

RESEARCH ARTICLE

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Barriers and Facilitators of Fruit and Vegetable Consumption among Nigerian Adults in a Faith-Based Setting: A Pre-Intervention Qualitative Inquiry

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Abstract

Background: Inadequate consumption of fruit and vegetable is a risk factor for morbidity and mortality associated with non-communicable diseases (NCDs). An understanding of the barriers and facilitators to consumption is important for effectiveness of intervention in Africa. We present insights among church members before developing a church-based multi-component intervention to address the inadequate consumption of fruit and vegetable. **Methods:** We conducted eighteen focus group discussions among 163 church members. All discussions were audio-taped, transcribed verbatim, and were analyzed for thematic content. **Results:** We identified five main themes; Personal: awareness and knowledge of benefits, choice, habits, and curiosity, dietary restrictions and gastrointestinal symptoms following fruit and vegetable consumption. Familial: practices promoting the ready availability of fruit and vegetables in the home or habits that encourage children to eat vegetables as they transition into adulthood, pre-existing health problems of family members and the long preparation time of some traditional vegetables. Socio-cultural: Cultural practices that encourage F&V consumption, the high cost of fruits and vegetables, alternatives foregone, and cultural taboos. Environmental: inadequate farmland and storage facilities, seasonality of several fruit and vegetables, and sharp practices of force-ripening with chemicals. Church-related: inadequate space provided by the church for arable cultivation and lack of knowledge of the benefits among church leaders, church activities that involve serving fruits and vegetables and the biblical support for the consumption of fruits and vegetables. **Conclusion:** It is essential to leverage practices that promote fruit and vegetable intake and address barriers mentioned by the participants when designing such interventions.

Keywords: Faith-based- qualitative study- fruit and vegetable- focus group discussion- healthy eating

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Introduction

Globally, the lack of adequate fruit and vegetable (FV) consumption is estimated to cause about 14% of mortality from gastrointestinal cancers, 11% of ischaemic heart disease, and 10% of stroke-related deaths (World Health Organization, 2015). This translates to about 1.7 million deaths worldwide (World Health Organization, 2015). Fruit and vegetables are a critical component of a healthy diet. Also, they serve as good sources of carbohydrates, proteins, protective micronutrients, dietary fibre, vitamins, and minerals (Layade and Adeoye, 2014).

The consumption in Africa is lower than the recommended daily guidelines prescribed by the World

Health Organization (Hall et al., 2009). In sub-Saharan Africa, estimates of fruit and vegetable consumption range from 70-312g per person per day, which is far lower than the WHO recommendation of at least 400g per person per day (Ruel and Minot, 2005). The steady rise in the burden of non-communicable diseases (NCDs) in Sub-Saharan Africa over the past 20 years, driven by an increase in risk factors such as unhealthy diets, (Bigna and Noubiap, 2019) coupled with the concurrent challenges of infectious diseases, makes it imperative to seek cost-effective interventions to address the low consumption of FV in these settings.

Previous research has shown that determinants of FV consumption in sub-Saharan Africa include household

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income, FV availability, the cost and feasibility of home production, consumer preferences, and decision-making processes within households (Ruel and Minot, 2005). In urban areas in Nigeria, limited year-round availability of FV, affordability, and the need for convenience, food safety issues, and the attraction of modern Western lifestyles have been reported as deterring factors to fruit and vegetable consumption (Hollinger and Staats, 2015). Cultural beliefs, taboos, and religious beliefs were also found to influence food choices (Ijewere and Odia, 2012). Addressing these determinants may require holistic approaches that encompass the individual, family, and the community.

A large proportion of people in many sub-Saharan African nations are deeply committed to the tenets of one or the other of the world's two largest religions; Christianity and Islam. Compared with high-income countries (HIC), almost all (>95%) Nigerians identify with at least one of these two main religions (Lugo and Cooperman, 2010; Nigeria, 2014) with Christianity being predominant in the southern region, where this study will be conducted (Hollinger and Staats, 2015). Religious environments serve as potential avenues for health promotion and have become increasingly relevant because of the existing social networks and support (Bigna and Noubiap, 2019).

