4 PROBLEM STATEMENT

Some of the major reasons for food insecurity consists of, lack of money and information on making food choices that are nutrient-dense (WHF 2010:4). Recent findings revealed that an average elderly person consumes five grams of salt daily which is more than 200% above the recommended intake (Morley 2011:87). It is also evident that foods consumed by the elderly in Nigeria have been found to be high in both salt and fat (Ordinioha & Brisibe 2013:24) resulting in non-communicable diseases like high blood pressure, diabetes and cancer (Morley 2011:87). In Nigeria, the elderly diet consists of fewer kilojoules as they age because they are faced with enormous economic problems such as low-income (Dorner, Fredrick & Posthauer 2010:1549). A corresponding study on body ailments, dietary patterns and nutritional status carried out in Nigeria confirmed that nutrient-deficient foods affect healthy living in the elderly as a result of lack of nutritional knowledge and unavailability of nutritional guidelines (Odugbemi, Onajole & Osibogun 2013:1). A related study on the elderly by Oldewage-Theron and Kruger (2009:300), revealed an all-inclusive nutrition and health assessments aimed at evaluating the health status of elderly persons attending a care-centre. This involved offering reasons and tactics to improve the well-being of the elderly. Lack of dietary education among the caregivers also constitutes a major problem because they are usually solely responsible for taking care of the elderly in terms of feeding, house care, personal hygiene, social care and medical upkeep (Contento 2011:16). Basic and nutrition education is vital for caregivers to guard the elderly in their care against malnutrition. The researcher organised the Nutrition Education Programme (NEP) in line with the guidelines suggested by the FAO (FAO 2009:5).

According to Acham, Oldewage-Theron and Egal (2011:24), the high percentage of age-related ailments derived from persistent inadequate dietary intake trends, is often caused by household food insecurity along with lack of diversification in food consumption. Furthermore, the results of the study revealed that most of the sampled age population had inadequate funding to sustain their day-to-day basic nourishment and survival needs, as manifested through the prevalence of gross household food insecurity and insufficient monthly income per household. According to the Department of Health (DoH) SA, the nutrition knowledge, through the information provided by the guidelines will help to correct dietary intake. This will then cultivate better dietary habits among the elderly and will be provided by the caregivers of the elderly (DoH 2008:29) and applied by the researcher in this development of the food and nutrition guidelines for this study. The nutrition health awareness programme implemented by the National Action Policy on Nutrition (NAPN) in Nigeria for the elderly in 2009 was not effective due to

inadequate fund allocation by the Federal Government of Nigeria (Jeffries, Johnson & Ravens 2011:317).

1.5 THE RESEARCH OBJECTIVES

1.5.1 Main objective

The main objective of the study was to determine the impact of food and nutrition and nutrition guidelines on the dietary behaviour of the elderly in Ondo West, Ondo city, Nigeria as depicted in the conceptual framework (Figure 1).

1.5.2 Sub-objectives

1. To conduct a baseline survey to determine the food consumption patterns of the elderly and the nutrition knowledge of the caregivers (Phase 1).
2. To plan and develop food and nutrition guidelines for caregivers of the elderly (Phase 2).
3. To train the caregivers on food and nutrition knowledge required for their role in caring for the elderly (Phase 3).
4. To implement the intervention programme of the food and nutrition guidelines (Phase 4).
5. To evaluate the compliance by the caregivers of the elderly on the use of food and nutrition guidelines as set out in a booklet (Phase 5).
6. To determine the impact of the food and nutrition guidelines on elderly food consumption habits by means of post-testing (Phase 6).

Fundamentally, the researcher assembled the data gathered from the baseline survey as well as referenced nutrition guidelines and based dietary guidelines of the USA, Europe, New Zealand, South Africa and Nigeria, with relevant nutrition research sources in developing the nutrition guidelines needed for the caregivers of the elderly in the study area. The caregivers were trained for a stipulated period as scheduled by the researcher. Thereafter, the caregivers implemented the developed nutrition guidelines over a period of six months. Following this, the impact of nutrition guidelines, as used by the caregivers in their interaction with the elderly food consumption habits, was determined.

1.5.3 Research question

The research question at hand was: To what extent did the nutrition guidelines impact the food consumption and dietary intake behaviour of the elderly?

1.6 RESEARCH METHODOLOGY

1.6.1 Study design

This quantitative study followed an experimental pre-and post-test research design of a descriptive nature. The research method was survey-based which consisted of the following phases:

Phase 1: Baseline survey or pre-test

This involved conducting a baseline survey to determine food choices, nutrient density and consumption patterns of the elderly in Nigeria. The baseline survey (sub-objective 1) for the elderly included 24-hour recall questionnaires, food frequency questionnaires (FFQ), socio-demographic questionnaires and a nutrition knowledge questionnaire (NKQ) for the caregivers.

Phase 2: Planning and development of nutrition guidelines for caregivers

The result obtained from phase 1 was used to determine the design of phase 2 which focused on the development of nutrition guidelines for the caregivers of the elderly (sub-objective 2),

Phase 3: Training of caregivers

The development of a training programme for the caregivers was based on the nutrition guidelines developed by the researcher in phase 2. Sub-objective 3 focused on the training of caregivers.

Phase 4: Intervention

Phase 4 of this research work consisted of an intervention programme which involved the implementation of the nutrition guidelines for the caregivers of the elderly compiled by the researcher (sub-objective 4).

Phase 5: Evaluation (post-test) to determine the compliance of the caregivers

Phase 5 of this research project involved a post-test which evaluated the compliance by caregivers after the implementation of the programme over a six-month period. The group interview and observation evaluated the perception of the caregivers and suitability of the nutrition guidelines. This phase included 24-hour recall, FFQ, and a nutrition knowledge questionnaire for the caregivers (sub-objective 5).

Phase 6 Post-test to determine the impact of food and nutrition guidelines on the elderly

Phase 6 involved a post-testing of the elderly to determine the impact of the food and nutrition guidelines by means of 24-hour recall questionnaires and FFQ completed by the elderly (sub-

objective 6). This was followed by conclusions and recommendations made by the researcher (Main objective).

1.6.2 Conceptual framework

The conceptual framework in Figure 1.1 depicts the design of a multiphase empirical study which includes an assessment of the nutrient content of foods currently consumed by the elderly by means of the six-phase approach as discussed above. The FAO framework used for nutrition intervention planning was adapted and Figure 1.1 was developed and used as the basis for the six phases involved in the research study. The information contained in the phases are: Phase 1: Baseline survey, training of fieldworkers, completion of SDQ, 24-hour questionnaires, FFQ by the elderly and NKQ by the caregivers; Phase 2: Planning and development of nutrition guidelines for caregivers of the elderly; Phase 3: Training of caregivers; Phase 4: Intervention programme and implementation of nutrition guidelines; Phase 5: Evaluation, involving compliance by the completion of NKQ by the caregivers, conducting observation and group interview; Phase 6: Determining the impact of nutrition guidelines; Post-testing with a 24-hour questionnaire and FFQ respectively.

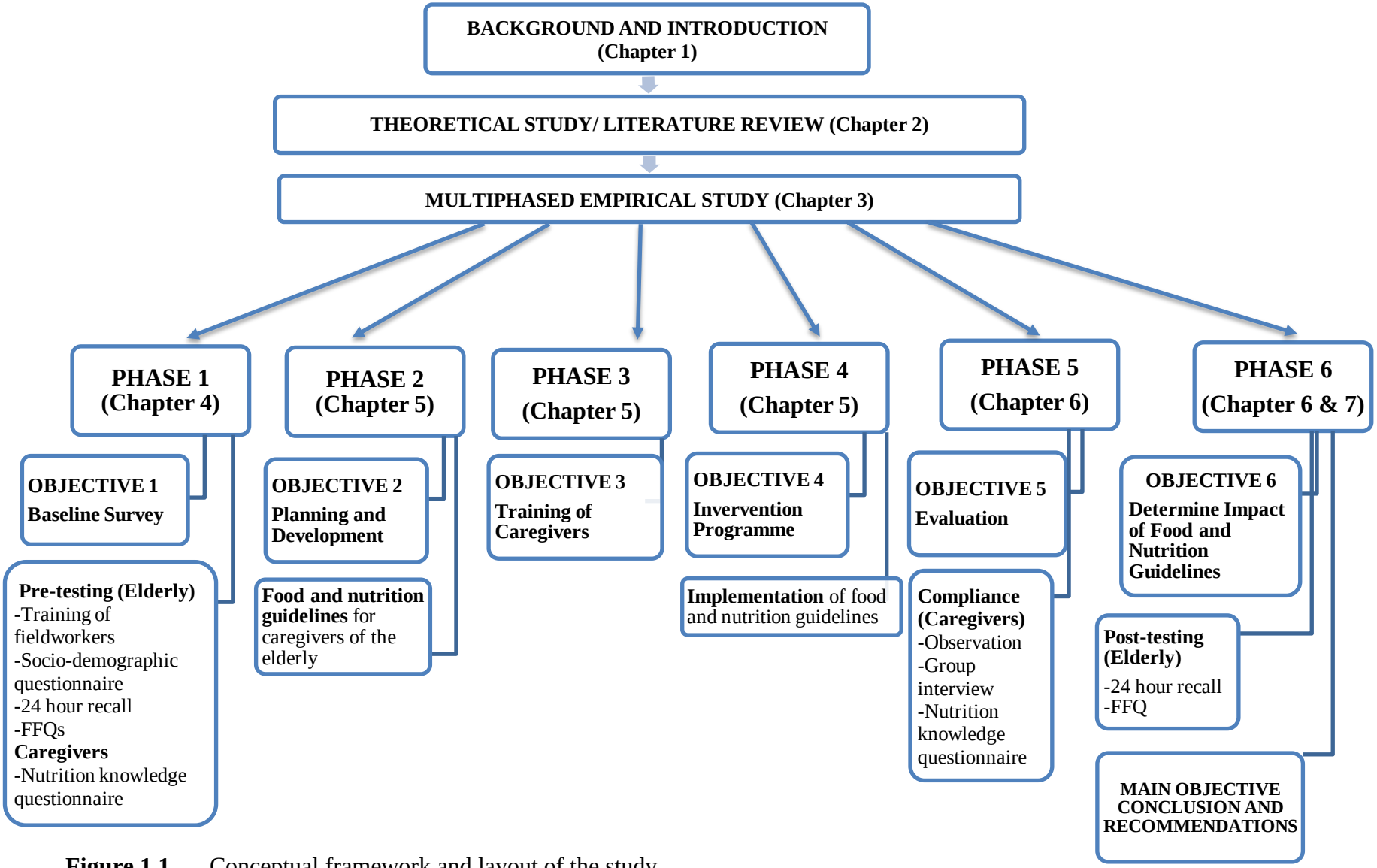

Figure 1.1 Conceptual framework and layout of the study

1.6.3 Study population and sampling

The study was conducted in Ondo West city in Ondo State, Nigeria. The population consists of 201,016 elderly individuals. The study followed a purposive sampling strategy including Ibitayo Fawehinmi Foundation, Bayo Fatusin and Daughters of Charity Provincial House. The sample size consisted of 120 elderly in total and ten caregivers in total.

1.6.4 Measuring instruments

The following measuring instruments were utilised in this study and will be discussed in detail in Chapter 3:

- Socio-demographic questionnaire;
- 24-hour recall questionnaire;
- FFQ;
- NKQ;
- Observation, and
- Group interview.

1.6.5 Data collection procedures

Data collection will be discussed in detail in Chapter 3.

1.6.6 Data analysis

The Dietary Manager Program was used to analyse the 24-hour recall and FFQ. Descriptive statistics for Social Sciences recent version 26.0 was used for the NKQ and socio-demographic questionnaire. The observation and group interview were analysed by means of qualitative content analysis as discussed in detail in Chapter 3.

1.7 ETHICAL APPROVAL

Ethical approval was obtained from the Ethics Committee for Research and Innovation at Vaal University of Technology and the Wesley University of Science and Technology, and the Ministry of Health in Ondo State, Nigeria (Annexure A). The ethical considerations will be discussed in Chapter 3 in more detail.

1.8 OUTLINE OF THE STUDY

CHAPTER 1: Introduction

The introduction comprises the background, motivation, and problem statement, objectives of the study, conceptual framework and a summary of the research methodology applied in this project.

CHAPTER 2: Literature review

This chapter addresses literature on the factors contributing to nutritional health related issues and malnutrition, dietary intake, nutritional needs and food consumption patterns of the elderly. Furthermore, the chapter discusses the importance of nutrition education for the caregivers of the elderly as well as some of the global, and more specifically, the South African and Nigerian nutrition guidelines available. A conceptual framework was used in the research project (Figure 1.1).

CHAPTER 3: Methodology

The design, ethical considerations and method of research used in the study covered in this chapter include: the study area, population, the sampling techniques for the caregivers and the elderly, fieldworkers training, methods of data collection used in the various detailed described study phases 1-6, measuring instruments (including the socio-demographic questionnaire, 24-hour recall, NKQ, group interview and observations), and data analysis of the various measuring instruments used. Reliability, validity and trustworthiness of the measuring instruments were addressed as well.

CHAPTER 4: Baseline survey and pre-test results

The baseline survey focused on the results of the socio-demography questionnaire, 24-hour recall and FFQ to determine the food variety score of the elderly, as well as the NKQ of the caregivers. This was followed by the interpretation of the baseline results to inform the development of the intervention.

CHAPTER 5: Planning, development and implementation of the food and nutrition guidelines.

This chapter discussed the planning and development of the food and nutrition guidelines for the caregivers of the elderly, the training of the caregivers and implementation of the intervention programme of the food and nutrition guidelines for the elderly, as guided by the FAO framework.

CHAPTER 6: Evaluation and impact of the food and nutrition guideline intervention programme

In chapter six, the objective of evaluating the compliance of the caregivers regarding the intervention programme implementation was discussed. Furthermore, the pre-and post-dietary intake results of the elderly were reported.

CHAPTER 7: Conclusion and recommendations

This provides an overview of the study limitations and implications for further research. Recommendations were made for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is purposely to obtain an understanding of how to determine the impact of nutrition guidelines on the dietary behaviour of the elderly in Ondo West city, of Nigeria. The study made use of related information that is most current and suitable from the nutrition guidelines of the USA, European, New Zealand, South Africa and Nigeria respectively.

Globally, nutrition guidelines (also known as dietary guidelines) are meant to establish a basis for public food and nutrition education programmes to improve healthy eating habits and lifestyle and communication for behavioural changes (CBC). It is an advisor on foods, food groups and dietary patterns to provide the needed nutrients to the general public and promote overall health and thus prevent the cause of chronic diseases (FAO 2016:1). Nutrition guidelines are instrumental translations of nutrients recommended into information, with the use of images and symbols easily understood by the public on foods and portion sizes (FAO 2016:1). According to a research study by Ramya, Ranganath, Jyothi and Swetha, (2017:1727) carried out in India on the nutritional health of the elderly, factors such as: advancing age, illiteracy, dependent financial status and living arrangements without spouse and/or children worsens nutritional status among the elderly. Furthermore, it was revealed in the study that the overall financial status of the elderly influences their nutritional status, furthermore the lower levels of malnourishment among them are an indication of the lack of family care.

2.2 FACTORS CONTRIBUTING TO NUTRITION RELATED HEALTH IN THE ELDERLY

In a feasibility pilot study carried out in Brisbane, Queensland, in Australia on Hospital to Home Outreach for Malnourished Elders (HHOME) in 2012, risk factors for malnutrition were identified as components of medical and social factors, as well as lifestyle and psychological influences (Mudge, Young & Ross 2012:131; Banna 2013:307). Giana and Humaira (2012:280) researched that nutrition in the elderly is affected by a variety of medical, psychological, social and life factors, all of which contribute to the sustenance of healthy living in the elderly.

2.2.1 Social factors

2.2.1.1 Financial factors

Financial factors refer to the ability to have sufficient money to purchase items needed for sustenance. Lack of adequate financial capability to purchase nutrient-rich foods creates problem for the elderly when they consume cheaper food items that are not nutritious (Kowlessar, Robinson & Schur 2015:3). Nutrition related health is intimately related to socio-economic status, as insecurity of money leads elderly people to choose foods against their preference, and the same applies to their inability to afford the cost of transport to access shopping centres and social networks (Locher, Ritche, Robinson, Roth, West & Burgio 2008:223).

2.2.1.2 Food security

FAO (2009:230) referred to food security as what exists when all people possess physical, social and economic access to sufficient, safe and nutritious food preferences for an active and healthy life. Wustefeld (2013:10) identified how to evaluate underlying concepts of food and nutrition security as follows: food security developed over time from "freedom from hunger" in early 1940 into a concept consisting of the four dimensions made up of availability and access to its utilisation and stability. Thereafter, nutrition security was identified as what evolved over time from multi-sectional nutrition planning approaches in the early1970s, made up of three determinants such as:

- Access to adequate food;
- Care;
- Feeding practice; and
- Sanitation and health.

The food security model indicates the state of food security and nutrition in the world and provides links between food and nutrition and the underlying causes of food insecurity and malnutrition. Figure 2.1 below illustrates food security and nutrition in the world in 2018.

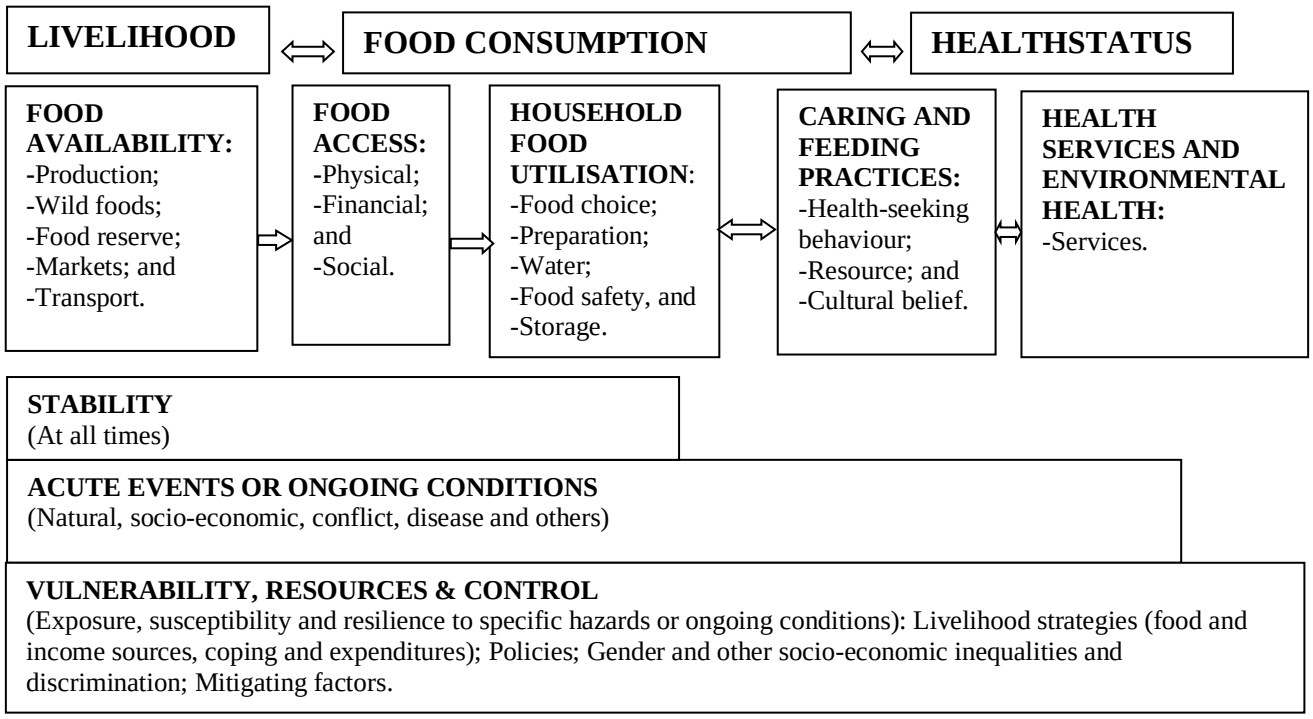

Figure 2.1 Food Security Model (FAO 2018)

2.2.1.3 Gender

Gender is a social factor that impedes nutrition in the elderly. In the present day, cohorts of male elderly are less likely than females to have proficiency in food preparation, to be part of a social network, and to turn to religious organisations for nutritional support (Bernstein & Luggen 2010:220).

2.2.1.4 Social networks

Social networks provide a sense of security, identity and predictable order in the life of the elderly. A research study carried out by Macaya and Lopez-Farre (2012:10) revealed that the elderly with diverse networks had a lower risk of insecurity than those with restricted networks. Social participation can have a positive influence on health and well-being by providing a sense of belonging and support that enhances feelings of well-being for preventive and therapeutic health behaviours.

2.2.1.5 Living arrangements

The elderly may experience a change in living arrangements from living with a partner to living alone, moving in with extended family, or moving somewhere that provides appropriate support, as living arrangements are often influenced by partnership status (Potocka & Moscioka 2011:377). Lack of

practical cooking skills or the confidence to use them by the elderly may hinder them and limit access to a wider choice of food and improved dietary behaviours (McGreary 2013:67).

2.2.2 Physical factors

2.2.2.1 Appetite

A decrease in appetite is a major cause of poor nutrition in the elderly. This may be as a result of a low ability to regulate their food consumption, interrupted level of hormones that influence appetite and changes in the central nervous system which decreases certain neurotransmitters; all of which affects the quantity of food eaten (Shisana, Labadarios & Rehle 2013:1).

2.2.2.2 Smell and taste

Smell and taste senses diminish as age advances. It has been found that 50% of people over the age of 65 years have a decreased ability to smell and 75% of people between the age of 80 and 97 years have an impaired sense of smell (Bernstein *et al.* 2010:220).

2.2.2.3 Dental health

The National Council on Aging (NCOA) (2015:1) indicated in their research that the health of the teeth is very important in the nutrition of the elderly, to avoid chewing problems. Chewing problems or disorders are common with the elderly because of weak teeth and thus results in reduced food intake or nutritional imbalances as they were only able to eat mashed or pre-cut foods (Brandt, Konig Schubothe-Zacher, Hans-Christoph and Kunzmann (2018:1).

2.2.2.4 Inability to swallow

Most elderly people find it difficult to swallow foods as they advance in age (Nakasato 2011:215). Ageing is associated with significant impairment in the regulation of food intake, which implies that older people become more unwilling to eat (Ledoux, Hinge & Baranowski 2011:143; Dermody 2016:1).

2.2.2.5 Visual impairment

Visual impairment occurs as a result of a disability, ageing and poor quality of life. The visual function includes visual activity (VA) visual field, and contrast sensitivity. It affects the ability of the elderly to perform daily tasks, affects their general health, and can lead to depression, irrespective of age, educational level, psychological status and interpersonal relationships. Owing to modern urbanisation,

more sedentary lifestyles, and increasing longevity, metabolic syndrome became more prevalent (Amarasinghe, Balakumar & Arasaratham 2015:61). Che, Lai, Shyu, Huang & Chiou (2010:625), in a research study on the elderly population in Eastern Taiwan, indicated a high rate of visual impairment among patients with an extensive duration of hypertension or diabetes for greater than ten years, including patients with diabetic retinopathy.

2.2.3 Psychological factors

Psychological factors such as stress and anxiety affect nutrition in the elderly and is a common cause of weight loss/increase which is widely recognised as a major health issue that hinders performing basic physical tasks such as cooking, eating and also can signal a change in appetite (Chong, Macdonald & Lovegrove 2010:28). Additionally, it leads to eating less than needed, thus causing dementia and confusion which in turn impairs the ability to feed oneself with individual choice of foods because of weight loss (Willis, Thomas, Willis & Slavin 2011:38).

2.2.3.1 Institutional influence

The physical and social environment of institutions like old people's homes and selected tailored menus to affect meal consumption of residents in making choices (Lin, Watson & Wu 2010:53). According to WHO (2000:1), the target population should be evaluated to identify desirable foods and their groups for inclusion in the guidelines based on various countries' nutritional recommendations or FBDGs on the WHO dietary guide, and CINDI.

2.2.3.2 Dietary restrictions

Dietary restriction is purposely meant to regulate restricted diets, nutrition and for prevention of chronic diseases, as a more liberal diet could result in increased enjoyment of food consumed and affect the quality of life. Living below poverty because of low-income and non-consistent sources of food limits the elderly people's access to healthy diets such as fruits and vegetables that are costly to afford (Dorner, Fredrick & Posthauer 2010:1549).

2.2.3.3 Mental disabilities

Mental disabilities are characterised by, among others, depression, bipolar disorder, schizophrenia and obsessive-compulsive disorder (OCD), that are currently prevalent in most countries of the world (Sathyanarayana Rao, Asha, Ramesh & Jagannatha Rao 2008:77). Diseases such as Alzheimer's,

Parkinson's, dementia, and mood disorders such as depression greatly influence the quality of life of the elderly. The abovementioned influence appetite, energy levels, concentration and daily behaviour in the elderly.

- Alzheimer's disease

Alzheimer's disease (AD) is a chronic neurodegenerative disease which includes problems of language, disorientation, mood swings, attitudinal issues, memory loss and lack of motivation (Phillip *et al.* 2010:440). The case of AD is unclear, as research indicated that five percent of AD is caused genetically and leads to death (Eggert, Anthony, Anvari, Dehrens & Dapprich 2016:233).

- Parkinson's disease

Parkinson's disease (PD) is a malfunction of the central nervous system which affects the motor systems within the body. Also, the symptoms involved generally include rigidity, shaking, difficulty in walking; thinking and behavioural problems, depression and anxiety as dementia becomes common in the advanced stages (Salah, Krose & Cook 2015:241).

- Dementia

Cognitive and perceptual barriers to eating affect the interest of the elderly in food consumption, as significantly identified in dementia. Dementia causes physical damages to the olfactory system itself and leads to several types of cognitive issues that affect the ability to eat (De Vere & Calvet 2011:1).

- Depression

Depression is a major issue in the elderly as it leads to a loss of memory, habits and affects recreational activities. These factors all hinder performing basic physical tasks including cooking and eating and the illness usually signals a change in appetite (Phillips, Foley, Barnard, Sering & Miller 2010:440; Olayiwola, Olanrewaju, Adeleke & Arigbede 2013:2185).

2.2.4 Nutrition and medical factors

2.2.4.1 Malnutrition

Malnutrition refers to a state of nutrition in which a deficiency or excess of energy, protein and micronutrients causes measurable adverse effects on tissues or body form (i.e. body shape, size or composition) and function, and clinical outcome (Academy of Nutrition and Dietetics 2015:1255).

Auestad, Hurley, Fulgoni, Victor and Schweiter (2015:4593) revealed that malnutrition is a problem peculiar to the aged in residential care, and the community.

- Under-nutrition

The Australian and New Zealand Society of Geriatrics Medicine (ANZSGM 2007:1) report referred to under-nutrition (otherwise known as protein-energy malnutrition (PEM)) as a chemical syndrome characterised by weight loss that is associated with a significant decrease in fat storage and muscle mass. All elderly people are at potential risk of under-nutrition which is peculiar to obesity as body composition changes due to central accumulation of fat, increase in ageing appendicle fat mass, increased risk of stroke, diabetes, hyperlipidaemia, heart disease and hypertension, which are common in the elderly (DiMonaco, Castiglioni & De Toma 2015:465). Changes in main body composition are often observed with starvation and loss of free fat mass (FFM) (Seung 2014:4; Hebutern & Schneider 2015).

- Over-nutrition or obesity

According to Matheus-Vliegen (2012:533), obesity is caused by a high body mass index (BMI) of >30kg/m2. This was supported by the Global Builder of Disease study in 2013 which revealed a universal increase of 27.5%. The findings indicated that body mass peaks at age 55 years for men (25% obese) and 60 years for women (31.3% obese) in developed countries, with a report of 25.0 to 29.9kg/m^2 for adverse lowest mortality across age groups, and pronounced specifically in the older adults (Flegal, Kit & Graubard 2013:1681). A research study carried out by the United States of Aging Survey with National Council on Aging (NCA) (2015:1) reported that out of a representative sample of over 1600 older adults collated, over two-thirds of those surveyed agreed that eating a healthy diet and exercising regularly are essential components for maintaining good health.

2.2.4.2 Sarcopenia

The European working group on sarcopenia in older people referred to it as an inability of the elderly to function in the performance of daily activities leading to the risk of post-hip fracture complications (DiMonaco *et al.* 2015:465). Sarcopenia is linked with the resultant negative outcome of physical disabilities that inhibits swallowing of foods, reduced mobility, institutionalisation, poor quality of life and even death in the elderly (Zunzunegui, Sanchez, Garcia, Casado & Otero 2012: 29). Several causes of general malnutrition in the elderly lead to depletion of muscle mass, including starvation PEM and cachexia. Furthermore, the prevalence of PEM accelerates with age and a few morbidities (Yaxley *et al.*

2011:112). Yu, Leung and Woo (2014:551) indicated in two reports from a large sample of a Chinese community, consisting of men or women aged 65 and older, that sarcopenia is a predicted fracture risk of BMD (Body Mineral Density), with other clinical risk incidences. The report further revealed that when diagnosed, it adds to the inter-segmental value of fracture risk assessment tool algorithm (Maruthakuti 2011:119).

2.2.4.3 Rheumatoid Arthritis

Rheumatoid arthritis (RA) is globally known as one of the most common auto-immune diseases associated with chronic progression; a systematic inflammatory disorder that affects the synovial joints and produces symmetrical arthritis (Baddack, Frahm, Antolin-Fontes, Grobe, Lipp & Muller 2015:1657). Arthritis is a debilitating multifactorial disease process that mainly affects the ageing population and places a huge burden on their healthcare system (Saegusa & Tanabe 2014:142). Pain is the major clinical symptom of RA that has non-receptive and neuropathic components (Ahmed, Magan, Vargas, Harrison & Sofat 2014:579). Further research findings estimated 50 million adults in the US alone and an estimated 175 million adults worldwide as having some sort of arthritic condition, out of which accounted for one to two percent of the global estimate (Mushapi, Dannhauser, Walsh, Mbahenyane & van Rooyen 2015:98). Osteoarthritis is the most common form of arthritis that affects people who work at physically demanding jobs and they are susceptible to develop the disease as they age. It is a chronic disease that affects the joints, occurring most often in knees, hips, lower back and neck, small joints of fingers, bases of thumbs and big toes. It currently has no cure (Murphy & Helmick 2012: S13). Gout is a metabolic inflammatory arthritis that develops in some people with a high level of uric acid in their blood and it is an autoimmune disease related to types, and amounts of foods eaten and how the body processes (metabolises) them (Singh & Cleveland 2018:1).

2.2.4.4 Cardiovascular diseases

Cardiovascular disease (CVD) is frequently and extensively due to imbalance diets and physical inactivity. Risk of heart disease and stroke is reduced by consuming less saturated, trans-fats and enough amounts of fruit and vegetables with less salt, as well as engaging in physical activities to control weight (DiMonaco *et al.* 2015:465). CVD affects the elderly, most prevalently as atrial fibrillation (A-fib), heart failure and chronic renal disease and causes high blood pressure and hypertension most prominently in women rather than men (Mallado-Ferreiro, Jarne-Betran, Artego-Mazuelas, Redondo-Arriozu & Urbina-Soto 2018:1).

2.2.4.5 Gastrointestinal immune factors

Gastrointestinal digestive and absorptive functions reduce as age increases, causing loss of strength in the intestinal wall and elasticity with changes in hormonal secretions and slower intestinal motility, while atrophic gastritis reduces secretions in gastric acid, intrinsic factors and pepsin from the stomach. This leads to the consequent decrease in bioavailability of vitamin B_{12}, folate, calcium and iron (Donini, Savina & Gennaro 2012:89).

2.2.4.6 Cancers

Hejmadi (2010:1) defined cancer as a disease that involves the uncontrollable growth of a group of abnormal cells, disregarding the normal rules of cell-division signals and developing into a degree of autonomy from its colonial origin, along with altered DNA. The most common type of cancer is breast cancer, followed by the lung and prostate. The ten deadliest cancers are: lung and bronchial, colon and rectal, breast, pancreatic, prostate, leukaemia, non-Hodgkin's lymphoma, liver and intra-hepatic bile duct, ovarian and oesophageal cancer respectively. Pancreatic cancer mainly occurs in the elderly having different biological, functional and psychosocial characteristics in comparison with the young population and it is caused by lifestyle, environment, age, smoking, hormonal factors, family history (generic), exposure to a hazardous substances, physical inactivity and ultraviolet radiation (Chan 2010:1).

Research statistics revealed that the incidence of cancer in western countries increases with ageing, as the occurrence in patients is estimated at more than 50% of all newly diagnosed patients over 60 years, which implies that one third is over 70 years and above (Siegel, Miller & Jemal 2015:29). In another study, it was indicated that by the year 2030, 70% of all malignancies and 85% of all cancer-related deaths are expected to occur in the elderly, at 65 years (Lasry & Ben-Neriah 2015:217). It was further revealed that the relationship between advancing age and cancer in established carcinogenesis, consumes time, causing body tissues to be more vulnerable to environmental carcinogens such as changes in the body. Chronic inflammation may encourage the development of cancer (Amedie, Niccolai & Prisco 2014:3354). In addition, red meat consumption is associated with cancer and death in the elderly population (Nobbs, Yaxley, Thomas, Dalaney, Koczwara & Luszcz 2016:528).

2.2.4.7 Osteoporosis

Osteoporosis (OP) is a systemic skeletal disease identified with low bone mass and micro-architectural spoilage of bone tissue caused by a consequent increase in bone fragility and fracture which is a major contributor to donatives spine disorders and frailty that tolerates the body's capacity adaption to structural degenerative changes (Waldrop, Cheng, Delvin, Fehlings & Berven 2015:546). Furthermore, OP affects the elderly in their physical state of health, loss of free movement, fractures with significant morbidity and mortality (Tarantino, Lolascon & Cianferotti 2017:3).

2.2.4.8 Diabetes mellitus

Being overweight, or obese, as well as physical inactivity are responsible for the increasing rates of types 2 diabetes universally and this subsequently leads to increased risk of heart disease, kidney disease, stroke and infections. Increased physical activity and maintenance of healthy weight help in the avoidance and control of diabetes in the elderly (Nobbs, Yaxley, Thomas, Delaney, Koczwara & Luszez 2016:528).

Sherifali, Rabi and Houlden (2018: S6) referred to type 1 diabetes as a chronic condition in which the pancreas produces little or no insulin. Insulin is a hormone that allows sugar (glucose) to permeate into cells to produce energy and commonly appears in childhood (as infants), develops in adulthood and defies any cure except by managing the situation from infant and young child feeding (IYCF). Peculiar symptoms identified with type 1 diabetes are increased thirst, frequent urination, bed-wetting in children who did not previously wet the bed at night, extreme hunger, unintended weight loss, irritability, other mood changes, and blurred vision (Sherifali *et al.* 2018: S6).

2.2.4.9 Anaemia

Alli, Vaughan and Patel (2017:1), referred to anaemia as haemoglobin levels below 120g and 130g per level for women and men respectively, involving a remarkably lower level of red blood cells and complete blood count, as indicated in global reputable scientific guidelines (Aldallal 2016:106; Thomas 2017:209). A complementary finding referred to iron as a dietary mineral associated with multi-body functions for oxygen transportation in the blood which deficiency is characterised by incomplete haemoglobin synthesis and results in micro-cynic and hypo-chromic red blood cells. (Akodu, Disu, Njokanma & Kehinde 2016:61).

Lopez, Cacomb, Macdougall and Peyrin-Biroulet (2016:909) revealed that iron deficiency anaemia (IDA) is characterised completely by the lower level of total body iron storage with inadequate supply to the bone marrow. This development was buttressed by the fact that approximately one third of IDA cases are associated with deficiencies in nutrient intakes, another third is associated with chronic inflammation, kidney diseases and the last one third does not show any association with specific aetiologies (Merchant & Roy 2012:173).

2.2.4.10 Cachexia

The primary features of cachexia consist of deficient nutrient intake, or absence of physical activity with altered metabolism due to a pathological systemic inflammatory response (Fearon, Strasser & Anker 2011:489; Wallengren, Lundholm & Bosaeus 2013:1519) as it is caused by pro-inflammatory cytokines that constitutes a number of chronic conditions such as cancers, HIV/AIDS, heart failure and chronic obstructive pulmonary disease (COPD). It is referred to as a complex metabolic syndrome associated with underlying illness and identified by loss of muscle which eventually leads to hospitalisation (Arthur, Noone, van Doren, Roy & Blanchette 2014:3). The provision of adequate nutrients in diets guarantees effective involvement in physical exercise for muscle restoration and reduced systematic inflammation in the elderly (Oberholzer, Hopkinson & Baumann 2013:77).

2.3 DIETARY PATTERNS OF OLDER ADULTS

The dietary pattern of the older adults referred to as the elderly in this study is described as food consumed in proportions containing protein, carbohydrate and fat similar to the ones eaten by the younger adults, as they were used to consuming in their early life (Akinoso, Aboaba & Olajide 2011:5300). FAO (2012:1) specified in a follow-up report that dietary recommendations should be considered in making overall food choices and the different items involved for consumption.

2.3.1 Dietary food intake

The dietary food intake observed in Nigeria is similar to those of other countries elsewhere in Africa and developed countries (Olumakaiye, Atinmo & Olubayo-Fatiregun 2010:154). The total food consumption by the elderly in the country does decline as they age, causing a drop in their intake of many nutrients, leading to a variation in meeting energy requirements (Robinson 2018:257).

2.3.2 Factors influencing healthy eating

Most elderly persons eat foods prepared by themselves or by their caregivers (Odugbemi, Onajole & Osibogun 2012:1). They experience metabolic and physiological changes with lifestyle modifications such as reduced physical activity levels and dietary behaviours as they age (Babio, Becerra-Toma, Martinez-Ganzalez, Corella, Estruch & Ros 2015:2316). This makes food preparation difficult.

2.3.2.1 Cost and accessibility

The high cost of a food item is a primary barrier to the elderly. Low-income groups of elderly have a greater tendency to consume unbalanced diets and experience low intakes of fruits and vegetables (Odugbemi *et al.* 2012:1).

2.3.2.2 Education and knowledge

Good nutrition knowledge enables caregivers to access accurate and consistent information through various media, on food packages and from health professionals (Koopman 2011:104). Inadequate nutrition knowledge by the caregivers can hinder them from guiding the elderly to make healthy food choices; therefore, the focus of this study was to determine the impact of nutrition guidelines on the dietary behaviour of the elderly as influenced by the knowledge of the caregivers.

2.3.2.3 Culture

Cultural restrictions influence forming different dietary habits to consume certain foods prepared and can also lead to the exclusion of certain food items from the diet, especially when migrating from one country to the other (Morley 2011:87). The development of culturally sensitive nutrition guidelines is crucial to promote healthy eating habits and knowledgeable caregivers could play a positive role in changing the elderly's dietary behaviour (Mbahenyane, Makuse, Ntuli, Mbhatsani & Sayed 2008:227).

2.4 NUTRITIONAL NEEDS OF THE ELDERLY

The energy needs, carbohydrates, protein, vitamins and minerals for males and female 50 years and older are depicted in Table 2.1.

Table 2.1 Dietary reference intakes for people 50 years and older (Whitney & Rolfes 2019)

Nutrients per day	**Males**	**Females**
Energy kJ (EER) sedentary to moderately active	8400-9200	6700-7500
Protein RDA (g)	56	46
Carbohydrates RDA (g)	130	130
Vitamins		
A (µg)	900	700
B_1 - Thiamine (mg)	1.2	1.1
B_2 - Riboflavin (mg)	1.3	1.1
B_3 - Niacin (mg)	16	14
B_4– Choline	550	425
B_5 - Pantothenic acid	5	5
B_6 - Pyridoxine (mg)	1.7	1.5
B_7 -Biotin (µg)	30	30
B_{12} -Cobalamin (µg)	2.4	2.4
C (mg)	90	75
D (IU)	600-800	600-800
E (mg)	15	15
Folate (µg)	400	400
K(µg)	120	90
Minerals		
Calcium (mg)	1200	1200
Phosphorus (mg)	700	700
Iron (mg)	8	8
Zinc (mg)	11	8
Iodine (µg)	150	150
Selenium (µg)	55	55
Chloride (mg)	30-100	
Chromium (mg)	0.05-0.2	
Copper (mg)	1.5 – 3.0	
Fluoride (mg)	1.4 -5.0	
Manganese (mg)	2.0 – 5.0	
Molybdenum (mg)	0.075 – 0.25	
Potassium (mg)	1600-3500	

A change in the calorie needs of the elderly is experienced due to excess body fat and reduced lean muscle with their involvement in less activity. This however, leads to a decrease in their calorie needs exacerbated by their choice of nutrient-dense foods. For example, the consumption of low-fat milk rather than full-fat milk (Potocka & Moscioka 2011:377, Charlton, Ferreira, Du Plenssis, Chavarro-Carrajal, Reyes-Ortiz, Samper-Ternent, Arciniegas & Gutierrez 2015:304).

Table 2.2 Nutrient reference values for older adults (New Zealand dietary guideline 2006)

Definition of NRV recommendations	
RDI (Recommended Dietary Intake)	The average daily dietary intake level sufficient to meet the nutrient requirements of nearly all healthy individuals (97–98%) in a life stage/gender group.
EAR (Estimated Average Requirement)	The median usual intake estimated to meet the requirements of half the healthy individuals in a life stage/gender group. This value is usually used for populations.
AI (Adequate Intake)	Where an EAR (and therefore an RDI) for the nutrient cannot be determined because of limited or inconsistent data, then an adequate intake is determined. The AI can be used as a goal for individual intake but is based on experimentally derived intake levels or approximations of observed mean nutrient intakes by a group of apparently healthy people maintaining a defined nutritional state.
EER (Estimated Energy Requirement)	The average dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height and level of physical activity, consistent with good health. In children and pregnant and lactating women, the EER is taken to include the needs associated with the deposition of tissues or the secretion of milk at rates consistent with good health.
UL (Upper Level of intake)	The highest level of continuing daily nutrient intake likely to pose no adverse health effects in almost all individuals.
AMDR (Acceptable Macronutrient Distribution Range)	An estimate of the range of intake for each macro-nutrient for individuals (expressed as percentage contribution to energy) that would allow for an adequate intake of all the other nutrients while maximising general health outcomes.

The NRVs are presented as a set of recommendations with a range of levels, including the recommended dietary intake (RDI). Each of these recommendations is defined in Table 2.2. The dietary reference intakes (DRI) include two sets of nutrient-intake goals for individuals, namely the recommended dietary allowance (RDA) and adequate intake (AI). The RDA reflects the average daily amount of a nutrient considered adequate to meet the need of healthy people. If there is insufficient evidence to determine an RDA, an AI is set. In addition, the estimated energy requirements (EER) represent the average dietary intake considered adequate to maintain energy balance in healthy people (Whitney & Rolfes 2019).

2.4.1 Energy

Energy is required in the body for metabolic process, physiological functions, muscular activity, heat production, growth and the synthesis of new tissues. Food components release energy through oxidation

during the digestive process. This involves protein, carbohydrate, fat (the macro-nutrients) and alcohol from food and drinks that are the only independent sources of energy for humans with variations in energy by gender (male or female), body size and physical activity but generally diminish as age advances (Flicker, McCaul & Hankey 2010:234). PEM is the main cause and consequence of adverse outcomes in older persons and is known to be especially vulnerable to PEM-related consequences (Pererra & Ekanayake 2012:556). Indicated in Table 2.1 are the energy levels of sedentary to moderate active older people and the required protein intake.

2.4.2 Macronutrients

The functional role of water is vital as it exceeds that of other nutrients and when taken adequately, it reduces stress in kidney functions, eases constipation and encourages a younger look physically, making it difficult to detect thirst (Cate, Caillet, Sylvain & Lacroix 2010:679; NHMRC 2013:28). Additional to macro-nutrients, fibre plays an important role in the healthy sustenance of the elderly for the functioning of the colon, reduction of cancer and in exterminating toxins from the body and insufficient quantity with fluid, assists in maintaining normal bowel functions and reduction in the risk of intestinal inflammation. Dietary fibres are sourced from vegetables, fruits, grain products, cereals, seeds, legumes and nuts that are components of dietary fibre (van Dam & Seidell 2007:75; Hornicks & Weiss 2011:130).

2.4.2.1 Protein

Proteins are needed for building and repairing of tissues in hormone, enzyme and antibody synthesis with other numerous body functions. Its insufficient intake in the elderly causes increase in skin fragility, decreased immune function, poor healing and longer recuperation from an ailment. Its nutritional requirement for people aged over 70 years is 25% higher than for younger adults (NHMRC 2013:226).

2.4.2.2 Carbohydrates

Carbohydrates provide the major single source of energy in the diet and are easily available as nutrient-dense items that are relatively high in unrefined forms and low in fat quantity (Hornicks & Weiss 2011:130). Most starchy foods consumed by the elderly are relatively high in carbohydrates and are easily sourced locally in the community (van Dam & Seidell 2007:75).

2.4.2.3 Fats

Fats facilitate the absorption of the fat-soluble vitamins A, D, E and K, along with other fat-soluble biologically active components. Fat conveys food's flavour components that assist with satiety and stimulates palatability. A research study revealed that it is ideal to reduce the overall fat content in the diet of the elderly for an easy reduction in calories intake, body weight and chronic diseases (Lee, Visser & Tylavsky *et al.* 2010:79).

2.4.3 Micronutrients

Vitamins and mineral components contain compounds inclusive of metabolic activities essential for growth, development and health at an optimum level for healthy living. Also, micronutrients are important in the prevention of infections and chronic diseases (Morakinyo, Samuel & Adegoke 2016:141).

2.4.3.1 Vitamins

Hornicks and Weiss (2011:130), in their research investigations, revealed that various vitamins needed by the elderly consists of thiamine (vitamin B_1), pyridoxine (vitamin B_6) which is sourced from the intake of refined flour products, riboflavin (vitamin B_2) which is sourced from whole grain. Low intake affects the skin, as well as energy levels. It was further indicated that the deficient consumption of leafy green vegetables results in a lack of vitamin B_{12} and folic acid required for building blood cells and energy. Also, Csapo, Albert and Prokisch (2017:127), in a related study, indicated that vitamins are very important in the elderly for the preservation of life in controlling metabolism and the regeneration of the body with involvement in physiological processes of enzymes and protein synthesis.

2.4.3.2 Minerals

The diets of the elderly population are commonly deficient in minerals. The lack of hydrochloric acid (HCL) that is needed for adequate absorption of minerals, such as iron, calcium, and zinc (Hamidi, Boucher, Cheung, Beyene & Shah 2011:1681) elevate the deficiency problem further. Egan (2016:202) in a research study indicated that minerals are inorganic substances required by the body in minimal quantity for the formation of bones, teeth; an essential constituent of body fluids, tissues, enzyme systems and nerve function. Nutrition aims at the sustenance of a healthy diet and exercise in reducing non-communicable diseases to meet up with dietary needs of the aged ones for recovery from muscle loss (Agarwal, Miller, Yaxley & Isenring 2015:296).

2.4.4 Addressing malnutrition in older adults

The United Nations Food and Agriculture Organisation recommended food fortification with iodine, iron and vitamin A, in particular, for governments of countries with high malnutrition rates, as indicated in the United Nations Standing Committee on Nutrition report (UNSCN) in 2010 (UNSCN 2010:3), World Hunger and Poverty Facts (WHFP 2010) and World Food Programme (WFP 2010), respectively. Food fortifications are implementable by the food industry and are an effective way of tackling deficiencies in densely populated urban areas. Mandatory labelling informs consumers with needed information on knowledge about fortification along with the accompanying effective 'social marketing campaign strategy' (Treatman 2012:6). Food supplements possess a high concentration of vitamins and minerals produced by pharmaceutical manufacturers in form of capsules, tablets or injections and are administered as part of health care or specific nutrition campaigns to the aged (Haas 2014:1251). The utilisation of high energy and protein diets with oral nutritional supplements showed improved nutritional, clinical and functional outcomes on the elderly in various research studies (Philipson, Snider, Lakdawalla, Stryckman & Goldman 2013:121). Oral nutrition supplements (ONS) are liquid preparations that are high in energy and protein content as a review of several studies on ONS revealed beneficially a decline in mortality pressure ulcers and infections (Straton, Green & Elia 2007:226). FAO (2017) referred to diversification in approaches that aim at increasing availability and affordability of diverse foods and can be actualised in the following ways: implementation at regional or national level on a large scale by helping to enhance available diverse foods in the markets at reduced prices for nutritious foods; Integrated farming systems (e.g. agro-silvopastoral food systems), using legume-based cropping systems involving crop rotation and intercropping; home gardening with an emphasis on nutrient-dense varieties of vegetables and fruit trees with small-scale integrated farming systems (e.g. mixed crop and livestock); strengthening the focus on horticulture sector, emphasising the importance of fruits and vegetables; diversification on a small scale (e.g. implemented at home or at smallholder level, predominantly for consumption purposes) that can help increase direct access to micronutrients and protein which may be expensive for poor people living in remote communities.

Nutrition education is a central component beneficial for the health and well-being of individuals in different age groups, specifically in formulating good attitudes, knowledge and practices, making suitable use of NE programme (Chernoff 2001:47).

2.5 NUTRITION EDUCATION

Nutrition education (NE) promotes healthy behaviour, utilising instructional methods to impart information in deciding on dietary habits (Gil 2010:223; USDA 2011). Contento (2011:15) revealed that nutrition education is mainly increased nutrition awareness and making healthy food choices. The FAO (2012:1) emphasized that the NE programme facilitates building skills and creating a supportive environment to accelerate healthy lifestyle among the elderly in the prevention of chronic diseases. Healthy Aging Research (HAR) in the US (2015) stressed the need for NE programmes by incorporating suitable modifiable forms of physical activity tailored towards preventing the development of physical ailments (Greenfield 2015:43; Wunderlich & Gatto 2016:2).

2.5.1 Global perspective

FAO (2010:1), in its research studies on "Why Nutrition Education Matters" globally, articulated the great need for nutrition education as problems of under-nutrition, vitamin and mineral deficiencies, obesity and diet-related chronic diseases increase globally.

A study conducted in Hawaii (Lin *et al*. 2010:53) on the elderly population, revealed an increase in the projected growth rate of people at age 65 years and above to 93.8% by the year 2030. This would necessitate education to acquire nutrition knowledge by the elderly in developing their eating habits. ENACT (2016:1) referred to nutrition education as an integral component needed by the elderly for healthy living. Individual perception of lifestyle changes and the reluctance of the elderly to adapt to nutrition messages influence their nutrition attitudes, knowledge and practice. A related study in Korea indicated that elderly females that attended some weeks of NE programme focused on "healthy food habits and dietary guidelines", experienced an improvement in their overall dietary attitudes and behaviours (Aina 2015:220). Shittu (2011:228) pointed out that nutrition education encourages people to establish good food habits for changes that are acceptable within the framework of their value system. The FAO (2011a) specified the need to execute public policies by the government for people in the community to acquire nutrition knowledge and develop relevant skills on healthy eating, making use of "train-the-trainer" approach. However, it was further emphasised that the "train-the-trainer" tactic works by using a few qualified individuals to learn certain nutrition curriculum and subsequently transferring the knowledge to other groups of people (Sylliaas, Brwold, Wyller & Bergland 2011:221). The study further revealed that "train-the-trainer" strategy is an effective upstream line of approach that provides in-depth nutrition concept knowledge, instructor training, facilitation skills, and ultimately prepares the

receivers to inculcate the trainer skills for role-playing in developing and implementing nutrition education programmes for other target populations. Kowlessar *et al.* (2015:1) stated that a needs assessment survey provides the researcher with results on areas of possible fittings for interventions.

Globally, various nutrition education programmes conducted over the years indicated various research findings that influence positively on the dietary intakes of the elderly. In Slovenia, a research study reported that the majority of seniors had good eating habits (83.1%) by indicating a food intake within an average of three to four meals per day (59.8%) and the majority of them, male and female, showing a preference for meat in their diets, while fish intake was preferred by those with higher education qualifications. More elders from rural areas opted for fruit and vegetables compared to residents in urban areas (Munoru, Kuria & Dorcus 2018:1). Giuli, Papa, Mocchegiani and Marcellini (2012:875), in a study on a sample of Italian seniors, revealed that food consumption declines with age in both male and female on food items like white bread, fresh fruit, olive oil, raw vegetables and pasta. Also, a related Malaysian study indicated that older adults experience nutritional challenges from under-nutrition and over-nutrition, because of their low literacy level (Skates & Anthony 2012:18). According to the study, within ten years the following developments took place: overweight occurrence among older people doubled from 15.6% in 1996 to 29.8% in 2006; obesity increased more than three times from 3.1% in 1996 to 10.9%; the prevalence of overweight occurrence decreased with age from 35.63% (age 60-64 years) to 12.64% (80 years plus) along with adults having diabetes as recorded by the government health clinic (Suzana, Kee, Jamaludin, Noor-Safiza, Khor, Jamaiyah, Geeta, Ahmad-Ali, Rahmah, Ruzita & Ahmad-Fauzi 2010:318). This study was followed by a development of suitable nutrition education packages for effective improvement in the quality of dietary intake and lifestyle of seniors in Malaysia.

2.5.2 Nutrition education in South Africa

The prevalence of acute and chronic malnutrition and micronutrient deficiency is high in developing countries where malnutrition affects numerous persons as a result of poor nutrition knowledge, lack of education, the transmission of harmful diet traditionally and poor nutritional practices (Labadarios, Steyn & Nel 2011:6; Morley 2011:1955). Stajkovic, Aitken and Holroyd-Leduc (2011:443) indicated there is limited data on nutritional knowledge by poor and middle-income countries such as South Africa. A study in South Africa, between 2007-2011, by Otitoola, Oldewage-Theron and Egal (2015:15), emphasised the efficacy of providing nutrition education and health promotion at care centres in Sharpeville to solve the problems of weight loss in elderly men.

2.5.3 Nutrition education in Nigeria

Nutrition education in Nigeria is purposed to provide the following for the poor: adequate information, skills and motivation, in order to ensure appropriate diets are sourced from available local foods (Achor 2014:249). Furthermore, the aim was to utilise local foods efficiently and avoid nutritional practices that are detrimental to healthy living. This was supported by Abisola and Ikeola (2018:1), who stated that the nutrition education policy in Nigeria makes provisions for creating awareness on diet, prevention of obesity and diet-related NCD (Non-communicable diseases), making use of food labelling, advertising of healthy diets and improvement on physical activity for a healthy lifestyle.

According to a research study conducted in Nigeria on NE by Kuku-Shittu, Onabanjo, Fadare and Oyeyemi (2016), based on the information provided by the National Food Nutrition, Health, Policies and Programmes (NFNHPP), and the National Plan of Action on Food and Nutrition (NPAFN), the following targets were set for effective actualisation between 2014 and 2018: reduce by 20% the number of children under five who are stunted; reduce low birth weight by 15%; ensure no increase in childhood overweight; reduce and maintain childhood wasting to less than 10%; reduce anaemia in women of reproductive age by 50% and increase exclusive breastfeeding rates in the first six months to at least 50%. Furthermore, the research supported the addition of vitamin A to wheat, flour, maize meal, vegetable oil and sugar as well as the addition of iron, zinc, folic acid, vitamin B, niacin, thiamine and wheat, as mandated by the Nigerian law on food in line with the certification received from Universal Salt Iodization in 2005.

2.5.4 Planning of nutrition education programmes

Cote, Caillet Doyon, Sylvain and Lacroix (2010:666) as well as Kowlessar *et al.* (2015:1) stated that to achieve good nutrition programmes, a proper planning approach should be involved along with reliable criteria for effective consideration of the gap between technical and the existing local indigenous knowledge in making the NE activities attractive to the community. Furthermore, according to Koopman (2011:104), NE requires specific skills and adequate resources in the field along with the role and responsibilities of members of the community identifiably to assess the impact of the external funding with the risks involved. All nutrition education programmes should follow the Triple A cycle (Figure 2.2) of planning which consists of: assessing a problem, analysing the causes of the problem and taking action based on the analysis and resources available (Department of Health 2012; NHMRC 2013:226).A needs assessment survey provides the researcher with results on areas of possible gaps (analysis) to be addressed by an intervention (action) as suggested by Kowlessar *et al.* (2015:1).

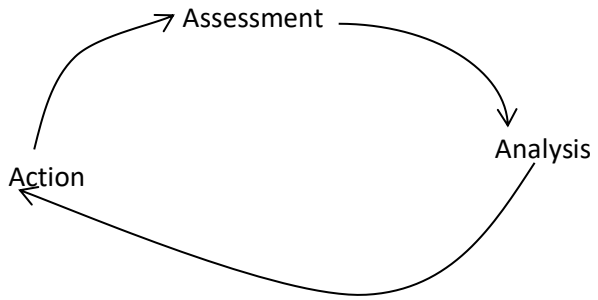

Figure 2.2 Triple A cycle (Department of Health 2000; 2014)

2.5.4.1 Community support

According to McGreary (2013:67), the involvement of the community is vital in planning nutrition programmes to address nutritional needs of the people in ensuring a sense of ownership and a reasonable level of commitment in planning and evaluation. The research conducted by Crichton and Alkerwi (2014:1036) revealed that community advocacy and participation with more support provides an ideal strategy to advocate NE programme to involve, lobbying key people in the community. This with the idea of creating a rally on information sharing, using media, features on the television or using the radio to express views concerning the programme and conducting campaigns to influence decision-makers. Gillespie, Robertson, Gillespie, Sherrington, Gates and Clemson (2012:9), stated that effective motivation of members of the community is the major way to draw support for NE programme as it requires a review of the needs assessment (Figure 2.2) of the elderly in the community to focus attention on their identified health problems, motivational drive, social benefits and cost-effectiveness, which involves lower- and higher-level decision-makers. Also, it was revealed in a related study that a familiarity link with the community leadership and structure should be established to mobilise community participation and ensure the capability to provide resources effectively for the project (Lin & Lee 2005:221; Train the Trainer 2011).

2.5.4.2 Planning committee

According to Masony, Jefroodi, Ghabari, Kazemne, Ad, Shojaei and Rafiei (2012:65), for an NE to be effective, a planning committee should be established after obtaining the supportive consent of the community and the size must be determined by the resources available; there must be an appointment of executive officers as members and they must be led by a chairperson, a project leader, with good qualities,

keen interest, knowledge of nutrition programmes, leadership skills and organisational traits and skills. In furtherance to this, the planning committee should include stakeholders from different sub-groups in the community among the target population, and other interested individuals. Also, the steering committee should consist of ‘doers’ and ‘influencers’, with an assured guarantee of the sponsors, to institutionalise the programme (van der Merwe 2011:1).

2.5.4.3 Framework for the planning of a nutrition education programme

The FAO Framework (1997) was developed to assist in developing nutrition education programmes most suited to communities. The framework centred on nutrition promotion and education, as the determinant of the nutritional status of the family and the community members. There are four basic components within this framework, as depicted in Figure 2.3. The components focused on the identification of nutrition-related issues relevant to a specific population, the use of different methods in design development and implementation and evaluation of a nutrition education programme, identifying the primary, secondary and tertiary targets as well as the identification of a suitable medium which can provide maximum access to a large audience.

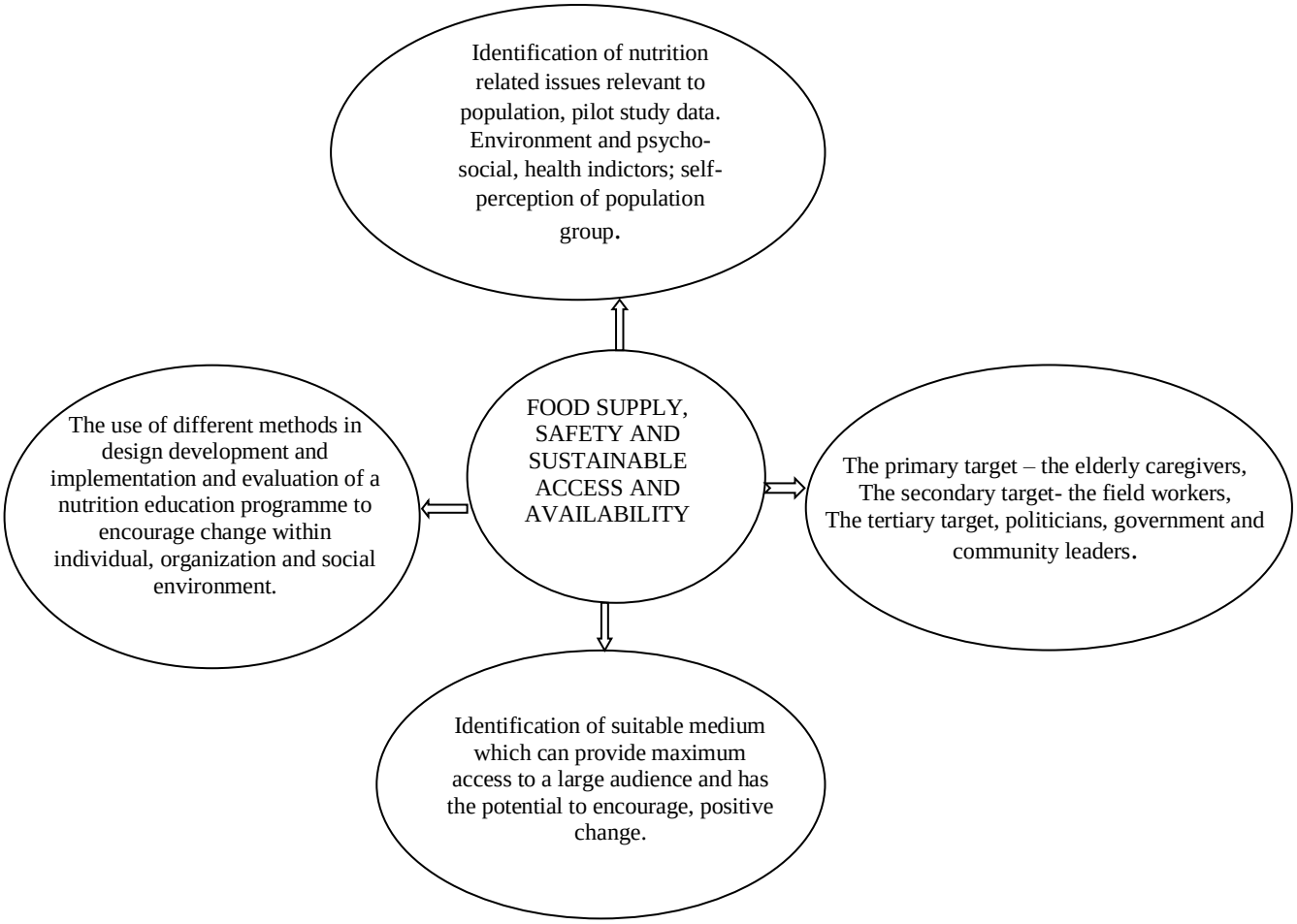

Figure 2.3 Adapted framework for planning of nutrition education programmes (FAO & ILSI 1997)

2.5.4.4 Training caregivers on nutrition education

According to Achor (2014:249), caregivers should acquire good nutrition knowledge, through NE training programmes, to enable them to have the ability to provide the elderly with a balanced diet in the old people's homes. Furthermore, training creates awareness about the importance of basic nutrition, scaling up nutrition (SUN), food, food sources and health issues related to food choices (Austed *et al.* 2015:10). It is imperative that owners of old people's homes and staff members possess basic knowledge regarding the safety and sanitary regulations regarding food storage and its preparations (Thompson & Subar 2013:84).

