

# Women's Perception of and Readiness to Adopt A Healthy and Sustainable Diet: A Cross-Sectional Survey in Enugu City, Nigeria

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## Research Article

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## Abstract

**Background:** Perceived benefit of and readiness to adopt healthy and sustainable diets (HSDs) is under-investigated in low-resource countries. We assessed women's perceived benefit of and readiness to adopt HSDs and their associated factors in Enugu Metropolis, Nigeria.

**Methods:** A household cross-sectional survey of childbearing age women (n = 450) was conducted in January and February 2021 using a questionnaire assessing food choice motives, perceived benefit, and readiness to adopt HSDs. Readiness to adopt HSDs was grouped into pre-contemplation and contemplation (PC/C), preparation and relapse (P/R), and action and maintenance (A/M). Data were analysed using univariate and bivariate statistics and multinomial logistic regression. Statistical significance was set at alpha 0.05 level.

**Results:** About 79% and 60% of women have high perception and adopted HSDs respectively. Perceived benefit of HSD was associated with younger age ( $\beta = -0.20, p < 0.05$ ), low education ( $\beta = -0.19, p < 0.05$ ), and poor wealth quintile ( $\beta = -0.57, p < 0.001$ ). PC/C was predicted by low perceived benefit (OR = 10.07, 95% CI: 4.78-21.22,  $p < 0.001$ ), low education (OR = 2.51, 95% CI: 1.25-5.04,  $p = 0.010$ ), and prioritising taste as a food choice motive (OR = 3.96, 95% CI: 1.61-9.75,  $p = 0.003$ ). PR was predicted by low perceived benefit (OR = 3.92, 95% CI: 1.99-7.73,  $p < 0.001$ ), low education (OR = 1.82, 95% CI: 1.00-3.29,  $p = 0.049$ ). A/M was related to younger age (OR = 0.48, 95% CI: 0.27-0.84,  $p = 0.010$ , PR), and stating health as a food choice motive (OR = 0.14, 95% CI: 0.06-0.36,  $p < 0.001$ , PC/C) and (OR = 0.17, 95% CI: 0.08-0.35,  $p < 0.001$ , P/R). The foregoing findings notwithstanding, significant differences exist in the predictive factors associated with perceived benefits of and readiness to adopt individual healthy and sustainable dietary behaviours.

**Conclusions:** Readiness to adopt HSDs need to improve in Enugu, Nigeria. We identified the factors that should inform dietary guidelines and campaigns to increase women's readiness to adopt HSDs.

## Introduction

Achieving a healthy and sustainable diet (HSD) is a growing global concern given the contributions of food choices and consumption behaviours to human and planetary health and implications for achieving the food security, nutrition, and health targets of the Sustainable Development Goals (SDGs) 2 and 3 [1–4]. Sustainable diets are dietary patterns that promote all dimensions of individuals' health; have low environmental pressure and impact; are accessible, affordable, safe, and equitable; and are culturally acceptable[5]. It aims to achieve optimal growth and development of all individuals and support functioning and physical, mental, and social wellbeing at all life stages for present and future generations. Also, it prevents all forms of malnutrition (including undernutrition, micronutrient deficiency, overweight, and obesity), reduce the risk of diet-related non-communicable diseases (NCDs), and supports the preservation of biodiversity and planetary health[5]. Globally, transitioning towards healthy and sustainable diets requires substantial population-level changes in food consumption practices[5, 6]. These dietary shifts entail shifting consumption away from animal-based foods and towards more plant-based foods such as fruits, vegetables, nuts, seeds, and whole grains; limiting consumption of highly processed foods and beverages[1, 5, 7]; and balancing nutrient requirements, food costs, and cultural acceptance against environmental impact and other social needs[1, 5, 8].

Unsustainable and unhealthy diets contribute significantly to the risk of NCDs[9, 10]. In low- and middle-income countries, urbanization and increasing prosperity have led to a dietary shift termed nutrition transition in which people consume diets high in calories, hydrogenated fats, sugars, and animal products and low in fibre[11, 12]. Highly processed foods that contain high levels of salt, sugar, and fat lead to increasing rates of various chronic diseases, including obesity, diabetes, heart disease, and stroke[13]. Diet-related NCDs are the top risk factors for deaths and disability-adjusted life-years (DALYs) lost[14]. In contrast, adherence to a plant-based dietary pattern reduces the risk of diabetes[15, 16]. Moreover, adopting a healthy and sustainable diet could avert 10.8–11.6 million deaths per year, resulting in 19–24% reduction in deaths among adults[1].

The environmental impact of unsustainable and unhealthy diets is also high. Global food systems emit 20–35 per cent of global greenhouse gas (GHG) emissions, occupying about 40 per cent of the Earth's ice-free land area, resulting in terrestrial and aquatic nutrient pollution and biodiversity loss[17]. Adoption of HSD resulted in reductions of over 70% GHG emission and land use, and 50% water use [18–21]. In the United Kingdom, replacing 50% of meat and dairy products in the diet with fruits, vegetables, and cereals resulted in a 19% decrease in GHG emissions[22]. Also, diets that eliminate red meat have a lower global warming potential[23]. Avoiding air-freighted foods, choosing organic over conventional produce, and reducing meat consumption have high environmental benefits[24, 25]. Nonetheless, consumer awareness of the environmental impact of meat production and willingness to change meat consumption is low[26, 27].

Nigeria is one of the few sub-Saharan African countries to develop food-based dietary guidelines (FBDGs)[28]. FBDGs are a set of simple advisory statements that guide consumers on healthy eating patterns, types of food or food groups, or nutrients needed to promote better nutrition and address diet-related health conditions in a country[29]. Notwithstanding existence of FBDGs since 2006, Nigeria is experiencing a double burden of malnutrition where undernutrition co-exists with rising cases of overnutrition (overweight/obesity) [30]. About 37%, 7%, 22%, and 2% of Nigerian children aged 6–59 months are stunted, wasted, underweight, and overweight[31]. Also, 12% of women aged 15–49 are thin (below a healthy weight according to the body mass index scale), while 28% are overweight or obese[31]. Malnutrition was the leading risk factor for death and disability from non-communicable diseases (NCDs) between 2009 and 2019 in Nigeria [32]. The mortality from NCDs, such as diabetes mellitus, hypertension and dyslipidaemia, increased from 24% in 2014 to 29% in 2018[33, 34].

