

Exploring Mass Media to Improve Fruit Consumption Pattern of a Section of Nigerian Adult Population

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ABSTRACT

Inadequate fruit consumption is responsible for high incidence of non-communicable diseases. This study was designed to assess fruit consumption pattern and to identify channels of information to reach Nigerian adult population. This cross-sectional study involved 300 staff of a private University in Ado-Ekiti, Nigeria. Personal data, fruit consumption pattern and sources of nutrition information were obtained using self-administered questionnaire. Respondents' knowledge was obtained based on 20 questions. Chi-square test was used to establish relationship among variables at 5% level of significance. Majority (83.3%) were <50years. Most (97.3%) of the respondents consumed fresh fruits and more of males (62.0%) than females (35.3%); 64.3% consumed fruits ≤ 4 times in a week. More than two-thirds (69.6%) of the respondents had good knowledge of nutrition of fruit and only 35.7% consumed fruits more than 4 times in a week. More males (45.7%) than females (24.0%) had good knowledge score. Less than half listened to radio (41.7%) whereas 59.3% watched television more than 4 times per week. These were higher in males than females. The prominent sources of nutrition information were internet (79.0%), social media (71.0%). More respondents that watched television (66.3%) compared to those that listened to radio (57.0%) had good knowledge score. Low fruit consumption frequency was observed. Fewer females consumed fruits frequently and exposed to communication channels. Internet and social media are channels that can be explored to reach the studied population with specific nutrition information on fruits.

Keywords: adult population, fruit consumption, nutrition knowledge, mass media, nutrition information sources

INTRODUCTION

Globally, non-communicable diseases (NCDs) such as cardiovascular diseases, coronary heart diseases, hypertension, diabetes mellitus and obesity are in the forefront of public health challenges and are barrier to economic development and progress [1,2]. Annually, NCDs are responsible for 41m deaths [1,3] and 15m of these deaths occurred in people below age 70 [3]. By 2025, NCDs will be responsible for about 70% global deaths, 85% of which will be in developing countries [1] which include Nigeria. Not less than 9m of these deaths occurred in people under the age of 60. It has been projected that NCDs burden will increase by 27% in Africa [2]. Sustainable Development Goals include a target to reduce mortality due to NCDs by 30% by 2030 [4]. In Nigeria, the prevalence of NCDs is high with 51% deaths from cardiovascular diseases [5], 34% were diabetic [6], about 50% hypertensive [7,8] and 24% to 45% were overweight/obese [9,10].

Dietary factor has been implicated in about 80% of chronic disease burden [1]. Hence, NCDs can be prevented by addressing unhealthy diets among other top risk factors. Consumption of fruits and vegetables has been associated with a reduced risk of NCDs [1]. Fruits are a rich source of antioxidants, phytochemicals, dietary fibre, potassium, vitamins and are generally low in density and high in water content [11,12]. Unlike other food sources, they contain a significantly low amount of protein and fats and contain high amount of simple sugars (fructose and sucrose) [13,14]. Insoluble fibre, which has the digestive advantage of adding bulk to stool, is especially high in fruits and a high fibre diet have been associated with reduced risk of cardiovascular diseases, gastrointestinal diseases, and some cancer [15]. Likewise fruits have been prescribed as part of diet in the management of weight and the prevention of obesity [14]. WHO recommends that one should eat at least two to three portions of fruits every day and eating more than five portions (400grams) of fruits and vegetable combined per day [13].

High level of micronutrient deficiencies in developing countries including Nigeria has been attributed

to consumption as a result of low knowledge of the nutritional value of fruits and vegetables [14,16]. According to WHO, eating a variety of fruits clearly ensures an adequate intake of most micronutrients, dietary fibres and a host of essential non-nutrient substances [14].

Across the world, inadequate fruit consumption has been observed [11,17-20]. Fruits are readily available throughout the year in Nigeria but the level of consumption is low. Study among university staff in Nsukka, Jos, Calabar [13,21,22], civil servants in Zaria [23], oil workers in Port Harcourt [24], traders in Sokoto [25] and households [26] revealed inadequate consumption. In all these studies, only about a quarter met the WHO recommended daily fruit intake of five serving of fruit per day and about half consumed fruit three or less times in a week. A daily intake of fruits is recommended for protection against NCDs [11, 27, 28].