McCurry, Gibbons, Logsdon, Vitiello and Teri (2005:793) in a research study conducted in the US, referred to their caregivers' training programme as NITE-AD (night-time insomnia treatment and

education for Alzheimer's disease). This programme indicated that it is an evidence-based schedule consisting of daily walking, light exposure (via light boxes), sleep hygiene education, training in behaviour management skills, educating the caregivers on support and general dementia for the elderly and modification of the programme. These included changes consisting of measurements tools, curriculum review from feedback groups, programme structure and scheduling caregivers for weekly sessions for group implementation.

According to a study by Achor (2014:249), the methodology for NE is vital in determining success and effectiveness when applied within the research location and the community. Adult learning principles emphasises dialogue, builds on the life experience of the learners, active learning using problem-solving approaches in small groups, practical applications, engagement of learners' intellect and emotions, with affirmation. Thereafter, other methodological issues that hamper the effectiveness of nutrition education or groups was said to include convening groups that are too large (more than ten), which prevents people from expressing their ideas, to be heard and see well, as visual aids are often too minimal with dim colours for outdoor settings.

It was further stressed that individual counselling should be more tailored towards the needs and situation of each learner but taking cognisance of the challenge posed to the counsellors in ensuring good interpersonal skills with the conveyance of accurate information and dialogues within individuals to discern issues or barriers for strategizing helpful solutions. Also, learning good counselling skills requires much practice with feedback to make improvements as "one-off training" with little "follow-up" are often the norm for in-service training. The challenge of building capacity of health and nutrition professionals in counselling greatly affects governments as they roll out programmes (Achor 2014:249).

Lack of professional capacity for nutrition education and the high burden of malnutrition has necessitated international development programmes to create solutions to overcome the gap in the short-term which led to designing comprehensive training packages, such as the UNICEF and IYCF counselling package (UNICEF 2012d:127) and the USAID-funded Essential Nutrition Action Training Guide for Health Workers (Guyon, Quinn, Hainsworth, Ravonimanantso, Ravelojoana, Rambeloson & Martin 2009:106). The training materials contained advice on suitable adaptions by various countries on its use at their national governments and NGOs levels to provide "in-service training" to personnel without involving national experts (Chong *et al.* 2010:28).

Haas (2014:1251) in a research conducted in the US on "strategies to improve nutrition for older adults" specified that someone with a professional or social relationship with the elderly should observe the person for signs of poor or deteriorating nutrition and determine what assistance or intervention is needed, with emphasis on the following:

- Involving a professional caregiver, making use of the employing agency and appropriate referrals, consultations, or modifications;
- Considering whether the caregiver should be a member of the family, which implies that nativity of the relationship, dictates the level of possible interventions and directions;
- Encouraging a doctor's involvement by the family; and
- Limited role-playing by friends, communicating with the family effectively or notifying a responsible agency of their concerns (Amedei *et al*. 2014:3354).

The food industry and health professionals contribute enormously to communicating effectively with the consumers on the guidelines pertaining to their needs. Such information educates and motivates consumers on food behaviour and eating habits. FBDGs are effectively communicated making use of posters, brochures, and radio and television messenger. Educational materials enriched with explanations and specific information on meal serving sizes for traditional and packaged, compared with home-produced, foods are easily developed to support FBDGs (WHO 2010; FAO 2016:1). The use of mass media has become ever more sophisticated as a tool for NE as it has expanded beyond broadcast and print media to include the range of opportunities available on the internet and other technology like cellular phones. The limitation in using mass media goes beyond information transfer, motivational appeals to action, and helping people learn skills on healthy eating. A serious challenge posed by mass media is the dissemination of supposed nutrition information from unreliable sources spread by advertisers or commercial interest. Nutrition educators must separate fact from fiction when seeking information on the internet or the many print sources for advertisement (Contento 2011:15).

2.5.4.5 Nutrition education training materials

According to the Agency for Healthcare Research and Quality (AHRQ) report (2014:281), NE can easily be directed on what people eat, by providing detailed descriptions of foods and its preparations, rather than investigating the social affective elements on food choices, its serving, family decision-makers and feeding process involved. It was further stated that the NE approach involved should enable the caregivers to have the capacity to interpret findings on messages of the programme clearly for the elderly

understanding and suitably apply them (Pruchno, Wilson-Genderson & Gupta 2014:924). A follow-up on the report indicated relevant information to achieve a desirable NE intervention to consist of:

- Setting learning objectives that measure the outcome of behaviour change, and not only the acquired knowledge;
- Defining the target audience including decision-makers as influencers as more than one audience is anticipated;
- Examining the audience in relation to the stages of change to determine what type of intervention is needed;
- Selecting messages tailored to the needs of the audience vis-a-vis using all generic messages on a topic, to avoid overloading the audience with messages, as formative research and baseline survey results help in defining suitable behaviours; and
- Assessing capacity and training needs of the educators for ultimate message delivery and community-level activities and aligning methods to participants on messages, and context. This means considering factors such as gender dynamics, demands on women's time, access to men, dispersion of households, availability of community volunteers and constraints of government workers (time and transport) (Pruchno *et al*. 2014:924).

2.5.4.6 Assessment of nutrition education programmes

The outcomes of interim measures of nutrition education rely on the quality of materials, training curricula, skills and the support that the training personnel receive. Compliance of the users with materials and guides involved and their willingness to follow the written instructions and be pre-tested (Chong *et al.* 2010:28) are also required in the success of NEPs. According to Meara, Richards and Cutter (2008:350), formative research constitutes the basis for an overall NE programme design, messages and activities for adoption of the desired nutrition behaviours by the elderly. According to EU-funded 7th framework project on, "How policies create a healthier Europe", it was reported that healthy eating policy interventions need to be systematically evaluated for their impact in order to establish what works and what does not (Traill 2010:895).

2.5.4.7 Benefits of nutrition education programmes

Several studies have shown that programmes combining nutrition education and physical activity have produced positive outcomes in evaluating different demographic groups, with counselling strategies to improve their health and well-being and modify dietary practices against chronic disease as reported in

a review of published interventions in North America (Lee *et al.* 2010:78; Chapman 2011:579). A 2012 Cochrane review of NE programme indicated that multiple-component group exercise programmes significantly reduced the rate and risk of falling, especially among those involved in the Tai Chi programmes (Gillespie *et al.* 2012:9). Also, according to Thompson and Subar (2013:5), it was revealed that NE programme helps people to develop new attitudes towards and confidence about nutritional habits, as individuals, in the household and at community level. Furthermore, the nutrition messages provided are utilised in training local key persons and other community workers to provide needed information for caregivers of the elderly in the old people's homes (Thompson & Subar 2013:5).

Related research conducted by Ecker, Breisinger and Pauw (2012:1) indicated that micronutrient malnutrition can be averted by conducting a NE programme on dietary diversification on balanced diets and this was supported by a joint position paper delivered at a forum of the American Dietetic Association, the American Society for Nutrition and the Society for Nutrition Education, that encouraged the provision of government-financed food and nutrition programmes to ensure more healthful ageing in America. The development of appropriate nutritional assessment tools for application to older people is aimed to improve under-nutrition, prevent, and reduce the prevalence of chronic clinical conditions before they occur, along with government-funded home- and community-based services on physical activity for the ageing population (Lopez-Contreras *et al.* 2012:239).

The United States Department of Agriculture (USDA 2015:1) provided funding for nutrition education programmes on information about caloric balance, daily physical activity, and the consumption of fruit, vegetables, whole grains, and low-fat dairy, making use of various methods including social marketing campaigns and more traditional educational programmes. MacGreary (2013:67) in a follow-up study revealed that a review of money allotment fund to increase funding of such programme should be linked to reducing the menace caused by BMI and being overweight. The study went further to state that researchers should offer a group of congregate meal recipients NE training and counselling, with cooking demonstrations, group interviews, hand-outs, and a group of home-delivery meals, and telephone-delivered counselling (Wunderlich, Bai & Piemonte 2011:768). A related study conducted on high-risk elderly individuals participating in government-sponsored programmes revealed some stratification of diet quality based on factors such as race, gender, marital status and educational background (Wudnerlich, Brusca, Johnson-Austin, Bai & O'Malley 2012:204).

Nutrition intervention for the elderly consists of the following:

- Nutrition education;
- Caregivers should be encouraged both with nutrition knowledge, skills and remuneration by the community establishments owned by the government, Non-Government Organisations (NGOs) and private organisations;
- Introduction of gerontology courses in schools to teach about ageing for future transfer towards care of the elderly by the young ones;
- Printing of food and nutritional guidelines for community centres;
- Creation of awareness through the media;
- Establishment of care homes for the elderly by the government with caregivers in attendance;
- Workable policy by the government that is implementable and financially supported in the community;
- Establishment of a focus discussion forum regularly, either monthly or quarterly every year to create awareness on the need for food and nutrition guideline programmes and especially the food pyramid-food fortification, food supplementation (efficient allocation of funds);
- Menu compilation that suits the nutritional needs of the elderly; and
- Efficient allocation of funds for food supplementation programmes and nutrition education programmes (Donini *et al.* 2012:89; WHO 2013:1).

2.5.4.8 Problems experienced with nutrition education programmes

According to Marriott, Olsho, Hadden and Connor (2010:228), the assurance of the technical capacity of managers, supervisors, designers and technical specialists, is paramount for a successful NE programme ineffective monitoring, evaluation of activities, and solving problems. According to the UN Agencies and NGOs findings, there is a drastic shortage of personnel with requisite knowledge and skills in nutrition education in most developing countries (Blumberg, Hearney, Huncharek, Scholl, Stampfer, Vieth, Weaver & Ziesel 2010:478). Related research by Wunderlich *et al.* (2011:768) indicated that insufficient funds limit access to nutrition-education programmes as government assistance or externally funded programmes plays an in-depth role in the sustenance of health of the ageing population as financial circumstances are often tight.

2.6 NUTRITION GUIDELINES IN PERSPECTIVE

Science-based dietary guidelines are designed to provide guidance on the composition of a healthy diet (e.g. reduction on fat intake) and are effective only if they achieve the proposed dietary change (Anderson & Zlokin 2000:1404). The aim of the developed food and nutrition guidelines for the elderly in this study is to educate and assist caregivers of the elderly to improve dietary intake behaviour of the elderly.

2.6.1 Dietary guidelines for the Americans, for older adults (elderly)

The nutrition guidelines, otherwise referred to as Dietary Guidelines for Americans, developed by the United States Department of Agriculture, purposely informed the development of National Food, Nutrition, Health Policies and Programmes (NFNHPP) through the use of nutrition education materials (Ignacio 2015:1). There is the need for the published guidelines to adhere consistently to dietary specifications as an informative instrument for USDHHS (United States Department of Health and Human Services) and National School Lunch Programme Special Supplementation (NSLPSS) for women (UNSCN 2010). On Health and Human Services in the US, the Administration on Aging (AOA 2014) implemented the Dietary Guidelines through the application of Older American Act and Nutrition Services programmes for older adults. The integral bases of the dietary guidelines for Americans (DGA) for 2015-2020 are as follows:

- Choose patterns of eating sustaining the calories throughout life to achieve and maintain healthy body weight, with supportive nutrients towards the reduction of chronic disease;
- Emphasis on varieties of nutrient-dense foods to meet nutrient needs in food groups on desired recommendation;
- Limit calories from sugars and saturated fats with reduced sodium intake;
- Choose food and beverages that are healthy; and
- Healthy eating patterns should be supported for all persons (DGA 2015).

Dietary guidelines are expected to serve as an evidence-based foundation for nutrition education materials that are developed by the Federal Government for the public. The publications of the guidelines are required by law to be consistent with the dietary specifications as an information instrument for USDHHS (United States Department of Health and Human Services) and National School Lunch Programme Special Supplementation (NSLPSS) for women (UNSCN 2010). In Health and Human Services in the US, the Administration on Aging (AOA 2014) implements the Dietary Guidelines through the Older American Act and Nutrition Services programmes for older adults. The food groups and

nutrients required by the elderly, according to the United States Department of Agriculture (USDA) in 2015, should provide nutrients, and the required amounts recommended that reflects eating patterns associated with possible health outcomes, implying that food from all food groups should be consumed in nutrient-dense forms. The five food groups involved should consist of vegetables, legumes and carbohydrates, fruits, dairy and protein foods.

Nutrition guidelines are reviewed every five years in the U.S. The most recent review, spanning from 2015-2020, emphasised reflecting advancement in scientific knowledge and translating the science currently at the time into sound food-based guidelines to promote health in the United States. Figure 2.4 depicts the dietary guidelines for American older adults. The guidelines include information on consumption of fruit and vegetables, protein, grains, dairy, healthy oils, herbs and spices, and fluids.

The Dietary Guidelines of America (DGA) for 2015-2020 was based on the following integral areas:

- Follow a healthy eating pattern across the lifespan to calorie level in achieving and maintain healthy body weight, support nutrient adequacy, reduce risk of chronic disease;
- Focus on variety, nutrient density and amount to meet nutrient needs within calorie limits; choose nutrient-dense foods, across and within all food groups in recommended amount;
- Limited calories from added sugars and saturated fats and reduce sodium intake;
- Shift to healthier foods and beverage choice; and
- Support healthy eating patterns for all (DGA 2015).

The guidelines indicated as follows:

- Eat a variety of foods. The food pyramid depicts the recommended daily servings of the key food groups. The model suggests, eat more bread, cereals, fruits and vegetables and eat less meat, dairy and fatty foods to reduce risk of heart disease, cancer, diabetes and obesity.
- Balance the food you eat with regular physical activity, maintain or improve your weight to control excessive weight gain that leads to non-communicable diseases.
- Choose diet low in fat, saturated fat, and cholesterol.
- Choose lean meats, poultry.
- Increase consumption of fish, two or three servings per week.
- Trim away visible fat, try low cooking fat methods such as boiling, baking and steaming.
- Use monounsaturated fats, e.g. canola, olive oils when oils are needed.

- Substitute high-fat foods with low-fat foods, because of dietary cholesterol (responsible for 20% of the cholesterol in the body) from foods of animal origin-meat, dairy products and eggs.
- Choose a diet with plenty of grain products, vegetables (e.g. peas and carrots) and eat more of whole grains (e.g. barley and rice), fruits (e.g. apples and pears), cereals (e.g. raisin bran and oats bran), legumes (e.g. kidney and lima beans) and whole wheat bread.
- Choose a diet moderate in salt and sodium, limit the use of salt-cured food items, smoked and nitrite-cured foods, and snacks to manage or prevent high blood pressure.
- Moderate alcohol consumption. Advisably, limit intake to fewer than two drinks per day.

General tips to help elderly eat well:

Plan meals and snacks to include favourite foods; use a variety of foods from each of the four food groups; prepare food that provides a variety of texture, colour and temperature; provide a pleasant setting, i.e. flowers, placemats, matching tableware with adequate lighting.

According to the USDHHS report, it is fundamentally assumed that dietary guidelines guide the consumers on nutrients knowledge which in turn leads to improved food choices and availability (USDHHS 2010:332).

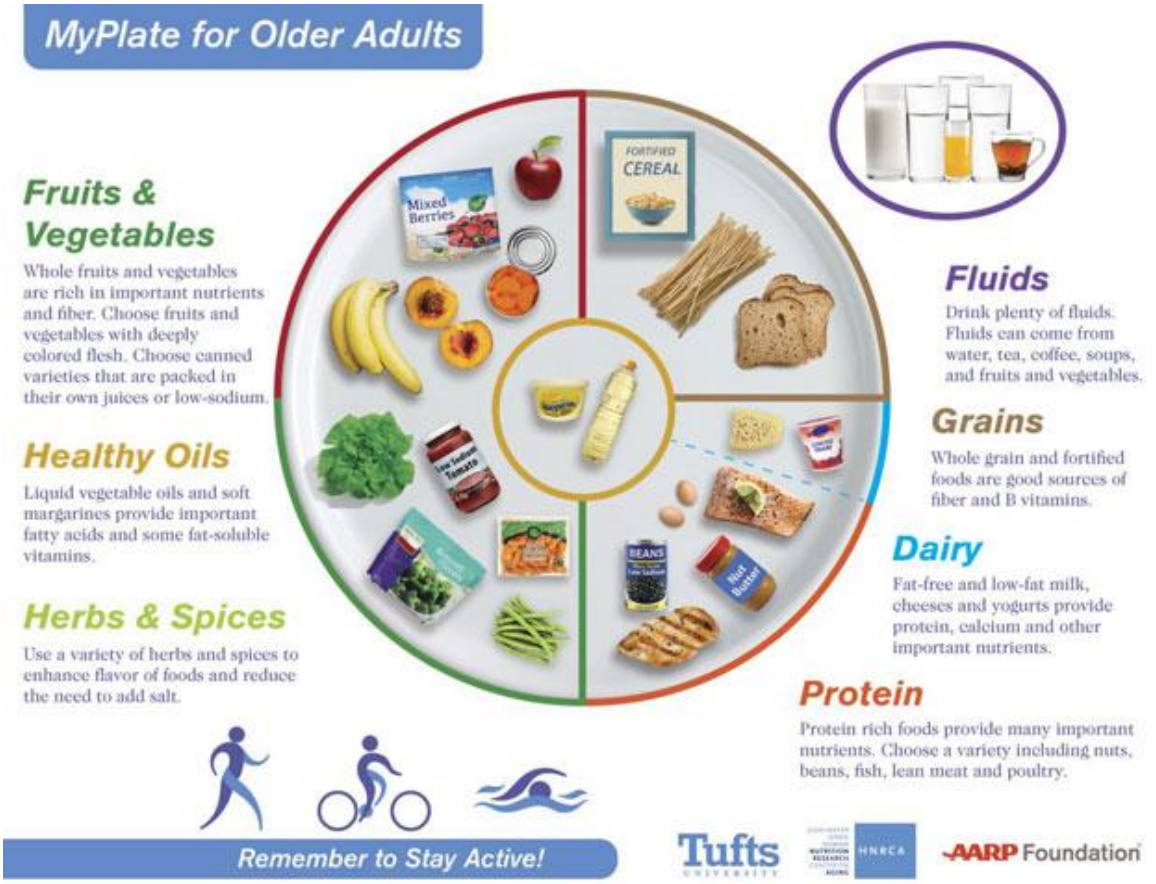

Figure 2.4 Dietary guidelines for American senior citizens 2015- 2020 (DGA 2015; DeSalvo, Olson, & Casavale 2016:457)

2.6.2 European guidelines

The European Food Safety Authority (EFSA) scientific opinion identified seven steps for developing the European Food-Based Dietary Guidelines (EFBDG), which consists of identifying the following: diet health relationships; country specific diet-related problems; nutrients of public health importance; foods relevant for FBDG; food consumption patterns as well as the testing and optimising FBDGs and graphical representation of FBDGs (Turconi, Rossi, Roggi & Maccarini 2013:48; EUFIC 2016). Furthermore, it was specified that the FBDG should be updated regularly with sufficient resources and evaluated on: the efficacy of assessing guidelines for effectiveness on the impact of graphical representation and or the messages about peoples' behaviour; development of educational materials to support the FBDG for further explanations on the content and its application in everyday life. It was recommended that the contents of the FBDG message should be short and clear, easily remembered, and comprehensible (understandable by the general public). Also, the visual materials used to communicate the FBDG messages must be clear and comprehensible for effectiveness (Mariott *et al*. 2010:228).

The Euro diet report of the WHO in 2000 indicated a follow-up development steps with an emphasis placed on the need for refiner updates of the FBDG and evaluation of their efficacy in the development phase of the guidelines so that sufficient resources are put aside from the start. Updates are essential to adapt the guidelines to the evolving scientific knowledge on the relationship between food, nutrition and health and to changing food habits and lifestyles (WHO 2013:1). The European Food Safety Authority (EFSA) held a scientific colloquium in 2008 and came up with seven steps in developing nutrition guidelines, which are as follows:

- Identification of diet-health relationships;
- Identification of country specific diet-related problems;
- Identification of nutrients of public health importance;
- Identification of foods relevant for FBDG;
- Identification of food consumption pattern;
- Testing and optimising FBDG; and
- Graphical representation of FBDG (EUFIC 2016:23).

2.6.3 New Zealand guidelines

The New Zealand nutrition guidelines consist of the following:

- Have milk and milk products in your diet, preferably, seafood, eggs, nuts, seeds or legumes;
- Drink plenty of liquids each day, especially water;
- Prepare foods or choose pre-prepared foods, drinks and snacks with minimal added fat, especially saturated fat. The food should also be low in salt (if using salt, choose iodised salt, with added sugar (limit your intake of high-sugar foods);
- Take opportunities to eat meals with other people;
- Eat three meals every day. Nutritious snacks are recommended, especially for those who are underweight or have a small appetite;
- Consider food safety when purchasing, preparing, cooking and storing food;
- If choosing to drink alcohol, limit the intake; and
- Be physically active by including at least 30 minutes of moderate-intensity physical activity on most days of the week (NZDG 2006:25; NHMRC 2006).

In New Zealand, the Nutrition Guidelines for Healthy Older Adults states the following:

- Provision of adequate and timely information on the nutrition, physical activity, lifestyle and environmental determinants to achieve and maintain excellent health in older people;
- Provision of reliable and consistent information to utilise as a basis for suitable programmes and education in supporting healthy older people (e.g. district health board and technical background for health education resources);
- Guiding and supporting health practitioners (including dieticians, nutritionists, doctors, nurses, pharmacists, primary health care providers, health promoters and physical activity providers) to practise healthy nutrition and physical activity, thus providing them with comprehensive information sources; and
- Identification of health inequalities relevant to nutrition and physical activity (NZDG 2006:28).

The Nutrition Guidelines depicted in Figure 2.5 are aimed at the majority of older New Zealanders who largely maintain physical, mental and social health and independence through most of their lifespan. However, an age-associated decline in physical and mental functioning, as well as the social and lifestyle changes that are experienced with advancing age can make it difficult to differentiate healthy ageing from ill-health (NZDG 2006:28).

The NZ food guide for older adults focused on daily and weekly consumption of healthy food items. The pyramid indicated that red meat should be consumed only monthly and not daily or weekly. It includes the importance of daily physical activity and the regular consumption of water. It also advises that alcohol is drunk in moderation. The Nutrition Guidelines of New Zealand emphasised enjoying a variety of nutritious food; making healthier food choices; food safety; and physical activity (NZDG 2006:25; NHMRC 2006).

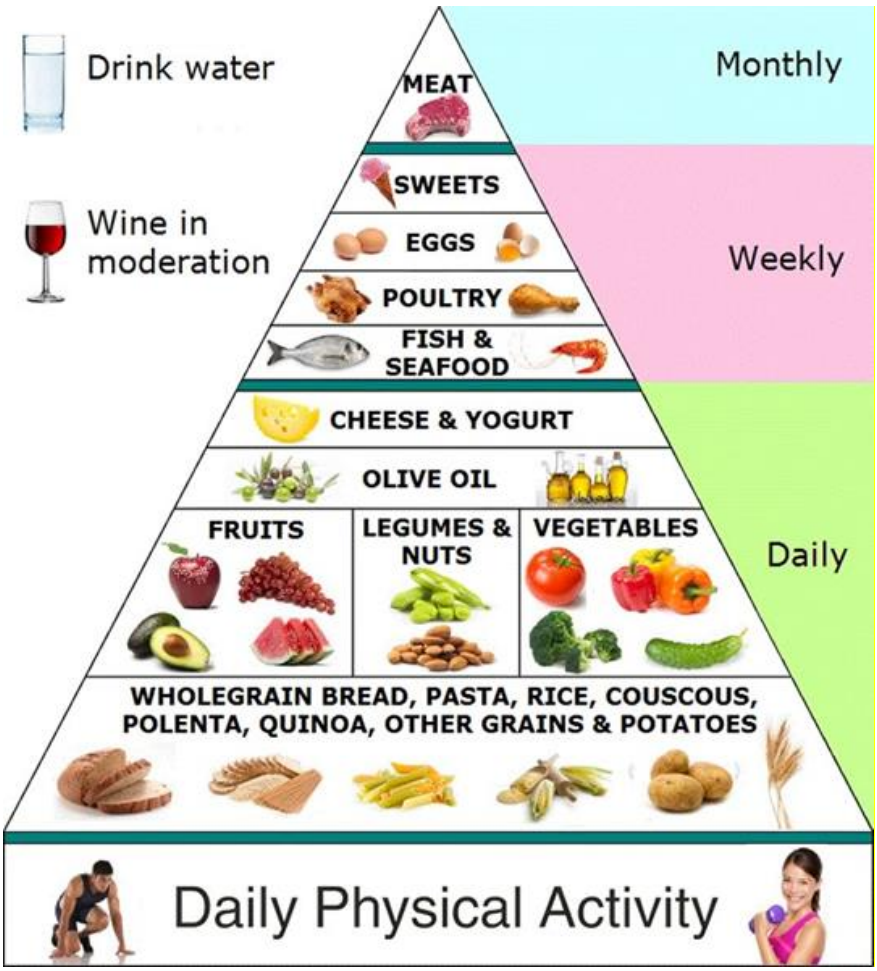

Figure 2.5 New Zealand food guide for older adults (NZDG 2006:25; Keller & Lang 2008:867)

2.6.4 South African food-based dietary guidelines

The South African food-based dietary guidelines published in 2013 were purposely developed to have a set of food-based dietary guidelines (FBDG) that promote health for South Africans older than five. These guidelines were based on affordable and available foods that are widely secured and also encourage environmentally sound agricultural practices (SAFBDG 2013). The FBDG was mainly to correct existing nutrient deficiencies and excesses along with the resulting nutrition-related public health problems of a specific country or community. In order to successfully change eating behaviour, a number of specific characteristics for the FBDGs were identified, based on the FAO and WHO recommendations, consisting of the following information:

- Individual guidelines should possess messages that are simple and understandable;
- The formulation or illustration of the guidelines should be understandable and not confusing; and
- Positive messages should be used all through (SAFBDG 2013:1).

The revised general food-based dietary guidelines for South Africans are as follows:

- Enjoy a variety of foods;
- Be active;
- Make starchy foods part of most meals;
- Eat plenty of vegetables and fruit every day;
- Eat dry beans, split peas, lentils and soya regularly;
- Have milk, maas or yoghurt every day;
- Fish, chicken, lean meat or eggs can be eaten daily;
- Drink lots of clean, safe water;
- Use fats sparingly. Choose vegetable oils, rather than hard fats;
- Use sugar and foods and drinks high in sugar sparingly; and
- Use salt and food high in salt sparingly (Vorster, Badham & Venter 2013: S7).

Figure 2.6 below illustrates the food guide for healthy eating in South Africa.

Figure 2.6 South African food-based dietary guide (Vorster, Badham & Venter 2013: S7)

2.6.5 Nigerian nutrition guidelines

Dietary guidelines for Nigerians were developed by the National Plan Action on Food and Nutrition (NPAFN) to address the nutrition needs of adults' non-communicable diseases (NCDs). These were meant to provide information and knowledge on good nutrition that is essential in the prevention and management of NCDs and made available for use of individuals of the public: individuals, knowledge,

health workers, health institutions, educational institutions, corporate organisations and food industries like eateries, hotels and restaurants (NPAFN 2015:25) and consists of the following information:

- All food intake should consider the level of physical activity to perform;
- Individuals engaging in manual work need to eat more food than those who do sedentary work;
- Fat intake from animal-sourced foods should be limited;
- Diet consumed should consist of a wide variety of foods as possible, e.g. cereals, legumes, roots/tubers/fruits, vegetables, fish, lean meat, local cheese; and
- Limit intake of salt, bouillon cubes and sugar (NPAFN 2006:5).

Table 2.3 below indicates guidelines on food groups, adequate portion sizes and general advice for Nigerian population.

Table 2.3 Nigerian nutritional food groups (National Strategic Plan of Action for Nutrition 2014-2019)

Food Group	Advice	Serving Size Examples	Nutrients Provided
Vegetables and fruit (includes fresh, frozen, canned and dried)	Eat at least five servings per day: at least three servings of vegetables and at least two servings of fruit. If consumed, only 1 serving of juice or 1 serving of dried fruit counts towards the total number of servings for the day	Vegetables: one medium potato, or similar-sized root vegetables such as yam (135g), ½ cup cooked vegetable (e.g., watercress, silver beet, paragon, corn, broccoli, (50–80g), ½ cup salad or mixed vegetables (60g) one tomato (80g) One fruit: such as apple, pear, banana or orange (130g), 2 small apricots or plums (100g), ½ cup fresh fruit salad Half cup stewed fruit (fresh, frozen or canned) (135g) One cup fruit juice (250 ml), 2 tablespoons dried fruit	Carbohydrates Dietary fibre Vitamins: especially folate, vitamin A (yellow and green vegetables) and vitamin C (dark-green vegetables and most fruit, potatoes) Minerals: magnesium and potassium
Bread and cereals (includes breakfast cereals, bread, grains, rice and pasta), preferably wholegrain	Eat at least six servings per day (choose wholegrain bread and cereals)	One bread roll (50 g) One muffin (80 g) One medium slice Rowena One medium slice bread (26 g) One cup cornflakes Half cup muesli (55 g) Half cup cooked porridge (130 g) Half cup cooked pasta (150 g) Half cup cooked rice (150 g) One cup cassava or tapioca (150 g) Two plain sweet biscuits (14 g)	Carbohydrates Dietary fibre Protein Vitamins: all B group (except B_{12}), E (rich in wheat germ) Minerals (particularly in wholegrain bread and cereals): magnesium, calcium, iron, zinc and selenium
Milk and milk products (includes milk, cheese, yoghurt and ice-cream) and alternatives	Eat at least three servings per day(choose low- or reduced-fat options)	One large glass milk (250 ml) One bottle yoghurt (150 g) Two slices cheese (40 g) Two scoops ice-cream (140 g) One large glass calcium-fortified soy milk (250 ml)	Protein Fats: a higher proportion of saturated than poly-or mono-unsaturated fats, especially in full fat products Vitamins: riboflavin, B_{12}, A, D Minerals: especially calcium, phosphorus, zinc and iodine
Lean meat, poultry, seafood, eggs, nuts and seeds, and legumes	Eat at least one serving per day	Two slices cooked meat (approximately 100 g) ¾ cup mince or casserole (195 g) One egg (50 g) One medium fillet of cooked fish (100 g) ¾ cup cooked dried beans, peas or lentils (135 g) Two drumsticks or 1 chicken leg (110 g) Half cup nuts or seeds	Protein Fats: both visible and marbled in meat (mostly saturated fat and cholesterol); mostly unsaturated fats in seafood, nuts and seeds Vitamins: B_{12}, niacin, thiamine Minerals: iron, zinc, magnesium, copper, potassium, phosphorus and selenium iodine: particularly in seafood and eggs

The Nigerian food-based dietary guideline (NFBDG) shown in Figure 2.7 below is a food pyramid divided into five groups. Food items at the bottom, are bread, grains and tubers, followed by vegetables and fruits. Items in both groups are to be consumed at every meal. Eggs, fish, meat and dairy are on the third level: to be eaten in moderation. Oil and fats should be taken sparingly according to the pyramid, with confectionary limited to rare occasions. A glass of water is placed outside the pyramid advisably to be taken plentifully.

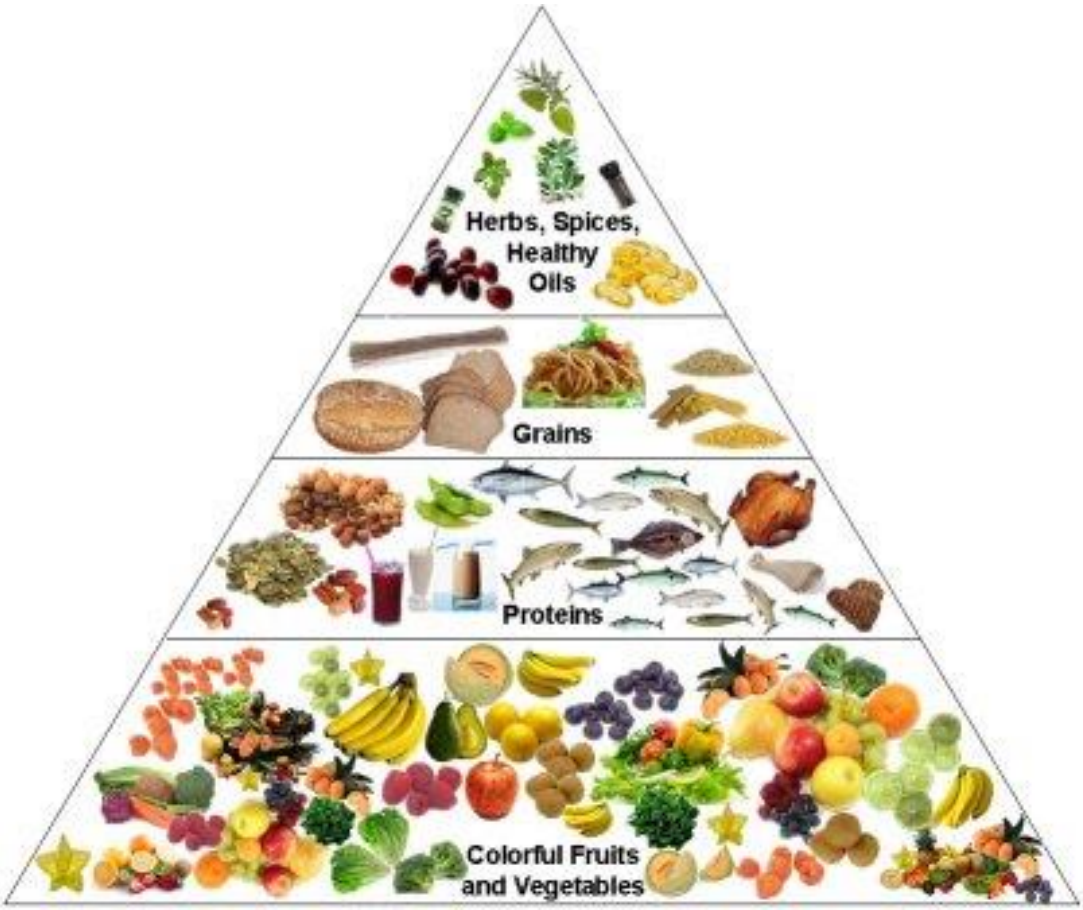

Figure 2.7 Nigerian food-based dietary guidelines (Sanusi 2010:161)

The main information emphasised in the NFBDG is that the total food intake should consider a person's level of physical activity; individuals who do manual work need to consume more foods, e.g. cereals, legumes, roots/tubers as well as fruits, vegetables, fish, lean meat, local cheese (wara); limit intake of salt, bouillon cubes and sugar; and liberal consumption of whatever fruit in season is encouraged.

The NFBDG did not make any specified provision to take care of the elderly dietary meal intakes in Nigeria. However, the researcher identified the following guidelines that provided general tips to help the elderly as follows: eat diets that are prepared from a variety of foods

e.g. cereals, tubers, fruits, vegetables etc.; increase consumption of fish and fish-based diets; eat more of fruits and vegetables; eat more frequently (Sanusi 2010:161).

2.7 DEVELOPMENT OF NUTRITION GUIDELINES

In order to successfully change eating behaviour, a number of specific characteristics for the FBDGs have been identified, based on the Food and Agricultural Organization (FAO) and the World Health Organization (WHO) recommendations.

These include the following:

- Each guideline should have only one, easily understandable, simple message;
- Guidelines should be formulated or illustrated in a manner that people from different cultures and literacy background will easily grasp their meaning, they should be user friendly and not confusing, they should be formulated in a positive way; and
- No negative message using words such as ‘avoid’, ‘decrease’, ‘limit’, ‘cut out’ or ‘eat less’, should be used (Clay 1997).

According to the Food and Agricultural Organization report in 2016, science-based public health issues, social-economic, agricultural and environmental dietary factors, food availability and eating patterns should form the basis for developing food-based guidelines and supported by World Health Organization (WHO 2010; FAO 2016). The FBDG should not create guilty feelings about or negative association with food: they should be compatible with the different cultures and eating patterns of the target population, they should be based on affordable, available foods that are widely consumed, they should be sustainable and they should encourage environmentally friendly agriculture. Furthermore, they should lead to a selection of food that is usually eaten together in groupings that are compatible with existing dietary practice and they should address both over- and under-nutrition. Likewise, FBDGs should help people to choose a more adequate diet and over-nourished people to choose a more prudent diet; they should emphasise the joy of eating and they should be formulated and communicated to the target population using marketing skills based on the knowledge, perceptions, attitudes and behaviours of the target population (SAFBDG 2001:1).

In order to know which foods and food groups should be included in the Nutrition Guidelines, it is necessary to assess the target population, as discussed in section 2.5.4. In some cases, this might be difficult to achieve, which is why provisional FBDGs are built on other countries nutritional recommendations or FBDGs or the World Health Organization dietary guide (WHO 2000).

Key principles for developing food-based dietary guidelines (FBDGs) consist of the following:

- Dietary patterns: dietary guidelines should emphasise food patterns and not numerical nutrient objectives;
- Practically: food groups recommended should be easy to afford, available and easy for most people to access. The social, economic, agricultural, and environmental conditions affecting foods and eating patterns of people must be considered;
- Comprehensibility: It should be easy to understand by the public irrespective of the literacy level with simple, understandable terminologies that refer to foods. There is a need for a visual understanding of presentations. FBDG must be tested before it is disseminated; and
- Cultural acceptability of food choices illustrated appropriately in colours (Clay 1997).

The FAO/WHO committee on the effective development of FBDGs recommended the following:

- Forming a working group duly represented on agriculture, health, food science, nutritional science, consumer, food industry, communication and anthropology;
- Gathering information on nutrition-related diseases for food availability, and its intake patterns in each country;
- Identifying through a full discussion a set of major problems on health nutrition where the guideline is useful;
- Evaluating general food production and supply situation through utilising current practices subsidies and other governmental policies for suitable implementation of the guidelines;
- Drafting guidelines with background and back-up statements and circulating to members of the group;
- Conducting a pilot test on guideline statements with consumer groups, followed by a revision and cross-checking;
- Finalising the background statements and sending to special interest groups in the country for comments and meeting once again for consideration of views, responses and drafting of the final report; and
- Concluding, adopting, publishing, and finalising the report for dissemination and commencing implementation (WHO 2010; FAO 2016).

The research suggested that public awareness programmes on healthier eating could benefit from the following (Traill 2010:895):

- Strengthening research into citizens' environment and current trends;
- Increasing citizens' involvement;
- Decreasing barriers for and expanding public-private partnerships; and
- Stressing short-term non-health benefits of healthy behaviours (Capacci 2011:1753).

2.8 SUMMARY OF THE LITERATURE REVIEW

The importance of the study is focused on how nutrition guidelines can impact on the food consumption and dietary behaviour of the elderly in Ondo West, city of Ondo, Nigeria with due consideration of information gathered from existing literature. The researcher focused on the use of relevant information from the USA, European, New Zealand, South Africa and Nigeria. This information involved food-based dietary guidelines for the needs of the elderly for a clear understanding of the efficacy on their nutritional dietary food intake. The chapter started by describing the meaning of nutrition guidelines globally, followed by: factors contributing to nutrition related health in the elderly; dietary patterns of older adults; nutritional needs of the elderly; malnutrition in the elderly; nutrition education; and nutrition guidelines respectively. The chapter included a discussion of the framework for planning nutrition education as suggested by the FAO and its intervention with various suitable approaches.

Chapter 3 of the study will discuss the methodology involved in the execution of the research study.

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the design and methods used in the study according to the different phases followed in the study (See Chapter 1 Figure 1.1 Conceptual framework). The main objective of the study was to determine the impact of nutrition guidelines on the dietary behaviour of the elderly in Ondo West, city of Nigeria. The sub-objective of Phase 1 was to conduct a baseline survey to determine the food consumption patterns of the elderly and the nutrition knowledge of the caregivers. Phase 2 included the planning and development of nutrition guidelines for the caregivers of the elderly. Phase 3 consisted of the training of the caregivers. The implementation and the intervention programme of the nutrition guidelines were completed in Phase 4. The last two phases were the evaluation of the compliance by the caregivers on the use of nutrition (Phase 5) and determining the impact of the nutrition guidelines on the elderly food consumption habits (Phase 6).

3.2 STUDY DESIGN

The study design followed an experimental pre- and post-test approach of a descriptive nature. A quantitative survey included the following questionnaires as measuring instruments: for the elderly socio-demographic, 24-hour recall and food frequency questionnaires. For the compliance by the caregivers, NKQ, as well as quantitative observations and qualitative group interview, were done to confirm the results of the NKQ.

3.3 ETHICAL CONSIDERATIONS

The study received the approval of the Vaal University of Technology South Africa Research and Innovation Ethics Committee on 8th May 2017 (Ethical clearance Number ECN 29–2017) (Annexure A). The fieldwork was conducted in accordance with the approval of Ondo State Government of Nigeria guidelines from the Ministry of Health (Ethical Approval Number AD 4693/303) (Annexure A) on 5th April 2016, (Annexure B) and the Committee for Research and Human subjects Wesley University of Technology Ondo, Ondo State Nigeria, Approval Clearance Certificate (Protocol Number WUSTO 21200) on 18th January 2016 (Annexure C). Written informed consents from caregivers and the elderly were obtained during the baseline survey. Consent forms (Annexure D) were completed by the caregivers, the elderly (Annexure E) and the fieldworkers (Annexure F), duly signed at a meeting convened in the community of the study location. The purpose of the study was explained in detail by the researcher before

the consent forms were signed. Three descriptive features characterised the consent forms as follows:

- A specification of the competency and skills of the participants on the use of the data collection methods and tools for the research work;
- Detailed explanation of information, and purpose of the research study and its outcome.
- Lastly, a clear understanding of the purpose of the project by the participants.

Out of the 120 elderly, 90 signed while 30 thumb-printed the consent forms. All the ten caregivers signed the consent forms.

3.4 METHODOLOGY

The research involved a multi-phase empirical study as depicted in the conceptual framework (Figure 1.1). It was survey-based, having six phases namely: Phase 1 – baseline survey, Phase 2 and 3 – planning and development of nutrition guidelines for caregivers, Phase 4– intervention, Phase 5 – Post-evaluations and Phase 6 – determining the impact of food and nutrition guidelines. The phases will be discussed in 3.4.5. In addition, this section describes the study area, population, sampling, the measuring instruments and the data analysis.

3.4.1 Study area

The study took place in Ondo city, situated in Ondo West, Ondo State, Nigeria (Figures 3.1). It is an urban populated area dominated by people involved in agricultural peasant farming and other local vocations. It consists, 98.3 million hectares of land with a population of 358,430. Ondo city is the second largest town in Ondo State, Nigeria. It is sited in longitude “44.9 59,988” and at an altitude of 264 metres (Figure 3.2).

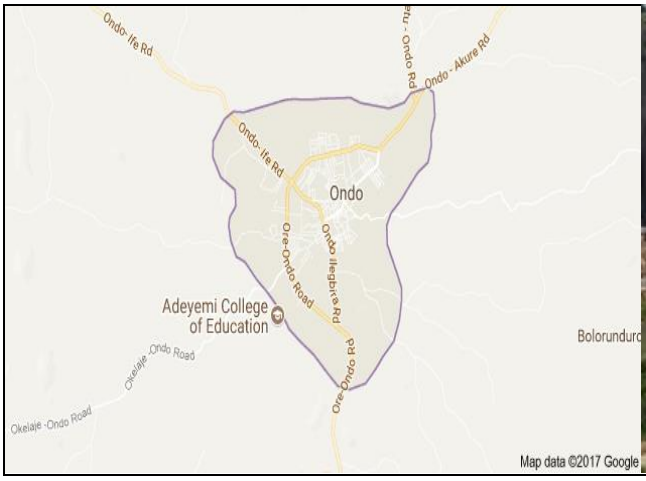

Figure 3.1 Map of Ondo

Figure 3.2 Ondo Township

3.4.2 Study population

The population of Ondo State in Nigeria consists of 201,016 elderly individuals. Forty-nine percent of this is from Ondo West city, the study area. Many of the elderly were between 60-69 years of age, of the Christian religion and 81% were married. The majority had no formal education, with <25% having primary education and less than 3% having attended a tertiary institution (NPC 2006:28).

3.4.3 Elderly population in Nigeria

3.4.3.1 Sampling for the elderly population

This study followed a purposive sample of 120 old peoples in three care homes located at Ondo City, namely: Ibitayo Fawehinmi Foundation, Bayo Fatusin and Daughters of Charity Provincial House. The first two old people's homes (foundations) are privately owned while the third is owned by the state or federal government. They are registered by the Nigerian Government National Security Council (NSC).

The sample size calculation (Gibson 2005) formula used for this study was:

$$SS = \frac{z^2(p) * (1-p)}{c^2}$$

Z = Z value (1.96 for 95% confidence level)

P = Percentage expressed as decimal (0.5 used for sample size headed)

C = Confidence interval, expressed as a decimal (12.55 for this study)

Although the sample size calculation indicated a total of 61 participants to be statistically representative, the researcher approached the attendees of the three old people's homes and 120 elderly (males and females) gave consent to participate in this study. This was equally divided between the three old people's homes in Ondo West. Thus the study consists of 40 elderly people aged between 60-70+years from each home.

3.4.3.2 Sampling for the caregivers

The sample size for the caregivers consists of a total of ten caregivers (n=10) purposefully selected from the three old people's homes mentioned in 3.4.3.1, who were targeted to implement the intervention programme consisting of the nutrition guidelines. The same caregivers (of which three were cooks as well) were observed for compliance and all the caregivers/cooks participated in the group interviews.

3.4.4 Measuring instruments

The validated instruments which consist of a socio-demographic questionnaire, 24-hour recall, and food frequency questionnaires were used to determine the nutritional status of the elderly at baseline (pre-testing) and evaluation (post-testing). For the caregivers, a nutrition knowledge questionnaire was used to determine their nutritional knowledge (pre-testing) and assist in the development of the nutrition guidelines. Furthermore, it was used to evaluate the impact of the intervention programme together with observations and a group interview (post-testing).

3.4.4.1 Socio-demographic questionnaire

The validated (Oldewage-Theron, Napier, Dicks & Rutengwe 2005:13) socio-demographic questionnaire (Annexure G) prompts characteristics such as age, gender, education, race, marital status, residential status, including the type of home and number of people living in the home and general living conditions. This instrument is commonly used in many studies as its very nature discloses the variables of poverty. The SDQ consist of multiple-choice questions easy to complete within a short period of time.

3.4.4.2 24-hour recall

To determine the food consumption patterns of the elderly in the three old people's homes, the validated 24-hour recall questionnaire (Annexure H) was used. These were repeated over a period of 24 hours on three different days which was selected in accordance with the old people's homes regulations. The food models used were provided by the Wesley University of Technology, Ondo city in Nigeria. The ten fieldworkers assisted the elderly by means of one-on-one interviews in estimating portion sizes.

3.4.4.3 Food frequency questionnaire

Food frequency questionnaires (FFQ) (Annexure I) were used to determine the food variety scores and a variety of food eaten by the participants in a seven-day period. This questionnaire is important for this study as it is a good indicator of the dietary diversity of the food consumed over the seven days (Oldewage-Theron & Kruger 2009:106) in the three old people's homes in Ondo West, city of Ondo, Nigeria. The researcher adapted the FFQ to include information on locally available food products consumed in the community by the elderly such as: plantain, yam, cassava, eba, ewedu, palm oil, Asaro palm oil.

3.4.4.4 Nutrition knowledge questionnaire

The nutrition knowledge questionnaire (NKQ) (Annexure J) consists of section A, containing information on knowledge of Nigerian food-based guidelines; section B, deficiencies in vitamin and minerals; section C, general food knowledge; and section D, nutrition health and food safety. Three nutrition lecturers from the Wesley University of Technology, in Ondo took part in the face validity testing of the questionnaire. The lecturers assisted the researcher to check if the questionnaire measures what the researchers wanted to measure as suggested by Maree (2016:240).

A pre-test was conducted to ascertain the level of knowledge of the caregivers on the information contained in the nutrition knowledge questionnaire. For this purpose, ten caregivers were selected from three other old people's homes in different locations other than the old people's homes for the research. The caregivers completed the questionnaire three times to ensure consistency in response and comparison of information. The caregivers also assisted in the test-retest reliability of the questionnaire (Maree 2016:238). The pre-testing of the NKQ was conducted from October 16th, 2017 for three weeks in Osogbo, Ibadan cities in South-West Nigeria different, from the locations selected for the study in Ondo West in South-West Nigeria with the assistance of the Co-promoter in Nigeria Dr Otitoola, and she verified the authenticity of the statistical analysis. The Cronbach Alpha of 0.69 (Annexure K) indicated that the questionnaire was suitable and reliable to use in this study and no adaptation was made to the questionnaire. Furthermore, the researcher evaluated the current menu being used in the three old people's homes to determine the nutritional practices existing at the time of the start of the study. This information assisted in the development of the food and nutrition guidelines used for this intervention study, as discussed in Chapter 5.

3.4.4.5 Observations

For this study, observations were used as part of the evaluation of the compliance of the kitchen staff in the old people's homes (Phase 5). The researcher carried out an intensive observation of the staff in the food preparation areas (the kitchen) and the food service area (the dining room) to determine the impact on research sub-objective 5. The observation was conducted in such a manner that those observed were not aware of being observed. The researcher protected the participants' integrity and anonymity (the observation process followed will be discussed in Chapter 6 of this study).

3.4.4.6 Group discussions

The objective of the group discussions or group interviews was to determine if the training programme was successful. In order to conduct the group discussion, the following procedures were involved (Marcel, Henk & Rene 2014:176):

Step 1: the researcher acted as the moderator in the group discussion, having skills and knowledge and capability to lead and assist with open questions. The researcher also acted as the interpreter as he is familiar with the local Yoruba language. The group sessions were recorded to assist with transcribing of the data.

Step 2: the researcher determined the number of groups needed, the number of participants and the length of time the group discussion continued until data saturation was reached.

Step 3: the researcher prepared for each group interview, with regard to the location, venue, time and day in the week.

Step 4: the researcher conducted the group interview with an introduction by explaining the reason for the visit, emphasising that participation is voluntary and that anyone can opt-out if they wished. The researcher guaranteed confidentiality on information provided by participants.

Step 5: the researcher listened to attendees and respected opinions; allowing one person to talk at a time and records were taken (see guide for group interview Annexure L).

Step 6: the researcher analysed the data of the group interview. After transcribing the data, the researcher identified categories and themes for each question and reported the results in Chapter 6.

3.4.4.7 Reliability and validity of all the questionnaires

The requirements for internal reliability and validity were applied during the research. Marcel (2013:118) defined reliability as the extent to which a measuring instrument is repeatable and consistent. Internal consistency of the questionnaires was checked during the pre-testing before the commencement of the fieldwork using Cronbach Alpha. Cronbach's Alpha values range from zero to one and in the social science, values at or above 0.7 is desirable (McEnvoy, Williams & Olds 2010:373).

Validity refers to the degree to which a test or instrument measures what it purports to measure (Nelson, Silverman & Thomas 2011). The following types of validity were examined: content, construct, convergent and discriminate validities. These types of validity were achieved by ensuring that the instrument measured what it is intended to measure (Maree 2015:332). The validated (Oldewage-Theron *et al.* 2005:13) socio-demographic questionnaire was used to

collect the data. The FFQ was standardised in a previous study sharing a similar food intake culture with the research community (Oldewage-Theron & Kruger 2009:304) and updated to include traditional Nigerian food items. The reliability and validity of the 24-hour questionnaire were verified by the consistency of the value derived from its use repeatedly in the research.

3.4.4.8 Trustworthiness of observations and groups discussions

The term 'trustworthiness', widely used in evaluating qualitative content analysis, aims at a qualitative inquiry to support the argument that the inquiry's findings are "worth paying attention to" (Miles & Jozefowicz-Simbeni 2010). According to Anney (2014), trustworthiness in qualitative research involves criteria such as: credibility, transferability, confirmation and dependability to ensure the rigours of the qualitative findings. According to the findings, quantitative researchers take into consideration criteria such as: reliability, objectivity and validity (i.e. internal and external) to ensure the trustworthiness of the findings (Anney 2014:272). The researcher ensured trustworthiness by applying the following: conducting an audit trail throughout the research process, member checking, triangulation by making use of group interview, questionnaire and observations; peer debriefing was done after each group discussion.

3.4.5 Data collection phases

Data for the multiphase empirical study were collected making use of various structured questionnaires, observations and group interview. Appointments were arranged for the pre-and post-test. The data collection procedures for each of the phases as depicted in Figure 1.1 (Chapter 1) will be discussed in this section.

3.4.5.1 Phase 1: Baseline study survey (Pre-testing)

The sub-objective of this phase was to conduct a baseline survey to determine the food consumption patterns of the elderly and the nutrition knowledge of the caregivers.

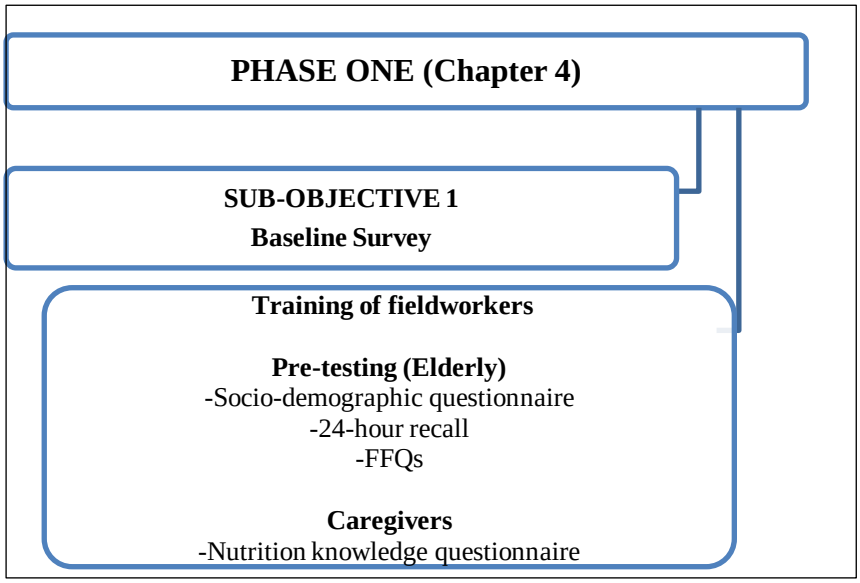

Figure 3.3 Baseline survey (Phase 1)

Phase 1 of the research project (Figure 3.3) firstly involved the training of ten fieldworkers to assist in data collection from both the elderly and the caregivers. Planning the fieldwork in Phase 1 involved recruiting volunteer Yoruba-speaking fieldworkers from undergraduate and graduate students of Hospitality and Food Science Technology Department, Wesley University of Technology, Ondo in Nigeria. The ten fieldworkers were trained by the researcher at the Ondo town community hall for two weeks in May 2017. The fieldworkers were trained in order to be able to translate and guide the elderly in completing the questionnaires. Also, training was given to the fieldworkers on how to approach the elderly during the data collection exercise. Fieldwork training was completed by the researcher in accordance with VUT guidelines on how to collect data accurately utilising the socio-demographic, 24-hour recall, FFQ and NKQ respectively. Training was given to them on how to complete a 24-hour recall questionnaire with the use of food models to estimate the portion sizes correctly. The duration of the training was four hours daily for one week. A dietician from the Department of Hospitality and Tourism Management from Wesley University of Technology, in Ondo, assisted the researcher with the fieldworker training. No student of Wesley University Ondo, Nigeria was allowed to assist in the research as fieldworker without training.

Secondly, to conduct the pre-testing (baseline) for the elderly, the researcher contacted the management of the three old people's homes in the month of June 2017. During a visit, after a previous correspondence informing them about the data collecting, the managers gave permission for the fieldwork to take place. A meeting was held with the management of each of the old people's homes to obtain permission to invite the participants (the elderly) and allow

them to attend an information session to explain the objectives of the study. Furthermore, another meeting was held before the programme took off to discuss the project and obtain written approval in the form of informed consent (n=120 as described in 3.4.3.1).

Before data collection, two days were assigned to address and familiarise the elderly, ten caregivers and the ten trained fieldworkers on the data collection information procedures. It entailed the research objectives, assurance of confidentiality, integrity and personality of participants with sample copies of the research questionnaires. The questionnaires were completed for the elderly by the fieldworkers assigned to each old age people's home within the period of time allocated in the scheduled days. Altogether, 120 copies of the questionnaires were completed for each of the homes. The completion of the questionnaire involved one-on-one interaction between the elderly and the fieldworker. The fieldworkers made sure the elderly participants were comfortably seated during the period allocated for data collection. It was supervised by the researcher between July and December 2017.

Only during the baseline survey (pre-test), the socio-demographic questionnaire was used to collect data. The questionnaires were completed in a one-on-one interview between the researcher, fieldworker and participants. Proper training of the fieldworkers enabled fieldworkers to assist the elderly in completing the questionnaires as suggested by Walsh and Joubert (2007:294).

The 24-hour recall questionnaire is a fast and easy method for gathering dietary information, as it allows individuals to recall in detail all the food and drinks consumed during the previous 24 hours. It has the advantages of speed and ease of use of administration and because it only covers the previous 24 hours, it is suitable for elderly use. The 120 elderly were provided details of the 24-hour recall questionnaires completed in a one-on-one interview between the researcher and, or fieldworker and participants (Walsh & Joubert 2007:294). The data collection took place in the dining room of each of the old people's homes to allow access to the use of needed equipment and food items from the kitchen, apart from the food models. The fieldworkers were assigned to handle data collection for each of the old people's homes. A complete list of all food and drinks consumed during the previous day was recorded, followed by a full description of each food and beverage intake, based on the methods of cooking involved along with obtaining the brand names. Food models were used to estimate the portion sizes of each of the meals on the menu list of the old people's homes with correct demonstrations. The estimated amount of each item consumed using the food models and

household utensils were used by the fieldworkers to assist the participant to identify the portion size of the items consumed. Conclusively, the information was reviewed to ensure all items involved were mentioned and correctly recorded (Gibson, Diack, Munro & Strath 2014:1).

The FFQ consists of a printed list of foods that are categorised according to nine nutritious food groups: group 1: flesh foods; group 2: eggs; group 3: dairy products; group 4: cereals, roots and tubers; group-five: legumes and nuts; group 6: vitamin A-rich fruits and vegetables; group 7: other fruits; group 8: other vegetables; group 9: oils and fats as recommended by FAO (FAO 1999). The food items listed in the FFQ correlated with the food intake patterns of the elderly population in Ondo West community of Nigeria. Only food items were listed without specified quantities. The dietary diversity was measured by the FFQ of individual foods, referred to as the food variety score (FVS), and the number of food groups utilized as the food group diversity (FGDS), calculated for a seven-day period for this research study (Oldewage-Theron & Kruger 2009:125; Matla 2008).

The data collection started at 10 a.m. each day and ended at 3 p.m. The researcher provided refreshments during intervals when requested by the participants. Altogether, 40 questionnaires each for SDQ, 24-hour recall and FFQ were completed by the fieldworkers for each of the three old people's homes, totalling 120 questionnaires. It was a great challenge to collect data from the elderly population, as the fieldworkers and participants read through the questions together and completed the questionnaires in a one-on-one interview with each of the participants. The researcher supervised the data collection thoroughly to avoid mistakes.

Thirdly, the nutrition knowledge questionnaire (NKQ) was administered to the ten caregivers that were engaged by the management of the three caregiver homes to take care of the elderly. Earlier, before the data collection, permission was obtained from the management of the three old people's homes for the exercise and the consent of the caregivers was obtained. The researcher assisted by one fieldworker administered the questionnaires (see 3.4.4.4.) one-on-one to the caregivers. They were assisted on how to complete the question with a detailed explanation of its purpose. This was conducted in one day between 10 a.m. and 1.00 p.m. in the first week of July 2017 at the Ondo town community hall in Nigeria. Altogether, ten questionnaires were completed by the caregivers. Furthermore, a situation analysis was carried out, consisting of the evaluation of the current menus being used in the three old people's homes to assist with the development of the food and nutrition guidelines (see Chapter 5).

