

Vitamin A Food Sources and its Consumption Pattern in a Rural Community in South-Eastern Nigeria.

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Abstract-- Objective: This study was undertaken to identify the dietary sources of vitamin A and also to determine the consumption pattern of vitamin A in Aba South L.G.A.

Methodology: A total number of one hundred and sixty-three households were selected. A random sampling technique was adopted. Questionnaire was designed to provide information on the socio-economic, food habits and food consumption pattern of vitamin A rich food sources in the households. Information was collected on diet history (24-hour diet recall) by interview. Data obtained from the questionnaires were analyzed using frequencies and percentage.

Results: The results showed that 65% of the respondents purchased palm oil while 35% processed palm oil by themselves. More than half (51.6%) of the respondents consumed palm oil 4 to 5 times weekly and 37.4% consumed palm oil 2-3 times weekly. However, 11% consumed palm oil daily. About 6% produced carrots with {90-3600 Retinol Equivalent (RE)} while 87.1% purchased it, pumpkin leaf with (300RE) were purchased by 22.7% and 65.6% produced same. Less than a quarter (19.3%) of the respondents consumed fruits and vegetables daily and only 0.2% spent above N2,000 on fruits and vegetables weekly. Twenty four hour dietary recalls revealed that 23.9% consumed pumpkin leaf, 16.0% consumed pawpaw while 14.1% consumed mango.

Conclusion: It was noted that most of the vitamin A rich food sources were not grown but purchased in the area. This might have predisposed the respondents into low consumption of these foods because of poor purchasing power. Home gardening in the area should be encouraged.

Index Term-- Vitamin A foods, Consumption pattern, Aba South, Abia State Background of study.

I. INTRODUCTION

Vitamin A deficiency is a major public health problem in less-developed and developing countries. It has a high impact on morbidity and mortality in chronically undernourished and undeserved population [1]. Vitamin A deficiency affects an estimated 125-130 millions preschool-aged children and 7 million pregnant women in low-income countries [2]. While there has been substantial progress towards its global control into the new millennium [3], vitamin A deficiency remains an underlying cause of at least 650,000 early childhood deaths due to diarrhea, measles, malaria and other infections each year [4]. It is recognized as a critical factor in child health and survival. Vitamin A deficiency leads to lower immunity and increases rate of illness and death. It is one of the most serious childhood nutritional diseases often associated with protein-energy malnutrition (PEM).

Vitamin A is used generically for all β -ionone derivatives (other than carotenoids) that have the biological activity of all-trans retinol [5]. Preformed vitamin A is found almost exclusively in animal products, such as human milk, glandular meats, liver and fish liver oil, especially egg yolk, whole milk and other dairy products. Preformed vitamin A is used to fortify processed foods such as sugar, cereals, condiments, fats and oil [6]. Provitamin A carotenoids are found in green leafy vegetables (e.g. spinach, amaranthus, and young leaves from various sources), yellow vegetables (e.g. pumpkins, squash and carrots), and yellow and orange non-citrus fruits (e.g. mangoes, apricots and pawpaw). Red palm oil produced in several countries worldwide is, especially rich in provitamin A. An example is the fruit known as gac in Vietnam, which is used to colour rice, particularly on ceremonial occasions [7]. Vitamin A plays important roles in the well being of an individual. The roles of vitamin A include maintaining epithelial barrier function and regulating cellular and antibody-mediated immunity [8], improves colour vision and vision in bright illumination [9]. Retinoids control the expression of enzymes involved in the synthesis of some of these compounds [10]. FAO food disappearance data reported that the supply of food vitamin A is generally high in industrialized countries, with most derived from the highly available retinyl esters. Conversely, for most of the developing countries such as Nigeria, the total supplies are appreciably lower. The major source is carotenoids, the utilization of which may be affected by dietary and other factors. Household level data mask problems of intra-household distribution. This study therefore was undertaken to identify the dietary sources of vitamin A and also to determine the consumption pattern of Vitamin A in the study area.

