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Healthy eating, healthy lives: examining sustainable food choices and household reported ailments in Oyo State, Nigeria

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Abstract

This study explored food choices, awareness, and consumption of healthy and sustainable food (HSF), along with the determinants and implications of HSF consumption on reported ailments among households in Oyo State, Nigeria. A multistage sampling technique was used to select 240 households. Descriptive statistics were used to analyze socio-economic and demographic characteristics, food consumption patterns, awareness levels, HSF consumption, and reported ailments. Two Ordinary Least Squares (OLS) regression models were estimated to identify the determinants of HSF consumption and the covariates of reported ailments. Findings revealed that female-headed households had slightly higher HSF awareness (87.5%) than male-headed ones (84.0%), with fewer reported ailments. Higher-income households (>₦200,000/month) consumed less HSF (mean, 0.6249) and reported more ailments (mean, 2.29) than lower-income households (<₦50,000/month), which had higher HSF consumption (mean, 0.8345) and fewer ailments (mean, 1.78). Urban households consumed less HSF (0.6667) and reported more ailments (mean, 1.88) than rural households (0.8312 mean consumption, 1.54 mean ailments). Determinants of HSF consumption included the age of the household head, rural residence, and employment in agriculture, which were all positively related to HSF consumption. On the other hand, a negative relationship was found between HSF consumption and reported ailments (coefficient -1.3331, p = 0.001) and between physical activity and reported ailments. The study concluded that increasing HSF awareness and availability, especially in urban and higher-income households, could improve health outcomes and reduce ailments. It recommended promoting nutrition education and enhancing HSF accessibility to foster better health outcomes.

Keywords: *Healthy and Sustainable Foods; reported ailments; Ordinary Least Squares regression; Oyo State, Nigeria*

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Introduction

Food systems include all inputs (environment, people, processes, infrastructure and institutions), activities, actors as well as outcomes (nutrition and health, economic, social and environmental outcomes) that are involved in the production, processing, distribution, preparation, and consumption of food. This encompasses the entire food supply chain, from farm to table, as well as the interconnections and impacts of each component on overall food

security, sustainability and health outcomes of consumers (HLPE, 2014). Beyond providing for the livelihood and consumption needs of actors, food systems are also meant to provide a variety of foods that make up the ideal diet for consumers (GloPan, 2016). The ideal diet may be defined as healthy food of sufficient quality and quantity that is affordable, safe and culturally acceptable for the optimal nutritional and health status of its consumers (Drewnowski, 2014; Donati *et al.,* 2016). That this "ideal diet" is lacking on the tables of many households around the world is evidenced by the continued high prevalence of malnutrition in many countries in the form of undernutrition, micronutrient deficiency and overweight or obesity, with some countries struggling with multiple forms (DI, 2018). While there are many underlying factors that drive malnutrition, suboptimal diets are a major factor leading to poor nutritional outcomes (Lartey, 2008; Imamura *et al.,* 2015; Mozaffarian and Forouhi, 2018). Therefore, a lack of understanding of the importance and potential impacts of poor dietary choices by many consumers deepens the existing problems of malnutrition, resulting in grave health outcomes among many households and individuals.

Dietary choices, whether healthy or unhealthy, are rooted in the food system, and the capacity of the food system to sustainably cater for the food needs of households and individuals is crucial to ensuring nutritional security, public health and overall socioeconomic wellbeing. It is important to understand how the food system evolves in its ability to provide a nutritious diet while minimizing the potential negative impacts on the environment (Ranganathan *et al.,* 2016; Willett *et al.,* 2019). With urbanization and globalization, economic growth and consolidation of the food industry, however, food systems and actors have become more complex, thereby increasing the potential negative impacts on health and nutrition as well as the environment in which food production and distribution is done (Glopan, 2016; HLPE, 2017).