It has been established that health programmes focusing on behaviours that can be reinforced by social support are effective in religious settings. Studies exploring FV consumption in religious settings are predominantly in developed countries, (Naude, 2013) highlighting a gap in such knowledge in low and middle-income countries, particularly in sub-Saharan Africa. This is a part of a more extensive study to develop a multi-component intervention to address physical activity and unhealthy eating among church members in Lagos, Nigeria. Specifically, we aim to identify the existing barriers and facilitators to FV consumption by qualitatively exploring church members and their leaders' opinions before developing an intervention to address low FV in church settings. Our ultimate goal is to use the insights obtained from this study to design sustainable interventions to improve FV consumption in resource-limited settings.

Materials and Methods

Study design and participants

Ethical approval was obtained from the Health Research and Ethics committee of the College of Medicine, University of Lagos, Nigeria. Research was conducted in line with the principles of the Declaration of Helsinki.

The design and methods are as previously described. (Odukoya et al., 2020) Eighteen (18) focus group discussions (FGDs) were conducted among members of a group of orthodox churches in Lagos, Nigeria by a team led by the lead researcher (O.O.*), a female, Medical Doctor and an Associate Professor at the College of medicine, University of Lagos. Eligible participants were: Men and women aged 18 years and over residing in Lagos. Persons who have been church members for at

least one year and attend church services at least once a week. All participants were contacted prior to the study and were purposively selected. Focus group guides were developed in line with the objectives of the study. The questions were pretested among church members of the same denomination not included in the study. Appropriate corrections were made after that. See Appendix A.

Recruitment, data collection, and setting

Eligible participants were recruited by word of mouth with the collaboration of church leaders. The focus groups were held within the church premises, facilitated by interviewers, moderators and note-takers that were part of the research team and were trained on how to prevent personal biases and assumption from interfering with the responses of the study participants. The lead researcher introduced the team to the participants and also stated the objectives of the FGDs. We obtained informed consent from all study participants before participation. There were 179 participants, of which 16 participants dropped-out citing lack of time and interest. The response rate was 91.1%. Focus group sessions were held in three age brackets, a) Youth (18-30 years), b) Adults (31-65 years), and c) Elderly (>65 years). We started each session by informing participants study's purpose and nature and assuring them of confidentiality. Then, we collected necessary demographic information such as age and sex and assigned codes to each participant. Sessions lasted between 45 and 90 minutes, and data were collected until saturation was reached. All FGDs were audio-taped and later transcribed verbatim.

Data Analysis

We removed personal identifiers to maintain confidentiality and anonymity and transcribed the recordings verbatim. Field notes were made during the FGDs and this was analysed along with the transcripts. We adopted a sequential (inductive-deductive) approach to analyze the data (Odukoya et al., 2020). We did this by initially applying an inductive approach where initial codes were drawn from the existing literature on the topic of inquiry guided by the research aims and FGD questions. The inductive approach coded the data into several categories or themes. Initial codes were categorized into five groups (personal, family, socio-cultural, environmental, and biblical/spiritual) based on the socio-ecological model of behavioural change (Robinson, 2008). Subsequently, we used a deductive approach to derive additional codes from the data and then merged both sets of codes. The codes and transcripts were then uploaded onto Dedoose™ by two trained research team members, relevant codes were then assigned to the quotes within each transcript, and the data was summarized for presentation.

Results

Sample characteristics

Sixteen (16) focus group discussions were conducted from November 2018 to December 2018; eight (8) sessions among adults aged 31-64, four (4) sessions among

the youth aged 18-30, and another four (4) sessions among church members that were 65 years and older. The mean \pm SD age of the participants in the FGDs was 47.7 (20.6) years. Additional characteristics of the participants in the focus group discussion are shown in Table 1.

Study themes

The study themes are summarized in Table 2.

