NUTRITIONAL ASSESSMENT OF RURAL FARMERS IN IMO STATE, NIGERIA; IMPLICATION FOR HEALTH AND WELL-BEING.

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Abstract

Nutritional status is an important component of nutritional care and state of health of any individual. This study examined the nutritional status of rural farmers in Imo State Nigeria using dietary assessment method and body mass index (BMI).The major objective of the study was to determine the food regimen of the farmers, compare it with their nutritional status and suggest improvement measures. Four research questions and hypothesis guided the study. A total of 270 farmers were used for the study. Questionnaire was used to collect data on dietary pattern of the farmers. Descriptive statistics (mean and percentage) and linear regression analysis were used for data analysis. Results showed that food selection was based on locally produced food (plant products). BMI results showed that 4.1% of the farmers were underweight, 26.3% were normal, 29.6% were overweight, 25.9% were pre-obesed and 14.1% were obesed. The result further showed that Energy, Fat and Iron intake of the farmers had positive relationship with BMI while Protein, Calcium and Vitamin A intake showed negative relationship with BMI .It was concluded that lack of adequate dietary pattern may result in poor nutritional status of the farmers, this could pre-dispose the farmers to non-communicable diseases and poor productivity. The study recommended that nutrition education, healthy eating pattern and nutrition intervention among others be made available to rural farmers by the various levels of government and organization.

KEYWORDS: Nutritional status, Body Mass Index, Dietary pattern, Rural Farmers.

INTRODUCTION

Malnutrition is widespread in the entire country and rural areas are especially vulnerable to chronic food shortage, unbalanced nutrition poor quality and high cost of food (Akinyele,2009).Malnutrition and nutrition related diseases continue to be problems of public health importance in Nigeria (Unicef,2014) .Underlying these problems of malnutrition are a number of issues such as poor maternal nutrition, poverty ,inadequate health services and limited access to nutritious foods amongst others. The rural dwellers are mostly affected. UNDP (2005) observed that 75% of Nigeria population live in the rural area, of this number 65% are poor and directly or indirectly linked with agricultural sector.

Assessment of nutrition status of an individual is an important component of the nutritional care of that individual. Nutritional status is the current body status of a person or a population group related to their state of nourishment; which includes their level of consumption and utilization of nutrients. An ideal nutritional status occurs when the supply of nutrients conforms to the nutritional requirements or needs of a person. An individual attains good nutrition status when the food supply is adequate and the individual is able to select, obtain, consume and utilize the foods that will meet his nutrients needs (Davidson, Passmore, Brock and Truwell, 2005).

Nutritional status has powerful factors for the health and wellbeing of any group of persons. It is a major modifiable and powerful element in promoting health, preventing and treating diseases, and improving the quality of life. Nutritional status reflects the level of healthiness of any group of individual (Pinna, 2001). The balance between nutrient intake and the expenditure by an organism determines the rate of growth, reproduction and health maintenance. A healthy diet is a pillar of wellbeing throughout lifespan. It promotes the achievement of pregnancy outcomes, supports normal growth, development and aging; helps to maintain weight, reduces chronic disease risks and promotes overall health and wellbeing.

Consuming a healthy diet which is usually obtained from a wide variety of foods and beverages can be attained with good dietary pattern. When nutrient intakes are inadequate and nutrient reserves are depleted, malnutrition sets in, affecting the health and well-being of a group. Malnutrition is a condition that results from eating a diet in which nutrients are either not enough or are too much that the diet cause health problems (Pinna, 2001). Malnutrition may increase risk of susceptibility to infection and chronic diseases; under-nutrition may lead to increased infection and decreases in physical and mental development while over-nutrition may lead to obesity as well as to metabolic syndrome such as diabetes.

Nutritional status may be determined using direct methods of assessment such as anthropometric, clinical, dietary and biochemical laboratory methods. Anthropometric method is a measurement of body, height and weight, total skin fold thickness and arm circumference while dietary assessment is used to determine the nutrient intake of individuals or population group. These are then compared with recommended standards. Anthropometric measurements are excellent first line of attack in determining nutrition status (Wardlaw, Hampl and Disilvesto, 2007). Dietary assessment is also a good approach to identifying nutrients that are likely to be either under or over consumed by an individual, and used for determining Protein –Energy Malnutrition (PEM) (Wardlaw, Hampl and Disilvesto, 2007).

