Effects of Educational Intervention on Dietary Pattern and Nutrition Intake among Elders in Oyo State, Nigeria

Udontre Emmanuel[1*], Olubiyi Kayode[2], Oyadiran Gifty[3], Ajibade Bayo[4], Akinfolarin Oseyemi[5]

[1]Head of Department, Planning, Research and Statistics - Nursing and Midwifery Council of Nigeria and Department of Nursing, Ladoke Akintola University of Science and Technology, Ogbomoso, Oyo State.

[2] Associate Professor - Department of Nursing, University of Ilorin, Kwara State

[3] Lecturer - Department of Community/Public Health Nursing, Faculty of Nursing, Ladoke Akintola University of Science and Technology, Ogbomoso, Oyo State

[4] Vice Chancellor - Mercy University of Medical Science, Iwo, Osun State

[5]Research and Data Analyst, HadunesKerogene, Osun State, Nigeria

Corresponding Author Email: *emmanueludontre[at]gmail.com*
Phone No: +2348075719140
+2348098222224

Abstract: *Adequate nutrition is crucial for good health, well - being, growth, and development throughout the life course. It is necessary for improved geriatric health, and longevity. Poor nutrition and bad eating habits can cause, preventable illness, reduced life span and premature death. Previous studies had identified poor nutritional habits and dietary patterns among Nigerians. These could be corrected through health education at the community level thereby improving longevity among older adults. This was a quasi - experimental, one group pre and post intervention study. A structured validated and pre - tested questionnaire was used for collection of data from 480 adults 50 years and above, who met the eligibility criteria. A pre - assessment, nutrition education and a post assessment were done to determine modification in habits and practices. Analysis was done based on responses from 468 participants available at the post intervention assessment. The study identified negative nutritional habits and a few positive ones among the respondents. Significant improvements were observed in the number adopting positive habits and a reduction in the negative habits post intervention (47.9% - 73.5%). The study concluded that health education has significant positive influence over adoption of healthy nutrition and subsequently healthy ageing and should be mounted regularly at Primary health care centers.*

Keywords: Educational intervention, Nutritional intake, Dietary pattern, Healthy ageing, Elders

1. Introduction

Predictors of healthy ageing or healthy ageing determinants could be biological, physical, emotional, and mental, socioeconomic, and environmental factors. These include dietary pattern and nutritional intake, physical activity, rest and sleep, social support, habits, timely medical examination, and appropriate health care (Chalise, 2019; Amarya, Singh & Sabharwal, 2018; Daskalopoulou, et al.2018). Adequate nutrition is required throughout the life course. It is a necessity for improved infant, child, adolescent, maternal, adult, geriatric health, and longevity. Nutrition of older adults however requires some specific attention due to slowing of metabolic processes, frequent loss of appetite, and for some loss of dentition and age long negative nutritional habits and dietary pattern, psychological and socioeconomic factors (U. S. National Library of Medicine, 2020; Rivlin, 2007).

2. Literature Review

The relationship between dietary intake and the ageing process has been studied for several years and the results indicate a strong linkage between the two (Alma, et al., 2019; Bocheva, Slominski, Slominski, 2019 and Schagen, et al., 2012). Nutrition and dietary intake play a direct role in the aging process at the cellular level as well as in the development and prevention of some diseases (Fekete, et al., 2022). Dietary pattern and modifications that favour older persons include reduction in calories, increase in vitamins due to lowered immunity, increase in vegetable intake which provides not just vitamins and minerals but fiber that aids digestion and bowel motion (U. S. National Library of Medicine, 2020).