In response to these unacceptable indices, Nigeria's food and nutrition policy aims to attain optimal nutritional status for all Nigerians by addressing the double burden of undernutrition and overweight/obesity[30]. The FBDG in Nigeria advises consumption of a variety of foods including bread, grains and tubers, vegetables, and fruits at every meal; consumption of eggs, fish, meat, and dairy in moderation; and limitation of sugar, fat, and salt[35]. However, adherence to these guidelines is poor due to low dietary diversity in both rural and urban areas[36–38]. Whereas international dietary guidelines focus on healthy and sustainable diets that aim to address health, economic, and environmental dimensions of food systems, the Nigerian FBDG narrowly focuses on nutritionally adequate and healthy diets. That notwithstanding, applying the international dietary guidelines to Nigerian setting would support a shift towards

alternative sustainable dietary guidelines in Nigeria, and facilitate cross-country comparison of efforts towards attaining the sustainable development goals on food security, health, and nutrition[39].

Research has been conducted to determine consumers perceptions of healthy and sustainable diets to support development and implementation of more comprehensive dietary policies and interventions. In high-income countries, studies using modelling or environmental impact analysis focused on "average diets" extrapolated from national dietary surveys or market data on food, recommended diets by public officials, and hypothetical or optimized versions of diets [1, 7, 40]. Most consumers perceived plant-based diets as more beneficial than animal-based diets[41–44]. Readiness to adopt HSDs is affected by food choice motives including availability[45], taste[46–48], price[45, 46, 48], health[48–51], weight control[48], and environmental consideration[44, 46, 47]. In some research studies no socio-demographic relationship was found but in others a relationship was identified. Willingness to adopt a healthy and sustainable diet was not associated with socio-demographic characteristics[41, 52]. Conversely, females [44, 52, 53], young people [44, 54], and high education[45, 51, 54] are more likely to adopt HSDs. In this study, we hypothesize that stating availability and health as food choice motives will predict high readiness to adopt HSD, while prioritizing taste, and cost will predict low readiness to adopt HSD. We further propose that younger age and high education attainment will predict high readiness to adopt HSD.

A significant knowledge gap exists about social and economic aspects of healthy and sustainable diets, the drivers of diet, and how scientific information on health and sustainability influence perception and actual practices of consumers[55, 56]. The environmental impact and socio-cultural aspects of diet are considered less frequently in national dietary guidelines[4]. In Nigeria, no study has examined the readiness of consumers to adopt healthy and sustainable diets. Also, there are no data to show what interventions would be needed to shift Nigerian diet towards a healthier and more sustainable one. Therefore, this study assessed the perceived benefit of healthy and sustainable diets (HSDs), readiness to adopt HSDs, and their associated factors among childbearing women in Enugu State, Nigeria. The findings can inform appropriate policies and strategies to facilitate a shift towards an alternative sustainable dietary guideline, development of a sustainable reference diet for Nigeria, and revision of the national nutritional guidelines on NCD prevention, control, and management in Nigeria.

## Materials And Methods

### Study setting

The study took place in Enugu metropolis, Enugu State, Nigeria. Enugu metropolis is the capital city of Enugu State and comprises three local government areas (LGAs): Enugu East, Enugu North, and Enugu South LGAs. Whereas Enugu North is composed of an entirely urban population, Enugu East and Enugu North have a mix of urban and rural areas. Enugu East, Enugu North, and Enugu South LGAs comprise 808, 565, and 451 enumeration areas (EAs)[57]. In 2020, the estimated population of Enugu metropolis was 1.2m people from the 2006 population census[58]. The publicly owned health facilities in the metropolis include one teaching hospital, three general hospitals, and a network of primary health care facilities.

### Research Design

The study adopted a cross-sectional survey design using an interviewer-administered questionnaire.

### Study Population And Sampling Strategy

Childbearing women aged 18 to 49 years living in the Enugu metropolis constituted our study population. We chose childbearing age women for this study because mothers make the decisions regarding food and meals in families in Nigeria[59]. A sample size of 344 women was calculated using a single population proportion formula, assuming 70.1% prevalence for dietary diversity among women in Enugu[31], 95% confidence limit, 5% margin of error, and 10% non-response rate. We, however, sampled 450 eligible childbearing age women using a multi-stage sampling strategy with proportionate size weights. The first stage was to select 20, 14, and 11 enumeration areas from Enugu East, Enugu North, and Enugu South LGAs correspondingly using systematic random sampling. In the second stage, we selected ten households from each enumeration area by systematic sampling. One eligible woman per household was interviewed, totalling 450 respondents.

### Data Collection

Data were collected in January and February 2021 using an interviewer-administered questionnaire. The questionnaire had four sections. Section A covered consumer perception of sustainable dietary habits. We adapted nine questions assessing consumer perception of healthy and sustainable diets published in a previous study[44]. We reworded certain items. For instance, we used 'foreign' goods since air freighted goods were known locally as 'foreign' goods in Nigeria; while 'prioritise plant proteins' was changed to 'eating more of' plant proteins. We also inserted examples to avoid misinterpretation such as processed meat (frozen chicken, sausages, and hotdogs). Although not specific to Nigeria's dietary recommendations, using the questionnaire which aligns with international sustainable dietary guidelines, is deemed helpful in identifying gaps and facilitating cross-country comparisons in efforts toward healthy and sustainable diets[39]. Women's perceived benefits of healthy and sustainable diets were measured using a 5-point Likert scale from 'very small benefit' to 'very large benefit'. We estimated the scale content validity index (S-CVI) of the nine-item questionnaire. Five experts (drawn from nutrition, public health, and health systems) evaluated the content of the questionnaire for relevance to Nigerian context and socio-cultural appropriateness of the statements. A moderate sample size (5–9 experts) is deemed appropriate for assessment of content validity of data collection tools [60]. The evaluation was done using a 4-point

scale (score 1 = not relevant, 2 somewhat relevant, 3 = quite relevant, 4 = highly relevant). In this study, the scale content validity index is 0.95, while its reliability in our sample is 0.755.

