



Rural Dwellers' Knowledge of Nutrition and their Food Consumption Pattern in Oyo State

Meludu, N.T. and Ajibade, O.Y.

Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan Nigeria

ABSTRACT: Lack of knowledge of available foods and their nutritional and health attributes result in inappropriate feeding practices causing malnutrition and associate problems. This study assessed rural dwellers' knowledge of nutrition and their food consumption pattern in order to develop strategies for creating awareness on the issues of better nutrition. Three rural local government areas in Oyo state were purposively selected, out of which two wards were randomly selected from each local government area making a total of six wards. One head of household was picked from each household making a total of 156 respondents. Frequencies, percentages, Chi-square and Pearson Product Moment Correlation (PPMC) were used to describe and analyze the data. The descriptive statistics showed that the main income generating activity was farming with the average income of less than ₦12, 000.00 per month.. Chi-square test also showed that income ($\chi^2 = 8.292$, $P = 0.009$) is significantly related to animal protein consumption pattern, while education has significant relationship with carbohydrate ($\chi^2 = 16.259$, $P = 0.039$) and vitamin ($\chi^2 = 15.860$, $P = 0.044$) consumption.. Finally Chi-square test revealed that there is significant relationship between constraint to adequate feeding and consumption pattern of plant protein ($\chi^2 = 6.863$, $P = 0.033$), animal protein ($\chi^2 = 10.342$, $P = 0.039$) and vitamin ($\chi^2 = 10.243$, $P = 0.037$). Carbohydrate based foods were the major consumed foods by the rural dwellers with few protein and insufficient vitamin. Therefore daily intake of fruits, leafy vegetables as well as other nutrients should be encouraged for proper functioning of the body system and healthy living, through nutrition awareness programme.

Keywords: Food, nutrition awareness, consumption, channel, rural dwellers.

INTRODUCTION

Food is the main source of good nutrition and we eat food to supply us with substances that are referred to as nutrients. Good nutrition involves consuming a variety of foods in appropriate amounts (Answer, 2006). Meludu (2007); Merck (2007) defined nutrient as substances in foods that we cannot see with our naked eyes but are needed for the proper functioning of the body and for good health. The most important aim of any government of any country is to achieve reasonable level in the standard of living and general well being of every individual in such country through self-sufficiency in food production and consumption

without sustainable food security nutrition adequacy cannot be achieved. Food security is a fundamental concept on elaborated development strategies-millennium development goal (MDG). It has been defined as access of all individuals at any time to sufficient nourishing food for a healthy and active life through availability of foodstuff, the quality of the diet, the stability of supplies overtime and space and the access of food produced at home or purchased (Honfoga and Boom, 2003). Adequate food and good nutrition is a fundamental human right (Kidshealth 207, under nutritional however, is the main threat to health and well-being not only in the middle and low income countries but also globally (ACC/SCN, 2006; SCN, 2004; SCN, 2006). The ever-increasing levels of household food insecurity are contributing to less frequent feeding of rural dwellers.

Manuscript received: April 2008; Revision Accepted October 2008

Address for correspondence: E-mail : nkiru_m@yahoo.com

West African's diverse agricultural ecosystem provide a wide range of indigenous and traditional foods which if effectively mobilized and managed can increase food availability, expand household food choices and better nutrition (Kurwijila, 2004; Smith, Eyzaguirre, Matig and Johns, 2006). Often with poor nutrition, children and adults alike are vulnerable to disease and death (Dirorimwe, 2006). Malnutrition during the early life leads to permanent stunting in growth. Improved health and nutrition among children contributes to high enrollment, better school attendance, low rates of dropout and improved performance in academic work as well as to social equity and economic growth (Mwiria, 2005). Prioritization of care not just food to the most vulnerable individuals within household is necessary. Among adults, both under nutrition and over nutrition are present even within the same household in the rural areas giving them low resistance and exposing them to diseases (SCN, 2006). Major foods from agricultural ecosystems provide an insight into the wide array of under utilized indigenous and traditional foods. However if the heads of household in the rural areas do not provide good nutrition for their household members, it limits the ability of individuals and families to carry out their functions hence there is reduction in the level of agricultural production which is a function of the reduction in agricultural labour force.