Good nutrition knowledge enhances development of proper nutritional behavior and appropriate nutrition practices [18,29,30]. About a quarter Nigerians had good knowledge of importance of fruits [14,16,23]; these authors found poor knowledge to be responsible for low consumption pattern of fruits. There are various channels of communication which can be explored to disseminate nutrition information to people in the population. These include internet, radio, television, newspaper, health workers, neighbours and family members. These channels had been used in other population [23, 29,31].

Information is important to enhance knowledge and practice. To enhance fruit consumption pattern in a population therefore, information on importance of fruit ought to be passed on to individuals in the population [13]. In a particular population, prominent sources of information can be used to disseminate nutrition information on fruits so as to influence people to increase their fruit consumption [29]. Radio and family members were used by a quarter Nigerians as sources of information [23]. Hence, this study was designed to assess the fruit consumption pattern of a university staff and the channels of communication that can be used to reach them with nutrition information on fruit.

MATERIALS AND METHOD

STUDY DESIGN AND PARTICIPANTS

The study was descriptive and cross-sectional in design, involving both the academic and non-academic staff of Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria.

SAMPLE SIZE DETERMINATION

Taking a precision of 0.05 at 95% confidence interval (Z), the minimum sample size (N) was calculated by simple proportion based on 50% estimated prevalence of consumption pattern, thus,

$$N = \frac{Z^2 pq}{D^2}$$

Where

$$Z^2 = \text{confidence level at } 95\%$$

N = minimum sample size

D = Desired precision = 0.05

P = 50%

q = 1 - p = 0.5

$$N = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05^2} = 384$$

Therefore the sample size used for this study was 384.

SAMPLING PROCEDURE

There were five colleges in the University and the calculated sample size was divided into five based on proportion of population of each college. A list of staff in each college was used to randomly select the staff that participated in the study [32]. Staff that was not ready to participate was replaced.

INSTRUMENT AND DATA COLLECTION PROCEDURE

A validated and pretested self-administered questionnaire with reliability coefficient of 0.75 was used

to collect data on socio-demographic characteristics of the respondents, nutritional knowledge and sources of food and nutrition information. Information on fruit consumption pattern was obtained through food frequency questionnaire. Twenty questions with each question carrying five points were used to measure the nutritional knowledge of the respondents. The questionnaire was administered to the participants in their offices during the working hours.

DATA ANALYSIS

Data analysis was done using statistical package for the Social Sciences (SPSS) software version 20. Descriptive statistics was carried out and the results were presented in frequencies, percentages and mean scores. Knowledge of the respondents was classified as good, average and low based on the 20 questions on the nutritional knowledge. Each question carried a weight of 5 points and the 20 questions gave a total of 100%. Participants that scored 70-100%, 50-69% and below 50% were described as having good, average and low knowledge respectively [33]. Chi-square was done to establish association between variables.

ETHICAL CONSIDERATION

The study was approved by the Ethical Committee of Afe Babalola University. Verbal informed consent was obtained from each respondent after the nature and purpose of the study were explained to them. The respondents were assured of confidentiality of information given.

RESULTS AND DISCUSSION

RESULTS

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1 shows the socio-demographic characteristics of the respondents. A total of 300 respondents were sampled with 63.3% being males and 36.7% being females. The mean age of the respondents was $46.5 \pm (0.7)$ with 60.3% being between ages 30-49 years. Majority (62.0%) of the participants were married, 85% were monogamists. Majority (85%) of the participants had tertiary education. More than half (54%) of the study's participants were non-teaching staff while 62.7% were senior staff.

RESPONDENTS' FRUIT CONSUMPTION PATTERN

Table 2 shows the fruit consumption pattern of the respondents. Majority (97.3%) of the participants consumed fresh fruits with 62% male and 35.3% female. Less than half (48.3%) consumed fruits in less than four times in a week with more males (30%) than females (18.3%). Most (96.7%) of the respondents preferred fresh fruit to processed fruit juice (3.3%) and this was higher in male (61%) than female (35.7%).

The most consumed fruit was orange (92%), followed by watermelon (89.7%), banana (87.3%), pineapple (84.7%), apple (78.3%), pawpaw (76.0%) and mango (72.0%). Less than half (47%) consume African star apple and 44.7% consume cashew. The least consumed fruit was bush mango (25%). Generally, males consumed fruits more than females.

