Fruit Consumption among Staff of Agricultural Based Institutions

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Abstract
Fruits play a significant role in human nutrition, especially as sources of vitamins, minerals, and dietary fiber. The human diet will be considered imbalanced without the presence of the recommended quantities of vitamins and minerals. Micronutrients necessary for proper development of humans are found only in fruits. This study investigated fruits consumption among staff of agricultural-based institutions in Ibadan, Nigeria. Primary data were collected using stratified random sampling technique considering the three strata of trade unions existing in the Institute. Data collected from 311 members of staff were analyzed using descriptive statistics and linear regression model. The most preferred fruits are plantain (91.3%), banana (89.7%), sweet orange (87.5%) and apple (86.2%). On the other hand, the least preferred fruits are lemon (40.5%) and lime (46.9%). On daily basis, only 21.5% of the respondents consumed sweet orange. The result further showed that 47.9% consumed plantain, sweet orange (38.9%), banana (38.6%) and only 4.8% consumed grape fruit, lemon (5.1%) and lime (5.5%); 2-3 times per week. Moreover, 67.2% of the respondents purchase their fruits from neighborhood market while only 2.6% patronize grocery stores. The regression result revealed that educational status of the respondents as well as their monthly income significantly (p<0.05) increases fruit consumption. The most limiting constraint to fruit and vegetable consumption was inadequate storage facilities (27.4%). In essence, staff of agricultural based institutions should be sensitized on increasing their fruits consumption. Also, they should be enlightened on appropriate short term storage methods to improve the shelf-life of fruits they purchase for consumption.
Keywords: Fruits, consumption pattern, fruit preference, mode of consumption, constraints.

1. Introduction

Fruit is defined as the ripened ovary of a flower together with any accessory parts associated with it (Lewis, 2002). Culinary speaking, the term fruit generally refers to plants that are sweet and fleshy, such as, apples, oranges, banana/plantain, water melon and cucumber (Landais, 2012). Nigeria is known and credited with production of large quantity of fruits such as mangoes, watermelon, guava, pineapples, pawpaw, oranges, tomatoes, tangerines, and many other indigenous fruits. More than 50% are lost due to perishable nature of fruits occasioned by high moisture content, poor post harvest handling and marketing strategies. Fruit juice is the next best thing to fresh fruit, and can be packaged in aseptic, easily transportable containers that are less susceptible to damage and have a relatively long storage life (Olukunle *et al*, 2007).From a public health point of view, a high consumption of fruits reduces the risk of heart disease and some forms of tumor. Eating enough and sufficient fruits daily could help prevent major diseases, such as cardiovascular diseases and certain cancers (WHO/FAO, 2003). Increase in the consumption of fruits and vegetables are being promoted because of the health benefits of micro nutrients and phytochemicals associated with health maintenance and prevention of chronic diseases (Olufolaji, 2014). Based on evidence of the role of fruit in the prevention of many health problems, such as diet‑related diseases, the World Health Organization (WHO) has recommended consumption of at least 400g of fruit and vegetables per day (excluding potatoes and other starchy tubers) which corresponds to five servings of 80g for each portion (WHO, 1990). Studies carried out to investigate whether people meet the WHO daily fruit and vegetables recommendations reported that most people do not (Landais, 2012) and over 2 billion people worldwide are undernourished in sub-saharan Africa (FAO, 2008).

 Despite the relevance of fruits in the diet, per capita consumption of vegetables and fruits in the developing world is only 100g compared with 220g in the more advanced countries (Messiaen, 1992). Developing countries account for about 98 percent of total fruit production, while the developed countries account for 80 percent of world import trade (FAO, 2004). The World Health Organization (WHO) ranked low intake of fruits as the 6th among its 20 risk factors for global human mortality, just behind other killer indicators such as tobacco use and high cholesterol diets (FAO, 2006). Dietary guidelines throughout the world are increasing the emphasis on consuming more fruits. To help reduce chronic diseases, the World Health Organization (WHO) and Food and Agricultural Organization (FAO) calls for nations to increase consumption of fruit through targeted campaigns (World Health Organization, 2003a) asserting that effective health communication has the capacity to create awareness, improve knowledge and induce long-term changes in individual and social behaviours (World Health Organization 2003b). Studies on fruit and vegetable consumption in Nigeria include those of Adenegan and Adeoye, (2011), Ibrahim, (2011), Banwat *et al* (2012), Ilesanmi *et al*, (2014). None of the studies have

investigated fruit consumption among agricultural based research institute in Nigeria.   Developing interventions requires an understanding of the factors determining fruit consumption, place of purchase, frequency of consumption, constraints to fruits consumption and fruits preference by the target population. All these are what this study aims to investigate.

