



Nutrition Knowledge, Attitude and Dietary Restriction Behaviour of the Elderly in Umuahia South Local Government Area of Abia State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Authors OCN and IMT designed the study, performed the statistical analysis, wrote the protocol and first draft of the manuscript. Authors IMT and UCE managed the analyses of the study. All the authors managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To assess the nutrition knowledge, attitude and dietary restriction behaviour of the elderly.
Study Design: The study is a multi-stage cross-sectional study.
Place and Duration of Study: Umuahia South Local Government Area of Abia State, Nigeria between May and September 2016.
Methodology: Two hundred and forty respondents (113 males, 127 females; age range \geq 65 years) were randomly selected and used for the study. Validated, structured and an interviewer-administered questionnaire was used to obtain information on demographic characteristics, nutrition knowledge, attitude and dietary restriction behaviour. Nutrition knowledge, attitude and dietary restriction behaviour responses were classified as poor (0-39%), fair (40- 59%) and good (\geq 60%) while SPSS software version 20.0 was used for statistical analysis using descriptive statistics and ANOVA and significance was judged at $P = .05$ and $p < .01$.
Results: Majority (96.85%) females and (95.58%) males had learnt about nutrition through radio

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and television (69.17%). Nutrition knowledge showed (49.6%) males and 46.5% females had fair knowledge; 43.4% males and 37.8% females had good knowledge while few (7.1%) males and 15.7% females had poor knowledge. There was a significant difference ($P = .01$) in the knowledge of respondents (poor, fair and good) for both males ($F = 426.091$) and females ($F = 530.117$). In attitude (51.33% males, 45.67% females) had a good attitude to nutrition while few (9.73% males and 14.17% females) had a poor attitude. Dietary restriction behaviour (57.52% males, 66.14% females) had good dietary restriction behaviour. There was a significant difference ($P = .01$) in dietary restriction behaviour scores for the males ($F = 111.722$) and females ($F = 203.744$).

Conclusion: Nutrition knowledge was generally above average; those with good attitude were statistically higher than those with fair or poor attitude to nutrition and most had good dietary restriction behaviour. Nutrition education regularly organized for the elderly will help to improve their knowledge.

Keywords: Nutrition; knowledge; attitude; dietary restriction; behavior; elderly.

1. INTRODUCTION

Old age is the greatest challenge that an individual faces and is a continuous process that begins with conception and ends with death [1]. The elderly in developing countries are vulnerable to health predicaments associated with near to low-income society, poor eating pattern, undernutrition, overnutrition, chronic illnesses and diseases [2]. The ageing process is one of the progressive and irreversible biological changes that result in a growing risk of cognitive and functional impairment and increased likelihood of dying [3]. Shubhangini [4] reported that as a person grows older, his organs show reduced ability to perform physiological functions and this is because there are cell loss and reduced cell metabolism.

Nutrition knowledge presumably influences attitude and eating behaviour [5]. Nutrition education as one of the important practical aspects of nutrition knowledge play an important role in raising public awareness and ultimately the health of a society [6].

Nutrition knowledge refers to knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and diseases, foods representing major sources of nutrients, and dietary guidelines and recommendations [7]. Lack of nutrition knowledge among other factors has been associated with poor food choices, dietary habits and increased risk of chronic conditions [8]. Their ability to taste and smell may decrease their appetite for needed foods and they may have dental problems that make it difficult to eat [9]. Attitudes represent an individual's subjective feelings about an issue, for example, whether following a healthful diet is important to an object,

whether low-fat foods taste good. Many of the behavioural theorists consider attitudes to be crucial predictors of behaviour [10].

Whereas knowledge may provide the individual with the information necessary to implement a behaviour change, attitude may determine whether the individual is motivated to implement that change. For example, when choosing foods, nutrition is only one consideration, along with taste, price, and convenience. If consumers do not value nutrition as a factor in food selection or if they value other factors more highly, they may not choose nutritious foods even if they are knowledgeable about nutrition.

The elderly have been acquiring dietary behaviours and nutrition knowledge through a lifetime of experience; however, they are at higher risk of being targeted for nutritional problems [9]. There is little or no information on the dietary restriction behaviour and its relationship with the nutrition knowledge and attitudes of older persons in Nigeria generally and in Abia state in particular. This thus motivated this study to assess the nutrition knowledge, attitude and dietary restriction behaviour of older persons in Umuahia South LGA of Abia State, Nigeria.

2. MATERIALS AND METHODS

This study was carried out in Umuahia South L.G.A of Abia State, Nigeria using a multi-stage cross-sectional descriptive design between the months of May and November 2016.

Umuahia South has an area of 140 km² and a population of 138,570 at the 2006 census. The inhabitants are mainly farmers, cultivating various products like yam, cassava, maize, oil palm, and also traders. The sample size was

calculated using the Kish Leslie formular as documented by Anorlu [11] as: $n = z^2 pq / d^2$ where n is the sample size,

Z is the confidence interval taken as 1.96 or 2 approximately; p is the percentage of the older persons in Nigeria which is 4% according to WHO [12], q is the complementary proportion equivalent to 1 minus the percentage of the elderly in Nigeria while d is the degree of accuracy at 0.05. Hence $n = 1.062 \times 0.04(1 - 0.04) / (0.05)^2$; $n = 16$.