Table 1: Socio-demographic characteristics of the respondents

| Characteristics | Male Freq (%) | Female Freq (%) | Total Freq (%) | |
|---------------------------------|------------------|--------------------|-------------------|--|
| Age | | | | |
| Less than 30 | 36(12) | 33(11) | 69(23.0) | |
| 30-49 | 126(42.0) | 55(18.3) | 181(60.3) | |
| 50-69 | 20(6.7) | 15(5) | 35(11.7) | |
| 70 and above | 8(2.7) | 7(2.3) | 15(5.0) | |
| Mean \pm SD =46.5 \pm (0.7) | | | | |
| Marital status | | | | |
| Single | 65(21.7) | 49(16.3) | 114(38.0) | |
| Married | 125(41.7) | 61(20.3) | 186(62.0) | |
| Family type | | | | |
| Monogamy | 161(53.7) | 94(31.3) | 255(85.0) | |
| Polygamy | 29(9.7) | 16(5.3) | 45(15.0) | |

| | | | | |
|--------------------------|-----------|-----------|-----------|--|
| Ethnicity | | | | |
| Yoruba | 162(54.0) | 85(28.3) | 247(82.3) | |
| Igbo | 8(2.7) | 14(4.7) | 22(7.3) | |
| Hausa | 14(4.7) | 4(1.3) | 18(6.0) | |
| Others | 6(2.0) | 7(2.3) | 13(4.3) | |
| Religion | | | | |
| Christian | 182(60.7) | 105(35.0) | 287(95.7) | |
| Muslim | 5(1.7) | 1(0.3) | 6(2.0) | |
| Others | 3(1.0) | 4(1.3) | 7(2.3) | |
| Level of education | | | | |
| Secondary | 7(2.3) | 4(1.3) | 11(3.7) | |
| Post-secondary (OND/NCE) | 22(7.3) | 12(4.0) | 34(11.3) | |
| Tertiary | 161(53.7) | 94(31.3) | 255(85.0) | |
| Position | | | | |
| Teaching staff | 86(28.7) | 52(17.3) | 138(46.0) | |
| Non-teaching staff | 104(34.7) | 58(19.3) | 162(54.0) | |
| Level at work | | | | |
| Junior staff | 55(18.3) | 57(19.0) | 112(37.3) | |
| Senior staff | 135(45.0) | 53(17.7) | 188(62.7) | |

Table 2: Fruit consumption pattern

| Characteristics | Male Freq (%) | Female Freq (%) | Total Freq (%) |
|----------------------------|------------------|--------------------|-------------------|
| Consume fresh fruits | | | |
| Yes | 186 (62.0) | 106(35.3) | 292(97.3) |
| No | 4(1.3) | 4(1.3) | 8(2.7) |
| Frequency of consumption | | | |
| Less than 4 times per week | 90(30.0) | 55(18.3) | 145(48.3) |
| 4 times per week | 29(9.7) | 19(6.3) | 48(16.0) |
| More than 4 times per week | 71(23.7) | 36(12.0) | 107(35.7) |
| Preference for | | | |
| Fresh fruits | 183(61%) | 105(35.7) | 290(96.7) |
| Processed fruit juice | 7(2.3) | 3(1.0) | 10(3.3) |
| Fruit consumed | | | |
| Banana | | | |
| Yes | 162(54.0) | 100(33.3) | 262(87.3) |
| No | 28(9.3) | 10(3.3) | 38(12.7) |
| Cashew | | | |
| Yes | 78(26.0) | 56(18.7) | 134(44.7) |
| No | 112(37.3) | 54(18.0) | 166(55.3) |
| Orange/tangerine/grape | | | |
| Yes | 172(57.3) | 104(34.7) | 276(92.0) |
| No | 18(6.0) | 6(2.0) | 24(8.0) |
| Apple | | | |
| Yes | 138(46.0) | 100(33.3) | 238(78.3) |
| No | 52(17.3) | 10(3.3) | 62(20.7) |
| Pineapple | | | |
| Yes | 158(52.7) | 96(32.0) | 254(84.7) |
| No | 32(10.7) | 14(4.7) | 46(15.3) |