3.4.5.2 Phase 2: Planning and development of nutrition guidelines for caregivers

The result obtained from Phase 1 was used to determine the design of Phase 2 which focused on the development of nutrition guidelines (Figure 3.4) for the caregivers of the elderly (sub-objective 2) in the old people's homes in Ondo West, Nigeria.

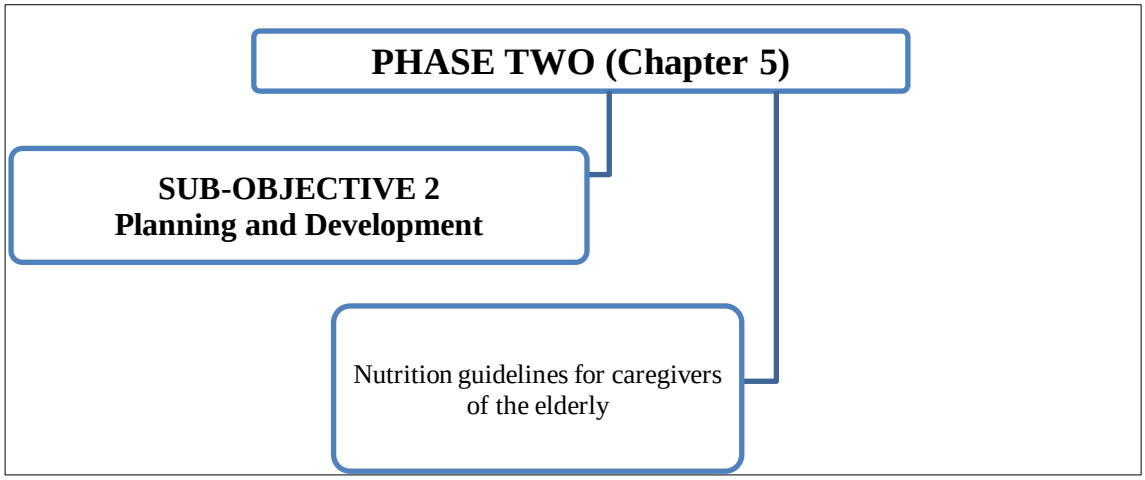

Figure 3.4 Planning and development of nutrition guidelines for caregivers (Phase 2)

The researcher followed these steps in Phase 2.

Step 1: According to the FAO framework used for nutrition intervention programmes, a working group duly represented on agriculture, health, food science, nutritional science, consumer, food industry, communication and anthropology should be formed. Therefore, in this study, representatives of the Ondo State Government Ministry of Health as well as representatives of the food industry and anthropology units of the Wesley University of Technology, Ondo, Nigeria were consulted and gave ethical approval (Annexure B and C) for the research study. The authority of the Ministry of Health assigned the responsibility to the appointed food industry as one of the establishments under their control and the representative from the anthropology unit was under the control of the hospitality department. The discussion of the working group was held at the conference room of the Department of Hospitality Management during the first two weeks of July 2015 with the permission of the Head of Department, Professor Emmanuel Akande.

Step 2: Gathering information on nutrition-related diseases for food availability, and its intake patterns in each country. To achieve this, the researcher conducted a literature review as per Chapter 2.

Step 3: The researcher evaluated the dietary intake and food consumption patterns of the elderly as well as the nutrition knowledge of the caregivers in order to develop a nutrition education programme (NEP) for the caregivers of the elderly. Nutritional data were collected based on the menus currently in use and the food consumption patterns of the elderly at baseline using the 24-hour recall and FFQ results (See chapter 4). The nutrition guidelines developed were based on the various guidelines discussed in Chapter 2. The NEP for the caregivers, developed by the researcher, consisted of the following information: the importance of consuming a variety of nutritious foods; the necessity for being active; making starchy foods the basis of most meals; an encouragement to eat a variety vegetables and fruits every day; the importance of eating dry beans, peas, lentils and soya regularly; stressing the importance of eating chicken, fish, meat, milk or eggs daily; a warning to use fat and salt sparingly; advice to drink lots of clean safe water; and to use food and drink containing sugar sparingly (Yaxley & Miller 2011; Yaxley, Miller, Fraser, Cobiac & Crotty 2012:386; NFBDG 2006; Sanusi 2010:161; NZDG 2013; DGA 2015; & SAFBDG 2013).

Step 4: Development of food and nutrition guidelines for the caregivers by taking into consideration the results of the baseline survey and the various countries food-based dietary guidelines.

Step 5: Implementing the intervention programme in the three old people's homes, which will be discussed in Chapter 5.

3.4.5.3 Phase 3: Training of caregivers

The development of a training programme for the caregivers was based on the nutrition guidelines developed by the researcher in phase 2. Sub-objective 3 focused on the training of caregivers (Figure 3.5).

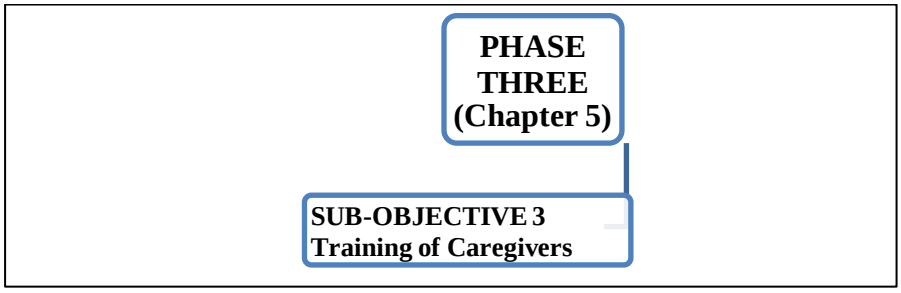

Figure 3.5 Training of the caregivers (Phase 3)

The training of the caregivers was held on a bi-monthly basis in the community using nutrition instruction training manuals. This contained information on balanced meals, menu planning and food hygiene to ensure uniformity and suitability, and they also focused attention on specific nutritional needs of the participants. The training started by 10 a.m. each day and ended at 2 p.m. with a one-hour break interval at noon to serve lunch and refreshment. The specific days for the caregivers' training were Tuesday, Wednesday and Thursdays from May 2018 until the end of September 2018 (see also Tables 5.3).

The training consists of ethical codes of conduct, the importance of the project objectives and the collection of valid and reliable data. Demonstrations were carried out on how to use food models in estimating appropriate and correct portion sizes to assist the caregiver in identifying the correct food portions. A variety of participatory methods were involved in the training consisting of demonstrations, role-playing and communication.

3.4.5.4 Phase 4: Intervention study

Phase 4 of this research work consisted of an intervention programme (Figure 3.6) which involved the implementation of the nutrition guidelines for the caregivers of the elderly compiled by the researcher (Sub-objective 4).

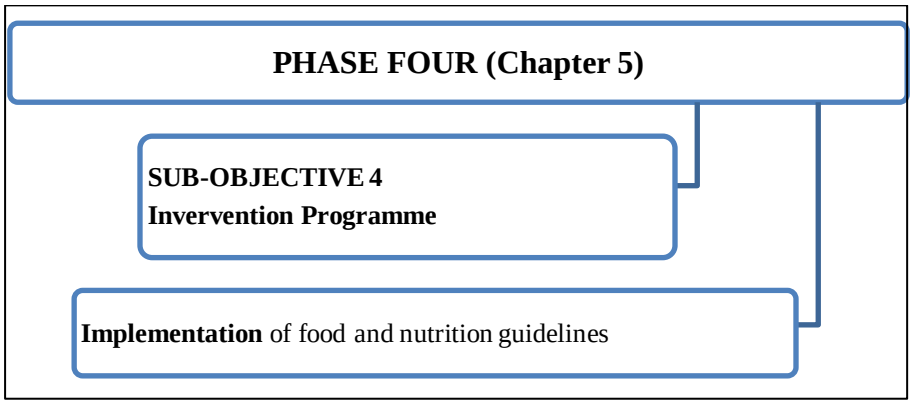

Figure 3.6 Intervention study (Phase 4)

The food and nutrition guidelines were made available in printed form as instructional booklets and given to each caregiver. The researcher provided the caregivers with all the information contained in the guideline in formal training sessions. Specialist support was also provided to equip staff with the technical knowledge and skill required for menu development, and to devise systems in monitoring and use of information on the impacts of the modified menus. The nutritional knowledge of the caregivers/cooks was always updated, with institutional support (Keenan *et al*. 2018:1). Menu development was conducted with the assistance of the

dietician who was the co-promoter in Nigeria, Dr Otitoola. The researcher guided the caregiver/cooks to modify menus and recipes to be compliant with the nutrition guidelines. The caregivers implemented the food and nutrition guidelines for a period of six months. Implementation of the food and nutrition guidelines took place from the beginning of October 2018 to end of March 2019.

To ensure effective implementation of the guidelines, a team of ten caregivers/cooks from each of the three old people's homes were part of the intervention. They had a broad range of skills such as speciality cooking of pastry, preparation of cold vegetable desserts and fruits collections; roasting of foods; hygiene health guides; compilation of menus with professional culinary applications. Furthermore, the team included a nutritionist, a health officer from the Local Government Council adding health and nutrition knowledge to the training team of the caregivers.

The researcher monitored the implementation of the food and nutrition guidelines. Un-announced visits were made weekly on three selected days by the researcher during food preparation and service of the elderly. The researcher observed the activities through the window in the kitchen during food preparation periods; observing the preparation as well as the food storage procedures of cold and dry goods; use of equipment; sanitation of food preparation and service areas and staff hygiene practices.

3.4.5.5 Phase 5: Evaluation (post-testing) of compliance by the caregivers after implementation of food and nutrition guidelines

Phase 5, as depicted in this research project, involved post-test which evaluated the compliance by caregivers after the implementation of the intervention of the Food and Nutrition guidelines over a six-month period. The observation method used evaluated the implementation and application of the food and nutrition guidelines. The group interview evaluated the perception of the caregivers and the previously used nutrition knowledge questionnaire confirmed the suitability of the nutrition guidelines to improve the dietary intake of the elderly (sub-objective 5).

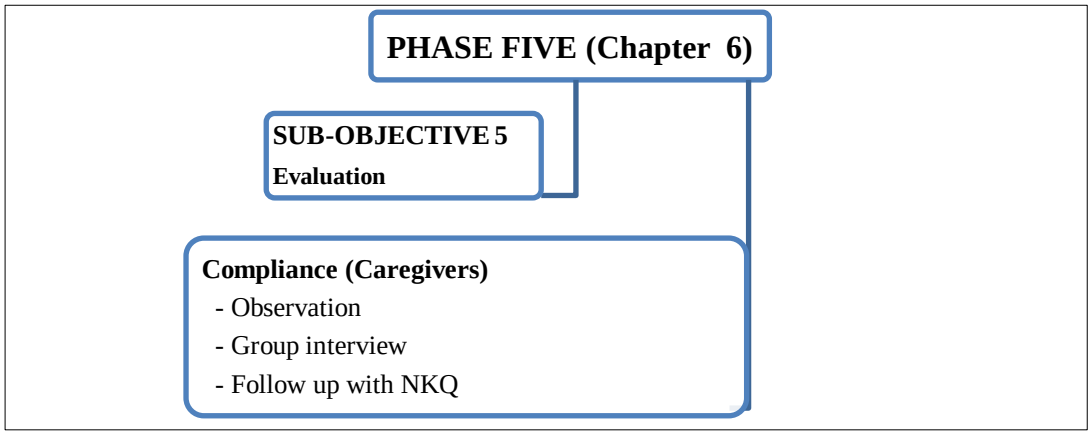

Figure 3.7 Post-testing/evaluation of compliance by the caregivers (Phase 5)

The impact of the nutrition guidelines on the nutrition knowledge of the caregivers was determined by the post-evaluation of their nutrient knowledge. For the post-test, all the caregivers completed the same NKQ that was used for the pre-test. The observation and group interview made use of ten participants selected from the three old people's homes, consisting of four caregivers, three kitchen staff and three all-purpose duty staff. They were all selected by means of a proportional stratified sampling method. The observation was conducted so that those observed were not aware of what was being observed. Once again, the researcher protected the participants' integrity and anonymity. The information provided was kept confidential with respect to the consent forms completed and signed by the participants before the exercise to avoid legal implications on divulging private information. The moderator (the researcher in this case) conducted the group discussions and the assistant moderator (Mr Tolu Ikusemiju, a senior lecturer in Hospitality, Tourism & Leisure Management, Federal Polytechnic, Ede, Osun State, Nigeria) took notes and took care of the audio and video recordings. Compliance of the caregivers was done in May 2019 by means of group discussion and observation. The post-NKQ was administered and completed during this period. The venue for the group discussion and observation was the Ondo West city Community centre, financed by NGO and the Local Government community as indicated in the thesis.

3.4.5.6 Phase 6: Post-test to determine the impact of food and nutrition guidelines on the elderly

Phase 6 involved post-testing of the elderly to determine the impact of the food and nutrition guidelines by means of 24-hour recall questionnaires and FFQ completed by the elderly (sub-objective 6). Four months' worth of follow-up data were collected in the three old people's homes to enable the researcher to explore perceived and actual barriers to implementation of

the developed nutrition guidelines (Keenan, Poland, Manthorpe, Hart & Moniz-Cook 2018:1). The post-24-hour recall questionnaire and FFQ were done in July 2019 in Nigeria.

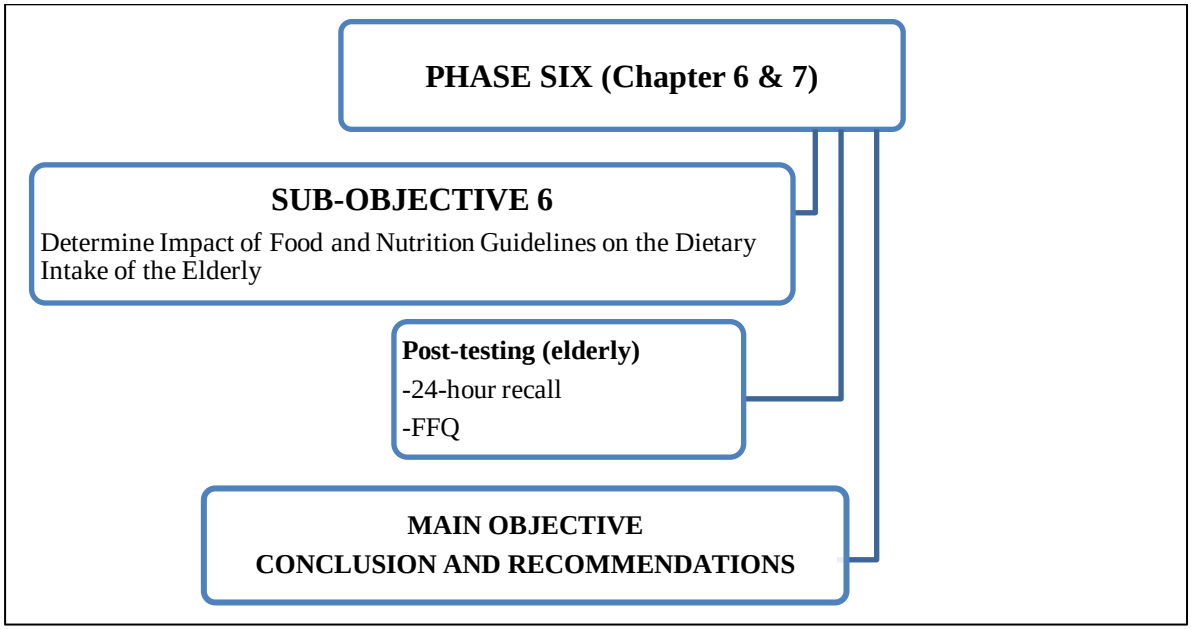

Figure 3.8 Post-test to determine the impact of food and nutrition guidelines on the elderly (Phase 6)

This was followed by conclusions and recommendations made by the researcher (Main objective).

3.4.6 Data analysis

Quantitative data analysis for the study was conducted with the necessary detailed information required as discussed underneath in respect of each measuring instruments used to capture the relevant data. The data for the research was analysed based on the information provided on the research instruments consisting of socio-demographic, 24-hour recall, food frequency, and nutrition knowledge questionnaires respectively. Qualitative content analysis was used to analyse the observation and group interviews data. The data analysis of the separate questionnaires will be discussed in the following sections.

3.4.6.1 Socio-demographic questionnaire

The socio-demographic questionnaire (Annexure G) for this study was validated (Oldewage-Theron & Kruger 2008:102) consisting of questions on household size, housing conditions, household income, assets in the household and its services. This questionnaire was used to compile a socio-demographic profile of the participants to provide a situational analysis of the dietary behaviour of the elderly in the study locations. All questionnaires obtained were sorted

and duly checked by the researcher to ensure appropriate completeness and accuracy. The data was captured on a Microsoft Excel spread sheet and analysed by the researcher with the assistance of a statistician on Statistical Package for Social Sciences (SPSS) programmed recent version 26.0 (version 23 was the most recent when conducting the study) by means of descriptive statistics for standard deviation (SD), means and frequencies. The data obtained were presented in Tables in the form of frequencies, percentages means and standard deviation. The T-test was conducted to determine the effect of socio-demographic characteristics on food consumption patterns, and differences in energy and nutrient intakes (Mkhize, Napier & Oldewage-Theron 2013:1).

3.4.6.2 Food frequency questionnaire

After the fieldwork was completed, the questionnaires were arranged properly and checked for completion, accuracy and ideal usage by the researcher. The FFQ data in this study was captured on Microsoft Excel spread sheet and analysed statistically for frequencies with SPSS recent version 26.0 (version 23 was the most recent used when conducting the study). The FFQ data were analysed for means and (SD) and were compared with the dietary reference intake (DRIs). The dietary diversity data were analysed in terms of frequencies and food consumed for specific periods (Kennedy, Razes, Ballard & Dop 2011). The most frequently consumed foods were calculated in the form of frequencies, means and standard deviations, and ranked according to consumption by the elderly (UNWFP 2008). A simple count of food was used for the dietary diversity score (DDS) as done by Oldewage-Theron and Kruger (2008:105).

3.4.6.3 24-hour recall analysis

The nutrient intake by the participants was analysed, and calculated as means, standard deviations (SD) and followed by a comparison with dietary reference intake (DRI) of the elderly within the age group 60-70 years. Frequencies were used to determine the percentage of participants whose nutrient intake is lower than 100% of the estimated average requirements (EAR). The 24-hour recall questionnaire was analysed by median statistical method on daily intake of the 120 sampled elderly, using descriptive statistics for standard deviation (SD), mean and frequencies. The 24-hour recall questionnaires and FFQ were analysed by a statistician.

3.4.6.4 Data analysis of nutrition knowledge questionnaire

The result of the nutrition knowledge questionnaire (Annexure J) was captured on Microsoft Excel spread sheet and analysed statistically for frequencies with SPSS version 26.0 (version

23 was the most recent when conducting the study) for descriptive statistics. Cronbach's Alpha coefficient was used to determine the reliability of this questionnaire. Paired T-test was used to determine the significance between variables of the pre-and post-intervention. The consumption of fruits and vegetables were impressively high after the intervention compared to before.

3.4.6.5 Analysis of observations

Content analysis was used in the study to analyse the observation of this qualitative technique. Responses of interviews were categorised according to the topics included in the 12 modules of the food and nutrition guidelines used in the intervention. Data was transcribed and cub-concepts, concept and categories were identified and arranged into the different themes. Priori and selective coding were used (Nieuwenhuis 2017:111).

3.4.6.6 Analysis of group discussions

The content analysis describes analytical approaches ranging from impressionistic, intuitive, interpretive analyses to systematic, strict textual analyses (Elo, Kaariainen, Kanste, Poikki, Urianen & Kyngas 2014:1). This analytic approach allowed shifting through large volumes of data with systematic fashion (Elo *et al*. 2014:1). This involved the analysis of what the text conveys (the message), how it addressed the content aspect and describes the visible, obvious components that constitute the manifest content (Creswell 2013). The application of the use of content analysis in this study is the most suitable for allowing the researcher to discover and describe actions, context, elderly people, old people's homes and care with nutritious meal preparations, its services, menu compilations and other related cares that enhances improved dietary behaviours of the elderly. The following were involved in the analysis process:

- In preparing for the analysis, only essential information was picked using a systematic and verifiable process. This was followed by transcribing all group discussions on the tapes and inserting notes into transcribed material where appropriate.
- In furtherance to this, all transcripts were cleaned up by stripping off all non-essential words.
- Simultaneously, each participant comment/quote was assigned a separate line on the page as well as each new thought or idea therein.
- Each participant was labelled with each line and group number.

The researcher made use of manual analysis for the group discussion data. The following were involved:

- A copy of the cleaned transcript was made and labelled.
- Entries were categorised by sticking them onto separate sheets of paper labelled with broad headings.
- Entries were re-categorised as indicated until the researcher was satisfied with the groupings.
- Entries were made into a Microsoft Word document.
- Once the focus findings were organised in the synthesised form, the researcher made them ready for presentation.

On request for a more formal report, the researcher wrote findings in a narrative format that includes an executive summary, background section, methods used, major findings, conclusions, and recommendations,

3.5 SUMMARY

The methodology for the study was conducted by the researcher to investigate the suitability of the developed nutrition guideline in determining its impact on the dietary behaviour of the elderly in Ondo West, city of Ondo, Nigeria, along with the consideration of the nutrition knowledge of the caregivers in the three old people's homes. This involved conducting of the baseline included a 24-hour recall questionnaire, socio-demographic questionnaire and food frequency questionnaires. A pre-testing of the NKQ was conducted and the Cronbach Alpha of 0.69 was acceptable for the research study and no changes were made. The chapter covered the study design, ethical considerations, and methodology with the focus on a detailed explanation of the data collection phases as set out in Figure 1.1 and data analysis. Chapter 4 which follows will discuss baseline surveyor pre-test results.

CHAPTER 4

BASELINE SURVEY OR PRE-TEST RESULTS

4.1 INTRODUCTION

This chapter describes the baseline survey which was conducted to determine the socio-demographic profiles, the food consumption patterns of the elderly and the nutrition knowledge of the caregivers in the three selected old people's homes. The baseline survey was conducted in the following old people's homes: Bayo Fatusin Foundation, Daughter of Charity and Ibitayo Fawehinmi Foundations located in Ondo West City, in Nigeria. The chapter includes the results of the baseline (Phase 1) of socio-demographic information, 24-hour recall, FFQ, NKQ and interpretation of the results.

4.1.1 Objectives

The objective of this part of the project was mainly to discuss the results of the baseline survey conducted to determine the food consumption patterns of the elderly as well as the nutrition knowledge of the caregivers. The result of the baseline study lead on to the planning, development and implementation of the food and nutrition guidelines in Chapter 5. (Phase 1).

4.1.2 Study design

The study design involved in the research is experimental which consist of the pre-test which includes the administration of questionnaires for participants. The results obtained were analysed and used to develop food and nutrition guidelines to serve as a nutrition education training manual for the caregivers of the elderly (Chapter 5).

4.1.3 Data collection procedures for the baseline survey

Data for the research work were collected making use of structured questionnaires and interviews. Appointments were arranged for the pre-test or baseline survey. The questionnaires were completed by the elderly with the assistance of the trained fieldworkers in the three old people's homes making use of one-on-one interviews. A total of 120 questionnaires were completed by the elderly, checked for accuracy and reported in this chapter. Ten caregivers completed the NKQ: four from Bayo Fatusin Foundation and three each from the other two old people's homes, Daughters of Charity and Ibitayo Fawehinmi respectively. The baseline data was collected between July and December 2017.

4.2 BASELINE SURVEY RESULTS

4.2.1 Socio-demographic questionnaire results of the elderly

Hundred and twenty participants (n=120) completed the socio-demographic questionnaire (Annexure G). The results of the personal information of the participants showed in Table 4.1 depict results for both females and males. The socio-demographic questionnaire indicated that 61.7% of the participants were females and 38.3% were males. Most of the elderly were between 60 to 65 years old (44.1%), followed by 66 to 70 years (29.1%); 71 to 75 years (25.0%) and older than 76 years of age (1.7%). The marital status showed that most were married (54.2%), followed by 30.8% widowed; while 10.8% of them were single and 4.2% divorced.

Table 4.1 Demographic characteristics: personal information

Variable	Female(n=74) 61.7%	Male (n=46) 38.3%
Age range		
60 to 65yrs	30.8%	13.3%
66 to 70yrs	13.3%	15.8%
71 to 75yrs	15.8%	9.2%
76yrs and above	1.7%	0.0%
Marital status		
Single	7.5%	3.3%
Married	45.0%	9.2%
Divorced	0.8%	3.3%
Widowed	18.0%	22.5%
Religion		
Christianity	41.7%	27.5%
Islam	15.0%	2.5%
Traditional	4.2%	6.7%
Others	0.8%	1.7%
Tribe		
Yoruba	39.2%	25.8%
Igbo	10.8%	4.2%
Hausa	5.0%	0.8%
Other	6.7%	7.5%
Occupation		
Civil Servant	12.5%	5.0%
Retiree	27.5%	17.5%
Trader	21.7%	15.8%

Table 4.1 further indicated on religion, that 69.2% of the elderly were Christians, 17.5% belong to Islam religion, 10.8%, followed traditional religion, and 2.5%, other religions respectively. The Yoruba tribe constitutes 65%, followed by Igbo (15%), Hausa (5.8%) and other tribes, (14.2%). Furthermore, the results indicated that most of the elderly were retirees (45%); followed by 37.5% traders and 17.5% civil servants. Religion and tribe are important in Nigeria and significant for this study, as both concepts affect the food intake, food habits and beliefs of the elderly. The Christians' dietary intake is reflected by what is permitted by their faith in that the consumption of certain foods is an abomination and sinful (Adegboye, Smith, Anang

& Musa 2016:2483; Okeke, Ibenwa, & Okeke 2017:1). For example, Christians eat pork while people in Islam do not (Meyer-Rochow 2009:1; ITC 2015). Also, the tribe to which one belongs is reflected in their food intake as required by customary beliefs. The Yoruba and Igbo people consume lots of food sourced from tubers while the Hausa consume meals sourced from grains like millet (Muhamad & Amusa 2005:254). The results for occupation for civil servants were females 12.5%, males 5.0%, retired females 27.5%, retired males 17.5%, trader females 21.7%, trader male 15.8%. In Table 4.2, results for accommodation and family background will be discussed.

Table 4.2 Demographic characteristics: accommodation and family background

Variable	Female (n=74)	Male (n=46)
Family background		
Native	26.7%	17.5%
Non-Native	22.5%	15.0%
Immigrant	12.5%	5.8%
Role in the family		
Mother	6.6%	-
Grandmother	30.8%	-
Father	-	12.5%
Grandfather	-	47.5%
Others	2.5%	
Accommodation		
Town/City	31.7%	25.8%
Rural	29.2%	12.5%
Type of house		
Brick	39.2%	26.7%
Clay	22.5%	11.7%
Type of building		
Single dwelling	33.3%	10.0%
Block of flat	23.3%	23.3%
Hostel (Private home)	5.0%	5.0%
House ownership		
Owned	25.8%	24.2%
Rented	35.8%	14.2%
How many people are living in your home?		
<3	40.0%	31.7%
4-6	12.5%	3.3%
7-9	8.3%	3.3%
10 and above	0.8%	0.0%
Living conditions		
Homeless	0.8%	0.8%
Living with relatives	35.8%	7.5%
Living with friends	7.5%	0.8%
Hostel (Private homes)	7.5%	4.2%
Rented house/flat	9.2%	6.7%
Others	0.8%	0.8%

Regarding the family background, 44.25% were natives, 37.5% were non-natives and 18.3% were immigrants. The results for the role in the family indicated that 6.6% were mothers, 30.8%

were grandmothers, 12.5% were fathers and 47.5% were grandfathers. Of the participants, 57.5% live in a town/city, 41.7% in rural areas. Most of the participants live in brick homes (65.9%) and 34.2% live in clay structures. Types of buildings include single dwellings: (43.3%), block of flats (46.6%) and 10% in a hostel or private home. The results indicated that 50.0% of the participants owned that house they live in and 35% rent houses. People living in the home with less than three occupants in a house were 71.7%, 15.8 with four to six people; 11.6% lives with seven to nine people in the home. On living conditions, 43.3% live with relatives, 16% were homeless and 8.3% live with friends.

The elderly were not staying in the old peoples' home permanently. Some stay within and others on day visits as arranged with the home management on specified regulations.

Table 4.3 indicated the facilities available to the elderly at their home resulting in 8.3% having access to municipal facilities in the house; 7.5% have access to river/stream facilities, with boreholes 31.7%, 48.3% have well water and 4.2% were dependent on rainwater.

Table 4.3 Facilities available to the participants (n=120)

Variables	**(%)**
Water and the sources available	
Municipal	8.3
River/stream	7.5
Borehole	31.7
Well water	48.3
Rain	4.2
Water supply	
Piped to the home	44.2
Obtained around	11.7
Fetch from elsewhere	44.2
Toilet facilities	
None	10.8
Pit latrine	21.7
Flush/Sewage	62.5
Bucket system	5.0
Waste disposal	
Outside incineration	73.3
Waste disposal agency	20.0
Others	6.7
Types of fuel	
Wood fire	11.7
Paraffin	18.3
Electricity	10.8
Gas	30.0
Coal	7.5
Others	21.7
Type of roads	
Tarred	56.7
Un-tarred	43.3

Participants receiving water supply piped into their houses were 44.2%, water obtained around were 11.7% and 44.2% fetched water elsewhere. Participants with no toilet facility were 10.8%, 21.7% used pit latrines, while most of the elderly in the study (62.0%) used flush/sewerage systems and 5% used the bucket toilet system. Waste was disposed of employing outside incineration (73.3%), other waste disposal agencies 20.0% and 6.7% of the participants seek other alternatives. Some participants used wood fires (11.7%), others used paraffin (18.3%); only (10.8%) made use of electricity, 30.0% used gas, 7.5% used coal. Results indicated that 43.3% of the participants had un-tarred roads to their house and 56.7% had tarred road to their houses. The elderly revealed that they experienced problems in the house regarding repairs and dampness. Other problems experienced by the elderly in their households were displayed in Figure 4.1. The results showed that 50.8% of the participants' experience problems with mice/rats, 70.0% had problems with cockroaches at home. Furthermore, 20.0% had problems with ants, 22.5%, had problems with flies? Majority (76.7%), had problems with mosquitoes while 22.5% had problems with geckos and 13.3% with termites.

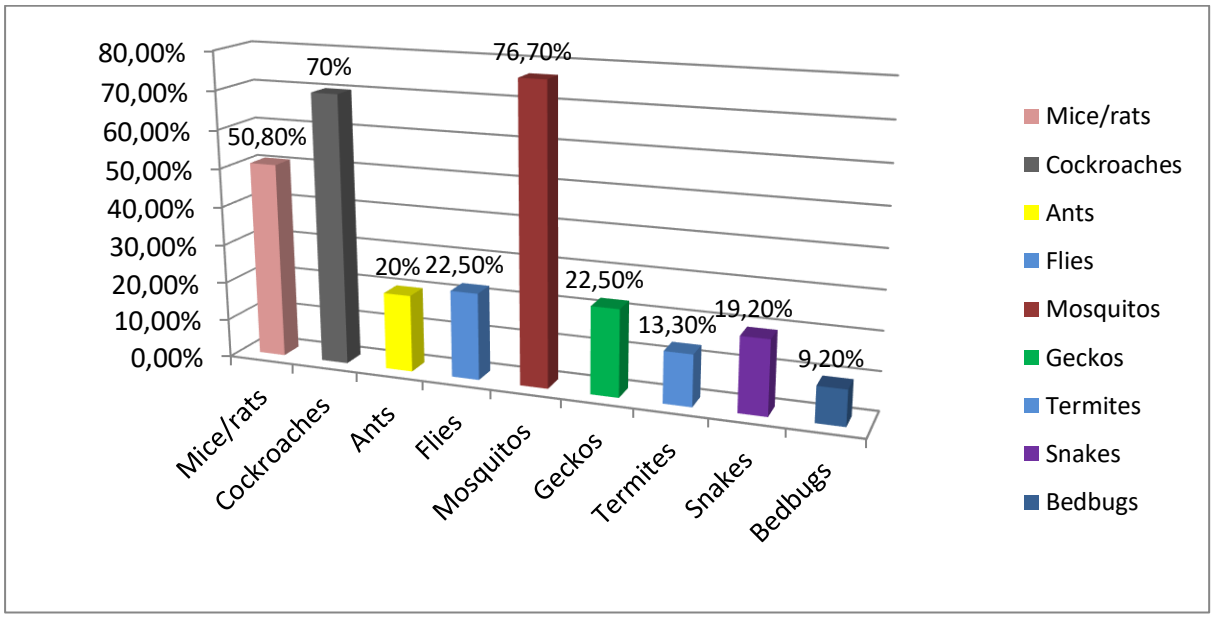

Figure 4.1 Problems at elderly homes

Figure 4.2 below indicated items used by the elderly at home. Most of the elderly have a radio (80.0%), television (80.8%) and a bed with a mattress (75.8%). Approximately half of the elderly have electric stoves (45.0%), gas stoves (55.8%), refrigerators (50.0) and freezers (44.2%).

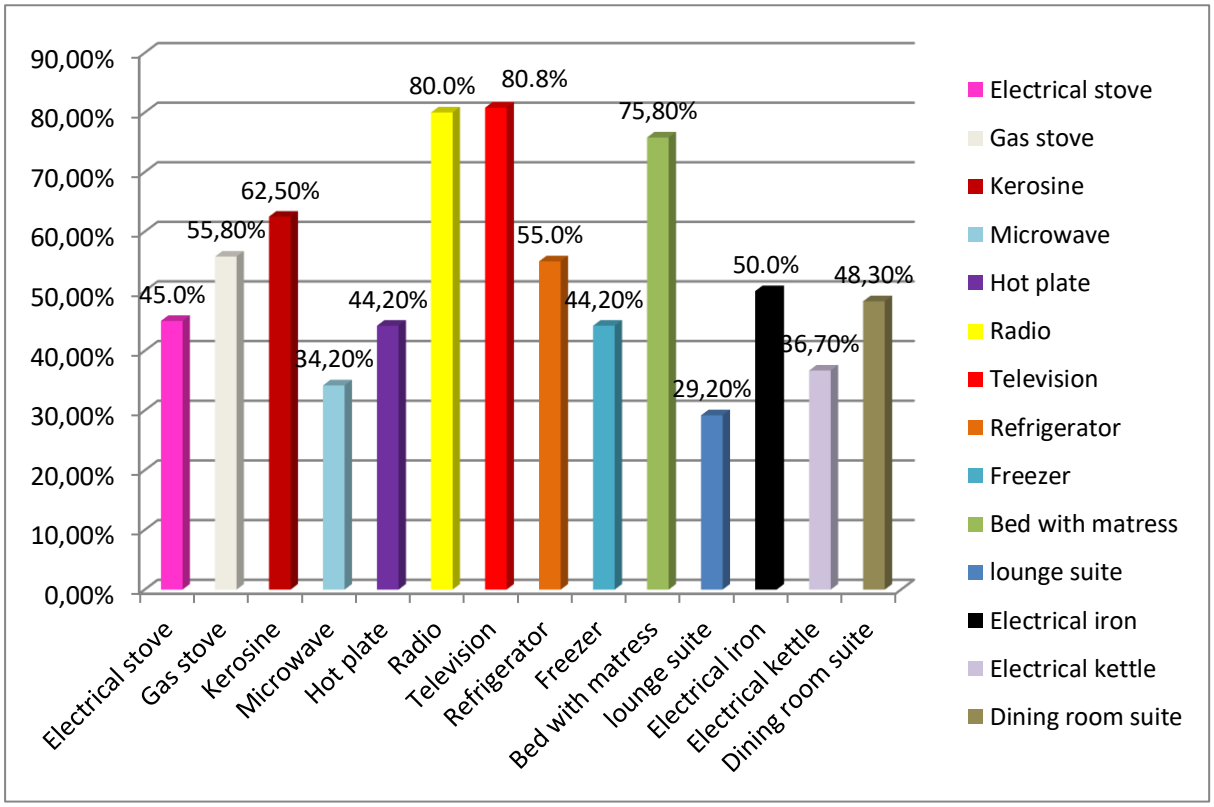

Figure 4.2 Items used at elderly people's homes

Table 4.4 below indicates the types of materials that pots were made of: cast iron (13.3%); aluminium pots (59.2%); stainless steel (11.7%); clay (5.8%); and other materials (10.0%). The above result implied that most of the pots were made from aluminium.

Table 4.4 Types of materials pots were made of (n=120)

Items	**Age (%)**
Cast Iron	13.3
Aluminium	59.2
Stainless Steel	11.7
Clay	5.8
Others	10.0
Total	**100.0%**

The work status and income results in Table 4.5 revealed that 35.8% of the participants were unemployed and 38.5% indicated that they were retired. Concerning the current job, 17.5% had a permanent position and 18.3% had a part-time job. The total household income per month, indicated that 11.7% had an income of less than <N5000, 24.2% had an income of between N10001-N20000. For the income ranges of N20001-N30000, N30001-N40000, N40001-N50000, the participants indicated 17.5%, 8.3% and 10% respectively.

Table 4.5 Demographic characteristics: work status, income, education and language

Current Work status	
Unemployed	35.8%
Retired	38.5%
Housewives	10%
Casual labour	5.8%
Other	12.5%
Current job	
No response	47.5%
Permanent position	17.5%
Temporary position	7.5%
Fixed-term contract	9.2%
Part-time job	18.3%
Household total income	
No response	24.2%
<N5000	11.7%
N10001-N20000	24.2%
N20001-N30000	17.5%
N30001-N40000	8.3%
N40001-N50000	10.0%
>N50000	4.2%

Figure 4.3 below shows the level of education of the elderly and indicated that 20.8% of them were not educated, 23.3% have primary school education, 4.2% of them have secondary school education and the majority (51.7%) have a tertiary qualification.

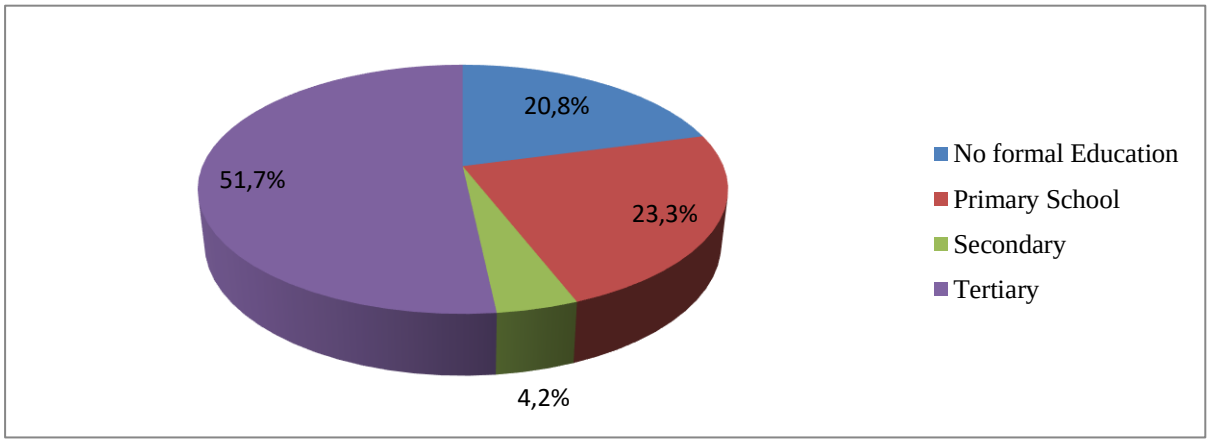

Figure 4.3 Level of education of the elderly

Figure 4.4 below revealed information on the languages spoken by the elderly indicating Yoruba (20.8%), Ikale (10.8%), English language (25.8%), Pidgin (28.3%) other languages (3.3%) more than one language (10.8%). The above result implied that most of the participants speak Pidgin language.

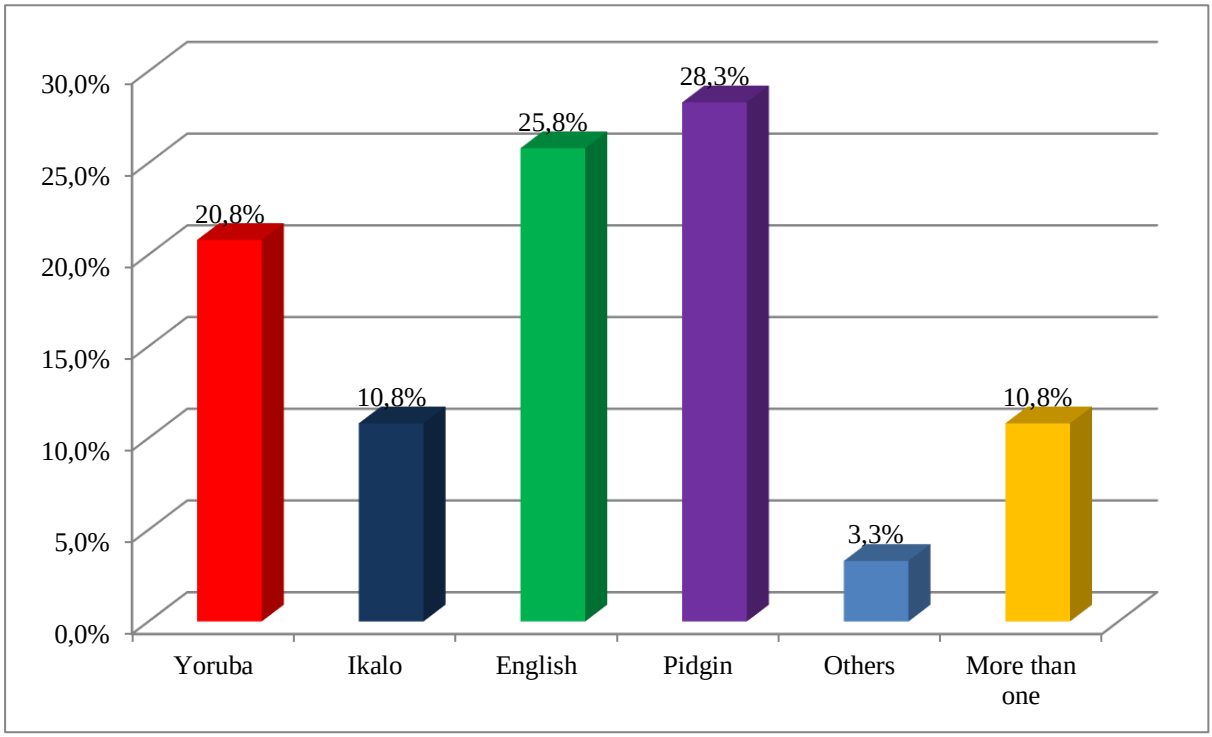

Figure 4.4 Languages spoken by the elderly (n=120)

In Table 4.6 the income and expenditure results for the elderly revealed that (4.2%) of the participants spend less than N2000 on food per month, and (13.3%) between N2000–N5000 per month, while 20% spends between N5001-N10000 and the majority (34.2%) spends between N10001–N15000 monthly. Moreover, (5.8%) of the participants spend between N15001–N20000 on food monthly and 2.5% spends between N20001–N25000, only 1.7% spend N25001. The findings on how often one does have enough money revealed that 12.5% do not always have money; approximately 50% indicated that they sometimes do not have money to buy food.

About 14% indicated that between seven and nine people contributed to the household income and 7.5% indicated that more than ten people contributed to the household income. On how often foods were bought, 9.1% indicated every day, 6.6% indicated once a week and 20.0% once a month. Information on where foods were bought revealed 20% bought on the open market, 27.5% from the street vendor, 20.0% from wholesalers and 26.7% from supermarkets. The results on the purchase of cooked foods show that 18.3% bought food daily, 11.7% once a week and 34.2% once a month. Shops/places where food was bought include bukateria (local community food sheds) (10.0%), restaurants (11.7%), road vendors (13.3%); and hawkers (10.0%). As indicated in Table 4.6, the participants used taxis (26.7%), buses (12.5%), and

trains (9.2%) as transport to get around. The researcher noticed that of the total participants, the majority (51.7%) used their own vehicle.

Table 4.6 Demographic characteristics: household food expenditure

Monthly food expenditure	
<N2000	4.2%
N2000-N5000	13.3%
N5001-N10000	20.0%
N10001-N15000	34.2%
N15001-N20000	5.8%
N20001-N25000	2.5%
>N25001	1.7%
Don't know	18.5%
How often one doesn't have enough money	
Always	12.5%
Often	16.7%
Sometimes	49.2%
Seldom	10.8%
Never	10.8%
How many people contribute to house income	
0-3	48.3%
4-6	30.0%
7-9	14.2%
>10+	7.5%
How often foods were bought	
Everyday	9.1%
Once a week	6.6%
Once a month	20.0%
Don't know	64.3%
Where buy food	
Open market	27.5%
Street vendor	20.0%
Wholesalers	20.0%
Supermarkets and other shopping places	26.7%
How often cooked foods are bought	
Daily	18.3%
Once a week	11.7%
Once a month	34.2%
Sometimes	35.8%
Never	-
Where cooked foods were bought	
Bukateria	10.0%
Restaurant	11.7%
Road vendor	13.3%
Hawkers	10.0%
Other	55.0%
Type of transport	
Taxi	26.7%
Bus	12.5%
Train	9.2%
Own vehicle	51.7%

The results in Tables 4.5 and 4.6 imply that majority of the participants spent between N10001–N15000 on food per month and the highest income in the household was between N10000–N20000 (24.2%).

Table 4.7 Demographic characteristics: dietary pattern and food preparation

How many times are you involved in food preparation?	
None	10.2%
Once	10.0%
Twice	16.6%
Thrice	60.0%
More than thrice	3.2%
How many times do you eat per day?	
Once	11.5%
Twice	41.6%
Thrice	31.6%
More than thrice	15.3%
Do you skip meals?	
Yes	30.9%
No	69.1%
Type of meal skipped	
No response	31.6%
Breakfast	28.4%
Lunch	31.8%
Supper	8.2%
Why do you skip meals?	
No response	42.4%
Lack of funds	22.4%
No time to eat	24.5%
No reason	10.7%
Where do you eat most meals?	
Home	52.5%
Friends	32.6%
Group gatherings	4.1%
Care centre	5.4%
Other locations	5.4%

According to Table 4.7, the majority (60%) indicated that they are involved in food preparation at least three times and 16.6% twice daily. The elderly indicated that 41.6% ate two meals per day and 31.6% consumed three meals per day. About 31% of the elderly skipped meals. The main reason for skipping meals was no time to eat (24.5%), lack of funds (22.4%) and 42.4% gave no indication of the reason for skipping meals. Most of the types of meals skipped were breakfast (28.4%) and lunch (31.8%). About 8% indicate that they skipped supper. The majority (52.5%) indicated that they ate most meals at home or with friends (32.6%). The non-relevant information included in the demographic questionnaire (Annexure G) was omitted and only the relevant data as per approved questionnaire were included.

4.2.2 24-recall results of the elderly

The energy and nutrient data of the elderly were obtained from the 24-hour diet recall (Annexure H). For the 24-hour recall, the dietary intake data captured was used to analyse the food consumption data in the three old people's homes. Two methods were involved in the illustrations of the dietary intake and food consumption patterns in the study, consisting of the 24-hour recall and food frequency questionnaire (see 4.2.3). The nutrient intake by the elderly participants was calculated as means, standard deviations (SD) by comparison with the dietary reference intake (DRI) of the elderly within the age group of 60-70 years. Frequencies were used to determine the percentage of participants whose nutrient intake is lower than 100% of the estimated average requirements (EAR).

4.2.2.1 Dietary intake of the elderly

The dietary requirement intake (DRI) for the elderly in Ondo city, Nigeria was expressed in Table 4.8 together with the adequate nutrient intake of the elderly for EAR and DRI (IoM 2009). The recommended dietary requirement intake for the elderly are as follows: energy is 6119.4 kJ for females and 64344 kJ for males; the total protein requirements for females are 46g and 56g for males; carbohydrates 130g, for both male and female; fibre's 30g for males and 21g for females; calcium, 1000mg females, 1200mg males; iron 8g for both male and females; vitamin A is 625µg females and 500µg males; vitamin B_6 for females 1.5mg and males 1.7mg with an inadequate intake of 1.1mg males and 1.0mg females; vitamin B_{12}, 2.0µg female and male 1.8µg for both male and females.

Nutrient adequacy ratio (NAR), refers to the ratio of the level of a nutrient consumed recommended nutrient intake (RNI). Mean adequacy is the sum of NARs of all evaluated nutrients divided by the number of nutrients and expressed in percentage. Nutrient or nutritional adequacy refers to the fulfilment of daily nutrients requirements for adequate consumption of diverse foodstuffs that form a balanced diet. In this sense, adequacy is an indicator of the equilibrium between nutrient requirement and intake. The ideal or perfect correlation coefficient for nutrient adequacy is when all nutrients consumed can satisfy the recommended allowance or the nutrient requirement. The NAR provides information on the analysis of the dietary intake by the participants provided by the 24-hour recall with specified nutrients which influenced the mean group.

Table 4.8 Mean daily dietary intake and nutrient adequacy of the elderly

Dietary intake Variables	**No**	**Percentage**	**Men Mean ± SD.**	**Women Mean ± SD.**	**Men <100% EAR**	**Women <100% EAR**	**DRI Men**	**DRI Women**	**Nutrient Adequacy ratio men**	**Nutrient Adequacy ratio women**
	Participants		**Actual intake of the elderly**		**Recommended intake for the elderly**					
Energy (kJ)	109	90.8%	5646.31±4091.8	5334.60±3864.24	95.8	95.8	6434.4	6119.4	88%	88%
Protein (g)	114	95.0%	48.0±23.65	50.27±22.65	100.0	97.2	56g	46g	103%	109%
Fat (g)	115	95.8%	36.0±41.60	34.0±20.50	97.9	98.6	ND	ND	-	-
Carbohydrate (g)	110	91.6%	137.0±145.2	137.0±145.2	97.9	97.2	100	100	198%	145%
Calcium (mg)	110	91.6%	140.0±148.1	160.0±158.4	97.9	9.7	1200	1200	20%	19%
Iron (mg)	112	93.3%	5.73	5.73	ND	ND	8	8	72%	72%
Fibre (mg)	34	28.3%	6.03±6.84	5.69±6.32	95.8	97.2	30	21	20%	27%
Vitamin A (µg)	115	95.8%	420	346	67.2	69.2	625	500	84%	55%
Vitamin B_6 (mg)	110	91.6%	1.1	1.0	64.7	66.7	1.7	1.5	65%	67%
Vitamin B_{12} (µg)	114	95.0%	1.8	1.8	90.0	90.0	2.0	2.0	90%	90%

The nutrient adequacy ratio (NAR) of the diet consumed by the elderly in the research study revealed that their diet before the intervention for both males and females regarding energy (kJ) consumption was only 88%. The protein and carbohydrate consumption indicated that all the elderly consumed above 100% for the recommended intake. Calcium, and fibre consumption was significantly lower than the recommended daily intake for both males and females (<30%), whereas iron and vitamin B_6 showed higher intakes (> 75%). A significantly lower vitamin A intake for females was measured (55%) compare to the males (84%). The vitamin B_{12} intake for both males and females was 90%, adequate.

The daily nutrient intake of the elderly needs to be improved on calcium which indicated lower consumption and should be addressed in the developed food and nutrition guidelines. Also, the fibre intake should be emphasised in the guidelines in order to address the problem.

4.2.2.2 Relationship between nutrients and food consumed

The relationship between nutrients and food consumed revealed as follows: Energy 719kJ with mean 1328.59±484.02, protein 667g, mean 54.21±27.59, fat 247g, mean 45.66±93.65 and carbohydrate 482g, mean 217.96±143.49 indicating significance for all the above. Calcium 2720mg, mean 17564±293.63, iron 231mg, mean 171.59±281.86 and fibre 72g, mean 0.29±1.88, indicated no significance. The relevant information on the relationships was indicated in Table 4.9 below.

Table 4.9 Relationship between nutrients and food consumed

Nutrients	**Quantity food consumed**	**Mean/SD score**	**Statistical correlation**	**Comment**
Energy	719kJ	1328.59±484.02	P <.05	Significantly related
Protein	667g	54.21±27.59	P <.05	Significantly related
Fat	247g	45.66±93.65	P <.05	Significantly related
Carbohydrate	482g	217.96±143.49	P <.05	Significantly related
Calcium	2720mg	17564±293.63	P >0.05	Not significantly related
Iron	231mg	171.59±281.06	P >0.05	Not significantly related
Fibre	72g	0.29±1.88	P >0.05	Not significantly related

4.2.2.3 Top 20 foods consumption by the elderly

Table 4.10 indicated most frequent foods consumed by the 120 elderly participants before the intervention was implemented along with their mean and per capita intakes based on the 24-

hour recall results. According to the list as depicted in Table 4.10, the food most consumed is pounded yam with an intake of 24605g and 205g per capita consumed by the participants (n=120). White bread and jollof rice were also highly consumed by some participants (n=80), respectively. The list reflected carbohydrates-sourced diets as nine most consumed food items were dominated by starch-based foods including pounded yam, jollof rice, plantain, semolina, pounded cassava, pap (maize), bread (white), Asaro in Palm oil and potatoes. The mean daily intake showed good portion sizes of the food items consumed.

Protein-rich foods consumed are as follows (Table 4.10): egg (n=8), meat (n=13), fish (n=16), chicken (n=17); consumed by small participants and their portion sizes are: beans (mean 100g±58.6), meat (mean 139g±96), fish (mean 98g±947) and chicken (90g±949). One type of dairy was consumed namely milk (n=72) (mean 95.1±60.7). Pineapple juice (n=5) was the only fruit item consumed with an average portion size (300ml) (mean 300ml (30g) ±110.9).

Table 4.10 Top 20 usual food frequently consumed by the elderly

	Pre-testing (Before intervention n=120)				
Ranking	**Food items (g)**	**Total intake (g)**	**Mean/SD daily intake (g)**	**No of participants**	**Per capita daily consumption (g)**
1	Pounded yam	24605	259±165.48	95 (79%)	205
2	Jollof rice	18820	254±138.71	74 (61%)	156
3	Semolina	12470	249±117	50 (41%)	103.9
4	Asaro in palm oil	9019	322±160	28 (33%)	75.2
5	Pounded cassava	8850	103.8±54	86 (71%)	73.8
6	Bread white	8515	106±52.51	80 (6%)	71.0
7	Milk	6860	95.1±60.7	72 (60%)	57.2
8	Potatoes	3130	71±29	44 (36%)	26.1
9	Plantain	3130	70±29.8	44 (36%)	26.0
10	Pap (maize)	11510	171±82	67 (55%)	26.0
11	Melon seed egusi	2325	77±38	30 (25%)	19.4
12	Meat	1810	139±96	13 (10%)	15.1
13	Fish	1568	98±94.7	16 (13%)	13.1
14	Chicken	1560	90±94.9	17 (14%)	13
15	Pineapple juice	1400	300±110.9	5 (4%)	11.7
16	Egg	800	100±64.1	8 (6%)	6.7
17	Soy stew	750	375±106	2 (1%)	6.3
18	Beans	700	100±58.6	7 (5%)	5.8
19	Okra	700	100±58	7 (5%)	5.8
20	Ewedu	699	233±55	3 (2%)	5.8

On the list of 20 most frequently consumed food intake of vegetables (Table 4.10), vitamin A rich-foods and the legume group did not show. Starchy foods were mostly consumed by a large number of participants. From the per capita daily intake, carbohydrate-sourced foods were

mainly consumed. Beans, okra and ewedu consumption were recorded least. Animal protein consumption was low at numbers 12 to 14.

The per capita intake indicated inadequate intake for all the foods except for pounded yam (205g) and jollof rice (156g). The per capita daily intake in grams (g) for top ten most commonly consumed food items are as follows: pounded yam (205.0g), jollof rice (156g), semolina (103.9g), Asaro in palm oil (75.2g), pounded cassava (73.2g), bread (white) (71.0g), milk (57.2g), potatoes (26.1g), plantain (26g), pap (maize) (26g) respectively.

As indicated in the Tables 4.8 to 4.10, the estimated average requirements (EAR) for females aged 51 to 70 years old according to IoM (2000; IoM 2003) are: adequate intake (AI) levels for aged 51–70 years (IoM 2000; IoM 2010); an estimated energy requirement (EER) for females based on physical activity level (PAL).

4.2.3 Food frequency questionnaire results for the elderly

Two methods were involved in the illustrations of the dietary intake and food consumption patterns in the study consisting of the 24-hour recall (Annexure H) and food frequency questionnaire (Annexure I). After the fieldwork was completed, the questionnaires were checked for completion and accuracy. The FFQ data in the study was captured on a Microsoft Excel spread sheet and analysed for frequencies, means and standard deviations, and ranked according to consumption by intake and sample with the SPSS version 23.0. The results obtained were compared with DRI and EAR. The next section discusses the food consumed by the elderly as captured from the food frequency questionnaire and will be depicted in tables (Table 4.11-4.19).

4.2.3.1 Diversity of Group 1: fleshy foods

The dietary diversity was measured by measuring the number of individual foods and will be referred to as the food variety score (FVS). Table 4.11 illustrates the different flesh food meat items consumed. Group 1 (Table 4.12) showed the frequency and of meat (fleshy foods) consumed by elderly people. In ranking, chicken ranked 1st (88.3%), fresh fish 2nd (70.8%), smoked fish 3rd (58.3%), goat meat 4th (35.0%), tinko meat 5th (31.7%), tinned fish 6th (27.5%), mutton meat 7th (25.0%), all tripe/offal/runner and heads 8th (25.0%), beef meat 9th (23.3%), lamb meat 10th (21.7%) and pork meat 11th (20.0%). Chicken meat (88.3%) was ranked as the most consumed meat product by the elderly. Then the second most consumed meat product

was fish. Seafood was not included because it is not available within the community and hence not accessible to be included on the menu list. The p-value on the significant value in relation to food consumed and the composite nutrients, were indicated in Table 4.9.

Table 4.11 Group 1: Flesh foods meat

No.	Items	Yes n(%)	No n(%)	Rank
1	Meat (chicken)	106(88.3)	14(11.7)	1
2	Meat (beef)	28(23.3)	92(76.7)	9
3	Meat (mutton)	30(25.0)	90(75.0)	7
4	Meat (lamb)	26(21.7)	94(78.3)	10
5	Meat (pork)	24(20.0)	96(80.0)	11
6	Meat (goat)	42(35.0)	78(65.0)	4
7	Dried Meat (tinko)	38(31.7)	82(68.3)	5
8	Smoked fish	70(58.3)	50(41.7)	3
9	All tripe/offal/runner and heads	30(25.0)	90(75.0)	8
10	Fish (fresh fish)	85(70.8)	35(29.2)	2
11	Tinned fish (Pilchards/Tuna), dried fish	33(27.5)	87(72.5)	6

4.2.3.2 Diversity of Group 2: Eggs

Table 4.12 Group 2: Eggs

No.	Items	Yes n (%)	No n (%)	Rank
1	Egg: Fried or boiled	47 (39.2)	73 (60.8)	1

Table 4.12 showed that 39.2% of elderly people consumed eggs. There was a reduction in the consumption of carbohydrate-sourced food items, fat, sugar and salt as informed by the developed guidelines.

4.2.3.3 Diversity of Group 3: Dairy products

Table 4.13 showed the ranking of dairy products consumed by the elderly. Milk powder has higher (75.0%) score with custard (68.3%) followed by ice cream, with yoghurt consumed the least (34.2%).

Table 4.13 Group 3: Dairy products

No.	Items	Yes n(%)	No n(%)	Rank
1	Milk powder	90(75.0)	30(25.0)	1
2	Evaporated milk (unsweetened)	68(56.7)	52(43.3)	4
3	Condensed milk	59(49.2)	61(50.8)	5
4	Yoghurt	41(34.2)	79(65.8)	7
5	Cheese	43(35.8)	77(64.2)	6
6	Custard	82(68.3)	38(31.7)	2
7	Ice cream	76(63.3)	44(36.7)	3

4.2.3.4 Diversity of Group 4: Cereals, roots and tubers

Table 4.14 showed the diversity in the cereals, roots and tubers group. The ranking reveals that macaroni/pasta/spaghetti/indomine was higher (70.0%) than rice (63.3%) breakfast cereals (corn flakes, oats) (39.2%) was lower.

Table 4.14 Group 4: Cereals, roots and tubers

No.	Items	Yes n(%)	No n(%)	Rank
1	Rice	76(63.3)	44(36.7)	2
2	Maize (millet, sorghum)	49(40.8)	71(59.2)	8
3	Macaroni/Pasta/Spaghetti/Indomine	84(70.0)	36(30.0)	1
4	All bread (White/brown)	56(46.7)	64(53.3)	6
5	Biscuit, chinchin, cake, puffpuffs	65(54.2)	55(45.8)	3
6	Semolina	63(52.5)	57(47.5)	4
7	Breakfast cereals (corn flakes, oats)	47(39.2)	73(60.8)	9
8	All tubers/ roots (yam, sweet potato, cocoyam, cassava)	56(46.7)	64(53.3)	5
9	Irish potatoes	52(43.3)	68(56.7)	7

Indomine refers to the brand name (Unilever) of spiral shaped small sized pastas like macaroni products from the makers, globally. It belongs to the same group as macaroni/pasta/spaghetti. Chinchin: refers to short pastry cube-shaped pieces' shallow dry fried in vegetable oil by the local communities as snacks in Nigeria. Chinchin is classified as a biscuit or cake. Puffpuffs refers to mixed flour dough with little sugar added and fried in hot vegetable oil, resulting in a fluffy and soft product usually consumed for social entertainment of guests at community social gatherings in Nigeria. Cocoyam is a type of short spherically shaped tuber whereas the yam tubers are long shaped. It is referred to as Chinese yam but in Nigeria as cocoyam. Except for macaroni/pasta/spaghetti/indomine the results reflect vividly the staple foods consumed in the Nigerian study population.