2.1 Sampling Procedure

Multi-stage random sampling was adopted by firstly randomly selecting five out of the autonomous communities in each of the three clans that make up Umuahia South LGA using balloting giving 15 communities. In the second stage, 16 elderly persons were selected from each of the 15 autonomous communities purposively since the study considered only those ≥ 65 years. Thus (16×15) gave a total of 240 elderly persons for the study. The market, the churches and the community squares were the major places of meeting with the respondents.

2.2 Preliminary Visits

Prior to the commencement of the study, preliminary visits were made to the traditional rulers and village heads of the selected communities to inform them of the study and to seek their consent to use their subjects.

2.3 Informed Consent

No adverse reactions were expected as the participants were only interviewed and no invasive procedures were carried out. However, informed consent of the respondents was sought and only those who consented were used for the study.

2.4 Data Collection

A Validated questionnaire was issued to the respondents by the researchers which contained information on demographic and socioeconomic, nutritional knowledge, attitude and dietary restriction behaviour. It was structured that with little explanation both the literate and non-literate respondents can answer the questions without stress. However, the questions were interpreted to assist the non-literate respondents.

2.5 Data Analysis

The information from the questionnaire was sorted and coded in accordance with correctly ticked information provided by the respondents.

The nutrition knowledge, attitude and dietary restriction behaviour were classified based on percentages; 0-39% as poor, 40-59% as fair while 60% and above as good. The three variables for the classification are uniform. Data obtained were subjected to statistical analysis using the statistical product for service solution (SPSS), version 20 using descriptive statistics such as frequency, percentage, mean scores and with inferential statistics such as Analysis of Variance (ANOVA) and Pearson Product Moment Correlation Coefficient. The correlation coefficient was taken to be significant at $P = .05$ and $P = .01$ significant level.

3. RESULTS AND DISCUSSION

3.1 Results

Table 1 shows the demographic and socio-economic characteristics of the respondents. More women (52.9%) participated in the survey than men (47.1%) with (39.82%) males and female (46.46%) within the age range of 65-69 years. About half of the respondents (55%) were married, (64.93%) were majorly farmers. About (42.48%) males were into business.

Majority earned at least N10, 000 monthly while few (12.085%) earned at most N5, 000 per month.

Nutrition knowledge of the respondents (Table 2) revealed that majority (96.85%) females and (95.58%) males had learnt about nutrition through radio and television (69.17%), books such as diet books (52.50%) while few (22.92%) got their own information from Physician/nurse. Knowledge on six classes of food was high, about (85.04%) women and (82.30%) men. Knowledge on the most important meal in a day showed that majority of the respondents (72.57%) males and (74.80%) females accepted that breakfast is the most important meal of the day while few of the respondents (3.54%) males and (25.20%) females accepted that snacks and lunch respectively, are the most important meals of the day. In assessing the knowledge of the respondents on a healthy meal, the result showed that half of the respondents

Table 1. Demographic and socioeconomic characteristics of the respondents

Parameters	Male		Female		Total	
	Freq.	%	Freq.	%	Freq.	%
Sex	113	47.1	127	52.9	240	100.0
Age range(years)						
65-69	45	39.82	59	46.46	104	43.33
70-74	33	29.20	37	29.13	70	29.17
75-79	7	6.19	14	11.02	21	8.75
80 and above	28	24.78	17	13.39	45	18.75
Marital status						
Single	3	2.65	3	2.36	6	2.50
Married	86	76.11	46	36.22	132	55.00
Divorced	3	2.65	6	4.72	9	3.75
Widowed	19	16.81	72	56.69	91	37.92
Separated	2	1.77	0	0	2	0.83
Religion						
Christianity	112	99.12	127	100.00	239	99.58
Traditionalist	1	0.88	0	0	1	0.42
Occupation						
Farming	36	31.86	42	33.07	78	32.50
Trading	48	42.48	47	37.01	95	39.58
Pensioner	21	18.58	29	22.83	50	20.83
No occupation	8	7.08	9	7.09	17	7.08
Residence						
Urban	21	18.58	15	11.81	36	15.00
Rural	92	81.42	112	88.19	204	85.00
Educational status						
No formal	27	23.89	40	31.50	67	27.92
Primary	27	23.89	23	18.11	50	20.83
Secondary	36	31.86	41	32.28	77	32.08
Tertiary	23	20.35	23	18.11	46	19.17
Source of income						
Profits from proceeds	61	53.98	60	47.24	121	50.42
Pension	25	22.12	28	22.05	53	22.08
Maintenance allowance from children/relatives	27	23.89	39	30.71	66	27.50
Monthly income						
N1000 -N5000	16	14.16	13	10.24	29	12.08
N6,000 - N10,000	43	38.05	46	36.22	89	37.08
N10,000 and above	54	47.79	68	53.54	122	50.83