Table 2 (CONTD)

| Characteristics | Male Freq(%) | Female Freq(%) | Total Freq (%) |
|--------------------|-----------------|-------------------|-------------------|
| Watermelon | | | |
| Yes | 166(55.3) | 103(34.3) | 269(89.7) |
| No | 24(8.0) | 7(2.3) | 31(10.3) |
| Pawpaw | | | |
| Yes | 140(46.7) | 88(29.3) | 228(76.0) |
| No | 50(16.7) | 22(7.3) | 72(24%) |
| Mango | | | |
| Yes | 134(44.7) | 82(27.3) | 216(72.0) |
| No | 56(18.7) | 28(9.3) | 84(28.0) |
| African star apple | | | |
| Yes | 81(27.0) | 60(20.0) | 141(47.0) |
| No | 109(36.3) | 50(16.7) | 159(53.0) |
| Bush mango | | | |
| Yes | 50(16.7) | 26(8.7) | 76(25.3) |
| No | 140(46.7) | 84(28.0) | 224(74.7) |
| Others | | | |
| Yes | 25(8.3) | 16(5.3) | 41(13.7) |
| No | 165(55.0) | 94(31.3) | 259(86.3) |

RESPONDENTS' EXPOSURE TO FOOD AND NUTRITION INFORMATION SOURCES

Table 3 shows the level of exposure to food and nutrition information sources of the respondents. Majority (82.7%) of the respondents listen to radio with more males (53.7%) than females (29%); and less than half (42.3%) listen to radio in less than 4 times in a week. Majority (81.7%) of the respondents read newspapers with more males (55%) compare to females (26.7%) and half (50.3%) read newspapers less than 4 times per week. Majority (95.7%) watched television and 59.3% watched it more than 4 times per week; this was higher in males (37.7%) than females (21.7%).

The dominant sources of food and nutrition information of the respondents were internet (79%), social media (71.0%) and television (71.0%). These were followed by friends and relatives (66.0%) and hospital and medical professionals (63.0%). About half received information through seminars and conferences (54%), neighbours (53%), radio (51%) and newspapers (49.7%). However, less than half received information from magazine (42%) and postal and hand bills (38%). Overall, males were more exposed than females.

Table 3: Exposure to food and nutrition information sources

| Characteristics | Male Freq(%) | Female Freq(%) | Total Freq (%) |
|---------------------------------|-----------------|-------------------|-------------------|
| Listen to radio | | | |
| Yes | 161(53.7) | 87(29.0) | 248(82.7) |
| No | 29(9.7) | 23(7.7) | 52(17.3) |
| Frequency of listening to radio | | | |
| Less than 4 times per week | 61(20.3) | 66(22.0) | 127(42.3) |
| 4 times per week | 30(10.0) | 18(6.0) | 48(16.0) |
| More than 4 times per week | 99(33.0) | 26(8.7) | 125(41.7) |
| Read newspapers | | | |
| Yes | 165(55.0) | 80(26.7) | 245(81.7) |
| No | 25(8.3) | 30(10.0) | 55(18.7) |

| | | | |
|---|-----------|-----------|-----------|
| Frequency or reading newspapers | | | |
| Less than 4 times per week | 77(25.7) | 74(24.7) | 151(50.3) |
| 4 times per week | 26(8.7) | 14(4.7) | 40(13.3) |
| More than 4 times per week | 87(29.0) | 22(7.3) | 109(36.3) |
| Watched television | | | |
| Yes | 182(60.7) | 105(35.0) | 287(95.7) |
| No | 8(2.7) | 5(1.7) | 13(4.3) |
| Frequency of watching television | | | |
| Less than 4 times per week | 49(16.3) | 30(10.0) | 79(26.3) |
| 4 times per week | 28(9.3) | 15(5.0) | 43(14.3) |
| More than 4 times per week | 113(37.7) | 65(21.7) | 178(59.3) |
| Sources of food and nutrition information | | | |
| Radio | | | |
| Yes | 99(33.0) | 54(18.0) | 153(51.0) |
| No | 91(30.3) | 56(18.7) | 147(49.0) |
| Television | | | |
| Yes | 132(44.0) | 83(27.7) | 215(71.5) |
| No | 58(19.3) | 27(9.0) | 85(28.3) |
| Newspapers | | | |
| Yes | 92(30.7) | 57(19.0) | 149(49.7) |
| No | 98(32.7) | 53(17.7) | 151(50.3) |
| Internet | | | |
| Yes | 144(48.0) | 93(31.0) | 237(79.0) |
| No | 46(15.3) | 17(5.7) | 63(21.0) |