4.2.3.5 Diversity of Group 5: Legumes and nuts

Table 4.15 Group 5: Legumes and nuts

No.	Items	Yes n(%)	No n(%)	Rank
1	All Beans-Dried (White/Brown beans, pigeon peas)	48 (40.0)	72 (60.0)	3
2	Fermented locust bean (Iru)	69 (57.5)	51 (42.5)	2
3	Soybean (Soymilk, Soy cheese, soy pap)	72 (60.0)	48 (40.0)	1

The ranking reveals that soybean (soymilk, soy cheese, soya pap) was most consumed (60.0%) of the legumes and nuts group; fermented locust bean (iru) (57.5%) all beans-dried (white/brown beans, pigeon peas) (40.0%) (Table 4.15).

4.2.3.6 Diversity of Group 6: Vitamin A-rich fruits and vegetables

Table 4.16 showed the frequency and percentage of vitamin A-rich fruits and vegetables diversity consumed by the elderly people. Pawpaw (50.8%), carrots (53.3%), green-leaf vegetables (53.3%), okra (68.3%), palm oil (61.7%), dried okra (orunla) (55.8%) (44.2%), jute-mallow (ewedu) (58.3%) and mango (51.7%).

Table 4.16 Group 6: Vitamin A-rich fruits and vegetables

No.	**Items**	**Yes** **n (%)**	**No** **n (%)**	**Rank**
1	Pawpaw	61(50.8)	59(49.2)	8
2	Carrots	64(53.3)	56(46.7)	5
3	Green-leaf vegetables	64(53.3)	56(46.7)	6
4	Okra	82(68.3)	38(31.7)	1
5	Palm oil	74(61.7)	46(38.3)	2
6	Dried okra (orunla)	67(55.8)	53(44.2)	4
7	Jute-mallow (ewedu)	70(58.3)	50(41.7)	3
8	Mango	62(51.7)	58(48.3)	7

Orunla refers to the South West Nigeria Yoruba language name given to sliced sundried cutlets of pieces of okra. Jute-mallow (ewedu) is a South West Nigeria Yoruba language name given to a variety of vegetables of the spinach type in Nigeria. It is boiled in hot waters as an accompaniment to pap (made from maize) for community meal consumption. Jute-mallow is the scientific name. The ranking revealed that okra has higher (68.3%) of vitamin A-rich fruits and vegetables diversity consumed by the elderly people and pawpaw (50.8%) was lower.

4.2.3.7 Diversity of Group 7: Other fruits and juices: deciduous fruits

Table 4.17 showed the frequency and percentage of other fruits (and juices) diversity including deciduous fruits consumed by the elderly people. The ranking revealed that sub-tropical fruit (lemon (lime) has a higher consumption (57.5%) than other fruits (and juices). The deciduous fruits consumed by the elderly people are mostly apples (45.8%), sub-tropical lemon (lime) ranked 1st, avocado 2nd, orange (tangelo/tangerine) 3rd and pineapples 4th.

Table 4.17 Group 7: Other fruits and juices deciduous fruits

No.	Items	Yes n(%)	No n(%)	Rank
1	(Apples)	55(45.8)	65(54.2)	14
2	Pear	63(52.5)	57(47.5)	8
3	Grapes (Black/Green)	63(52.5)	57(47.5)	9
4	Subtropical lemon (Lemon (lime)	69(57.5)	51(42.5)	1
5	Orange (Tangelo/Tangerine)	67(55.8)	53(44.2)	3
6	Garden egg	57(47.5)	63(52.5)	13
7	Banana	59(49.2)	61(50.8)	12
8	Pineapple	65(54.2)	55(45.8)	4
9	Avocado	68(56.7)	52(43.3)	2
10	Walnut (Asala)	65(54.2)	55(45.8)	7
11	Watermelon	65(54.2)	55(45.8)	5
12	Guava	60(50.0)	60(50.0)	11
13	Pawpaw	65(54.2)	55(45.8)	6
14	Juices (Juice (100% pure juice)	60(50.0)	60(50.0)	10

4.2.3.8 Diversity of Group 8: Other vegetables

Table 4.18 showed the frequency and percentage of other vegetables consumed by the elderly people. Approximately 50.8% of the participants consumed onions followed by cabbage (53.3%) melon seed (51.7%), tomatoes (67.5%), green beans (fresh), (58.3%) peas (fresh) (55.8%), chilli (green/red) (49.2%), green/yellow/red pepper (61.7%) and ginger and garlic (fresh) (58.3%). The ranking reveals that tomatoes consumption was highest (67.5%) with chilli (green/red) (49.2%) lowest.

Table 4.18 Group 8: Other vegetables

No.	Items	Yes n(%)	No n(%)	Rank
1	Onions	61(50.8)	59(49.2)	8
2	Cabbage	64(53.3)	56(46.7)	6
3	Melon seed	62(51.7)	58(48.3)	7
4	Tomatoes	81(67.5)	39(32.5)	1
5	Green beans (fresh)	70(58.3)	50(41.7)	4
6	Peas(fresh)	67(55.8)	53(44.2)	5
7	Chilli (green/red)	59(49.2)	61(50.8)	9
8	Green/Yellow/Red pepper	74(61.7)	46(38.3)	2
9	Ginger & garlic (fresh)	70(58.3)	50(41.7)	3

4.2.3.9 Diversity of Group 9: Oils and fats

Table 4.19 showed that margarine ranked 1st, palm oil 2nd, cooking oil (e.g. groundnut oil, melon seed oil, etc.) 3rd, fried food (puffpuffs, chinchin, egg buns) 4th and Nido cream white powdered milk 5th respectively.

Table 4.19 Group 9: Oils and fats

No.	Items	Yes n(%)	No n (%)	Rank
1	(Cooking oil e.g. groundnut oil, melon seed oil, etc.)	59(49.2)	61(50.8)	3
2	Margarine	67(55.8)	53(44.2)	1
3	Palm oil	61(50.8)	59(49.2)	2
4	Fried food (puff puffs, chin chin, egg buns)	56(46.7)	64(53.3)	4
5	Nido cream white powdered milk	55(45.8)	65(54.2)	5

4.2.3.10 Food variety scores of the elderly participants

Table 4.20 showed the food variety scores of the participants in the research study on the food groups.

Table 4.20 Food variety scores of the elderly participants

Food group	FVS Mean	Food items
Group 1: Flesh Food Chicken, meat, fish	1.10 ±0.32	1-11
Group 2: Eggs	1.10 ±0.32	1-1
Group 3: Dairy	1.20 ±0.42	1-7
Group 4: Cereal, roots and Tubers (yam, cassava, plantain, potatoes).	1.10 ±0.31	1-9
Group 5: Legumes	1.40 ±0.52	1-3
Group 6: Vitamin A	1.30 ±0.48	1-8
Group 7: Fruit Juice	1.30 ±0.48	1-14
Group 8: Vegetables	1.20 ±0.42	1-9
Group 9: Oil (palm oil, vegetable oil, soy oil) and Fat	1.50 ±0.52	1-
Total food items	**11.20±3.79**	**12-10**

Group 1: flesh foods consisting of chicken, meat and fish: FVS 1.10, mean±0.32 contains one to twelve food items; group 2: eggs: FVS 1.10, mean±0.32 contains one item only; group 3: dairy: FVS 1.20, mean±0.42 contains one to three items; group four: cereal, roots and tubers (yam, cassava, plantain, potatoes): FVS 1.10 mean±0.31 contains one to eleven items; group 5: legumes, FVS 1.40 mean±0.52 contains one to four items; group 6: vitamin A, FVS 1.30

mean±0.48 contains one to eight items; group 7: fruit juice, FVS 1.30±0.48, contains one to ten items; group 8: vegetables, FVS 1.20, mean±0.42, contains one to eight items; group nine: oil (palm oil, vegetable oil, soy oil) and fat, FVS 1.50, mean 0.52, contains one to four items.

Table 4.21 below showed the classification of the food variety within the food groups. The food group with the most variety was the fruit and juice group with 14 food items, followed by the cereal group with 13 food items and the flesh food (chicken, meat, fish) group with 11 food items. Both, the cereal, roots and tubers and the vegetable groups consisted of nine items within the food groups. The Vitamin A group consisted of eight food items; dairy, seven food items; legumes (beans), oil and fats (palm oil, vegetable oil, soy oil), have five items each. The egg group has the least, one food item.

Table 4.21 Classification of food variety within the food groups

Food groups	**Food items**	**Mean/SD**	**Food variety within groups**
Group one	Flesh Food (chicken, meat, fish)	2.7±1.3	1-11
Group two	Eggs	0.7 ±0.5	1-1
Group three	Dairy	0.79±0.5	1-7
Group four	Cereals, roots and tubers (yam, cassava, plantain, potatoes).	10.69±3.9	1-9
Group five	Legumes	3.9±1.8	1-3
Group six	Vitamin A	2.7±1.3	1-8
Group seven	Fruits and Juice	2.5±1.1	1-14
Group eight	Vegetables	0.6±0.5	1-9
Group nine	Oil and Fats	2.6±1.2	1-5
Total food items (FVS)		27.28±1.2	67

The pre-intervention results indicated a total of 67 individual food items consumed by the elderly over a period of seven days with a range of 15-67 food items consumed by any individual participant in Table 4.21. For this research, the mean FVS (±SD), for all the foods consumed from all the food groups in a period of seven days was 27.2 ±12. This revealed a medium dietary diversity score for the elderly. Not all the participants achieved the medium FVS, as 40% of the participants consumed 31-60 food items, with 35% consuming 16-30 food items which reflected a low food variety score (≥30 individual foods or 0-3 food groups). Food group 4 (cereals, roots and tubers) indicated the highest mean ±SD FVS 10.6±3.9 for legumes:

3.9±1.8, flesh food: 2.7±1.3, vitamin A: 2.7±1.3, oils and fats: 2.6±1.2. The food groups that showed the lowest mean ±SD was egg 0.7±0.5 and vegetables 0.6±0.5.

The cut-off points used in this investigation for low, medium and high DDS and FVS were categorised as low =0-3 or <30 individual food items, medium= 4-5 food groups or 30-60 individual foods; high= 6-7 individual foods or >60 individual foods (Chakona & Shackleton 2018:5).

Table 4.22 Household food access measured by the variety within the food groups consumed over a period of one week at baseline (Total individual food, n = 67)

Flesh	**Egg**	**Dairy**	**Cereals**	**Legumes**	**Vitamin A**	**Fruit and Juice**	**Vegetables**	**Oils and Fats**	**Total food items consumed**
n=1	n=1	n=7	n=9	n=3	n=8	n=14	n=9	n=5	n=67
1=106	1=47	1=90	1=76	1=48	1=61	1=55	1=61	1=59	0-1=11
2=28		2=68	2=49	2=69	2=64	2=63	2=64	2=67	12-15=1
3=30		3=59	3=84	3=72	3=64	3=63	3=62	3=61	16-19=7
4=26		4=41	4=56		4=82	4=69	4=81	4=56	20=23=9
5=24		5=43	5=65		5=74	5=67	5=70	5=55	24=27=3
6=42		6=82	6=63		6=67	6=57	6=67		28=31=8
7=38		7=76	7=47		7=70	7=59	7=59		32-35=14
8=70			8=56		8=62	8=65	8=74		36-39=9
9=30			9=52			9=68	9=70		40-43=5
10=85						10=65			
11=33						11=65			
						12=60			
						13=65			
						14=60			

As indicated in Table 4.22, a large number of the elderly consumed mostly flesh food in group one, highly with item one (n=106). Egg in group two with only one item, the lowest in the group, was consumed by 49 persons. Oils and fat consumption fall within the range of 30-60 persons indicating medium classification as shown in Table 4.19. The dairy food items were highly consumed, mostly with more than 60 persons in each of the seven items, except in three.

Also, vitamin A rich fruits and vegetables consumed indicated high intake with more individuals on each item in the group.

4.2.4 Nutrition knowledge results of the caregivers

Nutrition knowledge is the major pivot for the advancement in understanding the association between diet and disease, thus leading to changes in dietary recommendations (Kliemann, Wardle, Johnson & Croker 2016:1174). Nutrition knowledge, in this study measured by NKQ (Annexure J), is one of the factors that affect the nutritional habits of individuals, families and communities (Uddin, Islam & Uddin 2008:14). Nutritional care can be enhanced with the use of a suitable NKQ. Improvement of nutrition knowledge are some of the practices undertaken by health professionals and others alike, nutritionists and food service specialists to improve individual's food-related behaviour and subsequent health outcomes (Dumic, Miskulin, Pavlovic, Orkic, Bilic-Kirin & Misculin 2018:1). The nutrition knowledge questionnaire (Annexure J) used in this study comprised four sections, namely Section A which determined the caregivers' knowledge on the Nigerian food based dietary guidelines, section B covered the various vitamin and health deficiencies. Section C of the questionnaire covered general food knowledge and finally, section D was about health and food safety. The four sections will be discussed below.

4.2.4.1 Nutrition knowledge questionnaire results of section A

Section A below discusses the caregivers' knowledge of Nigerian food-based dietary guidelines.

Table 4.23 indicated results on knowledge of Nigerian food-based dietary guidelines indicated that all the caregivers were aware of the importance of being active, that the consumption of soy mince and local cheese (wara) is healthy and, the total food intake should be taken into consideration for a person's level of physical activity and that less sugar should be consumed. Ninety percent of the caregivers furthermore knew that eating a variety of food including seasonal fruit is good for your health and that salt, sugar and bouillon cubes should be limited in the daily food intake. Seventy percent of the caregivers know that fat intake should be limited. This is the guideline in which the caregivers have the least knowledge. The results revealed that the caregivers had an above average knowledge of the Nigerian food-based dietary guidelines (NFBDG).

Table 4.23 Knowledge of Nigerian food-based dietary guidelines

No|	Item	True (%)	False (%)
1	If you are more active you need to eat more food	10 (100.0)	0(0.0)
2	Soy mince, dry beans, peas are as healthy as meat and should be eaten often as a replacement for meat	10 (100.0)	0(0.0)
3	Local cheese (wara) is good for the elders' health	10 (100.0)	0(0.0)
4	Elderly people should eat less sugar	10 (100.0)	0(0.0)
5	Eat as many fruits that are in season as possible	9 (90.0)	1(10.0)
6	Total food intake should take into consideration a person's level of physical activity	10 (100.0)	0(0.0)
7	Limit fat intake from animal foods	7 (70.0)	3 (30.0)
8	The diet should contain as wide a variety of foods as possible e.g. cereals, legumes, roots/tubers, fruits, vegetables, fish, lean meat, local cheese(wara)	9 (90.0)	1(10.0)
9	Limit intake of salt, bouillon cubes and sugar	9 (90.0)	1(10.0)

4.2.4.2 Nutrition knowledge questionnaire results of section B

Section B of the questionnaire covered the various vitamin and health deficiencies. The results of section B (Annexure J) will be discussed in the same order and numbering as the questions in the NKQ. The results revealed that 80% of the participants were aware what vitamin A deficiency (Question B1) was; however, none of them could identify the specified symptoms of someone that lacks vitamin A (Question B2). On health problems (Question B3) that occur when a person is obese 60% of the caregivers had knowledge of the symptoms. All the participants were aware of the causes of lack of vitamin A in the body (Question B4), and how one can prevent (Question B5) a lack of vitamin A in the body. The question on whether the food based dietary guideline image has been seen before (Question B6) was unanimously answered, indicating that all the caregivers were aware of the NFBDG. For the rest of the questions, all the caregivers answered positively that they were aware of the health problems that can occur when a person is obese, why people are overweight or obese and could identify what can prevent being overweight or obesity.

4.2.4.3 Results of section C

Section C of the questionnaire covered general food knowledge and is depicted in Table 4.24 below. The results revealed the following on general food knowledge of the caregivers at pre-

test: half of the caregivers answered true for fruits and vegetables as a good source of vitamin C, on the question about fruits as good source of vitamin C, 80% responded true, while on fruits and vegetables having lots of vitamins that will strengthen the body's immune system and prevent illnesses, 90% indicated true. Eighty percent indicated eating a high content of calcium-rich foods for strengthening bones and preventing osteoporosis was true.

Table 4.24 General food knowledge

No.	Item	True (%)	False (%)	Do not Know (%)
1	Fruits and vegetables are a good source of vitamin C	5 (50.0)	5(50.0)	0(0.0)
2	Fruits and vegetables are a good source of vitamin A	8 (80.0)	2(20.0)	0(0.0)
3	Fruits and vegetables have lots of vitamins that will strengthen the body's immune system and prevent illnesses	9 (90.0)	1(10.0)	0(0.0)
4	Eating a high content of calcium-rich foods will strengthen bones and prevent osteoporosis	8 (80.0)	2(20.0)	0(0.0)
5	Consuming chicken liver will prevent anaemia	8 (80.0)	2(20.0)	0(0.0)
6	Meats have a high content of protein	4 (40.0)	5(50.0)	1(10.0)
7	Fruits and vegetables have a high content of minerals	6(60.0)	3(30.0)	1(10.0)
8	Dairy products have a high content of calcium	7(70.0)	1(10.0)	2(20.0)
9	Potato chips in meals contain the least fat	2 (20.0)	6(60.0)	2(20.0)
10	Eko (pap from maize) is rich in fat	6 (60.0)	3(30.0)	1(10.0)
11	Elderly are required to eat healthy snacks	9 (90.0)	1(10.0)	0(0.0)
12	Brown bread sandwich with thinly spread peanut butter and jam is a healthy choice	1(10.0)	5(50.0)	4(40.0)
13	Spinach is deficient in fat	5 (50.0)	3(30.0)	2(20.0)
14	Brown bread is suitable for the elderly	5 (50.0)	3(30.0)	2(20.0)
15	It is healthy for the elderly to eat only one portion of meat every day	7 (70.0)	2(20.0)	1(10.0)
16	There should be a little bit of salt included in elderly diets because most salt has iodine that prevents goitre	4 (40.0)	4(40.0)	2(20.0)
17	Should starchy foods like porridge, rice, bread be included into elderly meals?	9 (90.0)	1(10.0)	0(0.0)
18	A well-balanced diet consists mostly of meat, with smaller amounts of starchy fruits, vegetables and dairy products	3(30.0)	5(50.0)	2(20.0)
19	A well-balanced diet consists mostly of vegetables and smaller amount of meat and dairy products	4 (40.0)	5(50.0)	1(10.0)
20	A well-balanced diet consists mostly of starches, vegetables and fruit with smaller amount of meat and dairy products	5 (50.0)	5(50.0)	0(0.0)

For the question about consuming chicken liver to prevent anaemia, 80% responded it is true, 40.0% answered true on meat having a high content of protein, and 50% indicated false. Of the caregivers, 60% agreed that fruits and vegetables have a high content of minerals and dairy

products have a high content of calcium (70.0%). The caregivers were not sure how to answer the question regarding potato chips containing less fats - 20% answered true, 60% false and 20% did not know. On eko (pap from maize) being rich in fat, 60% answered true. The majority (90.0%) was aware of the importance of whether the elderly is required to eat healthy snacks (Question 11 Table 4.24). Only 10.0% answered true that brown bread with thinly spread peanut butter and jam is a healthy choice and 50% indicated that brown bread is suitable for the elderly. On whether it is healthy for the elderly to eat only one portion of meat every day (Table 4.24), 70.0% indicated it is true, 20% false and 10% did not know; on the inclusion of a little bit of salt in elderly diets, 40.0% answered true and false, respectively. Ninety percent answered true that the starchy foods like porridge, rice, and bread should be included in the in elderly meals.

Only 30.0% answered true for the question regarding a well-balanced diet consisting of meat, with smaller amount of starch, fruits, vegetables and dairy products, and 40.0% answered it is true that a well-balanced diet should consist of mostly vegetables and smaller amount of meat and dairy products, whereas 50% indicated that a well-balanced diet consisting mostly of starches, vegetables and fruit with smaller amount of meat and dairy products was necessary.

4.2.4.4 Results of section D

Section D discusses the last section of the questionnaire about health and food safety.

Table 4.25 Health and food safety

No.	**Item**	**False (%)**	**False (%)**	**Do not know (%)**
1	When working with food, it is important to wash hands at the start of preparations	4 (40.0)	6 (60.0)	0 (0.0)
2	When working with food, it is important to wash hands after using bathroom or toilet	10 (100)	0 (0.0)	0(0.0)
3	You should not wash fresh fruit and vegetables before cooking them	10 (100)	0 (0.0)	0(0.0)
4	It is important to encourage the caregivers to wash their hands before eating	4 (40.0)	4 (40.0)	2(20.0)
5	When preparing food, chopping boards should be used	9 (90.0)	1 (10.0)	0(0.0)
6	Different chopping boards should be used when working with bread, raw food and cooked food	8 (80.0)	2 (20.0)	0(0.0)
7	It is important to encourage the caregivers to wash their hands before serving food	10 (100.0)	0 (0.0)	0(0.0)

Table 4.25 shows the results of nutritional health and food safety. Only 40% of the caregivers know the importance of washing hands at the start of food preparations. All caregivers (100.0%) know to wash hands after using the bathroom or toilet and about washing fresh fruits and vegetables before cooking. The answers to the question about washing hands before eating was worrying as only 40% answered the question correctly. Caregivers know to use chopping boards in preparing foods, and the need for the use of different chopping boards while working with bread, raw and cooked foods (80.0%). Caregivers also know to wash their hands before food service. Apart from washing hands before food preparations and before eating the caregivers' knowledge was acceptable.

4.3 INTERPRETATION AND CONCLUSION OF THE BASELINE SURVEY

The socio-demographic results for the elderly indicated that about 61.7% were females with an average age between 60 and 65, of which 54% were married. The total household income was between N20001-N50000. Twenty percent of the elderly were uneducated and more than 50% had tertiary education. Most of the participants spend N10001-N15000 on food. Approximately 40% of the elderly ate two meals per day and 30% three meals per day.

The elderly's energy, calcium and fibre intake were below the recommended daily allowance whereas the protein and carbohydrate intake were higher. Starchy foods were mostly consumed as confirmed by the top 20 most consumed food results. Most of the starchy foods were indigenous foods. Chicken was mostly consumed followed by fresh fish and pork was consumed less. The results indicated a medium dietary diversity score for the elderly and thus attention should be given to food variety in the Food and Nutrition Guidelines booklet as confirmed by the Nigerian dietary guidelines of eating a variety of foods.

The study identified the need for high level of nutrition knowledge by the caregivers towards their responsibility to care for the elderly with the goal of improved change in healthy dietary habits. The results from the study revealed high level of knowledge in all the four sections (A, B, C, and D) of the nutrition knowledge questionnaire (NKQ) completed in response to the questions asked. There were some shortcomings in some answered questions as stated underneath. On health problems that occur when a person is obese, the answer was, 60% true, indicating the caregivers' knowledge of the symptoms. The question on whether fruits and vegetables are sources of vitamin C, the answer given was 50% correct. About potato chips having low-fat content, most of the response was wrong. The answers given to questions asked

on whether meat has a high content of protein, the responses varied but were mostly wrong or they did not know. The caregivers did not know that a well-balanced diet should consist of mostly vegetables and smaller amount of meat, dairy products and half of them did not know that a balanced diet should consist mostly of starches, vegetable and fruit with smaller amounts of meat and dairy products. On health and safety, the caregivers indicated a low level of knowledge on questions asked on the need to wash hands.

Chapter 5 of the study focuses on the planning, development and implementation of the food and nutrition guidelines.

CHAPTER 5

PLANNING, DEVELOPMENT AND IMPLEMENTATION OF THE FOOD AND NUTRITION GUIDELINES

5.1 INTRODUCTION

This chapter discussed the planning and development of the food and nutrition guidelines for the caregivers of the elderly (Phase 2 of this study), the training of the caregivers (Phase 3 of this study) and implementation of the intervention programme of the food and nutrition guidelines for the elderly (Phase 4 of this study) as set out in Figure 1.1 (The conceptual framework and layout of the study). The FAO framework (Figure 5.1) for nutrition education programmes was used to tailor the nutrition education programme for this study as cited in phases 1, 2, 3 and 4 of the FAO framework. According to conceptualisation or preparation (Phase 1) of the FAO framework, the researcher defined the nutrition problems related to the elderly in Nigeria, determined its causes and established the relevant educational framework. This was done by consulting the related literature sources (Chapter 2) and doing a baseline survey as presented in Chapter 4 addressing sub-objective 1 of this study. The methods used for the baseline survey included two different questionnaires completed by the elderly (FFQ and 24-hour recall) and a nutrition knowledge questionnaire completed by the caregivers as presented in Chapter 4.

Based on this information, the researcher then proceeded to the Phase 2 of the FAO framework and formulated the objectives, design messages, chose suitable media and multi-media combinations in order to formulate a suitable NEP (intervention programme). Phase 2 focused on conducting a literature search (Chapter 2 in this thesis) during which the latest information was obtained on all the topics agreed upon. The researcher decided on developing a booklet for the caregivers. The results discussed in Chapter 4 and the existing menus (Annexure M) used by the caregivers were applied to support the developed content of the Food and Nutrition Guidelines booklet (Annexure N) for the intervention programme to take place in Ondo West, Nigeria. Also, the knowledge of the caregivers was determined to identify the gaps in their food and nutrition knowledge. These gaps were addressed by means of the designed training programme as discussed in this chapter. Moreover, the Nigerian food guide pyramid, as well as the South African, American, New Zealand and European food-based dietary guidelines,

served as a basis to develop the Food and Nutrition Guidelines booklet (Annexure N). The text of the Food and Nutrition Guidelines booklet was written, after which the contents were checked by a registered dietician from Nigeria for correctness. The guidelines were developed to provide in-depth information on all the nutrient needs of the elderly to guide the caregivers of the elderly to implement this knowledge and practices in the old people's homes. The objectives for each of the messages in the 12 modules developed were to address the problems associated with the dietary behaviour of the elderly as described in Chapter 4. In addition, it was designed to address sustainable healthy living of the elderly taking into consideration the knowledge gaps of the caregivers.

Phase 3 of the FAO framework guide the researcher to the implementation of the food and nutrition guidelines as presented in section 5.4. Phase 3 (Figure 5.1) involved producing the needed materials for the instruction manual for training (Annexure O), training the change agents (the caregivers) and executing the communication intervention with the media and multimedia materials available at the local community environment. Figure 5.1 explains the evaluation of the training programme (Phase 4), to confirm the suitability of the Food and Nutrition Guidelines booklet designed by the researcher for the caregivers of the elderly. This was done by means of the comparison of pre-test (baseline) and post-test to ascertain the impact on the dietary behaviour of the elderly as discussed in Chapter 6. Compliance of the caregivers was tested by utilising NKQ, observations in the kitchens during food preparation and group interviews. Furthermore, post-testing was done for the elderly through 24-hour recall and FFQ.

Phase 1 (Chapter 4)	**PREPARATION** Defining the nutrition problems Determining the causes of the problem Establishing the educational framework
Phase 2 (Chapter 5)	**FORMULATION** Setting the objectives Designing messages (12 Modules Booklet) Choosing the media and multi-media combination
Phase 3 (Chapter 5)	**IMPLEMENTATION** Producing the material (training tools) Training the change agents (sessions for caregivers) Executing the intervention (implement in three old people's homes)
Phase 4 (Chapter 6)	**EVALUATION** Nutrition guidelines **(post-testing)**

Figure 5.1 Adapted FAO Framework of nutrition education (FAO, 1998).

The NEP framework is characteristically a food-based route for research continuity along with a scientific evaluation data (FAO 1998).

5.2 PLANNING OF FOOD AND NUTRITION GUIDELINES FOR THE CAREGIVERS (FAO PHASE 1 PREPARATION)

Sub-objective 2 of this study was to plan and develop food and nutrition guidelines for caregivers of the elderly (Phase 2 of this study). Therefore, questionnaires were used by the researcher to determine the current nutrition knowledge. The researcher looked at the existing menus (Annexure M) currently used at the old people's homes to determine the food variety (as confirmed with the FFQ results), cooking methods and availability used to compile improved cycle menus for the elderly (Annexure P). The researcher furthermore consulted literature providing guidelines for healthy eating for the elderly.

5.2.1 Defining the problems

Gaps in nutrition knowledge identified in the situational analysis were used as a starting point for the development of NE intervention. The current information in the Nigerian food-based dietary guidelines did not meet up with the dietary needs of the elderly who, over the years, were used to poor dietary behaviour caused by their consumption of meals that are deficient in the required level of nutrients as revealed in the 24-hour recall and the FFQ results in the baseline survey. After the report (Chapter 4) of the baseline survey was presented, the management of the old people's homes and the caregivers, along with other stakeholders in the research project, agreed on the need for implementation of nutrition education training intervention programme. The need for the intervention was as a result of the poor dietary behaviour of the elderly and lack of nutrition knowledge of the caregivers in the old people's homes located in Ondo West city, Nigeria.

5.2.2 Determining the causes of the problem

The result of the baseline survey in this research (see Chapter 4) revealed that the majority (44.1%) of the elderly in the three old people's homes were between the ages of 60-65 years with 61.7 % females and 38.3% males with a total household income of N10001-N20000 (24.2%). The dietary habits of the elderly indicated that 41.6% had two meals and 31.6 % three meals per day. The energy intake for both the males (5646.31kJ) and females (5334.60kJ) was lower than the recommended intake. The elderly consumed more carbohydrates and protein than the recommendation. The nutrient intake analysis indicated deficient intakes for calcium,

iron and vitamins A, $B_{6,}$ B_{12}. The consumption of nutrient-dense foods is vital for the elderly and this includes vitamin D, B_{12}, B_6 and calcium. Elderly aged 50 years and above were recommended to take vitamin B_{12} as a supplement, as indicated in the baseline study, where deficiency leads to depression (National Institute of Health 2011).

Fibre intake was also very low which could lead to the elderly suffering from a slow digestive system. This can be avoided by a high fibre intake like whole grain cereal, rice, and fresh fruits and vegetables, all of which have a positive influence on the gastrointestinal tract (WHO 2012). From the analysis of the food consumption on the top 20 most commonly consumed items, pounded yam was the highest with 79%, carbohydrate-sourced food items were consumed more than the protein-rich foods. Such foods consist of: jollof rice, plantain, pounded yam, cassava, pap, bread and potatoes while consumption of protein-rich foods like eggs (6%), fish (13%) chicken (14%) was low. Milk was consumed by 60% of the elderly. Consumption of traditional vegetables food items was low for okra (5%) and ewedu (2%). The dietary intake of the elderly consisted of foods including yam, rice, beans, semolina, soy, milk, pap and bread as depicted in Table 4.11. The result of the baseline informed the developed food and nutrition guidelines.

5.2.3 Establishing the educational framework

Before the commencement of the design of the Food and Nutrition Guidelines booklet used in the nutrition education training programme, the researcher visited the elderly in Ondo West city community in Nigeria to establish the relationship on the research, and also held a discussion with the management of the three old people's homes selected for the study (WHO 2002). Meetings held focused on identifying the training venue, time and selected days suitable for each of the old people's home and the caregivers.

The following were considered in designing the Food and Nutrition Guidelines booklet:

- The low literacy level of the participants (caregivers) in the NEP necessitated the following steps to develop the training schedules:
- Developing an in-depth literature review using internet searches for relevant information to determine different types of learning that are available and suitable.

- Determining the content of the nutrition education training intervention programme based on the guidelines used in the research and its suitability for the Nigerian elderly along with cultural settings, thus ensuring compliance with their food intake needs.
- Selecting suitable contents for use with images for visual presentation. The use of written information in the NEP has benefits of consistency, flexibility delivery of messages, cost-effectiveness, clarity of unasked questions during training session and permanence of information (Oldewage-Theron & Napier 2011:287)

5.3 DEVELOPMENT OF FOOD AND NUTRITION GUIDELINES FOR THE CAREGIVERS (FAO PHASE 2 FORMULATION)

Phase 2 of the adapted FAO framework focused on the development of nutrition guidelines for the elderly in the three old people's homes in Ondo West city, Nigeria. This is part of sub-objective 1 of this study to develop food and nutrition guidelines for caregivers of the elderly (Phase 2 see Figure 1.1). This phase involved a review of the existing Nigerian food-based dietary guidelines and incorporating related information from the guidelines of Nigerian food-based dietary guidelines, South African food-based dietary guidelines, dietary guidelines for the Americans, New Zealand dietary guidelines and European food-based dietary guidelines towards the needs of the elderly in the research locations, in order to actualise the objectives of the project, as discussed previously. The dietary guidelines consulted were intended to establish a basis for public food and nutrition education programmes for healthy eating and lifestyles. They also provide advice on foods, food groups and dietary patterns for the required nutrients to the general public in promoting overall health and prevention of chronic diseases; and characteristically translate nutrient recommendations into simple information using language and symbols understood by the public. They also focus on foods commonly consumed, portion sizes and behaviour, (DGA 2015; FAO 2016). The SAFBDG fits into the Nigerian elderly situation as the information on dietary needs of the elderly in South African food-based dietary guidelines (SAFBDG) is more detailed than the Nigerian food-based dietary guidelines (NFBDG) for the Nigerian elderly, because of areas of needs that were specified. Advisably, the information on SAFBDG were integrated into the guidelines for use of the Nigerian elderly. The seven food groups in the SAFBDG emphasised sourcing food commodities locally and affordably which is also suitable for the Nigerian elderly within their environment. The South African food-based dietary guidelines fit into the Nigerian situation in that they are more detailed and emphasized sourcing food locally and affordably.

In addition, the USA, dietary guidelines for the Americans (DGA), fit into Nigerian elderly situation as there is a close link between the information on DGA and NFBDG. The American guidelines are more explicit and specify the area of needs by the elderly on food items and their implications on healthy living and cover the consequences of contracting diseases; for example, hypertension, diabetes and heart diseases. DGA information was integrated into NFBDG to help the Nigerian elderly in their dietary needs because of the more detailed information therein (USDHHS 2008; 2010:332). The DGA provides general tips for the elderly consisting of: plan meals and snacks to include favourite foods; use a variety of foods from each of the four groups; prepare foods that provide a variety of texture, colour and temperature; provide a pleasant setting, i.e. flowers, placemats, matching tableware and food lighting which the researcher adopted and included as part of the nutrition guidelines developed for the Nigerian elderly. The DGA, further consulted, included the following: eat a variety of foods as depicted in the food pyramid with recommended daily serving of four food groups; balance the food eaten with physical activity because of non-communicable disease; choose a diet low in fat and cholesterol; choose lean meat, poultry and fish; increase consumption of fish to two or three servings per week; trim away visible fat, try low cooking fat methods such as boiling, baking and steaming; use monounsaturated fat, e.g. canola, olive oil; substitute high-fat food with low; choose a diet with plenty of grain products, vegetables and fruits, eat more of whole grains; choose a diet moderate in salt and sodium, limit salt-cured, smoked and nitrite-cured foods and sodium-laden processed foods; moderate alcohol consumption. The American guideline fits into the Nigerian context because it contains more information than the Nigerian food-based dietary guidelines. Also, it emphasised caution on unhealthy food consumption.

New Zealand dietary guidelines emphasised the following (and they displayed the forms of food groups): enjoy a variety of nutritious food; making healthier food choices; food safety and physical activity; maintain healthy body weight by eating well and getting involved in daily physical activity.

Evidenced based methodology was applied for good understanding for the implementation of the guidelines by the caregivers. Also, close attention was paid to the criteria needed to evaluate information on diet-disease relationship. The information on the nutrition guidelines was based on the emphasis that, informed food choices for the elderly should consist of more plant-based diets such as: dry beans, peas, whole grains and seeds, in a public community dominated by

poor diets, to prevent non-communicable diseases (DGA 2015). Related research to this study indicated that dietary guidance (science-based) should be modified as it cannot be used without modification as applied in this study (Anderson & Zlotkin 2000:1405). This is because each country should use the best scientific knowledge available to develop dietary guidelines that are appropriate to meet the needs of the target population. For example, the focus of fat intake reduction in a developed country may not be applicable in a developing country (Steyn, Nel, Nantel, Kennedy & Labadarios 2006:644). The research went further to state that it is not ideal to develop a new set of dietary guidelines entirely because of the legislative and long-term protocols involved with governmental approval which requires the global clearance from WHO and the various specialists that should constitute the membership of the working committee.

For the development of the Food and Nutrition Guidelines booklet, menu planning with reference to cycle menus was included to enhance the currently used cycle menus (Annexure M). The aim of cycle menus is to save time, avoid repetition and simplify food purchasing. A cycle menu refers to a series of menus planned for a specific period of time. For example, three weeks. The menu is differentiated by each day in the cycle. At the end of the cycle (i.e. three weeks), the menu is repeated in the same order. This encourages saving of labour costs, time on menu planning, recipe preparation and smart shopping when foods are purchased, keeping inventory at appropriate levels and reduction of food waste. Planning a cycle menu involves gathering menu planning materials which consist of the food groups and meal pattern requirements and making copies; deciding on the number of weeks the cycle menus will take. A cycle menu for old people's home should be used at least for three weeks, to avoid repetition in service (Annexure P).

5.3.1 Setting the objectives

The objectives of the food and nutrition education programme were to evaluate its suitability for the elderly use through their caregivers with due consideration to the acceptability and preference of relevant information in the booklet, the language of expression, its simplicity, formats, pictures and illustrations in the posters for effective training as suggested by Contento (2011). The objectives of the NE intervention training programme were purposed to explain the basic concepts of food and nutrition guidelines; the description of basic principles for menu planning and how to read food labels; as well as identifying with teachings on four methods of preparing foods their storage. The learning objectives to measure the outcome of each module were included in the booklet in each module.

The following objective was set for each of the 12 modules in the Food and Nutrition Guidelines booklet. The objective of module 1 was to discuss the developed Nigerian food based guideline pyramid for the elderly which forms the basis for this training manual. To improve the knowledge of the caregivers on the use of natural flavouring agents to enhance the taste and aroma of food in moderate amounts suitable for the elderly was the objective for module 2. Module 3 was developed to provide information on the use of healthy oils suitable for elderly consumption. Module 4 explained the importance of the consumption of fish, meat and other protein-sourced food items as part of a balanced meal and discussed the benefits of fish, meat and other protein sources for the health of the elderly while module 5 explained the importance of including dairy products as part of a balanced meal for the elderly. Explain the importance of daily consumption of fruit as part of a balanced diet was the objective of module 6, and module 7 explained the importance of including a variety of vegetables as part of a balanced diet. Module 8 focused on improving the awareness of the importance of inclusion of grain and legumes to the diet of the elderly while module 9 created awareness by the elderly, that baked products such as cakes, sweets and chocolate should be consumed in moderation and daily consumption of sweets, chocolate and baked products is not advised on health grounds. The objective of module 10 was to discuss the important role water plays in the sustaining healthy living among the elderly and module 11 discussed the significance of engaging in daily physical activity for the elderly. Finally, the last module was designed to provide the needed guidance to the caregivers for menu planning for the elderly, to provide guidelines on healthier food preparation practices for the elderly and to enhance the caregivers' knowledge to utilise information acquired during the training on healthy food choices that can be used during menu compilation, food preparation and in serving portion sizes. Further, module 12 included objectives to prepare meals with specific consideration of dietary needs, to provide the needed guidance on the preparation of healthy meals without losing nutrients during food preparation and cooking and to emphasise preparation utilising appropriate nutrition knowledge.

5.3.2 Designing the Food and Nutrition Guidelines booklet

In designing the Food and Nutrition Guidelines booklet (Annexure N), the researcher conducted an in-depth literature review using the internet searches and the library for relevant information to determine different types of teaching and learning models that are available and

suitable. The researcher also determined the content of the nutrition education training intervention programme based on the baseline data, the dietary needs of the elderly and related literature. Furthermore, the guidelines used in the research and its suitability for the Nigerian elderly along with cultural settings were taken into consideration to ensure compliance with their food intake needs was taken into consideration and selecting suitable contents for use with images for visual presentation. The researcher additionally considered the use of written information in the NEP to include consistency, flexibility in the delivery of messages, cost effectiveness, clarity of unasked questions during training sessions and permanence of information as mentioned by Oldewage-Theron and Napier (2011:287).

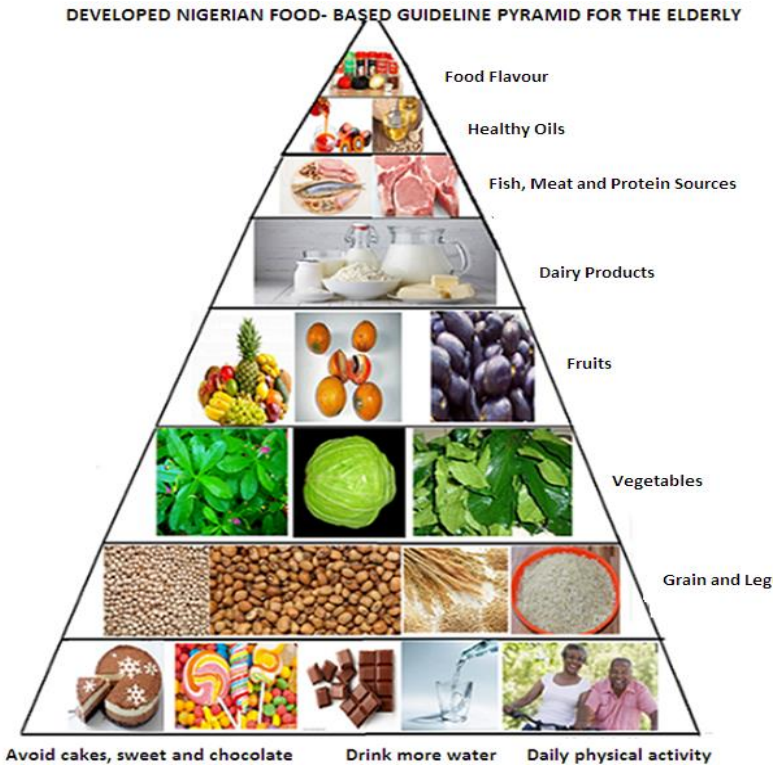

Figure 5.2: Developed Nigerian food-based guideline pyramid for the elderly

Source: Developed by Olomo (2018). Adapted from the Nutrition Division, Federal Ministry of Health Abuja, Nigeria (NAFBDG 2006:14); South African food-based nutrition guidelines (Schonfeldt, Pretorious, Hall & Bester 2013:226). Ministry of Health, New Zealand; New Zealand Dietary Guideline (2011); US Dietary Guideline (DGA 2015)

For the research study, relevant information from the Nigerian food-based dietary guidelines used consists of the following: eat a variety of foods as indicated in the food pyramid recommended for daily servings of the key food groups; balance the food eaten with regular

physical activity and maintain or improve weight to control excessive weight gain; choose a diet low in fat, saturated fat and cholesterol; choose lean meats, poultry and fish; increase consumption of fish and skinless poultry with two to three servings per week; trim away visible fat; try low cooking fat methods such as: boiling, baking and steaming; substitute high-fat food with low; choose a diet with plenty of grains products, vegetables and fruits; choose a diet moderate in salt and sodium, limit the use of salt-cured smoked items and moderate alcohol consumption. Furthermore, supplementary information was provided on local meals consumed in the community for additional options for elderly on their menu list which consists of: soft pap, yam chip (snacks); a variety of foods from each of the four food groups; and foods with varieties of textures. This information was used to develop a Nigerian food based-dietary guideline pyramid for the elderly (Figure 5.2).

In designing the programme, the following information was included in the 12 modules (Annexure N). In the guidelines: introduction to nutrition guidelines, food flavouring; healthy oils; fish, meat and protein sources; dairy products; fruits; vegetables; grains and legumes; avoid cakes, sweets and chocolates; drink enough water; daily physical activities; menu compilation and food preparation. The 12 modules in the Food and Nutrition Guidelines booklet will be discussed below.

5.3 2.1 Module 1

An introduction to the Nigerian food-based dietary guidelines for the elderly that provided information on eating adequate amounts of foods; increased consumption of fish and its products; fermented solid foods (wara-local cheese), kunu, soybean solid and soft pap. The information provided emphasised the importance of training caregivers and the materials used for the session using the pyramid; visual presentation (Microsoft PowerPoint and posters); nutrition guideline training booklets; pictures of food items; flavourings used in food preparations; cooking equipment and aids; identification of the food items shown on the pyramid.

5.3.2.2 Module 2

Flavourings were included highlighting the health implication of eating more salt than recommended; how it enhances tastes and aroma; limiting the quantity of salt used in food preparation; altering of natural foods that lack flavour; defining flavour; aroma; use of different

flavouring: ginger, turmeric, cayenne pepper, cinnamon, black pepper. Asking questions on flavouring: helping the elderly by improving the taste of food and boosting appetite.

5.3.2.3 Module 3

The modules on healthy oils provided information on various types of healthy oils (palm oil, vegetable oil); their use, health implications and benefits; micronutrient content; diseases caused by its deficiency; lists of those with Omega-3.

5.3.2.4 Module 4

Fish, meat and protein sources: stress its importance and benefits with the health implications involved along with portion size required daily per person; its preparation and inclusion in the meal with types involved like salmon, sardine, trout fish; white meat, chicken; eggs; turkey; skinned chicken at preparation. Questions were asked on the preference of fish intake by the elderly; avoidance of red meat consumption because of cancer; suitability of fish for elderly; and benefits of eating protein-rich foods.

5.3.2.5 Module 5

The dairy products module (Annexure N) included nutrient sources of dairy products, calcium, potassium, vitamin D, and protein were explained and their roles in keeping strong bones through consumption of nutritious foods. According to the Institute of Medicine (IoM) (2010), dietary reference intake for calcium and vitamins: estimated average requirements specifications were considered suitable for the use of the elderly in Nigeria (IoM 2010).

5.3.2.6 Module 6

Health benefits of eating fruits were discussed in module 6, mentioning the types available and accessible in the community such as: apple, orange, pawpaw, banana and grape. Portion size per person was specified with their nutrient values.

5.3.2.7 Module 7

The vegetable module indicated the importance of vegetables in the diet of the elderly which was explained along with the specified portion sizes per person on daily intake. Various types were referred to like, leafy greens, lettuce, pumpkins, carrots and tomatoes, and their health benefits were highlighted.

5.3.2.8 Module 8

This was the module on grains and legumes. Varieties of cereal grains and legumes were mentioned during the training session with detailed explanations on the objective for inclusion in elderly dietary intake, its importance and health implications. Examples of grains and legumes discussed are peanuts, soybeans, lentils, dried beans, chickpeas, etc.

5.3.2.9 Module 9

Module 9 focused on avoiding of cakes, sweets and chocolate. The training session emphasised that the elderly should avoid consumption of cake, sweets and chocolates because of health hazard and advised these, if eaten, should be taken in moderation with a portion size of 30 grams per person. Diseases caused are cancer, heart diseases, high blood pressure and inflammations.

5.3.2.10 Module 10

To drink enough water, was emphasised and the elderly were implored to remember to drink enough water to avoid dehydration. 1920ml was recommended for daily intake. Drinking enough water is ideal to reduce thirst, enhance metabolism and for better digestive health.

5.3.2.11 Module 11

Daily physical activity was discussed in module 11. The training session encouraged older people of 65 years that are physically fit with no health conditions and mobility limitation to get involved in daily activities. The benefits were discussed which included independent living; reduction in risk of falling and bone fractures; reduction in coronary heart diseases and high blood pressure.

5.3.2.12 Module 12

Finally, the menu compilation and food preparation module were developed. The trainees were duly informed on methods involved in compiling a menu that is suitable for elderly needs and food preparations. Guidance was provided on menu planning and food preparation practices. Cycle menu procedures were taught to the caregivers.

5.3.3 Nutrition education training tools used for the caregivers

The training tools used for caregivers included face-to-face communication in lecture format conducted by the researcher and facilitated by a Yoruba-language-speaking caregiver from the community working in the old people's homes (one FBDG each session) and developed NE material in booklet form, based on selected FBDGs. Designing the contents and training plans as contained in the instruction manual for training (Annexure O) in Ondo West, Nigeria with due consideration of their communication level and understanding of the Yoruba language as well as their educational literacy levels.

The training tools, as stipulated in the instruction manual for training the caregivers (Annexure O) were used by the trainer (researcher) during the intervention and were used together with Food and Nutrition Guidelines booklet (Annexure N). The booklet contained an introduction to the Nigerian nutrition guidelines for the elderly; information on food flavouring; healthy oils; fish, meat and protein sources; dairy products; fruits; vegetables; grains and legumes; why cake, sweets and chocolates should be avoided; the importance of drinking enough water and daily physical activity and finally a section on menu compilation and food preparation. The researcher demonstrated food-preparation techniques to the caregivers where after the caregivers could prepare their own meals practising the skills learned in the session. Cooking demonstrations included boiling, stewing, frying, steaming, braising in the oven; barbecuing and roasting and the correct use of kitchen equipment. This was demonstrated with recipes using appropriate measurements for portion sizes and food models. Hand-outs were given to the caregivers during training sessions.

Figure 5.3 Training tools used for training of the caregivers

Visual presentation consisted of posters, Food and Nutrition Guidelines booklets; samples of flavouring and food items used in preparing meals; as well as the use of pictures of various food items. To understand the content of the guidelines, relevant pamphlets issued by a dietician and food models representing various dishes that the elderly needs were used by the researchers as training tools.

According to Banna (2013:2), one of the more effective approaches to deliver nutrition materials and information to the caregivers is using the "train-the-trainers" method. The researcher further stressed that train-the-trainer tactic works by having a few qualified individuals learn a certain nutrition curriculum which they subsequently pass on what they learn to another group of people (Train the Trainer 2011:1). Thereafter, it was emphasised that this strategy of train-the-trainer tactic is an effective upstream line of attack that provides in-depth nutrition concept knowledge, instructor training, facilitation skills and ultimately prepares the receivers to accept what the trainer imparts, in order for them to play the needed role to the elderly (Train the Trainer 2011:1). Needs assessment survey of the elderly population for information on the areas where intervention would be fitting was conducted.

5.4 TRAINING THE CAREGIVERS AND THE INTERVENTION PROGRAMME (IMPLEMENTATION)

The study sub-objective addressed in this section was to train the caregivers on food and nutrition knowledge required for their role in caring for the elderly (Phase 3) and to implement the intervention programme of the food and nutrition guidelines (Phase 4).

5.4.1 Producing the materials

The researcher prepared all the training materials in the form of the printed food and Nutrition Guidelines booklet (Annexure N) for the training of the caregivers of the elderly. The researcher made copies of the booklet for each caregiver.

5.4.2 Training of the caregivers

This part of the study focused on the caregivers who completed and signed the consent forms. An agreement was reached for the training to be held twice weekly for eight hours. The caregivers agreed to attend the training on Wednesdays and Thursdays. The training involved the use of the 12 modules and focused on empowering the caregivers to take care of the elderlies' diet and health. The training was divided into three training sessions, which can be seen in Table 5.1 in the text.

Table 5.1 Nutrition education programme training schedule

Date	Module used	Duration
May–June 2018 (6 weeks)	Module 1: Introduction to the use of nutrition guidelines of Nigeria as per Food and Nutrition Guidelines booklet.	Twice a week for three weeks
Training session 1 week 1 June 2018	Module 2 and 3: Food flavouring and healthy oils.	
Training session 2 July, week 2	Module 4 and 5: Fish, meat, protein sources and dairy products.	Twice a week for three weeks
Training session 2 August 2018	Module 6, 7 and 8: Fruits vegetables, grains and legumes.	
Training session 3 September 2018 week 3.	Module 9, 10 & 11: Avoid cakes, sweets and chocolate; drink enough water; get involved in daily physical activity (strength, balance, aerobic and flexibility training).	Twice a week for three weeks
Training session 3	Module 12: Menu compilation and preparation.	

The first training session was about the introduction to nutrition guidelines and consisted of a PowerPoint presentation made used for a face-to-face lecture (Figure 5.4). The presentation covered the introduction of Nigerian nutrition guidelines, basic nutrition knowledge,

specifically the developed pyramid for the elderly, portion sizes and nutrients, and part 2 of training session 1 included food flavouring, healthy oils.

Figure 5.4 Training session of the developed Nigerian food-based guideline pyramid for the elderly

During the training session, the information contents of the developed Nigerian food-based guideline pyramid (Figure 5.4), which formed the basis of the training manual, were discussed for better understanding and implementation by the caregivers. The pyramid is a basic guide for foodservice and portion sizes and enhances a healthy living lifestyle for the elderly.

The second training session involved discussions on fish, meat and protein sources; dairy products; and the section session of training session 2 covered fruits; vegetables; grains and legumes. After the video presentation was shown, questions were asked of the caregivers. The modules include information about food flavouring; healthy oils; fish, meat, protein sources; dairy products; fruits; vegetables; grains and legumes.

Figure 5.5 Face-to-face training

The third training session included a discussion on avoiding cakes, sweets and chocolates; drinking water; daily physical activity. A lecture was conducted about healthy food choices and eating habits. Section 2 of training session 3 provided the caregivers with information on menu planning and eating habits suitable for the elderly were discussed; furthermore, menu compilation and food preparation were demonstrated. The trainees were allowed to try on their own, "make your own meals" hands-on training sessions. This provided them with the opportunity to practise what they learnt about the previous training session on local food products for the elderly. Food preparation was discussed to provide information on the use of relevant methods of cooking, kitchen maintenance and cleaning. Provision of hand-outs was made available during the training session. The responsible person for the training of the caregivers was the researcher. The training medium provided insights into old people's homes foodservice environment. The NEP took place from May to September 2018.

5.4.3 The implementation of the intervention

The three old people's homes in Ondo West, city of Ondo, Nigeria were sequentially selected for the implementation of the NE intervention programme of the developed Food and Nutrition Guidelines booklet. After the training of the caregivers, they were sent back to the old people's homes to implement the newly learned skills in the kitchens. Phase 4 of this study was implemented between October 2018 and March 2019.

Figure 5.6 Bayo Fatusin caregivers participating in the training programme

Close supervision was maintained by the presence of the researcher whenever the caregivers/cooks were preparing foods to determine compliance with food handling rules (reported in Chapter 6). The researcher observed the preparations of the food in the three old people's homes. Simultaneously menu development was implemented by the researcher and a dietician who worked with the caregivers/cooks in the old people's homes to modify the menus and recipes for compliance with the nutrition guidelines developed by the researcher, thus making use of the baseline results on the nutrient deficiencies in the current meals taken by the elderly in the old people's homes.

Figure 5.7 Caregivers participating in the training in the implementation at Daughters of Charity Provincial House

Figures 5.6-5.8 show the caregivers from the three different old people's homes, namely Ibitayo Fawehinmi Foundation, Bayo Fatusin and Daughters of Charity Provincial House taking part in the study.

Figure 5.8 Caregivers from the Ibitayo Fawehinmi Foundation

5.5 CONCLUSION

The practical guide provided by FAO and WHO framework (1998) relevant to the study, was adopted as an acceptable method for planning the NEP programme in this study. The four phases involved the preparation, formulation, implementation and evaluation of the NEP. The designing of the food and nutrition guidelines involved the review of the existing guidelines of: Nigerian food-based dietary guidelines, South African food-based dietary guidelines, dietary guidelines for the Americans, New Zealand dietary guidelines, and the European food-based dietary guidelines for the dietary needs of the elderly in the research locations. The study reiterated the specifications of evidence-based methodology for better understanding of the caregivers to enable them to implement effectively and with ease the food and nutrition guidelines in the old people's homes as applied in the NE training programme. The training materials used for the research consisted of the developed Food and Nutrition Guidelines booklet; including the instruction manual for the training of the caregivers used by the researcher. Training tools included pictures of each food item discussed in each module; sampling of flavouring and food items used in preparing meals; kitchen equipment to reinforce the verbal education training.

In Chapter 6, the evaluation as suggested by the FAO frameworks determines the effectiveness of the developed Food and Nutrition Guidelines booklet for caregivers of the elderly in the community will be discussed.

CHAPTER 6

EVALUATION AND IMPACT OF THE FOOD AND NUTRITION GUIDELINES INTERVENTION PROGRAMME

6.1 INTRODUCTION

This chapter discussed Phase 5 of the study, addressing the objective of evaluating the compliance by the ten caregivers of the elderly regarding the use of the developed food and nutrition guidelines. The evaluation aspect (Phase 5 of the FAO framework Figure 5.1) of this research study consisted of observations of the caregivers in applying the food and nutrition guidelines and group interviews with the caregivers/cooks of the three old people's homes in Ondo West city, Nigeria. The post-test was conducted to test the effectiveness of the training programme used as a food and nutrition education intervention programme. The post-test evaluation of the caregivers was conducted to test their level of nutrition knowledge compared to the pre-test at the baseline, making use of the nutrition knowledge questionnaire (Annexure J) to determine compliance. The post-test study contained the same questions used for the pre-test of nutrition knowledge before the intervention.

In addition to the compliance of the caregivers, the post-test assessment of the 120 elderly participants in the old people's homes, making use of 24-hour recall and food frequency questionnaires, were used to determine the impact of the NEP. This part of the study took place during May 2019. Therefore, this section addressed Phase 6 of this project (Phase 5 of the FAO framework) as set out in sub-objective (section 1.5.2), to determine the impact of the food and nutrition guidelines on elderlies' food consumption habits. According to Contento (2011:320) evaluation is a central component of NEP used to measure the value of the programme and a valuable tool for the research programme to achieve set goals.

6.2 RESULTS OF THE COMPLIANCE OF THE CAREGIVERS

The success of the implementation of the Food and Nutrition Guidelines booklet was determined by means of testing the nutrition knowledge of the caregivers, observations and group interviews conducted by the researcher. The researcher focused on the compliance of the caregivers and appropriateness of the developed food and nutrition guidelines. The food and nutrition guidelines implementation were tested to confirm the impact and determine the

changes in the dietary behaviour of the elderly in the old people's homes. The purpose was to address sub-objective 5 which was to evaluate the compliance by the caregivers of the elderly on the use of food and nutrition guidelines as set out in the developed booklet (Phase 5).

6.2.1 Comparison of pre- and post-knowledge nutrition results of caregivers

After the implementation of the nutrition guidelines, the caregivers assisting in the old people's homes were evaluated to determine their nutrition knowledge, making use of the NKQ. The same questionnaire used for the pre-test before the NE intervention training programme was used for the post-testing of nutrition knowledge. The questionnaire focused on the developed Nigerian food-based dietary guidelines pyramid (Figure 5.2) for the elderly (section A), vitamin and deficiencies, (section B), general food knowledge (section C) and health and food safety in section D; all topics that were included in the developed Food and Nutrition Guideline booklet.

6.2.1.1 Nutrition knowledge results of section A

Section A below discusses the comparison of the caregivers' pre-test (Table 4.24) and post-test knowledge on the Nigerian food-based dietary guidelines. Table 6.1 indicated results on pre- and post-test comparison on knowledge of Nigerian food based dietary guidelines. All the caregivers were aware of the following statements at pre-test: "If you are more active you need to eat more food"; "soy mince, dry beans, peas are as healthy as meat and should be eaten often as a replacement for meat"; "local cheese (wara) is good for the elder's health"; "elderly people should eat less sugar"; and total food intake should take into consideration a person's level of physical activity. The post-test results for these statements indicated a decline in nutrition knowledge as between 10% and 20. For the rest of the statements a decline incorrect answer was also observed. Most of the caregivers (90%) know that both at pre- and post-test that the diet should contain a wide variety of foods such as cereals, legumes, roots/tubers, fruits, vegetables, fish, lean meat, local cheese (wara) and that the intake of salt, bouillon cubes and sugar should be limited. From the responses of the caregivers, they were answered wrongly at post-test this is a cause for concern because the training during the intervention was supposed to increase their knowledge at the post-test to serve the purpose on the research in the care of the elderly meal intake. There should be an in-house arrangement with the management of the care homes for periodical training by a nutritionist for refresher programmes for the caregivers making use of the developed nutrition guidelines and training manual from the research study.

Table 6.1 Comparison of pre-test and post-test nutrition knowledge

No|	Item	Pre-test		Post-test		
		True (%)	**False (%)**	**True (%)**	**False (%)**	**Do not know**
1	If you are more active you need to eat more food	10 (100.0)	0 (0.0)	6 (60.0)	1 (10.0)	3 (30)
2	Soy mince, dry beans, peas are as healthy as meat should be eaten often as a replacement for meat	10 (100.0)	0 (0.0)	6 (60.0)	1 (10.0)	3 (30)
3	Local cheese (wara) is good for the elder's health	10 (100.0)	0 (0.0)	7 (70.0)	2 (20.0)	1 (10.0)
4	Elderly people should eat less sugar	10 (100.0)	0 (0.0)	9 (90.0)	1 (10.0)	0(0.0)
5	Eat as many fruits that are in season as possible	9 (90.0)	1 (10.0)	8 (80.0)	2 (20.0)	0 (0)
6	Total food intake should take into consideration a person's level of physical activity	10 (100.0)	0 (0.0)	8 (80.0)	2 (10.0)	0 (0)
7	Limit fat intake from animal foods	7 (70.0)	3 (30.0)	9 (90.0)	1 (10.0)	0 (0)
8	The diet should contain as wide a variety of foods as possible, e.g. cereals, legumes, roots/tubers, fruits, vegetables, fish, lean meat, local cheese (wara)	9 (90.0)	1 (10.0)	9 (90.0)	1 (10.0)	0 (0)
9	Limit intake of salt, bouillon cubes and sugar	9 (90.0)	1 (10.0)	9 (90.0)	1 (10.0)	0 (0)

6.2.1.2 Nutrition knowledge results of section B

Section B of the questionnaire covered the various vitamin and health deficiencies. The results of section B (Annexure J) will be discussed in the same order and numbering as the questions in the NKQ and be compared with the post-test. The result revealed that 80% at pre-test were aware of vitamin A deficiency and100% post-test (Question B1). However, none of them could identify the specified symptoms of someone that lacks vitamin A (Question B2); nevertheless, in the post-test, all caregivers were able to identify the symptoms associated with the lack of vitamin A. On health problems (Question B3) that often occurs when a person is obese, 60% of the caregivers had knowledge of the symptoms at pre-test and 100% at post-test. All the participants were aware of the cause of lack of vitamin A in the body both at pre- and post-test (Question B4), and how one can prevent (Question B5) a lack of vitamin A in the body. Thus, an improvement in knowledge of vitamin A was achieved. The question on whether the food based dietary guideline image has been seen before (Question B6) was unanimously answered both at pre- and post-test indicating that all caregivers were aware of the NFBDG. All the caregivers responded positively to answer the rest of the questions and that they were aware of

the health problems that can occur when a person is obese, why people are overweight or obese and could identify what can prevent people being overweight or obesity.