Farmers also called agriculturists are persons engaged in agriculture, raising living organism for food or raw materials (Dwyer, 2007). They account for the greater part of the population of any developing country such as Nigeria. In Nigeria, farmers may own the farm land or may work as labourer on land owned by others. Traditional methods characterized by bush burning and hand tillage are mostly practiced by the farmers. These result in food shortage. In addition, there could be lack of arable land, adverse weather, low farming skills or lack of modern technology. The farmers may lack resources needed for higher yields found in modern agriculture such as fertilizers, pesticides, irrigation machinery and storage facilities. As a result of wide spread poverty, the rural farmers cannot afford the resources necessary to improve the local yields. In rural Nigeria, where majority of the farmer reside are noted for poor infrastructure and inadequate basic amenities such as water and electricity (NDHS, 2013). These problems notwithstanding, adequate nutrition is necessary for the farmers to be fit, productive and capable of fulfilling their capabilities in life.

The study therefore intends to assess the nutritional status of rural farmers and suggest the implications of the outcomes of their health and well-being. Health and wellbeing are reflections of their ability to eat right, get regular exercise and be at their recommended body weight.

Objective of the study: The main objective of this study was to assess the nutritional status of rural farmers in Imo State of Nigeria. Specifically, the study was designed to:

- Obtain information about the socio-economic characteristics of the farmers.
- Assess the dietary pattern and nutrient intake of the rural farmers.
- Obtain the anthropometric measurements (height, weight, BMI status) of the rural farmers.
- Compare the nutrient intake and anthropometric data of the farmers.

Hypothesis: The hypothesis postulated in the paper stated that;
H_0: There is no significant relationship between Body Mass Index (BMI) and Nutrient intake.
H_1: There is a significant relationship between Body Mass Index (BMI) and the explanatory variable (Nutrient intake).

METHODOLOGY

Study design: This study was a descriptive cross sectional survey involving rural farmers in Imo State, Nigeria.

Study area: This study was conducted in Imo State of Nigeria. Imo State is one of the 36 states in Nigeria and it is within the South-eastern political zone. It consists of three zones namely Okigwe, Orlu and Owerri zones, which are sub-divided into 27 Local Government Areas (LGAs). Owerri is the capital of Imo State. In Nigeria, nearly 75% of country's population live in rural areas where poverty has been on the increase. Of the total rural population, 65% are directly or indirectly linked with agricultural sector (UNDP, 2005). More than 70% of the citizens dwell in the rural communities and are predominantly farmers.

Population of the study: The study population comprised all registered farmers (male and female) in Imo State. The available records at the three Zonal offices of ADP (Agricultural Development Programme) in Owerri, Orlu and Okigwe gave the population of farmers as 6300 (Opara, 2010).

Sampling Procedure: Multi-Stage stratified sampling technique involving four stages was used. The first stage was the stratification of the entire Imo State into three zones, namely Orlu, Owerri and Okigwe zones. Each zone became a stratum.

The second stage was the selection of one Local Government Area (LGA) from each stratum. Since this study is based on rural farmers, all LGAs with cosmopolitan nature were purposively excluded from the Study. Thus Nwangele, Owerri North and Ehime Mbano LGAs were selected for the Study.

In the third stage, six communities were randomly selected from the three selected LGAs. Thus Amaigbo and Abba in Nwangele LGA, Uratta and Egbu in Owerri North LGA and Umuneke and Ibeme in Isiala Mbano LGA were included in the study.

At the fourth stage, 45 farmers were conveniently selected from each of the six selected communities. This gave a total of 270 farmers involved in the study.