General food consumption trends across the world, including in Nigeria, reveal increased consumption of meat, raw dairy products and highly processed meals (FAO UN, 2011). This, combined with an increase in sedentary lifestyles and modern diets, has led to an increase in obesity, even in children and adolescents according to the World Health Organization (2005). Similarly, Adegboye *et al.* (2016) reported that there was increasing evidence of dietary transitions from the 'traditional' to more processed foods in Nigeria with attendant upward trends in the incidence of poor nutritional outcomes among households in the country. As opined by Carlsson-Kanyama and Gonzalez (2009), good nutritional outcomes result from positive dietary adjustments such as reduction in the amount of cholesterol consumed through foods like red meat along with a conscious decision to purchase more of organically produced food than conventional ones. Furthermore, the traditional Mediterranean diet, the low-meat flexitarian diet, the pescatarian diet, as well as the vegetarian diet have consistently been shown, by research, to be associated with reduced morbidity and mortality in the United States, European Union and other high-income countries (Willett *et al.,* 2019). These diets mostly include whole grains, fruits, vegetables, nuts and seeds, legumes, oils, and healthy fats, with very limited inclusion of animal food products sugars, sweeteners and alcohol (De Souza *et al.,* 2015). It is also noteworthy that consumers can adjust Mediterranean, pescatarian, vegetarian or vegan diets based on personal food preferences, availability, culture and socioeconomic values within the ambits of healthy dietary guidelines in order to ensure that their nutritional needs are met while giving due consideration to their individual circumstances and lifestyle choices (Satija *et al.,* 2017).

Over the past few decades, Nigeria has experienced rapid urbanization, along with a fast-growing population, which has caused significant changes in both rural and urban food systems along with unprecedented nutritional problems occasioned by significant changes in food and nutrition choices made by individuals and households (Mekonnen *et al.,* 2011). For example, high Body Mass Index (BMI) related deaths have increased by 29% among females and by 79% among males between 1990 and 2015 in the country (GBD, 2015; Obesity

Collaborators, 2017). This represents a dire situation and requires deliberate policy intervention along with advocacy in order to stop (or reverse) the tide of such morbid nutrition outcomes for individuals and households in Nigeria.

In the light of the foregoing, this study sought to examine the healthy and sustainable food (HFS) consumption patterns of households in Oyo state, (south western) Nigeria and their relationship with reported ailments among the households. Specifically, it aimed at determining the level of awareness of households with regards to HSFs, examining the patterns of consumption of HSFs and reported ailments among household members, analyzing the factors influencing the extent of consumption of HSFs among households and evaluating the effect of HSFs consumption on reported ailments among the households.

Theoretical Underpinning of the Study

This study is underpinned by a number of theories in economics and nutrition which were reviewed and summarized as follows:

The Theory of Consumer Behaviour which posits that consumers seek to maximize their satisfaction from consuming a bundle of commodities based on their preferences among goods. It combines elements of positive theory (how individuals react to economic changes) and normative theory (utility maximization). A number of important economic models underpin this theory, including Duesenberry's Theory of Relative Income, which emphasizes individual consumption relative to income earned by other economic agents; the Life Cycle Hypothesis by Modigliani and Ando, which explains lifetime income expectations; and Friedman's Permanent Income Hypothesis, which is focused on long-term income stability (Duesenberry, 1949; Friedman, 1957; Modigliani & Ando, 1963).

The Food Choice Process Model developed by Furst *et al*. (1996) which examines how food choices made by individuals and households are influenced by their life experiences, cultural values, and social contexts. It uses elements like life course trajectories, cultural ideals, personal factors, resources, social influences, and current contexts to explain how personal systems (cognitive processes and strategies) result in individual food decision-making while balancing competing values like taste, cost, and health. An extension of the food choice process model is *The Household Production Model* which models households as both producers and consumers, who balance their time, skills, and purchased goods in order to maximize satisfaction, within constraints of income and available technology (Becker, 1965; Lancaster, 1966).

The Utility Theory, the Multi-Attribute Decision Model and ***the Subjective Expected Utility (SEU) Model***, which center on how consumers decide among different choices and manage uncertainty. While the Utility Theory assumes that consumers rank their choices based on satisfaction (Hicks, 1939), the Multi-Attribute Model posits that the decision maker chooses based on decision-relevant attributes which ignore social factors (Shafir and LeBoeuf, 2002) and the SEU Model goes further by including subjective probabilities in order to address uncertainty in decision outcomes (Edwards, 1954). On the other hand, *the Health Economics Theory*, considers health as both a consumption and investment good, opining that health investments affect well-being and productivity (Grossman, 1972; Parkin, 2017).