6.2.1.3 Nutrition knowledge results of section C

Section C below discusses the comparison of pre-test (Table 4.25) and post-test (Table 6.2) general food knowledge of the caregivers as depicted below. The result revealed the following on general food knowledge of the caregivers comparatively at pre- and post-test. On the question about fruits and vegetables as a good source of vitamin C, the answer was at pre-test 50% true, and at post-test 100%, indicating an improvement of knowledge. Eighty percent indicated that fruit and vegetables areas a good source of vitamin A for both pre-test and post-test. The question regarding fruits and vegetables having lots of vitamins in strengthening the body's immune system and prevent illness 90% indicated true, at pre-test, 70% at post-test. On eating a high content of calcium-rich foods for strengthening bones and preventing osteoporosis were pre-test 80% and post-test 100%. During the pre-test the question of consuming chicken liver to prevent anaemia was answered true (80%) and only10% indicated true in post-testing. In future training, a clear explanation regarding these issues should be given. The caregivers indicated a huge improvement in the knowledge of the protein content in meat (40% to 90%). Caregivers agreed that fruits have a high content of minerals 60% (pre-test) and 80% (post-test). The knowledge of dairy products remained at 70%. The caregivers' response to the question about potato chips containing less fats, 20% answered true, at pre-test and 30% true, at post-test. Eko (pap from maize) and brown bread results remains the same. On whether elderly is required to eat healthy snacks there was a huge decrease from 90% to 20%. The question on elderly eating one portion of meat daily was 70% and decreased to 40%. Positive results were observed for the question on eating a little bit of salt to prevent goitre. A decline was noticed in the knowledge whether to include starchy food. The caregivers know about balanced diet as an increased of knowledge from pre- to post-test were observed for question 18, 19 and 20.

An increase was observed in nine of the 20 general food knowledge statements, proving that the developed Food and Nutrition Guideline booklet and trading was effective to some extent.

Table 6.2 General food knowledge

No.	Item	Pre-test			Post-test		
		True (%)	False (%)	Don't know (%)	True (%)	False (%)	Don't know (%)
1	Fruits and vegetables are a good source of vitamin C	5 (50.0)	5 (50.0)	0 (0.0)	10 (100.0)	0 (0.0)	0 (0.0)
2	Fruits and vegetables are a good source of vitamin A	8 (80.0)	2 (20.0)	0 (0.0)	8 (80.0)	0 (0.0)	2 (20.0)
3	Fruits and vegetables have lots of vitamins that will strengthen the body's immune system and prevent illnesses	9 (90.0)	1 (10.0)	0 (0.0)	7 (70.0)	3 (30.0)	0 (0.0)
4	Eating a high content of calcium-rich foods will strengthen bones and prevent osteoporosis	8 (80.0)	2 (20.0)	0 (0.0)	10 (100.0)	0 (0.0)	0 (0.0)
5	Consuming chicken liver will prevent anaemia	8 (80.0)	2 (20.0)	0 (0.0)	1 (10.0)	3 (30.0)	6 (60.0)
6	Meats have a high content of protein	4 (40.0)	5 (50.0)	1 (10.0)	9 (90.0)	1 (10.0)	0 (0.0)
7	Fruits and vegetables have a high content of minerals	6 (60.0)	3 (30.0)	1 (10.0)	8 (80.0)	2 (20.0)	0 (0.0)
8	Dairy products have a high content of calcium	7 (70.0)	1 (10.0)	2 (20.0)	7 (70.0)	3 (30.0)	0 (0.0)
9	Potato chips in meals contain the least fat	2 (20.0)	8 (80.0)	0 (0.0)	3 (30.0)	4 (40.0)	3 (30.0)
10	Eko (pap from maize) is rich in fat	6 (60.0)	3 (30.0)	1 (10.0)	6 (60.0)	3 (30.0)	1 (10.0)
11	Elderly required to eat healthy snacks	9 (90.0)	1 (10.0)	0 (0.0)	2 (20.0)	7 (70.0)	1 (10.0)
12	Brown bread sandwich with thinly spread peanut butter and jam is a healthy choice	1 (10.0)	5 (50.0)	4 (40.0)	5 (50.0)	4 (40.0)	1 (10.0)
13	Spinach is deficient in fat	5 (50.0)	3 (30.0)	2 (20.0)	4 (40.0)	4 (40.0)	2 (20.0)
14	Brown bread is suitable for the elderly	5 (50.0)	3 (30.0)	2 (20.0)	5 (50.0)	0 (00.0)	5 (50.0)
15	It is healthy for elderly to eat only one portion of meat everyday	7 (70.0)	2 (20.0)	1 (10.0)	4 (40.0)	5 (50.0)	1 (10.0)
16	There should be a little bit of salt included in elderly diets because most salt has iodine that prevents goitre	4 (40.0)	4 (40.0)	2 (20.0)	8 (80.0)	2 (20.0)	0 (0.0)
17	Should starchy foods like porridge, rice, bread be included into elderly meals?	9 (90.0)	1 (10.0)	0 (0.0)	6 (60.0)	2 (20.0)	2 (20.0)
18	A well-balanced diet consists mostly of meat, with smaller amount of starch fruits, vegetables and dairy products	3 (30.0)	5 (50.0)	2 (20.0)	5 (50.0)	4 (40.0)	1 (10.0)
19	A well-balanced diet consists mostly of vegetables and smaller amount of meat and dairy products	4 (40.0)	5 (50.0)	1 (10.0)	7 (70.0)	1 (10.0)	2 (20.0)
20	A well-balanced diet consists mostly of starches, vegetables and fruit with smaller amount of meat and dairy products	5 (50.0)	5 (50.0)	0 (0.0)	4 (40.0)	5 (50.0)	1 (10.0)

6.2.1.4 Nutrition knowledge results of section D

Table 6.3 revealed the response of the caregivers on health and food safety knowledge questions (compare Table 4.26).

On the question about the washing of hands at the start of food preparations, there was an improvement from 40% pre-test to 100% post-test. As regards the importance of washing hands after using the bathroom or toilet when working with food, the answer was 100% true for both pre- and post-test. On not washing fresh fruits and vegetables before cooking them, at pre-test the answer was 100% true and post-test 10% true, 90% false. This question could have been misleading as it was asked in a negative way. The caregivers' knowledge in washing hands before eating improved. The caregivers were aware of the importance of using chopping boards during food preparation; however, not all were aware of using different chopping boards when preparing bread, raw food and cooked food. Lastly, the response to the question of encouraging the caregivers to wash their hands before serving food declined.

Table 6.3 Health and food safety

No.	Item	Pre-test		Post-test	
		True (%)	False (%)	True (%)	False (%)
1	When working with food, it is important to wash hands at the start of preparations	4 (40.0)	6 (60.0)	10 (100.0)	0 (0.0)
2	When working with food, it is important to wash hands after using bathroom or toilet	10 (100)	0 (0.0)	10 (100.0)	0 (0.0)
3	You should not wash fresh fruit and vegetables before cooking them	10 (100)	0 (0.0)	1 (10.0)	9 (90.0)
4	It is important to encourage the caregivers to wash their hands before eating*	4 (40.0)	4 (40.0)	9 (90.0)	1 (10.0)
5	When preparing food, chopping boards should be used	9 (90.0)	1 (10.0)	9 (90.0)	1 (10.0)
6	Different chopping boards should be used when working with bread, raw food and cooked food	8 (80.0)	2 (20.0)	10 (100.0)	0 (0.0)
7	It is important to encourage the caregivers to wash their hands before serving food	10 (100.0)	0 (0.0)	10 (100.0)	0.(0.0)

* Q4 answer do not know 2 (20.0)

6.2.2 Observation of the implementation of the food and nutrition guidelines by the cooks

The observation was conducted by the researcher involving the cooks in the old people's homes in an unobtrusive way. For this part of the study, only the caregivers who fulfil duties as cooks as well in the old people's homes were observed. The researcher observed visual clues, relating to the layout of the kitchen as mentioned by Davies and Coleman (2013:254). The researcher

observed the kitchen layout, arrangement of equipment, arrangement of raw food materials as displayed for meal preparations, cooking of meals and how the food and nutrition guidelines in the intervention were applied. Also observed were general practices and procedures used in the daily operations of the three different kitchens. Notes and relevant video recordings on a cell phone of the observations were taken.

Each of the participants was observed between the hours of 10 a.m. and 2 p.m. on the different days allocated for the respective kitchens. A window viewing method was used to observe various actions performed by the cooks. The participants were kept unaware and were not given any prior notice about the time for the observations. The time chosen by the researcher coincided with the period scheduled for mid-meals served at 11h00 consisting of sandwiches, croissants and juice and the main meal served from 14h30 to 15h00.

The researcher focused on the following aspects in observing (Annexure Q) the cooks: food preparation and cooking methods, ingredients and food products used the use of recipes and observed general hygiene with food safety practices. The researcher also focused on practices linked to the modules discussed in the Food and Nutrition Guideline Booklet (Annexure N) given to the cooks. The observer recorded all integral aspects of the observations on the activities performed by each participant in his observation field notes (Annexure R). The recorded notes of the researcher on the activities are discussed in the tables below.

The researcher observed the activities of the three cooks responsible for preparing the food for the elderly in the kitchens mentioned earlier. They gave consent to be observed (Annexure D). One of the three cooks/chefs was a trained chief cook employed at Bayo Fatusin Foundation old people’s home, who oversees the kitchen activities and prepares food. The second a senior cook was from Daughters of Charity Foundation old people’s home and the third participant was a chef from Ibitayo Fawehinmi Foundation old people’s home. This approach of train-the-trainer was followed to empower untrained cooks to share their food and nutrition knowledge with the rest of the kitchen staff in each of the different old people's homes. The researcher was the main observer of the activities carried out on the cooks of the three old people’s homes in the study, namely Bayo Fatusin, Daughters of Charity and Ibitayo Fawehinmi foundation located in Ondo West of Nigeria. The observation was carried out in the middle of November 2018 by the researcher on three consecutive days: Tuesday, Wednesday and Thursday respectively in each of the three kitchens.

6.2.2.1 General observations

From the observation (see observation field notes Annexure R), it is evident that cooks were neatly dressed in well-ironed uniforms and wore kitchen aprons. The cooks furthermore wore head coverings (caps) although one of the cook's hairs was not properly covered. The researcher observed clean shaven faces in the men and short hair and nails. Most of the time the cook did not wash their hands before food preparation and thus more emphasis should be placed on hygiene in training sessions. However, it was observed that the cooks washed their hands during and after meal preparation. Hands were not washed with hot soapy water.

It was also observed that separate chopping boards were not used when cutting the different food commodities, instead, general chopping boards were used when preparing food. Moreover, chopping boards and cooking utensils were not washed immediately after cooking. Cleaning of the utensils and workstations was done after food preparation. The cooks used the correct knives during meal preparation.

Foods cooked was kept cold in food containers; foods were left as cooked; prevention of food contamination was not considered. Refrigerating foods was not considered important by the cooks and cleaning of workstations after food preparation was not done; all this could have a negative influence as food handlers play a major role in ensuring food safety throughout the chain of producing, storage and preparation of food because mishandling and disregard for good hygiene measures results in food contamination and attendant consequences (Andy, Mangai, Kayong, Afoi, Goshit, Kasang & Innocent 2015:83).

It is worth noting that no cakes and sweets were served on the days the observations were done. Glasses of clean drinkable water were provided to the elderly during mealtimes as recommended in the guidelines and as emphasised by research conducted by the European Food Security Agency (EFSA) where the panel reported that with ageing, body water stores decrease, thirst sensation is disturbed and kidneys are less able to concentrate urine, putting the elderly at increased risk of dehydration (EFSA 2010:1459).

6.2.2.2 Specific observations on the use of salt, flavouring oils and fats

The observer noticed that in some instances, the cooks placed salt on the table for meal service and when salt was placed on the table for service, the minimal quantity was used. In another old people's home salt was not placed on the table for service. In food preparation, fresh herbs, curry, ginger and turmeric were alternated in place of salt whilst another used too much salt. Furthermore, some cooks used the minimal quantity of fresh herbs. This demonstrates that the cooks apply the information provided in the Food and Nutrition Guideline booklet.

Healthy oils consisting of soy oil, vegetable oil and palm oil were used to prepare the meals and was the most suitable for consumption as per guidelines although one of the cooks used an excessive quantity of oil for food preparation. One of the participants maintained normal heating temperature before and after cooking while one used unregulated temperature in meal preparations. The researcher further observed the low quantity of butter and margarine added to food during preparation. According to a research study, healthy oil has a beneficial effect on health against cholesterol (Surarong, Dujaudee & Ampica 2017:1) and it is evident that some of the cooks adhered to the provided guideline.

6.2.2.3 Observations on the use of meat, dairy and other protein sources

The cooks featured fish in the meals rather than meat. It was probably preferred by the elderly. A participant prepared fish cutting it according to the portion size and used boiling and frying methods for cooking. Meat cuts were correctly cleaned but the additional fat was not removed, and in appropriate portion sizes were used. Suitable cooking methods were used. A research study revealed that fish makes the most widespread contribution to healthy living as the cheapest source of animal protein to some communities and also prevents contact of cancerous diseases for those who avoid consumption of red meat (Fanuel, Penima & Musara 2016:1). The cooks used low-fat dairy yoghurt; some consisted of sugar-free, sweetened and plain low-fat yoghurt respectively. A recent study revealed that dairy products significantly contribute to a balanced diet because of their beneficial macro- and micronutrient composition including high quality proteins and calcium content (Gille, Walther, Badertscher, Bosshart, Brugger, Bruhlhart, Gauch, Noth & Vergeres 2018:17). Further training on these guidelines is needed as discrepancies were observed in the different kitchens.

6.2.2.4 Observations regarding fruits and vegetables

Fruits served consisted of overripe mangoes, pawpaw, oranges, banana, guava and watermelons. Mangos, watermelon and oranges were cut into the required portion sizes as recommended in the developed food and nutrition guideline booklet. This indicated that fruits are included in the meals of the elderly as eating a diet high in fruits reduces the risk of many chronic diseases, including cardiovascular diseases, diabetes mellitus, and certain cancers as they contain potassium, antioxidants, vitamins A, C, D minerals and can promote overall health (Omar, Nouch, Younis, Moftah, Tahani, Salim & Alteeb 2017:299) and was recommended in the developed guidelines. The observation on green vegetables indicated the use of lettuce, cucumber and cabbage. The inclusions of green vegetables in the meal with the correct portion sizes were used. An increased consumption of cruciferous vegetables was reported in research conducted in Iran to cause a decrease in the risk of intestinal, bowel, thyroid, pancreatic and lung cancer. Also, it reduces the risk of non-communicable diseases (Pem & Jeewon 2015:1309).

6.2.2.5 Grains and legumes used by cooks as observed by the researcher

The observation was conducted on the use of grains and legumes in the research. The cooks, used rice, maize and local brown beans mainly in the meals prepared for that day. The grains and legumes were prepared as part of the main dishes (jollof rice, pilaf rice) and it was well seasoned as observed by the researcher. Cereals and legumes are significant sources of energy, protein, dietary fibre, vitamins, minerals and phytochemicals (Morteza & Prakash 2016:1). The observation conducted by the researcher indicated that the cooks in the three different old people's homes applied what was learnt in the food and nutrition training sessions although there are some of the modules that were not fully understood and applied. More training and emphasis needs to be put on the areas where the cooks were lacking.

6.2.3 Group discussion results regarding food and nutrition knowledge

The research team for the group interview consisted of the researcher as the principal investigator and the postgraduate students of the Wesley University of Technology Ondo, Nigeria to assist the researcher in organising the process and do the set-up for the group interviews. Ten caregivers/cooks participated in the group interview. The Ondo Social Centre Community hall was used for the interview. It consists of seat arrangements in spherical form with the researcher strategically positioned to interact conveniently with explanations and allows him or her to ask and answer questions logically. Open-ended questions (Annexure S)

were asked making use of information contained in the developed nutrition guidelines. There was a person assigned to make a video and a camera recording with a cell phone. Notes were taken by the researcher himself, assisted by one of the postgraduate students from Wesley University of Technology Ondo, Nigeria, who acted as the moderator.

The group sessions were conducted by using the group interview question guide compiled by the researcher consisting of 13 questions (Annexure S). Questions were asked on the 12 modules and all the answers were written down by the moderator. During the session, the researcher had to promote debate and discussions by asking open-ended questions to ease-out peoples' perceptions and meaning about the topic. The researcher, who doubled as the facilitator, also had to ensure that everybody participated and had to ensure that conversations did not deviate from the topic and guidelines provided. Group interviews need to be run consistently according to Gibbs (1997:1). The verbatim recoding was transcribed and coded by means of axial and open coding. Concepts, categories and themes were identified and will be reported in the following sections.

6.2.3.1 Theme1: General knowledge of food and nutrition guidelines

The participants' knowledge (Table 6.4) showed they had knowledge of some of the macro-nutrients as participants could only recall carbohydrates and proteins.

Table 6.4 General knowledge of food and nutrition guidelines

Category	**Concept**	**Sub-concept**	**Responses/Quotes**
General Knowledge	Recall Macro-nutrients	Carbohydrates Proteins	Nutrition guidelines contain information on food nutrients, e.g. carbohydrates and proteins.
	Provide directives	What to eat What not to eat	Nutrition guidelines give directives on what to eat and not.
	Provide information	Nutrient content Balanced diet Food groups	It provides information on having a balanced diet; It is a good source for high nutrient foods; Nutrition guideline is a source of information on the food intake for healthy living; It is an access for nutrition knowledge for workers of old people's homes; It contains information on food groups desired for human health.
	Provide advice	Prevent diseases body growth	It advises on prevention of diseases; It is useful to know the foods required for body growth.
Lack of knowledge	Do not know content	Awareness	I don't know about nutrition guideline but am aware of its importance to the elderly.

Fat as a micronutrient was missing indicating a lack of knowledge. The participants were aware that the guide will inform and give advice to you about what to eat and what not to eat as well as information on nutrient contents and balanced diet based on the different food groups. One of the participants indicated an awareness of the importance of the guidelines for the elderly specifically but was unable to recall its contents.

6.2.3.2 Theme 2: The importance of nutrition guidelines for use in old people's homes

In this theme, the nutrition guidelines are important in sourcing nutrients from local food products in the community. It provides insight into the categories identified as nutrient knowledge, menu planning, portion sizes, and applying hygiene standards by the caregivers/cooks, standardisation of recipes, cautions on diseases and its implication along with partaking in physical activities and improving dietary habits.

Table 6.5 Importance of nutrition guidelines for use in old people's homes

Category	**Concept**	**Responses/Quotes**
Source of nutrient knowledge in food products	Local foods; Yam, Cassava	Nutrition guidelines are good for use in old people's homes to source required information on food nutrients, e.g. carbohydrates from yam, cassava, protein from local beans (ewa). It provides more nutrient knowledge for people caring for the elderly.
Menu planning	Balanced diet; body needs	It enables planning a balanced diet for the essential body needs of the elderly.
	Cater for special needs	It encourages menu planning for the elderly that are weak and those with special needs, e.g. disabled persons.
Provides information on portion sizes	Quantity of cooked food intakes in grams	It provides information on the quantity of cooked foods intake, e.g. in grams.
Provides information on hygiene and safety procedures	For cooks; service staff	It provides information on health standard for cooks and service staff in old people's homes, e.g. washing hands before and after cooking; no sneezing over food.
Encourage the use of standard recipes	Nutrient-dense recipes	It encourages the use of food recipes that are scientifically approved for the preparation of nutrient-rich foods for the elderly.
Cautions on diseases	High blood pressure; diabetes	It cautions against contracting high blood pressure and diabetes by poor diets.
Awareness of physical activities	Needs: walking, stretching and trekking	It creates awareness for the need of the elderly to partake in physical activities, e.g. walking, stretching and trekking.
Guide to improve dietary habits	Food choices	It is an integral tool to guide the elderly on their dietary habits.

The results of the group interview depicted in Table 6.5 indicated the importance of nutrition knowledge to use as guidelines in menu planning, portion control, standardised food preparation procedures and the importance of food hygiene and safety procedures during meal preparation for the elderly. It furthermore discussed the importance of cautions on diseases and awareness of physical activities as well as the guide to improve dietary habits. The idea of sourcing food products for the elderly from the local environment was supported globally by countries like Canada because of the natural nutrient contents that are beneficial to health in meeting needs of vitamins and minerals (Canada Food Guide 2007:1). Also in Kenya, food products sourced locally have economic and cultural benefits on acceptability (National Guidelines for Healthy Diets and Physical Activity 2017:3).

The elderly should manage portion size because it is the recommended amount of one particular food and an important key to healthy eating in checking portion control for better digestion, balanced blood sugar, improved satiety, weight loss and money saving (Vidisha & Chadha 2017:106). It is the total amount of food a person consumes at a particular eating time (in grams) established by the total intake of items included in the group and consumed in at least one 24-hour period, divided by the number of eating occasions of the consumed items (Fisher, Goran, Hetherington & Rowe 2015:1). The management of portion size is an important factor in the diet that enables the elderly to compare the amount of the food normally eaten to the serving size listed on the Nutrition Facts Label. Eating portions can lead to weight gain as they have more calories (ADG 2013). Managing portion sizes necessitated understanding the nutrition guidelines for effective consistent use by the elderly to improve their dietary behaviour (Havens, Burns, Britten & Davis 2006: S124). An uncontrolled portion size leads to uncontrollable number of calories, 45% more than the average amount of calories which is dangerous to health (Vidisha & Chadha 2017:106-112). According to the developed nutrition guidelines by the researcher, the portion sizes for the elderly meals were specified for the daily intake of individual elderly.

It is important to have local available food that is culturally acceptable because it refers to those food items that are tolerable within the community settings and are allowed to be prepared and eaten in the community without hindrance and objection such as norms, traditions, religion, language, ethics and values (Spector 2012; Kitler & Sucher 2011). Food items have meanings attached to them. In many Western countries, a box of chocolates would be viewed as an appropriate gift (James 2004). In West Africa, the cultural location of this research study in

Nigeria, the diets of the cultural foods are heavy with starchy items such as cassava, sweet potatoes, yams, cocoyam and other root vegetables. Traditional foods include rice, millet, sorghum, groundnuts, peanut, butter, black-eyed beans, beef, chicken, mutton, guinea fowl and eggs (Foyer, Kadambot & Considine 2017:1815). The food pyramid developed by the researcher of this study contains all the cultural foods in line with what is obtainable in the West African sub-region as seen in the developed Food and Nutrition Guideline booklet (Annexure N).

6.2.3.3 Theme 3: Knowledge regarding Nigerian food-based dietary pyramid

Table 6.6 Knowledge regarding Nigerian food-based dietary pyramid

Category	**Concept**	**Responses/Quotes**
Provides information on local Nigerian foods	Cultural foods eaten	Nigerian food-based dietary pyramid contains information on Nigerian foods sourced directly from farms in Nigeria, e.g. Yam, cassava, plantain and millet.
		It mentions foods eaten by all the cultural people of Nigeria, e.g. Hausa, Yoruba, Ibo. Foods such as: TuwoShinkafa for Hausas; eba, amala and iyan for Yorubas; apu and ogbono for Ibos.
	Affordable food products	It displays the essential food products that are locally sourced from Nigerian farms at affordable costs for the elderly, e.g. Ewedu, palm oil and local cherry, roasted yam and boiled plantain.
	Local Staple food intakes:	It educates on staple local food intakes. Jollof rice, Akara, Egusi.
Healthy living	Improve Micronutrient intake	It guides the caregivers of the elderly on the food intake for healthy living, e.g. pawpaw, watermelon, mango.
		It encourages the intake of plain local yoghurt, soya milk and local cheese by the elderly for protein and vitamins especially vitamin A, sourced from palm oil; It increases the appetite of the elderly through food intakes that are easily digestible to maintain light body weight and prevent obesity.
	To gain physical strength	It emphasises the food that should be consumed by the elderly to gain strength physically. E.g. jollof rice, local beans with palm oil.
	Avoid high sugar containing foods	The pyramid provides guides that the elderly should avoid intake of cakes, sugar for healthy living.
Classification of food products	Triangular pyramid for the elderly	It classifies food products in food groups according to the hierarchy of needs in a triangular pyramid for the elderly, e.g. Healthy oils- palm oil, soy oil and olive oil; grains, legumes and vegetables.

The Nigerian food-based dietary pyramid is a triangular classification of food and was extracted from the developed food and nutrition guidelines based on the needs of the elderly

consisting of all the food groups (Table 6.6). In Nigeria, the idea of food pyramid was embraced by the National Plan Action on Food and Nutrition to showcase explicitly the local food products consumable in the Nigerian environment as specified in the developed nutrition guideline in this study (NPAFN 2015:25). The participants emphasised the importance of culturally acceptable and affordable foods eaten in the community, and indicated an awareness of the classifications, micronutrient needs and its benefits to healthy living and caution on avoidance of intakes of cakes and sugar. The information in the pyramid encourages the intake of local staple foods and healthy options such as plain local yoghurt, soya milk and local cheese for protein and vitamins especially vitamin A, sourced from palm oil. It increases the appetite of the elderly through food intakes that are easily digestible to maintain light body weight and prevent obesity.

The food intake of the elderly should cover virtually all the local food products available in the community with consideration of their seasonal availability, accessibility to procure and the cost and also should be high in macro- and micronutrient contents. Research evidence suggests that the nutritional quality of local foods like fruits, local yam, cassava, millet, rice local beans is probably highest straight after harvest guaranteeing high nutritional quality, then declines with time (Edward-Jones 2010:582; Kitler & Sucher 2011).

The need to guide caregivers was highlighted in the developed nutrition guidelines by the researcher as they are guided to adopt defined positions to ensure the elderly were fed with the food items contained in the guidelines. The nutrition guide is concerned with issues that require knowledge of nutrition and food products generally. The pyramid provides guides that the elderly should avoid intake of cakes, and sugar for healthy living. Healthy eating guidelines indicated that the elderly intake of sugar should reduce minimally because of Type 2 diabetes and heart diseases. This implied that sugary carbohydrate and all sweet foods such as cakes; chocolates should be excluded from the elderly food intake (Irish Nutrition and Dietetic Institute 2017:6).

6.2.3.4 Theme 4: Importance of food flavour in meals for elderly

According to the developed food and nutrition guideline booklet, food flavour should be used proportionately. Flavours such as curry, thyme, stock cubes are required on the menu for meals. A restriction was placed on salt for use at a minimal portion because of its health implications. The importance of meals was showcased by taste, stimulating values, morale boosting, value

additive, hastening digestion, source of micronutrients, food appreciation, health sustenance and a reminder of mealtimes.

Table 6.7 Food flavours used in meals for the elderly

Category	Concept	Sub-concept	Responses/Quotes
Function of flavourings in food	Improve taste	Food types	To improve taste, e.g. local melon seed (egusi); ogiri.
		Add flavour	Locust bean seed (iru) is a nutrient rich condiment with high flavouring quality and of high value for the elderly.
		Smelling of food aroma	It makes them appreciate the food preparation skills of the cooks through smelling food aroma.
		Stimulates appetite	It stimulates appetite, e.g. Curry powder, thyme, Knorr cubes and Maggi cubes.
	Improve appearance	Add value	It adds value to the quality of food visually to the elderly, e.g. Grated red chilli, shredded green pepper and garlic
		Colourful look of food	It boosts the morale of food intake on its aesthetic colourful look, e.g. Curry powder.
Use of salt	Amount of salt	Use sparingly	Meat prepared for the elderly should be sparingly seasoned with little or no salt.
Incorrect interpretation of flavourings	Keeps healthy	Keep strong	It keeps the elderly strong, looking good and radiant at all time.
	Not a flavouring	Nutrient rich condiment	Locust bean seed (iru) is a nutrient-rich condiment with high flavouring quality and of high value for the elderly.

The results in Table 6.7 depicted the caregivers' knowledge of adding food flavours in the correct quantity to meals to improve taste and appearance which helps to stimulate appetite. Globally, various countries supported the use of food flavours as a major contributor to healthy living among the elderly as follows: The New Zealand dietary guideline emphasis as supported by the National Health and Medical Research Council of New Zealand and Australia (2006:115); The dietary guidelines for American citizens supported the use of varieties of herbs and spices in place of salt (DGA 2015-2020). A similar research in Nigeria revealed the enormous nutrient benefits derivable from food flavour sourced naturally (Olasumbo & Ayo 2013:18). Furthermore, in Kenya, the National Guidelines for Healthy Diets and Physical Activity supported the use of condiments and spices for flavours in foods (NGHDPA 2017:56). The participants were aware of the fact that salt should be used sparingly. An incorrect interpretation of food flavouring was that it will keep you healthy and strong and that it is a nutrient-rich condiment indicating the need for further training on this topic.

6.2.3.5 Theme 5: Use of healthy oils as ingredient of meals prepared for the elderly

The caregivers' perception of use of healthy oils after training is discussed in this section.

Table 6.8 Understanding of healthy oils as ingredient of meals prepared for the elderly

Category	Concept	Responses/Quotes
Improve food appearance	Brightens and attractive	It adds values to the outlook of the food to make brighter and attractive (red palm oil).
Adds moisture	Types of oil used	It keeps the component of food prepared moist and compact, e.g. Palm oil added to Yam pottage; vegetable oil added to jollof rice.
Improve taste	Pleasant	It adds a pleasant taste to the food, e.g. Plantain chips (fried) and fried potato chips.
Source of micronutrients	Vitamin A	It is a good source of vitamin A, for good sight in the elderly from palm oil.
Prevent cholesterol	Healthy living	Healthy oils sustain healthy living in the elderly against cholesterol, e.g. Soy oil.

The results of the group interview on the theme discussing healthy oils indicated in Table 6.8 that it adds value to food quality in terms of brightness, attractiveness, moisture and adds a pleasant taste. It is a good source of vitamin A and contributes to healthy living. The use of healthy oil is supported in Canada and New Zealand with emphasis on the benefits of using soybeans and olive oils in meals for the elderly (Canada Food Guide 2007:1; NZDG 2013). In Malaysia, the use of palm oil is very prominent in their food intake because it is a high source of vitamin A (Suzana, Kee, Jamaludin, Noor-Safiza, Khor, Jamaiyah, Geeta, Ahmad, Rahmah, Ruzita & Fauzi 2012:318) and also in Nigeria as specified on the developed Nigerian nutritional food-based dietary pyramid (NPAFN 2015:38).

6.2.3.6 Theme 6: Knowledge about fish

Table 6.9 indicated that the participants were aware of the health benefits of fish when included in elderly meals in terms of its suitability, softness and rapid digestibility, low-fat content, micronutrient contents, ease of preparations and cost effectiveness as supported by the literature (Irish Nutrition and Dietetic Institute 2017:6). Canada's food guide validated the intake of salmon, and herring fishes as nutritious because of their low-fat content (Canada Food Guide 2007; FAO 2014). Fish intake is furthermore beneficial as it is a good replacement for meat, it can be preserved, adds variety to other meals and is cheaper to procure directly from local Nigerian streams, rivers and agricultural settlements, making it cost effective.

Table 6.9 Benefits of fish intake

Category	Concept	Responses/Quotes
Easy to digest	Easily chewable	It has a soft gradient and easily chewable. It is easily digestible and contains high nutrient.
Healthy choice	Replacement for red meat	It is most desirable for elderly consumption than meat.
	Low-fat content	Some are low in fat content, e.g. Hake, croakers fishes
	Source of micronutrients	They contain a high content of protein and vitamins for elderly needs. It is easily digestible and contains high nutrient values.
Preparation techniques	Fast and easy	It is easy to prepare speedily to meet up with the mealtime of the elderly; It is easy to preserve for projected meal preparations.
Add variety to menus	Use in different meals	It is a suitable accompaniment for other meals; It is a suitable main meal with fresh vegetable accompaniments such as lettuce, cucumber and cabbage.
Cost effective	Local food	It is cheaper to procure directly from the local Nigerian streams, rivers and agricultural settlements.

6.2.3.7 Theme 7: Suitable meat prepared for elderly

The participants were aware of the types of meat desirable for elderly consumption and mentioned the following: lean meat, white grain meat, skinned chicken, minced meat and tenderised lean meat. Red meat is undesirable to eat because of its health risk. They were aware of the ease of preparation, and the importance of trimming visible fat and removing chicken skin for healthier options.

Table 6.10 Types of meat prepared for elderly

Concept	Sub-concept	Responses/Quotes
Use lean meat	Low in fat	Lean meat is what the in-training taught to be suitable for the intake of the elderly; Lean meat for the elderly consumption should be soft fried in a shallow amount of fat.
	Tenderized meat	Tenderised lean meat is nutrient rich for the elderly.
	Trim fat	White grain meat with trimmed-off fat is what is desirable to prepare for the elderly after training.
	Skinned chicken	Skinned chicken is suitable to prepare for the elderly because of its low-fat level.
Avoid red meat	Health risk	Red meat is risky for elderly intake because it causes cancer.
Use minced meat	Easy to chew	Minced meat or meat pudding could be prepared for the elderly to chew easily at meals. Meat for the elderly intake should not be over fried to enable them to chew easily;

The result in Table 6.10 indicated that lean meat is the most ideal for elderly because it is easier to chew. A research finding in England in 2018 corroborated this for safe health (NATPHE 2018:1).

6.2.3.8 Theme 8: Knowledge about dairy products

Knowledge of the participants regarding dairy products used by the elderly indicate their awareness of the use of sugar free, plain dairy, low-fat and fat-free types. Some dairy products were emphasised like plain yoghurt and skimmed milk which are good sources of calcium. The intake of fatty dairy, dry powdered milk and flaked milk should be avoided because of the health risks involved. Dairy products high in fat could cause cholesterol and obesity and should be avoided. Alternative dairy products such as soya milk are nutrient rich, especially protein and are suitable for the elderly. The results indicated the caregivers' awareness of the health benefits of dairy products for the elderly.

Table 6.11 Knowledge about dairy products

Concept	**Sub-concept**	**Responses/Quotes**
Health benefits	Sugar free	Sugar free dairy product is ideal for elderly intake because of diabetes.
	Lower fat intake	Plain yoghurt, skimmed milk is recommended for the elderly. Snack dairy products should be monitored for fat content before elderly intake.
	Good source of Calcium	Milk should be consumed proportionately and not abused to source for calcium for the elderly.
	Fat-free milk	Low-fat dairy products like fat-free milk are suitable for the elderly.
	Portion control	Consumption of dairy products should be regulated proportionately.
Negative health benefits	High-fat dairy	Fatty dairy product causes cholesterol and obesity and should be avoided.
Reconstituted milk	Powdered milk	Dry powdered milk should not be fed to the elderly because of the high fatty composition and health implications.
	Flake milk powder	Flakes sourced from milk products should be checked for nutrient composition before included in elderly meals.
Alternative dairy products	Soya milk	Soya milk is nutrient rich for the elderly especially protein.

The knowledge results depicted in Table 6.11 was supported by the research conducted in the UK, which recommended that low-fat dairy, skimmed milk, low-fat yoghurt and unsweetened soya drinks are healthy for the elderly (PHE 2018:115). Also, the New Zealand dietary

guideline backed up the UK recommendations on low fat or fat-free dairy intake for the elderly because of the hazard of non-communicable diseases earlier mentioned (NZDG 2013). The nutrition facts about labels of the Food and Drug Administration provide information on the content of products such as dairy (Roberto & Khandpur 2014).

6.2.3.9 Theme 9: Caregivers' knowledge of fruits and vegetables

The participants were aware that adequate consumption of fruits and vegetables is vital for the good upkeep of the elderly health and that it should be included in every meal (Table 6.12). It is easy to digest especially when prepared in purees and smoothies, can sustain healthy living, is a good source of micronutrients (vitamin A and C), and provides antioxidants. They knew that fruit and vegetables can sustain healthy heart function and prevent cancer.

Table 6.12 Knowledge, uses and understanding of fruits and vegetables

Category	**Concept**	**Responses/Quotes**
Regular available	Include in menus	Fruits and vegetables should be available at every meal for elderly intake.
Knowledge of health benefits	Easily digestible	Fruits and vegetable intake by the elderly hastens their digestive system and enhances bodily freshness. Vegetables could be prepared in puree include in smoothies for easy consumption by the elderly.
	Source of vitamins and minerals	Vitamin C is one of the major nutrient benefits derivable by the elderly from fruits and vegetable intake. Antioxidants from beta-carotene, vitamin C and selenium sourced from fruits and vegetables are ideal for the elderly as they help fight against cell damage, premature ageing resulting from poor dietary intake. Adequate consumption of (carotenoids) carrots, pumpkin, should be ensured to source vitamin and sweet pepper, turnip greens, tomato, for vitamin C in respect of the elderly food intake.
	Sustain healthy living	Fruits and vegetables help to sustain healthy living through clearing abdominal congestion and maintenance of good physical strength in the elderly.
	Could prevent certain illnesses	It helps the elderly to sustain healthy heart function and prevention of cancer through consumption of carrot, pumpkin, tomatoes, leafy green, spinach, cabbage and green leafy lettuce.
Food preparation	Healthier cooking methods	Healthier food preparation methods by stir-frying, grilling, baking and by microwave is the most suitable for the elderly intake of fruits and vegetables.
	Avoid Overcooking	Overcooking of vegetables for the elderly should be avoided to prevent loss of nutrients.
	Puree and smoothies	Vegetables could be prepared in puree include in smoothies for easy consumption by the elderly.

Furthermore, the results (Table 6.12) indicated that the participants were aware of the importance of healthier food preparation methods such as stir-frying, grilling, baking and

microwaving as the most suitable for the elderly and that the overcooking of vegetables should be avoided to prevent loss of nutrients. No comments were made regarding the pre-preparation such as peeling and soaking of vegetables indicating that this information was possibly missing in the training of the caregivers. Therefore, there should be more emphasis laid on this in future training. The importance of consumption of fruit and vegetables is evident in the literature and 'My Plate' contained in the government dietary guideline for the Americans is quartered into the following sections: fruits, vegetables, grains and protein. Half the plate is taken up by fruits (DGA 2015). Also, in the Australian dietary guidelines, a standard serve of 75g (100 to 350kJ) half a cup cooked green or orange was recommended for daily food intake per elderly person (ADG 2012). The South African food-based dietary guidelines indicated the need to eat plenty of vegetables and fruits every day (SAFBDG 2013: S6).

6.2.3.10 Theme 10: The importance of including vegetables, grains and legumes in meals

The theme discussing the importance of including vegetables, grains and legumes showed their knowledge of the importance of the inclusion thereof in the diet of the elderly because these food items contain both soluble and insoluble fibre, are low in fat and good sources of protein and minerals. Furthermore, they prevent diseases such as obesity, type 2 diabetes, cardiovascular diseases, hypertension, bowel cancer and asthma when regularly consumed. A total misunderstanding of fibre consumption (in that it can decrease cholesterol is evident). The high intake of core grains is encouraged, which is incorrect knowledge and should be addressed in future nutrition education. The results in Table 6.13 stated that grains, legumes and vegetables are easily prepared by boiling, steaming, stir-frying, and baking however one of the participants indicated that some legumes can be cooked in the microwave which is incorrect. Future training indicating the correct as well as the incorrect cooking methods and their results is needed. Participants were aware that sharp knives should be used when preparing vegetables.

The importance of the knowledge that the participants indicated for this theme is supported by the Canada food guide, which, by its design, gives the visual cue that the greatest quantity of food should be selected from the grains group (Canada Guide 1991). In the United States, bread grain and cereal products contributed 14%-18% daily energy and 23%-29% of daily fibre in that it decreases cholesterol (DGA 2010). It is furthermore supported by a research finding in the UK, which states that fibre is a "nutrient to get more of". In addition to aid digestion, it has

a few health benefits. A high-fibre diet is low in cholesterol, trans-fats, added sugars, salt and cholesterol (Cobiac, Scarborough, Kaur & Rayner 2016:1).

Table 6.13 Importance of including vegetables, grains and legumes in elderly meals

Category	Concept	Sub-concept	Responses/Quotes
Preparation methods	Cooking methods	Stir-fry, grill, bake and microwave	Stir-fry, grill, bake, steam and microwave.
		By boiling, steaming and microwave.	Legumes like dried and canned beans; baked beans, lentils and chickpeas should be prepared through boiling, steaming and microwave for elderly regularly.
	Conserve skin	Good nutrient source	Cut off all inedible parts of vegetable and conserve the skin for the best nutrients.
	Knife skills	Sharp knife	Use a sharp knife to cut vegetables in proportionate sizes.
		Equal sized	Use a sharp knife to cut vegetables in proportionate sizes.
Benefits of grains and legumes	Good sources	Insoluble and soluble fibre	Whole grains and legumes are ideal for elderly food intake because they are good sources of insoluble and soluble fibre.
		Protein, minerals	Core grains are suitable for elderly food intake because they are low in fat and good sources of protein and minerals especially from soy products.
	Prevent diseases of lifestyle	Regular consumption	The elderly should consume grains and legumes very often for effective management of weight, obesity and type 2 diabetes; Elderly food intake should be adequate in grains and legumes for protection against cardiovascular disease, hypertension, bowel cancer and asthma**.**
	Low in fat	Polyunsaturated fat	Core grains are suitable for elderly food intake because they are low in fat and good sources of protein and minerals especially from soy products.
Incorrect knowledge	Grains	Increased intakes	High intake of core grain foods such as bread, breakfast cereals (oats, cornflakes, and wheat), rice, pasta and noodles should be encouraged in the elderly.
	Soy products	Decrease cholesterol	Elderly should consume soy products adequately because they contain a high level of polyunsaturated fat and fibres to decrease cholesterol.

6.2.3.11 Theme 11: Caregivers' knowledge on limiting sugar and salt in the meals

The participants were aware that sugar intake should be drastically reduced for the elderly because of its health risks as it causes diabetes, tooth decay and possibly avoided because of the abovementioned two factors, plus impaired memory, increased risk of developing gout, dementia, obesity, body wrinkles, heart disease and high blood pressure (Table 6.14). Sugar intake should be reduced drastically in the elderly as it can lead to increase in body weight.

Table 6.14 Importance of limiting sugar and salt in elderly meals

Category	Concept	Sub-concept	Responses/quotes
Reduce diseases of lifestyle	Types of diseases associated with sugar intake	Diabetes, weight gain, tooth decay, gout development, impaired memory, dementia.	Elderly should take less sugar because of diabetes; Sugar intake should be reduced to prevent the risk of an increase in weight gain in the elderly; Sugar intake should reduce drastically in the elderly to avoid tooth decay (dental problems) and rise of gout problem; reduce sugar intake in the elderly to avoid impaired memory and increase of dementia; High sugar intake in the diet of the elderly leads to heart disease, obesity and high blood pressure; High sugar consumption in the elderly increases risk of depression; High sugar intake in the elderly increase the production of advanced end products (AGES) that leads to skin ageing and wrinkle formation.
Incorrect knowledge	Recommended consumption amount	30g sugar	30g of sugar intake per week is the most ideal for each elderly for good health.
		5g salt	Salt intake by the elderly should be reduced to the barest minimum level of 5g per week per person

The caregivers (Table 6.14) incorrectly indicated sugar intake should be limited to 30g per person and salt 5g weekly; this should be addressed in future nutrition education. The Dietary Guidelines for the Americans specifically indicated that the food intake of sugar and salt should be at the barest minimum level to avoid health risks (DGA 2015-2020). Also, in Kenya, the national guidelines for healthy diets and physical activity gave a similar guide to keep the elderly in good health condition (NGHDPA 2017). In the UK, the Quick guide to the government's healthy eating recommendations indicated emphatically low sugar and salt intake for healthy living (PHE 2018).

6.2.3.12 Theme 12: Explaining the importance of water consumption by the elderly

The caregivers were aware that adequate water intake is very important in keeping the elderly healthy and has the following benefits: reduces thirst, keeps the metabolism in order, enhances

brain function, prevents migraine and headaches, aids digestion, manages effective kidney and urinary health and avoid fatigue. The participants recalled the recommended daily water intake per person accurately as seen in Table 6.15. These daily amounts is supported in research depicted in the guide for the government's healthy eating in England where a recommended intake of a minimum of 6-8 glasses daily for each person (PHE 2018) is given as well as in the South African food-based dietary guidelines which specified that lots of safe water should be consumed daily p person (SAFBDG 2013: S11). The New Zealand dietary guidelines recommended surplus intake of water whether at mealtime or not (NZDG 2013).

Table 6.15 Explanation on the importance of water consumption by the elderly

Category	**Concept**	**Responses/Quotes**
Functions of water	Reduces thirst	Diminish thirst
	Enhances Metabolism	Enhance metabolism
	Boost Brain function	Boost brain function
	Maintenance Urinary health	Maintain urinary health
	Enhances Digestion	Enhance better digestive health
	Manages Kidney health	Manage kidney health effectively
	Prevents Dehydration, headache and migraine.	Avoid dehydration leading to headache and migraines
	Avoids Fatigue	Avoid fatigue
Recommended intake	Eight glasses recommended per person daily.	Ensure healthy living, eight glasses of water (1920ml) is recommended daily per person.

6.2.3.13 Theme 13: Knowledge about the benefits of physical activities to the elderly

The result in Table 6.16 specified the benefits for the elderly to partake in physical activities every day to exercise their body strength to avoid seizure of body tissues, ligaments and muscle, enjoy free blood flow and also experience reduction in falling, fractured bones, high blood pressure, osteoporosis, increase in strength and bone balance. The importance of physical activity is emphasised globally.

Table 6.16 Importance of physical activities to the elderly

Category	**Concept**	**Responses/Quotes**
Benefits of physical activities	Independent living	Helps maintain their ability for independent living.
	Reduces various health risks	Reduces their risk of falling and fracturing bones; Reduces blood pressure in hypertensive elderly persons. Reduces the risk of hip fracture by 40%; It reduces the risk of stroke and heart attack.
	Increases and improve various body functions	Improve muscle strength and bone density and balance.
	Reduces osteoporosis	Walking or swimming can increase lifespan by three to five years and also reduces osteoporosis.

In 2011, the government of Kenyan Food and Nutrition Security Policy in Nairobi specified that the elderly should do 150 minutes of moderately intensive aerobic physical activity a week like cycling or walking, play games to keep healthy (KFNSP 2011). Also, the New Zealand dietary guidelines recommended 30 minutes of moderate-intensive physical activity to enable be physically active to move about (NZDG 2013).

6.3 RESULTS OF THE ELDERLIES' PRE- AND POST-TEST DIETARY INTAKE

The purpose of this section (Phase 6 of this study) was to determine the impact of the food and nutrition guidelines on elderly food consumption habits by means of post-testing (sub-objective 6) as indicated in section 1.5.2. The dietary intake for the research was recorded during Phase 3 of the study (July to December 2017) before the implementation of the NEP intervention (October 2018 to March 2019). One hundred and twenty elderly were involved in the dietary intake recording making use of the 24-hour recall (Annexure H) and the FFQ (Annexure I) used for comparison of both the pre- and post-intervention. An evaluation was carried out by the researcher in July 2019 to ascertain the consistency in the use of the developed food and nutrition guidelines and its impact on the dietary behaviour of the elderly in the old people's homes.

6.3.1 Comparison of the 24-hour recall results before and after the intervention for the elderly

Nutrient analysis of the 24-hour recall (Annexure H) was undertaken and compared both before and after the NEP intervention in the study to determine the dietary intake of the elderly. A summary of the results was presented in Table 6.17. To ascertain the significant changes in the dietary intake before and after the NEP intervention, t-test was applied to each of the nutrient variables. The before and after dietary intake was analysed to indicate changes in food consumption after implementation of the nutrition intervention. The mean energy intake for women (5335kJ/day) was comparatively low compare to the EAR women (7355kJ/day) before the intervention and decreased even more after the intervention (4560kJ/day). Men's energy intake was 5647kJ/day before intervention and 4800kJ/day after the intervention, indicating lower energy intake. The pattern of consumption for protein increased from 48g to 60g for women and men 48g to 55g which both was more for both gender than the required EAR (46g). A decrease in the fat consumption for both females and males was detected. Carbohydrate consumption was the same for both genders before the intervention and decreased after the intervention.

Table 6.17 Elderlies' dietary intake analysis of food consumed before and after implementation of the intervention

Nutrient	No. of participants (%)	Women (n=72)			Men (n=48)			Average for women and men
		DRI	Mean before	Mean After	DRI	Mean before	Mean after	Significance 2 tailed *P*-value *
Energy (kJ)	109 (90.1%)	7355	5335	4560	7850	5647	4800	0.470
Protein (g)	114 (95%)	46	50	60	56	48	55	0.10
Fat (g)	115 (95.8%)	ND	34	9.0	ND	36	5.0	0.18
Carbohydrate (g)	110 (91.6%)	100	137	80	100	137	105	0.96
Calcium (mg)	110 (91.6%)	1200	160	1000	1200	140	920	0.007
Iron (mg)	112 (93.3%)	5.0	5.73	10.0	6.0	5.73	12.0	0.18
Fibre (g)	34 (28.3%)	21	5.69	6.52	30	6.03	7.5	0.10
Vitamin A (µg)	115 (95.08%)	500	346	420	625	420	430	0.103
Vitamin $B_{6(mg)}$	110 (91.6%)	1.3	1.0	1.6	1.4	1.1	1.5	0.18
Vitamin $B_{12(\mu g)}$	115 (95.08%)	2.0	1.8	2.0	2.0	1.8	2.1	0.103

* $p \leq 0.05$

There was a significant difference (p= 0.007) in the intakes of calcium before and after the intervention for women 160mg/day before and 1200mg/day after compared to the required intake of 1000mg/day; and for men, 140mg (before) and after 920mg/day (EAR 800mg). The protein intake could be the reason for the improvement in the calcium dietary intake. Calcium is vital in determining health sustenance in the elderly. The dietary intake of vitamin A, iron, and fibre, vitamin B_6 increased for both genders after intervention but fibre and vitamin A did not comply with EAR specifications. The intake for vitamin B_{12} before and after indicated 1.8µg/day and 2.0µg/day for women, whilst for men 1.8µg/day and 2.1µg/day, meaning the daily requirement was met after the intervention.

Table 6.18 Elderlies' mean daily dietary intake and nutrient adequacy before and after the intervention

Nutrient	DRI	Mean actual intake before	Mean actual intake after	NAR before	NAR after	DRI	Mean actual intake before	Mean actual intake after	NAR before	NAR after
	Women (n=72)					**Men (n=48)**				
Energy(kJ)	6119.4	5334.60±3864.24	5620.14±4098	88%	92%	6434.4	5646.31±4091.8	5860.12±4218	88%	91%
Protein(g)	46	50.27±22.65	60.15±32.5	109%	131%	56	48.0±23.65	70.16±37.54	103%	125%
Fat(g)	ND	34.0±20.50	38±23.50	-	-	ND	36.0±41.60	32.31±19.50	-	-
Carbohydrate(g)	100	137.0±145.2	218.16±195	145%	168%	100	137.0±145.2	320±300	198%	246%
Calcium(mg)	1200	160.0±158.4	2010±1910	19%	201%	1200	140.0±148.1	2560±2215	20%	213%
Iron(mg)	8.0	5.73±3.6	10.2±4.91	72%	128%	8.0	5.73±3.6	7.6±3.7	72%	95%
Fibre(g)	21	5.69±6.32	6.52±3.5	27%	30%	30	6.03±6.84	7.5±3.69	20%	25%
Vitamin A (µg)	500	346±320	420±310	55%	67%	625	420±310	430±312	84%	86%
Vitamin$B_{6\ (mg)}$	1.5	1.0±0.32	1.2±0.32	67%	80%	1.7	1.1±0.49	1.4±0.8	65%	82%
Vitamin $B_{12(\mu g)}$	2.0	1.8±0.94	2.4±0.45	90%	120%	2.0	1.8±0.94	2.5±0.43	90%	125%

The nutrient adequacy ratio **(**NAR) is a clarification of the analysis in the mean dietary intake of the participants (See NAR discussion in Chapter 4, p 84), obtained from the 24-hour recall. Table 6.18 indicates the detailed information on the mean NAR for the elderly participants in the research before and after the intervention. Energy intake improved for both genders after the intervention; however, the results indicate that the energy intake for both genders was below the DRI before and after the intervention. The NAR was at 90% for female and males respectively. The mean protein intake improved after the intervention from 50.27 to 60.15 and was above the average DRI for women. The men's intake was below (48.0g) the mean NAR and increased after the intervention. This resulted in a NAR of 131% for female and 125% for males. Fat intake was higher after the intervention for the females and lower for men. The consumption of carbohydrates was higher for both women (137.0g and 218.16g) and men (137.0g and 320g) before and after the intervention. Caution about high consumption of carbohydrates should be included in module 8 of the developed Food and Nutrition Guidelines booklet where grains and legumes were discussed as this could possibly lead to being overweight and obesity, increasing the global problem of lifestyle diseases. Calcium intake was noticeably lower before the intervention for both genders; however, the intake changed drastically after the intervention. This suggested that the food and nutrition guidelines could possibly have an effect as it was discussed in detail in module 5. Iron levels improved from before to after the intervention but remains low and more focus should be placed on this in the Food and nutrition guidelines for the caregivers. The actual intake of fibre should be 21g which was noticeably low for women (5.69g and 5.63g) and men (6.03 and 7.5g) who have an average intake of 30g. Vitamin A results showed that the actual intake for both men and women was lower than the suggested DRI before and after the intervention. This indicated that the elderly lack vitamin A in their diet which could lead to health problems associated with the lack of fruit and vegetable intake as discussed in chapter 2. The consumption results for both vitamin B_6 and B_{12} suggest a lower intake for both genders before the intervention; however, a change could be seen after the intervention. In general, the elderly had a remarkable improvement in some of the macro-nutrients in the dietary intake intervention implemented by caregivers over the nine-month study period.

6.3.2 Top 20 foods consumed by the elderly before and after the intervention

Table 6.19 Comparison of the top 20 foods consumed before and after the NEP intervention by the elderly.

Table 6.19 Comparison of the top 20 foods consumed before and after the intervention

	Pre-testing (Before intervention n=120)					Post-testing (After intervention n=120)				
	Food items (g)	**Total intake (g)**	**Mean/SD daily intake (g)**	**No of participants**	**Per capita daily consumption (g)**	**Food items (g)**	**Total intake (g)**	**Mean/SD daily intake (g)**	**No of participants**	**Per capita daily consumption (g)**
1	Pounded yam	24605	259±165.48	95 (79%)	205.0	Potato	30100	68±20	43 (35%)	250.8
2	Jollof rice	18820	254±138.71	74 (61%)	156.0	Fruits and vegetables	24605	205±54	95 (79%)	205.0
3	Semolina	12470	249±117	50 (41%)	103.9	Fish	24530	204±34	95 (79%)	204.4
4	Asaro in palm oil	9019	322±160	28 (33%)	75.2	Melon with seed/ egusi	24504	204±46	95 (79%)	204.2
5	Pounded cassava	8850	103.8±54	86 (71%)	73.8	Chicken	18900	157±92	98 (82%)	157.5
6	Bread white	8515	106±52.51	80 (6%)	71.0	Beans	18820	156±91	74 (61%)	156.8
7	Milk	6860	95.1±60.7	72 (60%)	57.2	Semolina	12500	10.4±	50 (42%)	104.2
8	Potatoes	3130	71±29.8	44 (36%)	26.1	Ewedu	12470	101±59	50 (41%)	103.9
9	Plantain	3130	71±29.8	44 (36%)	26.0	Soy stew	11540	95±94	68 (55.5)	96.2
10	Pap (maize)	11510	171±82	67 (55%)	26.0	Pap (maize)	11450	95±80	67 (55)	95.4
11	Melon seed Egusi	2325	77±38	30 (25%)	19.4	Bread white	8614	71±29	80 (66%)	71.8
12	Meat	1810	139±96	13 (10%)	15.1	Pounded yam	8515	70±98.5	80 (66%)	70.9
13	Fish	1568	98±94.7	16 (13%)	13.1	Egg	6860	57±24	72 (60)	57.2
14	Chicken	1560	90±94.9	17 (14%)	13.0	Plantain	3500	26±60	44 (37%)	29.2
15	Fruits and vegetables	1400	300±110.9	5 (4%)	11.7	Okra	3135	27±20	44 (37%)	26.1
16	Egg	800	100±64.1	8 (6%)	6.7	Milk	2350	190±110	90 (77%)	19.6
17	Soy Stew	750	375±106	2 (1%)	6.3	Jollof rice	1910	157±92	74 (62%)	15.9
18	Beans	700	100±58.6	7 (5%)	5.8	Pounded cassava	1610	140±97	12 (10%)	13.4
19	Okra	700	100±58	7 (5%)	5.8	Meat	1400	205±54	5 (4%)	11.7
20	Ewedu	699	233±55	3 (2%)	5.8	Asaro in palm oil	800	110±59	8 (6%)	6.7

From the above (Table 6.19) the comparison of the top 20 foods consumed before and after intervention indicated that pounded yam was most highly consumed before intervention at per capita 205g, mean/SD daily intake 259 ± 165.48 compared to potatoes ranking first after the intervention with per capita 250.8g, mean/SD daily intake 68 ± 20. The second most consumed food was jollof rice before intervention and indicated per capita of 156g, mean /SD daily intake 254 ± 138.71 compared to pineapple juice after intervention per capita 205g mean/SD daily intake 205 ± 54. The third most consumed food is semolina before intervention with per capita 103.9g, mean/SD daily intake 249 ± 117 and fish after intervention with per capita 204.4g, mean/SD daily intake 204 ± 34. The fourth most consumed is Asaro in palm oil before intervention with per capita consumption of 75.2g with a mean/SD daily intake 322 ± 160 and melon with seed /egusi after intervention with per capita 204.2g, mean/SD daily intake 204 ± 46. The fifth item on the list is pounded cassava before intervention with per capita 73.8g, mean/SD daily intake 103.8 ± 54 and chicken after intervention with per capita 157.5g mean/SD daily intake 157 ± 92. The above results indicated that before the intervention, plenty of traditional Nigerian foods were consumed by the elderly. After the intervention, fewer tradition foods featured in the top five although they were still part of the top 20. After the intervention, protein foods moved up in the top 20 food ranking, revealing a healthy balanced diet. This could be an indication that caregivers implemented the knowledge gained from module 4 about fish, meat and protein sources as portrayed in the developed food and nutrition guidelines.

White bread before intervention and beans after intervention were ranked sixth and milk before the intervention and semolina after intervention were ranked in the seventh position. The eighth item before intervention was potatoes with per capita 26.2g, mean/SD daily intake 71 ± 29.8 and after intervention ewedu with per capita 103.9g, mean/SD daily intake 101 ± 59. The ninth most consumed food was plantain before intervention with per capita 26.0(g), mean/SD daily intake 71 ± 29.8 against soy stew after intervention with per capita 96.2g, mean/SD daily intake 95 ±94. Tenth on the list of top 10 consumed food items remained pap (maize) however the per capita daily consumption increased from 26.0g to 95.4g.

The ranking between ten and 20 indicates each of the different protein food consumption lower than 20g per capita. After the intervention the results indicated higher carbohydrate consumption; however, the per capita intake was lower than pre-intervention. A noticeable change was Asaro in palm oil with a per capita consumption much lower after the intervention, indicate that module 3 of the developed food and nutrition guidelines to reduce fat consumption

were successful. Conclusively, the comparison food intake before and after intervention indicated higher per capita after intervention than before. The average consumption of carbohydrate in the top 20 food items dropped drastically after the intervention, from 15 items to nine, indicating that the correct nutrition message contained in the food and nutrition guideline was implemented but the caregivers for the elderly.

6.3.3 Food variety score before and after the intervention

Dietary diversity is considered as a measure of the food variety scores and a variety of food eaten by the elderly participants in Ondo West, Nigeria. A summary of the result is presented in Table 6.20 of the study making use of the baseline FFQ and post-test FFQ results as determined by the food variety score (Annexure I).

Table 6.20 Food variety score before and after the intervention

Food group	Food items	Baseline (Pre-test)		Evaluation (Post-test)	
		Mean/SD	Food Variety within groups	Mean/SD	Food Variety within groups
Group 1	Flesh food (chicken, meat, fish)	1.10±0.32	1-11	2.7±1.3	1-12
Group 2	Egg	1.10±0.32	1-1	0.7±0.5	1-1
Group 3	Dairy	1.20±0.42	1-7	0.79±0.5	1-7
Group 4	Cereals, roots and tubers (yam, cassava, plantain, potatoes)	1.10±0.31	1-9	10.69±3.9	1-15
Group 5	Legumes	1.40±0.52	1-3	0.2±1.8	1-2
Group 6	Vitamin A	1.30±0.48	1-8	1.2±0.3	1-8
Group 7	Fruit and juices	1.30±0.48	1-14	2.5±1.1	1-10
Group 8	Vegetables	1.20±0.42	1-9	0.6±0.5	1-8
Group 9	Oil and fats	1.50±0.52	1-5	2.6±1.2	1-6
Total (FVS)			67		69

Table 6.20 showed the comparison of the food variety score of the participants before and after nutrition education (NE) intervention for Group 1: Flesh food (chicken, meat, fish). There was an increase of one food item as well as Group 4: Cereals, roots and tubers (yam, cassava, plantain, potatoes nine items and increased to fifteen items. The variety of oils and fats increased with one item. The food variety in the groups for eggs, dairy and vitamin A rich food remains the same. There was a decline in the food variety within the following groups: legumes, fruit and juices and vegetables. Total food variety increased from 67 to 69 items.