II. MATERIALS AND METHODS

Survey Area

The survey was carried out in households in Aba South L.G.A of Abia State, Nigeria. Aba South L.G.A is located about 64Km from Umuahia the State capital and the commercial nerve centre of the Southeastern States of Nigeria. Most of the populace were civil servants and traders while few of them were subsistence farmers.

Study Design

The study was a cross sectional survey study.

Sample selection

A total number of one hundred and sixty-three households were selected. A random sampling technique was adopted. The sample size was obtained using the following:

$$n = p \times (1 - p) \times \left(\frac{Z\alpha}{d}\right)^2 \text{ according to (11)}$$

Where p = Proportion or a best guess about the value of the proportion of interest. If we have no information about p , the $p = 0.5$ is a conservative estimate.

d = the distance (or tolerance level) – how close to the proportion of interest the estimate is desired to be. For this work, it is within 0.05.

$Z\alpha$ = the probability of making an error under the one-sided comparison table.

n = the sample size.

$$\begin{aligned} n &= 0.5 \times (1 - 0.5) \times \left(\frac{1.28}{0.05}\right)^2 \\ &= 0.5 \times 0.5 \times \left(\frac{1.28}{0.05}\right)^2 \\ &= 162.8 \cong 163 \end{aligned}$$

One hundred and seventy-five questionnaires were distributed. This excess 12 was intended to substitute the subjects that might drop out or withdraw.

Data collection

Questionnaire was designed to collect information on the socio-economic, food habits and food consumption pattern of vitamin A rich food sources in the households. Information was collected on diet history (24-hour diet recall) by interview from the subjects (mothers and adolescent girls) who prepare the family meals. The structured questionnaire was validated by academic staff of Department of Home Science, Nutrition and Dietetics for data collection. The selected questionnaire items were pre-tested on thirty women in Aba North L.G.A. who were not involved in the main study. After the pre-test, the questionnaires were modified and used for the main study. The questionnaires were distributed to the respondents by the researcher and a trained assistant in their homes and working places.

Data Analysis

The data collected were subjected to various analyses. The data were analyzed with SPSS (Statistical Package for Social science) Version 14 using frequency and percentages.

III. RESULTS

TABLE I
THE SOCIO-ECONOMIC STATUS OF THE SUBJECTS

	Frequency	Percentage
Education		
No education	5	3.1
Primary School completed	8	4.9
Secondary School Completed	30	18.4
OND/NCE	107	65.6
HND/B. Sc	13	8.0
Total	163	100.0
Occupation (Breadwinner's employment)		
Skilled job	21	12.9
Unskilled job	8	4.9
Unemployed	8	4.9
Civil servant	104	63.8
Trader	18	11.0
Farmer	2	1.2
Pensioner	2	1.2
Total	163	100.0
Household size		
1-3	45	27.6
4-6	81	49.7
7-9	22	13.5
10-above	15	9.2
Total	163	100.0
Income range (breadwinner) ₦		
Less than 10,000	22	13.5
10,000-30,000	85	52.2
31,000-69,000	32	19.6
70,000 and above	24	14.7
Total	163	100.0

From Table I, 3.1% of the respondents had no education, 4.9% attended primary school, 18.4% completed their secondary school, and 65.6% had OND/NCE, while 8.0% had HND/B.Sc. Some 63.8% of the respondents were civil servants, 12.9% had skilled jobs, 4.9% had unskilled jobs and 4.9% were unemployed, 11% were traders and 1.2% was farmers and pensioners.

Less than half (49.7%) of the respondent's household size was 4-6 members, 27.6% had 1-3 members, 13.5% had 7-9 members and 9.2% had 10 and above household members.

Slightly more than half (52.2%) of the breadwinners earned between ₦10, 000 and ₦30, 000 per month, 19.6% earned between ₦31, 000 and ₦69, 000. Another 14.7% earned between ₦70, 000 and above and 13.5% earned less than ₦10, 000.