Personal determinants of Fruit and Vegetable consumption

The personal determinants for fruit and vegetable consumption (promoting or deterring factors) mentioned by the participants knew the benefits of eating fruit and vegetables. One participant noted, "Lack of awareness (is what) prevents eating fruits and vegetables" (Adult, male 1).

The health benefits of fruit and vegetable consumption were highlighted in this famous quote by one of the respondents. "An apple a day keeps the doctor away." Other health benefits associated with fruits and vegetable consumption was improved digestion and skin nourishment.

Participants mentioned that some persons might not be interested in eating fruits and vegetables because of their personal preferences. It was also noted that specific individuals might be averse to eating vegetables and consider them as foods fit for animals.

"I don't think anything can prevent someone from taking F&V in the family unless they don't like it. Some people don't like it." (Adult, male 2)

"People are (so) used to eating rice in the morning and 'eba' (cassava flakes) in the afternoon. It may be difficult

for them to change and imbibe new habits." (Adult, male 1)

According to a respondent, "It also depends on some individuals, for instance, my younger brother; if you cook vegetable soup, on no account will he eat it, even if my mother encourages him, he will say the grass (vegetables) is meant for goats and not for humans." (Youth, female 3)

It was also mentioned that personal curiosity or an individual's preferences for trying out new tastes might also affect the variety of fruits and vegetables consumed.

One respondent said... "I encourage people to try out the taste of new fruits to broaden the range of fruits they eat. For instance, I didn't know what watermelons were until I saw others eating them. I was curious; I tried it and liked it". (Youth, female 4)

Medical-related dietary restrictions like diabetes were identified as possible reasons for not consuming some fruits. Another deterrent was that some vegetables are high in fibre and often associated with gastrointestinal symptoms like watery stools.

"Some people who have diabetes may not consume certain fruits" (Adult, female 3)

"...like vegetables when I eat it, I do go to the toilet" (Adult, female 2)

Family determinants of fruits and vegetable consumption

Family practices that promote the ready availability of fruits and vegetables or encourage children to eat as they transition into adulthood were noted as critical familial facilitators.

"We (my family) like taking fruit every day from my childhood even up till now." (Adult, male 1)

"My mum just says, if you don't eat fruits, you don't

Table 1. Characteristics of Participants

Focus Group Sessions	Number of sessions	Number of participants	Mean age (SD)	Male: Female distribution
Youth (18-30 years)	4	46	23.1(3.5)	25:21(54.3%:45.7%)
Adults (31-64 years)	8	72	46.8(10.2)	24:28(33.3%:66.7%)
Elderly (65 years or older)	4	45	74.3(5.2)	15:30(33.3%:66.7%)
Overall	16	163	47.7(20.6)	69:94(42.3%:57.7%)

Table 2. Facilitators and Barriers of Fruit and Vegetable Consumption

Determinants	Facilitators	Barriers
Personal determinants	Personal awareness; personal choice and habits; curiosity; knowledge of health benefits.	Dietary restrictions and gastrointestinal symptoms.
Family determinants	Family practices that promote the ready availability of fruits and vegetables; Family habits that encourage children to eat vegetables as they transition into adulthood	The presence of family members with certain diseases; long preparation time
Socio-cultural determinants	Cultural practices that encourage FV consumption; Ethno-cultural food diversity.	The high cost of fruits and vegetables; low satiety and alternative foregone; food taboos; commercial interests.
Environmental determinants		Inadequate storage facilities; Seasonality of fruits and vegetables; Inadequate space for home food gardens; Sharp practices of force-ripening with unhealthy chemicals.
Spiritual determinants	Church activities involving fruit and vegetable servings such as fasting and prayer; Biblical support for FV consumption.	Lack of space provided by the church for food gardens; Lack of knowledge of the benefits among church leaders.

eat anything.” (Youth, male 1)

Familial factors may impact the kinds of foods eaten by the family. For instance, the presence of a family member with a familial condition like diabetes may affect the entire family’s eating habits.