(51.33%) males and (50.39%) females accepted that combination of rice + beans + steamed vegetables + fish + watermelon as the most healthy meal of the day while few of the respondents (2.65%) males and (3.15%) females accepted combination of rice + spaghetti + fried plantain + 'kpomo' (cow skin) + water as the most healthy meal of the day. The knowledge of the respondents on who need to eat plenty of fruits and vegetables, showed that some of the respondents (48.67%) males and (52.76%) females accepted that children, adults, grandparents, and teenagers all need to eat plenty of fruits and vegetables while, few of the respondents (1.77%) males and (0.79%)

females accepted that teenagers are the people that need to eat plenty of fruits and vegetables. In the knowledge of foods that is best to keep ones eye healthy, some (40.71%) males and (37.01%) females accepted that consumption of paw-paw is best to keep ones eye healthy while, (0.88%) males and (1.57%) females accepted beans and coconut as best to keep ones eye healthy. Few of the respondents (23.89%) males and (27.86%) females accepted that consumption of red palm oil is best to keep ones eye healthy, while (33.63%) males and (31.50%) females accepted that consumption of orange is best to keep ones eye healthy.

Table 2. Distribution of the respondents by their nutritional knowledge

Parameters	Male (n=113)		Female(n=127)		Total (n=240)	
	Freq.	%	Freq.	%	Freq.	%
Knowledge about nutrition						
Yes	108	95.58	123	96.85	231	96.25
No	5	4.42	4	3.15	9	3.75
Source of knowledge about nutrition						
News paper/ magazine	38	33.63	54	42.52	92	38.33
Radio/ television	87	76.99	79	62.20	166	69.17
Books, like diet books	55	48.67	71	55.91	126	52.50
Food labels	10	8.85	26	20.47	36	15.00
Studied in school/ professional nutrition literature	43	38.05	88	69.29	131	54.58
Neighbor/ friends/ relatives/ spouse	86	76.11	102	80.31	188	78.33
Home economist/ registered dietician/ nutritionist	19	16.81	35	27.56	54	22.50
Physician/ nurse	23	20.35	32	25.20	55	22.92
Knowledge of six classes of food						
Carbohydrate+proteins+vitamins+minerals+ fats and oil+water	93	82.30	108	85.04	201	83.75
Carbohydrate+malt+fats and Oil+snacks+protein+water+minerals	16	14.16	15	11.81	31	12.92
No response	4	3.54	4	3.15	8	3.33
Most important meal in a day						
Breakfast	82	72.57	95	74.80	177	73.75
Lunch	26	23.01	32	25.20	58	24.17
Dinner	4	3.54	-	-	4	1.67
Snacks	1	0.88	-	-	1	0.42
Constituent of a healthy meal						
Rice + beans + steamed vegetables + fish + water melon	58	51.33	64	50.39	122	50.83
Rice + spaghetti + fried plantain + kpomo + water	3	2.65	4	3.15	7	2.92
Rice+ steamed vegetable +fish +water melon	49	43.36	53	41.73	102	42.50
Yam + rice + meat	3	2.65	6	4.72	9	3.75
Person who needs to eat plenty of fruits and vegetables						
Children	28	24.78	33	25.98	61	25.42
Adults	19	16.81	16	12.60	35	14.58
Grandparents	9	7.96	10	7.87	19	7.92
Teenagers	2	1.77	1	0.79	3	1.25
All of the above	55	48.67	67	52.76	122	50.83
Foods best to keep ones eye healthy						
Red palm oil	27	23.89	35	27.56	62	25.83
Orange	38	33.63	40	31.50	78	32.50
Pawpaw	46	40.71	47	37.01	93	38.75
Beans	1	0.88	2	1.57	3	1.25
Coconut	1	0.88	3	2.36	4	1.67
Milk better for elderly persons						
Fermented milk	44	38.94	36	28.35	80	33.33
Ice cream	3	2.65	4	3.15	7	2.92
Whole milk	66	58.41	87	68.50	153	63.75

The nutritional attitude of the respondents is presented in Table 3. Both the males and females had high proportion of correct responses in their nutritional attitudes. There was 100% correct response for both males and females on the fact that nutritional problems is not limited to a particular age and should be considered always by all in their attitudes to nutrition. Others

to mention a few are; the way food are prepared affect diet (correct response 92.04% males, 87.40% females), only those who are overweight should limit snack intake (correct response 98.23% males, 95.28% females), eating healthy foods can make one live longer (correct response 86.73% males, 77.95% females), one eats less nutritious meal when one eats alone