Furthermore, Camus (2006) stated the importance of nutrition in dealing with HIV/AIDS as funding of programmes to ensure adequate nutrition for those with HIV/AIDS is now firmly acknowledged. This is an important contribution towards goal 6 of the Millennium Development Goals, but without focus in eliminating hunger and malnutrition many of the MDGs will be very difficult to achieve. When there is lack of knowledge, not only of available foods but of their nutritional and health attributes it results in inappropriate feeding pattern causing malnutrition which dis-empowers individuals by causing or aggravating illness, lowering educational attainment and diminishing livelihood skills and options. This makes it harder for individuals to seize new opportunities in a globalizing world and reduces their resilience to resist the challenges and shocks it generates. The general objective of this study determined the rural dwellers' knowledge of nutrition and their food consumption pattern in Oyo state. This study therefore aimed at gaining a better understanding of the household nutritional situation and identified the potential opportunities, which had not been adequately exploited nutritionally. Finally, it aimed at building a

policy bridge that will help policy makers in their nutritional campaign, to herald the message of nutrition and food consumption so that many people will benefit from it and have change in people's behaviour via nutrition education to solve nutritional problems in the rural areas.

MATERIALS AND METHODS

Sampling The study area is Oyo State, which is situated in the tropics, within the South western part of Nigeria. Oyo state has 33 local government areas and a land area of about 37,753 square kilometers population of 578,983. It lies between latitude 7⁰2' and 9⁰1' north and longitude 2⁰4' and 4⁰3' east. It is bounded in the West by the Republic of Benin, East by Osun State, North by Kwara and Niger State and South by Ogun States. Oyo State enjoys a tropical climate with prominent wet and dry season. Oyo state is characterized by a tropical rainforest in the south, but covered mostly by a derived savanna in the north, which is largely the result of clearing and burning of the formal forest cover to provide land for civilization. The economy is based mainly on agriculture and handcrafts, agriculture being the main traditional occupation of the state. The climate favours the cultivation of variety of food crops such as yam, maize, cassava, fruits, leafy vegetables and tree crops such as cocoa, citrus, oil palm, kolanut etc (Town Planning Authority, 2007). The population of the study includes all the rural dwellers in Oyo State. Out of the 33 local government areas in Oyo state, purposive sampling was used to select three rural local government areas because of the focus of the study which is to assess rural dwellers knowledge of nutrition and food consumption pattern. These include: Afijio, Iddo and Oluyole. Two wards were randomly selected from each local government area making a total of six wards out of which two villages were randomly selected from each ward which gave a total of twelve villages. Thirteen households were selected from each village to make a total of 156 household. Head of each household was chosen for the study making a total of 156 respondents. Interview schedule (questionnaire) use of to record the information from the respondents. The instrument was divided into the following sections: Socio-economic characteristics, Information on nutrition, knowledge of food consumption pattern and food consumption frequency table. Both descriptive and inferential tools were used to analyze the data collected (chi-square, Pearson Product Moment Correlation- PPMC).

RESULTS AND DISCUSSION

This section starts with the presentation, interpretation and discussion the findings of the study on some selected socio-economic characteristics of the rural dwellers, their knowledge of nutrition and their food consumption pattern.

Table 1:
Distribution of the socio-economic characteristics of the respondents (n=156)

Variable	Frequency	Percentage
Level of Education		
Non-formal	31	19.9
Adult	56	35.9
Primary	36	23.1
Secondary	24	15.4
Tertiary	9	05.7
Income Generating Activities		
Civil servant	6	3.9
Farming	100	64.1
Tailoring	17	10.9
Arts & Crafts	18	11.5
Trading	15	9.6
Estimated Monthly Income (₦)		
Below 10,000	113	72.4
10,000-15,000	20	12.8
16,000-20,000	13	8.3
20,000 and above	10	6.4

Source: Field Survey, 2007.

Table 1 shows that the level of education of the respondents is low. Very low proportion of the respondent (15%) had secondary education while high proportion (20%) does not have any formal education.