In the areas of food choices and eating habits, it has been established that whole foods such as grains, peas, legumes, nuts, vegetables, fruits, poultry products, fish and lean meat have higher health benefits and positive effects such as better body weight, improved blood glucose control, higher quality and quantity of beneficial gut flora, better digestion and metabolism, than highly processed and artificial foods high in calories, salts, preservatives and sugars (Joye, 2020; Kopp, 2019). Harman, the renowned Biologist noted as early as 1956 that the high generation of 'free radicals' during metabolism can lead to cellular damage and resulting partly to the process of aging (Gladyshev, 2014; Harman 1956 in Brintz, 2013; Sailaja Rao, et al., 2011). Free radicals are also released during alcohol intake, smoking, exposure to

radiation and stress. This can also occur when individuals are exposed to pollution. On the other hand, foods rich in flavonoids, carotenoids, and vitamins such as carrots, berries, apples, green leafy vegetables have anti oxidative properties that counteract the effects of these highly reactive and damaging group of atoms (Dhanjal et al.2020; Alam, et al., 2019). Therefore, the positive effects of health and adequate nutrition are numerous. On the other hand, poor nutrition and bad eating habits can cause not just negative effects on health and wellbeing of older persons but reduced life span and even premature death (Lippi, Henry, Sanchis - Gomar, 2019; Daskalopoulou, 2018; Warburton, Nicol, Bredin, 2006). Poor nutrition and bad eating habits can cause, preventable illness, reduced life span and premature death (World Health Organization, 2022). Previous studies had identified poor nutritional habits and dietary patterns among Nigerians. These negative habits and practices include overeating, especially intake of large quantities of staple carbohydrates, low intake of proteins, poor food combination, late - night eating, intake of excessive salt, oils, sugars and consumption of junk foods instead of natural unprocessed foods. (Nigeria Protein Deficiency Report, 2022). As noted by Headey, et al. (2019), most of these habits are related to ignorance, high cost of foods and attitude or preferences. These negative nutrition habits and practices can be corrected or modified through health education and counselling programs targeted at adults in order to promote good health and longevity. Modification of lifestyles and adoption of healthyfoods and eating patternand better methods of food preparation and physical exercise, areamong the actions, behaviours and practices that significantly affect how individuals grow old over time (Tosh & Bordenave, 2020). Teaching new habits and practices could be an arduous task, though a viable tool for reducing ignorance, promoting health and well being. Habits could be hard to reject and age long behaviors could be difficult to change, however, the task is not impossible with understanding, support, and motivation. Knowledge when properly dispensed is a powerful tool for positively influencing attitude, behaviour, and practices (He, et al.2016). Therefore, this quasi - experimental study was designed to promotion of healthy ageing using nutrition education among older adults utilizing primary health care services in Oyo State in Southwestern Nigeria.

3. Statement of the Problem

In spite of the huge benefits of natural foods and healthy diets, its consumption globally is very low while the intake of fast foods, sugary drinks, and juices high in calories but low in fibre is on the increase due to availability, tastes, advertisement, attitude and eating habits (Barrett et al., 2020). In a USAID supported research conducted by experts from University of Michigan and International Food Policy Research Institute it was found out that the major nutritional problem in Nigeria is overindulgence in locally available high carbohydrate foods which predisposes individuals to overweight and its negative effects among adults (Ecker, et al.2022). This was supported by the Nigeria Protein Deficiency Report (2022), which indicated that about 93 million Nigerians do not eat the recommended amount of protein daily, but over consume high calorie foods instead. This, according to those reports, has been linked to not just

to poverty or unavailability of healthy and safe diets or foods but to ignorance and lack of adequate information. The poor life expectancy in Nigeria of about 55 years for males and 56 years for females (World Population Review, 2022; Worldometer, 2022), is an indication of cumulative disadvantages in various dimensions. Therefore, promoting healthy ageing and better quality of health requires appropriate nutrition education (Ramachandran, et al., 2018). This is bound to instill basic knowledge about actions, practices and habits that are to be adopted by the elders and their families when it comes to nutrition.

Objectives
1) To assess the dietary pattern of older adults attending PHCs in Oyo State
2) To determine the Pre and Post - intervention dietary pattern among these older adults.
3) To design information, education, and communication material for sustainability of nutrition education at the Primary Health Care level.