Instruments for data collection

i. **Questionnaire: Structured** and pretested questionnaire was administered to elicit information on socio-economic characteristics and dietary pattern of the respondent.

ii. **Weighted food intake:** direct weighing method of food intake: a 3-day direct weighting method was used for food consumption data. Foods consumed by the respondents were weighed using salter scale at meal time. Weighing was done before and after the meals, such that the leftovers in the plates and the actual amount consumed were recorded.

At each visit, respondents were asked what other foods, snacks, drinks and in-between meals they ate since after the last visit. The equivalent portion of the food taken outside homes were then purchased and weighed. The foods were recorded into the respondents' coded form.

The food intakes were converted to nutrient intake using food composition table (Oguntona and Akinyele, 1995). The nutrient values were entered into the computer micro excel sheet. The average energy and nutrients per day were calculated for each respondent.

iii. **Anthropometric measurements**: The height and weight measurements were taken simultaneously using a standiometer and a portable bedroom scale (Harson Emperor's body scale model H:89). The subjects were asked to stand unassisted at the center of the scale and looked straight ahead, relaxed but still wearing minimum clothes and without shoes, feet together, knees straight and heels, buttocks and shoulder blade in contact with the vertical rod. The arms were hanging loosely at the sides in a natural manner. The plastic headpiece was gently lowered to the level of the scalp, crushing the hair and making contact with the top of the head. Measurement of the body weight was recorded to nearest 0.1kg, while the height was to the nearest 0.1cm. Body Mass Index (BMI) was calculated as weight in Kilogram (Kg) divided by height in metre square (m^2).

$$BMI = \frac{Body\ weight\ (kg)}{Height\ (m^2)}$$

BMI cut off values (WHO, 2004) commonly applied for adults are BMI

$$<18.5 = underweight,$$
$$18.5\text{-}24.9 = normal,$$
$$25\text{-}29.9 = overweight$$
$$> 30 = obesity.$$

DATA ANALYSIS
Simple descriptive statistical techniques such as frequency counts, percentages and mean were used to analyze data on socio-economic characteristics, dietary habits, nutrient intake and BMI status of the respondents .The linear regression analysis was done to estimate the relationship between body mass index (dependent variable) and nutrient intake (independent variable). SPSS computer package version 15 was used for the analysis**.**

RESULTS
Table1 showed the socio – economic characteristics of the 270 respondents . Majority (41.9%) were between 41-50 years of age. A total of 73.3% were men while 26.7% were women and 88.9% were married. On educational qualification, 62.2% and 25.2% had non-formal or primary school education. The farmers were mainly into crop farming (49.6%),

22.6% into poultry and 13.0% into ruminant rearing as the main sources of their lively hood. The estimated monthly income of most (40.7%) farmers was between ₦21,000-₦30,000 per month and estimated expenditure on food was assumed between ₦11,000-₦20,000 per month.

Parameters	Freq	%
Age		
25-30	38	14. 0
30-35	41	15.2
36-40	48	17.8
41-45	55	20.4
46-50	58	21.5
51-above	30	11.6
Total	270	100.0
Sex		
Male	198	73.3
Female	72	26.7
Total	270	100
Marital status		
Married	240	88.9
Widow/widower	24	8.9
Separated	6	2.2
Total	270	100.0
Educational qualification		
Non-formal Education	168	62.2
First leaving certificate	68	25.2
SSCE/GCE	32	11.9
NCE/BSC/BED and above	2	0.7
Total	270	100.0
Type of family activity		
Crop farming	134	49.6
Poultry	61	22.6
Vegetables	40	14.6
Small ruminants	35	13.0
Total	270	100.0
Estimated monthly income		
<₦10,000	30	11.1
₦ 10,000 - ₦ 20,000	78	28.9
₦ 21,000- ₦ 30,000	100	40.7
₦ 31,000 – above	22	8.2
Irregular income	30	11.1
Total	270	100.0
Estimated monthly expenditure of food		
<5,000	51	18.9
₦ 5,000- ₦ 10,000	47	17.4
₦ 11,000- ₦ 20, 000	104	38.5
₦ 21,000 and above	68	25.2
Total	270	100.0

Table 1: Socio-Economic Characteristics of the farmers

Table 2 showed the sex specific dietary pattern of the studied rural farmers. Foods consumed by most (46.5%) men and (47.3%) women were mainly carbohydrate foods which were obtained from their farms as indicated by 75.8% men and 69.4% women.