“Families with diabetic people shouldn’t take fruits anyhow” (Adult, male 5)

Poor access to available sources of fruits and vegetables and the long time required to obtain or prepare FV were noted as discouraging factors.

“...there is a lack of availability of fruits” (Elderly, male 1)

“...some do not have an organized way of getting it (fruits and vegetables)” (Elderly, female 1)

“...my husband’s choice of food. He eats lots of vegetables. What discourages me is the time factor because if I want good healthy food, it will exhaust me for preparing and cooking at home” (Adult, female 1)

Socio-cultural determinants of fruits and vegetable consumption.

Fruits and vegetables are relatively expensive in this part of the country. Many respondents reported that these high costs were a significant constraint. Furthermore, some of the respondents noted that fruits and vegetables were not considered “filling” or enough to satisfy hunger. As a result, people often choose other foods like carbohydrates, which are relatively cheaper and more filling. Respondents also viewed fruits and vegetables as not being seen as a regular part of main meals.

“One of the major things that discourage the eating of fruit and vegetable is that they are not cheap considering that someone may have only N500 (USD 1.5) to spend on food”. (FGD youth female 1)

“No available funds for fruits.” (Elderly male 2)

“Fruits are expensive, and it discourages if you say you want to eat it well, it will cost more than the food that feeds you.” (Adult male 6)

A youth member reiterated this by saying: “Fruits do not fill you, so it is me knowing that I have money to buy food before I have money to spare for fruits and vegetables”. (Youth female 4)

Most respondents affirmed that the Nigerian culture promotes fruit and vegetable consumption, particularly among vulnerable groups such as pregnant women.

“Our culture promotes the eating of fruits and vegetables for pregnant women. When you are pregnant, they tell you to eat those (fruits and vegetables)”. (Youth, female 3)

There is also the perception that certain ethnic groups in some parts of the country have cultures that promote FV consumption.

“Some Nigerian cultures eat more vegetables than others in their meals. The Igbos (an ethnic group in the Eastern part of the country) always have vegetables in their meals”. (Adult, female 4)

Cultural deterring factors to fruits and vegetable consumption included cultural norms or taboos based on past experiences.

“In one of my neighbouring villages, they don’t eat

cashew because one of their sons ate it then, and the person died. So it discourages other people” (Adult, male 1)

“In the past, in some families, we don’t eat certain vegetables like the called one vegetable “efoodu” (Elderly female 3)

When farmland exists, the preference for the cultivation of more lucrative cash crops to the detriment of FV of family consumption was also noted as a deterrent.

“In our culture, we see fruits as what we produce in the farm and bring them to town to sell it.”. (Elderly, male 1)

Environmental determinants of fruit and vegetable consumption

The lack of adequate storage facilities and constant power outages often lead to increased spoilage of most fruits and vegetables, and several respondents lamented the lack of consistent electricity to store fruits and vegetables adequately as a main deterring factor:

“And in my environment, if there is no light (electricity), they have given an order that by midnight; you must (turn) off your generator (home power generating set)” (Adult, female 5)

Participants mentioned that the seasonality of fruits and the unavailability of fruits all year round as deterrents to consistent fruit and vegetable consumption.

“It (fruits) is seasonal.” (Elderly, male 2)

“Because you know we don’t have oranges in all-season” (Adult, female 2)

Prevailing sharp practices such as using harmful chemicals as preservatives or inducing premature ripening of fruits were prevalent in this environment. This knowledge serves as a deterrent to the consumption of fruits and vegetables bought at the local markets.

“Most of the fruits are not fresh. They use chemicals to preserve them, and those chemicals harm the body, so this discourages me from eating fruits” (Youth, male 1)

Urbanization and inadequate space for arable cultivation of fruits and vegetables in the cities were also some of the respondents’ deterrents.

“...no farmlands because of urbanization compared to villages where these are available.” (Adult, female 6)

Spiritual determinants of Fruits and Vegetable consumption

Respondents reported that the church has often helped promote fruit and vegetable consumption by serving fruits during certain church activities, such as at annual church harvests, during lent, and monthly prayer and fasting programs. Most reported no spiritual barriers to the consumption of fruits and vegetables.