Hypothesis
1) There is no difference between the Pre and Post - intervention dietary pattern among these older adults.

Significance
Intake of food or nutrition is a single action required by all humans for survival (WHO, 2022). When basic healthful principles related to nutrition are adhered to healthy ageing and wellbeing could be promoted. Numerous studies have shown the benefits of healthy diets and nutritional habits. These include lowering of caloric intake as one ages, consumption of whole cereals, intake of legumes, nuts, and safe proteins fish, chicken, and lean meat. These foods are associated with lower risk of cardiovascular diseases, obesity, better health, and longevity (Leitao et al, 2022; Martini, 2019; Galbete, Schwingshackl & Schulze, 2018). The consumption of foods rich in carotenoids, flavonoids, vitamins, and antioxidants, such as fresh coloured vegetables and fruits have been seen to have counteracting effects on free radicals thereby preventing cellular damage due to their high antioxidant contents (Dhanjal et al, 2020; Schagenen, et al, 2012). All these facts and knowledge are available to the healthcare personnel, biochemists, and other scientists but not generally to the citizens. Health education along with counselling, teaching, support, encouragement are unique modalities that are suitable for helping individuals in the various villages and communities acquire knowledge, to be equipped and empowered to modify their lifestyles, adopt better nutritional practices, habits, and behaviours. When properly designed health education could provide deliberate opportunities of teaching, enhancing knowledge and providing information to older adults in the communities to improve their ageing trajectory and promote good health and longevity (Baumann & Karel, 2013). Nutrition education can serve as motivation for positive attitudinal and behavioural changes.

4. Theoretical Framework

The theory used in supporting this study is the Pender's Health Promotion Model that highlights that when education and adequate information is provided to clients on time by

healthcare providers such as nurses and doctors, on healthy lifestyles, they can be empowered to take positive action in order to promote health, prevent illness and untimely deaths (McEwen & Wills, 2011; Laranjo, 2016). When health professionals such as nurses, doctors and those who work with older persons in the ageing field provide correct and adequate nutrition information and education this will enable older adults and their families to take positive action to promote healthy ageing, better quality of life and prevent illness. Individuals according to Pander when properly