Table 3 (CONTD)

| Characteristics | Male Freq(%) | Female Freq(%) | Total |
|---------------------------------|--------------|----------------|-----------|
| | | | |
| Magazines | | | |
| Yes | 78(26.0) | 49(16.3) | 127(42.3) |
| No | 112(37.3) | 61(20.3) | 173(57.7) |
| Postals, billboards, handbills | | | |
| Yes | 71(23.7) | 43(14.3) | 114(38.0) |
| No | 119(39.7) | 67(22.3) | 186(62.0) |
| Hospitals/medical professionals | | | |
| Yes | 114(38.0) | 75(25.0) | 189(63.0) |

| | | | |
|----------------------------------|-----------|----------|-----------|
| No | 76(25.3) | 35(11.7) | 111(37.0) |
| Friends, relatives | | | |
| Yes | 116(38.7) | 82(27.3) | 198(66.0) |
| No | 74(24.7) | 28(9.3) | 102(34.0) |
| Neighbours, community | | | |
| Yes | 102(34.0) | 59(19.7) | 161(53.7) |
| No | 88(29.3) | 51(17.0) | 139(46.3) |
| Seminars, conferences, workshops | | | |
| Yes | 94(31.3) | 70(23.3) | 164(54.7) |
| No | 96(32.0) | 40(13.3) | 136(45.3) |
| Social media | | | |
| Yes | 125(41.7) | 88(29.3) | 213(71.0) |
| No | 65(21.7) | 22(7.3) | 87(29.0) |

RESPONDENTS' PREFERRED CHANNELS OF RECEIVING FOOD AND NUTRITION INFORMATION

The preferred channels of receiving food and nutrition information is shown in Table 4. The most preferred channels of receiving food and nutrition information were internet and other computer applications (70.3%), electronics media (69.3%), interpersonal interactions (68.0%) and seminar and conferences (60.0%); and the least was outdoor media (36.7%). Overall, greater proportion of males than females preferred these channels to receiving food and nutrition information.

RESPONDENTS' NUTRITION KNOWLEDGE OF FRUITS

Figure 1 shows the respondents' nutrition knowledge of fruits. Majority (69.6%) of the respondents had good knowledge of fruit and 12.3% had low knowledge.

Table 4: Preferred channels of receiving food and nutrition information

| Characteristics | Male Freq (%) | Female Freq (%) | Total Freq (%) |
|---|------------------|--------------------|-------------------|
| Electronics Media | | | |
| Yes | 129(43.0) | 79(26.3) | 208(69.3) |
| No | 61(20.3) | 31(10.3) | 92(30.7) |
| Print media (newspaper, magazine) | | | |
| Yes | 94(31.3) | 53(17.7) | 147(49.0) |
| No | 96(32.0) | 57(19.0) | 153(51.0) |
| Outdoor media (handbill, billboard, postal) | | | |
| Yes | 63(21.0) | 47(15.7) | 110(36.7) |
| No | 127(42.3) | 63(21.0) | 190(63.3) |
| Seminar, workshop, conference | | | |
| Yes | 108(36.0) | 72(24.0) | 180(60.0) |
| No | 82(27.3) | 38(12.7) | 120(40.0) |
| Social media | | | |
| Yes | 101(33.7) | 60(20.0) | 161(53.7) |
| No | 89(29.7) | 50(16.7) | 139(46.3) |
| Internet and other computer applications | | | |
| Yes | 133(44.3) | 78(26.0) | 211(70.3) |
| No | 57(19.0) | 32(10.7) | 89(21.7) |
| Interpersonal interactions | | | |
| Yes | 125(41.7) | 79(26.3) | 204(68.0) |
| No | 65(21.7) | 31(10.3) | 96(32.0) |