TABLE II
WAYS OF OBTAINING PALM OIL AND FREQUENCY OF PALM OIL
CONSUMPTION IN ABA SOUTH L.G.A

	Frequency	Percentage
Ways palm oil is obtained		
Purchased already processed oil	106	65.0
Processed oil by self	57	35.0
Total	163	100.0
Frequency of palm oil consumption		
2-3 times a week	70	37.4
4-5 times a week	84	51.6
Everyday	9	11.0
Total	163	100.0
Forms consumed		
Fresh palm oil	111	68.1
Bleached palm fruit	9	5.5
Boiled palm fruit	26	16.0
Combination of either fresh or bleached or boiled palm fruit	17	9.2
Total	163	100.0

Table II shows that 65% of the respondents purchased palm oil and 35% processed palm oil by themselves. More than half (51.6%) of the respondents consumed palm oil 4 to 5 times weekly and 37.4% consumed palm oil 2-3 times weekly. However, 11% consumed palm oil daily. A large (68.1%) segment of the subjects consumed palm oil fresh, 5.5% consumed it bleached, 16% consumed it as boiled palm fruit and 9.2% consumed it in combination of either fresh or bleached or boiled palm fruit.

TABLE III
PRODUCTION/PURCHASE OF FOOD ITEMS AND THEIR VITAMIN A (RETINOL EQUIVALENT)

Food items	*Vitamin A (RE) Produced µg	Produced		Purchased	
		No	%	No	%
Potato	33	7	4.3	124	76.1
Cowpea	6	1	0.6	136	83.4
Pigeon pea	Ø-42	1	0.6	42	25.8
Carrot	90-3600	10	6.1	142	87.1
Pumpkin leaf	300	37	22.7	107	65.6
Spinach	300	29	17.8	88	54.0
Bitter leaf	300	57	35.0	81	50.0
Garden egg leaf	300	36	22.1	98	60.1
Water leaf	300	42	25.8	95	58.3
Tomatoes	45-130	9	5.5	146	89.9
Red pepper	30-40	7	4.3	139	85.3
Green pepper	30-40	10	6.1	131	80.4
Mango	180	21	12.9	113	69.3
Orange	21	35	21.5	111	68.1
Pawpaw	300	35	21.5	105	64.4
Guava	66	26	16.0	108	66.3
Banana	50	21	12.9	115	70.6
Avocado pear	60	27	16.6	99	60.7
Cashew	45	20	12.3	116	71.2
Water melon	0-30	19	11.7	122	74.9
Pineapple	30	20	12.3	122	74.9
Fish	05	-	-	161	98.9
Condensed skimmed milk	100	-	-	89	54.6
Whole egg	300	4	2.5	136	83.4
Liver	0-6000	2	1.2	138	84.7

*RE= retinol equivalent, - Not available, 0 Contains none, Ø Contains too small a quantity to be significant in dietary evaluation

*Source: Platt (12)

Table 3 shows some commonly produced/purchased food items by households and their vitamin A retinol equivalent

(RE). Production/ purchasing percentages of respondents for the following food items were: Carrot (90-3600µg(RE) (6.1/87.1)%, Pumpkin leaf (300µg(RE) (22.7/65.6)%, Tomatoes(45-130µg(RE) (5.5/89.9)%, Mango (180µg(RE) (12.9/69.3)%, Whole egg (300µg(RE) (2.5/83.4)% and Liver (0-6000µg(RE)(1.2/84.7)%.

TABLE IV
THE CONSUMPTION PROFILE AND AMOUNT SPENT ON THE FOOD CATEGORIES

Categories of foods	Consumption profile		Amount spent on them weekly		
	Frequency (%)		Frequency (%)		
	Daily	Weekly	<N500	N510-N2000	>N2000
a. Starchy roots and tubers	35(21.2)	34(21.0)	89(54.4)	34(21.0)	4(2.6)
b. Cereals	17(10.6)	26(15.8)	52(32.2)	22(13.5)	5(2.9)
c. Legumes	19(11.4)	103(63.3)	56(34.2)	9(5.8)	-(-)
d. Fruits and vegetables	32(19.3)	44(27.0)	129(78.9)	10(6.4)	1(0.2)
e. Animal products	53(32.5)	33(20.4)	77(47.5)	36(21.8)	9(5.7)

Food Consumption profile

Less than a quarter (21.2%) of the subjects consumed starchy roots and tubers daily and 21.0% consumed them weekly. A few (10.6%) of the subjects consumed cereals daily and 15.8% consumed cereals weekly. Another group (11.4%) consumed legumes daily and 63.3% consumed legumes weekly. Some groups (19.3%) consumed fruits and vegetable daily and 27% consumed them weekly. A group (32.5%) consumed animal products daily and 20.4% consumed them weekly.