Table2: Dietary Pattern of the Farmers

Dietary Pattern	Male		Female	
	Freq	%	Freq	%
Foods Mostly consumed				
Carbohydrates	92	46.5	34	47.2
Proteins	41	20.7	14	19.5
Fats and Oils	32	16.2	10	13.9
Mineral salts	17	8.6	7	9.7
Vitamins	16	8.0	7	9.7
Total	198	100	72	100
Sources of Food Mostly Consumed				
From farm	150	75.8	50	69.4
Bought from market	38	19.2	12	16.7
Obtained as gift	10	5.0	10	13.9
Total	198	100	72	100
Number of meals consumed daily				
Once	11	5.6	6	8.3
Twice	115	58.1	46	63.9
Thrice	66	33.3	6	22.2
Four times and above	6	3.0	4	5.6
Total	198	100	72	100
Meal usually skipped				
Breakfast	11	5.6	6	8.3
Lunch	115	58.1	46	63.9
Dinner	11	5.6	6	8.3
Snacks	61	30.7	14	19.3
Total	198	100	72	100
Beverages mostly consumed				
Alcoholic beverages	120	60.6	13	18.1
Refreshing beverages	22	11.1	21	29.1
Stimulating beverages	22	11.1	16	22.2
Nourishing beverages	14	7.1	20	27.8
None	20	10.1	2	2.8
Total	198	100	72	100
Snacks consumption pattern				
Consumes snacks for lunch	62	31.3	26	36.0
Consume snacks in-between meal	60	30.3	14	19.5
Does not consume snacks	45	22.7	10	13.9
Consumes snacks for breakfast	11	5.6	13	18.1
Consume snacks for dinner	11	5.6	4	5.6
Consume snacks anytime	9	4.5	5	6.9
Total	198	100	72	100

Protein foods sources were regularly consumed by 20.7% men and 19.5% women. Foods were obtained from farm (74.1% men and 69.4% women). Most (58.1%) men and (63.9%) women indicated consuming meals only twice daily. Lunch meals were mostly skipped by the respondents. A total of 60.6% men were in the habit of consumed alcoholic beverages while 29.1% and 27.8% women consuming refreshing and nourishing beverages respectively.

Snack consumption pattern of 31.3% men was mainly to substitute meal while 30.3% women consumed snacks in-between meals.

Table 3 shows the daily energy and nutrient intake of the farmers.

Table 3: Daily Energy and nutrient intake of farmers compared with mean FAO/WHO (1993) recommendation

Variables	Age (yrs)	FAO/WHO mean recommendation	Farmer's daily intake level	Freq	%
Energy (Kcal)	19-55	2250	2000-2350	95	35.2
			1800-1900	140	51.8
			1600-1700	35	13.0
Protein(gram)	19-55	1.4-2.0	2.9-3.0	105	38.9
			1.7-2.8	116	43.0
			1.0-1.6	49	18.1
Fat (gram)	19-55	30-31	81-100	111	41.1
			61-80	148	54.8
			45-60	11	4.1
Iron (mg)	19-55	20	15-20	8.4	31.1
			10-14	186	68.9
Calcium (mg)	19-55	800	350-500	152	56.3
			250-329	118	43.7
Vit A (mg)	19-55	500	700-800	151	55.9
			500-694	100	37.0
			300-499	19	7.1

The daily caloric and nutrient intake of the farmers as calculated from food composition table Oguntana and Akinyele (1995) and compared with FAO/WHO (1975) recommendation showed that only 35.2% could come near the recommended intake in calorie. Many (18.1%) were poor in protein. Fat intake was far above the recommendation level. Most (68.9%) were poor in iron intake levels. Non met the recommended level of 800g in calcium 7.1% were below recommended level in vitamin A.

Table 4 reveals sex specific nutritional status of the farmers.