Materials and Methods

The Study Area

Oyo State is one of the 36 states of the Federal Republic of Nigeria and it is located in the south western part of the country, covering about 28,454 square kilometers of land area. Oyo State has an equatorial climate with dry and wet seasons and relatively high humidity along with average daily temperatures ranging from 25 °C (77.0 °F) to 35 °C (95.0 °F) all of which support the production of a wide array of both plant and animal food products. The data for this study was obtained from the Ido Local Government

Area (LGA) which is located between latitude 7.524348N and longitude 3.723389E. With an estimated land area of 1,010.95 square kilometers, Ido LGA is one of the largest in the state and it contains both urban and rural sections. Due to its fertile soil and friendly topography, residents mostly engage in farming as their means of livelihood. However, the LGA has also been affected by urban industrialization which has led to a noticeable presence of industrial and mining activities.

Sampling and Data Collection

Primary data for the study was collected through a multistage sampling procedure, after Ido LGA had been randomly chosen, culminating in 240 households being selected for the study. The first stage of sampling involved the stratification of Ido LGA into urban and rural communities (or wards). In the second sampling stage, four communities were randomly selected from both the urban and rural strata (making 8 communities in total). Finally, the third stage of sampling was the random selection of households from each of the eight communities (4 urban and 4 rural communities) in a proportionate-to-size fashion. The rural communities selected were Akindele, Akinware, Akufo, and Araromi, while the urban communities were Awotan, Ido, Ologuneru, and Apete. In all, 272 households were selected for the study. However, after the survey, only 240 responses were found to be usable for analysis. Information was obtained from respondents with the aid of a structured questionnaire administered on household heads. Data on socioeconomic characteristics of households, food consumption, reported ailments, among others were got from household heads.

Analytical Techniques

In this study, healthy and sustainable food (HSF) consumption was conceptualized as the consumption of whole plant foods and minimally processed foods. Information was collected from households based on a reference period of 24 weeks (6 months).

Descriptive statistics were used to profile the socioeconomic characteristics, level of awareness of HSFs, extent of HSF consumption, and number of reported ailments among households. *The reported ailments included in the study were those for which a diagnosis had been obtained from a competent medical institution during the past 24 weeks.*

The extent of HSF consumption (Y_i) was computed as a ratio of the total expenditure on HSFs by a household to the total food expenditure of the household during the reference period of 24 weeks as shown in Eq. 1:

$$y_i = \frac{HSFs\ expenditure\ of\ Household\ in\ naira}{Total\ food\ expenditure\ in\ naira} \quad (1)$$

The Ordinary Least Squares (OLS) regression technique was used to analyze the determinants of the extent of consumption of HSFs by the households and the effect of HSFs consumption on the frequency of reported ailments by households during the past 24 weeks.

The OLS regression models were of the general form:

$$y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon_i \quad (2)$$

Where, y_i = Extent of HSF consumption (in OLS model 1) and Number of reported ailments by households during the past 24 weeks (in OLS model 2)

β = Parameters to be estimated (β_0 = constant term)

ε_i = error term

The explanatory variables in OLS model 1 are:

X_1 = Age of household head in completed years

X_2 = Age of Spouse in completed years

X_3 = Sex of household head (1 = Male, 0 otherwise)

X_4 = Number of years of formal education of household head

X_5 = Total household monthly income in Naira

X_6 = Awareness of household head of benefits of HSFs (Aware = 1, 0 otherwise)

X_7 = Household size (number)

X_8 = Location of household (Rural = 1, urban = 0)
X_9 = Occupation of household head (Agriculture = 1, 0 otherwise)
X_{10} = Occupation of spouse (Agriculture = 1, 0 otherwise)
X_{11} = Household experienced location change (migration) (Yes =1, 0 otherwise)

The explanatory variables in OLS model 2 are:

X_1 = Age of household head in completed years
X_2 = Sex of household head (Male = 1, 0 otherwise)
X_3 = Total household monthly income in Naira
X_4 = Extent of consumption of HSFs by household (ratio)
X_5 = Household size (number)
X_6 = Occupation of household head (Agriculture = 1. 0 otherwise)
X_7 = Occupation of spouse (Agriculture = 1. 0 otherwise)
X_8 = Average hours of physical activity per day of household members
X_9 = Household experienced location change (migration) (Yes = 1, 0 otherwise)
X_{10}= State of household housing (Poorly ventilated without mosquito nets = 1, 0 otherwise)
X_{11} = Household water source (Treated water source = 1, 0 otherwise)
X_{12} = Household has access to modern sanitary facilities (Yes = 1, 0 otherwise)

Results

Socioeconomic Characteristics of Households, HSF Awareness, Consumption Pattern of HSFs and Household Reported Ailments

The socioeconomic distribution of the households used for the study, their awareness of HSFs, the mean extent of their HSF consumption as well as their mean reported ailments are presented in **Table 1**. The majority of the households were male-headed (83%), with an average of about 6 members. Household heads were also mostly within their economically active years with an average age of 48 years and had almost 13 years of formal education on average. **Tables 2** and **3**, show the food consumption pattern and distribution of reported ailments, among the respondents, in the last 6 months.

Table 1

Distribution of Socioeconomic Characteristics of Households by Awareness, HSF Consumption Pattern and Reported Ailments in Oyo State, Nigeria

Variables	**Distribution of variables (n = 240)**			
	Percentage of Sample	Awareness level (%)	*Mean extent of HSF consumption	#Mean number of reported ailments in the past 24 weeks
Sex of household head				
Male	83.33	84.00	0.7568	1.73
Female	16.67	87.50	0.7099	1.63
Number of Years of formal education of household head				
0 – 6	14.58	7.08	0.8523	1.51
7 – 12	35.42	29.58	0.7794	1.69
13 – 18	47.92	45.83	0.6984	1.76
>18	2.08	2.08	0.6714	2.20
Mean ± S.D = 12.50 ± 3.87				
Age of household head				
≤30	3.75	3.75	0.8165	1.22
31 – 45	32.08	28.75	0.7211	1.62

46 – 60	53.75	45.83	0.7437	1.79
61 – 75	9.58	5.42	0.8456	1.65
>75	0.83	0.83	0.7472	2.50
Mean ± S.D = 48.41 ± 9.59				
Marital status of household head				
Married monogamous	71.25	62.92	0.7331	1.69
Married polygamous	16.25	11.25	0.7951	1.80
Never married	5.83	5.42	0.7407	1.57
Divorced	0.42	0.42	0.9603	1.00
Separated	0.83	0.83	0.6800	1.00
Widow/widower	5.42	3.75	0.8224	2.00
Sector of Occupation of household head				
Agriculture	32.08	23.33	0.8188	1.61
Civil service	17.08	17.08	0.6750	1.61
Trading	15.83	13.33	0.7206	1.61
Private salary	21.67	19.58	0.7355	1.87
Artisans	12.92	10.83	0.7292	1.90
Others	0.42	0.42	0.7977	3.00
Total monthly income of household				
<50,000	7.50	5.83	0.8345	1.78
50,000 – 100,000	56.67	47.50	0.7837	1.56
100,001 – 150,000	25.83	22.92	0.6836	1.89
150,001 – 200,000	6.25	5.00	0.6677	1.93
200,001 – 250,000	2.92	2.92	0.6249	2.29
>250,000	0.83	0.42	0.6931	2.00
Mean ± S.D = ₦98,272.92 ± ₦45,575.51				
Household size				
1 – 4	22.50	19.58	0.7392	1.69
5 – 7	59.58	52.50	0.7416	1.71
8 – 10	15.42	10.83	0.7731	1.73
>10	2.50	1.67	0.8643	1.83
Mean ± S.D = 5.85 ± 2.12				
Location of household				
Rural	50.00	39.58	0.8312	1.54
Urban	50.00	45.00	0.6667	1.88
Water source of household				
Tap water (Treated)	29.58	25.50	0.6787	1.99
Well (Treated)	69.17	55.83	0.7773	1.58
Streams/Rivers (Untreated)	1.25	1.25	0.8445	2.00

HSF = Healthy and Sustainable Food
** Table 2 provides a distribution of the food consumption pattern of the households*
 # Table 3 provides a distribution of the major ailments reported by the respondents

Determinants of the Extent of Consumption of HSFs

The parameter estimates of the OLS regression model for the determinants of the extent of HSF consumption by households are presented in **Table 4**. Among the variables regressed on the dependent variable, the age of the household head, the age of the spouse, and the household income, among others, were found to

significantly affect the extent of consumption of HSFs by households.