Table 3. Distribution of the respondents by their nutritional attitude

S/NO	Nutrition attitude statements	Male		Female	
		% of correct response	% of incorrect response	% of correct response	% of incorrect response
1	The food I eat affect the way I feel.	64.60	35.40	70.08	29.92
2	One reason I have lived as long as I have is because I have a healthy diet.	79.65	20.35	77.17	22.83
3	The way food are prepared affect my diet	92.04	7.96	87.40	12.60
4	If I find out that food I really like is not good for me, I will continue to eat it any way.	60.18	39.82	55.12	44.88
5	At a social gathering if someone brings food that I had never tried, I will taste it	78.76	21.24	55.91	44.09
6	I eat less nutritious meal when I eat alone than when I eat with others.	86.73	13.27	77.17	22.83
7	Buying nutritious food requires most of my monthly income.	84.96	15.04	85.83	14.17
8	I often feel too tired to bother preparing a meal.	71.68	28.32	69.29	30.71
9	There are so many foods that I have given up because they don't agree with me.	85.84	14.16	70.87	29.13
10	I am more likely to snack on fresh fruits than sweet.	78.76	21.24	77.17	22.83
11	I eat raw vegetable at least 3 times a week.	87.61	12.39	79.53	20.47
12	It's not necessary to force oneself to eat something he doesn't like for health reasons.	76.99	23.01	77.95	22.05
13	Only those who are overweight should limit snack intake.	98.23	1.77	95.28	4.72
14	Eating healthy foods can make you live longer.	86.73	13.27	77.95	22.05
15	Healthy foods sold in the market are higher in nutritional value than foods prepared at home.	73.45	26.55	71.65	28.35
16	Elderly people should avoid eating rough or strong foods.	76.11	23.89	79.53	20.47
17	Elderly people should avoid eating cooling foods e.g. chilled foods.	79.65	20.35	70.87	29.13
18	In order to be healthy I should eat some foods I have not eaten before.	80.53	19.47	81.10	18.90
19	I have already lived to be this old so I don't have to think about nutritional problems anymore.	100.00	0.00	100.00	0.00

than when one eat with others (correct response 86.73% males, 77.17% females).

The dietary restriction behaviour of the respondents (Table 4) showed that more than half of the respondents (56.67%) comprising 65.35% males and 52.21% females eat three times per day while very few 4.17% (3.54% males, 4.72% females) eat more than three per day. Most (56.67%) of the respondents (61.06% males and (52.76%) females skip mostly their lunch while few others (5.31%) males and

(8.66%) skip mostly their dinner and 6.25% do not skip any meal. The major reason for skipping meals was because of lack of time to prepare the meal (40.83%) comprising 47.79% males and 34.65% females while few (8.85%) males and (11.02%) females was because they cannot afford it. Finance (69.58%) made up of 69.03% males and 70.08% females was the major determinant of what the respondents ate. However, few (18.33%) made of 21.24% males and 15.75% females ate based on what was available in the family.

Table 4. Distribution of the respondents by their dietary restriction behaviour

Dietary restriction behaviour	Male (n=113)		Female(n=127)		Total (240)	
	Freq.	%	Freq.	%	Freq.	%
Frequency of daily consumption						
Two times	50	44.25	38	29.92	88	36.67
Three times	59	52.21	83	65.35	142	59.17
> three times	4	3.54	6	4.72	10	4.17
Meals usually skipped						
Not applicable	7	6.19	8	6.30	15	6.25
Breakfast	31	27.43	41	32.28	72	30.00
Lunch	69	61.06	67	52.76	136	56.67
Dinner	6	5.31	11	8.66	17	7.08
Reason for skipping meals						
No one to cook	30	26.55	38	29.92	68	28.33
Cannot afford it	10	8.85	14	11.02	24	10.00
Formed habit	12	10.62	23	18.11	35	14.58
No time to prepare it	54	47.79	44	34.65	98	40.83
Not applicable	7	6.19	8	6.30	15	6.25
What determines what you eat						
finance	78	69.03	89	70.08	167	69.58
hunger	11	9.73	18	14.17	29	12.08
Family	24	21.24	20	15.75	44	18.33
Factors considered when choosing meal						
culture	89	78.76	98	77.17	187	77.92
religion	67	59.29	76	59.84	143	59.58
health	110	97.35	119	93.70	229	95.42
likes and dislikes	111	98.23	117	92.13	228	95.00
what is mostly available from farm.	78	69.03	87	68.50	165	68.75
foods you do not eat because your culture forbids it	5	4.42	23	18.11	28	11.67
foods you don't eat because your religion forbids it	9	7.96	12	9.45	21	8.75
foods you don't eat because you can't chew them	34	30.09	43	33.86	77	32.08
Presence of health challenge						
Yes	36	31.86	40	31.50	76	31.67
No	77	68.14	87	68.50	164	68.33
Health challenge						
diabetes	9	7.96	9	7.09	18	7.50
Hypertension	10	8.85	7	5.51	17	7.08
arthritis	14	12.39	20	15.75	34	14.17
Dementia	3	2.65	4	3.15	7	2.92