Amount spent weekly on foods

Slightly more than half (54.4%) of the respondents spent less than N500 on starchy roots and tubers, 21% spent between N500 and N2000 and 2.6% spent above N2000 on these foods. However 32.2% spent less than N500 cereals, 13.5% spent between N500 and N2000 and 2.9% spent above N2000. The subjects (34.2%) spent less than N500 on legumes, 5.8% spent between N500 and N2000. Surprisingly none of the respondents spent above N2000 on foods.

A higher percentage (78.9%) spent less than N500 on fruits and vegetables. A few (6.4%) spent between N500 and N2000 and a fewer (0.2%) spent above N2000 on fruits and vegetables. Less than a half (47.5%) of the subjects spent less than N500 on animal products, 21.8% spent between N500 and N2000 and some (5.7%) spent above N2000 on this food group.

TABLE V
24-HOUR DIETARY RECALL

List of foods	*Retinol Equivalent(RE)µg	No. of subjects	Percentage
Starchy roots and tubers			
Yam and its products	6-25	105	64.4
Cassava & its products	Ø-30	135	82.2
Sweet potatoes	33	34	20.9
Plantain	Ø-330	54	33.1
Cereals			
Maize	30-180	38	23.3
Legumes			
Cowpea	6	51	31.3
Soyabean	Ø-60	40	24.5
Pigeon pea	Ø-42	17	10.4
Fruits and Vegetables			
Dark green vegetables	300	78	47.8
Pumpkin leaf	300	39	23.9
Orange	21	62	38.0
Mango	180	23	14.1
Banana	50	50	30.7
Pawpaw	300	26	16.0
Carrot	90-3600	56	34.4
Tomatoes	45-130	72	44.2
Animal products			
Egg	300	48	29.5
Milk	100	59	26.2
Fish	05	88	54.0
Fats and oil			
Palm oil	300-30,000	122	74.9
Butter	600-1350	8	4.9
Beverages			
Bournvita***	1,500	29	17.8
Milo***	1,560	53	32.5
Ovaltine***	1,300	33	20.3

*** Values as indicated by Manufacturer

*Source= Platt^[12]

The 24-hour dietary recall of foods consumed and their vitamin A retinol equivalent in Table V shows that for starchy roots and tubers, 64.4% consumed yam and yam products with {6-25 μ g(RE)}, 82.2% consumed cassava and its products with {0-30 μ g(RE)}, 20.9% consumed sweet potatoes with {33 μ g(RE)} and 33.1% consumed plantain with {0-330 μ g(RE)}. The consumption of maize with {30-180 μ g(RE)} was 23.3% of the respondents. Under legumes, 31.3% consumed cowpea with {6 μ g(RE)}, 24.5% consumed soya bean with {0-60 μ g(RE)} and 10.4% consumed pigeon pea with {0-42 μ g(RE)}. For fruits and vegetables, 47.8% of the respondents consumed dark green vegetables with {300 μ g(RE)}, 44.2% consumed tomatoes with {45-130 μ g(RE)} while 38.0% consumed oranges with {21 μ g(RE)} under animal products whereas 74.9% consumed palm oil with {300-30000 μ g(RE)} under fats and oil. Under beverages, 32.5% of the respondents consumed milo with {1,560 μ g(RE)}

IV. DISCUSSION

Aba is a business town in Abia State as such it is imperative that the subjects that live in Aba will include both skilled and unskilled labour according to their qualification. Hence, it was not a surprise to observe that the subjects were unskilled to skilled from all walks of life.