motivated can take positive actions or modify behaviour in order achieve optimal health and wellbeing. This approach can save a lot of money, prevent unnecessary pains, medications resulting from preventable illness and unwarranted hospitalization and untimely deaths. Community and Public health nurses as well as gerontology and geriatric nurses should therefore always seek opportunities to promote the health of senior citizens through education and motivation thereby helping the to overcome barriers to healthy ageing.
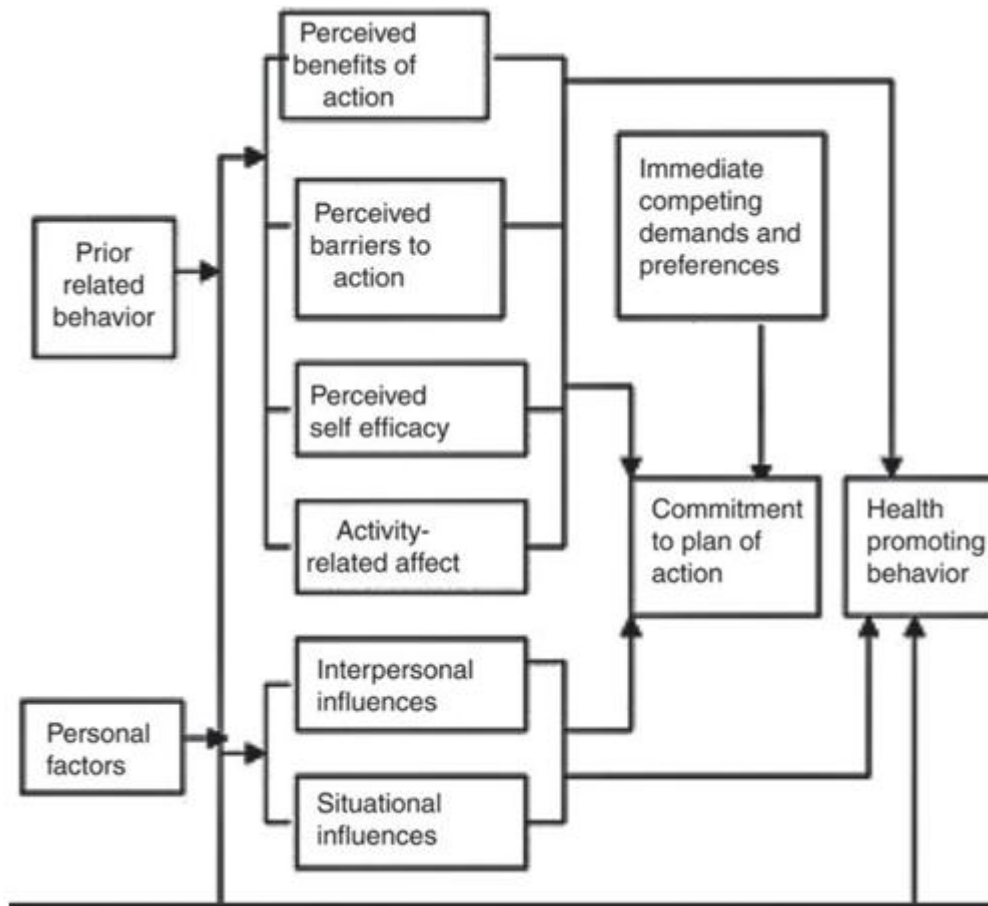

Figure 1: Nola Pender Health Promotion Model (Pender, 1987)

5. Methods

Design: This was a quasi - experimental design based on three phases (pre - intervention, intervention, and post - intervention). Kuo - Song et al (2017) used a quasi - experimental design of one group pre and post test approach to study the relationship between health education of middle age and older adults and raising awareness of health promotion behaviours.

Setting: This study was conducted in Oyo state in the Southwestern region of Nigeria. It has thirty - three (33) Local Government Areas (LGAs) and covers a land mass of about 28, 454 square kilometers. The state is divided into three (3) senatorial zones: Oyo North with thirteen (13) LGAs, Oyo Central with eleven (11) LGAs, and Oyo South with nine (9) LGAs. The state has a projected population of about 7, 970, 000 people in 2022. With the annual population growth rate of 4% - 6%, it is estimated that the population of adults 50 years and above is about over 896,

954 people (Oyo State, 2022; Manpower Nigeria, 2022; Ajuwon & Sandhu, 2018). The various LGAs are divided into wards and each ward has Primary health centres that cater for healthcare delivery of the citizens at the community level.

Population: All the elders who at the point of conducting this study attend Primary health centres in Oyo State, within the last three years 2020 - 2023 for the purpose of accessing care and services.

Inclusion Criteria: This study included only older adults who gave consent were aged 50 years or above who have been accessing PHC services in Oyo State. This age range was chosen since the aim is to promote and inculcate interventions for healthy ageing and life expectancy in Nigeria is about 55 years for males and 56 years for females (World Population Review, 2022; Worldometer, 2022). So, by including adults aged fifty, the population segment about

to get to the designated age for older persons was captured early enough for the intervention.

Exclusion Criteria:
Elders who were very sick were excluded to allow for prompt healthcare in the Centre or referral to secondary or tertiary facilities for advanced care. Also, those who were not residing in the LGA or on visit were excluded.