Table 2

Food Consumption Pattern Among Respondents During the Previous 6 Months in Oyo State, Nigeria

Food Group	Average Consumption in Rural Areas (%)	Average Consumption in Urban Areas (%)	Trend
Staples (Rice, Maize, Wheat, etc.)	90 – 100	95 – 100	High in both areas
Legumes & Nuts (Beans, Groundnuts, etc.)	70 – 100	75 – 100	Slightly higher in rural areas
Tubers (Yam, Cassava, etc.)	80 – 100	60 – 90	Higher in rural areas
Fruits (Mango, Orange, Banana, etc.)	50 – 90	60 – 100	Higher in urban areas
Vegetables & Spices (Leafy greens, Onions, Tomatoes, etc.)	80 – 100	85 – 100	High in both areas
Animal Products (Beef, Fish, Eggs, Dairy)	60 – 90	70 – 100	Higher in urban areas
Processed Foods (Bread, Pastries, Soft Drinks, etc.)	10 – 80	50 – 100	Significantly higher in urban areas

Table 3

Reported Ailments among Respondents Within the Previous 6-Month Period in Oyo State, Nigeria

	Malaria	Tuberculosis	Beriberi (thiamine deficiency)	Kwashiorkor	Typhoid fever	Diarrhea	Diabetes	Obesity	Cancer	Stomach ulcer	Food poisoning	High Blood Pressure	Heart-related issues	Stroke	Indigestion
Rural															
Akindele	100	-	-	-	43.3	-	-	-	-	-	6.7	3.3	-	-	16.7
Akinware	100	-	-	-	16.7	-	-	-	-	13.3	-	13.3	-	-	-
Akufo	100	-	-	-	26.7	-	-	-	-	6.7	-	16.7	-	-	6.7
Araromi	100	-	-	-	23.3	-	-	-	3.3	3.3	-	16.7	-	-	-
Urban															
Awotan	93.8	-	-	-	31.3	-	-	18.8	-	6.3	-	37.5	-	-	18.8
Ido	94.3	-	-	-	31.4	-	-	2.9	-	8.6	11.4	5.7	2.9	-	8.6
Ologuneru	100	-	-	-	40.0	-	12.0	16.0	-	-	-	-	-	4.0	32.0
Apete	97.7	2.27	2.27	2.27	31.8	2.27	6.82	9.1	-	9.1	2.3	13.6	-	-	9.1

** Figures are percentages*

Table 4

OLS Parameter Estimates of the Determinants of Extent of HSF Consumption in Oyo State, Nigeria

Variables	Coefficient	Standard error	t-value	P > | z |
Age of household head	0.0000296***	9.04e-06	3.27	0.001
Age of spouse	-0.0000293**	0.0000121	-2.43	0.016
Sex of household head	0.0083005	0.0203956	0.41	0.684
Education of household head	-0.0008007	0.0030122	-0.27	0.791
Total household monthly income	-0.00000059***	2.04e-07	-2.90	0.004
Awareness of HSF	0.0004234	0.0227489	0.02	0.985
Household size	0.0072781*	0.0041703	1.75	0.082
Location of household	0.1665359***	0.018129	9.19	0.000
Occupation of household head	0.052502***	0.0202812	2.59	0.010
Occupation of spouse	0.0504297	0.0321725	1.57	0.118
Household location change	0.03513*	0.0195598	1.80	0.074
Constant	-0.4350557	0.0532531	-8.17	0.000
Number of obs. = 240; F (11, 228) = 26.27; Prob > F = 0.0000; R-squared = 0.5590				
Adjusted R-squared = 0.5377; Root Mean Squared Error = 0.1112				

**** Significant at 1%, **Significant at 5% and *Significant at 10%.*

Effect of HSF Consumption on Reported Ailments among Households

Table 5 shows the parameter estimates of the covariates of households' reported ailments in Oyo state, Nigeria. The extent of HSF consumption was found to be a statistically significant determinant of reported ailments among the households. Also, the sex of the household head, household size, hours of physical activity among others, were significant variables.