Section B of the questionnaire measured readiness to adopt healthy and sustainable diets using one question with six response options based on the stages of change construct of Transtheoretical Model of behaviour change[61]. The response options included: 'I am not interested in doing this at the moment' (pre-contemplation), 'I am thinking about this but I need more information' (contemplation), 'I would like to do this but there are things stopping me' (planning), 'I have started to do this some of the time' (action), 'I am doing this confidently most of the time' (maintenance), and 'I am not currently doing this but have done in the past' (relapse).

Section C focused on food choice motives. Childbearing age women selected their three most significant food-choice motivations from a provided list (health, cost, religion, taste, environmental sustainability, availability, and animal welfare) based on a previous study[44]. Section D covered socioeconomic and demographic information. We measured socioeconomic status using Nigeria's equity tool[62]. Information about age, education level, marital status, and whether participants had children living at home, were also collected. Data were collected using an open data kit (ODK collect (version 1.29.2)). Five research assistants, trained to use ODK collect, administered the questionnaire. The interviewers explained the meaning of a healthy and sustainable diet and evaluated how the women answered each question and scored the response. The questionnaire was pre-tested and modified before actual data collection.

## Data analysis

Data were analysed using SPSS (version 20, IBM, New York, USA). Descriptive statistics were used to summarise the characteristics of respondents, perceived benefit, and food choice motives. The median value of the perceived benefit of healthy and sustainable diets was used to dichotomise women into two categories 'low perceived benefit' and 'high perceived benefit'. Also, we reclassified the six stages of change into three categories: pre-contemplation and contemplation (PC/C), preparation and relapse (P/R), action and maintenance (A/M). These three stages reflect groups of individuals who are not interested or may need further information (PC/C), those that experience other barriers (P/R), and those who are already taking action (A/M). Chi-square test of independence was used to test the differences between women with perceived low and benefit of HSD disaggregated by women's sociodemographic characteristics. We identified determinants of the perceived benefit of SHD using binary logistics. Differences in the proportion of women at different stages of adoption were tested using the Chi-square test of independence. Multinomial regression analysis was used to predict women's stage of change for healthy and sustainable diets based on perceived benefit, demographic characteristics, and reported food-choice motives. The odds ratio (OR) represents the likelihood of childbearing age women being in the PC/C or P/R stages of change compared to the reference, A/M stage of change. Statistical significance was set at alpha 0.05 level.

## Ethical Consideration

The Health Research Ethics Committee of Enugu State Ministry of Health, Enugu, Nigeria, approved this study (MH/MSD/REC21/163). We obtained written, informed consent from all respondents.

## Results

### Basic characteristics of the respondents

The response rate was 100%. All responses were also complete and included in the analysis. Over 50% of the respondents were in the 25–34 age group (Table 1). Almost 68% of respondents were married, about 60% had tertiary education, and 64% lived with children. Nearly 83% of respondents were in the rich quintiles.

[Insert Table 1 here]

### Women's Food Choice Motives

Health, cost, availability, and taste were the most reported food choice motives among childbearing age women (Fig. 1).

[Insert Fig. 1 here]

### Perceived Benefits Of Healthy And Sustainable Diets

Overall, 79% of women perceived a healthy and sustainable diet as a high benefit (Table 2). 'Consume seasonal fruits and vegetables' and 'reduce consumption of air-freighted goods' were perceived to have the highest (84%) and lowest benefits (54%), respectively.

[Insert Table 2]

### Factors associated with perceived benefit of healthy and sustainable diets

Overall, a significantly higher proportion of women over 35 years ( $p = 0.005$ ), women with higher education ( $p < 0.001$ ), and women in the rich socio-economic status ( $p < 0.001$ ) perceived a high benefit with healthy and sustainable diets recommendations (Table 3). Apart from consuming seasonal fruits and vegetables and consuming sustainable fish, a large proportion of women with higher education and women in the rich socio-economic status perceived all other HSD recommendations to have a high benefit than women with lower education and women in the poor quintiles ( $p < 0.05$ ). A larger proportion of women over 35 years associated a high benefit with 'buying local produce' ( $p = 0.005$ ), 'prioritize plant proteins' ( $p = 0.026$ ), and 'choose organic produce' ( $p = 0.010$ ) than women less than 35 years.

[Insert Table 3 here]

## Predictors Of Perceived Benefits Of Healthy And Sustainable Diets

Overall, being poor (OR = 0.19,  $p < 0.001$ ), age < 35 years (OR = 0.39,  $p = 0.008$ ), and low education (OR = 0.36,  $p < 0.001$ ) significantly predicted low perceived benefit of healthy and sustainable diets (Table 4). Specifically, predictors of perceived benefit of individual healthy and sustainable dietary behaviours varied (Additional file 1). Age < 35 years predicted low perceived benefit of 'buy local produce' (OR = 0.38,  $p = 0.016$ ), 'prioritise plant protein' (OR = 0.56,  $p = 0.032$ ), and 'choose organic produce' (OR = 0.49,  $p = 0.019$ ). Low education predicted low perceived benefit of 'avoid excessive packaging' (OR = 0.55,  $p = 0.012$ ), and 'prioritise plant protein' (OR = 0.59,  $p = 0.030$ ). Being poor influenced the perceived low benefit of 'avoid excessive packaging' (OR = 0.41,  $p = 0.023$ ), 'buy local produce' (OR = 0.27,  $p = 0.003$ ), 'limit red and processed meat' (OR = 0.37,  $p = 0.019$ ), 'prioritise plant protein' (OR = 0.42,  $p = 0.0304$ ), 'reduce consumption of airfreighted goods' (OR = 0.29,  $p = 0.004$ ), 'reduce food waste' (OR = 0.15,  $p < 0.001$ ), and 'choose organic produce' (OR = 0.21,  $p < 0.001$ ). Stating health food choice motive predicted perceived high benefit of 'prioritise plant protein' (OR = 2.65,  $p = 0.004$ ) and 'reduce consumption of airfreighted goods' (OR = 3.27,  $p < 0.001$ ), while availability predicted high benefit of 'reduce food waste' (OR = 2.38,  $p = 0.014$ ).