Deterring factors mentioned were the lack of space for planting within the church premises. Some respondents felt it would be a good idea to have church farms providing fresh local produce. A respondent said;

“No space around church premises to provide for planting fruits and vegetables...” (Adult, female 1)

“It is believed that the Bible supports the consumption of FV (Adult, male 4)

“If we follow scriptures we would also realize

that scriptures supported healthy eating from Genesis when God created the green grasses and trees for our consumption” (Adult, female 7).

Discussion

This study revealed a complex interplay of personal, family, socio-cultural, environmental, and biblical determinants of FV consumption among the church members. The knowledge of the health benefits of FV consumption was the primary determinant of consumption. However, personal habits, curiosity, individual preferences, and medical restrictions such as diabetes diets, influenced FV consumption among the church members. A study among adults in Perth, Western Australia, cited a lack of knowledge of the recommended guidelines for consuming fruit and vegetables, giving rise to the perceived adequate consumption (Pollard, 2008). In line with our findings, the International Food Policy Research Institute of the World Health Organization (WHO) reported that household consumption of fruits and vegetables in Sub-Saharan Africa is often determined by knowledge of the benefits of fruits and vegetable consumption, the level of income, preferences, personal experience, and cultural norms (Ruel and Minot, 2005). However, the knowledge that fruit and vegetable (FV) intake promotes health and well-being may not be enough to ensure adequate consumption according to current guidelines. Other factors like personal habits, curiosity, individual preferences, and medical restrictions were also mentioned in this study. Among adults in the United States, aside from knowledge, self-efficacy and perceived social support were positively associated with fruits and vegetable consumption (McSpadden et al., 2016). Incorporating strategies to promote knowledge and build habits that promote FV should be considered in designing health programs to address FV consumption.

The understanding that personal preferences exist and may affect such interventions' success was also noted in this study. Respondents mentioned that the habit of FV consumption in childhood might encourage consumption in adulthood. This trend was also discovered in a 21-year prospective study carried out among young Finns. The study demonstrated that low nutritional fat and increased fruit and vegetable consumption formed in childhood did not change in adulthood (Mikkilä et al., 2004). Hence, encouraging children to develop fruit and vegetable intake habits may encourage them to make healthy food choices in adulthood.

Long preparation times and poor availability of FV negatively influence FV consumption. A qualitative study conducted among women in the Canadian province of Prince Edward Island, exploring the benefits and barriers to FV intake, discovered that long preparation time, the effort required to prepare, and lack of availability due to high costs and seasonality of FV serve as deterrents to their intake (Maclellan et al., 2004). Similar findings were observed among adults in Perth, Australia (Pollard, 2008).

Developing countries face policy-related and structural barriers to fruit and vegetable production and availability (Thow and Priyadarshi, 2012). We also noted

that environmental and economic challenges such as poor electricity supply and inadequate infrastructure for food processing and storage impact FV consumption. Inadequate supply of electricity discourages bulk buying and preparation, thereby reducing consumption. The high costs of FV in urban settings, low feasibility of self-production, seasonality of fruits and vegetables, and their ability to perish within a limited time, especially in countries without adequate technological facilities for proper storage or year-round availability, reduces adequate FV consumption and can reduce their nutritional value even when consumed. A qualitative study carried out in rural communities in Ghana noted that some families who prepare soups in bulk resort to repeated re-heating due to poor electricity and storage facilities (Omari et al., 2017). This may potentially lead to loss of micronutrients. Efforts to provide consistent power supply or alternative power sources such as solar and the provision of technologies that promote FV processing and storage are required to address this important barrier.