Table 5

OLS Parameter Estimates of the Covariates of Households' Reported Ailments in Oyo State, Nigeria

Variables	Coefficient	Standard error	t-value	P > | z |
Age of household head	0.1545	0.1595	0.97	0.334
Sex of household head	0.4110*	0.2199	1.87	0.063
Total household monthly income	-0.2385	0.1594	-1.50	0.136
Extent of HSF consumption	-1.3331***	0.3859	-3.45	0.001
Household size	0.3097*	0.1808	1.71	0.088
Occupation of household head	-0.0021	0.2034	-0.01	0.992
Occupation of spouse	-0.0424	0.3201	-0.13	0.895

Average hours of physical activity	-0.3128***	0.1066	-2.93	0.004
Location change (migration)	0.4892**	0.1966	2.49	0.014
State of household housing	0.7972*	0.4673	1.71	0.089
Household water source	-0.5055**	0.2048	2.47	0.014
Modern sanitary facilities	-0.1084	0.1615	-0.67	0.503
Constant	2.0205	1.9111	1.06	0.292
Number of obs. = 240; F (12, 227) = 3.25; Prob > F = 0.0002; R-squared = 0.1468; Adjusted R-squared = 0.1017; Root Mean Square Error = 0.79366				

****Significant at 1%, ** Significant at 5%, and *Significant at 10%.*

Discussion

Socioeconomic Characteristics of Households, HSF Awareness, Consumption Pattern of HSFs and Household Reported Ailments

The analysis of the socioeconomic characteristics of households in Oyo State, reveals significant gender disparities in awareness and consumption of HSFs as well as their correlation with household-reported ailments. For example, female-headed households showed slightly higher levels of HSF awareness (87.5%) than their male-headed counterparts (84.0%) and these results were associated with fewer reported ailments among female-headed households (1.63) than the male-headed ones (1.73). These results suggest that HSF awareness needs to be increased among male-headed households. Similarly, properly targeted nutrition education programmes aimed at male heads of households could close this gap and improve health outcomes.

The findings also reveal the relationships among educational attainment, HSF awareness, and consumption. It was found that households with heads having 13-18 years of formal education showed the highest awareness (45.83%) and moderate HSF consumption (0.6984). However, they reported more ailments (1.76) than those with 0-6 years of education (7.08% awareness, 0.8523 consumption, and 1.51 ailments). While these results might seem to be counterintuitive, the higher reported ailments among households of the more educated heads could partly be an indication of their better health-seeking behaviour resulting in more diagnoses of ailments. Furthermore, age showed important connections with HSF consumption and health, as households with older heads (61 – 75 years) showed higher consumption (0.8456) than all other age categories. However, the second highest consumption rate (0.8165) and fewest ailments (1.22) were reported among those aged ≤30 years while those aged >75 years reported the most ailments on the average (2.50). Based on the foregoing, it is clear that practical education campaigns that align awareness with dietary practices, particularly for less educated households, are needed to improve their health outcomes.

Income levels and household sizes also played a crucial role in HSF consumption and reported ailments. As **Table 1** shows, higher-income households (>₦200,000 monthly income) had lower HSF consumption (0.6249) and higher mean reported ailments (2.29) than the lower-income households (<₦50,000), who showed higher HSF consumption (0.8345) and lower mean reported ailments (1.78). These findings may be attributable to the transition to ultra-processed foods by many higher-income households in modern society as opined by Adegboye *et al.* (2016). On the other hand, larger households (8-10 members) consumed more HSF (0.7731) but reported more ailments (1.73) compared to smaller households (1-4 members) with 0.7392 consumption and 1.69 ailments. Furthermore, urban households consumed less HSFs (0.6667) and reported more ailments (1.88) than rural households (0.8312 consumption and 1.54 ailments), which is a consequence of the lower access to healthy food options in urban areas relative to the rural. These findings call for interventions that explore

education, occupational health, and bridging urban-rural disparities in a bid to enhance public health through better nutrition.