Sample Size: The sample size was determined using Slovin formula. This formula is suitable when working with a known or finite population that is easily accessible.
The Slovin's formula is as follows: $n = N/(1+Ne^2)$
n = minimum required sample size in population
N = Population (N = 896, 954)
e = Margin of error = 0.05
$n = 896, 954/1+896, 945 (.05)^2$
n = 896, 954/2243.4
n = 400 (Approximately)

Therefore, the calculated number of respondents was 400.
10% attrition rate was added to make up for non - response.
$10/100 \times 400 = 40$

The sample size after attrition rate was added: 400+40=440

The sample size was further rounded up to 480 (to cater for equal distribution across the 12 selected PHCs).

Sampling Techniques

Multistage sampling technique was adopted as follows:
Stage One: Two LGAs were selected using random sampling techniques by balloting from each of the three senatorial districts of Oyo North, Oyo South and Oyo Central. Two Local Governments were selected due to time constraint making twelve (12) in all.
Stage 2: Two wards were selected from each local government areas using purposive sampling technique, to ensure one is urban and one is rural, making a total of twelve (12) wards.
Stage 3: In the selected wards, all primary health care centers were identified, two PHCs - one from rural and one from urban area in each of the selected ward using purposive sampling, a total of twelve (12) PHCs. The Oyo State health facilities listing, a published document was used as reference.
Stage 4: The records of attendance in the PHC Centers were arranged against the population, and using stratified random sampling in line with selected local governments. Then equal proportionate sample across PHCs was taken.
Stage 5: All eligible participants in the selected PHCs were selected using random sampling techniques. The participants were invited to the Primary health centre using their contact records in the Clinic. Those that gave consent were selected.

The LGAs, wards and PHCs are shown in table1 below.

Table 1: Senatorial Districts, Local Governments, Wards and Sample Size

Senatorial Districts	LGA Selected	Wards	PHCs	Location	Sample Size (%)
Oyo South	Ibadan North	Aba - Apata Agbowo	Apata Agbowo PHC	Urban	40
		Nalende	Nalende PHC	Rural	40
	Ido	Ido/Onikede	Ido HC	Urban	40
		Ami Adio	Ami Adio HC	Rural	40
Oyo North	Ogbomoso North	Jagun	Jagun PHC	Rural	40
		Isale Afon	Ibrahim Taiwo PHC	Urban	40
	Saki East	Ago Amodu 1	Ago Amodu CHC	Semi Urban	40
		Ogbooro 1	Ogbooro PHC	Rural	40
Oyo Central	Oluyole	Odo Ona/Idi - Ayunre	Idi Aynre PHC	Urban	40
		Apete - Ayekun	Apete PHC	Rural	40
	Atiba	Aafin 2	Aafin PHC	Rural	40
		Basorun	CHC Basorun	Urban	40

CHC: Comprehensive Health Centre
PHC: Primary Health Centre
HC: Health Centre

Procedure: Ethical approval was obtained from the Health Research Ethics Committee of the Oyo State Ministry of Health.

Data Collection: A structured validated and pre - tested questionnaire was developed and used for the collection of data. The administration of the instrument was done pre and post health education. The questionnaire consisted of seven (7) items which measured quality of diet taken, adequacy, preparation, regularity of dietary intake, dietary choices and habits. The section was rated on 4 level scale, Always (A), Often (O), Rarely (R) and Never (N).

Pre - intervention Phase: This part took four (4) weeks. During this phase (12) the Researcher with twelve Research assistants were involved in the data collection. The participants were assigned numbers for identification, after which a pre - intervention assessment was conducted using the researcher developed questionnaire, with each identification number noted on each questionnaire that was distributed. After the assessment, which took about 30 minutes, the completed questionnaires were retrieved and stored.

Intervention Phase: This phase commenced immediately after the pre - intervention due to time constraint and lasted for twelve (12) weeks. Participants were subjected to educational intervention on quality of life as well as healthy ageing. Participants were educated on the importance adequate diet, quantity and quality, benefits of natural foods against artificially prepared ones, the dangers of excessive

salt and oil intake, overcooking of vegetables and the value of fruits and vegetable intake, among others.