2.0   Area of study

The area of study was Ibadan (7°23′47″N 3°55′0″E7.39639°N 3.91667°E) which is located in Oyo State. It is the third largest metropolitan area by population in Nigeria after Lagos and Kano with a population of 1,338,659 according to the 2006 census. Ibadan is located in south western Nigeria, and the principal inhabitants of the city are the Yorubas. Ibadan has a tropical wet and dry climate with a lengthy wet season and relatively constant temperatures throughout the course of the year. The mean total rainfall for Ibadan is 1420.06 mm with mean maximum temperature of 26.46^0C, minimum 21.42^0 C while the relative humidity is 74.55% (Wikipedia, 2014). There are eleven local governments in Ibadan metropolitan consisting of five urban local governments in the city and six semi urban local governments in the less city. There are numerous public and private institutions in the city. The city is a major centre for trade in cassava, cocoa, cotton, timber, rubber and palm oil. The main industries in the area include the processing of agricultural products, flour milling, leather working and furniture making. There are a number of agricultural based research institutions in the city such as the National Horticultural Research Institute (NIHORT), Cocoa Research Institute of Nigeria (CRIN), Forestry Research Institute of Nigeria (FRIN), Institute of Agricultural Research and Training (IAR&T) amongst others.

2.1   Sampling procedure

In the area of study, there are eight Research institutions and three Federal Colleges of Agriculture. All the research institutions were purposively sampled except one that had industrial crisis during the sampling period and another one that had been used for a similar study. In each institution, three categories of trade unions exist namely: Academic Staff Union, Senior Staff Association and Non- Academic Staff Union. The three trade unions were purposively sampled to ensure all categories of staff were representatively sampled. Pretested and validated questionnaires were administered to 60 respondents randomly sampled from the three unions in institutions totaling 480 questionnaires. The breakdown of sampled institutions and questionnaires retrieved is shown on Table 1. Of the 480 questionnaires distributed, only 311 respondents gave the information used in the study.

Table 1: Breakdown of questionnaires retrieved from sampled institutions

Institutions	Number of Respondents
Institute of Agricultural Research and Training	60
National Cereals Research Institute (sub-station)	21
National Agricultural Quarantine Services	18
National Centre for Genetic Resources and Biotechnology	45
National Agricultural Extension Research Liaison Services	16
Federal College of Animal Health and Production Technology	53
Federal College of Agriculture	47
Forestry Research Institute of Nigeria	51
Total	**311**

2.2   Data analysis

Descriptive statistics such as frequencies and percentages were used to describe the socio-economic characteristics of respondents, their consumption level and pattern for fruit and vegetable, sources of purchase as well as constraints to fruit and vegetable consumption. In addition, factors that influence the consumption of fruits and vegetables were analyzed using the linear regression model.

3.0   Results and Discussion

3.1   Socio-economic characteristics of sampled staff members of agricultural-based research institutions

The profile of the socio-economic characteristics of sampled staff members of agricultural-based research institutions in Ibadan, Nigeria are presented in Table 2. Most of them are female (54.0%),majority belong to 21-

50 years age group (92.7%), are married (73.0%), possess tertiary education (79.8%), are Christians (84.0%) and earn a monthly income of more than ₦71,000 (58.6%). The finding of the study on marital status of the respondents is similar to that obtained by Ibrahim (2011) on fruit response efficacy and fruit consumption among civil servants of Oyo state, Nigeria.

Table 2: Socio-economic characteristics

Characteristics	Percentage
Sex	
Male	46.0
Female	54.0
Age group (in years)	
<=20	2.9
21-30	19.6
31-40	31.8
41-50	19.9
51-60	5.1
>60	0.3
Marital status	
Single	27.0
Married	73.0
Religion	
Christianity	84.0
Islam	16.0
Educational status	
Primary education	6.0
Secondary education	6.8
Tertiary education	79.8
Income (in Naira)	
<10,000	2.3
10,000-40,000	21.2
41,000-70,000	12.9
71,000-100,000	32.2
101,000-130,000	19.3
131,000-190,000	2.9
>190,000	4.2

Source: Field survey, 2013

3.2   Consumption of fruits and the frequency of consumption

The result shows that plantain (91.3%), banana (89.7%), sweet orange (87.5%) and apple (86.2%) are the four most consumed fruits among staff of agricultural based research institutions in Ibadan, Nigeria (Table 3). These fruits are mostly consumed 2-3 times per week (47.9%, 38.6%, 38.9% and 32.5% respectively). In addition, 21.5% of the respondents consume sweet orange once a day while 25.4%, 20.6% and 19.9% of the respondents consume banana, plantain and apple 3-4 times per month. According to Marijuana Seeds and Drug Test Information (MSDTI), 2005, sweet orange has become most popular both in Nigeria and the world generally. Its popularity may be due to pleasing flavor as a result of satisfactory balance of sugar and acids, suitability of fresh fruits and for processing. In Nigeria, plantain and banana has been described as an important staple crop and about 70 million people depend on plantain and banana for a large proportion of their daily carbohydrate needs in West and Central Africa (Bifarin *et al*, 2010; IITA, 2007; Rowe, 1998). Banana contains high potassium and particularly low sodium content; this characteristic feature makes banana come in very handy as an excellent add-on to the menu for low salt intake prescribed to people with hypertension and cardiovascular diseases (Bolajoko, 2012). Akinyemi *et al*, (2010) further opined that a tremendous rise in consumption of plantain in recent years in Nigeria has been linked to rapidly increasing urbanization and the great demand for easy and convenient foods by the non-farming urban populations, because all stages of the fruit from immature to overripe are used as a source of food in one form or the other.