[Insert Table 4 here]

## Factors associated with readiness to adopt healthy and sustainable diets

About 19%, 21%, and 60% of women are in the pre-contemplation and contemplation (PC/C); preparation and relapse (P/R); and action and maintenance (A/M) correspondingly. Readiness to adopt HSDs significantly differed in some socio-demographic factors except in 'marital status' and 'living with a child at home'. Also, the readiness to adopt healthy and sustainable diets differed significantly by food choice motives except for the environment (Table 5). Comparing women at different stages of change, women in the A/M had the highest perceived benefit of healthy and sustainable diets ( $p < 0.001$ ) (Table 5).

[Insert Table 5 here]

## Predictors Of Readiness To Adopt Healthy And Sustainable Diets

Stating health as a food choice motive predicted women's likelihood of being in the A/M stage of change for overall healthy and sustainable diets compared to PC/C (OR = 0.14,  $p < 0.001$ ), and P/R (OR = 0.17,  $p < 0.001$ ) stages of change (Table 6). Low perceived benefit of healthy and sustainable diets predicted being in the PC/C (OR = 10.07,  $p < 0.001$ ) and P/R (OR = 3.92,  $p < 0.001$ ) stages of change, correspondingly. Taste, as a food choice motive, was significantly associated with being in the PC/C stage of change (OR = 3.96,  $p = 0.003$ ). While low education was associated with being in the PC/C stage (OR = 2.51,  $p = 0.010$ ) and P/R stage (OR = 1.82,  $p = 0.049$ ) compared to A/M stage. Age < 35 years predicted the likelihood of women being in the A/M stage compared to P/R (OR = 0.48,  $p = 0.010$ ) stage of change.

[Insert Table 6 here]

Furthermore, stating health as a food choice motive predicted of being in the A/M compared to PC/C and P/R stages of change (OR = 0.11–0.27,  $p < 0.05$ ) for all the individual healthy and sustainable dietary behaviours (Additional file 2). Reporting cost as a food choice motive predicted being in PC/C stage of change for only 'sustainable fish' (OR = 3.09,  $p = 0.046$ ). Excepting 'choose sustainable fish' and 'prioritise plant proteins', prioritising taste predicted being in PC/C stage of change for all other individual HSD recommendations (OR = 4.60–10.51,  $p < 0.05$ ). Stating availability as motivation for food choice predicted being in PC/C for 'avoid excessive packaging' (OR = 4.69,  $p = 0.016$ ) and 'buy local produce' (OR = 3.01,  $p = 0.043$ ). Age < 35 years predicted being in A/M compared to P/R stage for 'avoid excessive packaging' (OR = 0.46,  $p = 0.026$ ), 'buy local produce' (OR = 0.45,  $p = 0.009$ ), 'consume seasonal fruits and vegetable' (OR = 0.35,  $p = 0.008$ ), 'reduce food waste' (OR = 0.47,  $p = 0.019$ ), and 'choose organic produce' (OR = 0.48,  $p = 0.022$ ). Age < 35 years also predicted being in the PC/C stage of change for 'choose sustainable fish' (OR = 7.60,  $p = 0.010$ ). Low education predicted the likelihood of being in PC/C for 'buy local produce' (OR = 2.42,  $p = 0.028$ ), and 'choose sustainable fish' (OR = 2.81,  $p = 0.020$ ), as well as being in P/R for 'consume seasonal fruits and vegetables' (OR = 2.07,  $p = 0.023$ ) compared to A/M stage of change. Low perceived benefit of healthy and sustainable diets predicted being in the PC/C for 'avoid excessive packaging' (OR = 15.85,  $p < 0.001$ ), 'buy local produce' (OR = 5.06,  $p = 0.001$ ), 'consume seasonal fruits and vegetables' (OR = 12.22,  $p < 0.001$ ), 'Choose sustainable fish' (OR = 10.80,  $p < 0.001$ ), 'reduce food waste' (OR = 11.36,  $p < 0.001$ ), and 'choose organic produce' (OR = 7.89,  $p < 0.001$ ). Similarly, low perceived benefit of healthy and sustainable diets predicted being in the P/R stage for 'avoid excessive packaging' (OR = 5.75,  $p = 0.005$ ), 'consume seasonal fruits and vegetables' (OR = 9.07,  $p = 0.001$ ), 'prioritise plant protein' (OR = 3.30,  $p = 0.019$ ), 'choose sustainable fish' (OR = 4.69,  $p = 0.001$ ), 'reduce food waste' (OR = 3.17,  $p = 0.015$ ), and 'choose organic produce' (OR = 3.52,  $p = 0.005$ ).