Table 4: Sex-specific Nutritional Status of the farmer

BMI cut off	Weight status	Male		Female		Total	
		freq	%	freq	%	Freq	%
<18.5	Underweight	4	2.0	6	8.3	11	4.1
18.5-24.99	Normal	40	20.2	31	43.1	71	26.3
25.0-29.99	Overweight	65	32.8	16	22.2	80	29.6
30.0-34.99	Pre-obesed	57	28.8	13	18.1	70	25.9
>35	Obesed	32	16.2	6	8.3	38	14.1
Total		198	100	72	100	270	100

The nutritional status result (BMI) of the farmers showed that 2.0% men and 8.3% women were underweight, 20.2% men and 43.1% women were normal, 32.8% men and 22.2% women were overweight while 28.5% men and 18.1%women were pre-obesed. A few 16.2% men and 8.3% women were obesed. The overall index showed that some (4.1%) of the farmers were underweight and pre-obesed. This showed that the farmers were in different levels of poor nutritional status.

The linear regression analysis result is shown in Table 5.

Table 5 Result of Linear Regression Analysis

Variables	Coefficient	Standard error	t-ratio	Probability
BMI (constant)	-11.06	4.178	-2.635	0.009
Energy (Kcal)	0.022	0.001	23.944	0.000
Protein (g)	-0.022	0.030	-0.728	0.467
Fats (g)	-0.018	0.018	1.002	0.317
Iron (mg)	0.188	0.101	1.854	0.065
Calcium (mg)	0.000	0.003	-0.145	0.885
Vitamin A (mg)	-0.010	0.005	-2.186	0.030

T=117.2121   f=1.22

The result showed that Energy, Fat and Iron came up with positive signs while Protein, calcium and Vitamin A reported negative signs. This therefore indicated that Energy, Fat and iron have positive relationship with Body Mass Index while Protein, Calcium and Vitamin A showed negative relationship with Body Mass Index (dependent variable) of the rural farmers From the regression result, F. cal=117 while the F-table value is 1.22. Therefore the null hypothesis is rejected while the alternative is accepted. Hence the overall joint test is statistically significant.

DISSCUSSION OF RESULT

Nutritional status assessment of rural farmers is important requirement which enables them to perform physically, maintain wellness and fight diseases. This study evaluated the socio-economic status, dietary assessment, anthropometric parameters in comparing the nutritional

status of the rural farmers in Imo State of Nigeria, which has implication on their health and well-being. The socio-economic data revealed that majority of the farmers had low educational attainment. As much as 62.2% had no form of educational qualification while 25.2% had only primary education. Their low educational level may have contributed to their poor monthly income. Opara (2010) observed that the federal office of statistics stated in1990 that if the literacy rate of men and women in rural Nigeria could improve, there would be enhanced entry into diverse opportunities such as political offices and jobs of higher status which attract diverse payment and improved standard of living.

Majority (40.7%) earned between ₦21, 000- ₦ 30,000 per month and spent about ₦11, 000-₦ 20,000 on food only. These amounts are grossly inadequate to purchase enough food and other family needs. Piana (2001) observed that the consequences of poor income and unavailability to a large extent may affect the consumption pattern of household. Members may consume whatever food that is available without concern about the nutrient content of the food and their well-being. The low income rural farmers may face high level of stress and poor mental health (anxiety and depression) due to financial and emotional pressures of food scarcity, lack of access to health care, inadequate transport, poor housing amongst others. These could put pressure on their health and well-being.

The sex-specific dietary pattern result shows that the farmers had poor food consumption pattern. Food mostly consumed by the farmers showed 45.5% men and 47.2% women, 20.2% men and 19.5% women for protein. Food sources were mostly from farm (75.8% men; 69.4% women). Most (58.1% men; 63.9% women) consumed meals twice daily and lunch meal was mostly skipped. Alcoholic beverages were mostly consumed by 60.6% men while most (29.1%) women consumed refreshing beverages. Inadequate consumption of carbohydrate and protein food by farmers who utilize a lot of energy could lead to adverse health consequences. In addition to poor food intake majority skipped meals and consumed alcoholic drinks. Some consequences of meal skipping for whatever reason can promote the development of diabetes; inadequate nutrition and drastically altering the way the body digest food (Wardlaw et al, 2007). Those who are eating less or skipping meals to stretch food budget may over eat when food those become available resulting in chronic ups and downs in food intake that can contribute to weight gain (Bruening et al., 2012, Dammann and Smith 2009 , Olison et al 2007).