Foods stopped eating because of the health challenge						
high fat/cholesterol foods	14	38.89	19	47.5	33	43.42
Fried foods	8	22.22	5	12.5	13	17.11
High sugar foods	11	30.56	13	32.5	24	31.58
Plant protein	3	8.33	3	7.5	6	7.89
Source of advise to stop eating them						
Doctor	6	5.31	4	3.15	10	4.17
Dietician	2	1.77	3	2.36	5	2.08
Friends and neighbors	9	7.96	10	7.87	19	7.92
family members	15	13.27	18	14.17	33	13.75
Self.	4	3.54	9	7.09	13	5.42
Avoidance or eat only small amounts of:						
Some traditional foods because of their texture	12	10.62	15	11.81	27	11.25
High fat/cholesterol foods.	33	29.20	44	34.65	77	32.08
Pickled or fermented foods e.g. pickled vegetables	23	20.35	20	15.75	43	17.92
High starch or high sugar foods e.g. sweet foods.	45	39.82	48	37.80	93	38.75
Action for fear of being obese						
Select foods that are low in fat/cholesterol	67	59.29	76	59.84	143	59.58
Select foods that are low in starch	110	97.35	119	93.70	229	95.42
select more of vegetables and fruit	111	98.23	117	92.13	228	95.00
Select foods that are high in fat and starch	78	69.03	87	68.50	165	68.75
Select foods that are not fattening	11	9.73	23	18.11	34	14.17

In a multiple response on factors considered when choosing foods; health (95.42%), likes and dislikes (95%), culture (77.92%) and what is mostly available from the farm were among some factors rated high to mention a few. However foods forbidden because of culture (11.67%) and religion (8.75%) were the least. Only 31.67% (31.86% males and 31.50% females) reported having any known health challenge. Some of the respondents (38.89%) males and (47.5%) females stopped eating high fat/cholesterol foods, 30.56% males and 32.5% females stopped eating high sugar foods because of the health challenges while few (8.33%) males and (7.5%) females stopped eating plant protein because of their health challenges. The advice to stop eating these foods because of their health challenge was received from different people ranging from family members (42.11%), friends and neighbours (26.32%) and the least was from Doctors (11.84%) and Dietitians (6.58%). This implies that more of the elderly persons are mostly restricted from eating some foods due to their health challenges by their family members. On whether the respondents avoid or eat small amount of some food items, the result showed that some of the respondents (39.82%) males

and (37.80%) females avoid or eat only small amount of high starch and high sugar foods; 32.08% (29.20% males and 34.65% females) avoid or eat only small amount of high fat/cholesterol foods while smallest proportion (10.62%) males and (11.81%) females avoid or eat only small amount of some traditional foods because of their texture. Majority (95.42%) comprising 98.23% males and 93.70% females for fear of being obese will select their foods from foods low in starch; (98.23%) males and (93.70%) females will select more of vegetables and fruits while few (9.73%) males and (18.11%) females will select foods that are fattening.

The nutrition knowledge, attitude and dietary restriction behaviour grades of the respondents are presented in Table 5. In nutrition knowledge, the result showed that most (49.6%) of the males and 46.5% of the females had fair knowledge of nutrition; 43.4% males and 37.8% females had good knowledge while few (7.1%) males and 15.7% females had poor knowledge of nutrition. The ANOVA F-statistics indicated that there was significant difference (P = 0.01) in the knowledge grade mean scores of the three groups of respondents (poor, fair and good) for both the

males (F = 426.091) and females (F= 530.117). The attitude grade showed that most 51.33% of the male respondents and some of the female respondents (45.67%) had good attitude to nutrition while few (9.73% males and 14.17% females) had poor attitude. The ANOVA F-statistics indicated that there was significant difference (P = 0.01) in the attitude grade scores of the three groups of respondents for both

males and females. The result of the dietary restriction behaviour grade of the respondents showed that most (57.52%) males and 66.14% females had good dietary restriction behaviour. The ANOVA F-statistics indicated that there was significant difference in the restriction behaviour grade scores of the three groups of respondents for the males (F=111.722) and females (F=203.744).

Table 5. Nutrition Knowledge, attitude and dietary restriction behaviour grades of the respondents

Attribute Grade	Male		Female		Total	
	Freq	%	Freq	%	Freq	%
Knowledge						
Poor knowledge (<39%)	8	7.1	20	15.7	28	11.67
Fair knowledge (40 – 59%)	56	49.6	59	46.5	115	47.92
Good knowledge (> 60%)	49	43.4	48	37.8	97	40.42
Total	113	100.00	127	100.00	240	100.00
P- value	426.091***		530.117***			
Attitude						
Poor attitude (<39%)	11	9.73	18	14.17	29	12.08
Fair attitude (40 – 59%)	44	38.94	51	40.16	95	39.58
Good attitude (> 60%)	58	51.33	58	45.67	116	48.33
Total	113	100.00	127	100.00	240	100.00
P- value	111.722***		203.744***			
Dietary restriction behaviour						
Poor restriction behaviour (<39%)	8	7.08	13	10.24	21	8.75
Fair restriction behavior (40 – 59%)	40	35.40	30	23.62	70	29.17
Good restriction behavior (> 60%)	65	57.52	84	66.14	149	62.08
Total	113	100.00	127	100.00	240	100.00
P- value	111.722***		203.744***			

*** = Significant at 1%

The summary of the mean, standard deviation, and percentage of correct responses of nutrition knowledge, attitudes and dietary restriction behavior is presented in Table 6. The nutrition knowledge revealed that the respondents had more than half of percentage of correct response in dietary and nutrition knowledge (51.6%) and source of nutrition knowledge (56.3%), however scored 48.5% in healthy meal related knowledge i.e. they were least knowledgeable in this area.