## Discussion

- This study has examined women's perceived importance of and readiness to adopt healthy and sustainable diets and the factors associated with perceived benefits and readiness to adopt healthy and sustainable diets (HSDs) in a Nigerian urban city. The findings revealed that most women considered HSDs of high benefit, but readiness to adopt was moderate. Perceived benefit, food motives (most commonly health and taste), and socio-demographic factors (age and education) predicted the readiness to adopt HSDs. These findings provide pointers to strategies that can be considered when developing alternative sustainable dietary guidelines.
- Our finding of high perceived benefit of HSDs among childbearing age women is consistent with the evidence of previous studies[24, 42–44, 48, 63]. This finding might reflect an increasing awareness of diet-related NCDs, health consciousness and high nutrition value of HSDs, and renewed interest in traditional foods among Nigerians[64]. Nevertheless, our sample differs from previous existing evidence in some ways. For instance, while 'consume seasonal fruits and vegetables' conferred the highest benefit in our study, 'reduce consumption of air-freighted goods' conferred the highest benefit in a previous study [44]. Also, our findings that 'limit red and processed meat' and 'reduce consumption of air-freighted goods' offered the lowest benefits contrast results from a previous study in which 'prioritise plant protein' and 'choose organic produce' were perceived to confer the smallest benefits [44]. These context-specific variations in the perceived benefits of healthy and sustainable diets could be due to a different understanding of perceived benefit of dietary behaviours. Strategies intended to improve the readiness to adopt HSDs among women should be tailored to dietary behaviours perceived as less important in this study.
- Despite the high perceived benefit of HSDs among women in our sample, readiness to adopt is moderately high, which aligns with findings from Europe[48], but differs from the evidence of low willingness to adopt HSDs in other prior studies[26, 65, 66]. Consistent with the Transtheoretical Model of behaviour change[61], we found that readiness to adopt HSDs increased with its perceived benefit. This finding aligns with the results of previous studies[44, 48, 53, 67]. In this study, women with low perceived benefits were about ten and four times more likely to be in the PC/C and P/R stage of change correspondingly. Generally, the proportion of women with low perceived benefit declined, while the proportion of women with high benefit increased in the A/M stage compared to P/R and P/CC stages of change. Yet, the women's high perceived benefit did not always translate to A/M as some women with high perception of benefit were in the PC/C and P/R stages. The main dietary behaviours associated with being in PC/C and P/R stages in this study include 'avoid excessive packaging', 'consume seasonal fruits and vegetables', 'choose sustainable fish', 'reduce food waste', and 'choose organic produce'. Therefore, interventions to improve the adoption of HSDs must target two sub-populations – women with low perceived benefit and those with high perceived benefit who are in PC/C and P/R.
- Stating health as a food choice motive predicted the likelihood of women being in the A/M stage of change for all healthy and sustainable diets, thus, confirming our hypothesis that health as a food choice motive would predict high readiness to adopt HSDs. Health concerns increased women's readiness to adopt healthy and sustainable diets as was found in prior studies[44, 48, 49]. This finding is not surprising because, in this sample, health was the foremost food choice motive, implying that health and nutrition benefits of foods take precedence over all other motivations for food choice. Evidence indicates that health as a food choice motive positively correlates with better adherence to healthy nutritional guidelines[51]. While health was also the leading food choice motive in the United Kingdom and Tanzania, it was the fourth-ranked motivation for food choice in a study of nine European countries[44, 48, 67]. In these European settings where health is not a foremost food choice motive, people believe that they already eat a healthy diet and therefore do not consider HSDs would provide benefits over and above their existing dietary behaviour[48]. However, in developing countries, health consciousness resulting from increasing NCDs may have influenced consumers to adopt HSDs[64, 67].
- Our finding that women reporting prioritizing taste as a food choice motive were more likely to be in the PC/C stage confirmed our hypothesis that prioritizing taste would predict low readiness to adopt HSDs. In this study, women were more likely to remain in PC/C in all sustainable dietary behaviours except 'prioritise plant protein'. These findings are similar to the results of previous studies where concern for taste was associated with less healthy dietary habits[47, 48]. Conversely, a previous study found that taste influenced the readiness to adopt plant-based proteins but no other HSDs[44]. Nevertheless, reporting taste as the fourth important motivation for food choice in this study suggests that other food choice motives such as health concerns would be considered before taste when selecting a healthy and sustainable diet as was also argued in a previous study[48].
- We hypothesized that increased age would have a high perceived benefit and more likely to adopt HSDs. However, while increased age was associated with higher perceived benefits, it did not translate to the readiness to adopt HSDs. Our finding that younger women were more likely to be in the A/M stage contrasts evidence of a prior study in which younger consumers were more likely to be PC/C stage for HSDs[44]. Our findings are surprising from three perspectives. First, in a traditional food system, people prefer locally produced foods, legumes, seasonal vegetables, and fruits to animal source foods and highly processed foods[3]. However, young women in Nigeria tend to eat few traditional foods and prefer imported and western goods, perceived as appealing and healthy[59]. Secondly, young women tend to be vulnerable to media influences that promote air-freighted foods[59]. Thirdly, consumption of sugary foods decreased with age among Nigerian women[31]. One possible explanation of our finding is the large proportion of younger women in our sample who reported health concerns as a food choice motive. Given that attitudes relate to individuals and others, and the intention to act is personalised[48], it might also be that younger women are more proactive than older women in translating their perceived benefit into action. There is a need to target older women with behaviour change communication interventions.
- This study's findings confirmed our hypothesis that high education was associated with high perceived benefits and high readiness to adopt HSDs. Existing evidence suggests that high education predicts the readiness to adopt HSDs[45, 51, 54]. Although socioeconomic status was not a significant predictor of readiness to adopt HSDs in this study, differences in education might reflect income disparities in urban Nigeria. Women in low-income urban households have lower educational qualifications, poorer intake of micronutrients, and less diversified diets than high-income urban households in Nigeria [36]. Education increases the opportunities for employment, which improves financial access to diverse, healthy and sustainable diets [36, 59]. Targeting information campaigns on maternal nutrition and health knowledge towards women with a lower level of education might improve their readiness to adopt HSDs.
- This study contributes to existing scholarship by providing evidence of perceived benefit and motivation to adopt healthy and sustainable diets in Nigeria. This evidence can inform the adaptation of FBDGs to improve women's access to HSDs in urban areas of South-East Nigeria. These notwithstanding, social desirability bias might limit the study. Women in this study may have projected a socially desirable image of food choice motives and dietary

behaviours. The use of an interviewer-administered questionnaire reduced the chances of response biases given that respondent received explanations of the questions and seemed to understand them before responding. Secondly, the perceived benefit of HSDs may not have adequately captured environmental benefits. In this study, environmental concern was the fifth important motivation for food choice. Evidence elsewhere suggests that the impact of food on the environment is poorly understood, and consumers have not yet internalised environmental sustainability[54]. Therefore, the interpretation of the environmental effects of food in Nigeria constitutes an area for future studies. Equally, it would be a helpful addition to exploring the adoption of healthy and sustainable dietary behaviours from a qualitative perspective.