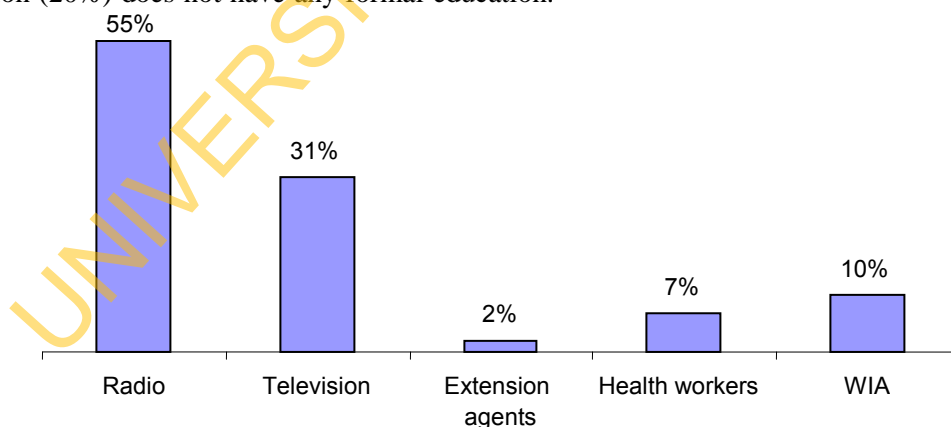
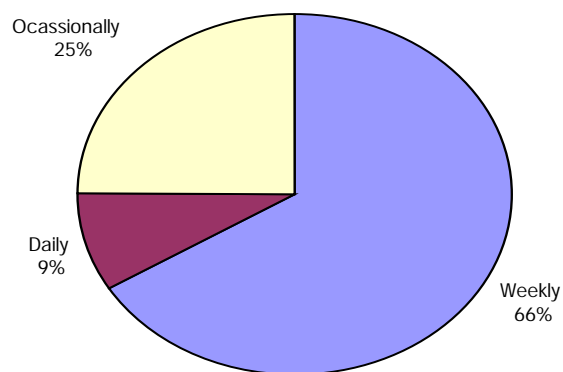


Figure 1. Distribution of the respondents on sources of nutrition information

Source: Field Survey, 2007.

There is need to improve the educational status to enhance their opportunity of gainful employment, increasing their income earnings, increase household food security and for a better understanding and implementation of nutritional education. This is in line with Okyere (2004) that nutrition security depends very much on education, health and hygiene. However, the result reveals that more than half of the populations (64%) were subsistence farmers while others engaged in other activities such as tailoring (10%), trading (9%), arts and crafts (11%) as well as civil servants (3%). The table further presents the distribution of the respondents based on their level of monthly income, high proportion of the respondents (72%) earn below ₦10,000 monthly while very few about 8 percent earn ₦ 20,000 and above. However, this study revealed that the mean family income of the studied population was less than ₦12, 000.

Figure 1 shows that radio has made the greatest contribution to nutritional information being the most popularly used (58%) of the total source of nutritional information. This is due to the cost of the radio which is relatively low and affordable, majority of the respondents have to listen to on nutritional needs. While about 31 percent have access to nutritional information via the television because they can afford it. This is very low due to continuous power failure. Very few (2%) have access to nutritional information through women in agriculture (WIA) because not many seminar and lectures had been organized in the past at the local government level. While the minority (7%) that had access through health workers were mainly pregnant women that attend antenatal clinics in their various health centers.



Source: Field survey, 2007.

Figure 2: Distribution of respondents on the rate of access to nutrition information

Figure 2 revealed that, majority of the respondents (66%) have weekly access to nutrition information while very few (9%) have daily access to nutritional information. As a result of this, more than half of the respondents (75%) in a different question indicated that they need constant nutrition education in their communities so as to gain more knowledge about food and a better understanding of nutrition to enhance a better status of healthy living.

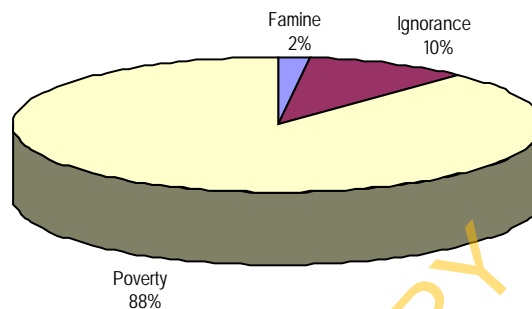


Figure 3: Distribution of respondents on constraints to nutritious and adequate diet

Table 2: Distribution of the role of Women in Agriculture in enhancing adequate nutrition n= 148