Table 6.21 Food variety within the food groups consumed by the elderly before and after the intervention

Intervention	Flesh	Egg	Dairy	Cereals	Legumes	Vitamin A	Fruit and Juice	Vegetables	Oils and fats	Total food items consumed
*B	n=11	n=1	n=7	n=9	n=3	n=8	n=14	n=9	n=5	n=67
*A	n=12	n=1	n=7	n=5	n=2	n=8	n=10	n=8	n=6	n=69
B	1=106	1=47	1=90	1=76	1=48	1=61	1=55	1=61	1=59	1-11
A	1=100	1=50	1=85	1=73	1=53	1=59	1=57	1=60	1=58	1-12
B	2=28		2=68	2=49	2=69	2=64	2=63	2=64	2=67	1-1
A	2=27		2=75	2=52	2=85	2=62	2=64	2=62	2=66	1-1
B	3=30		3=59	3=84	3=72	3=64	3=63	3=62	3=61	1-7
A	3=31		3=48	3=82		3=66	3=60	3=66	3=59	1-7
B	4=26		4=41	4=56		4=82	4=69	4=81	4=56	1-9
A	4=24		4=43	4=59		4=79	4=71	4=79	4=35	1-15
B	5=24		5=43	5=65		5=74	5=67	5=70	5=55	1-3
A	5=30		5=44	5=63		5=81	5=64	5=71	5=59	1-2
B	6=42		6=82	6=63		6=67	6=57	6=67	6=61	1-8
A	6=44		6=82	6=65		6=66	6=95	6=69		1-8
B	7=38		7=76	7=47		7=70	7=59	7=59		1-14
A	7=35		7=75	7=50		7=71	7=58	7=55		1-10
B	8=70			8=56		8=62	8=65	8=74		1-9
A	8=51			8=53		8=59	8=61	8=71		1-8
B	9=30			9=52			9=68	9=70		1-5
A	9=32			9=50			9=67			1-6
B	10=85						10=65			
A	10=85			10=62			10=68			
B	11=33						11=65			
A	11=33			11=57						
B							12=60			
A	12=36			12=54						
B							13=65			
A				13=80						
B							14=60			
A				14=60						
B										
A				14=65						

*B=before, *A=After

Table 6.21 shows the cut-off points used by Chakona and Shackleton (2018:5) as low, medium and high DDS and FVS were categorised as low =0-3 or <30 individual food items, medium= 4-5 food groups or 30-60 individual foods; high= 6-7 individual foods or >60 individual foods. The results indicated a high dietary diversity score with nine food groups and a total of 69 individual foods consumed by the elderly, indicating an increase of two items after the intervention.

6.4 DISCUSSION OF THE INTERVENTION RESULTS

Chapter 6 reported on the sub-objectives to evaluate the compliance by the caregivers of the elderly on the use of food and nutrition guidelines (Phase 5) and to discuss the impact of the food and nutrition guidelines on elderly food consumption habits by means of post-testing (Phase 6) in order to achieve the main objective of the study, which was to determine the impact of food and nutrition guidelines on the dietary behaviour of the elderly in Ondo West, city of Nigeria as depicted in the conceptual framework (Figure 1.1).

6.4.1 Effect of the NEP on nutrition knowledge of the caregivers

The NEP increased the nutrition knowledge of the caregivers (sub-objective 5) after the intervention as indicated in the post-test assessment scores compared to the pre-test before the intervention programme (Tables 6.17- 6.21). The NE materials served as a guideline to be used for future reference. The face-to-face communication strategy used to train the caregivers was supported by the NE materials to reinforce the messages for suitability of increasing nutrition knowledge of the caregivers.

The researcher developed the Food and Nutrition Guideline booklet which was used in the intervention training in an attempt to improve the caregivers' nutrition knowledge and ultimately the dietary intake of the elderly. The need for caregivers to have adequate nutritional knowledge is supported globally by research conducted in the US, UK, Canada, Kenya, Australia and South Africa. The Food and Agriculture Organization of the United Nations and the DGA (2015) also supported the idea of nutrition knowledge for the caregivers as evidenced in its document on "Why Nutrition Education Matters" on the problems of undernutrition as related to vitamin and mineral deficiency with diet-related chronic diseases (FAO 2015; DGA 2015). The nutrition training specifically focused on the use of nutrition guidelines and the Nigerian Nutrition pyramid for the caregivers in menu planning and making the most suitable food choices to benefit the elderly. This provided the trainees with the opportunity to practise what was learnt on local food products and followed by another power-point presentation, where menu and eating habits were discussed (Train the Trainer 2011:1; Banna 2013:2).

The significance of the NE in the study was evident in the results of the nutrition knowledge of the caregivers. Unfortunately, there was a decline in the positive results of the food based dietary guideline (Section A) indicating a possible misunderstanding by the caregivers of the questions in the questionnaire. The post-test results revealed a decline in the correct answers for some of the questions. Most of the caregivers (90%) know that both at pre- and post-test

that the diet should contain a wide variety of foods. Responses of the caregivers on the answers to the questions revealed a need for on-going nutrition education. The observation results indicated that the cooks in the three different old people's homes applied the information from the food and nutrition training sessions although there are some of the modules that were not fully understood and applied. Further nutrition education should focus on the areas where the cooks were lacking.

The group interview results indicated that the caregivers had some knowledge of macro-nutrients. They knew the importance of using local foods in food preparation; they were aware of the Nigerian food based dietary guidelines for the elderly, developed as part of the food and nutrition guidelines booklet. The caregivers knew that food flavouring in preparing the meals of the elderly was important. Furthermore, the results indicate that they had knowledge of the importance of including healthy oils, fish, dairy products, fruit and vegetables, as well as grains and legumes in the meals of the elderly. Lastly to limit salt and sugar in meal preparation, drinking enough water and the benefits of being active as an elderly person.

6.4.2 Impact of NEP on dietary intake of the elderly

Sub-objective 6 determined the impact of the food and nutrition guidelines on elderly food consumption habits by means of post-testing. The mean energy intake for both men and women was lower before and after the intervention. Although there was an improvement of the energy intake after the intervention as confirmed by NAR results (Table 6.18), it was still below the DRI. Most food consumed in Ondo West city community was carbohydrates before the intervention but after the intervention, there were changes in the intake of protein, vitamins B_6, and B_{12}. About participants' compliance with EAR, for specific nutrients, the following were revealed in the study for carbohydrates where 91.6% of the participants reached the EAR as depicted in Table 6.18, while the percentage of participants complying with iron requirements 93.3% was relatively good. Vitamin B_6 and B_{12} intakes within the top 20 foods consumed by the participants complied with the EAR as indicated in Table 6.17. Calcium intake remains a major concern because the intake was low both before and after the NEP. The findings of this study confirmed that dietary intake was poor both at pre- and post-intervention as indicated by the nutrient analysis, though there was a moderate improvement after the intervention (Table 6.17).

There was a change detected in the consumption of the top 20 foods before and after the NEP results. The significant reduction in iron intake could be ascribed to red meat being substituted

by chicken in the top 20 most consumed food list (after intervention Table 6.19). The results indicated a high dietary diversity score after the intervention with nine food groups and a total of 69 individual foods consumed by the elderly, indicating an increase of two items. It should be remembered in this study that there was a time-lapse of nine months between the two dietary analyses before and after the NEP. This could have been responsible for seasonal variations in food intakes, food availability, and price fluctuations in food that influenced food choices. Such changes are difficult to control both at pre- and post-test designs and are recognised by the research as a threat to internal validity of the study.

6.5 CONCLUSION

The main objective was to determine the impact of nutrition guidelines on dietary behaviour of the elderly in Ondo West, Nigeria ~~as discussed above~~. This nutrition programme followed logic planning procedure, information collection and evaluation process for changes in dietary intake as suggested by Luther *et al.* (2013). The significance of the NE in the study was to establish awareness on the food and nutrition knowledge of the caregivers of the elderly in this community. This was achieved by the provision of carefully developed food and nutrition guidelines informing the caregivers on the sustainable relationship between diets, health and individual nutritional needs and the evaluation after. Although, knowledge is not an automatic access towards improved dietary intake, it can assist the caregivers in this community. Promotion of quality and ideal dietary intake could be actualised with an access to reliable information on the nutrient values of foods, individual food preferences, purchasing, economic decisions, good hygienic storage and preparations.

The NEP and NE materials used in the research were effective, resulting in an increase in nutrition knowledge of the caregivers after the intervention (Tables 6.6- 6.16). However, the findings of the study confirm that dietary intake was poor before intervention with moderate improvement after intervention, as confirmed by the nutrient analysis (Table 6.17-6.18). Although the NEP was effective in increasing knowledge to some extent, it only increased the dietary intake at a moderate level. Improving nutrition knowledge is classified as a short-term period strategy, as changing dietary behaviour takes time, involving persistence and step-by-step processes.

The pre- and post-test research approach methods used in this study was useful for the target group of participants (caregivers) as qualitative results obtained from the group interviews and observation about the NEP assisted in giving meaning and understanding to the qualitative

results. The qualitative analysis in the research identified core themes in terms of compliance of the caregivers on the food and nutrition guidelines booklet education. Illustrations in the NE training manual booklet were meaningful contributions to the text as the caregivers were able to identify the food pyramid diagram.

The final chapter (Chapter 7) will provide detailed information on the conclusions, accomplishment of objectives, limitations of the study and various recommendations.

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 INTRODUCTION

In this chapter, conclusions were drawn in the study with specific contributions and recommendation made for further research. Limitations were acknowledged and suitable methods to address errors in the study highlighted. Reflections were made on the process involved in the development and implementation of the nutrition guidelines for the elderly in Nigeria. The nutrition guidelines of South Africa, Nigeria, USA, Europe and New Zealand were consulted to address the purpose of the study and applied to develop the Food and Nutrition Guidelines booklet for the caregivers of the Elderly in Ondo West Nigeria. The objective of the NEP was to promote nutrition knowledge of the caregivers in eradicating malnutrition of the elderly as suggested by Walsh, Dannhauser and Joubert (2003:89). The study involved development of a sustainable Food and Nutrition Guideline booklet following the theoretical FAO framework for NEPs utilising the five phases (FAO 1998). The training programme was aimed to build the capacity of the caregivers in order to address the nutrition needs and to contribute towards better food choices for the elderly.

7.2 STUDY OBJECTIVES

The study objectives and the main findings in each aspect of the study were summarised in different phases as specified in Chapter 1 in the conceptual framework of this study (Figure 1.1). The study objectives were addressed in six phases, with the main objective being to determine the impact of food and nutrition guidelines on dietary behaviour of the elderly in Ondo city, Nigeria (Figure 1.1 FAO framework).

In sub-objective one, a baseline survey was conducted to determine the food consumption patterns of the elderly and to test the existing nutrition knowledge of the caregivers (Phase 1). Sub-objective two was to plan and develop food and nutrition guidelines for caregivers of the elderly (Phase 2) while sub-objective three was to train the caregivers utilising the developed Food and Nutrition Guideline booklet (Phase 3). Phases 4-6 were to implement and evaluate the compliance by the caregivers (Phase 5) in order to determine the impact of the food and nutrition guidelines on the elderlies' food consumption habits by means of post-testing (Phase 6).

7.3 MAIN FINDINGS

The reliability for the data in the study was validated with the pilot study conducted before the baseline pre-intervention to avoid variation in sample sizes with Cronbach Alpha statistical analysis. The caregivers were tested for nutrition knowledge before and after the intervention. Information obtained from the statistical analysis was used to develop the NEP. The tests were used to measure changes in the mean nutrition knowledge both at pre-and post-tests. The participants in the NEP discussion group consisted of the ten caregivers selected for the study, as well as the researcher and the supportive personnel for the entire targeted elderly population. Despite the limitations encountered in the study, many things were learnt within the discussion sessions. The researcher's study involved testing of developed NE material to deliver needed valuable information for in-depth use. In the next section, the main findings of the baseline study, the development of the intervention and the evaluation are discussed.

7.3.1 Baseline study

The baseline survey (Phase 1) conducted in the research was used to determine the extent of the problem and to identify the inclusive content of the Food and Nutrition Guidelines booklet (Annexure N) as well as the NE training manuals (Annexure O) that can then be utilised by other caregivers for the elderly. The socio-demographic questionnaire, the 24-hour recall and the FFQ were used to determine the dietary inadequacies of the elderly aged between 60 and 75, of which the majority was females (62%). The results for religion and local tribes were important to design the intervention programme as indigenous foods, food habits and beliefs played a role in the elderlies' food choices. The majority of the households spend between N10001 and N15000. Just below 50% indicated that they bought food in the open market and from street vendors confirming the use of local produce. Sixty percent of the elderly is still actively involved in food preparation with approximately 40% who ate two meals per day indicating that the change in the menus at the old people's homes could also influences their cooking habits. The dietary intake results indicate that the elderly have an energy intake of below 90% of the recommended daily intake, however, the protein and carbohydrate intake were above the daily requirements. Regarding the micronutrients, the consumption of the elderly fluctuated (Table 4.8). The top 20 food consumption results confirmed that the elderly ate local produce and have a high carbohydrate and protein intake. A variety of traditional Nigerian foods were consumed by the elderly before and after the intervention. The food variety score showed a range of between 15-67 food items was consumed by the elderly indicating a medium food variety score, with a food diversity of 67 different food items consumed before the intervention which increased to 69 food items after the intervention.

Furthermore, it was required to test the caregivers' knowledge with the NKQ to determine the strategies in attempting to improve the elderlies' dietary intake. Regarding the Nigerian Food Based Dietary guidelines, the results indicated above-average knowledge by the caregivers. Not all caregivers were able to identify vitamin A deficiency, but they were aware of the cause of vitamin A deficiencies. The above informed the researcher to develop a set of food and nutrition guidelines in order to improve the dietary intake of the elderly. The caregivers' general food knowledge revealed lack of knowledge regarding a well-balanced diet. Specificity issues in the health and food safety section showed the caregivers had a lack of basic hygiene knowledge as only 40% indicate that it is important to wash hand before eating. The caregivers' food hygiene knowledge during preparation was acceptable. Overall, the caregivers had a good nutrition knowledge however some shortcomings were identified in the NKQ answers, which was specifically addressed in the developed booklet.

7.3.2 Nutrition education intervention programme for caregivers

During the baseline, the needs assessment in the study revealed some gaps in nutrition knowledge of the caregivers. As a result of this, it was determined that the appropriate intervention would provide important basic information that the caregivers could use in the old people's homes to improve the food choices and healthy eating habits of the elderly. The need arose to design an intervention, which could address the gap based on the FAO framework for nutrition education programmes. Improvements in the caregivers' nutrition knowledge were needed; therefore, it was decided to design a Food and Nutrition Guidelines booklet (Annexure N) for the target population (elderly) in the study. The content of the booklet was derived from the baseline data in conformity with the needs of the elderly dietary intakes along with the established culture in place in the community. Relevant information in the design of the food and nutrition guideline booklet consists of: Eat a variety of foods from the pyramid for serving key food groups every day; regular physical activity; choice of low-fat diet; lean meat, poultry, high intake of fish, skinless poultry twice or thrice, serving weekly. The caregivers obtained information to improve on their basic knowledge on menu compilation, meal preparations, and food nutrients with an expectation of a gradual improvement, making subsequent reference to the copy of the developed food and nutrition guidelines given to them for personal consultation and use after the NEP. This was a theory-based NE intervention programme that was developed to address the caregivers' level of nutrition knowledge towards the needs of the elderly on improved dietary behaviours in Ondo West, city of Ondo, Nigeria.

During the intervention programme, the developed training materials (Annexure O) was used in the train-the-trainer approach to train the caregivers who then could train the cooks and chefs working in the three old people's homes which participated in this study. The channels of communication used for the NEP consisted of face-to-face interactions. The nutrition education materials provided for the NE intervention training were effective to some extent considering the short time of training received by the caregivers and the relative short implementation period due to time constraints of this study. The fundamental basis of communications for behavioural change follows a disciplined series of programme development and implementation phases accompanied by steps designed to learn from the community itself inclusive of: conducting formative research to formulate and test the programme's strategy, designing, testing and improving messages; producing communication materials; monitoring progress and making necessary revisions in programme strategies to address people that have not tried the new behaviour better or who have stopped desired behaviours (Allen & Gilepsie 2001:76). In the case of this study, the researcher followed these phases, realising that CBC is a close resemblance of the FAO framework in their respective processes.

7.3.3 Evaluation phase

According to the FAO framework for nutrition education, the last phase involved the evaluation of the impact of the developed Food and Nutrition Guidelines as described in the booklet to facilitate a change in the elderlies' dietary behaviour. The impact of the food and nutrition guidelines was determined after the NE training programme was presented to the caregivers during a period of six months to assess its effectiveness on elderlies' dietary behaviour and to determine what changes occurred.

With regard to the nutrition knowledge of the caregivers in the study, it was revealed that the caregivers' knowledge of different food groups before and after the intervention remained the same. The training increased the caregivers' awareness and to some extent their nutrition knowledge to provide the required care and ultimately to focus on the well-being of the elderly. The observation indicated what the cooks learnt during the food and nutrition training sessions and some of the modules that were not fully understood and applied. More training and emphasis needs to be put on the areas where the cooks were lacking. The qualitative analysis in the form of the group discussions and the observations highlighted the improvement of the food and nutrition knowledge of the cooks and caregivers, although it was only a small improvement. Although the training was effective in increasing knowledge of the cooks and caregivers in some areas, the dietary intake of the elderly increased at a reasonable level.

Both before and after the intervention, the dietary intake analysis revealed a low energy intake was observed for the elderly, but it was still below the required daily intake. The protein intake before and after the intervention was above the recommended daily intake. The carbohydrate intake of the elderly was remarkably high before and after the intervention for both genders, this was confirmed by the top 20 foods intake results. More emphasis should be placed on the correct carbohydrate intake as it could lead to being overweight and obesity subsequently contributing to the worldwide problem. More emphasis should be placed on this section of the Food and Nutrition Guidelines. Fat consumption reduced drastically after the intervention for men, but it increased for women. Unfortunately, there was only a slight increase in the fibre intake. Regarding the micronutrients (calcium, iron, vitamins, A, B_6, B_{12}) there was an increased intake for both genders before and after the intervention. This was confirmed by the NAR results. Calcium in particular is important in the elderly food intake to strengthen bones and prevent osteoporosis. Iron is an important micronutrient needed for the growth of red blood cell haemoglobin in the human body. It is among the micronutrients for the prevention of infections and chronic diseases. It contains compounds inclusive of metabolic activities essential for growth development and optimum health levels. Iron deficiency in the elderly is more commonly the result of illness than inadequate intake. Iron requirements for premenopausal women are more than twice that of men, but after the age of menopause, those requirements decrease so that requirements are the same for both genders.

The top 20 results confirmed also that the elderly consumed mainly carbohydrates as indicated by the first eight items (Table 6.19). There was also an improvement in the consumption of protein-sourced food. This result is an indication of the effectiveness of the NEP intervention on the dietary intake of the elderly in the study locations of Ondo West city, Nigeria. The information on elderly food choices based on preferred dietary intakes at post-intervention is reflected in the results obtained from the comparison of the post-and pre-intervention intakes.

7.4 CONCLUSION

The NEP developed for this research consisted of combined efforts purposed to educate the caregivers and empower them with the required knowledge on food and nutrients to improve the food choices and dietary intake behaviour of the elderly. The intervention programme was successful as confirmed by the post result obtained in the study on improved knowledge of the caregivers (Tables 6.4-6.16). Dietary behaviour changes were observed after the NEP and its

implementation. For behaviour changes to take place, it requires time with a step-wise approach. NE intervention is considered as part of the longer route involved in addressing malnutrition. It is obvious that poverty, food insecurity and malnutrition are interrelated. Several experts and the political class have seen the solution in an integrated, horizontal and cross-sector approach (Weiss 1998:21).

Dietary intake changes take place over time. In most populations, it is gradual and slow. Nevertheless, programmes and interventions can always be used to improve the nutrition knowledge of the caregivers of the elderly incrementally as suggested by Weiss (1998:21). Changes in dietary intake and behaviour in a population is complex with socio-economic factors making data alone an inadequate evidence for the effectiveness of NEP evaluation. It is an ambitious attempt to develop a simple outcome measure that results in validity and reliability (Guthire, Stommes & Voichick 2006:6). When communities accept new ideas, services or products as fulfilling their aspirations and well-being, it becomes easier to achieve.

The effectiveness of the results obtained with the NEP, indicated the need to increase the time allocated for both implementations of the intervention and evaluation. The result from the post-test confirmed that the intervention was successful, which implied the efficacy of the nutrition education material provided.

7.5 LIMITATIONS

The value and the applications of the results obtained in the study depend on the validity and reliability of the data collected and methods used. However, this research proposed to provide authentically validated data that are reliable. The short period of the intervention was a challenge for establishing lasting changes in the dietary behaviour of the elderly for continuous sustainability in the old people's home.

The questionnaire used in testing the nutritional knowledge was in the English language and not translated to the Yoruba language of the community. This could have influenced a negative result. From various research, it was specified that inconsistent responses often occur when respondents' complete questionnaires without comprehension of what has been asked (Fong & Lam 2010:27). Complications arose during the research as a result of the lower level of nutrition knowledge of the caregivers. The low scientific background knowledge of the caregivers was a constraint for them to understand and interpret the questions asked in the NKQ for suitable answers. Most importantly, the contents of the nutrition education material could

be more diverse and straightforward, while focusing on discussion one issue at a time without overwhelming the target group.

This research report contained little information on discussions between the researcher and the elderly. Hence, further research could be explored on facilitating factors, for more effective and participatory group activities including the elderly. The elderly people could benefit from information session, nutrition knowledge training and skill demonstrations such as cooking methods and food preparation.

7.6 CONTRIBUTION OF THE STUDY

The study contributed to enhancing the nutrition knowledge of the caregivers and cooks to empower them in their responsibility to take care of the elderly in the old people's home in Ondo West, city of Ondo, Nigeria. This encouraged the caregivers to motivate the elderly to improve their dietary behaviour to make healthier food choices. The developed Food and Nutrition Guideline booklet can be of beneficial use in further related studies, considering its success on improving the nutrition knowledge of the caregivers for the advantage of the elderly in the community. The training of the fieldworkers and caregivers is a major pivot for them in capacity building, empowerment and status uplift. Previously untrained people (cooks and caregivers) were trained as part of the intervention, contributing to their sense of self-worth.

7.7 RECOMMENDATIONS FOR FUTURE RESEARCH

The results obtained from this study provided an avenue for areas that need further development in the study locations, and recommendations could be included for the local council and the national government within identified gaps for future research.

7.7.1 Further activities that could be implemented by Ondo West city community for capacity building

The following activities can be implemented in the future:

- In furtherance of the NEP, the group of enabled, educated caregivers can be suitably positioned to mobilise socially and lobby for promoting better and healthier food choices among the elderly in the community.
- Future intentions to ensure food security in the community could include NEP with supplementary efforts for increased accessibility to and availability of healthier foods.
- The local channels in the community could arrange for nutrition education training sessions to provide caregivers and other old peoples' home personnel with information on

food and nutrition, food safety, food storage and preparation skills to optimise availability and preservation of nutrients.

- Partnerships that are vital could be established between the communities and healthcare professionals to ensure collaborative beneficial decision-making for improved community health among the elderly population.
- The researcher can update the Food and Nutrition Guidelines Booklet to accommodate the shortcomings on knowledge and skills identified during the NEP implementation.
- There should be an in-house arrangement with the management of the care homes for periodical training by a nutritionist for refresher programmes for the caregivers, making use of the developed nutrition guidelines and training manual from the research study.
- Simple and clear messages should be used in the food and nutrition guidelines to ensure that all caregivers understand and interpret the nutrition message correctly.
- A continuous motivation and good encouragement of the caregivers could be advantageous for a remarkably longer period in the sustenance of the developed nutritional guidelines for suitable effective implementation.

7.7.2 Further activities for implementation by policymakers

The findings will help in guiding policy and programmes for improved institutional health. All tiers of the government that are major decision-makers responsible for the caring of citizens at various levels could be annexed on further activities for effective implementation.

7.7.2.1 Local government

The local government, as a major player, provides the greatest access to the vulnerable populations in the community. They possess the potential to open doors on long-term support to enhance sustainable NEPs in the interest and welfare of the communities, in order to address the nutritional needs of the elderly. Also, the NGOs, as partners in the communities, are instrumental vehicles to support results-oriented actions on food accessibility which can lead to better food security and healthy choices.

7.7.2.2 National government

Consideration should be given to provide the public and government workers with NE knowledge required in their various departments. For example, the agriculture and health sectors in particular could contribute significantly to improve nutrition, as they are solely responsible for implementing agricultural, food security and nutrition programmes in the community settings. This requires the need to empower the caregivers on nutrition knowledge

for the elderly. It is calling for the empowerment of the elderly (females and males) in the procurement and preparation of food with nutrition knowledge and skills in the community. Therefore, NEPs should be implemented with the consideration of socio-demographic influences on the study population.

Making provision for NE using a tax levy on food advertising that promotes healthy eating as applicable to media, restaurant and food outlets. For example, consumers may be encouraged to make healthier choices by placements of items in retail grocery stores and cafeterias with relevant accompanying nutrition information. Implementing social marketing of the FBDGs using the mass media and government channels for a reputable model to other sectors, by involving the food industry like restaurants, food services and consumers through food organisations should also be considered. FBDG could be communicated through all media channels nationally for all Nigerians to familiarise themselves with good eating practices and well-being.

Launching advocacy projects to policy and decision-makers on the significance of the NEPs and FBDG in impacting good nutrition to develop Nigeria nationally and economically would also be beneficial. Long-term investments in lifestyle and behaviour changes could lead to sustainable improvement on international status for higher productivity and economic growth.

7.8 FUTURE RESEARCH

Research is an integral aspect of quality NE programmes, which contributes to creating a base for scientific evidence. In the future, this NEP could be replicated by testing on a larger sample size with further research explored on the objectives of this study for a sustainable longer period to focus specifically on behaviour change and its impact on nutritional intake. From this research, the results indicated that the NEP can be used as an option to train cooks and caregivers. There is a need for more studies on cost-effective interventions.

Methodologies should be standardised for easy comparison and analysis. Extensive qualitative and quantitative research is needed in a co-relationship between diet and nutrition insecurity, in the community of Ondo West, city of Ondo, Nigeria. There should be an investigation on optimising diets and its sensitivity to cost and social norms. Health behaviours for sustainable hygiene ethics should be targeted for a prospective change to improve dietary habits in the elderly.

Suggestions for future improvement of nutrition education by the researcher suggested that a progress test can be inserted in between the pre-test and post-test. Although the pre-test and the post-test are used as standards to monitor improvements regarding nutrition knowledge in the target group (caregivers) before and after reading the nutritional materials, the progress test could reflect the effectiveness of the NE materials based on population performance and response. If the trainees (caregivers) show strong improvements, the number of educational materials can be increased. If progress is slow, adjustments could be made to future materials and distribution to the best-fit level of readiness of interests. A progress test would be the mid-point assessment or another starting point, whereas the post-test is the end point of the project. The use of standard indicators other than pre-test, progress test and post-test for tracking improvements regarding nutrition knowledge in the form of activities, such as Jeopardy or trivia competitions (which do not require literacy to complete) would be ideal. The main goal is to have the elderly engaged in nutrition education.

For developing questions for the surveys as well as information on nutrition education material, there are many factors that need to be taken into consideration. For example, font size needs to be adjusted due to possible vision problems in the target population. Moreover, the questions and educational information should be kept simple and to the point to avoid confusion for the participants. The message needs to be simple yet convey the meaning effectively. Beside the text and sentence structure, incorporating meaningful pictures would also be beneficial. These pictures would reinforce the concepts and importance of the NE. Education materials could be in various forums such as hand-outs, pamphlets, recipes, nutrition facts and cooking videos. The facilities and equipment available in the specific community needs to be taken into consideration when planning the training. Using different types of educational material determines the most effective material suitable to adjust in fitting learning styles and education levels.

Increasing the frequency of the NE for the target population could be more beneficial. More meeting times should be made available for each section of the NE training material packet to be broken up and reviewed on different days. Each meeting could feature a new lesson, where the participant would be able to learn more information on a selected single topic per meeting, thereby avoiding an overload of information. There should be frequent meetings coupled with activities that would help to communicate information. Such should be focused on communication and finding a common ground without any difficulty. The teaching and

communication process can trigger the participants' enthusiasm about nutrition and reflect learning progress.

7.9 OUTCOME AND SELF-EVALUATION OF THE RESEARCH STUDY

Self-reflection refers to taking stock which is action oriented and incorporated in serving human interests; a process to consider situations historically (Boud, Keogh & Walker 2005:33).

7.9.1 Self-evaluation

During the research, the researcher acquired new scientific knowledge and gained in-depth insight of the following:

- It was a privilege talk to people at the grassroots level and to work with participants in such warm and intimate interactions of generosity and open-heartedness. The researcher had a renewed compassion for people who are coping with a poverty lifestyle on a daily basis.
- The financial implications of the study were greater in the field before, during and after the intervention especially the cost of the group interviews, relevant media and documentary activities. However, the result led to a valuable insight on the research.
- Necessary investigations were carried out in the study with working strategies on nutrition interventions including capacity building for the caregivers. The NEP was developed and used mainly to transfer needed knowledge to the caregivers, to empower them in the execution of their work responsibilities. The NEP framework (FAO 1997) provided relevant information on guided investigations, development and evaluations all through the research process. The thesis in the study followed the phases put in place by the framework.

7.9.2 The role of the researcher

The role played by the research in the project consists of the following:

- Writing and conducting a literature study on the nutritional needs of the elderly and the influence on their dietary behaviour for developing a suitable food and nutrition guidelines for the elderly;
- Designing the research study in phases with the assistance of the promoters;
- Getting involved in planning and execution of the fieldwork and interpretation of data;
- Involvement in training fieldworkers for data collection and training the facilitator for each discussion session using the NE training manual;
- Training the caregivers using the developed Food and Nutrition Guidelines booklet;
- Adapting the NKQs used for determining the caregivers' nutritional knowledge at pre-and-post intervention;

- Executing the reliability testing of the study questionnaires;
- Drawing guidelines for designing training booklet and the developed nutrition guidelines;
- Drafting the content of the developed nutrition guidelines booklet;
- Preparing and presenting the NEP to the caregivers with the assistance of the facilitator for discussion at each session;
- Organising study material for the poster session and its presentations;
- Organising collection of baseline and post-intervention data using the validated questionnaires; and
- The study utilised the participatory process in engaging the caregivers with suitable guiding structures during preparations, formulation, implementation and evaluation phases of the project with regulated meetings and feedback sessions.

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ANNEXURE A

Vaal University of Technology

Your world to a better future

VUT

RESEARCH DIRECTORATE
Tel: (016) 950 9531

Research and Innovation Ethical Clearance Certificate

Applicant:	JA Olomo (DTech Food Service Management)
Project:	Impact of nutrition guidelines on the dietary behaviour of the elderly in Ondo West City, of Nigeria
Institution:	Vaal University of Technology
Date Approved:	8 May 2017
Ethical Clearance Number:	ECN29-2017
Approved: Yes/No	Yes

DR SM NELANA
CHAIRPERSON: RESEARCH & INNOVATION ETHICS COMMITTEE

Date: 9 May 2017

Research and Innovation Ethics
Private Bag X 021
VANDERBIJLPARK
1900
Vaal University of Technology

Vanderbijlpark Campus - Private Bag X021 - Vanderbijlpark - 1911 - Andries Potgieter Blvd
South Africa - Tel: +27(0)16 950 9000 - Fax: +27(0)16 950 9999 - www.vut.ac.za

ANNEXURE B

B

ONDO STATE GOVERNMENT
OFFICE OF THE PERMANENT SECRETARY
MINISTRY OF HEALTH

AD.4693/303 5th April, 20016

Jerome Abiola Olomo,
Vaal University of Technology,
Dept. of Hospitally Tourism and PR. Management Vanderbijipark,
South Africa.

ETHICAL APPROVAL

I am pleased to inform you that upon your request for ethical approval and the submission of your research protocol titled: **Impact of Food and Nutrition Guidelines for the Caregivers of the Elderly in Ondo West, Nigeria,** the State Health Research Ethics Committee (SHREC) has considered your proposal and found it to be in compliance with international standards and best practices.

Therefore, I am pleased to convey to you the approval of the SHREC in line with the contents of your research protocols. However, the SHREC reserves the right to recall its approval if the conduct of the research deviates from the stated objectives, procedures and best practices.

Also, it is mandatory that the Ethics Committee be informed about the progress of the study, any revision in the protocol or extension of its duration. You are also required to disseminate your research outcome to the SHREC before your findings are made public

Best regards.

Dr. E.T. Oni,
Chairman, SHREC.

State Secretariat, Alagbaka, Akure, Ondo State. Email: ondostateministryofhealth@yahoo.com

ANNEXURE C

WESLEY UNIVERSITY OF SCIENCE AND TECHNOLOGY, ONDO. NIGERIA.
COLLEGE OF AGRICULTURE, FOOD SCIENCE AND TECHNOLOGY
DEPARTMENT OF HOSPITALITY MANAGEMENT AND TOURISM
Ethical approval for study

WESLEY UNIVERSITY OF SCIENCE & TECHNOLOGY, ONDO, ONDO STATE NIGERIA
College of Agriculture, Food Science and Technology (Research)

COMMITTEE FOR RESERCH ON HUMAN SUBJECTS (MEDICAL)

Ref: R213123142 Olomo

CLEARANCE CERTIFICATE PROTOCOL NUMBER WUSTO 21200

PROJECT	Impact of Food and Nutrition Guidelines for the caregivers of the elderly in Ondo West, Nigeria
INVESTIGATORS	MR JEROME A.OLOMO
DEPARTMENT	Hospitality, Tourism & PR Management, Vaal University of **Technology** Vanderbijlpark, South Africa
DATE CONSIDERED	Jan 18, 2016

DECISION OF THE COMMITTEE APPROVED UNCONDITIONALLY
Unless otherwise specified the ethical clearance is valid for 5 years and may be renewed
Application
This ethical clearance will expire on 18 January, 2021

DATE: 18-01-2016 CHAIRMAN: ..... 180116 (Prof. Emmanuel Akande)

- Guideline for written "informed consent" attached where applicable

cc Supervisor: Prof. Emsie G. Dicks;
Co- Supervisor Prof. Jeaneette Kearney
Dept of Hospitality, Tourism & PR Management, Vaal University of Technology Vanderbilpark, South Africa.

Works1//ain001wustoHurnEth01,wab/M 18-012016

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and ONE COPY returned to the Chairman Faculty of Science,: Research unit Wesley University of Science & Technology, Ondo NIGERIA.
I/We fully understand the conditions under which I am, we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved 1/we undertake to resubmit the protocol to the committee. I agree to a completion of a yearly progress form. I/we agree to inform the Committee once the study is completed.

DATE Feb 21, 2016 SIGNATURE .....

PLEASE QUOTE THE PTOTOCOL NUMBER IN ALL ENQUIRIES

ANNEXURE D

Vaal University of Technology

VUT

Your world to a better futur

FACULTY OF HUMAN SCIENCES

DEPARTMENT OF HOSPITALITY TOURISM & PR MANAGEMENT

INFORMATION LEAFLET AND INFORMED CONSENT FOR THE CAREGIVERS

PROJECT TITLE: IMPACT OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OFTHE ELDERLY IN ONDO WEST CITY OF NIGERIA

Primary investigator: Jerome Abiola Olomo
Study leader: Prof E.G Dicks, PhD, Department of Hospitality Tourism & PR Management, Vaal University of Technology
Co-study leader: Prof. J.E Kearney
Co- study leader: Dr O C Otitoola

Dear Potential research participant,

You are invited to participate in a research study that forms part of my formal DTech-studies. This information leaflet will help you to decide if you would like to participate. Before you agree to take part, you should fully understand what is involved. You should not agree to take part unless you are completely satisfied with all aspects of the study.

WHAT IS THE STUDY ALL ABOUT?

The research study aims to develop nutrition guidelines for the elderly population in Ondo West city of Nigeria to provide information combating health problems that arise from consuming low nutrient poor meals which leads to diseases.

WHAT YOU WILL BE REQUIRED TO DO

The primary investigator will welcome the participants into the community care centre common room. This will be followed by a brief introduction of the participants.
The field workers will attend to the participants and distribute the questionnaires with the guide of the primary investigator.
The project will take place over a period of six months. The elderly and caregivers will be requested to complete three questionnaires in an interview with the assistance of fieldworkers (who are students from Wesley University of Technology, Ondo in Nigeria) during November 2016 as well as in May 2017 (follow up). It will take about 2(two) hours to complete the 3 (three) questionnaires. The research investigator will arrange appointment dates with the management for you to complete the questionnaires.

If you decide to take part in the study, you will be required to do the following:

- To sign this informed consent form
- To complete a 24- hour recall questionnaire, socio- demographic questionnaire, and food frequency questionnaire. You will be asked to respond to questions regarding your general physical activities in a typical way. You will complete the questionnaire at the centre. It should not take more than 50 minutes to complete the questionnaire
- To participate in a focus group interview consisting of 6-8 persons who are knowledgeable about the nutrition needs of Ondo West community. You will be required to provide your opinions and/or insights of the study theme during the discussion that will last for approximately 1 hour. Note that the focus group discussions will be audio-recorded / video-recorded.

- To then sit for 10 minutes in one of the centre's lounge for a welcome address by the primary investigator.

EXCLUSION CRITERIA:

If you are lesser than 60 years old and more than 75 years old or live outside Ondo West city Community, you are excluded from participating in the exercise.

CAN ANY OF THE STUDY PROCEDURES RESULT IN PERSONAL RISK, DISCOMFORT OR INCONVENIENCE?

Questionnaires: The study and procedures involve no foreseeable physical discomfort or inconvenience to you or your family. Due to the personal nature of the questions, you may experience some emotional discomfort.

Physical exhaustion: A trained physician who is among the fieldworkers will constantly monitor the elderly during the session. He/she will terminate the exercise session as soon as you present with clinical symptoms
Minimal risk/discomfort/inconvenience: Participation in the study involves minimal risks, discomforts and/or inconveniences that are no more than the risks, discomforts and/or inconveniences one encounter in daily living.

THE POTENTIAL BENEFITS OF PARTICIPATING IN THE STUDY

The benefits of participating in this study are:

- You will make a contribution towards establishing a profile for food consumption pattern and dietary behaviour of the elderly in Ondo West city Community.
- You will receive personal information on nutrition knowledge for nutrient enriched meals.

- You will be invited to attend an information session presented by the research investigator and a dietician to create a forum for cross ideas between the community and professional experts.

COMPENSATION OR INCENTIVE FOR PARTICIPATING IN THE STUDY.

Please note that you **will not** be paid to participate in the study. However, you will receive refreshments after completion of the questionnaires.

YOUR RIGHTS AS A PARTICIPANT IN THIS STUDY.

Your participation in this study is entirely voluntary. You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You don't even have to provide the reason/s for your decision, your withdrawal will in no way influence the information needed for the research. Note that you are not waiving any legal claims, rights or remedies because of your participation in this research study.

HOW WILL CONFIDENTIALITY AND ANONYMITY BE ENSURED IN THE STUDY?

Only the researcher, fieldworkers and the supervisors will have access to the completed questionnaires. Your answers will be totally anonymous and your identity will not be revealed under any circumstance. Also, nobody outside the study panel will be able to connect any answer to you in any recognisable way. The results of this study might be published in a scientific journal and/or presented at scientific meetings, but again without revealing the identity of any research participant. The original questionnaires will be stored in a safe place for 5(five) years, after which they will be destroyed.

IS THE RESEARCHER QUALIFIED TO CARRY OUT THE STUDY?

The researcher comes from the same geographical region as you. This means that he/she deeply understands your cultural context and can fluently speak the local languages. The field workers will be registered professional nurses from the local communities.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes. The Faculty Higher Degrees Committee and the Research Ethics Committee of the Vaal University of Technology, Vanderbijlpark, South Africa have approved the study proposal. Also, the Wesley University of Technology Ondo and Ondo State Ministry of Health in Ondo Nigeria have granted written ethical approval for the study. All parts of the study will be conducted according to internationally accepted ethical principles.

WHO CAN YOU CONTACT FOR ADDITIONAL INFORMATION REGARDING THE STUDY?

The primary investigator, Jerome Abiola Olomo, can be contacted during office hours on his cellular phone at 082 794 6887 E-mail jabiolaolomo2001@yahoo.com. The study leader, Prof E.G. Dicks Expert, can be contacted during office hours at Tel (016) 950-9073. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the VUT Research Ethics Committee, Prof Allan Munro, during office hours at Tel (012) 382-6265/46.

DECLARATION: CONFLICT OF INTEREST

The research is mainly to investigate how nutrition guidelines will advance the elderly in Ondo West City of Nigeria on improving their healthy living through dietary behaviour and food consumption of nutrient dense foods.

The final results of the study will only be published after the written approval of the research report.

A FINAL WORD

Your co-operation and participation in the study will be greatly appreciated. Please sign the informed consent below if you agree to participate in the study. Signed consent forms will be kept in a file by the researcher.

CONSENT

I hereby confirm that I have been adequately informed by the researcher about the nature, conduct, benefits and risks of the study. I have also received, read and understood the above written information. I am aware that the results of the study will be anonymously processed into a research report. I understand that my participation is voluntary and that I may, at any stage, without prejudice, withdraw my consent and participation in the study. I had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

Research participant's name: _____ (Please print)

Research participant's signature: _____

Date: _____

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

VERBAL CONSENT

(Applicable when participants cannot read or write)

I hereby declare that I have read and explained the contents of the information sheet to the research participant. The nature and purpose of the study were explained, as well as the possible risks and benefits of the study. The research participant has clearly indicated that he/she is aware of the right to withdraw from the study at any time, for any reason and without jeopardizing his/her relationship with the research team. I hereby certify that the research participant has verbally agreed to participate in this study.

Research participant's name: _____ (Please print)

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

ANNEXURE E

Vaal University of Technology

VUT Your world to a better futu FACULTY OF HUMAN SCIENCES

DEPARTMENT OF HOSPITALITY TOURISM & PR MANAGEMENT

INFORMATION LEAFLET AND INFORMED CONSENT

FOR THE ELDERLY

PROJECT TITLE: IMPACT OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OFTHE ELDERLY IN ONDO WEST CITY OF NIGERIA

Primary investigator: Jerome Abiola Olomo
Study leader: Prof E.G Dicks, PhD, Department of Hospitality, Tourism & PR Management, Vaal University of Technology
Co-study leader: Prof. J.E. Kearney, DTech, Department of Hospitality, Tourism &PR Management, Vaal University of Technology
Co- study leader: Dr O. C. Otitoola, PhD, Department of Nutrition and Dietetics, Federal Polytechnic, Ede, Nigeria.

Dear Potential Research Participant,

You are invited to participate in a research study that forms part of my formal DTech-studies. This information leaflet will help you to decide if you would like to participate. Before you agree to take part, you should fully understand what is involved. You should not agree to take part unless you are completely satisfied with all aspects of the study.

WHAT IS THE STUDY ALL ABOUT?

The research study aims to develop nutrition guidelines for the elderly population in Ondo West city, of Nigeria. The guidelines will provide nutrition information to the caregivers in order to address malnutrition in the elderly.

WHAT YOU WILL BE REQUIRED TO DO

The project will take place over a period of six months. The elderly will be requested to complete three questionnaires as well as an interview with the assistance of fieldworkers (who are students from Wesley University of Technology, Ondo in Nigeria) during November 2016 as well as in May 2017 (follow up). It will take about 2 (two) hours to complete the 3 (three) questionnaires. The research investigator will arrange appointment dates with the management for you to complete the questionnaires.

If you decide to take part in the study, you will be required to do the following:

- To sign this informed consent form.
- To complete a 24- hour recall questionnaire, socio- demographic questionnaire, and food frequency questionnaire. You will be asked to respond to questions regarding your general physical activities in a typical way. You will complete the questionnaire at the centre. It should not take more than 2 (two) hours to complete the questionnaire.
- To then sit for 10 minutes in one of the centre's lounge for a welcome address by the primary investigator. The primary investigator will welcome the participants at the community centre common room. This will be followed by a brief introduction of the participants. The fieldworkers will attend to the participants and distribute the questionnaires with the guide of the primary investigator.

EXCLUSION CRITERIA:

If you are younger than 60 years old and older than 75 years old or live outside Ondo West City Community, you are excluded from participating in the research.

CAN ANY OF THE STUDY PROCEDURES RESULT IN PERSONAL RISK, DISCOMFORT OR INCONVENIENCE?

Questionnaires: The study and procedures involve no foreseeable physical discomfort or inconvenience to you. Due to the personal nature of the questions, you may experience some emotional discomfort.

Minimal risk: Participation in the study involves minimal risks, one encounter in daily living.

THE POTENTIAL BENEFITS OF PARTICIPATING IN THE STUDY

The benefits of participating in this study are:

- You will make a contribution towards establishing a profile for food consumption pattern and dietary behaviour of the elderly in the Ondo West city, Community.

COMPENSATION OR INCENTIVE FOR PARTICIPATING IN THE STUDY

Please note that you **will not** be paid to participate in the study. However, you will receive refreshments after completion of the questionnaires.

YOUR RIGHTS AS A PARTICIPANT IN THIS STUDY

Your participation in this study is entirely voluntary. You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You don't even have to provide the reason/s for your decision. Your withdrawal will in no way influence the information needed for the research. Note that you are not waiving any legal claims, rights or remedies because of your participation in this research study.

HOW WILL CONFIDENTIALITY AND ANONYMITY BE ENSURED IN THE STUDY?

Only the researcher, fieldworkers and the supervisors will have access to the completed questionnaires. Your answers will be totally anonymous and your identity will not be revealed under any circumstance. Nobody outside the study panel will be able to connect any answer to you in any recognisable way. The results of this study might be published in a scientific journal and/or presented at scientific meetings, but again without revealing the identity of any research participant. The original questionnaires will be stored in a safe place for 5 (five) years, after which they will be destroyed.

IS THE RESEARCHER QUALIFIED TO CARRY OUT THE STUDY?

The researcher comes from the same geographical region as you. This means that he/she deeply understands your cultural context and can fluently speak the local languages.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes. The Faculty Research and Innovation Committee and the Research Ethics Committee of the Vaal University of Technology, Vanderbijlpark, South Africa will approve the study proposal. The Wesley University of Technology Ondo and Ondo State Ministry of Health in Ondo Nigeria have granted written ethical approval for the study. All parts of the study will be conducted according to internationally accepted ethical principles.

WHO CAN YOU CONTACT FOR ADDITIONAL INFORMATION REGARDING THE STUDY?

The primary investigator, Jerome Abiola Olomo, can be contacted during office hours on his cellular phone at 082 794 6887 E-mail jabiolaolomo2001@yahoo.com. The study promoter, Prof E.G. Dicks, can be contacted during office hours at Tel (016) 950-9073. Should you have any questions regarding the study, you can contact the co- promoter in Nigeria, Dr O.C. Otitoola, at Tel (234) 706 893 7275.

DECLARATION: CONFLICT OF INTEREST

The research is mainly to investigate how nutrition guidelines will advance the elderly in Ondo West City of Nigeria on improving their healthy living through dietary behaviour and food consumption of nutrient dense foods.

The final results of the study will only be published after the written approval of the research report.

A FINAL WORD

Your co-operation and participation in the study will be greatly appreciated. Please sign the informed consent below if you agree to participate in the study. Signed consent forms will be kept in a file by the researcher.

CONSENT

I hereby confirm that I have been adequately informed by the researcher about the nature, conduct, benefits and risks of the study. I have also received, read and understood the above written information. I am aware that the results of the study will be anonymously processed into a research report. I understand that my participation is voluntary and that I may, at any stage, without prejudice, withdraw my consent and participation in the study. I had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

Research participant's name: _____ (Please print)

Research participant's signature: _____

Date: _____

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

VERBAL CONSENT

(Applicable when participants cannot read or write)

I hereby declare that I have read and explained the contents of the information sheet to the research participant. The nature and purpose of the study were explained, as well as the possible risks and benefits of the study. The research participant has clearly indicated that he/she is aware of the right to withdraw from the study at any time, for any reason and without jeopardizing his/her relationship with the research team. I hereby certify that the research participant has verbally agreed to participate in this study.

Research participant's name: _____ (Please print)

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

ANNEXURE F

F

Field worker confidentiality agreement

IMPACT OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OF THE ELDERLY IN ONDO WEST CITY OF NIGERIA

With due understanding of the nature, conduct, benefit and risk of the study and my role as a field worker in this study I _____ agree to assist the primary investigator by administering questionnaires to the Participants.

I agree to maintain full confidentiality during and after the performance of these tasks.

Specifically I agree to:

- Keep all research information shared with me confidential by not discussing or sharing the information with any other than the primary investigator
- Hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks
- Not to make copies of any raw data in any form or format unless specifically requested to do so by the primary instigator
- Keep all raw data that contains identifying information in any form secure while it is in my possession
- Give all raw data to the primary investigator when I have completed my research tasks
- Destroy all research information in form that is not returnable to the primary instigator upon completion of the research task

Field worker's name _____

Home Address _____

Telephone Number_____

Field worker's signature _____ Date _____

Name of Primary investigator_____

Signature of primary investigator_____ Date _____

ANNEXURE G

Vaal University of Technology

SOCIO-DEMOGRAPHIC QUESTIONNAIRE: AFRICAN COMMUNITY

This questionnaire covers certain aspects of your life, including work and personal details, health and illness, lifestyle and social life that is relevant to health. The answers to these questions will be kept strictly confidential and the information will not be identifiable from any reports and publications.

1. GENERAL INFORMATION

Subject number.....

Please answer all questions by marking the correct answer with **X,** except where otherwise indicated.

Where do you live?

……

2. PERSONAL INFORMATION

2.1 Your role in the family

Mother	Grandmother	Father	Grandfather	Other, specify .....

2.2 When were you born?

Year	Month	Day .....

2.3 How old are you? .....Years

2.4 Gender..... (F/M)

2.5 Are you?

Single	Married	Divorced	Widowed	Other specify .....

3. ACCOMMODATION AND FAMILY COMPOSITION

3.1 Do you live in?

Town / City	Farm	Squatter camp	Rural village	Hostel	Township	Other, specify .....

3.2 Do other people live in your home?

Yes		No	

3.3 How many people are living in your home?

1	2	3	4	5	6	7	8	9	10	10+

3.4 Please **complete** the table below on all members of the household

Name of household member	Age (yrs.)	Gender M/F	Family relationship	Does this person eat and sleep in this house at least 4 days a week?

3.5 Are all members' permanent residents in this house?

YES	NO

3.6 If yes, how long have you been staying permanent in this house?

<1year	1-5years	>5years

3.7 In what type of house are you staying?

Brick	Clay	Grass	Wood	Zinc/shack

3.8 How many rooms does your house have?

< 2 rooms	3-4 rooms	>4 rooms

3.9 Are there other houses/ shacks with the same yard of the main house?

YES	NO

3.10 How are you currently living?

Living with relatives	
Living with friends	
Hostel accommodation	
Squatter home	
Rented house/flat	

Employees properties	
Other, specify.....	

3.11 Do you have the following facilities at home?

3.11.1 Water

Tap in the house	
Tap outside the house (in yard)	
Borehole	
Spring /river/dam water	
Fetch water from elsewhere	

3.11.2 Toilet facilities

None	
Pit latrine	
Flush /sewage	
Bucket system	
Other, specify.....	

3.11.3 Removals

Waste removal	YES	NO

3.11.4 Roads

Tarred road in front of house	YES	NO

3.11.5

Gravel road in front of house	YES	NO

3.12 To what extent do you have problems with the state of your house (e.g. too small, repairs, dampness, etc.)

3.13 Do you have problems with the following?

Mice/ rats	
Cockroaches	
Ants	
Flees	

Mosquitoes	
Geckos	
Frogs	
Snakes	
Bed bugs	
Other, specify.....	

4 WORK STATUS AND INCOME

4.1 Are you currently employed?

YES	NO

IF YES, go to question 4.5

4.2 **If NO,** how would you describe your current status (tick one box only)?

Unemployed	Retired	Housewife	Social Grant	Pension	Student	Other Specify .....

4.3 are you actively looking for paid employment at the moment?

YES	NO

4.4 how long have you been unemployed?

< 6 months	6-12 months	1-3 years	>3 years

4.5 If **YES** (question 4. 1) is your current job a:

Permanent position	Temporary position	Fixed term contract	Other, Specify .....

4.6 Are you doing part time jobs on weekends?

YES	NO

4.7 What is the exact title of your current job?
(Including self-employed)

5 Pension and Social/Child Grant

5.1 Do you receive pension grant?

Yes	no

5.2 Is it difficult to receive a pension grant? If yes explain.

yes	no	Explanation

5.3 How long have you been receiving a pension?

1 year	2	3	4	5	6	7	8	9	10	Other

5.4 Is the pension your only income source?

Yes	no

5.5 Are all members of your household dependent on the pension grant?

Yes	no

5.6 Before receiving pension did you work? If yes please at what age did you retire or stop work.

Yes	Age:	No

5.7 Did you have to stop work/ retire? If stopped explain reason

Stopped	Retire	Explanation:

5.8 At time of retirement did you have a pension fund or retirement annuity?

Yes	No

5.9 Are you able to afford you daily living if pension was to be discontinued? If no explain

Yes	No	Explanation:

5.10 Is any child/children receiving the social grant?

Yes	No	Number of children receiving:

5.11 What is the total income in the household per month?

< R500	R501-R1000	R1001-R1500	R1501-R2000	R2000-R2500	> R2500

5.12 Please specify the monthly income in the household (if willing).....

5.13 How often does it happen that you do not have enough money to buy food for you and your family?

Always	Often	Sometimes	Seldom	Never

5.14 How many people e.g. partner, relatives & others (including yourself) contribute to your house hold income from any source, (including wages/salaries from paid employment, money from second or odd jobs income from savings investments, pension, rent or property, benefits and or maintenance etc.) in the last 12 months?

People	1	2	3	4	5	6	7	8	9	10	10+

5.15 How often do you buy food?

Every day	Once a week	Once a month	Other specify

5.16 Where do you buy food?

Tuck shop	Street vendor	Wholesalers	Supermarket	Other specify

5.17 What type of transport do you use to get around?

Taxi	
Bus	
Train	
Own vehicle	
Other specify	

5.18 How much money is spent on food PER MONTH? (Tick only one box)

R 0- R 50	R51- R100	R101- R150	R151- R200	R201- R250	R251- R300	>R500	I do not know

6 EDUCATION AND LANGUAGE

6.1 What is your highest educational level?

None	Primary school	Standard 8	Standard 10	College/FET	Other post school

6.2 What language is spoken mostly in the house?

iZulu	iXhosa	iSotho	iPedi	Other

				Specify .....

7 ASSETS

Tick one block for every question:	Self	Father	Mother	Sibling	Grandma	Grandpa	Aunt	Uncle	Cousin	Friend	Other
7.1 Who is mainly responsible for food preparation in the house?											
7.2 Who decides on what type of food is bought for the house hold?											
7.4 Who is the head of this household?											
7.5 Who decides how much is spent on food?											

7.6 How many meals do you eat per day?

0	1	2	3	>3

7.7 Where do you eat most of your meals?

Home	Friends	Work	Other, specify .....

7.8 Does your home have the following items and how many?

	YES	**NO**	**QUANTITY**
Electrical stove			
Gas stove			
Primus or paraffin stove			
	YES	**NO**	**QUANTITY**
Microwave			
Hot plate			
Radio			
Television			
Refrigerator			
Freezer			

Bed with mattress			
Lounge suite			
Electrical iron			
Electrical kettle			
Dining room suite			

7.9 What type of fuel do you usually use for food preparation?

Open fire	Paraffin	Electricity	Gas	Coal	Other, specify .....

7.10 What type/s of material are your pots made off (tick all relevant options)?

Cast iron	Aluminium	Stainless steel	Clay	Other, specify .....

Thank you very much for your co-operation. We appreciate your time.

ANNEXURE H

Vaal University of Technology

24- HOUR RECALL

Ondo West city, Nigeria

Subject date of birth: _____ Age: _____ Gender: 1. Male/2.Female

Interviewer:_____

Name:_____ Date:_____/____/20__

Address:_____

Tick what day was yesterday:

1.Monday	2.Tuesday	3.Wednesday	4.Thursday	5.Friday	6.Saturday	7.Sunday

Would you describe the food that you ate yesterday as typical of your habitual food intake?

1.Yes		2.No	

If Not, why?

_____

I want to find out about everything you ate or drank yesterday, including food you pick from veld. Please tell me everything you ate from the time you woke up to the

time you went to sleep. I will also ask you where you ate the food and how much you ate.

During the morning at old peoples home					

1.Time (approximately)	5.Place (old peoples home)	6.Description of food and preparation method	Amount	Amount in g (office use only)	Code (Office use only)
2.Middle of the day (Lunch time)					
During the afternoon					
3.At night (dinner time)					
Time	Place(Old peoples home)	Description of food and preparation method	Amount	Amount in g(office use only)	Code(office use only)
4.After dinner	Before going to sleep				

ANNEXURE I

Vaal University of Technology

FFQ LIST OF FOODS AND FOOD GROUPS DIVERSITY

ONDO WEST CITY OF NIGERIA

PLEASE INDICATE THE FOOD YOU ATE DURING THE PAST SEVEN (7) DAYS BY MARKING (X)

GROUP 1: Flesh Foods (Meat, Poultry, Fish) Diversity	**Y**	**N**
Meat (Chicken)		
Meat (Beef)		
Meat (Mutton)		
Meat (Lamb)		
Meat (Pork)		
Meat (Goat)		
Dried Meat (Biltong)		
All Mince		
All Tribe/Offal/Runners and Heads		
Fish (fresh/whole)		
Tinned Fish (Pilchards/Tuna)		
Processed Meats (sausage)		
Seafood (Prawns, Crab, Shrimp, Crayfish)		
GROUP 2: Eggs Diversity	**Y**	**N**
Eggs		
GROUP 3: Dairy Products Diversity	**Y**	**N**
All Milk		
Evaporated milk (unsweetened)		
Condensed milk		
All Cheese		
Custard		

Ice Cream		
GROUP 4: Cereals, Roots and Tubers Diversity	**Y**	**N**
All Rice		
Maize (pap, rice, samp, porridge, corn on the cob, popcorn, sweet corn)		
Macaroni/pasta /spaghetti		
All Bread (white/brown/ fat cake)		
Scones /Biscuits		
Breakfast Cereals (Corn flakes, Oats)		
All Tubers/Roots (Yam. Sweet potato)		
Potatoes		
GROUP 5: Legumes and Nuts	**Y**	**N**
All Beans Dried		
Dried peas		
Peanuts and nuts		
Soya		
GROUP 6: Vitamin A Rich Fruits and Vegetables Diversity	**Y**	**N**
Pumpkin		
Carrots		
Wild Leafy Vegetables		
Fresh and Dried		
Spinach		
Butternut		
Apricots		
Peach (yellow cling)		
Mango		
GROUP 7: Other Fruits (and juices) Diversity	**Y**	**N**
Deciduous Fruits		
Apples		
Peaches		
Pear		
Grapes (Black/green)		

Plum		
Sub-Tropical Fruit	**Y**	**N**
Lemon		
Orange		
Garden egg		
Banana		
Pineapple		
Avocado		
Walnut		
Watermelon		
Guava		
Paw-paw		
Juices	**Y**	**N**
Juice (100% pure juice e.g. Ceres/Liquid fruit)		
GROUP 8: Other Vegetables Diversity	**Y**	**N**
Onions		
Cabbage		
Melon seed		
Tomatoes		
Green beans (fresh)		
Peas (fresh)		
Cauliflower		
Chilli (green/red)		
Lettuce		
Green/ Yellow/ Red pepper		
Frozen vegetables (mixed)		
Ginger & garlic (fresh)		
GROUP 9: Oils and Fats Diversity	**Y**	**N**
Butter		
Sunflower oil		
Margarine		
Palm oil		
Potato crisps		

Nido cream white powdered milk		

ANNEXURE J

VAAL UNIVERSITY OF TECHNOLOGY, SOUTH AFRICA

NUTRITION KNOWLEDGE QUESTIONNAIRE, ONDO WEST CITY, NIGERIA

SECTION A:

KNOWLEDGE ON NIGERIAN FOOD BASED DIETARY GUIDELINES

No	ITEM	True	False	Don't know
1	If you are more active you need to eat more food			
2	Soya mince, dry beans, peas is as healthy as meat and should be eaten often as a replacement for meat			
3	Local cheese (wara) is good for the elderly			
4	Elderly people should eat less sugar			
5	Eat as many fruit that is in season as possible			
6	Total food intake should take into consideration a person's level of physical activity			
7	Individuals who do manual work need to consume more food than those who do sedentary work			
8	Limit fat intake from animal foods			
9	The diet should contain as wide a variety of foods as possible e.g. cereals, legumes, roots/tubers, fruits, vegetables, fish, lean meat, local cheese (wara)			
10	Limit intake of salt, bouillon cubes and sugar			

SECTION B: DEFICIENCIES

KNOWLEDGE QUESTION K1: Signs of Vitamin A deficiency

1. Have you heard about vitamin A deficiency or lack of vitamin A?
   (a) Yes (b) No ( )((c) Don't know/no answer
   If Yes:

Can you tell me how you can recognize someone who lacks vitamin A in his or her body?……
..……..