## Conclusions

- This study has highlighted the gap between perceived benefit and readiness to adopt healthy and sustainable diets and the factors associated with the adoption of HSDs in a South-Eastern Nigerian City. High perceived benefit does not always translate to the readiness to adopt HSDs. Women with low health concern, who prioritize taste as a food choice motive, and who are older than 35 years, and have low formal education should be targeted in future interventions to accelerate the transition to healthy and sustainable diets.

## Abbreviations

A/M  
Action and Maintenance  
DALY  
Disability-adjusted life-years  
EAs  
Enumeration areas  
FBDG  
Food-based dietary guidelines  
GHG  
Global greenhouse gas  
HSD  
healthy and sustainable diets  
LGAs  
Local government areas  
NCDs  
Non-communicable diseases  
ODK  
Open data kit  
PC/C  
Precontemplation/Contemplation  
P/R  
Preparation and Relapse  
SDGs  
Sustainable development goals  
UK  
United Kingdom

## Declarations

### Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Enugu State Ministry of Health (protocol code MH/MSD/REC21/163 and 6 January 2021). Written, informed consent was obtained from all subjects involved in the study.

**Consent for publication:** Not applicable

**Availability of data:** The data presented in this study are available on request from the first author

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## References

1. Willett W, Rockström J, Loken B, Springmann M, Lang T, Vermeulen S, Garnett T, Tilman D, DeClerck F, Wood A, et al: **Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems.***Lancet* 2019, **393**:447-492.
2. Sievert K, Lawrence M, Parker C, Baker P: **Understanding the Political Challenge of Red and Processed Meat Reduction for Healthy and Sustainable Food Systems: A Narrative Review of the Literature.***Int J Health Policy Manag* 2020.
3. Fanzo J: **Healthy and Sustainable Diets and Food Systems: the Key to Achieving Sustainable Development Goal 2?***Food Ethics* 2019, **4**:159-174.
4. Martini D, Tucci M, Bradfield J, Di Giorgio A, Marino M, Bo D, #039, C, Porrini M, Riso P: **Principles of Sustainable Healthy Diets in Worldwide Dietary Guidelines: Efforts So Far and Future Perspectives.***Nutrients* 2021, **13**:1827.
5. FAOandWHO: **Sustainable healthy diets – Guiding principles.** Rome: Food and Agricultural Organisation and World Health Organisation; 2019.
6. Steenson S, Buttriss JL: **Healthier and more sustainable diets: What changes are needed in high-income countries?***Nutr Bull* 2021, **46**:279-309.
7. Springmann M, Wiebe K, Mason-D'Croz D, Sulser TB, Rayner M, Scarborough P: **Health and nutritional aspects of sustainable diet strategies and their association with environmental impacts: A global modelling analysis with country-level detail.** *Lancet Planet Health* 2018, **2**:e451-e461.
8. Drewnowski A, Finley J, Hess JM, Ingram J, Miller G, Peters C: **Towards healthy diets from sustainable food system.***Curr Dev Nutr* 2020, **4**:nzaa083.
9. McClements DJ: **Future foods: Is it possible to design a healthier and more sustainable food supply?***Nutr Bull* 2020, **45**:341-354.
10. Branca F, Lartey A, Oenema S, Aguayo V, Stordalen GA, Richardson R, Arvelo M, Afshin A: **Transforming the food system to fight non-communicable diseases.***Brit Med J* 2019, **364**:i29.
11. Ruini LF, Ciati R, Pratesi CA, Marino M, Principato L, Vannuzzi E: **Working toward Healthy and Sustainable Diets: The "Double Pyramid Model" Developed by the Barilla Center for Food and Nutrition to Raise Awareness about the Environmental and Nutritional Impact of Foods.***Front Nutr* 2015, **2**:9.
12. Popkin BM: **Relationship between shifts in food system dynamics and acceleration of the global nutrition transition.***Nutr Rev* 2017, **75**:73-82.
13. Hall KD, Ayuketah A, Brychta R, Cai H, Cassimatis T, Chen KY, Chung ST, Costa E, Courville A, Darcey V, et al: **Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain: An Inpatient Randomized Controlled Trial of Ad Libitum Food Intake.***Cell Metab* 2019, **30**:67-77.e63.
14. Afshin A, Sur PJ, Fay KA, Cornaby L, Ferrara G, Salama JS, Mullany EC, Abate KH, Abbafati C, Abebe Z, Afarideh M: **Health effects of dietary risks in 195 countries, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017.***Lancet* 2019, **393**:1958-1972.
15. Qian, Liu G, Hu FB, Bhupathiraju SN, Sun Q: **Association Between Plant-Based Dietary Patterns and Risk of Type 2 Diabetes: A Systematic Review and Meta-analysis.***JAMA Intern Med* 2019, **179**:1335-1344.
16. Lee Y, Park K: **Adherence to a Vegetarian Diet and Diabetes Risk: A Systematic Review and Meta-Analysis of Observational Studies.***Nutrients* 2017, **9**:603.
17. IPCC: **Global warming of 1.5°C: an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.**: Intergovernmental Panel on Climate Change; 2018.
18. Lonnie M, Johnstone AM: **The public health rationale for promoting plant protein as an important part of a sustainable and healthy diet.***Nutr Bull* 2020, **45**:281-293.
19. Poore J, Nemecek T: **Reducing food's environmental impacts through producers and consumers.***Science* 2018, **360**:987-992.
20. Aleksandrowicz L, Green R, Joy EJM, Smith P, Haines A: **The impacts of dietary change on greenhouse gas emissions, land use, water use, and health: A systematic review.***PLoS One* 2016, **11**:e0165797.
21. Nelson ME, Hamm MW, Hu FB, Abrams SA, Griffin TS: **Alignment of healthy dietary patterns and environmental sustainability: a systematic review.***Adv Nutr* 2016, **7**:1005-1025.
22. Scarborough P, Allender S, Clarke D, Wickramasinghe K, Rayner M: **Modelling the health impact of environmentally sustainable dietary scenarios in the UK.***Eur J Clin Nutr* 2012, **66**:710-715.
23. Veeramani A, Dias G, Kirkpatrick S: **Carbon footprint of dietary patterns in Ontario, Canada: a case study based on actual food consumption.***J Clean Prod* 2017, **162**.
24. Jungbluth N, Tietje O, Scholz RW: **Food purchases: impacts from the consumers' point of view investigated with a modular LCA.***Int J Life Cycle Assess* 2000, **5**:134-142.
25. BDA: **One blue dot: the BDA's ground-breaking project for sustainable diets.**: British Dietary Association; 2018.
26. Hartmann C, Siegrist M: **Consumer perception and behaviour regarding sustainable protein consumption: A systematic review.***Trends Food Sci Tech* 2017, **61**:11-25.
27. Macdiarmid JI, Douglas F, Campbell J: **Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet.***Appetite* 2016, **96**:487-493.
28. Herforth A, Arimond M, Álvarez-Sánchez C, Coates J, Christianson K, Muehlhoff E: **A Global Review of Food-Based Dietary Guidelines.***Adv Nutr* 2019, **10**:590-605.
29. Hailu Bekele TH, de Vries JJHM, Trijsburg L, Feskens E, Covic N, Kennedy G, Brouwer ID: **Methodology for developing and evaluating food-based dietary guidelines and a Healthy Eating Index for Ethiopia: a study protocol.***BMJ Open* 2019, **9**:e027846.