Activities of WIA	Frequency	Percentage
To encourage people to adopt nutrition practices that affect both mind and body	27	18.2
To help people to learn to manage food resources and handle food safely	63	42.6
To teach how proper nutrition and healthy life style can improve the quality of life	58	39.2

Source: Field survey 2007

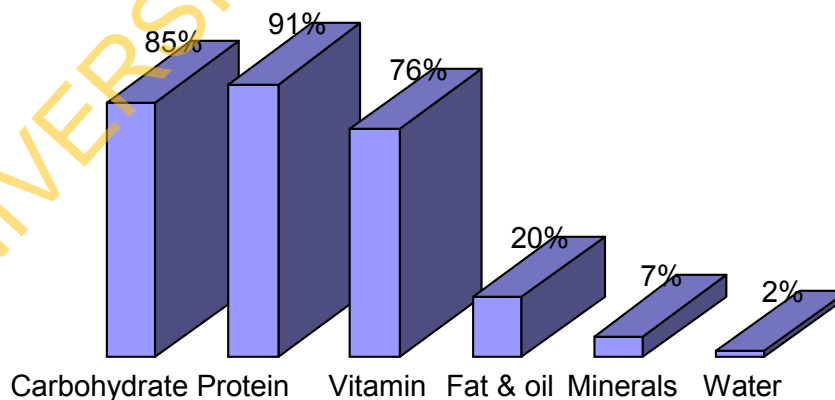


Figure 4: Distribution of respondents on knowledge of food nutrient

Table 3: Distribution of Respondents on Frequency of Food Consumption

Food Groups	F	(%)	F	(%)	F	(%)	N
	Never		Sometimes		Regularly		
<u>Cereals</u>							
Maize	-	-	14	(9.3)	135	(90.0)	149
Millet	47	(31.5)	29	(19.5)	73	(49.0)	149
Sorghum	40	(26.8)	35	(23.5)	74	(49.7)	149
Rice	-	-	2	(1.3)	146	(97.3)	148
Wheat	5	(3.4)	7	(4.7)	136	(91.9)	148
<u>Root, tubers and products</u>							
Yam	3	(2.0)	26	(17.5)	120	(80.5)	149
Cassava	25	(16.8)	55	(36.9)	69	(46.3)	149
Irish potato	23	(15.1)	58	(38.7)	68	(46.2)	149
Sweet potato	29	(19.3)	53	(35.3)	67	(44.7)	149
Cocoyam							
<u>Legumes, Nuts and Products</u>							
Cowpea	1	(.7)	4	(2.7)	144	(96.0)	149
Soybean	40	(26.8)	36	(24.2)	73	(49.0)	149
Groundnut	6	(4.0)	19	(12.8)	124	(83.2)	149
Walnut	13	(8.7)	35	(23.5)	101	(67.8)	149
Cashew nut	11	(7.1)	35	(22.4)	110	(70.5)	156
Melon	8	(5.1)	8	(5.1)	140	(89.8)	156
<u>Meat, Dairy and Products</u>							
<u>Fish and sea products</u>							
Snail	7	(11.4)	30	(20.1)	102	(68.5)	149
Pork	110	(73.3)	19	(12.7)	18	(12.0)	149
<u>Beef and dairy products</u>							
Poultry and products	1	(.7)	11	(7.3)	135	(90.0)	149
<u>Fruits</u>							
Tomatoes	2	(1.3)	2	(1.3)	145	(97.4)	149
Garden egg	8	(5.4)	6	(4.0)	135	(90.6)	149
Banana	2	(1.3)	4	(2.7)	143	(96.0)	149
All citrus	-	-	2	(1.3)	145	(96.7)	149
Almond	20	(13.4)	15	(10.1)	114	(76.5)	149
Cucumber	73	(49.1)	27	(18.1)	49	(26.8)	149
Pineapple	6	(4.0)	14	(9.4)	129	(86.6)	149
Pepper	-	-	12	(8.1)	137	(91.9)	149
<u>Leafy vegetables</u>							
Spinach	6	(4.0)	14	(9.4)	129	(86.6)	149
Okra	37	(24.8)	33	(22.2)	79	(53.0)	149
Cabbage	67	(45.0)	27	(18.0)	55	(37.0)	149
Amaranths	21	(14.1)	14	(9.4)	114	(76.5)	149
Green peas	54	(36.2)	26	(17.5)	69	(46.3)	149
Bitter leaves	14	(9.4)	35	(23.3)	100	(67.1)	149
Lettuce	78	(52.3)	26	(17.5)	45	(30.2)	149
Sweet potato leaves	117	(78.5)	6	(4.0)	26	(17.5)	149
Cochorus	5	(3.4)	2	(1.3)	142	(95.3)	149
Fluted pumpkin	4	(2.7)	2	(1.3)	143	(96.0)	149