On the other hand, the four least consumed fruits are lemon (40.5%), lime (46.9%), grape (53.4%) and guava (54.0%). These fruits are mostly consumed once a month by 22.5%, 20.9%, 27.0% and 29.9% of the respondents respectively. The relatively low consumption of these fruits may be adduced to the taste and composition of this category of fruits.

Table 3: Consumption of fruits and the frequency of consumption

Fruit	Consumption	Frequency of consumption				
	Percentage	Once per day	2-3 times per week	3-4 times per month	Once in a month	I don't eat
Sweet orange	87.5	21.5	38.9	19.0	8.0	4.2
Grape	53.4	2.9	4.8	10.0	27.0	40.5
Tangerine	78.5	8.7	23.8	20.3	24.1	10.9
Lemon	40.5	3.2	5.1	6.4	22.5	47.9
Lime	46.9	1.9	5.5	9.0	20.9	46.6
Banana	89.7	13.2	38.6	25.4	7.7	4.2
Plantain	91.3	12.5	47.9	20.6	6.4	3.5
Apple	86.2	10.9	32.5	19.9	19.0	6.8
Pineapple	80.7	7.7	19.3	22.8	26.4	11.6
Mango	74.3	7.7	13.5	17.0	27.0	20.3
Pawpaw	84.6	9.3	24.8	22.2	22.2	8.7
Guava	54.0	3.2	7.4	8.7	29.9	35.4
Watermelon	84.2	12.2	29.6	18.3	17.0	9.6

Source: Field survey, 2013

3.4 Reasons for consuming fruits

The result on figure 1 shows that more than half (55.4%) of the respondents consume fruits because of their health benefits. Only 2.5% of the respondents opined that religion influences their consumption of fruits. The health reason adduced by the respondents for consuming fruits can be as a result of the fact that fruits and vegetables are a major source of phytochemicals, fiber, proteins and vitamin C. Moreover, it has been reported that increase in the consumption of fruits and vegetables is being promoted because of the health benefits of micro-nutrients and phytochemicals associated with health maintenance and prevention of chronic diseases (Olufolaji, 2014). Spore (2011) reported that close to a billion people suffer from hunger while another billion lack important micronutrients such as vitamin A, zinc and iron in their diets which affects their health and productivity. According to WHO (2014), fruits and vegetables as part of daily diet could help prevent major non-communicable diseases. Consumption of a variety of fruit and vegetable clearly ensures an adequate intake of most micro nutrient, dietary fiber and a host of essential non nutrient substances. Adequate consumption of fruits and vegetables reduces the risk for cardiovascular diseases, stomach cancer and colorectal cancer. Approximately 1.7 million (2.8%) of deaths worldwide are attributable to low fruit and vegetable consumption (WHO, 2014).
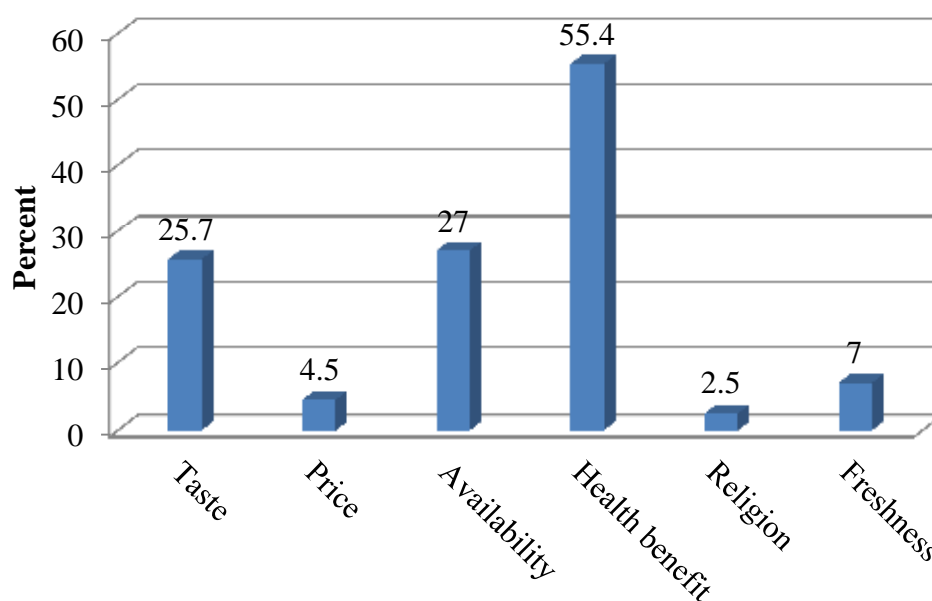