30. FMBNP: **National policy on food and nutrition in Nigeria**. 2016. Abuja, Nigeria: Federal Ministry of Budget and National Planning; 2016.
31. NPC[Nigeria]andICF: **Nigeria Demographic and Health Survey 2018**. Abuja, Nigeria, and Rockville, Maryland, USA: National Population Commission and ICF International; 2019.
32. GBD2019RiskFactorsCollaborators: **Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019**.*Global Health Metrics* 2020, **396**:P1223-1249.
33. WHO: **Noncommunicable diseases country profiles 2018**. Geneva, Switzerland: World Health Organisation; 2018.
34. WHO: **Noncommunicable diseases country profile 2014**. Geneva, Switzerland: World Health Organisation; 2014.
35. FMOH: **Food-based dietary guidelines**. Abuja, Nigeria: Federal Ministry of Health; 2006.
36. Obayelu OA, Osho FR: **How diverse are the diets of low-income urban households in Nigeria?***J Agric Food Res* 2020, **2**:100018.
37. Akerele D, Sanusi RA, Fadare OA, Ashaolu OF: **Factors Influencing Nutritional Adequacy among Rural Households in Nigeria: How Does Dietary Diversity Stand among Influencers?***Ecol Food Nutr* 2017, **56**:187-203.
38. Mekonnen DA, Trijsburg L, Achterbosch T, Brouwer ID, Kennedy G, Linderhof V, Ruben R, Talsma EF: **Food consumption patterns, nutrient adequacy, and the food systems in Nigeria**.*Agr Food Econ* 2021, **9**:16.
39. Mekonnen DA, Akerele D, Achterbosch T, de Lange T, Talsma EF: **Affordability of Healthy and Sustainable Diets in Nigeria**.*Front Sust Food Sys* 2021.
40. Chen C, Chaudhary A, Mathys A: **Dietary Change Scenarios and Implications for Environmental, Nutrition, Human Health and Economic Dimensions of Food Sustainability**.*Nutrients* 2019, **11**:856.
41. Lea EJ, Crawford D, Worsley A: **Consumers' readiness to eat a plant-based diet**.*Eur J Clin Nutr* 2006, **60**:342-351.
42. Reipurth M, Hørby L, Gregersen C, Bonke A, Perez CFJ: **Barriers and facilitators towards adopting a more plant-based diet in a sample of danish consumers**. *.Food Qual Prefer* 2019, **73**:288-292.
43. Vanhonacker F, Van Loo EJ, Gellynck X, Verbeke W: **Flemish consumer attitudes towards more sustainable food choices**.*Appetite* 2013, **62**:7-16.
44. Culliford A, Bradbury J: **A cross-sectional survey of the readiness of consumers to adopt an environmentally sustainable diet**.*Nutr J* 2020, **19**:138.
45. Fink L, Strassner C, Ploeger A: **Exploring External Factors Affecting the Intention-Behavior Gap When Trying to Adopt a Sustainable Diet: A Think Aloud Study**.*Front Nutr* 2021, **8**:511412.
46. Wekeza SV, Sibanda M: **Factors Influencing Consumer Purchase Intentions of Organically Grown Products in Shelly Centre, Port Shepstone, South Africa**.*Int J Environ Res Public Health* 2019, **16**:956.
47. Allès B, Péneau S, Kesse-Guyot E, Baudry J, Hercberg S, Méjean C: **Food choice motives including sustainability during purchasing are associated with a healthy dietary pattern in french adults**.*Nutr J* 2017, **16**:58.
48. Rankin A, Bunting BP, Poinhos R, van der Lans IA, Fischer AR, Kuznesof S, Almeida M, Markovina J, Frewer LJ, Stewart-Knox BJ: **Food choice motives, attitude towards and intention to adopt personalised nutrition**.*Public Health Nutr* 2018, **21**:2606-2616.
49. Shrestha A, Baral S: **Consumers' willingness to pay for organic agriculture products: a case study of Nepalgunj city, Banke**.*Int J Agric Environ Food Sci* 2019, **3**:58-61.
50. Wang X, Pacho F, Liu J, Kajungiro R: **Factors Influencing Organic Food Purchase Intention in Developing Countries and the Moderating Role of Knowledge**.*Sustainability* 2019, **11**:209.
51. Lê J, Dallongeville J, Wagner A, Arveiler D, Haas B, Cotel D, Simon C, Dauchet L: **Attitudes toward healthy eating: a mediator of the educational level-diet relationship**.*Eur J Clin Nutr* 2013, **67**:808-814.
52. Tobler C, Visschers VHM, Siegrist M: **Eating green. Consumers' willingness to adopt ecological food consumption behaviors**.*Appetite* 2011, **57**:674-682.
53. de Boer J, de Witt A, Aiking H: **Help the climate, change your diet: A cross-sectional study on how to involve consumers in a transition to a low-carbon society**.*Appetite* 2016, **98**:19-27.
54. Sánchez-Bravo P, Chambers E, Noguera-Artiaga L, López-Lluch D, Chambers E, Carbonell-Barrachina ÁA, Sendra E: **Consumers' Attitude towards the Sustainability of Different Food Categories**.*Foods* 2020, **9**:1608.
55. Ernstoff A, Stylianou KS, Sahakian M, Godin L, Dauriat A, Humbert S, Erkman S, Jolliet O: **Towards Win-Win Policies for Healthy and Sustainable Diets in Switzerland**.*Nutrients* 2020, **12**.
56. Vermeir I, Weijters B, De Houwer J, Geuens M, Slabbinck H, Spruyt A, Van Kerckhove A, Van Lippevelde W, De Steur H, Verbeke W: **Environmentally Sustainable Food Consumption: A Review and Research Agenda From a Goal-Directed Perspective**.*Front Psychol* 2020, **11**:1603.
57. NBS: **Local Government Area (LGA) Master Frame**. Abuja, Nigeria: National Bureau of Statistics; 2006.
58. NBS: **2006 Population Census**. Abuja, Nigeria: National Bureau of Statistics, Federal Government of Nigeria; 2007.
59. Mapis GJ: **The Dietary Decision-Making Process of Women in Nigeria**.*Doctoral*. Walden University College of Health Sciences; 2020.
60. Mokkink LB, Prinsen CA, Bouter LM, Vet HC, Terwee CB: **COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) and how to select an outcome measurement instrument**.*Braz J Phys Ther* 2016, **20**:105-113.
61. Prochaska J, Velicer W: **The trans-theoretical model of health behavior change**.*Am J Health Promot* 1997, **12**:38-48.
62. MetricsforManagement: **Nigeria equity tool**. vol. 2018: Metric for Measurement; 2015.
63. Hoolohan C, Berners-Lee M, McKinstry-West J, Hewitt CN: **Mitigating the greenhouse gas emissions embodied in food through realistic consumer choices**.*Energy Policy* 2013, **63**:1065-1074.