Figure 3, revealed that poverty is the major constraint to adequate diet as it has the highest proportion (88%) of the respondent while 10 percent indicated ignorance and very few (2%) of the respondents indicated famine. This result is confirmed by Sarbib (2006), that

poverty is the major cause of malnutrition. This could affect both access to nutritious foods.

Table 2 showed the activities of women in agriculture (WIA) in these communities in a laudable nutrition programme. Large proportion (42%) of the

respondents agreed that the role of WIA in their community is just to help people to learn to manage food resources and handle food safely, while about 39 percent agreed that the role of WIA involves teaching people how to ensure proper nutrition and healthy lifestyle that can improve the quality of life. In line with this, there is therefore a need for WIA to buckle up and frequently organize nutrition based programmes to ensure healthy consumption and living. Attending these programmes will help the respondents to gain better understanding of the indigenous and traditional foods which when effectively utilized can help to reduce malnutrition and improve food consumption pattern.

Figure 4 shows that high proportion of the respondents are aware of protein (91%), vitamin (76%) and carbohydrate (85%) as the only nutrients in food while about seven percent are aware of minerals and fats (20%) as nutrients. Only 2 percent of the respondent considered water as a nutrient. Result of another item however showed that less than 10 percent of the respondents combine all the six nutrients of food while about 60 percent combine three to four nutrients of food per meal.

Table 3 showed that the respondents eat food from the food groups of cereals, roots and tubers very well and regularly. This shows that there is high consumption of carbohydrate as over 90 percent of the respondents eat maize, rice and yam regularly. However, about 26 percent of the respondents have not eaten soybean and its products before, while 96 percent eat cowpea and melon regularly. The respondents knowing fully well that the nuts are seasonal in nature, they consume them regularly during their seasons (on season). From the sampled population, beef, dairy product, fish, poultry and poultry products are also consumed regularly by most of the respondents. However, they eat very minute quantity of these products even though some of them have access to these products (snails and bushmeat) they prefer to sell them to have money rather than eat for healthy living, this is as a result of poverty and ignorance. The available small game (bushmeat) insects and termites, when used in diversified diets can provide a population's daily needs for protein. Indigenous cereals, grain, legumes can contribute considerable amounts of micronutrients to the diet (Smith et al, 2006). Furthermore, Thiam, Samba, and Lwanga, 2006, recommended daily intake of fruits and leafy vegetables to help reduce the risk of coronary heart disease, stroke and hypertension. Fruits and leafy vegetables aid digestion and absorption of other food, however when not eaten in good quantity,

deficiency result in one disease or the other. From table 3, cucumber has the least consumption percentage (25%) as most of the respondents do not know it. Also some leafy vegetables that are less consumed include cabbage, green peas, lettuce and sweet potato leaves as most of the respondents have not taken these leaves before, this could be because they are exotic plants. These leafy vegetables are rich sources of vitamins and minerals, an example is the sweet potato leaves which is a rich source of vitamin A that enhance good eye sight.

Table 4:

Chi-square test of significant relationship between sex and food consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	.850	2	.654	NS
Plant protein	1.108	2	.575	NS
Animal protein	1.883	2	.390	NS
Vitamin	10.286	2	.006	S

Table 4 above revealed that there is no significant relationship between sex and consumption pattern on carbohydrate, plant protein and animal protein. However, sex has significant relationship with vitamin consumption pattern. This means that sex has no effect on the consumption of carbohydrate, plant protein and animal protein. This is in line with Barker (2000), that the foetal origin of disease provide greater justification for prioritizing nutrition of girls and women as genes provide a general recipe for making human being, but the human being is determined by the ingredients provided by the mother.