Post - Intervention Phase

This was done twelve (12) weeks after each educational intervention. Participants were re - convened. They were presented with a questionnaire each having their identification numbers. The questionnaires were retrieved after completion. A few who defaulted were traced to their homes using the records in the PHCs. The post - intervention was conducted for three weeks, a week per each senatorial district.

6. Results

Socio - Demographic Data of Respondents

Table 2: Frequency Distribution of Socio - demographic Characteristics

| Variable	Categories	Frequency	Percent
Age (years) Mean Age: 54.53 ± 8.89	50 - 60	195	41.7
	61 - 70	150	32.1
	71 - 80	88	18.8
	81 - 90	29	6.2
	91 and above	6	1.2
Gender	Male	148	31.6
	Female	320	68.4
Highest Education	None at all	80	17.1
	Primary school	132	28.2
	Secondary school	201	42.9
	Tertiary	55	11.8
Marital Status	Separated	25	5.3
	Married	138	29.5
	Divorced	53	11.3
	Living as married	48	10.3
	Widow/Widowed	204	43.6
Currently ill	Yes	338	72.2
	No	130	27.8
Location	Rural	234	50.0
	Urban	234	50.0
Financial Resources (Income per month)	Non	140	29.9
	1000 - 30, 000	116	24.8
	31, 000 - 50, 000	72	15.4
	51, 000 and above	140	29.9

Source: Researcher's Computation, 2023
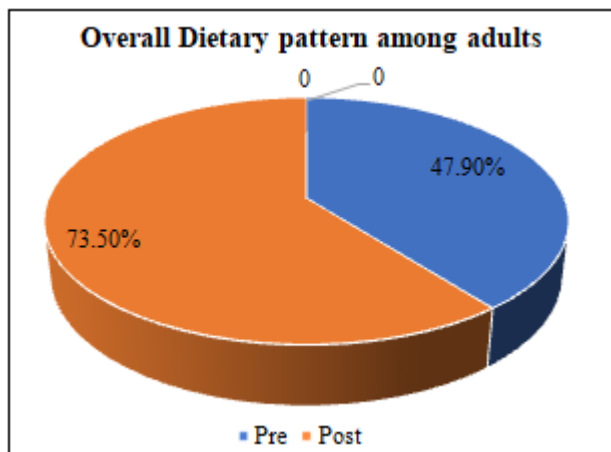
Figure 2: Overall Dietary pattern among the Elders

Dietary Pattern and Nutritional intake among the Elders Pre and Post Intervention

Table 3: Frequency distribution of respondents by nutritional intake pre and post intervention

Items		Pre (468)		Post (468)	
Which of these best describe your nutritional intake		CR	WR	CR	WR
I take a lot of vegetables such as Okra, onions, cucumber, green leafy vegetables, tomatoes, etc.	F	331	137	398	70
	%	70.7	29.3	85.0	15.0
I take Fruits such as orange, lemon, pineapple every day	F	142	326	301	167
	%	30.3	69.7	64.3	35.7
I like high Carbohydrates intake such as Rice, Amala, Eba among others	F	317	151	174	294
	%	67.7	32.3	37.2	62.8
I engage in direct consumption of Industrial Sugar	F	208	260	75	393
	%	44.4	55.6	16.0	84.0
I take Sugary drinks like Fanta, Coca - Cola are healthier than water	F	267	201	184	284
	%	57.1	42.9	39.3	60.7
I eat a lot of Processed foods	F	154	314	119	349
	%	32.9	67.1	25.4	74.6

Table 4: Frequency distribution of respondents by dietary pattern pre and post intervention

Which of this best describe your dietary pattern		CR	WR	CR	WR
Regular and early Breakfast	F	272	196	329	139
	%	58.1	41.9	70.3	29.7
Regular Lunch	F	126	342	244	224
	%	26.9	73.1	52.1	47.9
Regular Dinner	F	291	177	338	130
	%	62.2	37.8	72.2	27.8
I eat heavy solid meals (swallow) at night	F	284	184	162	306
	%	60.7	39.3	34.6	65.4
I often eat late in the night	F	189	279	43	425
	%	40.4	59.6	9.2	90.8
I prefer much seasonings, oil and salt in food	F	136	332	89	379
	%	29.1	70.9	19.0	81.0