The respondents expressed favorable attitudes toward non-health care related nutritional attitude questions (72.5%) than health – care related nutritional attitude questions (54.3%). They

tended to disagree with misconceptions about healthy foods, and they also had quite positive general eating attitudes recording 67.9%. In dietary restriction behavior, the respondents had low general dietary restriction behaviors with an average of 49.3% of correct response. Some (69%) agreed that the elderly should avoid eating some traditional meal or food texture that may affect their health, 62.5% believed in avoiding high fat/cholesterol foods; 54.1% believed in avoiding pickled or fermented foods; same 54.1% believed in avoiding high starch or high sugar foods; 90.9% believed in avoiding fried foods while 66.7% believed in avoiding plant protein.

Table 6. Summary of the mean and percentage of correct responses on nutrition knowledge, attitude and dietary restriction behaviour (N =240)

Variables	Total score	Mean	S D	% of correct response
Dietary and nutrition knowledge – total	38	73.6	0.09	51.6
Source of nutrition knowledge	8	14.2	0.25	56.3
Healthy meal related knowledge	20	41.2	0.14	48.5
General eating attitudes – total	19	28	0.14	67.9
Health-care related attitude	5	9.2	0.08	54.3
Non health care related attitude	14	19.3	0.00	72.5
Dietary restriction behaviours- total	17	34.5	0.14	49.3
Some traditional meal or food texture related restriction attitudes	2	2.9	0.16	69.0
High fat/cholesterol foods restriction attitudes	2	3.2	0.11	62.5
Pickled or fermented foods restriction attitudes	2	3.7	0.04	54.1
High starch or high sugar foods restriction attitudes	2	3.7	0.16	54.1
Fried foods restriction attitudes	2	2.2	0.26	90.9
Plant protein restriction attitudes	2	3	0.08	66.7

3.1.1 Relationship between nutrition knowledge, attitudes and dietary restriction behaviour of the respondents

The correlation coefficients (r) for nutrition knowledge, attitudes, and dietary restriction behavior are reported in Table 6. Respondents' nutrition knowledge was positively related (p = .01) to health-care related attitudes (r=.599), general nutrition attitudes (r=.410), high-fat or high-cholesterol food restriction behavior (r=.502), fermented or pickled food restriction behavior (r=.699), high sugar and high starch food restriction (r=.408), fried food restriction behavior (r=.515) and related at (p = .05) to source of nutrition information (r=.132). However, nutrition knowledge was inversely related to some traditional or texture related dietary restriction behaviors (r=-.193; p =.05).

Significant positive correlations were found between general nutrition attitudes at (p=.01) and health-care related attitude (r=.990), some traditional meal or food texture related restriction behavior (p=.581), high fat/cholesterol foods restriction (r=.325), pickled or fermented foods restriction (r=.415), high starch or high sugar foods restriction (r=.597), fried foods restriction (r=.593) and plant protein restriction behavior (r=.475). General nutrition attitudes were inversely correlated with non-health-care related attitude (r=-.232; p=.05).

Dietary restriction behaviours correlated at (p=.01) with high fat/cholesterol foods restriction (r=.919), high starch or high sugar foods restriction (r=.590), fried foods restriction (r=.630) and plant protein restriction (r=.568). However, dietary restriction behaviour was inversely

correlated with some traditional meal or food texture related restriction (r=-.594) and pickled/fermented food restriction (r=-.805).

3.2 DISCUSSION

Results of this study revealed that more females than males participated in the study. Similar findings of more females in study of the older persons have been reported [13,14,15]. This could be as a result of higher mortality rate in older males than females [16,17]. Katsuiku [18] reported that biologically, women live longer than men because the rate of decline of most T-cell and B-cell lymphocytes are faster in males than in females and also that men show a more rapid decline in two cytokines - Interleukin-1 (IL-1) and Tumor necrosis factor alpha (TNF- α). It has also been reported that two specific types of immune system cells that attack invaders (CD4-T-cells and natural killer cells) increase in number with age, with higher rate of increase in women than in men [18]. In Nigeria men usually get involved in high risk occupations, most take to excessive alcohol intake and more still the stress and anxiety of family financial security is more on men which may cause early date.