The result of this study revealed that majority (65.0%) of the respondents purchased red palm oil while 35.0% processed the palm oil by themselves. Red palm oil is traditional oil used for more than 5000 years in African countries, when small-scale family farms flourish^[13]. It is recorded that the refined red palm oil contains 5,000 μ g (RE)^[13]. It is also revealed from the study that only 11.0% of the respondents consumed palm oil daily. This is lower when compared to a similar study done in Orba community in Enugu state where it was found that 41.0% of the respondents consume it daily^[14]. OTAL^[15] reported that in West Africa, palm oil is often consumed in crude state, as a component of traditional foods, where it contributes to its characteristics colour and flavor to the dishes.

Most of the food items produced and purchased for consumption by the respondents had good amounts of vitamin A retinol equivalents as seen in table III. Hence it agreed with the Coconut Research Centre that carotenes in fruits and vegetables can supply the needed vitamin A if an adequate amount of fat is also consumed^[16]. Fruits like mangoes with 180 μ g RE and pawpaw with 300 μ g RE as well as red palm oil were purchased, grown and consumed by the respondents. This agreed with the report by^[17] where 33.0% vitamin A (including carotenes) observed in the diets of women came from fruits and vegetables. Citrus oranges and non-citrus e.g mangoes and pawpaw are good sources of pro-vitamin A. Desai^[18] had a view that among fruits and vegetables, mangoes are the most important source of vitamin A and that fresh ripe mango pulp contains 477 μ g RE/100g. He further said pawpaw contains 164 μ g RE/100g of dried weights to 174 μ g RE/100g fresh weights. Papayas offer not only the luscious taste and sunlight colour of the tropics, but are also

rich sources of antioxidant nutrients and flavonoids^[18]. Together, these nutrients promote the health of the cardiovascular system and also provide protection against colon cancer. In addition, papaya contains the digestive enzyme, papain, which is used like bromelain, a similar enzyme, to reduce trauma and allergies^[19].

The low (19.3%, 31.5% and 11.4%) consumption of fruits and vegetables, animal and animal products and legumes daily, respectively as observed in this study are major culprit for levels of vitamin A among the subjects. The low expenditure (less than N500) on fruits and vegetables, legumes and animal products need nutrition education, social marketing and other measures to improve the availability of these foods to these households^[20]. The poor purchasing power of the Aba community precipitated the low consumption of vitamin A rich foods which may lead to low serum levels. Richard and Semba^[1] reported that differentials in income levels were not reliable for prediction of risk of vitamin A deficiency, however, it provides the basis in which vitamin A deficiency clusters within households and communities. The low intake of vitamin A rich foods as shown in the 24hr recall reaffirmed the low intake observed among the households in the community.

The result also showed that majority of the respondents purchased most foods in their area especially animals and animal products, fruits and vegetables probably because most of them were civil servants and also may not have enough lands or time for cultivation of these crops. These may contribute to their low consumption of vitamin A rich foods, especially, those from beta-carotene.

V. LIMITATIONS OF THE STUDY

Subjects for the study were chosen from a single locality and thus may not be representative of affluent subjects throughout Nigeria. However, we carefully chose a colony which had a representative mix of subjects with all different professions, age groups and religions. The work was not carried out both in the dry and wet seasons so that one could compare their consumption pattern in these seasons.

VI. SUMMARY

This study showed that most of the vitamin A rich foods were not grown or produced by the respondents but were purchased, this might have predisposed them into low consumption of these foods. This was further confirmed by the 24-hour dietary recall. Vitamin A rich foodstuffs and their dietary sources showed that fruits, yellow and green leafy vegetables were not continually part of their meals.

VII. RECOMMENDATION

- VIII. Acceptance, compliance and behavior change in families must prevail among targeted beneficiaries for prevention programmes to be successful e.g. home gardening.
- IX. Planning, organization, logistics and political will are imperative to launch and sustain programmes at community level.

- X. Effective policy, funding and legislation are mandatory to enact national programmes on vitamin A deficiency.

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