Correct Response: CR; Wrong Response: WR
Source: Researcher's Computation, 2023

Table 4 above presents frequency distribution of respondents on dietary pattern. The result reveals that post - intervention (85.0%) reflects a notable improvement in the percentage of respondents who takes vegetables rightly compare to pre - intervention (70.7%). Also, post - intervention (30.3%) reflects a notable improvement in the percentage of respondents who take Fruits rightly compared to pre - intervention (64.3%). More results show post - intervention (37.2%) reflect a notable reduction in the percentage of respondents who make carbohydrates a priority compared to pre - intervention (67.7%). Results also show that post - intervention (16.0%) reflect a notable decrease in the percentage of respondents who take Industrial Sugar regularly compared to pre - intervention (44.4%). Also, post - intervention (39.3%) reflects a notable reduction in the percentage of respondents who take Sugary drinks regularly compared to pre - intervention (57.1%). Post - intervention (32.9%) reflects a notable reduction in the percentage of respondents who take Processed foods regularly compared

to pre - intervention (25.4%). Post - intervention (58.1%) reflects a notable improvement in the percentage of respondents who takes breakfast regularly and early compare to pre - intervention (70.3%). Post - intervention (26.9%) reflects a notable improvement in the percentage of respondents who take Lunch regularly compared to pre - intervention (52.1%). Post - intervention (62.2%) reflects a notable improvement in the percentage of respondents who eat Dinner regularly compared to pre - intervention (72.2%). Post - intervention (34.6%) reflects a notable reduction in

the percentage of respondents who eat heavy solid meals at night regularly compared to pre - intervention (60.7%). Post - intervention (9.2%) reflects a notable reduction in the percentage of respondents who eat late at night regularly compared to pre - intervention (40.4%). Results showed post - intervention (19.0%) reflect a notable reduction in the percentage of respondents who prefer much seasoned food compared to pre - intervention (29.1%).

Testing of Hypotheses

Table 5: Differences in Pre and Post Intervention Dietary pattern

		Paired Differences					T	df	Sig. (2 - tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair DP	PrDP - PtDP	.701	.065	.303	- .010	.402	3.416	467	.008

Source: Researcher's Computation, 2023

Table 5 above presents Paired Samples Test showing difference between pre and post intervention dietary pattern. Results showed that, there is a significant difference between pre and post intervention dietary pattern (t (467) =3.416; p - value=.008). Based on this, the null hypothesis which states

that, there is no significant difference between pre and post intervention dietary pattern was rejected, while the alternative which state that, there is a significant difference between pre and post intervention dietary pattern was upheld.

Table 6: Differences in Pre and Post Intervention Nutritional intake

		Paired Differences					T	df	Sig. (2 - tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair NI	PrNI - PtNI	.621	.094	.109	- .022	.469	8.212	467	.002

Source: Researcher's Computation, 2023

Table 6 above presents paired samples test showing the difference between pre and post intervention nutritional intake. Results showed that, there is a significant difference between pre and post intervention nutritional intake (t (467) =8.212; p - value=.002). The null hypothesis which states that, there is no significant difference between pre and post intervention nutritional intake was therefore rejected, while the alternative which states that, there is a significant difference between pre and post intervention nutritional intake was upheld.