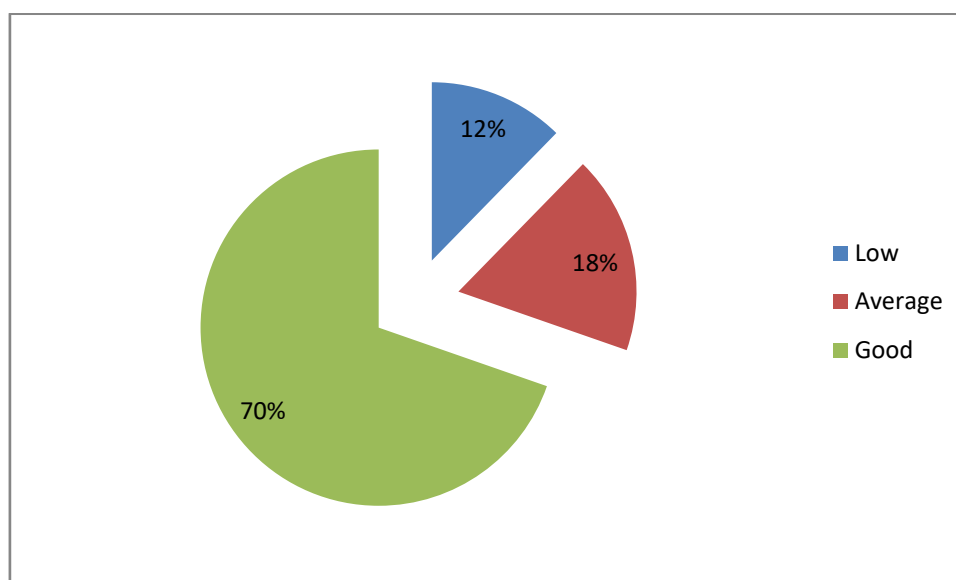


Fig 1: Knowledge score of the respondents

KNOWLEDGE SCORES ACCORDING TO SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 5 shows the knowledge score of the respondents with the demographic variables. Less than half (44.7%) of the participants in the age category 30-49 had good knowledge. More (45%) males (45.0%) than females (24.0%) had good knowledge score. A greater proportion (44.3%) of the married participants had good knowledge score compare to singles (25.3). More (61%) participants in monogamous family had good knowledge compare to those from polygamous family (8.7%).

Table 5: Knowledge score and socio-demographic characteristics

| Characteristics | Low Freq(%) | Average Freq(%) | Good Freq(%) | Chi-square | P-value |
|--------------------|-------------|-----------------|--------------|------------|---------|
| | | | | | |
| Age | | | | | |
| Less than 30 | 9(3.0) | 16(5.3) | 44(14.7) | 10.673 | 0.099 |
| 30-49 | 18(6.0) | 29(9.7) | 134(44.7) | | |
| 50-69 | 8(2.7) | 4(1.3) | 23(7.7) | | |
| 70 and above | 2(0.7) | 5(1.7) | 8(2.7) | | |
| Gender | | | | | |
| Male | 21(7.0) | 32(10.7) | 137(45.7) | 1.517 | 0.468 |
| Female | 16(5.3) | 22(7.3) | 72(24.0) | | |
| Marital status | | | | | |
| Single | 17(5.7) | 21(7.0) | 76(25.3) | 1.247 | 0.536 |
| Married | 20(6.7) | 33(11.0) | 133(44.3) | | |
| Family type | | | | | |
| Monogamy | 28(9.3) | 44(14.7) | 183(61.0) | 8.314 | 0.016* |
| Polygamy | 9(3.0) | 10(3.3) | 26(8.7) | | |
| Ethnicity | | | | | |
| Yoruba | 24(8.0) | 46(15.3) | 177(59.0) | 11.710 | 0.069 |
| Igbo | 4(1.3) | 3(1.0) | 15(5.0) | | |
| Hausa | 6(2.0) | 2(0.7) | 10(3.3) | | |
| Others | 3(1.0) | 3(1.0) | 7(2.3) | | |
| Level of education | | | | | |
| Secondary | 3(1.0) | 1(0.3) | 7(2.7) | 17.211 | 0.009* |

| | | | | | |
|--------------------------|----------|----------|-----------|-------|-------|
| Post-secondary (OND/NCE) | 4(1.3) | 7(2.3) | 23(7.7) | | |
| Tertiary | 30(10.0) | 46(15.3) | 179(59.7) | | |
| Position | | | | | |
| Teaching staff | 15(5.0) | 24(8.0) | 99(33.0) | 0.654 | 0.721 |
| Non-teaching staff | 22(7.3) | 30(10.0) | 110(36.7) | | |
| Level at work | | | | | |
| Junior | 14(4.7) | 22(7.3) | 76(25.3) | 0.356 | 0.837 |
| Senior | 23(7.7) | 32(10.7) | 133(44.3) | | |

*Significant at $p < 0.05$

RESPONDENTS' KNOWLEDGE SCORE AND LEVEL OF EXPOSURE TO FOOD AND NUTRITION INFORMATION

From table 6, more than half (57%) of the participants who listened to radio had good knowledge scores than those who did not; though, less than a third listened to radio for more than 4 times a week. More than half (56%) of the participants who read newspapers had good knowledge scores compare to those who did not but less than one third read newspaper less than 4 times in a week. More than half (66.3%) of the participants who had good knowledge scores watched television with less than half (43%) watching it for more than 4 times a week.