With regards to the occupation of the respondents, only 23.33% of household heads engaged in agriculture claimed to be aware of HSFs. However, their households had the highest consumption rate of HSFs (0.8188) and the joint least mean number of reported ailments (1.61). Given the fact that farming is mostly practiced in the rural areas in Nigeria, it is instructive that a similar pattern is seen with regards to the location of households: while fewer rural dwellers (39.58%) claimed awareness of HSFs than their urban counterparts (45%), consumption rates were much higher among the rural respondents (0.8312) than the urban (0.6667). Reported ailments were also less common among the rural respondents (1.54). These facts suggest that while awareness might be relatively low among rural/agricultural communities about the health benefits of HSFs, these foods already make up a large proportion of their diets and they are already inadvertently reaping the benefits of their dietary choices through improved health outcomes.

Determinants of the Extent of Consumption of HSFs

The age of the household head was positively related to HSF consumption, with a coefficient of 0.0000296 ($p=0.001$). This means that older household heads in Oyo state were more likely to consume HSFs which is expected as older persons tend to become more health-conscious to maintain a reasonable level of physical health as they age. This finding agrees with Carlsson-Kanyama and Gonzalez (2009) who noted that many individuals make more informed choices about their nutrition with age. The total household monthly income showed a negative relationship with HSF consumption (-0.00000059; $p=0.004$). This suggests that as household income increases, the extent of HSF consumption slightly decreases. The findings of Adegboye *et al.* (2016) suggest that wealthier households in Nigeria tend to substitute HSFs with highly processed foods which is corroborated by the foregoing finding. Moreover, the statistical significance ($p<0.01$) and the t-value of -2.90 support this finding. This, therefore, calls for extensive advocacy, especially among middle to upper-income urban dwellers, on the need for healthier food choices to improve nutritional outcomes.

The results also indicate that the location of the household was a strong determinant of HSF consumption as shown by the positive coefficient of 0.1665359 ($p<0.001$). The high significance level and t-value of 9.19 highlight the pronounced effect of rural living on HSF consumption, as the result indicates that being a rural dwelling household was associated with greater consumption of HSFs relative to urban households. This situation can be explained by the higher cost and lower availability of HSFs in urban areas in Nigeria where they are scarcely produced. This is a direct reflection of the inefficiencies in the food system where significant post-harvest losses are recorded between the farm gates in the rural areas and the urban centers. Further, the activities of middlemen in most agricultural value chains push up prices of HSFs and exacerbate the accessibility problem of HSFs in urban areas in Nigeria. Other notable determinants from the OLS model were household size which showed a positive relationship with HSF consumption ($p=0.082$) indicating that larger households tended to consume more HSFs; and occupation of the household head (positive, $p=0.010$) which showed that being employed in agriculture was associated with higher consumption of HSFs relative to being employed in other sectors. The model's R-squared value of 0.5590 indicates that approximately 56% of the variation in HSF consumption was explained by these variables, with an adjusted R-squared of 0.5377 showing a good fit. These results show how important socioeconomic and demographic factors are in shaping dietary patterns and can serve as bases for designing interventions to promote healthier eating habits across different household strata.

Effect of HSF Consumption on Reported Ailments among Households

Significantly, the results show that there is a negative relationship between the extent of healthy and sustainable food (HSF)

consumption and the average number of reported ailments by a household (coefficient -1.3331, p=0.001). This implies that households with higher HSF consumption tend to report fewer illnesses and, as argued by Imamura *et al*., (2015) and Lartey (2008), healthy dietary practices are directly linked to optimal physical condition and can be deployed as means for achieving improved public health with important ramifications for overall labour productivity and economic growth. The significant negative coefficient of the average number of hours household members spent in physical activity (-0.3128, p=0.004) further supports the argument about the importance of lifestyle choices in health outcomes.

The positive significant coefficient of sex of the household head (0.4110, p=0.063) implies that male-headed households tended to report more ailments in Oyo state. This could indicate differences in health-seeking behaviors between male and female household heads and necessitates more health advocacy targeting households with poor health-seeking patterns. Household size is positively associated with reported ailments (coefficient = 0.3097, p=0.088), implying that larger households might experience more health challenges, likely due to resource constraints which may lead to increased exposure to illness.