7. Discussion

Dietary Pattern and nutritional Intakeof Elders in Oyo State, Nigeria

This study revealed a lot about the nutritional intake and dietary pattern of older adults in Oyo State. Seventy percent (70.7%) of the respondents acknowledge take ample quantities of vegetables daily. Vegetables are readily available in this rain forest zone all year round and is cheap and is common in household diets, however 69.7% did not take fruits daily. The later habit may be due to ignorance of the value, high cost or a feeling that it is not necessary. The consumption of large amount of carbohydrate foods was high (67.7%) among the participates. This agrees with the findings of University of Michigan and International Food Policy Research Institute that found out that the major nutritional challenge in Nigeria is over consumption of locally available high carbohydrate foods which predisposes individuals to overweight and its negative effects among adults (Ecker, et al.2022). Thefindings also corroborated that of Nigeria Protein Deficiency Report (2022), which

indicated that about 93 million Nigerians do not eat the recommended amount of protein daily, but over consume high calorie foods instead. On intake of industrial sugars 44.4 % agreed to this habit, and over average of 57.1% the older adults acknowledged having preference for sugary and bottled fruit drinks over water. This finding agrees with that of Barrett et al., (2020) that noted intake of sugary drinks, and juices high in calories but low in fibre is on the increase due toeasy availability, tastes, and advertisement, among other factors. Other negative and harmful nutritional practices among these adults included late night eating of heavy meals by 60.7% and preference for plenty of seasonings, oil and salt in meals accepted by 70.9%. Udontre, et al (2023) noted in their study in this state, that 72% of the older adults acknowledged being diagnosed with one or more chronic illness out of which the highest percentage 26.9% had hypertension. This may not be unconnected with the dietary pattern.

A positive habit also identified among over half of the respondents was regular eating of breakfast (58.1%), however the percentage of those taking lunch regularly was low (26.9) and further study is necessary to find out the reason behind this.

The test of hypothesis for this study indicated that there is a significant difference between pre and post nutrition education intervention on nutritional intake and dietary pattern among older adults who participated in this study. Healthy nutrition, positive dietary choices and habits were supported by 42 (17.5%) in this study. This study indicated that the health education was able to raise awareness on the

influence of nutrition on healthy ageing. The nutrition education facilitated positive behavioral modification and promotionof healthy nutrition, good dietary choices, healthier meal preparation methods, food safety and hygiene though the percentage difference was slight in some areas. There was further slight improvement in areas that were better such as intake of vegetables, avoidance of intake of industrial sugars and regular eating of breakfast. This is an indication that the effects would be greater if the creation of awareness is continued regularly over a longer period.

Contribution to Knowledge and Practice
The researcher was able to design and produce educational Chart for nutrition education of older adults in the community, and for dissemination to PHCs for sustainability of the health education. This attached as Appendix 1.

8. Recommendations and Conclusion

Healthcare personnel should use every opportunity to educate older clients of how to promote healthy ageing in order to contribute towards improvement of the life expectancy in Nigeria.

The Primary healthcare system should be used as a platform to mobilize older persons from the community for health promotion activities regularly. This approach can contribute towards disease prevention and health maintenance, help seniors and their families save money that could be spent on hospitalization for preventable conditions. Adequate nutrition is directly linked with good health, prevention of some illness and promotion of wellness for all ages. Promoting adequate nutrition and healthy diet is essential for overall good health across the life span (National Institute on Aging 2020). Specific modifications are, however, necessary for promoting healthy ageing. This includes increasing green leafy vegetable and fruits low in fructose, consuming healthier proteins such fish rich in omega 3 - fats, poultry products and lean meats, including nuts in diet daily and limiting butter, cheese, and sweets (Fekete et al., 2022). Other practices include limiting caloric and salt intake, avoiding late meals and overcooking of vegetables (Dhanjal et al, 2020; Schagenen, et al, 2012). These pieces of information abound in the fields of biochemistry, nutrition, nursing, medicine and health sciences; however, it is not readily available to members of the community especially in underdeveloped villages and hard to reach areas. Community based education of older adults on healthy food choices and nutrition is necessary especially in developing nations and communities where knowledge about nutrition is not widespread among citizens.

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Appendix 1

(Udontre, E., 2023)