FRUIT CONSUMPTION PATTERN ON THE BASIS OF KNOWLEDGE SCORES

Table 7 shows the relationship between the knowledge scores and the fruit consumption pattern. Majority (67.3%) of the respondents with good knowledge scores consumed fresh fruits. However, only about one quarter consumed fruits more than 4 times per week and 67.3% preferred fresh fruits to processed fruit juice.

Table 6: Knowledge scores and food and nutrition information sources

| Characteristics | Low Freq(%) | Average Freq(%) | Good Freq(%) | Chi-square | P-value |
|----------------------------------|-------------|-----------------|--------------|------------|---------|
| Listening to radio | | | | | |
| Yes | 32(10.7) | 45(15.0) | 171(57.0) | 13.892 | 0.008* |
| No | 5(1.7) | 9(3.0) | 38(12.7) | | |
| Frequency of listening to radio | | | | | |
| Less than 4 times per week | 13(4.3) | 27(9.0) | 87(29.0) | 3.590 | 0.464 |
| 4 times per week | 9(3.0) | 7(2.3) | 32(10.7) | | |
| More than 4 times per week | 15(5.0) | 20(6.7) | 90(30.0) | | |
| Reading newspaper | | | | | |
| Yes | 34(11.0) | 43(14.3) | 168(56.0) | 2.964 | 0.227 |
| No | 3(1.0) | 11(3.7) | 41(13.7) | | |
| Frequency of reading newspaper | | | | | |
| Less than 4 times per week | 15(5.0) | 32(10.7) | 104(34.7) | 7.973 | 0.093 |
| 4 times per week | 9(3.0) | 8(2.7) | 23(7.7) | | |
| More than 4 times per week | 13(4.3) | 14(4.7) | 82(27.3) | | |
| Watching television | | | | | |
| Yes | 35(11.7) | 53(17.7) | 199(66.3) | 1.007 | 0.604 |
| No | 2(0.7) | 1(0.3) | 10(3.3) | | |
| Frequency of watching television | | | | | |
| Less than 4 times per week | 10(3.3) | 15(5.0) | 54(18.0) | 2.458 | 0.652 |
| 4 times per week | 7(2.3) | 10(3.3) | 26(8.7) | | |
| More than 4 times per week | 20(6.7) | 29(9.7) | 129(43.0) | | |

*Significant at $p < 0.05$ **Table 7: Knowledge scores and fruit consumption**

| Characteristics | Low Freq(%) | Average Freq(%) | Good Freq(%) | Chi-square | P-value |
|----------------------------|-------------|-----------------|--------------|------------|---------|
| Consume fresh fruits | | | | | |
| Yes | 37(12.3) | 53(17.7) | 202(67.3) | 1.527 | 0.466 |
| No | 0(0.0) | 1(0.3) | 7(2.3) | | |
| Frequency of consumption | | | | | |
| Less than 4 times per week | 21(7.0) | 23(7.7) | 101(33.7) | 2.474 | 0.649 |
| 4 times per week | 6(2.0) | 8(2.7) | 34(11.3) | | |
| More than 4 times per week | 10(3.3) | 23(7.7) | 74(24.7) | | |
| Preferred fruit | | | | | |
| Fresh fruits | 36(12.0) | 52(17.3) | 202(67.3) | 0.069 | 0.966 |
| Processed fruit juice | 1(0.3) | 2(0.7) | 7(2.3) | | |

DISCUSSION

This cross-sectional study focused on the fruit consumption pattern, nutritional knowledge and sources of food and nutrition information among staff of a higher institution in Ado-Ekiti.

The study participants were majorly middle aged individuals having families and high socio-economic status virtue of their level of education and position at work. Therefore, they were well positioned to influence other members of their families and co-workers.

Two third of the participants consumed fresh fruit less frequently however, this result is better compare to that of traders in Sokoto [25] and university staff in Nsukka/Enugu [13] with half of them consuming fruit less than three times in week but worse compare to university workers in Portugal with about half of them consuming fruit seven or more times per week [34]. More males than females consumed fruits and consumed them more frequently. This result contradicts those of Olatona et al in Nigeria [14] and Msambichaka et al in Tanzania [11] where inadequate fruit intake was higher among males. The most consumed fruit was orange which is similar to the previous findings [14,23,31,35]. Bush mango which is rich in carotene, a vitamin A precursor was least consumed. Previous studies in Nigeria have adduced several reasons for low consumption of fruits. These include high cost, low income and low level of education [14,35].