Table 5:

Chi-square test of significant relationship between income and food consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	4.100	4	.663	NS
Plant protein	4.087	4	.665	NS
Animal protein	17.012	4	.009	S
Vitamin	8.292	4	.217	NS

Table 5 showed that there is no significant relationship between income and consumption pattern of carbohydrate, plant protein and vitamins, while there is a significant relationship between income and animal protein consumption it means that the respondent have low income. It is generally accepted that animal foods are expensive and therefore not commonly consumed by the poor (Thitsted, 2001). Livelihood diversification ought to be encouraged in the rural areas to increase their level of income which will in

turn aid better standard of living as well as healthy consumption pattern.

Table 6:

Chi-square test of significant relationship between education and consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	16.259	5	.039	S
Plant protein	7.379	5	.496	NS
Animal protein	10.356	5	.241	NS
Vitamin	15.860	5	.044	S

Table 6 presents that there is no significant relationship between education and protein (both plant and animal) consumption pattern. However, education has significant relationship with carbohydrate and vitamin consumption. This means that the more the rural dwellers are educated the more their carbohydrate and vitamin consumption is affected. The importance of vitamins and minerals as emphasized by Meludu (2007) is determining the vulnerability of individuals, and of entire populations to disease and death has received less attention. Khan (2003) however acknowledged that hunger, poverty and lack of knowledge were the fundamental causes of malnutrition. This also means that education helps people to be aware of the effect of high consumption of carbohydrate and the importance of higher protein consumption.

Table 7:

Chi-square test of association between nutritional information and consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	5.543	4	.236	NS
Plant protein	2.425	4	.658	NS
Animal protein	2.123	4	.713	NS
Vitamin	12.212	4	.016	S

Table 7 showed that there is no significant relationship between nutritional information and consumption pattern of carbohydrate, plant protein and animal protein. This implied that nutritional information does not have effect on the consumption pattern of carbohydrate and protein. However, there is a significant relationship between nutritional information and vitamin consumption pattern. This agrees with Thitsted (2001), that though staple food is important for energy contribution and nutrients, small amounts of other food such as fruit and leafy vegetables should be consumed to enhance proper functioning of the body system for health and vitality. Vitamins are not easy to get because only small

quantities are found in food and they are easily destroyed. Therefore there is a need to be well informed about this essential nutrient (Meludu, 2007).

Table 8:

PPMC test of correlation between knowledge of nutrition and consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	.091	150	.266	NS
Plant protein	.070	150	.394	NS
Animal protein	.073	150	.377	NS
Vitamin	.120	150	.142	NS

Table 8 showed that there is no significant relationship between respondents' knowledge of nutrition and their food consumption pattern. This implied that knowledge has no effect on their consumption pattern. This affirms the result of figure 1,3,4 on the poor search for nutrition information and low rate of access for information. However, Ekwall (2005) that it is the right of every human being to feed himself or herself by his or her own proper means and in dignity.

Table 9:

Chi-square test of significant relationship between constraints to adequate feeding and consumption pattern

Variable	χ^2	df	P	Remark
Carbohydrate	6.863	4	.143	NS
Plant protein	10.461	4	.033	S
Animal protein	10.342	4	.039	S
Vitamin	10.243	4	.037	S

Drawing on the result, the study revealed that there is no significant relationship between constraint to adequate feeding and consumption pattern of carbohydrate (table 9). However, there is a significant relationship between constraint to adequate feeding and consumption pattern of plant and animal protein and vitamin. Some of the constraints to adequate nutrition include: ignorance, poverty and famine. Meludu (2007), concluded that a monotonous diet is the norm for hundreds of millions of households that are poor and food insecure. Rural dwellers are less able to generate livelihoods and less well equipped to resist chronic diseases in later life (Seres, 2005).

CONCLUSION

Low access to nutrition information, inadequate of knowledge of nutrients and poverty has result to deficient food consumption pattern. The food consumption frequency result revealed that

carbohydrate based foods were the major consumed foods by the rural dwellers with few protein (both plant and animal) and insufficient vitamin consumption. This resulted in an imbalance and inadequate dietary pattern which has effect on the nutritional status of the rural dwellers. Poverty and ignorance as the constraints to adequate feeding which if resolved would further improve the consumption pattern.