We noted that unsafe chemicals used to ripen fruits artificially might discourage some people from taking certain fruits. Chemicals such as calcium carbide, sometimes used to induce premature ripening, are injurious to health (Asif, 2012). These chemicals are linked to various health hazards like headache, dizziness, mood disturbances, sleepiness, mental confusion, memory loss, cerebral oedema, and seizures (Asif, 2012). This product has been banned in several developed and developing countries, including the USA and India. In Nigeria, the National Agency of food and drug administration and control issued a warning in 2018 to farmers advising them against using such chemicals; however, there is no national policy banning its use in Nigeria. The need for a national policy to address this and similar harmful practices is urgently warranted.

Culture may encourage or discourage the consumption of fruits and vegetables. In certain Nigerian cultures, traditional meals are often seen as incomplete without the inclusion of vegetables. Also, fruits are often planted in home gardens where space permits, allowing easy access and consumption. Reinforcing positive cultural practices such as these may improve fruit and vegetable consumption. Cultural influences impact on choices of diet and food preparation. The main factors influencing diet preference are traditions, beliefs, values, and cultural habits (PHAS, 2020). However, culture changes over time due to acculturation caused by migration and urbanization, which is often responsible for deviation from the traditional diet.

Food taboos were mentioned as a cultural barrier to fruit and vegetable intake by some of our study respondents. Food taboos may serve as a unifying factor; any food taboo acknowledged by a group of people as part of its norms may assist in maintain group identity and create a sense of belonging for its members (Meyer-Rochow, 2009). However, some food taboos may be harmful to health due to restrictions placed on otherwise nutritious and healthy food, leading to nutritional deficiencies. Most food taboos put the underprivileged and most vulnerable people, such as pregnant women, children, and the elderly,

at a nutritional disadvantage (Onuorah and Ayo, 2003).

Our study suggests that religion may play an important role in adopting positive health behaviours as it was noted that certain bible scriptures promote FV consumption and healthy eating. Others have pointed out the positive association between spirituality and fruit and vegetable consumption, such as the church providing FV during the fasting season (Tan et al., 2013). Some studies have demonstrated that some holy books such as the Bible and the Quran promote FV intake, similar to our findings (Aboul-Enein, 2017; Khazan, 2013). The teaching that God sees the human body as sacred and not to be treated irreverently may consciously encourage the members to make healthy food choices. We also noted that church leaders need to be educated on the importance of fruit and vegetable intake and their impact in preventing and controlling NCDs. Participants stated the biblical support for fruit and vegetable consumption and often followed such admonition if emanating from the pulpit. Incorporating such messages into pastoral sermons may be useful in promoting the consumption of fruit and vegetable among church members. This discovery may strengthen the link between faith-based interventions and positive health outcomes, as some studies have demonstrated the success and effectiveness of using religious leaders in health promotion interventions (Gichuru et al., 2018; Heward-Mills et al., 2018).

This study uses a large sample size to qualitatively explore the facilitators and barriers to FV consumption among church members. It has some limitations, and the findings should be interpreted with some caution. First, participants were purposefully selected consistent with qualitative methodologies, which may create some bias; however, the large sample size and data collection till saturation may ameliorate this. Second, the study was conducted among members of a single church denomination. The results cannot be generalized to other denominations or religions due to differences in religious beliefs and norms. Finally, because data were collected face to face and in a group format, the possibility of social desirability bias cannot be ruled out.

Our findings highlight the important barriers and facilitators to fruit and vegetable consumption among church members. Education on the health benefits of FV consumption, addressing personal and family barriers, suggesting innovative ways of FV storage to ensure that the fruits and vegetables retain their nutritional value over time are essential. FV interventions should also leverage the biblical support for FV consumption. There is also the need to advocate for policies that discourage unsafe chemical ripening and improve FV availability and affordability in urban areas. The insights should be incorporated into the design and implementation of FV interventions in church settings.

Author Contribution Statement

Authors O.O.*, F.O. and K.O. came up with the concept and design, authors O.O.*, O.O. and K.O. did the literature search, O.O.* and O.O. were responsible for the data acquisition and analysis. All the authors agreed on

the definition of intellectual content and all participated in manuscript preparation, editing and review. Data will be made available on request.

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