Less than half of the participants listen to radio and read newspapers more than four times in a week. In addition, less females compare to males used these channels. This implies that limited number of this population can be reached with nutrition information through these channels of communication; and females were likely to be less exposed to nutrition information. A greater proportion of the participants that watch television had good knowledge compare to those that listen to radio and read newspapers. The prominent sources of nutrition information among the participants were internet, television and social media. These channels along with medical professionals, relatives/friends, radio and newspapers can be explored to disseminate nutrition information on benefits of fruit consumption to this population group. Magazine and postal may not be appropriate channels to reach these people, however, some of them can still be reached with nutrition information through these channels. These findings run contrary to that of Eze and Eze [23] whereby the commonest sources of nutrition information among civil servants in Zaria were radio and family members. But, they are similar to the findings of Quaidoo et al [29] in Ghana with internet and traditional media as the prominent sources. To improve fruit intake in the population, information on health benefits of fruit should be disseminated to people to enhance knowledge and consequently practice [13]. This is essential because high prevalence of micronutrient deficiencies has been associated with low knowledge of nutritional benefits of fruits and inadequate consumption [14].

More than two third of the studied population had good knowledge of nutrition of fruit and only one third consumed fruits more than four times in a week. This suggests that knowledge was not translated into practice. This result is higher than that of civil servants in Zaria with 28% [23] and adult population of Lagos with 25% [14] and young adults in Jos [16] having good knowledge. It is equally

higher than young adults in Ghana [29] and pregnant women in Bandung City [18] where a little more than half had good knowledge. But, it is lower compare to the findings of Silva et al [36] whereby the study population was secondary school students. More males than females had good knowledge score. The gender distribution of knowledge of nutritional importance of fruit runs contrary to that of young adults in Jos [16] where females had better knowledge and practice than males. Knowledge is very important to fruit consumption practice.

As much as two thirds of those that watch television had good knowledge compare to those that listen to radio and read newspapers. This implies that more of this population can be reached through the television than radio and newspapers. About half of those that read about politics in the newspaper had good knowledge score. These people read newspaper more frequently and this might enable them to read other information especially on food and nutrition. Two third of the respondents that had good knowledge consumed fresh fruit.

This study reveals that fewer females than males had good knowledge of nutrition of fruit and consumed fruits less frequently. This has serious implication on the health of women. Females require more micronutrients than males because of monthly loss of blood due to menstruation and the extra demand due to pregnancy and lactation. Fruit consumption is crucial to prevent maternal and child micronutrient deficiencies and mortality since fruits are reliable source of micronutrients. Consumption of fruits will ensure healthy individuals and promote wellbeing which is essential to sustainable development. Attaining sustainable development goal of less than 70 maternal death/100,000 live births by 2030 requires improving fruit consumption to enhance micronutrient status. Overweight and obesity, a predictor of hypertension, is an emerging public health issue in Nigeria with a high prevalence of 57% [25]. Consumption of high fibre and low calorie diet has been recommended to prevent and manage this nutritional disease. Fruits are low in calorie and supply dietary fibre [14].

To increase consumption of fruit, there is need to increase knowledge of nutritional benefits of fruit. In order to accomplish that, there is need to disseminate nutrition information on fruit to the populace. This can be achieved through various channels of information. Relevant channels of information for each population group need to be identified. This study has been able to do that for the studied population group. Recently, people spend longer hours at work and this compels them to eat unhealthy snacks which are loaded with fat and sugar. Hence, work place offers opportunity to reach a large population with nutrition information on fruits and thereby increase knowledge and improve consumption.

CONCLUSIONS AND RECOMMENDATIONS

This study has established that the knowledge of nutrition of fruit was considerably high but consumption of fruits among the study participants was less frequent. The study revealed a higher knowledge of health benefit of fruits in male than female respondents. The participants were well exposed to common communication channels and their preferred sources of food and nutrition information were internet, television and social media. Fruit consumption by adults in the study area needs to be improved upon through nutrition education intervention by exploring all channels of communication. Specific channels of information for each population group should be identified and explored to communicate nutrition information on fruit to educate population groups in order to improve fruit consumption.

LIMITATION

The limitation of this study is that only one higher institution was used for the study. There may be need to carry out similar studies in other private and public institutions and make comparisons.

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