RECOMMENDATIONS

Health professionals can provide some answers, but they alone cannot solve the problem of malnutrition completely. Based on the findings arising from this research the strategy for creating awareness on better food consumption pattern should be on stakeholder collaboration. Also, the following recommendations are made:

1. Individuals should take up the responsibility of consuming variety of foods in appropriate amounts to enable them to get the required nutrients.
2. Home gardening and orchards should be encouraged to increase availability and accessibility of fruits and leafy vegetables especially during the off seasons to increase the daily consumption of vitamins.
3. Home Economics and Nutrition related courses should be taught at all levels of education to create awareness on good consumption pattern and habit.
4. Agriculturists need to ensure that enough food is produced at all seasons because food availability will have effect on food consumption pattern.

REFERENCES

ACC/SCN, 2000. The fourth report on the world nutrition situation *Standing Committee on Nutrition*. 3-7.

Answers, 2006. Definition: Nutrition and malnutrition. Retrieved December 30, 2006 from <http://www.answers.com>.

Barker, D. 2000, The foetal origin of disease. *Standing Committee on Nutrition in collaboration with IFPRI*. 6-7.

Camus C.L. 2006. Nutrition: an input and foundation for health. *Standing Committee on Nutrition*. 32:6-10.

Ekwall, B. 2005. Voluntary guidelines on the right to food; the perspective of a development agency *Standing Committee on Nutrition*. 27.

Honfoga, B.G. and Boom, J.M. 2003. Food consumption patterns in Central West Africa and challenges to combating malnutrition. *Food and Nutrition Bulletin* 24.2:167-176.

Khan, N.C. 2003. Nutrition intervention programmes in Vietnam: scaling up and challenges. *Standing Committee on Nutrition*.

Kidshealth, 2007. Good nutrition. Retrieved June 8, 2007 from <http://www.kidshealth.org/parent/food/general/habit>.

Kurwijila, R. 2004. Why has Africa not yet achieved food and nutrition security? in assuring food and nutrition security in Africa by 2020 prioritizing actions, partnerships. *Proceedings of an All-African Conference*. April 1-3, 2004. Washington DC:IFPRI. 29.

Meludu, N.T. 2007. "Classification of food Nutrients: the must for vitamins in our daily meal" Ibadan. Paper presented at the training workshop on "promoting the importance of vitamin consumption and skill development acquisition". March 21, 2007. 5-7.

Mwiria, K. 2005. Crucial role of nutrition in education *Food and Nutrition Bulletin* 26.2:168-169.

Nutrition Inforcenter, 2006. Basic concepts of nutrition. Retrieved November 21, 2006 from 1stholistic.com/nutrition/holnuitribasicconceptsintro.htm.

Okyere, K.A. 2004. Building human capacity in assuring food and nutrition security in Africa by 2020. Prioritizing actions, strengthening actors and facilitating partnerships. *Proceedings of an All-African Conference*. April 1-3 2004. Washington DC:IFPRI 148-150.

Sarbib, J. 2006. Nutrition, a renewed opportunity in development. *Standing Committee on Nutrition*. 32:10-12.

SCN, 2004. Fifth report on the world nutrition situation. nutrition for improved development outcome. *Standing Committee on Nutrition* 3-23.

SCN, 2006. Diet-related chronic diseases and the double burden of malnutrition in West Africa. *Standing Committee on Nutrition* 33.

Seres, N. 2000. Nutrition throughout the life cycle ACC/SCN in collaboration with IFPRI.

Seres, D.S. 2003. Nutritional assessment: current concepts and guidelines for the busy physician in nutrition issues in gastroenterology. Series 8 Rees C. (Ed). Retrieved November 21, 2006 from healthsystemvirginia.edu/internetdigestivehealth. 29-34.

Smith, I.F, Eyzaguirre, P.B, Matig, O.E. and Johns, T. 2006. Managing biodiversity for food and nutrition security in West Africa: building on indigenous knowledge for more sustainable livelihoods. *Standing Committee on Nutrition* 33.

Thiam, I. Samba, K. and Lwanga, D. 2006. Diet related chronic diseases in the West Africa region. *Standing Committee on Nutrition* 33.

Thitsted, S.H. 2001. Needed: more emphasis in using food-based strategies to improve human nutrition. *Standing Committee on Nutrition*.