The income level of the respondents is a clear reflection of their educational status and dependence on profit from proceeds because as educational status increases, income also increase and vice versa and to a great extent income affects food choices and habits according to Bryd-Breadbenner [19]. Low level of income of the respondents evident in their dependency on their children, relatives and pension corresponds with the study of Shubhangini in 2010 [4] and this makes them vulnerable to nutrition. Empirical

findings indicated that family origin and socio economic status affect the purchasing power of food, food choices, food preparation which in turn affect food consumption [20]. This quickly corresponded with the findings of this survey where the majority had finance as what determines what they eat. Older adults living on a fixed income may sacrifice buying high-quality food to purchase necessary medications [21]. As financial constraints increase, they may no longer buy enough food to meet their nutritional needs. Food that is purchased may be poor quality, such as ready-made meals that are high in fats and carbohydrates [22]. The percentage of poor and near-poor older adults who are food insecure, not knowing where their next meal will come from, is projected to increase to nearly 13% by 2025 [23]. In Nigeria, the elderly does not receive any financial support from the government. Even those who retired from civil service are not paid their gratuity and pension as at when due. These among other factors can lead to food insecurity in the elderly population. It was opined that the diminished capacity of the elderly to sustain themselves through own income, savings, assets or pensions and their consequent greater vulnerability to the acute poverty risk posed by life events like sudden retirement, redundancy or death of a spouse render older people more dependent than younger adults on family support [24]. All these will invariably predispose these elderly to food insecurity [24].

On nutrition knowledge, few respondents got to know about nutrition from physician/nurse which did not agree with an earlier study where General practitioners (GPs) and other primary health staff such as nurses, have been identified as preferred providers of nutritional care providing trustworthy and personalised care [25]. More than half of both the male and female respondents that had correct knowledge on what constitutes a healthy diet imply that most of the respondents in this study have good knowledge of what should be the constituent of a healthy meal as reflected in their choice of the diet that was represented from all the food groups. The most important meal of the day in which most of the respondents chose as breakfast is an indication of good knowledge. According to Penuela [26] breakfast is the most important meal of the day, and eating breakfast is a vital ingredient to the body and mind. Most of the respondents had good knowledge that everybody needs to eat plenty of fruits and vegetables. Reports have shown that adequate intake of

fruits and vegetables form an important part of a healthy diet and low fruit and vegetable intake constitute risk factor for chronic diseases [27]. In another study, there was a strong association between nutrition knowledge and intake of fruits, vegetables and fat and the association was stronger for fruit and vegetables compared to fat intake [28]. The knowledge of the respondents on nutrition by attesting to the fact that foods high in fat is related to high blood cholesterol and that vitamin E slows down ageing and adequate intake of dietary fibre especially bulk forming cereal fibre helps in the prevention of constipation also complements other studies [29,30,31].

Meal skipping was not common in this study. A similar report has been found in some studies where usual dietary pattern involved three meals per day, with skipping meals a rare occurrence [32]. The finding is also consistent with a study conducted by Wei and Ya-Wen [33], who found that most of the elderly persons are not restrictive to the number of times they eat. However, availability of finance was the major determinant of what the respondents ate. This implies that the dietary behaviour of the respondents is mostly restricted by their finance. It has been suggested that despite people knowing which foods are appropriate, the price of food becomes a major determinant in what they buy [34]. Findings also indicate that family origin and socio- economic status affect the purchasing power of food, food choices, food preparation and food availability which in turn affect food consumption [20]. Factors that impact on food choice and meal patterns have been reported to include social isolation [35], the presence of chronic disease resulting in dietary restrictions [36].

More respondents avoid or eat only small amount of high starch/high sugar foods; high fat/cholesterol foods while few others avoid or eat only small amount of some traditional foods because of their texture. This implies that the older persons in the study restrict themselves from consumption of foods high in starch and sugar which are likely to cause diabetes. This finding is consistent with Demeke [37], who observed that high intake of sugary and starchy foods by the elderly leads to diabetes and hypertensive cases. Majority of the respondents

Table 7. Relationship between nutrition knowledge, attitude and dietary restriction behaviour of the respondents

S/N	Variables	r values (N =240)												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Nutrition knowledge – total	1												
2	Source of nutrition knowledge	0.132 [*]	1											
3	Healthy meal related knowledge	0.116	0.900 ^{**}	1										
4	General eating attitudes – total	0.410 ^{**}	0.815 ^{**}	0.480 ^{**}	1									
5	Health-care related attitude	0.599 ^{**}	0.725 ^{**}	0.352 ^{**}	0.990 ^{**}	1								
6	Non health care related attitude	0.045	0.375 ^{**}	0.042	-0.232 [*]	0.366 ^{**}	1							
7	Dietary restriction behaviours- total	0.111	0.820 ^{**}	0.488 ^{**}	0.060	0.989 ^{**}	0.024	1						
8	Some traditional meal or food texture related restriction attitudes	-0.193 [*]	0.706 ^{**}	0.631 ^{**}	0.581 ^{**}	0.518 ^{**}	0.056	-0.594 ^{**}	1					
9	High fat/cholesterol foods restriction	0.502 ^{**}	0.754 ^{**}	0.444 ^{**}	0.325 ^{**}	0.916 ^{**}	0.014	0.919 ^{**}	0.268 [*]	1				
10	Pickled or fermented foods restriction	0.669 ^{**}	0.496 ^{**}	0.137 [*]	0.415 ^{**}	0.847 ^{**}	0.071	-0.805 ^{**}	0.001	0.944 ^{**}	1			
11	High starch or high sugar foods restriction	0.408 ^{**}	0.021	0.417 ^{**}	0.597 ^{**}	0.704 ^{**}	0.018	0.590 ^{**}	0.005	0.562 ^{**}	0.732 ^{**}	1		
12	Fried foods restriction	0.515 ^{**}	0.072	0.370 ^{**}	0.537 ^{**}	0.739 ^{**}	0.097	0.630 ^{**}	0.042	0.599 ^{**}	0.755 ^{**}	0.609 ^{**}	1	
13	Plant protein restriction	0.004	0.005	0.441 ^{**}	0.475 ^{**}	0.685 ^{**}	0.029	0.568 ^{**}	0.006	0.532 ^{**}	0.706 ^{**}	0.009	0.917 ^{**}	1