2. ( ) Weakness/feels less energetic
   ( ) be more likely to become sick (less immunity to infections)
   ( ) Eye problems: night blindness (inability to see at dusk and in dim light), dry eyes, corneal damage, blindness
   ( ) other
   ( ) don't know

Question K2: Risk of overweight and obesity

What are the health problems that can occur when a person is overweight or obese?

……..

……..

( ) Increased risk of chronic conditions (such as heart/cardiovascular disease, high blood pressure and diabetes, stroke, certain types of cancer, respiratory difficulties, chronic musculoskeletal problems, skin problems and infertility.

( ) Reduced quality of life
( ) Premature death
( ) Other
( ) Don't know

Question K 3: Causes of Vitamin A deficiency
What causes a lack of vitamin A in the body?
……..
……..
( ) poor variety of foods
( ) fear too little food/not eat much (poor intake)
( ) other
( ) don't know

Question K 4: Prevention of vitamin A deficiency
How can one prevent lack of vitamin A in the body?
……..
……..
( ) Eat/feed vitamin - A rich foods – having/giving a diet rich in vitamin A

( ) Eat/feed foods fortified with vitamin A
( ) Give vitamin A supplements/sprinkles
( ) other
( ) Don't know
Question K 5: Food sources of vitamin A
Can you list examples of foods rich in vitamin A?
Probe if necessary:
Do you know of any animal-source foods, vegetables or fruits that are rich in vitamin A?
……..
……..
Animal-source foods
( ) liver
( ) kidney
( ) heart
( ) egg yolks/egg from chicken, duck, guinea fowl or other
( ) milk, cheese, yoghurt or other dairy product bird

Orange-coloured vegetables
( ) orange sweet potato
( ) carrot
( ) pumpkin
( ) squash

Green vegetables
( ) Amaranthus, Spinach, cassava leaves
Fruits (orange)
( ) ripe mango

( ) ripe pawpaw

( ) red palm oil

Food-based dietary guidelines

Question K 1: Knowledge on Nigerian food-based dietary guidelines

K. 1A: Have you ever seen this image? (Show the image of Nigerian Food-based dietary guideline)

( ) Yes ……..go to question K. 1B

( ) No ……..go to question K.2

K. 1B: Could you tell me what it is?

……..

……..

( ) (insert the name of the Nigerian food-based dietary guideline)

( ) other

( ) Don't know

Question K. 2: Why do you think the Nigerian FBDG exist?

( ) To help people to eat more healthily/have a healthy diet

Or

( ) To encourage people to eat foods from different food groups/have a diversified diet

( ) other

( ) Don't know

Risks of Overweight and Obesity

Question K1:

What are the health problems that can occur when a person is overweight or obese?
……..
……..
( ) Increased risk of chronic conditions (such as heart/cardiovascular disease high blood pressure and diabetes, stroke, certain types of cancer)
( ) reduced quality of life
( ) premature death
( ) other
( ) don't know
Question K.2: Causes of overweight and obesity

Can you tell me the reasons why people are overweight or obese?

……..

……..

( ) Increased/excessive intake of energy-dense foods that are high in fat and/or sugar

( ) lack of or decreased physical activity

( ) other

( ) don't know

Question K 3: Prevention of overweight and obesity

How can people prevent overweight and obesity?

……..

……..

( ) reduce energy intake (less high-energy foods and drinks/reduce the intake of fatty and Sugary foods)

( ) eat vegetables and fruits more often

( ) eat legumes/whole grains products more often

( ) increase physical activity level/engage in regular physical activity

( ) other

( ) don't know

SECTION C: GENERAL FOOD KNOWLEDGE

NO	ITEM	True	False	Don't know
1	Fruits and vegetables are a good source of vitamin C and vitamin A. Fruits and vegetables have lots of vitamins that will strengthen the body's immune system and prevent infections			
2	Eating a high content of calcium rich foods will strengthen bones and prevent osteoporosis			
3	Chicken liver will prevent anaemia disease			
4	Beef and chicken have a high content of protein			
5	Fruits and vegetables have a high content of vitamins and minerals			
6	Yoghurt, cheese have a high content of calcium			
7	Elderly require to eat healthy snacks			
8	Fish and chips in lunch menu contain least fats			
9	Eko (pap from maize) is rich in fat			
10	Brown bread sandwich with thinly spread peanut butter and jam with a banana are fat enriched			
11	Spinach and rice are deficient in fat			
12	White bread is most ideal for the elderly			
13	Brown bread is suitable for the elderly			
14	Whole wheat bread is healthy for the elderly			
15	It is healthy for elderly to eat only one portion of meat everyday			
16	There should be a little bit of salt included to elderly's diets because most salt has iodine that prevents goitre			

17	Should starchy foods (like porridge, rice, bread) be included into elderly meals?			
18	A well balanced diet consists mostly of meat, with smaller amounts of starch, fruits, vegetables and dairy products			
19	A well balanced diet consists mostly of vegetables and smaller amounts of meat and dairy products			
20	A well balanced diet consists mostly starches, vegetables and fruits with smaller amounts of meat and dairy products			

SECTION D: NUTRITIONAL HEALTH AND FOOD SAFETY

NO	ITEM	True	False	Don't know
1	When working with food, it is important to wash hands at the start of preparations			
2	When working with food, it is important to wash hands after using bathroom or toilet			
3	You should not wash fresh fruit and vegetables before cooking them			
4	It is important to encourage the caregivers to wash their hands before eating			
5	When preparing food chopping boards should be used			
6	Different chopping boards should be used when working with bread, raw food and cooked food			

CRONBACH ALPHA 0.69

Reliability

Scale: ALL VARIABLES

Case Processing Summary

		N	%
Cases	Valid	9	90.0
	Excluded[a]	1	10.0
	Total	10	100.0

a. Likewise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.696	128

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Location	292.7778	54.944	.258	.500
family role	291.2222	52.194	.182	.480
Religion	228.4444	41.278	.208	.493
Gender	292.6667	54.250	.136	.489
marital status	292.3333	55.500	.200	.496
livewhere	293.3333	55.500	.000	.496
familtcomp	293.3333	55.500	.000	.496
homepermanence	291.3333	55.500	.000	.496
housetype	293.3333	55.500	.000	.496
buildingtype	292.0000	59.500	.551	.535
houseincompd	293.3333	55.500	.000	.496
livingcondtn	288.3333	55.500	.000	.496
watersource	290.4444	56.278	.178	.505
watersupply	293.3333	55.500	.000	.496
toiletfacilities	291.3333	55.500	.000	.496
wastedisposal	292.3333	55.500	.000	.496
roads	293.3333	55.500	.000	.496
housestate	292.0000	58.750	.301	.537
animalproblem	287.3333	55.500	.000	.496
Micerats	293.3333	55.500	.000	.496
cochroaches	293.3333	55.500	.000	.496
Ants	293.3333	55.500	.000	.496
Flees	293.3333	55.500	.000	.496
mosquitoes	293.3333	55.500	.000	.496
Geckoes	293.3333	55.500	.000	.496

Termites	293.3333	55.500	.000	.496
Snakes	293.3333	55.500	.000	.496
Bedbugs	293.3333	55.500	.000	.496
Others	293.3333	55.500	.000	.496
currentemployment	292.3333	55.500	.000	.496
Ifnowhy	292.3333	55.500	.000	.496
workdescription	292.3333	55.500	.000	.496
Jobtype	293.3333	55.500	.000	.496
Parttime	293.3333	55.500	.000	.496
familyincome	287.3333	55.500	.000	.496
foodmoney	289.2222	57.444	.407	.515
Buyfood	291.5556	52.278	.288	.473
wherebuyfood	292.5556	45.278	.487	.418
transporttype	290.6667	57.000	.166	.527
buycookedfood	292.3333	55.500	.000	.496
whrerebuycookedfood	291.5556	54.278	.002	.507
educationallevel	290.3333	55.500	.000	.496
Languge	288.3333	55.500	.000	.496
whereeatmeal	288.3333	55.500	.000	.496
electricstove	293.3333	55.500	.000	.496
Gastove	293.3333	55.500	.000	.496
kerosenestove	293.3333	55.500	.000	.496
microwave	293.3333	55.500	.000	.496
Hotplate	292.8889	58.361	.390	.526
Radio	293.2222	54.944	.090	.493
television	293.3333	55.500	.000	.496
electrickettle	292.3333	55.500	.000	.496
dinningroom	293.3333	55.500	.000	.496
Fueltype	290.6667	53.000	.194	.481

potmaterial	291.8889	51.611	.477	.463
Chicken	293.2222	54.944	.090	.493
Beef	292.8889	53.111	.275	.478
Mutton	292.6667	59.500	.551	.535
Lamb	292.5556	54.528	.119	.490
Pork	292.8889	53.611	.209	.483
Goat	293.1111	54.861	.068	.494
Tinko	292.8889	50.861	.580	.455
Fish	292.6667	53.250	.274	.479
Offal	292.7778	54.444	.100	.491
Sausage	292.7778	51.944	.431	.466
Seafood	292.8889	54.861	.046	.495
Egg	293.2222	55.194	.039	.495
Milk	293.1111	51.111	.665	.456
evaporated	292.5556	55.278	.004	.497
condensed	292.5556	56.028	.109	.504
Yoghurt	292.8889	54.361	.111	.490
Cheese	292.7778	56.444	.543	.509
Custard	292.7778	51.694	.465	.464
icecream	293.1111	57.861	.381	.520
Rice	293.2222	55.444	.112	.497
Maize	292.8889	50.111	.685	.446
macaroni	292.6667	55.750	.670	.503
Bread	293.0000	57.750	.329	.520
Biscuit	292.6667	51.500	.523	.461
semolina	292.8889	55.611	.049	.502
cornflakes	292.5556	56.278	.147	.506
Yam	293.1111	57.861	.381	.520
Potatoes	293.0000	50.750	.632	.453

Beans	293.1111	51.111	.665	.456
Nuts	293.0000	57.750	.329	.520
soyabean	293.2222	54.944	.090	.493
Pawpaw	293.3333	55.500	.000	.496
Carrots	293.3333	55.500	.000	.496
greenleafy	293.1111	54.361	.145	.489
Okra	293.1111	54.361	.145	.489
Palmoil	292.8889	56.611	.175	.511
Orunla	292.7778	52.444	.364	.471
Ewedu	293.0000	51.000	.595	.456
Mango	293.3333	55.500	.000	.496
Apples	293.2222	54.944	.090	.493
Pear	292.6667	55.250	.000	.498
Grapes	292.5556	51.278	.638	.458
Lemon	292.5556	53.778	.236	.483
Orange	293.1111	55.611	.646	.500
gardenegg	292.6667	53.250	.274	.479
Banana	293.1111	55.611	.646	.500
pineapple	292.8889	53.111	.275	.478
Avocado	292.5556	54.278	.158	.488
Walnut	292.3333	55.500	.000	.496
watermelon	292.6667	53.500	.239	.481
Guava	292.6667	55.000	.034	.496
Juice	293.2222	54.944	.090	.493
Onion	293.2222	54.944	.090	.493
Cabbage	292.3333	55.500	.000	.496
melonseed	292.3333	55.500	.000	.496
tomatoes	293.2222	55.444	.920	.497
greenbeans	292.5556	56.528	.843	.509

peas	292.4444	56.278	.178	.505
chilli	292.4444	56.278	.178	.505
margarine	292.5556	51.278	.638	.458
nidocream	292.4444	56.028	.175	.503
monday	292.5556	52.778	.395	.473
tuesday	292.4444	55.778	.781	.500
wednesday	292.5556	54.528	.119	.490
thursday	292.4444	56.028	.128	.503
friday	292.5556	60.278	.726	.540
saturday	292.3333	55.500	.000	.496
sunday	292.4444	54.528	.175	.489
ateyesterday	293.3333	55.500	.000	.496
morninghome	293.3333	55.500	.000	.496
lunchtime	293.3333	55.500	.000	.496
afternoon	293.3333	55.500	.000	.496
dinner7pm	292.5556	56.028	-.109	.504

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
294.3333	55.500	7.44983	128

ANNEXURE L

GROUP INTERVIEWS

A. Nutrition guideline is good for use in Old Peoples' Homes to source required information on food nutrients

e.g. carbohydrates from Yam, Cassava, protein from local brown beans (Ewa).

B. It provides more nutrient knowledge for people caring for the elderly.

C. It enables planning balanced diet for the essential body needs of the elderly.

D. It encourages menu planning for the elderly that are weak and those with special needs e. g. disabled persons.

E. It provides information on the quantity of cooked foods intake e.g. in grams,

F. It provides information on health standard for cooks and service staff in Old Peoples' Homes e.g. washing hands

before and after cooking; no sneezing over food.

G. It encourages the use of food recipes that are scientifically approved for preparation of nutrient rich foods for the

elderly.

H. It cautions against contacting non-communicable diseases by poor diets.

I. It creates awareness for the need of the elderly partaking in physical activities e.g. walking, stretching and trekking.

J. It is an integral tool to guide elderly on their dietary habits.

Response to Question 3 of Focus Group Discussion

A. Nigerian Food-Based Dietary Pyramid contain information on Nigerian foods sourced directly from farms in

Nigeria e.g. Yam, Cassava, Plantain and Millet.

B. It mentions about foods eaten by all the cultural people of Nigeria e.g. Hausa, Yoruba, Ibo. Foods such as Tuwo

Shinkafa for Hausas; Eba, Amala and Iyan for Yorubas; Apu and Ogbono for Ibos.

C. It emphasizes the food that should be consumed by the elderly to gain strength physically e.g. Jollof rice, local

beans with palm oil.

D. It guides the caregivers of the elderly on the food intake for healthy living e.g. Pawpaw, water- melon, Mango.

E. It displays the essential food products that are locally sourced from Nigeria farms at affordable costs for the elderly.

E.g. Ewedu, palm oil and local cherry.

F. Roasted Yam and Boiled Plantain.

G. It classifies food products in Food Groups according to hierarchy of needs in triangular pyramid for the elderly.

E.g. Healthy oils- palm oil, soy oil and olive oil; grains, legumes and vegetables.

H. It encourages intake of plain local yoghurt, soya milk and local cheese by the elderly for protein and vitamins

especially vitamin A sourced from palm oil.

I. It increases the appetite of the elderly through food intakes that are easily digestible to maintain light body weight

and prevent obesity.

J. The pyramid provides guide that the elderly should avoid intake of cakes, sugar for healthy living.

Response to Question 4 of the Focus Group Discussion

A. To improve taste. E.g. local melon seed (Egusi); Ogiri.

B. It stimulates appetite. E.g. Curry powder, thyme, knorr cube and maggi cube.

C. It boosts morale of food intake on its aesthetic colourful look e.g. curry powder.

D. It adds value to the quality of the food visually to the elderly. E.g. grated red chilli, shredded green pepper and

garlic.

E. It helps the elderly to haste their digestion and regulate gut.

F. It provides the needed vitamin to build and sustain healthy body cells.

G. Local shea-butter (Iru) is a nutrient rich condiment with high flavouring quality and of high value for the elderly.

H. It keeps the elderly strong, looking good and radiant at all time.

I. It makes them to appreciate food preparation skills of the cooks through smelling

food aroma.

J. They are constantly reminded of meal, time with reference to the previous.

Responses on Question 5 of Focus Group Discussion

A. It add values to the outlook of the food to make brighter and attractive.

B. It keeps the component of the food prepared moist and compact. E.g. Palm oil added to Yam pottage; vegetable oil

added to Jollof rice.

C. It hastens frying food products and gets it succulent for consumption. E.g. Fry cutlets of Hake fish and Croaker fish.

D. It adds pleasant taste to the food. E.g. Plantain chips (fried) and fried potato chips.

E. It expels moisture from fried foods at a regulated hot temperature. E.g. Fried Yam Chips.

F. It is a suitable medium to cook food by frying especially fish, yam slices, plantain and chicken.

ANNEXURE M

EXISTING MENU

BASICMENU PLAN		
Breakfast	**Light meal**	**Main meal**
Fruit Ogi (soft maize pap) Bread and Jam Tea or Coffee	Protein sourced dish (poached egg, hake fish, Lettuce, cabbage, cucumber; Raw fruits, Toast sliced bread, Jam or marmalade	Protein sourced dish (lean meat, local brown beans, skinned chicken breast) Yam, Plantain (cooked) Lettuce (one raw, one cooked) Dessert –roast peanut (unsalted) Tea or Coffee

EXISTING MENU					
Menu 1		**Menu 2**		**Menu 3**	
Breakfast: Ogi soft maize pap (yellow or white coloured) **Snack**: Mango **Lunch:** Fillet of Hake fish served with sliced cucumber and Rice	**Portion size** Two third cup= One and half portion One 150g =One portion	**Breakfast** Oats **Snack:** Pear **Lunch:** Skinned chicken Plantain, sliced boiled carrot and spinach	**Portion size** Two third cup= One and half portion One 60g-=One portion 200g= one portion 20g=one portion 15g=one portion	**Breakfast** Millet porridge **Snack:** Orange **Lunch:** Melon vegetable stew and Yam	**Portion size** Two third cup= one and half portion One 200g=one portion

ANNEXURE N

FOOD AND NUTRITION GUIDELINES BOOKLET

USED FOR THE TRAINING OF THE

Caregivers of the elderly in the Old People Homes in Ondo West city of Nigeria.

Developed by:

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MODULE 1: INTRODUCTION TO THE NIGERIAN NUTRITION GUIDELINES FOR THE ELDERLY

Introduction

Guides are meant to translate dietary standards or guidelines into food choices that contribute to healthy dietary lifestyle patterns for the elderly. Guidelines can assist people with little or no training in nutrition. They emphasize the consumption of a variety of foods which will ensure all nutrients required are obtained (Bechman, Reedy, Subar & Krebs-Smith 2008:1). In this context, the information in the guidelines of South African Food Based Dietary Guidelines (SAFBDG), New Zealand Dietary Guidelines (NZDG), and United Sates Dietary Guidelines (USDG) were used as basis to expand on the Nigerian Food Based Dietary Guidelines (NFBDG) in order to develop nutrition guidelines for the elderly in Nigeria.

Five areas of emphasis of the Nigerian Food Based Dietary Guidelines were developed using the results of the baseline study on the following five basic food groups: protein foods, grains, milk and milk products, fruits and vegetables, and oils (Whitney & Rolfes 2016: 48).
The guidelines consisted of the following:

- Eat adequate amounts of foods prepared from a variety of available foods e.g. cereals, tubers, fruits, vegetables, meats and milk.
- Eat a variety and more fruits and vegetables on a daily basis.
- Increase consumption of fish and fish products in the diet.
- Increase consumption of fermented semi-solid foods such as wara (local cheese), kunu, and soybean enriched pap, enriched agidi (solid pap) and eko (soft pap).
- Eat smaller meals more frequently (NFBDG 2006:14).

Importance of training caregivers

When caregivers have adequate nutrition knowledge, they will have the ability to provide the cooks and kitchen assistants with information on how to prepare a balanced diet and nutritious meals in the old people homes. Furthermore, the caregivers can assist the elderly on how to prepare balanced meals and make healthier food choices in their own homes. Additionally, this will enable the caregivers to create the awareness about the importance of nutrition emphasizing the following: basic nutrition, healthy food choices and sources, food portions,

being active and the importance of general food safety practices. This will enable the caregivers to inform the elderly on measures to take to avoid the risk of food borne illness and cross-contamination (Briley & Roberts- Gray 1999:987). When the elderly learn how to choose and enjoy different types of nutritious foods, it provides them the basis for a lifetime of good food choices (Hersheys 2004:4; Kellogs 2005:1).

Training material needed

- Visual presentation by means of power point presentation and posters.
- Nutrition Guideline Training booklet.
- Pictures of various food items.
- Pictures of different food items discussed in each module.
- Samples of various flavouring and food items used in preparing meals.
- Kitchen cooking equipment and teaching aids.

Knowledge testing on each module: After completion of each module the facilitator (researcher) will ask the caregivers simple questions on what they have learned during the training session. (15 minutes).

Objective of the module

- To discuss the developed Nigerian food based guideline pyramid for the elderly which forms the basis for this training manual.

DEVELOPED NIGERIAN FOOD BASED GUIDELINE PYRAMID FOR THE ELDERLY

The top levels of the pyramid consist of the following:

- Food flavouring
- Healthy Oils
- Meat, Fish and Protein sources
- Dairy Products
- Fruit
- Vegetables
- Grain and Legumes

The bottom level of the pyramid consists of the following:

- Avoid Cakes, sweets and chocolates
- Drink more water
- Daily physical activity

Adams-Campbell, Anderson, Brena, Campbell, Clinton, Hu, Nelson, Neuhouser, Perez-Escamilla, Siega-Riz, Story & Lichtenstein 2016:438).

The objective of the pyramid is to serve as a basic guide of food sources and their portion sizes for the elderly and to enhance the importance of healthy lifestyle practices.

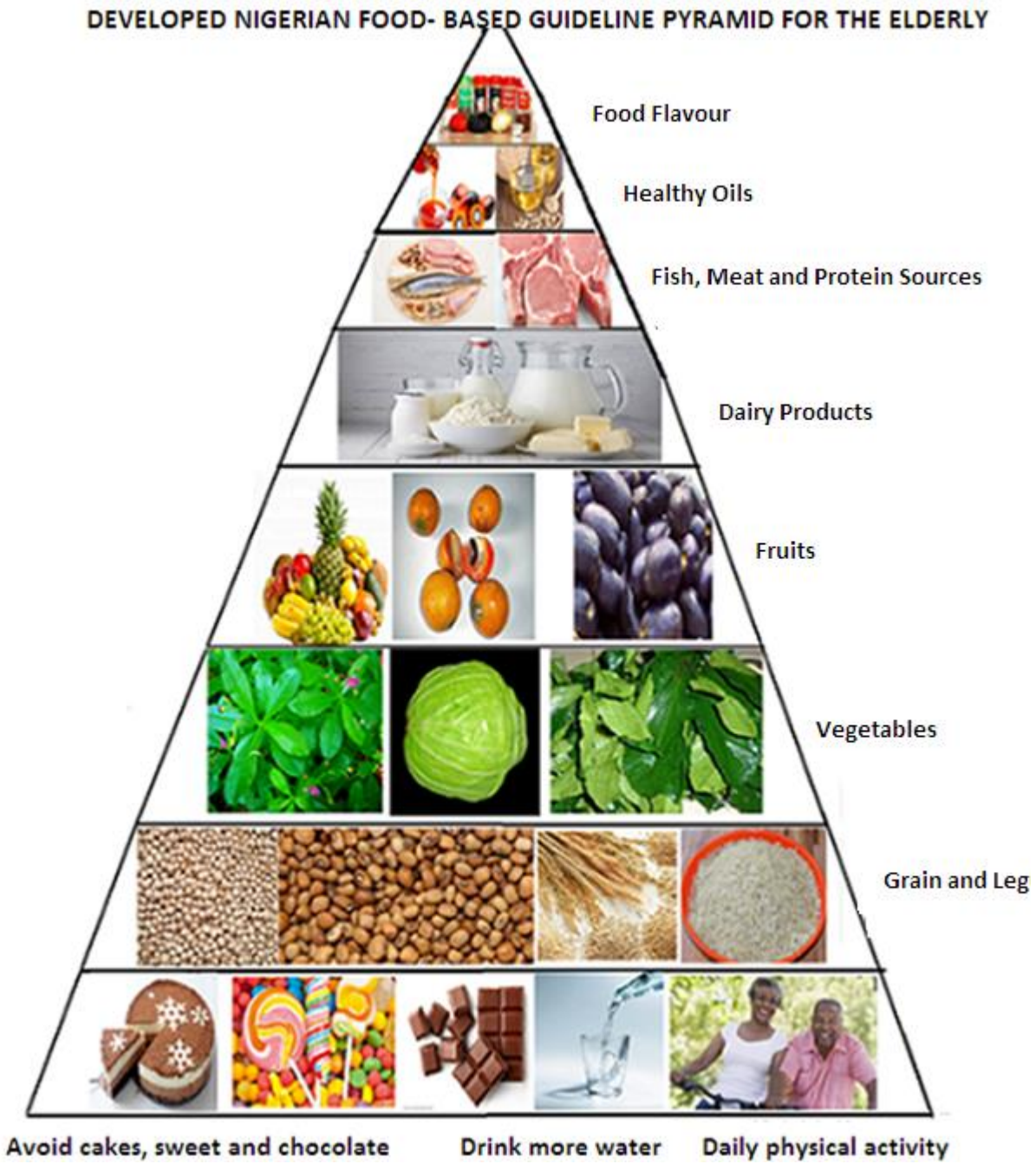


Fig. 1: Developed Nigerian Food- Based Guideline pyramid for the elderly.

Source: Developed by Olomo (2018). Adapted from the Nutrition Division, Federal Ministry of Health Abuja, Nigeria (NAFBDG 2006:14); South African Food- Based Nutrition Guidelines (Schonfeldt, Hall & Bester 2013:226). Ministry of Health, New Zealand; New Zealand Dietary Guideline (Bacon, Bolland, Ames, Amanda, Babara, Home, Grey & Reid 2011:1); US Dietary Guideline (Babara, Steve,

Instruction: Answer the following questions about the Food Pyramid.

- Identify level one from the top of the pyramid.
- Identify level two from the top of the pyramid.
- Identify level three from the top of the pyramid.
- Identify level four from the top of the pyramid.
- Identify level five from the top of the pyramid.
- Identify level six from the top of the pyramid.
- Identify level seven from the top of the pyramid.
- Identify level eight from the top of the pyramid.
- Give examples of the following:

  Food flavouring

  Healthy Oils

  Meat, Fish and Protein sources

  Dairy Products

  Fruit

  Vegetables

  Grain and Legumes
- Identify the bottom level of the pyramid.
- What is the objective of the pyramid.

MODULE 2: FOOD FLAVOURING

Introduction

The majority of the elderly eat more salt (sodium) than the recommended amount which can cause high blood pressure and heart problems. By flavouring food the taste can be enhanced and the adding of additional salt can be limited or reduced. Food flavours are used to alter the flavour of natural food products that do not have the desired flavour. They are classified into natural, nature-identical and artificial substances (Jiang & Adhikari 2013:532).

Importance of food flavour to the elderly

Food flavour is used to improve taste and/smell to food for the elderly. It helps to stimulate their appetite by encouraging them to eat prepared foods (Inetiabor Yakubu & Ezeonu 2015:1118).

Figure 2: Food Flavours (Inetianbor, Yakubu & Ezeonu 2015:1118).

Definition of flavour

Flavour is made up of both the natural and artificial components and defined as follows:

Natural flavours are typically complex mixtures of chemicals derived from plants and fruits while artificial flavour is synthesized from other chemicals rather than being extracted from a natural source. It contains only a small number, often just one-of the same flavour chemicals

found in the natural extract, but lack the others so they cannot precisely duplicate flavour of the complex nature (Bloom 2017:10).

Definition of Aroma

Aroma compounds are also known as odorant, aroma, fragrance or flavour. It is a chemical compound that has a smell or odour. A chemical compound has a smell or odour when it is sufficiently volatile to be transported to the olfactory system in the upper part of the nose. Aroma can be found in food, spices, wine and essential oils (Bloom 2015:7).

Objective of the module

To improve the knowledge of the caregivers on the following:

- The use of natural flavouring agents to enhance the taste and aroma of food in moderate amounts suitable for the elderly.

How to use different food flavouring

    - Salt must be used sparingly as it could cause high blood pressure. In place of salt use fresh herbs, onions, ginger, wine and vinegar to increase flavour of the food.
    - To help the elderly to eat less salt it is recommended that salt shakers are removed from the dining table.
    - Limit the use of salt during food preparation.
- Excessive use of curry makes the dish unappealing to eat as it can burn both the mouth and stomach.
- Ginger, nutmeg and cloves are suitable to be added to desserts and meat products to improve the taste of the food and to stimulate appetite.
- Herbs and spices give food extra burst of flavours when added to meats, soups and potato. E.g. the herb Rosemary gives refreshing scents it is proven to uplift and improves memory.
- Turmeric is a kind of spice used in curry dishes to give food bright colour and flavour. Turmeric helps reduce pain, inflammation and prevents heart attack. It tastes wonderfully when added to rice. It can also be added to chicken and for salad dressing. It gives extra flavour when sprinkled on egg.
- Ginger could be added to stir fried dishes, vegetables, fruit cakes and stews. It could lower blood sugar level in elderly (Inetianbor, Yakubu & Ezeonu 2015:1118).

- Cayenne pepper in low quantities is suitable to sprinkle as a spice to boost the metabolism, lower the risk of heart attack and reduce arthritis pain (Jiang & Adhikari 2013:532).
- Cinnamon is suitable to sprinkle small quantities over fresh fruit; can be added to cooked oat meal, soft pap and corn starch pap. Cinnamon helps to fight bacteria, control appetite and lowers blood sugar and lowers cholesterol (Inetiabor, Yakubu & Ezeonu 2015:1118).
- Black pepper should be used in cooked dishes to increase the flavour, because of its richness in vitamin C, A, flavonoids, carotenes and antioxidants.
- All food flavourings should be used in moderate amounts
- Food flavourings should be used to enhance natural flavours and not to overpower.

Instruction: Answer the following questions on the use of food flavouring.

- How would you help your elderly to eat less salt?
- What can you do to improve the taste of the food served to the elderly?
- List the food items that you can add to stir fry to enhance the flavour?
- Is food flavour used to improve the taste of meals?
- Does flavour add to the quality of meals?
- Does flavour boost appetite?
- Is flavour a component of spices and salt?
- Give another name for aroma.

MODULE 3: HEALTHY OILS

Introduction

Healthy oils are suitable for the elderly meals because they are essential products that the body cannot generate (Barbara, Steve, Adams-Campbell, Clinton, Hu, Nelson, Neuhouser, Perez-Escamilla, Siega-Riz, Story & Lichtenstein 2016:438).

Figure 3: Healthy Oils (2015 US Dietary Guideline Advisory Committee Scientific Report: Development and Major Conclusion).

Objective

- To provide information on the use of healthy oils suitable for elderly consumption.

Portion sizes

40 grams per person daily (USDA DGA 2015-2020).

Use of healthy oils

- Oils that are healthy for the elderly are sourced from plants and fish. They do not contain cholesterol.
- Unsaturated fats are found in vegetable oils.
- Examples of oils from plants are: soybeans oil which contains omega-3 fats and is heart-healthy fats.
- Palm oil is also sourced from palm trees and is predominantly consumed by the Nigerian elderly;

- Palm oil provides sufficient caloric density to meet the energy requirements of the elderly;
- Palm oil is one of the richest sources of active carotenoids;
- Palm oil reduces infection from vitamin A deficiency diseases; and
- It is palatable to taste and can stimulate the appetite of the elderly (Scrimshaw 2000:195).
- Soybean oil can be used purposely for sautéing and frying or making salad;
- Soybean oil is healthy for cooking;
- Soybean oil inhibits cholesterol absorption and reduces risk of several health diseases;
- Soy oil delays aging and prevents skin problem peculiar to older people;
- Its richness in vitamin K helps in bone strengthening;
- It treats Alzheimer's disease and heart related conditions;
- Soybean oil is rich in energy useful for the elderly health; and
- Apart from vitamin K, it also contains vitamin A, C and E (Nierenberg 2017:1).
- Coconut Oil is also popular in Nigeria. The flavonoids and polyphenol contents improves oxidative stress, involved in the ethology of various diseases, including type-2 diabetes mellitus (T2DM), cardiovascular disease and cancer (Boemeke, Marcadenti, Busnello & Gottsschall 2015:84).
- Portion sizes: 1 tablespoon soybean oil, low saturated fat (USDA 2015).
- To reduce the daily intake of fat choose low fat salad dressing; and
- Limit fat intake from animal foods.

Instruction: Answer the following questions on Healthy oils:

- Explain why healthy oils are good for old people.
- Mention two types of healthy oils suitable for the elderly.
- Mention the micronutrients present in soybean oil.
- Give the reasons why oils are good for elderly sight.
- List diseases caused by deficiency of healthy oil intake in the elderly.
- Explain briefly the type of diseases caused by oil deficiency.
- Where are unsaturated fats found?

- List the healthy oils that contains omega -3.

MODULE 4: FISH, MEAT AND PROTEIN SOURCES

Introduction

Proteins are used for building and repairing the body and should be consumed daily in each meal.

The importance of fish, meat and other protein sources to the elderly are as follows:

- It enhances brain function;
- It lowers the risk of cancer;
- It prevents obesity;
- It enhances avoidance of synthetic hormones;
- It boosts liver health;
- It dilates blood vessels (Biomed Research 2013:1).

Figure 4: Fish, Meat and Protein sources (Food and Nutrition Bulletin 2000. United Nations University).

Objective of the module

- To explain the importance of the consumption of fish, meat and other protein sourced food items as part of a balanced meal.
- To discuss the benefits of fish, meat and other protein sources for the health of the elderly.

Portion sizes

198 grams per person daily (USDA DGA 2015-2020).

Fish, Meat and Protein sources

- Fish is ideal on the menu of the old people because of its high nutritional value;
- Fish is easier to chew which makes it suitable for the elderly;
- Its pleasant taste stimulates appetites and it is easily digestible; and
- Salmon, sardine and trout fish are high in heart-healthy Omega 3 fats (Biomed Research 2013:1).
- If possible eat fish twice a week.
- Meat is needed by the elderly to sustain their health against diseases.
- Lean meat cuts should be used. Trim off visible fat.
- White meat is the most ideal because of the hazards of red meat causing cancer and other cardio vascular diseases. Older people should reduce consumption of red meat because it causes cancer.
- In place of red meat, the elderly can eat chicken and fish;
- Other protein sources such as eggs and chicken can be included in meals for the elderly (Biomed Research 2013:1).
- Protein foods help to make new cells and keep muscles healthy. The elderly stays fit and strong by eating protein –rich foods every day.
- Remove skin from chicken and turkey to lower fat intake.

Instruction: Answer the following questions about fish, meat and other protein sources.

- Explain why fish is suitable in the meals of the elderly.
- Provide examples of fish containing healthy oil.
    - Why is fish preferred by the elderly with weak gums?
    - How does eating fish encourage the elderly to eat more than anticipated?
    - What do you understand by the term: red meat?
    - Explain why white meat is suitable for elderly health.
    - State reasons why other sources of protein are ideal for the elderly and give examples.
    - List the benefits of eating protein foods for the elderly.

MODULE 5: DAIRY PRODUCTS

Introduction

Dairy products provide calcium, potassium, vitamin D, protein and other nutrients to keep bones strong and less likely to break. Dairy products should be included in daily diets because older adults need to eat nutritious foods (Saima, Nuzhat, Nabila, Anjum & Imtiaz 2018:3).

Figure 5: Dairy Products (Dairy Products and Health: Recent Insights. Journal of Agricultural and Food Chemistry 2015)**.**

Importance of dairy products

- Contain calcium that helps with bone formation;
- Provides vitamin D to keep bones healthy and sustain calcium level created through exposure to sunlight;
- Contain anti-hypertensive properties, and
- Help in maintaining healthy weight (Tunick & Hekken 2015:9381).

Objective of the module

- To explain the importance of including dairy products as part of a balanced meal for the elderly.

Dairy products in the daily diet

- Choose low-fat or fat- free cheese, milk and yoghurt as part of the diet to avoid high calorie intake from unnecessary fat.
- Dairy products leading to cholesterol causing diseases (Saima, Nuzhat, Nabila, Anjum & Imtiaz 2018:3).
- Include low fat milk, plain sugar free yoghurt and low fat cheese as part of a balanced diet for the elderly.

Portion sizes

600 grams per person daily (Whitney & Rolfes 2016:9).

Instruction: Answer the following questions about dairy products.

- Explain briefly what you know about dairy products.
- List four types of dairy items suitable for the elderly.
- Explain the health benefits of dairy products to the elderly.
- List the major nutrient in milk and explain its use for the old people.
- Why are low fat dairy products prescribed for the elderly diets?
- Why is plain yoghurt recommended for the elderly?

MODULE 6: FRUITS

Introduction

Eating fruits leads to life-long benefits for the older people. Fruits are identified as the most important part of a diet that prevents age-related diseases. Fruits are low in energy density i.e. few calories per serving of food yet are rich in nutrients (Nicklett & Kadell 2013:305). Examples of fruits suitable for the old people are: apple, oranges, pawpaw, pineapple, banana, grape etc.

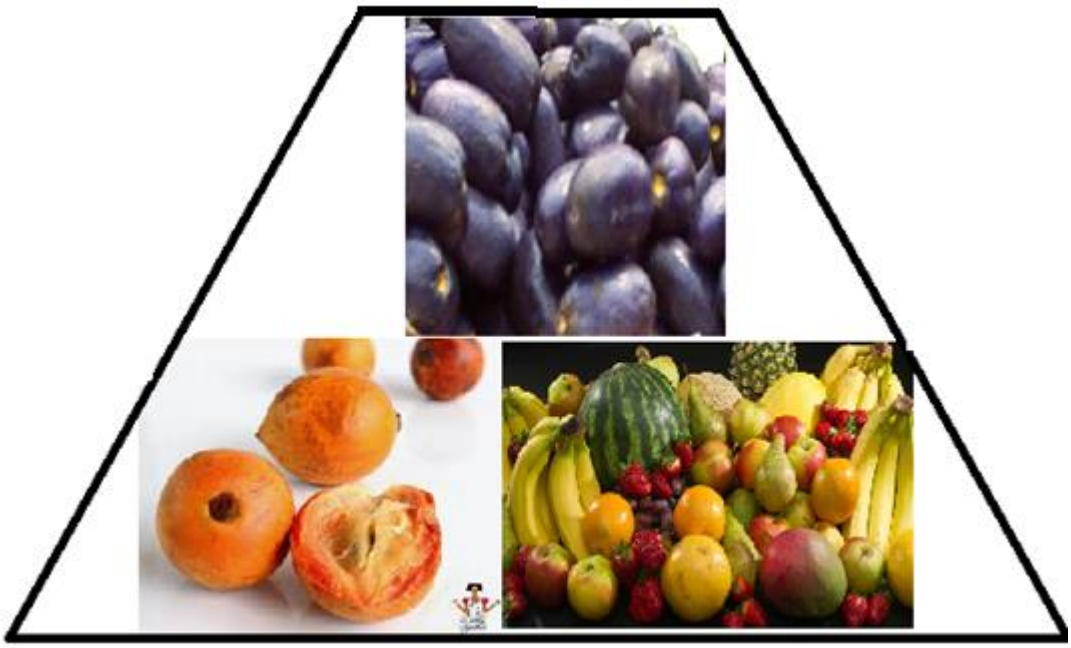


Figure 6: Fruits (Fruit and Vegetable intake among older adults: a scoping review. Mauritius Journal, 2013).

Objective of the module

- To explain the importance daily consumption of fruit as part of a balanced diet.

Portion sizes

2 portions of fruit per day

Importance of consuming fruit on a daily basis

- Fruit provide plenty of fibre which promotes appetite and control the digestion function.
- Fruit and vegetables are the best sources of the antioxidants beta-carotene, vitamin C and selenium, antioxidants help the body fight against cell damage and premature ageing as a result of a poor diet;
- Fruit and vegetables provide fibre which is important for bowel function; and
- Fruit and vegetables play an important role in reducing the risk of developing heart disease and various cancers (Gordon-Davis, Van Rensburg. 2002: 204).
- Orange fruits like mango, cantaloupe, apricots, and red or pink grapefruit are good sources of vitamin A.
- Citrus fruits and juices, kiwi, strawberries, guava, papaya, and cantaloupe are rich sources of vitamin C.
- Sources of fruit high in potassium are bananas, plantains, many dried fruits, oranges and orange juice, cantaloupe, and honeydew melons.
- Eat a variety of fruits—whether fresh, frozen, canned, or dried—rather than fruit juice for most of your fruit choices.

Instruction: Answer the following questions about fruit.

- List ten types of fruits you know are suitable for the elderly.
- List the benefits of eating fruits to the elderly.
- Explain the role of fruits in regulating bowels of the elderly.
- Fruit consumption reduces aging among the elderly. Explain your reasons briefly.
- Among all fruits why do you think ripened banana and pawpaw are the most preferred for eating by the elderly than other types?
- Give an example of fruit rich in vitamin A?
- Give an example of fruit rich in vitamin C?
- Give an example of fruit rich in potassium?

MODULE 7: VEGETABLES

Introduction

Consumption of fresh vegetables by the elderly gives them the assurance of long life in good health.

Like fruits, vegetables are low in energy density which implies that they contain few calories per serving of food and are enriched in nutrients. (Nickett & Kadell 2013:305). Examples are: water leaf, bitter leaf, spinach, cabbage, turnip green, lettuce etc.

Figure 7: Vegetables (Fruit and Vegetable intake among older adults: a scoping review. Mauritius Journal, 2013).

Objective of the module

- To explain the importance of including a variety of vegetables as part of a balanced diet.

Portion sizes

700 grams per person daily (Whitney & Rolfes 2016:9).

Importance of vegetables in the diet of the elderly

- Fruit and **vegetables** are the best sources of the antioxidants beta-carotene, vitamin C and selenium;
- Antioxidants help the body fight against cell damage and premature ageing as a result of a poor diet;
- Fruit and **vegetables** provide fibre which is important for bowel function; and
- Fruit and **vegetables** play an important role in reducing the risk of developing heart disease and various cancers (Gordon-Davis, Van Rensburg. 2002: 204).
- The following vegetables are good sources of vitamin A (carotenoids), bright orange vegetables like carrots, sweet potatoes, and pumpkin, tomatoes and tomato products (sauce, paste, and

puree), and red sweet pepper, leafy greens such as spinach, collards, turnip greens, kale, beet and mustard greens, green leaf lettuce, and romaine lettuce.

- Vegetable sources of vitamin C are broccoli, peppers, tomatoes, cabbage (especially Chinese cabbage), Brussels sprouts, and potatoes, leafy greens such as romaine lettuce, turnip greens, and spinach.
- Green leafy vegetables and fruits such as kale, spinach, lettuce, arugula, are considered to lower the risk of diabetes.
- Vary your vegetables.
- Eat rainbow! It means that you have to add more colour to your meal to get more nutritional benefits.
- Eat more dark green vegetables, such as broccoli, kale, and other dark leafy greens.
- Eat more orange vegetables, such as carrots, sweet potatoes, pumpkin, and winter squash.
- Vegetables can be pureed and included in smoothies.
- To avoid bruising, use a sharp knife to cut fresh fruits and vegetables.
- Cut off only the inedible parts of vegetables – sometimes the best nutrients are found in the skin, just below the surface or in the leaves.
- Do not overcook vegetables- this will lead to excessive loss of nutrients.
- Healthier food preparation methods for vegetables are stir-fry, grill, bake, steam and microwave.
- Do not overcook vegetables in order to reduce nutrient loss.

Instruction: Answer the following questions about vegetables

- List out the vegetables suitable for elderly diet.
- Briefly list out the benefits of consuming vegetables for the elderly.
- Explain how vegetables promote digestion in the elderly.
- What are your reasons for the elderly consuming fresh vegetables?
- Give examples of healthier food preparation methods for vegetables.
- Vegetables should be cooked mildly. Explain you reasons for this.
- Which vegetables are considered to lower the risk of diabetes?
- Give an example of vegetables rich in vitamin A?
- Give an example of vegetables rich in vitamin C?

MODULE 8: GRAINS AND LEGUMES

Introduction

Grains refer to cereal grains while legumes refer to pulse crops, peanuts, soybeans and other dried beans, lentils, peas and chickpeas. Regular consumption of whole grains and legumes result in improved health. Grains and legumes provide the dietary fibre needed by the old people to address health problems of mal- absorption of nutrients and constipation (Murray & Dunstan 2012:25).

Figure 8: Grains and Legumes (Grains Legumes. The Magazine of the European Association for Grain Legume Research, 2017).

Objective

- To improve the awareness of the importance of inclusion of grain and legumes to the diet of the elderly**.**

Portion sizes

283 grams per person daily (USDA DGA 2015-2020).

Importance of grains and legumes in the elderly diet

- Whole grains and legumes are sources of insoluble and soluble fibre.
- Whole grains and legumes provide benefits in the management of weight, obesity and type 2 diabetes.

- Whole grains and legumes provide protection against cardiovascular diseases, hypertension and bowel cancer.
- Grains play a role in the prevention of asthma.
- Core grains are primary contributors of vitamins such as thiamine and minerals such as magnesium and iron.
- Core grains are low in fat and are good sources of protein.
- Soy products contain a high level of polyunsaturated fats, fibre, minerals, and vitamin that also decrease LDL or bad cholesterol.
- Blood pressure can be lowered by consuming soy products. It is also adding protein without unhealthy fats and cholesterol.
- Both grains and legumes are good sources of protein, needed to build, repair and maintain body tissue and muscles.
- Include dry beans and peas, such as, kidney beans, black beans, split peas, and lentils in the diet of the elderly.
- Examples of core grain foods that can be included in the diet are breads, breakfast cereals, rice, pasta, noodles and crisp bread.
- Examples of legumes that can be included in the diet are such as dried and canned beans: baked beans, lentils and chick peas.

Instruction: Answer the following questions about grains and legumes.

- Briefly explain what you understand about grains.
- List five types of grains commonly eaten by the elderly.
- List the health benefits of grains to the elderly.
- List the micronutrients present in grains.
- What are legumes?
- Give examples of types of legumes you know.
- List the health benefits of legumes to the elderly
- List the micronutrients present in legume.

- Provide examples of core grain foods that can be included in the diet of the elderly?
- Provide examples of legumes that can be included in the diet of the elderly?

MODULE 9: AVOID CAKE, SWEETS AND CHOCOLATE

Introduction

Many of the elderly have excessive cravings for sweets. A diet high in sugar is not nutritionally sound. At old age, the elderly sense of taste decline along with their sense of smell which contributes to taste. Cakes may be delicious but they are extremely unhealthy for the elderly. There are almost no nutrients found in cakes that can boost mental or physical health (Olszewski 2006:5). High sugar intake is associated with a greater risk of Mild Cognitive Impairment (MCI) which refers to memory or other thinking problems that are more severe than those associated with normal aging (Stevenson. 2012).

Figure 9: Avoid Cake, Sweet, Chocolate Drink plenty Water Daily Physical Activity (Cupcakes! : From the Cake Mix Doctor, Bryn 2005); Getting plenty water to drink (Irish Nutrition and Dietetic Institute Fact Sheet 2015); Randomized controlled trial of a General Practice programme on Home Based Exercise to prevent falls in elderly women (British Medical Journal, 1997).

Objective of the module

- To create awareness by the elderly, that baked products such as cakes, sweets and chocolate should be consumed in moderation.
- Daily consumption of sweets, chocolate and baked products is not advised on health grounds.

Portion sizes

Limit intake of cake, sweets and chocolate to once a week and not more than 30 gram per person (Pfrimer, Sartorelli, Rosa, Resendes, Viera, Rabito, Scagliusi Moriguti & Ferriolli 2013:760).

Limit the consumption of cake, sweets and chocolates

- Consuming too much added sugar, especially from cakes, sweets, chocolates and sugary beverages, increases your risk of weight gain and can lead to visceral fat accumulation.
- Consuming too much added sugar increases heart disease risk factors such as obesity, high blood pressure and inflammation.
- High-sugar diets have been linked to an increased risk of dying from heart disease
- A high-sugar diet may lead to obesity and insulin resistance, both of which are risk factors for **diabetes.**
- Too much sugar can lead to obesity, insulin resistance and inflammation, all of which are risk factors for **cancer.**
- A diet rich in added sugar and processed foods may increase the risk of depression in both men and women.
- Sugary foods can increase the production of Advanced Glycation Endproducts (AGEs) which are compounds formed by the reactions between sugar and protein in your body. They have been found to play a key role in skin aging and wrinkle formation.
- High-sugar foods can negatively impact your energy levels by quickly spiking blood sugar and insulin levels, leading to increased energy, to avoid this apple along with a small handful of almonds which is an excellent snack can be eaten for prolonged, consistent energy levels.
- Cakes and biscuits contain unhealthy carbohydrates, which digests quickly and raises blood sugar, causing a spike in blood sugar followed by a crash.
- Added sugar n**egatively impact dental health resulting in tooth decay.**
- High sugar consumption patterns can **increase the risk of developing gout** which is an inflammatory condition characterized by pain in the joints, caused by the added sugars raising uric acid levels in the blood.
- High-sugar diets can lead to impaired memory and have been linked to an increased risk of dementia.
- Avoid the intake of chocolate in general. Substitute chocolate with dark chocolate.

- Dark chocolate have the following health benefits: helps to prevent heart diseases; it reduces the risk of Alzheimers; boosts overall mood; increases the level of good cholesterol; and lowers the risk of skin cancer (Ozgen 2016:194).
- Dark chocolate should be taken in moderation and the advised portion is not more than 10 gram per person (Pfamer, Sartorelli, Rosa, Resendes, Viera, Rabito,Scagliusi, Moriguti & Ferriolli 2013:760).
- Additional measures to limit sugar intake:
    - Limit the amount of sugar added to coffee or tea.
    - Avoid adding extra sugar when cooking vegetables.
    - Prepare your own healthy meals at home and avoid buying foods and drinks that are high in added sugar.
    - Replace candy with a homemade mix of dried fruit and nuts.
- The less sugar you eat, the healthier you will be.

Instruction: Answer the following questions about cakes, sweets and chocolates

- Mention the health problems that are caused by consuming too much sugar.
- How does food with high sugar content negatively impact your energy levels?
- High-sugar diets can lead to impaired memory which can lead to_____?
- Name the painful condition caused when added sugars raise the uric acid levels in the blood.
- Mention additional measures to limit sugar intake in the diet of the elderly.
- What are the health benefits of dark chocolate to the elderly?
- Give reasons why dark chocolate is more suitable for the elderly.
- What is the recommended portion of dark chocolate?

MODULE 10: DRINK ENOUGH WATER

Introduction

Aging makes the body to hold less water and less water, leading to dehydration. Older adults have a muted perception of thirst, so they may not know they need to drink water. Caregivers in the old people homes should make water accessible to the elderly at all time. The elderly can eat fruits and vegetables that contain water to avoid dehydration. Examples of such are: cucumber, tomatoes, watermelon (Cosgrove & Loucks 2015:4823). The elderly appetites decrease, less foods is consumed resulting in fewer intakes of fluids from solid food sources. In addition, the fluid balance of the elderly can be affected by medication, emotional stress, exercise, general health, and the weather. The aging body also lose some natural ability to regulate temperature making the elderly more susceptible to temperature changes in the environment.

Objective of the module

- To discuss the important role water plays in the sustaining healthy living among the old people.

Portion sizes

1920ml daily per person daily or approximately 8 glasses per day (Whitney & Rolfes 2016:9).

Importance of water

- It diminishes thirst;
- It enhances metabolism;
- Water boosts brain function;
- Maintenance of the urinary health;
- For better digestive health; and
- Management of kidney health (Sales-Ortells & Medema 2015: 34).
- Not drinking enough water can lead to dehydration, which can result in headaches and migraines
- Fatigue (feeling tired) is one of the first signs of dehydration and can be avoided by drinking enough water.

- Drink water instead of soda or juices.
- Drink water that is clean and free of contaminants.

Instruction: Answer the following questions about water.

- Explain why water is important for the elderly health**.**
- Give examples of how caregivers can make water accessible for the elderly in the old people homes.
- Why does the elderly body hold less water?
- What is the first sign of dehydration?
- Explain what causes dehydration in the elderly.
- What diminishes thirst in the elderly?
- Not drinking enough water can lead to dehydration, which can result in _____?
- Give examples of fruits and vegetables that the elderly can eat to avoid dehydration.

MODULE 11: DAILY PHYSICAL ACTIVITY

Introduction

Old people at 65 years that are generally fit with no health conditions that limit their mobility can try activities daily and should do at least 150 minutes of aerobic activity such as cycling or walking every week (Campbell, Robertson & Gardener 1997:1065).

Objective of the module

To discuss the significance of engaging in daily physical activity for the elderly.

Importance of physical activity

- Helps maintain the ability to live independently
- Regular exercise reduces the risk of falling and fracturing bones.
- Physical activity reduces the risk of dying from coronary heart diseases and developing high blood pressure.
- Physical activity reduces blood pressure from people with hypertension.

People who exercise have improved immune and digestive functioning, better blood pressure, bone density and a lower risk of Alzheimer diseases, diabetes, obesity, heart disease, osteoporosis and certain cancer (Lummel, Walgrad, Pijnappels, Elders, Garcia-Aymerich, Dieen & Beek 2015: 0144048).

- Regular exercise increase fitness, strength, confidence, coordination and mood.
- Even gentle, regular exercise such as walking or swimming can increase lifespan by around three to five years.
- Regular exercise improve muscle strength and bone density and balance and can be helpful in reducing the risk of falls.
- The WHO say regular exercise can reduce the risk of having a hip fracture by 40%.
- Regular exercise can reduce the risk of stroke or heart attack.
- Regular cardiovascular exercise, such as brisk walking, cycling or light housework – anything that raises the heart rate - will increase blood flow to the heart and boost your overall health.
- Weight-bearing exercise such as walking or jogging can help increase the strength of bones and reduce the risk of developing osteoporosis and fractures.
- Research proved that those who did not exercise were more likely to develop dementia than those who did.

- Exercise is an effective remedy for many chronic conditions. It can also help in management of high cholesterol; keeping cholesterol levels within a healthy range can help to reduce the risk of heart disease and stroke.

Instruction: Answer the following questions regarding the importance of physical activity for the elderly.

- Why is daily physical activity important for the elderly?
- Mention the types of exercise that can increase lifespan.
- Mention the benefits of regular exercise for the elderly?
- Give an example of weight-bearing exercise?
- What are the benefits of weight-bearing exercises?

MODULE 12: MENU COMPILATION AND FOOD PREPARATION

Introduction

Menu compilation and food preparation plays an important role in the planning of cycle menus for the elderly. The food based dietary guideline pyramid developed for the Nigerian elderly should form the basis in the planning of their daily meals and menus in general.

Objective of the module

- To provide the needed guidance to the caregivers for menu planning for the elderly.
- To provide guidelines on healthier food preparation practices for the elderly
- To enhance the caregiver's knowledge to utilize information acquired during the training on healthy food choices that can be used during menu compilation, food preparation and in serving portion sizes.

CYCLE MENUS

A cycle menu is a set of planned menus that are repeated in the same order for a period of time, usually 2, 3 or 4 weeks. The menu is different during every day during the cycle. A cycle menu offers variety and is flexible to allow for substitutions. Accurate compilation of a cycle menu is the most desirable for the elderly in the old people homes. It is planned for a specific period e.g. three weeks with different menu each day repeated at the end of the cycle duration of three weeks (Abbey, Wright & Sandra 2015: 7580)

The following aspects need to be taken into consideration when planning a cycle menu:

- Elderly's nutritional needs;
- Taste preferences;
- Where meals are served (care facility);
- Food costs;
- Food safety and handling;
- Equipment, and
- Availability of labour.

FOOD PREPARATION

Introduction

A healthy food preparation and balanced diet is very vital to improve the nutritional status and quality of dietary intakes of the elderly. A suitable approach is needed to prepare each meal to maintain its quality value for the end consumers (Bormann & Mensink 2016:41).

Objective

- To prepare meals with specific consideration of dietary needs.
- To provide the needed guide on the preparation of healthy meals without losing nutrients during food preparation and cooking.
- To emphasize preparation utilizing appropriate nutrition knowledge.

Importance of food preparation

- Raw food should be cooked to make it suitable and edible for human consumption from its natural state.
- Use healthy cooking methods such as steaming, broiling, grilling and roasting.
- Cook foods in as little water and for as short a period of time as possible to preserve all water soluble vitamins (B and C).
- Use a variety of herbs and spices for additional flavour rather than relying on salt alone.
- Avoid packaged or processed foods, which are likely to contain added salt, sugar and fats.

SAFE FOOD PREPARATION

- Foodborne illnesses usually come from bad food preparation, serving, and storage at home, to avoid this:
- Wash hands using hot, soapy water.
- Wash your hands before and after you handle food or utensils, especially raw meat, poultry, fish, or eggs.
- Wash all fruits and vegetables before eating.
- Separate raw, cooked, and ready-to-eat foods.
- Keep raw meat, poultry, fish, or eggs away from other foods to prevent cross-contamination.
- Use separate cutting boards for meat, poultry, fish, vegetables and fruit. If not, be sure to wash cutting boards carefully with soap between uses.

- Cook foods to a safe temperature using a food thermometer. Uncooked or undercooked animal products can be unsafe.
- Keep hot foods hot (above 140 degrees) and cold foods cold (below 40 degrees) to prevent bacteria growth. Refrigerate foods within two hours of purchase or preparation (one hour if the temperature is higher than 90 degrees).
- If you are not sure that food has been prepared, served, or stored properly, throw it out. If food has been left out for more than two hours, throw it out.
- Eat cooked leftovers within four days.

A demonstration will be given by the facilitator/researcher on the following:

- Provision of instructional practical guide and demonstration of healthy food preparation practices and cooking methods suitable to prepare meals on the menu list for the elderly.
- Demonstration of ideal cooking methods suitable for vegetables without getting rid of the nutrients.
- Teaching with detailed explanation on suitable cooking methods of foods generally.
- Teaching on how to select, measure and combine ingredients in an ordered procedure to achieve desired result (Abbey, Wright & Sandra 2015: 7580).

ANNEXURE O

INSTRUCTION MANUAL FOR TRAINING

TOPIC: NUTRITION EDUCATION TRAINING PROGRAMME FOR CAREGIVERS OF THE ELDERLY IN ONDO WEST CITY, NIGERIA

Language of instruction: Yoruba and English target audience:10 caregivers of the elderly

INTRODUCTION

Background

There is a prevailing problem of non-communicable diseases among the elderly in Ondo West city, Nigeria as a result of poor dietary behaviour form consumption of meals that are inadequate in essential nutrients that does not meet with the essential nutrition requirements and the recommended dietary intakes as stipulated by the global body (IOM 2009).

Module 1: Guide on the use of nutrition guidelines (Nigerian food-based dietary guidelines; South African food-based dietary guidelines, Dietary guideline for Americans; European food-based dietary guidelines and New Zealand dietary guidelines)

General introduction on the use of guidelines: Visual presentation in posters with illustrations of vital arrears relevant to the needs of the elderly following the result of the baseline study; Use of pictures of various food items, to understand the content of the guidelines; Use of relevant pamphlets issued by dietician on ground and researcher; Use of food models representing various dishes that the elderly needs.

Module 2 and 3: Food flavour and healthy oils: Food flavouring and healthy oils. Highlighting the health implication of eating more salt than recommended, in enhancing taste and aroma and limiting quantity used in food preparations; altering natural food flavour; defining flavour; aroma; use of different flavouring: ginger, turmeric, cayenne pepper, cinnamon, black pepper. Asking question on flavourings: Helping elderly improving taste of food and boosting appetite.

Types of oil: Palm oil, Soy oil, vegetable oil. **Purpose**: For energy; health body skin; a good source of vitamin A. **Its use:** Use sparingly and avoid animal fat to avoid cholesterol. **Source**: Dark green leafy vegetables, orange vegetables. **Health purpose**: For healthy eyes, skin, hair, resistance to infection

Module 4 and 5: Fish, meat, protein sources and dairy products. Meat group is a good source of protein. **Meat group:** provides protein, niacin, iron and thiamin-B1. 2 serving daily, dry beans and peas, soy extenders, and nuts combined with animal or grain protein can be substituted for a serving of meat. 2 grams of cooked, lean meat, fish or poultry-equivalent in amount of poultry as 2 eggs; 1 cup cooked dry beans, peas or lentils.

Purpose: For building red blood cells to carry oxygen to all parts of the body. It is beneficial for good health. Types: Salmon, sardine, trout fish, white meat, chicken, eggs, turkey; skinned chicken at preparation; avoid red meat consumption because of cancer; fish intake is suitable for the elderly because of weak gums and its protein benefits.

Milk group: provides calcium, riboflavin-B_2 and protein -2 serving daily foods made from milk contribute part of protein needs for body healthy functions. A good example is plain yoghurt and rich in calcium. **Purpose**: For preservation and repair of bones, teeth muscle contractions, blood clotting. 1 cup milk is equivalent to 1 cup yoghurt**.**

Module 6, 7 and 8 Fruits, vegetables, grains and legumes:

Purpose: For healthy gums, skin, healing of wounds, bones, resisting infection. Fruits are good sources of vitamin C. Types of fruits are: Apple, orange, pawpaw, banana, grape. It contains specified nutrient values. Vegetables: Types consists of: leafy green, green leafy lettuce, pumpkins, carrots, tomatoes and they are of high health benefits. Grains and legumes: peanuts, soybeans, lentils, dried beans, and chick peas. **Grain group**: provides carbohydrates, thiamin-B1, iron and niacin, 4 serving daily whole grain. 1 adult serving is: 1 slice bread,1 cup ready to eat ready –to-eat cereals (ogi, pap), custard, oats, millet, corn meal, rice and biscuit.

Fruit-vegetable group: provides vitamins A and C. 4 servings daily: dark green leafy or orange vegetables and fruit are recommended daily for vitamin C. 1 adult serving is 1 cup raw fruit or vegetable, ½ cup cooked fruit or vegetable, 1 medium fruit such as an apple or banana, ½ cup juice (100%) no sugar added.