The nutrient intake of farmers in this study were found below the FAO/WHO (1993) recommendations in Energy, Protein, Fat , Iron, calcium ,and Vitamin A. Naturally one would expect rural farmers to eat more in view of the demand in their job. The low nutrient intake may be due to poverty. For instance in Table 1 above the estimated income of some farmers was below ₦20.000 per month, which may be from sell of produce from their subsistent farming. These low intakes could have detrimental effects on their health and well-being. Minerals and vitamins are important for immune functions, prevention of anemia and reproductive functions, maintenance of bone tissues which are vital to the farmers.

Body Mass Index result of the farmers revealed that majority were in different levels poor nutritional status. Olayiwola (2007) in a similar study in Ogun State of Nigeria observed that Body Mass Index of the rural farmers showed a high level of undernutrition amongst the respondent. BMI is a simple and objective anthropometric indicator of nutritional status of adult population and it is closely related to food consumption and the prevalence of inadequate food and food consumption in a community (FAO, 1994).

The explanatory variable; Energy, Protein; Fat; Iron; Calcium and Vitamin A were adequate in explaining the changes in BMI of the rural farmers surveyed. Hence, there was a positive relationship between the explanatory variables and the dependent variable. In other words, the low intake in calorie and most of the studied nutrients were found to relate to the different levels of nutritional status.

Food energy is derived from carbohydrate, fats and oils and protein, each contributing respectively 4 kcal, 9 kcal and 4 kcal per gram. Despite these varied sources of energy, many of the respondents could not meet the recommended intake levels. Secondly, carbohydrate food sources such as yam, cassava, rice, maize among others are staple foods commonly produced and consumed by the farmers, who were unable to meet up their energy requirements. There is the need for farmers to have adequate store to allow maintenance for energy balance and healthy state as well as meet energy demands that arise from agricultural activities (WHO, 2000). Researchers conducting studies in different parts of Africa have agreed that high levels of productivity among farmers who labour to produce and harvest crops and are also involved in many other labour intensive work-related activities demands adequate energy intake and responsible health (Ferro-Luzzi, 2001). Therefore, if rural farmers in this study are to meet productivity demands especially during the farming season, improvement of energy intake, maintenance of energy balance and good nutritional status remain essential.

Low iron status of the study subjects may have caused iron-deficiency anemia. This is characterized by weakness, tiredness, apathy increased sensitivity to cold and paleness that reflects the reduction in the number and size of the red blood cells (Boyle and Long, 2007). Anaemia could worsen a person's inability to carry out muscular work during the insecure food situation of the community whose major sources of food and income are through farming (IFPRI, 2009).

CONCLUSION

The rural farmers in this study lacked adequate dietary pattern, their nutrient intakes in energy, protein, fat, iron, calcium and vitamin A were below the recommended standards. Consequent upon these, most of the farmers had poor nutritional statues. The nutritional status of the farmers could pre-dispose them to non-communicable diseases. Rural farmers suffering from NCDs have intensive and often health care needs. Eating healthy, adequate diet which improves the health and well-being of rural farmers must be encouraged.

RECOMMENDATION

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

1. The nutrition level of the farmers should be improved. The various government administrators should mobilize nutritionists, agricultural extension officers to educate the farmers on the need to eat adequate meals.

2. Elimination of extreme poverty through enhancing agricultural; productivity. The various governments should encourage the rural farmers by providing subsidy adequate fertilizers and agricultural inputs to real farmers and on time too.

3. Good roads, health care and infrastructural facilities should be made available to the rural farmers to improve their living standards

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