Figure 1: Reasons for consuming fruits

3.5 Purchase of fruits

The result on table 4 shows that most respondents (67.2%) purchase fruits from their neighborhood market while only 2.6% patronize the grocery, and observation during the survey revealed that Mega-supermarkets were recently launched into the city (Ibadan) less than six months prior the survey. Hence, the low patronage of grocery and supermarket outlets by respondents for their grocery needs shown in the results.

Table 4: Place of purchase of fruits

Place	Percentage
Neighborhood market	67.2
Rural market	14.4
Urban market	13.8
Farm gate	3.5
Street hawkers/vendors	14.1
Grocery	2.6
Supermarket	5.2

Source: Field survey, 2013

3.6 Preferred mode of fruit consumption

The preferred mode of fruit consumption as highlighted by the respondents is shown in table 5 which reveals that 66.6% of the respondents prefer to consume whole fruits than other forms of preparing fruits. On the contrary, 0.6% of them prefer canned fruits to other modes of fruit consumption. This is corroborated by Adenegan and Adeoye (2011) in a similar study on fruit consumption carried out among University students in which more than 60% of the students preferred whole fruits to other forms of processed fruits.

Table 5: Preferred mode of fruit consumption

Mode of fruit consumption	Percentage
Whole fruit	66.6
Fruit slices	11.0
Fruit juice	13.5
Dried fruits	1.3
Fruit salad	8.4
Canned fruit	0.6

Source: Field survey, 2013

3.7 Constraints to fruit consumption

The results reveal that inadequate storage facility is the most important constraint affecting consumption of fruits by the respondents (Table 6). National Stored Products Research Institute (NSPRI), 2010) reported that fresh fruits and vegetables are highly perishable after harvest particularly under hot tropical conditions. This is caused by loss of moisture, metabolic activities and pathogenic infections.

Table 6: Constraints to fruit consumption

Constraints	Percentage
Contamination of fruits	11.3
Poor income	11.2
Unavailability of fruit	23.2
Inadequate storage facilities	27.4
High price	19.5
Stomach sensitivity	9.4

Source: Field survey, 2013

3.8 Factors determining consumption of fruits

The regression result on table 7 reveals that monthly income and educational status of respondents determine their consumption of fruits in the study area. This implies that increase in monthly income and educational status (having secondary and or tertiary education) increases the average weekly budget on fruits. A similar finding was reported by Ruel *et al*, 2004 who explained that in most sub-Saharan African countries, the income elasticity

for consumption of fruits and vegetables is greater than unity and this shows that fruit and vegetables are considered as necessity i.e as income increases, the consumption increases. Banwat *et al*, 2012 also affirmed a close link between education and consumption of fruit and vegetables. Educated persons are likely to have access to nutrition related information through the mass media and from available educational literature. Riediger and Moghadasian (2008) found a strong positive association between fruit and vegetable consumption and total household income while examining patterns of fruit and vegetable consumption and the influence of sex, age and socio-demographic factors among Canadian elderly. Amount of income available to University students also influenced the consumption of fruits. (Adenegan and Adeoye, 2011)

Table 7: Regression analysis result showing the factors determining consumption of fruits

Variables	Coefficient	Standard error	t-value
Constant	-1687.258	1183.120	-1.426
Age	27.129	26.145	1.038
Sex	231.305	377.346	0.613
Marital status	140.223	541.185	0.259
Monthly income	297.404	131.754	2.257**
Educational status	403.966	194.834	2.073**

Dependent variable: Average weekly budget on fruit
** Significant @ 5%.

4.0 Conclusion

The study revealed that majority of respondents are female, married and earn monthly income of more than ₦71,000.00. The most frequently consumed fruits are in the order plantain>banana>sweet orange>apple which are mostly consumed at least 2 times in a week. Fruit consumption was mainly adduced to inherent health benefits. The respondents rarely patronize the groceries for fruit needs and mode of fruit consumption is whole fruit. Inadequate storage facility is the most important constraint identified. The regression result implied that increase in monthly income and educational status increases average weekly budget on fruits. Therefore, the study recommends the following:

- Sensitization of staff of agricultural based institution on the need to increase fruit consumption.
- Enlightenment on appropriate short term storage methods to improve shelf life of purchased fruits.

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