^{**}: Correlation is significant at the 0.01 level (2-tailed);

^{*}: Correlation is significant at the 0.05 level (2-tailed)

for fear of being obese will select their foods from foods low in starch and more of vegetables and fruits. This could be because of the percentage that had good nutrition knowledge recorded in this study. According to Beswick [29] increased fat intake is associated with high levels of obesity and overweight and cardiovascular disease.

More than half of the respondents had poor and fair nutrition knowledge. However, the respondents with fair knowledge of nutrition were statistically higher than those with poor nutrition knowledge. This is consistent with the study by Demeke who reported that most elderly people, because of their wide exposure in life, have wider knowledge of nutrition and as such, can have the ability to differentiate between poor and good nutrition [37]. This could predispose the respondents to better living, even in old age. The respondents with a good attitude to nutrition were statistically higher than those with fair or poor attitude to nutrition. This finding is similar to that of Wei Lin and Ya Wen [33] where the elderly expressed favorable attitude to healthy foods and towards nutrition. Most of the respondents had good dietary restriction behavior. Thus the respondents with good dietary restriction behaviour were statistically higher than those with fair or poor dietary restriction behaviour. Meiner [21] had reported that the prevalence of restricted diets for residents of nursing homes can contribute to poor nutritional intake. Dietary restrictions in older people without guidance are considered to have an unfavourable benefit / risk ratio with the potential to result in deficiencies and contribute to under-nutrition [36,38].

Dietary restriction behavior showed that half of the respondents eat more than three times per day which also is in tandem with the study conducted by Wei and Ya-Wen who found out that most of the elderly persons are not restrictive to the number of times they eat [33]. It therefore becomes imperative that the elderly should be encouraged or allowed to eat more in order to meet up with their nutritional requirement as loss of appetite is associated with old age.

The three variables considered in this study; nutrition knowledge, nutrition attitude and dietary restriction behavior generally positively correlated with health-care related attitudes, general nutrition attitudes, high-fat or high-cholesterol food restriction behavior, fermented or pickled food restriction behavior, high sugar and high starch food restriction, fried food restriction behavior and source of nutrition

information. The positive significant relationship that was found in this study between nutrition knowledge, attitudes and dietary restriction behaviour of the respondents is an indication that the nutritional well being of the elderly must consider these three aspects to maintain good health. Similar findings on the relationship of these three variables have been reported [33]. However, nutrition knowledge and dietary restriction behavior were inversely related to some traditional or texture related dietary restriction behaviours. Poor dental health may cause elders to avoid eating foods with tough texture, those with few or no natural teeth, or ill-fitting dentures, are more likely to eat a restricted variety of foods [39], and some older adults without their natural teeth experience pain when chewing [40]. Such experiences may discourage the consumption of foods that are difficult to chew, such as some vegetables, fruit and nuts, and some meats [41]. Chewing difficulties may also affect enjoyment of eating; possibly further limiting food and nutrient intakes. Research has shown that micronutrient intakes can be influenced by oral health, including vitamin B12 [42], vitamin C, vitamin E [43] and fibre [44].

4. CONCLUSION

Generally, the respondents in this study had good nutrition knowledge. The respondents with a good attitude to nutrition were statistically higher than those with fair or poor attitude to nutrition. Most of the respondents had good dietary restriction behaviour showing that those with good dietary restriction behaviour were statistically higher than those with fair or poor dietary restriction behaviour. The study revealed that the nutrition knowledge of the elderly was positively related to health care attitudes, general eating attitudes and dietary restriction behaviour. However, nutrition knowledge was inversely related to some traditional or food texture-related dietary restriction behaviours. The government and organizations should plan for more effective ways of improving the nutritional knowledge, attitude and general well-being of the elderly. Proper care by children and relatives are crucial at this age as the elderly are dependent on them. Social amenities and networks should be provided which can serve as a source of nutrition education to them for graceful and healthy ageing. Dietary restriction behaviours which have the potential to compromise their nutrition as dietary requirements change can be corrected through nutrition education. Further studies should be undertaken to look at

anthropometric measurements to see if the nutrition knowledge, attitude and dietary restriction behaviour has any effect on the anthropometric indices.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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