Note: Ensure the nutrients information are adhered to in line with the regulatory guideline of Nigerian Food and Drug Commission (NAFDAC)

Familiarize the caregivers with the nine (9) major food groups and emphasis four basic

Module 9, 10 & 11: Avoid cakes, sweets and chocolate; drink enough water; involve in physical activity (strength, balance, aerobic and flexibility training)

Purpose: The intake should be avoided because of its health hazards like: cancer, heart diseases, high blood pressure and inflammations. Enough water should be taken very often to avoid dehydration, reduce thirst, enhance metabolism and for better digestive health. Daily physical activity should be advised for the elderly for independent living; reduction in risk of falling; bone fractures; reduction in coronary heart disease and blood pressure.

Physical activity: It involves, general slow pace-walk for one hour daily within old people home premises in two interval splits of 30 minutes each; playing of the local traditional Ayo draft in groups of two persons each and three person umpires; service of natural fruit juice (100%) to recuperate

Module 12: Menu compilation and food preparation: It involves, guide on how to compile a menu; balanced diet; cycle menus; dietary needs of the elderly vice-versa availability of food commodities must be considered; meal and snacks should be planned to include the favourite of the consumers in the old people homes in the community; use variety of foods from each of the four groups; prepare foods that provides a variety of texture colour and temperature A pleasant setting must be provided i.e. flowers, place mats, matching dishes, good lighting.

Cooking demonstration

Methods of cooking: This consists of: boiling, stewing, frying, steaming, braising oven frying barbecuing, roasting use of kitchen equipment such as: small industrial boiling pan, fryers and ovens.

Professional basic cooking demonstration: Making use of recipes with appropriate measurements for portion sizes, food models.

Preparation of fat free, zero sugar and minimal salt added dishes: Plain and mixed vegetables salads; (zero cream); Mixed fresh fruits plated or in baskets; Fruit cutlets- pine apple cubes, sliced rings, apple cucumber sliced chopped lettuce or spread, pawpaw sliced or cutlets, orange cocktail; 100% natural fruit juice preparations; Use of poultry commodities (skinned remove and flesh component retained for preparation).

General food service practices: Storage of perishable and dry food commodities; use of shelves, cold storage equipment, open air storages of grains, hanging of meat joints in the cold room; receiving and issuing commodities in the old people's home kitchen stores.

Food safety: Creating awareness on the need to maintain a standard hygiene and health ethics; need for food handlers to be neat with sustainable hygiene and health culture to prevent disease and their spread against access to food contamination: Washing hands before, during and after meal preparations; no coughing over meals; regular environmental sanitation with food preparation and service areas; clean and well laundered uniforms; proper cleanliness of equipment; emphasis personal and oral hygiene and the contents**.**

DEVELOPMENT OF FLIPCHART, BOOKLET AND PLACEMENTS FOR THE CAREGIVERS NE TRAINING MANUAL

The NE training manual developed for the caregivers resulted from an extensive literature review available on dietary guidelines, module on skills for healthy eating, nutrition guide for elderly people in old people homes, and their caregivers along with results from previous needs assessment among elderly people in Nigeria (SiHi, Suzana, Suriah, Noor, Fatimah, Zaifun, Asharul Khadi, Mohmad & Noor, 2009: 925-930).

Title Content of Booklet and Flipchart

Booklet (10 messages)		Flipchart (6 guides)
Message 1:	Take a variety of food	What is obesity?
Message 2:	Be physically active for muscle strength	Guide 1: Weight management What is hyperlipidaemia?
Message 3:	Take at least 3 main meals in a Day	Guide 2: To reduce fat and cholesterol What is hypertension?
Message 4:	Increase the consumption of fruits and vegetables	Guide 3: To control blood pressure What is Diabetes Mellitus?
Message 5:	Meet calcium requirement	Guide 4: To control blood sugar
Message 6:	Reduced intake of foods high in fat and cholesterol	What is fibre?
Message 7:	Reduced salt in cooking and Foods high in sodium content	What is fibre? Guide 5: To increase fibre in diet

Message 8:	Reduced sugar and foods high in sugar	Guide 6: Exercise for older people
Message 9:	Drink plenty of water	
Message 10:	Safe food handling	

Source: A Need Assessment study among Rural Elderly Malays, Caregivers and Health Professionals 2009, Journal of Nutrition Health Ageing, 13:925-930.

A content analysis approach was employed to study and examine the various related documents. The information gathered became the basis for developing the content of the package concurrent with consideration of nutritional and health problems as well as dietary habits of elderly. The food plate is selected for use in the NE training manual because of its visual and contextual impact compared with the food pyramid which is less effective in conveying messages on portion sizes and a balanced diet (Hunt, Rayner & Gatenby 1994: 7-12). The food plate context in this manual, provided detailed recommendations on portion size and number of servings from the major food groups, carbohydrate, protein namely: cereals and grains; meat and dairy products; and fruits and vegetables with minimized intake of simple sugars, fats and oils (NCCFN, 1999). Additionally, a recommendation of six to eight glasses of water was included because of the importance of water and higher risk of dehydration among the elderly (Russel, Rasmussen & Lichtenstein 1999: 751-753).

Photo stand illustrations were introduced in the flipchart and booklet to facilitate understanding of health messages without the need for text (Goldberg & Owen, 1999:512-537). A professional artist was employed to design illustrations that would assist the understanding of the local older adult caregivers on nutrition information. Photos of foods and meals were captured in a photography studio. A series of meetings with the research group comprising dieticians, nutritionists, public health physicians and anthropologists were held to finalise the content, graphics and design of the NE package for suitability of use with regard to the ethnic Yoruba language speaking background of Ondo West city in Nigeria.

Flipchart

To provide information on reducing risk of chronic diseases, a flipchart titled 'Nutrition Guide for the Elderly: Reducing Risk of Chronic Diseases' was developed. This flipchart could be used by health professionals to provide dietary advice for the elderly about conditions related to metabolic disturbances including obesity, diabetes mellitus, hypertension, hyperlipidaemia and cardiovascular disease. It could be used during individual or group counselling. It listed six guidelines for reducing risk of chronic diseases with A5 size (210mm x 148mm) pages.
(USDHHS, 2005)
Fig flipchart
Table: six guidelines

Placemats

The placemats included in the NE training manual for the caregivers consists of sample menus displayed on the mats as perceived most suitable by the elderly as a preferred concept for understanding healthy eating.
The placemats had a photographic sample menu of breakfast, lunch, snacks or dinner and were titled 'Daily Food Guide for the Elderly'. For samples of menus were provided for each meal time.
To provide a guide for meal times, an illustration of a clock and common events surrounding each meal time of the day (i.e., breakfast, lunch, dinner and snacks) were inserted at the corner of each placemat. Placemats were A3 paper sized (420mm x 297mm) and illustrated with appropriate graphics and food photos, suitable to be used on the dining table to remind the elderly about healthy food choices and portion sizes. (Euro diet, 2001).
Nutrition education intervention programme for the caregivers in Ondo West City of Nigeria.

For the purpose of the NE intervention programme for the caregivers of the elderly questionnaires were used up by the researcher to determine the followings:

- Current nutrition education practice (dietary behaviour)

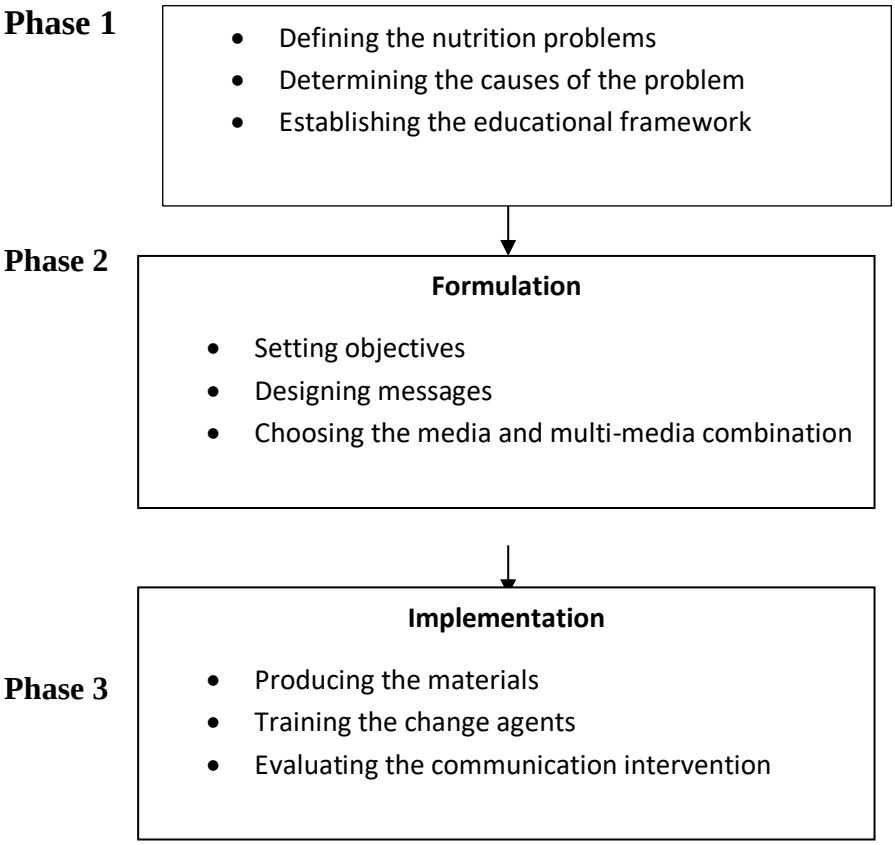
- NE tools and printed pamphlets that are needed
- NE topics to be included in the programme schedule

Measuring instrument for NE intervention

The measuring instrument for the intervention study is NKQ consisting of 46 questions developed by the researcher for the purpose and tested for internal validity (= 0.69). The questionnaires were completed by the givers themselves before and directly after the NEP (Nutrition education programme). Pre and post intervention data were captured from the nutrition knowledge questionnaire on an excel spread sheet.

Methods for developing the NE manuals

The methods followed the development of the NE manuals included the respective phases as determined by the United Nations Food and Agriculture Organisation (FAO) in 1998 for the development and implementation of nutrition education programmes as indicated in figure below;



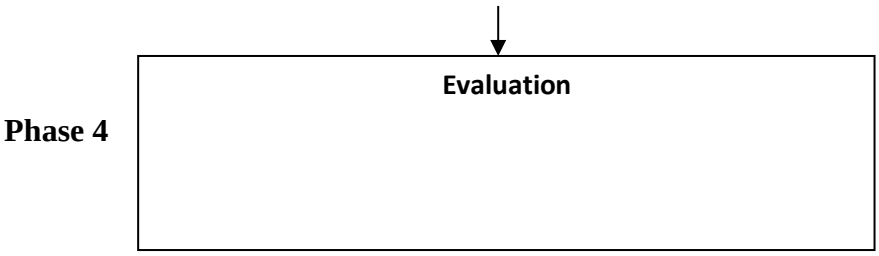


Figure 1: FAO framework for nutrition education (FAO 1998)

Source: United Nations Food and Agriculture Organisation Adapted by Olomo (2017)

During phase 1, a baseline survey was conducted to determine the problem and content of the nutrition education manuals. The methods used for the baseline survey included visits to the 3 old people homes and Wesley University of Technology Ondo West city Nigeria by the researcher. Ten postgraduate students were trained as fieldworkers and assisted the researcher with the questionnaires. The questionnaires work completed through one-on-one interviews with the participating educators. The results collected were used to establish the problem.

Phase 2 (Formulation section) – a literature search followed during which the latest information was obtained on all the topics that were agreed upon. The text of the manuals was written, after which the content was checked by a registered dietician for correctness.

Phase 3 implementation: - This involves producing the needed materials, training the change agents (the caregivers) and executing the communication intervention with the media and multimedia materials. One nutritionist, one graphic designer and a technician were involved in the implementation schedules.

Phase 4 Evaluation

An evaluation to confirm the suitability of the NEP was carried out by compassing the results of the pre-test and the post-test to ascertain the impact on the dietary behaviour of the elderly with the effectiveness of training in the nutrition knowledge acquired by the change agents (the caregivers) and the use of the developed nutrition guidelines.

Comparison of nutritional value from 24hours recall with EAR for elderly (n=120)

Nutrient	EAR	24-hour recall	Higher or lower than < 100% EAR	Percentage of participants with intake (100% of EAR

Energy (y)		1328		
Protein (g)		54		
Carbohydrate (g)		217.9		
Fibre (mg)		0.29		
Calcium (g)		306		
Iron (mg)		177.5		
Vitamin A				
Fat		45.6		

Classification of the food variety within the food groups

Food Group	**Mean**	**SD**	**Range**
Group 1: Flesh foods	2.7	1.3	1-11
Group 2: Eggs	0.7	0.5	1-1
Group 3: Dairy	0.79	0.5	1-7
Group 4: Cereals	10.69	3.9	1-9
Group 5: Legumes	3.9	1.8	1-3
Group 6: vitamin A	2.7	1.3	0-8
Group 7: Fruits and juice	2.5	1.1	1-14
Group 8: Vegetables	0.6	0.5	1-9
Group 9: Oils and fats	2.6	1.2	1-5
Total food items (FVS)	27.28	1.2	67

USING CYCLE MENUS

You can make it easier by planning your menus in advance and taking advantage of cycle menus, such as the ones in the Mealtime Memos.

Get ready to plan

When you plan menus ahead of time

- You can make sure each menu meets the Meal Pattern requirements
- You can save money by buying foods in season, taking advantage of food bargains, and buying in bulk.
- You can prevent last minute trips to buy forgotten items

- You can plan food items for children with special needs.

How cycle menus help

A cycle menu is a series of menus planned for a specific period of time, for example, 3 weeks. The menu is different for each day during the cycle. At the end of the cycle (i.e., 3 weeks), repeat the menus in the same order. Because the series of menus start again, it is called a cycle menu.

Using a cycle menu can help

- Save time. It takes less menu planning and recipe preparation time because they are repeated
- Shop smart when you buy food since you know what you will use and know how much you will need of each food ahead of time.

Planning a cycle menu

Set aside a time and place to plan

- Gather your menu planning materials including the food groups Meal Pattern requirements and your copies.
- Decide the number of weeks your cycle menus will include. A cycle menu for child care should be at least 3 weeks, so the children will not be served the same combination of foods too often.
- Plan the main dishes first. The main dish is your Meat/Meat Alternate. Foods such as pasta, rice and vegetables may also be a part of the main dish.
- Add foods to go with the main dish. Be sure you include all of the nine food group components.
- Plan menus for breakfast and snacks
- Do not repeat any one food too often
- Include a variety of foods to meet the nutrient needs of the elderly
- Plan nutritious meals that look appealing and taste good
- Include some of the children's favourite foods

Cycle menus are developed for a certain length of time and repeated on a periodic basis. It can be planned for four to six weeks and repeated all over again. Cycle menu save time, control food costs and enable menu planners to offer a variety of selections.

(a) Saving time aspects and labour costs of cycle menus consists of:

- Economy of time in gathering vital information, menu planning, developing specifications and relevant costing
- Standardizing purchasing procedures and minima use of time
- Familiarity of staff members with recipes and efficiency in their production as menu items are repeated

(b) Food costs control by cycle menus:

- Easy project of correct amount of product to purchase when the historical information of previous records is available
- Enables easy bulk purchase of items
- Takes advantage of seasonal availability of foods

(c) Cycle menus reduce costs of storage:

- Helps to project the right amount of product to purchase, thus keeping inventory at appropriate levels.

(d) Cycle menus reduces food waste:

- Repeated preparation of menu makes projection of quantity of items needed easier

Physical activity

Exercise help older persons improve muscle strength, balance and mobility and enable them to continue performing daily tasks.

A person's physical strength can also affect their ability to go shopping, look or eat independently which can ultimately influence food intake.

Encouraging the elderly to incorporate appropriate exercise will promote continued physical and mental functioning and prolong independence.

Different forms of exercise/training for the older persons that are beneficial are: balance training, strength or resistance training, flexibility training and aerobic or cardiovascular training.

(a) Resistance/Strength Exercise:

Its benefits:-

- Increased muscle strength and mass

- Improved balance and gait stability
- Increased bone density and strength
- Prevention of falls
- Improved appetite
- Improved diabetic control glucose tolerance
- Slowing of chronic wasting diseases
- Improved functional independence

Figure 1

(b) Strength Training

It involves:

- Lifting hand held weights
- Using weighted wrist
- Elastic resistance bands
- Weight lifting machines
- Isometric exercises
- Lifting body weight out of chair

Figure 2:

(c) Balance Training

It involves:

- Standing on one leg – can be done whilst holding on to the back of a chair
- Stepping over objects
- Standing on heels and toes
- Walking heel to toe
- Sitting on a balance ball

Figure 3:

(d) Aerobic Training

It involves:

- Walking, treadmill
- Exercise bike
- Climbing stairs

- Swimming
- Dancing
- Gardening

Figure 4:

(e) Flexibility Training

- Stretches

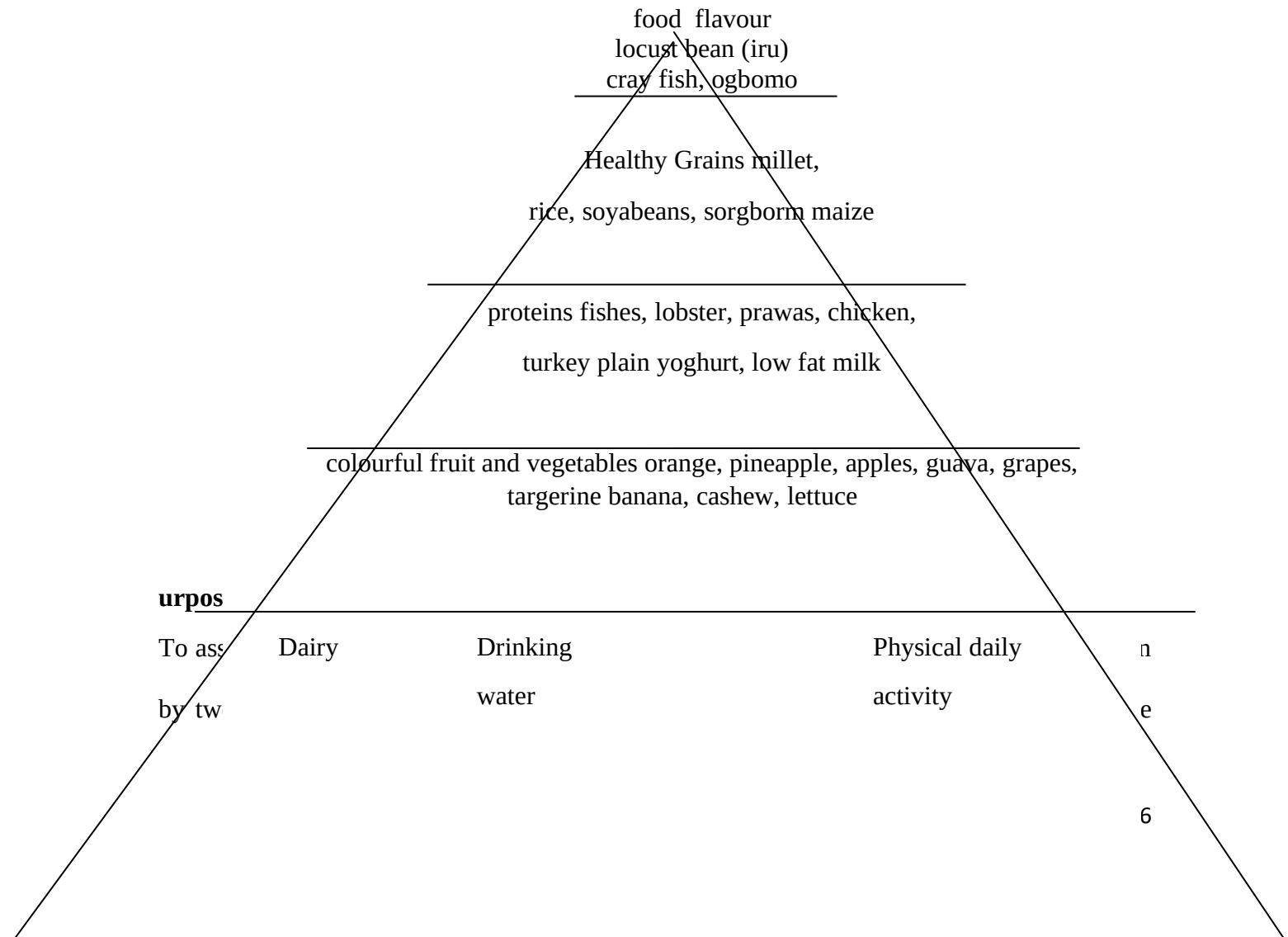
Figure 5:

Important information on physical activities

- Independence and quality of life are improved with exercise
- Resistance training on produce significant gains in strength and power of the elderly
- Strength training programme has been shown to improve walking, bathing, dressing and getting in and out of chair and bed. People climb stairs more easily, walk faster and have improved appetite. They achieve greater benefits from their nutritional supplements if taken in conjunction with strength training.

CHAPTER FIVE

Developed food guide pyramid for the elderly in Ondo West city Nigeria.



classroom setting aided by printed material) and the second using a audio projector version of a local folk art forms and to study the comparative effectiveness of these methods in improving knowledge levels.

Communication mateiral for nutrition education training

The communication materials were developed by the researcher in collaboration with specialist inputs of a graphic artist, and a technician. It consists of: charts, coloured folders and placements.

The charts contained basic nutrition and health-related information. The folders developed were expressed in Yoruba (local language) and English languages on different themes such as energy, proteins, fats, vitamin A.

Another communicated information, is a mini – drama concert of three persons (two females and the male) to demonstrate physically in local Yoruba language dialect the advantages and disadvantages of consuming nutrient enriched meals alongiwth its implications on dietary behaviour among the elderly. A local dance group complemented the mini-open drama. A nutritionist was on ground to validate the nutrition information used.

Factors to consider in designing messages for nutrition guidelines on NEP programme Dr Oluwatoyin O. Jaiyeoba

- Keep messages short and simple
- Use a slogan or theme
- Recommended precise behaviour change
- Make use of positive impression not negative
- Attract the attention of the audience

Area of focus on NEP for caregivers training

a) Basic nutrition

- Its role and importance
- Essential nutrients
- Hydration

b) Menu planning

- Consumer rights
- Food groups
- Food labels
- Portions and servings
- Food label and portion activity

c) Food safety

- Food borne illness
- Food preparation
- Storage

d) Special dietary needs

e) Menu and shopping tips

f) Menu planning activity

Table: Essential Nutrients

Nutrients	Food sources	Body uses for:
Proteins	Meat, fish, poultry, egg cheese, milk peas, nuts	Growth and strength, cell repair, build bones and body tissues
Carbohydrates (COH)	Bread, cereals, rice, pasta, potatoes, corn, fruits, sugars, flours	Energy, protection of body organs, nerves, cells.
Vitamins	Fruits, vegetables, milk, liver, cereals, breads	Growth, healing of wounds, resistance to sickness, healthy skin, eyes, teeth, gums, hair and bones
Minerals	Milk, cheese, yoghurt, green, leafy vegetables, meat, eggs, bread, cereals	Bones, teeth, blood nerves, muscles
Water	Water and other liquids	½ of the body is full of water (H_20). Water carries nutrients to cells, flush wastes from cells. Control body temperature

Fibre	Raw fruits and vegetables, whole grain cereals	Digestion, getting rid of wastes

Source: www.azdirectcare.org

CAREGIVERS TRAINING MENU

BASIC MENU PLAN		
Breakfast	**Light meal**	**Main meal**
Fruit Ogi (soft maize pap) Bread and Jam Tea or Coffee	Protein sourced dish (poached egg, hake fish, Lettuce, cabbage, cucumber; Raw fruits, Toast sliced bread, Jam or marmalade	Protein sourced dish (lean meat, local brown beans, skinned chicken breast) Yam, Plantain (cooked) Lettuce (one raw, one cooked) Dessert –roast peanut (unsalted) Tea or Coffee

SUGGESTED THREE DAY CYCLE MENU					
Menu 1		**Menu 2**		**Menu 3**	
Breakfast: Ogi soft maize pap (yellow or white coloured) **Snack**: Mango **Lunch:** Fillet of Hake fish served with sliced cucumber and Rice	**Portion size** Two third cup= One and half portion One 150g =One portion	**Breakfast** Oat **Snack:** Pear **Lunch:** Skinned chicken Plantain, sliced boiled carrot and spinach	**Portion size** Two third cup= One and half portion One 60g-=One portion 200g= one portion 20g=one portion 15g=one portion	**Breakfast** Millet porridge **Snack:** Orange **Lunch:** Melon vegetable stew and Yam	**Portion size** Two third cup= one and half portion One 200g=one portion

Example Menu Planner

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Filler of fish braised vegetables with or life seasoned sauce and boiled potatoes or Filler of sole fish with buttered Green peas and Potato chips	Role & Apple casserole or vegetable crumble served with potato wedges braised spaghetti vegetable medley carrots	Minced steak & potatoes pie Or Sweet & Sour chicken served with mashed potato Or White Rice cut Green Beans	Braised chicken with lentils Or Irish stew served with Lyonnais potato Or Wister mulch Cabbage Broccoli	Buttered fish Or Vegetable Lasagne Served with oven chips Or Boiled potatoes Peas Assorted raising	Ham & Leek crumble Or Chef's chicken curry Served with split chicken mash cauliflower and white onion	Roast Beef with potato Or Roast pork with potatoes served with mustard and Cut Greens.
	Fruit crumble & custard or Tapioca	Chocolate Chip sponge & Custard	Spotted Bide and Custard or rice studding & Nutmeg	Apple Pie and Custard or Summer fruits	Bread and butter Pudding and Custard or Rice & Steward Sauce	Raspberry and Custard with staved pudding
	Corned Beef Hash	Cauliflower cheese	Minestrone soup	Bacon, leek & Mushroom	Beef bolognaise Pasta	Cream Carrot

Sample Cycle Menu

A sample cycle menu to help plan calendar with creditable recipes that meet the new global meal pattern guidelines.

		MONDAY **DAY 1**	**TUESDAY** **DAY 2**	**WEDNESDAY** **DAY 3**	**THURSDAY** **DAY 4**	**FRIDAY** **DAY 5**
BREAKFAST	Milk	Whole Milk or Low/Fat Free milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole milk or Low/Fat Free Milk	Whole milk or Low/Fat Free Milk
	Fruit/Vegetable	Tangerine Oranges	Bananas	Strawberries	Hash browns	Peaches
	Grain/Meat+	Whole Grain Oatmeal	Waffles	Wholegrain Cereal	Ham Steak	Pancakes (salt & sugar free)
LUNCH	Milk	Whole milk or Low/Fat free milk	Whole Milk or Low/fat free Milk	Whole milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/vegetable*	Honeydew	Sliced Grapes	Sliced Apples	-	Bell Pepper Slices
	Vegetable	Carrots	Steamed Broccoli	Spinach	-	Baked Sweet Potato Wedges
	Grain	English Muffin	Whole Grain Roll	Spaghetti	Whole Grain Brown Rice	Whole Grain Bun
	Meat/Meat Alternate	Eggs	Baked Turkey Breast	Meatballs	Baked Fish	Hamburger
SNACK	Milk	-	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	-	-
	Fruit	Strawberry	-	-	-	Mixed Berries
	Vegetable	-	Beets	-	Refried Beans	-
	Grain	Graham Cracker	-	-	Tortilla	-
	Meat/Meat Alternate	-	-	Peanut Butter with crackers	-	Yogurt

		MONDAY DAY 6	TUESDAY DAY 7	WEDNESDAY DAY 8	THURSDAY DAY 9	FRIDAY DAY 10
BREAKFAST	Milk	Whole Milk or Low/Fat Free milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/Vegetable	Raisins	Applesauce	Orange slices	Tomato	Bananas
	Grain/Meat*	Cereal	Blueberry Muffin	Cream of Wheat	Eggs	Whole Grain Cereal
LUNCH	Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/vegetable*	Mixed Fruit	Watermelon	Cantaloupe	Tangerines	Green Beans
	Vegetable	Cucumber	Celery Sticks	Roasted Cauliflower	Yellow squash	Zucchini
	Grain	Bread Stick	Whole Grain Rice Cakes	Whole Grain Crackers	Noodles	Roll
	Meat/Meat Alternate	Yogurt	Peanut Better	Cheese Stick	Roast Beef Slices	Grilled Chicken
SNACK	Milk	Whole Milk or Low/Fat Free Milk	-	-	-	Whole Milk or Low/Fat Free Milk
	Fruit	-	Pineapple	-	-	Pears
	Vegetable	-	Carrots	Snap Peas	-	-
	Grain	Whole Grain Bagels	-	-	Whole Grain Tortilla	-
	Meat/Meat Alternate	-	-	Tuna Wrap	Cheese	-

+ Meat and meat alternates may be served in place of the entire grains component at breakfast a maximum of three times per week.

* The fruit component at lunch may be substituted by an additional vegetable.

Source: cacfp. Org

CYCLE MENU EXAMPLES

FOR ELDERLY IN OLD PEOPLE HOMES ONDO WEST CITY, NIGERIA					
WEEK 1	**MONDAY**	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
SANDWICH/SALAD OPTION	Tuna Mayonnaise Boiled Eggs Salami Bagel or Sandwich	Tuna mayonnaise Boiled Eggs Cold Chicken Drumstick Torpedo Roll or Sandwich	Tuna mayonnaise Boiled Eggs Cold Salt Beef Pitta Bread or Sandwich	Tuna mayonnaise Boiled Eggs Cold Sliced Turkey Cholas Knot or Sandwich	Tuna mayonnaise Boiled Eggs Tinned Salmon Round Bap or Sandwich
SALAD BAR	Lettuce, Tomato, Cucumber Grated Carrot Potato Salad Pasta Salad Special of the day	Lettuce, Tomato, Cucumber Crunchy Coleslaw Rice Salad Beetroot Special of the day	Lettuce, Tomato, Cucumber Coleslaw Celery, apple & Sultana Salad Special of the day	Lettuce, Tomato, Cucumber Raisins Red Cabbage Coleslaw Mixed Pepper Pasta Special of the day	Lettuce, Tomato, Cucumber Sweet corn Bean shoots couscous Special of the day
MAIN CHOICE	Chicken Drumsticks or Vegetable & Quoin Stir Fry	Fried Haddock in Matzo Meal or Spanish Omelette	Roast Turkey/Beef & Roast Gravy or Tuna & Potato Bake Veggie Shepherd's Pie	Pasta Bar or Homemade Vegetarian Burger	Yorkshire Pudding with Savoury Mince or vegetarian Bolognaise
CARBOHYDRATE	Rice Jacket Potato Sliced Courgette Baked Beans	Chipped Potatoes Jacket Potato Garden Peas Sweet corn	Roast Potatoes Jacket Potato Cauliflower Baked Beans	Pasta Jacket Potato Green Beans Sweet corn	Couscous Jacket Potato Sweet corn Broccoli Spears
FRUIT	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed
Sandwiches are available in white or wholemeal bread, biscuits & cakes are made with reduced levels of both fat & sugar					

Sample Cycle Menu

A sample cycle menu to help plan calendar with creditable recipes that meet the new global meal pattern guidelines.

		MONDAY **DAY 1**	**TUESDAY** **DAY 2**	**WEDNESDAY** **DAY 3**	**THURSDAY** **DAY 4**	**FRIDAY** **DAY 5**
BREAKFAST	Milk	Whole Milk or Low/Fat Free milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/Vegetable	Tangerine Oranges	Bananas	Strawberries	Hash browns	Peaches
	Grain/Meat+	Whole Grain Oatmeal	Waffles	Whole Grain Cereal	Ham Steak	Pancakes (salt & sugar free)
LUNCH	Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/vegetable*	Honeydew	Sliced Grapes	Sliced Apples	-	Bell Pepper Slices
	Vegetable	Carrots	Steamed Broccoli	Spinach	-	Baked Sweet Potato Wedges
	Grain	English Muffin	Whole Grain Roll	Spaghetti	Whole Grain Brown Rice	Whole Grain Bun
	Meat/Meat Alternate	Eggs	Baked Turkey Breast	Meatballs	Baked Fish	Hamburger
SNACK	Milk	-	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	-	-
	Fruit	Strawberry	-	-	-	Mixed Berries
	Vegetable	-	Beets	-	Refried Beans	-
	Grain	Graham Cracker	-	-	Tortilla	-
	Meat/Meat Alternate	-	-	Peanut Butter with crackers	-	Yogurt

		MONDAY DAY 6	TUESDAY DAY 7	WEDNESDAY DAY 8	THURSDAY DAY 9	FRIDAY DAY 10
BREAKFAST	Milk	Whole Milk or Low/Fat Free milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/Vegetable	Raisins	Applesauce	Orange slices	Tomato	Bananas
	Grain/Meat*	Cereal	Blueberry Muffin	Cream of Wheat	Eggs	Whole Grain Cereal
LUNCH	Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk	Whole Milk or Low/Fat Free Milk
	Fruit/vegetable*	Mixed Fruit	Watermelon		Tangerines	Green Beans
	Vegetable	Cucumber	Celery Sticks	Roasted Cauliflower	Yellow squash	Zucchini
	Grain	Bread Wafer	Whole Grain Rice Cakes	Whole Grain Crackers	Noodles	Stuffed bread Roll
	Meat/Meat Alternate	Yogurt	Peanut	Cheese Stick	Roast Beef Slices	Grilled Chicken
SNACK	Milk	Whole Milk or Low/Fat Free Milk	-	-	-	Whole Milk or Low/Fat Free Milk
	Fruit	-	Pineapple	-	-	Pears
	Vegetable	-	Carrots	Peas	-	-
	Grain	Prepared Groundnuts	-	-	Whole Grain	-
	Meat ‘n’ stick	-	-	Fish Tuna Wrap	Cheese	-

+ Meat and meat alternates may be served in place of the entire grains component at breakfast a maximum of three times per week.
* The fruit component at lunch may be substituted by an additional vegetable.
Source: cacfp. Org

CYCLE MENU EXAMPLES

FOR ELDERLY IN OLD PEOPLE HOMES ONDO WEST CITY, NIGERIA					
WEEK 1	**MONDAY**	**TUESDAY**	**WEDNESDAY**	**THURSDAY**	**FRIDAY**
SANDWICH/SALAD OPTION	Tuna Mayonnaise Boiled Eggs Salami Bagel or Sandwich	Tuna mayonnaise Boiled Eggs Cold Chicken Drumstick Torpedo Roll or Sandwich	Tuna mayonnaise Boiled Eggs Cold Salt Beef Pitta Bread or Sandwich	Tuna mayonnaise Boiled Eggs Cold Sliced Turkey Cholas Knot or Sandwich	Tuna mayonnaise Boiled Eggs Tinned Salmon Round Bap or Sandwich
SALAD BAR	Lettuce, Tomato, Cucumber Grated Carrot Potato Salad Pasta Salad Special of the day	Lettuce, Tomato, Cucumber Crunchy Coleslaw Rice Salad Beetroot Special of the day	Lettuce, Tomato, Cucumber Coleslaw Celery, apple & Sultana Salad Special of the day	Lettuce, Tomato, Cucumber Raisins Red Cabbage Coleslaw Mixed Pepper Pasta Special of the day	Lettuce, Tomato, Cucumber Sweet corn Bean shoots couscous Special of the day
MAIN CHOICE	Chicken Drumsticks or Vegetable & Quoin Stir Fry	Fried Haddock in Matzo Meal or Spanish Omelette	Roast Turkey/Beef & Roast Gravy or Tuna & Potato Bake Veggie Shepherd's Pie	Pasta Bar or Homemade Vegetarian Burger	Yorkshire Pudding with Savoury Mince or vegetarian Bolognaise
CARBOHYDRATE	Rice Jacket Potato Sliced Courgette Baked Beans	Chipped Potatoes Jacket Potato Garden Peas Sweet corn	Roast Potatoes Jacket Potato Cauliflower Baked Beans	Pasta Jacket Potato Green Beans Sweet corn	Couscous Jacket Potato Sweet corn Broccoli Spears
FRUIT	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed	From the Basket or Sliced Mixed
Sandwiches are available in white or wholemeal bread, biscuits & cakes are made with reduced levels of both fat & sugar					

(V) Vegetarian Option	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Early Morning	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water
Breakfast	Prunes Cereals/Porridge Boiled Egg Toast with butter/spread Preserves Tea or Coffee Water	Grapefruit Segments Cereals/Porridge Sausage and Tomato Toast with butter/spread Preserves Tea or Coffee Water	Fresh banana Cereals/Porridge Sausage and Tomato Toast with butter/spread Preserves Tea or Coffee Water	Orange Juice Cereals/Porridge Sausage and Tomato Toast with butter/spread Preserves Tea or Coffee Water	Fresh Melon Cereals/Porridge Scrambled Eggs Toast with butter/spread Preserves Tea or Coffee Water	Fresh banana Cereals/Porridge Toast with butter/spread Preserves Tea or Coffee Water	Orange Juice Cereals/Porridge Bacon and Mushrooms Toast with butter/spread Preserves Tea or Coffee Water
Mid-Morning Snack	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits
Lunch	Lancashire Hot Pot Grilled Plaice & Parsley Sauce Vegetable Pechora (V) Boiled Potatoes Cauliflower/Peas Banana Custard Fresh Apple Tea or Coffee Water	Spaghetti Bolognaise Tuna Pasta Bake Vegetarian Lasagne (V) Side Salad Crumble & Custard Fresh Pear Tea or Coffee Water	Poached Salmon Roast Chicken Vegetable Chilli & Rice (V) Roast/Mashed Potatoes Cabbage/Green Beans Plum Sponge & Custard Fresh Orange Tea or Coffee Water	Cottage Pie Chicken Chasseur Veg Shepherd's Pie (V) Boiled Potatoes Broccoli/Leeks Rice Pudding & Apricots Fresh Banana Tea or Coffee Water	Fried Cod Gammon & Pineapple Vegetable Flan (V) Chips/Mashed Potatoes Peas/Sweet corn Tinned Pears & Custard Fresh Grapes Tea or Coffee Water	Chicken Curry & Rice Beef Grill Steak & Rice Vegetable Curry &d Rice (V) Mixes of Vegetables Crema Caramel Fresh Banana Tea or Coffee	Roast Beef Fish pie Cauliflower Cheese (V) Roast/Mashed Potatoes Carrots/Sprouts Apple Pie & Custard Fresh melon Tea or Coffee Water

Afternoon Tea	Tea or Coffee + Water Scone & Jam Soft Cheese Sandwich Biscuits Fresh Orange	Tea or Coffee + Water Malt Loaf Biscuits Fresh Pear	Tea or Coffee + Water Ring Doughnut Soft Cheese sandwich Biscuits Fresh Grapes	Tea or Coffee + Water Currant Bun Biscuits Fresh Plums	Tea or Coffee + Water Chocolate Éclair Soft Cheese Sandwich Biscuits Fresh Apple	Tea or Coffee + Water Custard Tart Biscuits Fresh Orange	Tea or Coffee + Water Sponge Cake & Cream Soft Cheese Sandwich Biscuits Fresh Pear
Evening Meal	Pea Soup & Bread Roll Macaroni Cheese Sandwiches – Ham/Salmon Side Salad Fresh Fruit Salad & Ice-Cream Tea or Coffee Water	Tomato Rice Soup & Bread Roll Jacket Potato & Baked Beans Sandwiches – Turkey/Egg Side Salad Stewed Apple Yoghurt Tea or Coffee Water	Carrot & Coriander soup & Bread Roll Cheese and Tomato Pizza Sandwiches – Beef Salad/Tuna Side Salad Melon Chocolate Mousse Tea or Coffee Water	Cream of Mushroom Soup & Bread Roll Sardines & Tomato on Toast Sandwiches- Egg/Turkey Side Salad Canned Peaches/Fruit Salad Ice-Cream Tea or Coffee Water	Potato & Leek Soup & Bread Roll Sausage Tomato & Bread Sandwiches- Cheese and Pickle/Salmon Side Salad Fresh Fruit Salad Yoghurt Tea or Coffee Water	Butter Bean & Tomato Soup & Bread Roll Jacket Potato, Cheese & Coleslaw Sandwiches- Beef Salad/Tuna Side Salad Fresh Fruit Salad Cheesecake Tea or Coffee + Water	Vegetable soup & Bread Roll Prawn Salad & Bread Sandwiches- Egg/Turkey Side Salad Trifle Fresh Grapes Tea or Coffee Water
Night-time Snack	Hot Drink Biscuits Water	Hot Drink Jam Sandwich/Biscuits Water	Hot Drink Biscuits Water	Hot Drink Jam Sandwich/Biscuits Water	Hot Drink Biscuits Water	Hot Drink Jam sandwich/Biscuits Water	Hot Drink Biscuits Water s

- Hot drink for nighttime snack is choice of tea, coffee, hot chocolate, malted milk drink or oval tine

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Early Morning	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water	Tea or Coffee Water
Breakfast	Prunes Cereals/Porridge Boiled Egg Toast with butter/spread Preserves Tea or Coffee Water	Grapefruit Segments Cereals/Porridge Toast with butter/spread Preserves Tea or Coffee Water	Fresh banana Cereals/Porridge Sausage and Tomato Toast with butter/spread Preserves Tea or Coffee Water	Orange Juice Cereals/Porridge Toast with butter/spread Preserves Tea or Coffee Water	Fresh Melon Cereals/Porridge Scrambled Eggs Toast with butter/spread Preserves Tea or Coffee Water	Fresh banana Cereals/Porridge Toast with butter/spread Preserves Tea or Coffee Water	Orange Juice Cereals/Porridge Bacon and Mushrooms Toast with butter/spread Preserves Tea or Coffee Water
Mid-Morning Snack	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits	Tea or Coffee + Water Biscuits
Lunch	Lancashire Hot Pot Stir Fry Chicken & Rice Vegetable Pechora Boiled Potatoes Cauliflower/Peas Banana Custard Fresh Apple Tea or Coffee Water	Roast Pork & Apple Sauce Spaghetti Bolognaise Vegetarian Lasagne Roast/New Potatoes Spinach/Carrots Side Salad Rhubarb Crumble & Custard Fresh Pear Tea or Coffee Water	Poached Salmon Roast Chicken Vegetable Chilli & Rice Roast/Mashed Potatoes Cabbage/Green Beans Plum Sponge & Custard Fresh Orange Tea or Coffee Water	Cottage Pie Chicken Chasseur Vegetarian Shepherd's Pie Jacket Potatoes Broccoli/Leeks Rice Pudding & Dried Apricots Fresh Banana Tea or Coffee Water	Fried Cod Gammon & Pineapple Vegetable Curry & Rice Chips/Mashed Potatoes Peas/Sweet corn Tinned Pears & Custard Fresh Grapes Tea or Coffee Water	Chicken Curry & Rice Beef Grill Steak Vegetable Flan New Potatoes Mixed Vegetables/Cauliflower Crème Caramel Fresh Fruit Salad Tea or Coffee Water	Roast Beef & Yorkshire Pudding Pork Casserole Cauliflower Cheese Roast/Mashed Roast/Mashed Potatoes Carrots/Sprouts Apple Pie & Custard Fresh Melon Tea or Coffee Water

Afternoon Tea	Tea or Coffee + Water Scone & Jam Soft Cheese Sandwich Biscuits Fresh Orange	Tea or Coffee + Water Malt Loaf Biscuits Fresh Pear	Tea or Coffee + Water Ring Doughnut Soft Cheese Sandwich Biscuits Fresh Grapes	Tea or Coffee + Water Currant Bun Biscuits Fresh Plums	Tea or Coffee + Water Chocolate Éclair Soft Cheese Sandwich Biscuits Fresh Apple	Tea or Coffee + Water Custard Tart Biscuits Fresh Orange	Tea or Coffee + Water Sponge Cake & Cream Soft Cheese Sandwich Biscuits Fresh Pear
Evening Meal	Pea Soup & Bread Roll Macaroni Cheese Sandwiches – Ham/Salmon Side Salad Fresh Fruit Salad & Custard/Ice-Cream Tea or Coffee Water	Tomato Rice Soup & Bread Roll Jacket Potato & Cheese & Coleslaw Sandwiches – Beef/Egg Side Salad Peaches & Yoghurt Peaches & Rice Pudding Tea or Coffee Water	Carrot & Coriander soup & Bread Roll Cheese and Tomato Pizza Sandwiches – Turkey/Tuna Side Salad Melon Chocolate Mousse Tea or Coffee Water	Cream of Mushroom Soup & Bread Roll Sardines & Tomato on Toast Sandwiches- Egg/Ham Side Salad Banana Salad Fresh Fruit Salad Tea or Coffee Water	Potato & Leek Soup & Bread Roll Sausage Tomato & Bread Sandwiches- Cheese & Pickle/ Beef Side Salad Ice-Cream/Natural Yoghurt Tea or Coffee Water	Vegetable Soup & Bread Roll Jacket Potato, & Baked Beans Sandwiches- Ham/Tuna Side Salad Fresh Apple Cheese & Biscuits Tea or Coffee Water	Butter Beans Tomato Soup & Bread Roll Prawn Salad & Bread Sandwiches- Egg/Turkey Side Salad Grapes Trifle Tea or Coffee Water
Night-time Snack	Hot Drink Biscuits Water	Hot Drink Jam Sandwich/Biscuits Water	Hot Drink Biscuits Water	Hot Drink Jam Sandwich/Biscuits Water	Hot Drink Biscuits Water	Hot Drink Jam sandwich/Biscuits Water	Hot Drink Biscuits Water s

- Hot drink for nighttime snack is choice of tea, coffee, hot chocolate, malted milk drink or ovaltine

ANNEXURE Q

Kitchen/Food Service Observation

Old peoples' home/Facility Name: _____ **Facility Location:** _____ **Date**: _____

Observer's name: _____ **Signature:** _____

Time in:

Time out:

Module 1: Developed Nigerian Nutrition Guidelines	
Show the picture of the developed Nigerian Nutrition pyramid for the elderly to the cooks.	
Observe:	**Notes:**
• The cooks/chefs use of different items indicated in the food-based guideline pyramid. <u>The use of ingredients from:</u> • Level one: • Level two: • Level three: • Level four: • Level five: • Level six: • Level seven: • Level eight:	
Additional observations:	

Module 2: Flavouring	
Observe:	**Notes:**
• Whether salt is placed on the dining room table during meal service. • The use of salt during food preparations. • The addition of fresh herbs, spices in the place of salt. • The addition of curry powder, turmeric and ginger to enhance the flavor of food.	
Additional observations:	

Module 3: Healthy oils	
Observe:	**Notes:**
• The proportionate quantity of palm oil use in food preparations. • The heating temperature of oil/fat before actual cooking. • The frying or over-frying of food. • The use of soy bean oil for salad, frying and cooking. • The amount of oil used. • The use of oil in general in food preparation of the meal.	

• The addition of butter /margarine /peanut butter to vegetables.	
Additional observations:	

Module 4: Fish, Meat and Protein sources	
Observe:	**Notes:**
• Inclusion of fish and meat. • Cutting of meat. • Inclusion of fish/meat protein source as part of the meal. • Type of protein (animal/protein). • The preparation method of the protein source. • The portion size of the protein source. • The cut of meat (cleaning and removal of fats). • The use of salt during food preparations.	
Additional observations:	

Module 5: Dairy Products	
Observe:	**Notes:**
• Inclusion of dairy products as part of the meal. • Type of dairy product used. • The portion size of the dairy product. • Is dairy products used in more than one of the food items of the meal of the day.	
Additional observations:	

Module 6: Fruit	
Observe:	**Notes:**
• The choice of fruit included in the meal. • The portion size of the fruit included. • The quality of the fruit. • The use of the fruit products. • The use of fruit as part of a dish in the meal of the day.	
Additional observations:	

Module 7: Vegetables	
Observe:	**Notes:**
• The type of vegetable included in the meal. • The portion size of the vegetable dishes in the meal. • Amount of vegetables used as part of meal. • The washing of vegetables before preparation. • The pre-preparation of the vegetables before cooking. • The cooking methods used. • The keeping temperature after the cooking process.	
Additional observations:	

Module 8: Grains and Legumes	
Observe:	**Notes:**
• Type of grain or legume used as part of the meal. • Amount/ portion size of the grain or legume used. • Preparation methods used. • Addition of other ingredients to the grains/legumes. • The keeping temperature after cooking process.	
Additional observations:	

Module 9: Cake, sweets and chocolate	
Observe:	**Notes:**
• Inclusion of cake, sweets, chocolate as part of the meal. • Type included. • Portion size.	
Additional observations:	

Module 10: Drink enough water	
Observe:	**Notes:**
• Is water served on the table during meal? • How many of the elderly drink water with their meals?	
Additional observations:	

Module 11: Physical activity	
Observe:	**Notes:**
• Ask them if they have an activity programme.	
Additional observations:	

Module 12: Safe food preparation	
Observe:	**Notes:**
• Do the cooks/kitchen assistants wash hands when entering the kitchen? • Do the cooks/kitchen assistants wash hands before and after handling food? • Do the cooks/kitchen assistants wash their hands before and after handling cooking utensils? • Washing hands after handling raw meat, poultry fish or eggs. • Use separate cutting boards to prepare food. • Washing of hands using hot soapy water. • Appropriate use of separate cutting boards for meat, poultry, fish, vegetables and fruit. • Washing cutting boards carefully with soap between uses. • Cooking foods to a safe temperature using food thermometer. • Keeping hot foods hot (above 140 degrees). • Keeping cold foods cold (below 40 degrees) and to prevent bacteria growth. • Refrigerating foods within 2 hours of purchase or preparation. • Do the cooks/kitchen assistants clean work stations after food preparation?	
Additional observations:	

ANNEXURE R

Observation field notes

The researchers observation notes the respondents of the three old peoples' homes on the suitable use of the items contained in the developed Nigerian Nutrition Pyramid (NNP) for the elderly.

NNP General observation	**Respondent 1** The cook was well dressed in neat well ironed uniform and kitchen apron tied to the waist; wearing a cap; no visible make up or jewellery; Nails were cut short; Cook washed her hands in hot soapy water inside a bowl and wiped it with a clean kitchen towel, ready for food preparation of the day.	**Respondent 2** The cook wore jewellery consisting of ear rings (oscillating type); nails were painted. hair was not properly packed inside the cap on her head. The cook did not wash her hands before preparing the mid-day meal in the kitchen; the cook scratched her hands at interval within meal preparations; the cook did not separate chopping boards when cutting the different food commodities. Chopping boards used was not washed after cooking.	**Respondent 3** The cook wore Chefs jacket and professional long broad cap to match; clean shaved with short hair; wearing kitchen boots and hand gloves; used a kitchen napkin and kitchen towel to wipe off some spillages while cooking. The Chef did not wash his hands before food preparation.
Meal preparation	The mid-day sandwiches were prepared with brown slices of bread with a filling of cheese slices, fresh tomato and lettuce cuts. The sandwiches were cut with a clean short knife; Tea/ coffee was made available with boiled water and served with low-fat dairy milk from the	The mid-meal consisted of croissants with cucumber and chopped lettuce and unripe oranges wedges (unripe) were served in a breakfast plate for each person in the dining room. The croissant was pre prepared by the cook the previous day. The preparation was done within the first 30 minutes of the observation by the	The mid-day meal consists of water melon, plain pancake, drinkable clean water made available in water jugs. Pillaf rice was prepared for the main meal by the Chef; The flavours used by the Chef consists of: thyme, tomato and knorr cube.

	tea/coffee pots and milk jugs in a tray at the dining room. The knife used in cutting the sandwiches was washed and wiped with kitchen napkin after use; The cook washed her hands again after the preparations of the mid-day meal as she did before cooking food. Food preparation for the main meal started by 12 noon to meet up with the service time. Jollof rice was the main meal prepared by the cook; The cook measured the long grain white rice, rinsed the rice in clean water in a stainless kitchen pot; The fish to accompany the Jollof rice meal was boiled for 10 minutes with sliced onion and cloves of garlic, ginger, cayenne pepper and lemon juice were added. After 10 minutes, the stock was drained and the fish kept separate; The cook used a gas stove; The cook heated soy oil and added thyme, curry powder, tomato puree, salt and the fish stock; This was followed by pouring the rinsed rice into the cooking pot. Plantain was peeled and cut into appropriate slices by the cook and fried with soy oil in a frying pan; The fish was brought out of the storage freezer, thawed and rinsed in a kitchen basin.	researcher. Drinking water was made available in clean water glasses for service along with the mid-day meal in the dining room. Ewa riro a meal of local brown beans was prepared by the cook; Red onion, ground dried shrimps (cray-fish), bonnet pepper and shrimps were added for little flavour. Brown beans was measured in grams on the kitchen miniature scale before cooking. The gas cooker was lighted; water was put in a shallow pot to boil and the brown beans were added with a pinch of salt. The beans were cooked for 45 minutes. Onions were peeled and cut inside a kitchen bowl and added to the boiling beans. Grated chilli in the required quantity were added with tomato puree and some knorr cubes to add taste and flavour to the Ewa riro meal. Palm oil were added to the beans. Topside meat joint was cut into cubes with a separate meat knife. The meat was seasoned with knorr cube, pinch of salt, thyme and curry powder and boiled for 45minutes in a shallow pot for 55minutes; The boiled meat was drained and the stock kept in a separate kitchen bowl.	A shallow cooking pot was washed with soap and cleaned for the cooking. The rice was put inside the pot, onion, fresh tomatoes and fresh red pepper and green pepper were cut in julienne shreds and added into the pot containing the rice and some powdered chilli. Vegetable oil (Sun flower brand) was added to keep moist. The gas cooker was lighted and rice was cooked for 30 minutes. The Chef opened the cooking pot after 15 minutes to check the progress of the cooking and to taste and adjust the seasoning. He wore a clean kitchen hand glove during the cooking. Hake fish was filleted from the bone, seasoned with oil dropped on it and put to grill in the salamander; After boiling for 20 minutes the wooden paddle was used to turn around the Pillaf rice cooking on the gas stove; After 30 minutes the cooking was concluded and the pot brought down from cooking. The cooking utensils were not washed immediately after use. Separate clean chopping boards were not used to chop fresh ingredients (onion, tomatoes, green pepper, red pepper) and fish. The cook dropped all the cuttings in a small cooking pot and bind it with tomato puree and vegetable oil, allowed to cook on the stove for 10 minutes. It was portioned in joint plates and each portion accompanied with grilled

	A separate knife was used to clean and cut the washed crooker fish. The crooker fish was rubbed with little butter and arranged in a stainless tray and grilled in a salamander (kitchen-cooking equipment). The Jollof rice and the accompanying plantain slices with joint of crooker fish cuts were plated for the elderly; Salt was placed on the dining table for service between 2.30 and 3.00pm.	This was followed by frying the meat inside the kitchen deep fat fryer for 15 minutes using soya beans oil. The cook used a separate cooking pot to prepare the chilli peppered sauce; A little quantity of palm oil was added to the sauce; The cook used a small spoon to taste the sauce to see whether it meets up with the required standard for the meal. The cook washed her hands immediately after preparation of the main me After the main meal was prepared it was served in a joint plate per portion in the dining room. Salt was not placed on the dining table for service.	hake fish and peppered sauce, served in the dining room. Low fat dairy plain yoghurt was made available with each portion of Pillaf rice meal; Glasses of clean drinkable water for service was available Soy sauce in bottle was made available for dining room service. No salt was placed on the dining table for service.
Level 3 **Fish, meat, protein**	Crooker fish was served on the day of observation by the cook. After wards, it was cut in pieces for boiling to get stock for the Jollof rice. Before boiling, the fish was seasoned with thyme, curry powder and very little salt. After the boiling for 10 minutes, the fish was drained from the stock and shallow fried in soy oil.	Meat joint was trimmed of fat and cut in square pieces with sharp kitchen knives on the chopping board and put in a separate bowl. Another chopping board was used to cut onion in addition to the meat for boiling. After boiling the meat for 45 minutes. It was drained from the stock and shallow fried with soy oil. After the frying, onion were cut slightly basted in hot oil and banded with tomato puree and chilli sauce to accompany the meat for service..	Hake fish was brought out of the freezer in the kitchen, thawed, washed and cut in pieces and put in a bowl. Onions were cut on a chopping board added with water in a shallow cooking pot and boiled on the cooking ranges for 10 minutes. It was later shallow fried and made available as an accompaniment to the main meal, Pillaf rice for service in the dining room. .

Level 4 Dairy products	Low-Fat dairy sugar free yoghurt was served with the main meal in the dining room in milk jug to refresh.	Low fat dairy sweetened yoghurt was served with the meal by the cook.	Only low-fat dairy yoghurt was served with the meal by the Cook.
Level 5 Fruits	Cuts of over- ripe mango without seed were served. The fleshy cotyledon was separated in pieces and arranged in a fruit plate for each portion of service.	Unripe cutlets of oranges were served in fruit plates per portion. Whole orange was cut into four longitudinally after it was pre-washed, and the seeds picked out from the rind for service as a cover in a fruit plate per person in the dining room.	Water melon was peeled by the Cook, cut in cubes and portioned in a sweet bowl for service to each person in the dining room.
Level 6 Vegetables	Fresh lettuce with slices of cucumber was plated for each portion. It was rinsed in cold water, drained, cut in shreds and put in a separate bowl. The cucumber was peeled and cut in slices. The lettuce was arranged in a flat service salver and pieces of cucumber cyclical around it for service.	A whole cucumber was washed and cut in slices and served with shredded lettuce in flat plate per portion in the dining room.	Shredded cabbage with slices of white onions and slices of cucumber was plated for service. Whole cabbage was washed and cleaned before cutting into shreds on a chopping board with a sharp kitchen knife. Also, white onion was cleaned and cut in julliene with the sliced cucumber already peeled to accompany the cabbage.
Level 7 Grains and legumes	Jollof rice flavoured with soy oil, tomato puree and seasoned with sprinkles of knorr cube sauces were served in a joint plate, each cover for a portion.	Ewa-riro local brown beans pottage with chilli stewed tomato and onion sauce to bind was served in a joint plate per portion in the dining room. The Ewa- riro meal was well seasoned when prepared with all additives to make it tasty and succulent for consumption. It is the same additive earlier mentioned at preparation.	Pillaf rice with fillet grilled hake and stewed peppered sauce was served in a joint plate per portion.

ANNEXURE S

GROUP INTERVIEW QUESTION GUIDE

FOCUS GROUP SESSION GUIDE FOR THE IMPACT OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OF THE ELDERLY IN ONDO WEST, NIGERIA.

1.0 Registration

The participants were welcomed on arrival at the venue and made to complete the consent form to be recorded while the session is on. Each of them were given the identity name tag.

2.0 The relevance (five minutes)

We researchers welcome you to this session. My name is Jerome Abiola Olomo, the principal researcher of this research study. I am a DTech student in Food Service Management at the Vaal University of Technology, South Africa. I will like to introduce the three assistants in this field to you Veronica Olumide, Roseline Ayoola and Susan Oyenike. They are studying at Wesley University of Technology Ondo, Nigeria in Food Science.

Please, we hereby request tha you participate in this study while we thank you for your willingness to honour our request to do so.

During the discussion, we would have your views on nutrition guidelines.

The session will involve written activities and discussions. This research study complies by the ethics guidelines on which it is programmed that all information provided would be kept confidential as mentioned to you the day you agreed to participate in this study. Please ensure you have completed the declaration form.

Your personal opinions are most welcomed and there is no right or wrong answer or any hidden agenda. The guiding rule is that a person speaks at a time.

Kindly switch off your cell phone during the duration of the discussion session.

The convenience is located with indicated arrowed labels adjacent to the venue for your need.

3.0 Round table introduction (five minutes)

Please kindly introduce yourself to the group, giving your names and tell us what the best was

thing you can learn in my training programme. Can we start from the right side here?

4.0Focus group (40 minutes)

Question 1

What do you know in general about nutrition guidelines? Could you please explain?

Question 2

Why is nutrition guidelines important for use in old peoples' homes? Give your reasons with relevant examples.

Question 3

Do you know about the Nigerian food-based dietary pyramid? If you do explain what it is for and list out the information within.

Question 4

What are food flavours? Discuss briefly why they are important in meals and give examples.

Question 5

What are healthy oils? Why are they important vital ingredients on meals? Explain your reasons and give examples.

Question 6

Fish is most ideal to eat by the elderly. What do you know about fish? Discuss briefly with examples.

Question 7

Eating meat should be restricted to white varieties and not the red types because of the health hazards. Give your reasons for this statement.

Question 8

Are dairy products ideal for consumption in old peoples' homes? What do you know about this and how in your view do they benefit the elderly? Give your reasons with examples.

Question 9

What do you understand about fruits and vegetables? Explain briefly with relevant examples.

Question 10

What are grains and legumes? Explain their importance on elderly meals.

Question 11

Explain why the elderly should take less sugar and salts in their meals.

Question 12

Explain why water should be taken very often by the elderly than any other liquid. Give your reasons.

Question 13

Physical activities improve the strength of the elderly. Give reasons for this.

ANNEXURE T

EDITORIAL CERTIFICATE

This document certifies that the manuscript listed below was edited for proper English language,

This serves to certify that I, Colleen Figg, of CJF Copywriting & Editing Services, have proofread, edited, and checked for language accuracy, grammatical usage and flow, the PhD thesis of **Jerome Abiola Olomo**, entitled: **IMPACT OF NUTRITION GUIDELINES ON THE DIETARY BEHAVIOUR OF THE ELDERLY IN ONDO WEST CITY, NIGERIA,** submitted for the Degree **Doctor of Technology: Food Service Management** at the **Vaal University of Technology, Vanderbiljpark.**

The thesis comprised the abstract plus seven (7) chapters and annexures.
Please feel free to contact me if you have any further queries
0844862500 or colleenfigg@gmail.com.

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ANNEXURE U

TURNITIN REPORT

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