It was also found that households that experienced migration or location change were more likely to report ailments (coefficient = 0.4892, p=0.014) than those that had not. This may reflect the disruption in household dynamics associated with relocation as well as the initial imbalances (including health changes) that come with adjusting to new environments for migrants. Furthermore, poor housing conditions, as reflected in houses lacking good ventilation and mosquito nets, were found to be positively and significantly (coefficient = 0.7972, p=0.089) associated with reported ailments among households. This is expected since malaria, which was reported by almost all the households in the study (See **Table 3**), remains endemic in most parts of the tropics, and good housing conditions are crucial to preventing the ailment. The OLS estimates also revealed that households' having access to treated water sources was associated with fewer reported ailments (coeff. = -0.5055, p=0.014). This finding further highlights the importance of improving living conditions and access to clean water for healthy lives. These findings emphasize the diverse nature of factors that influence household health outcomes and the need for far-reaching policies that address dietary habits, lifestyle choices, and living conditions to reduce the burden of illness.

Conclusion

The analysis of the socioeconomic and demographic characteristics, awareness, and consumption patterns of healthy and sustainable foods (HSFs) among households in Oyo State, Nigeria, has exposed the important determinants of HSF consumption and its implications for household, community and national health. The study showed that female-headed households exhibited slightly higher HSF awareness and consumption levels relative to their male-headed counterparts, and these results were correlated with fewer reported ailments. It was also found that age, household income and location significantly influenced HSF consumption. Older household heads and those living in rural areas consumed more HSFs, while urban-dwelling, higher-income households showed lower consumption of HSFs as they increasingly substituted them with more processed food resulting in more reported ailments. The results suggest that enhancing HSF awareness and accessibility, particularly among urban and higher-income households, can potentially improve health outcomes and reduce reported ailments.

Recommendations

The following recommendations are therefore made based on the findings of this study:

Promotion of Nutrition Education Programmes
The study showed that urban residents and higher-income households were less likely to consume HSFs. Therefore, it is recommended that regular and far-reaching nutrition education campaigns aimed at increasing awareness of the benefits of HSFs should be promoted by state

and local governments as well as non-governmental organizations.
These programmes should mainly target urban dwellers and higher-income groups and emphasize the importance of incorporating HSFs into their diets. These initiatives should also focus on the health benefits of HSFs for all age groups, highlighting their role in preventing ailments, maintaining overall healthy lives and enhancing productivity. Policymakers can integrate HSF promotion into broader health and agricultural policies to ensure a cohesive approach to improving dietary habits and public health outcomes.

Enhancing Availability and Accessibility to HSFs: Efforts to improve the availability and affordability of HSFs, especially in urban areas where consumption is lower, need to be put in place. This can be achieved through the development of urban agriculture initiatives, financial and technical support for local farmers and policies that reduce the cost of HSFs such as improved rural-urban transportation systems and road networks that will ensure adequate supply of HSFs, reduced post-harvest losses and consequent lower prices. Controlling the exploitative activities of middle-men by empowering farmers to sell their produce themselves through well-tailored "Farm-to-Market" schemes can also enhance overall consumption of HSFs. Ensuring that HSFs are readily accessible can encourage higher consumption among urban households and those with higher incomes, who may currently rely more on processed foods.

***Incentivizing Healthy Eating Habits*:** By introducing incentives for households to prioritize HSF consumption such as subsidies on HSFs and support for farmers producing them, significant strides can be made in increasing their consumption. Making HSFs cheaper for households will encourage them to incorporate them into their regular diets. Further, existing agricultural credit schemes such as the "Anchor Borrowers Programme" can be modified to include HSF production and consumption support for farming households along with training and subsidy components in order to further promote their consumption among citizens.

Targeted Support for Rural and Low-Income Households: While the study showed that rural and low-income households were more likely to consume HSFs, providing additional support can further enhance their dietary patterns and overall quality of life. Access to resources such as seeds and farming tools as well as training on sustainable agricultural practices and ensuring access to clean water and good housing can go a long way to improve income and health outcomes among these groups.

By implementing these recommendations, stakeholders can foster an environment that supports higher HSF consumption, leading to improved health outcomes and reduced incidence of ailments among households in Oyo State and Nigeria as a whole.

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