64. Maziya-Dixon B, Achterbosch T, Adelekan D, Adeyemi O, Ajieroh V, Akerele D, Akinola A, Alamu E, van Berkum S, Byrd K, et al: **Food systems for healthier diets in Nigeria: A research agenda** Washington, DC: International Food Policy Research Institute (IFPRI); 2021.
65. Nocella G, Srinivasan CS: **Adherence to WHO's nutrition recommendations in the UK: dietary patterns and policy implications from a national survey.***Food Policy* 2019, **86**:101719.
66. Yau A, Adams JM, Monsivais P: **Time trends in adherence to UK dietary recommendations and associated sociodemographic inequalities, 1986-2012: A repeated cross-sectional analysis.***Eur J Clin Nutr* 2019, **73**:997-1005.
67. Pacho F: **What influences consumers to purchase organic food in developing countries?***Brit Food J* 2020, **122**:3695-3709.

## Tables

**Table 1 Socio-demographic characteristics of women of childbearing age, Enugu, Nigeria, 2021**

Parameters		Frequency (n)	Percent (%)
Age	18-24	99	22.0
	25-34	244	54.2
	35-44	95	21.1
	45-49	12	2.7
Marital Status	Single	125	27.8
	Married	304	67.6
	Other	21	4.7
Education	Primary	25	5.6
	Secondary/vocational	157	34.9
	Tertiary	268	59.6
Children	Yes	287	63.8
	No	163	36.2
Socio-economic status	Poorest/poorer	37	8.2
	Middle	41	9.1
	Richer/Richest	372	82.7

**Table 2 Women's perceived benefit of healthy and sustainable diets in Enugu, Nigeria, 2021**

Sustainable health diets	Perceived benefit			
	Low		High	
	n	%	n	%
Avoid excessive packaging	164	36	286	64
Buy local produce	73	16	377	84
Consume fruits and vegetables	58	13	392	87
Limit red and processed meat	195	43	255	57
Prioritise plant proteins	158	35	292	65
Reduce consumption of air freighted foods	199	44	251	56
Choose sustainable fish	100	22	350	78
Reduce food waste	81	18	369	82
Choose organic produce	114	25	336	75
Overall HSD	94	21	356	79

HSD = Healthy and sustainable dietary behaviour

**Table 3 Women's (n = 450) perceived benefit of healthy and sustainable diets disaggregated by socio-demographic characteristics in Enugu, Nigeria, 2021**

Perceived benefit		Age (%)				Marital status (%)					Education (%)				Leaving with a child (%)		
		<35	35+	χ <sup>2</sup>	Sig	Single	Other	Married	χ <sup>2</sup>	Sig	High	Low	χ <sup>2</sup>	Sig	Yes	No	χ <sup>2</sup>
Packaging	Low	38.5	29.9	2.6	0.108	38.4	38.1	35.5	3.4	0.843	29.9	46.2	12.4	<0.001*	36.9	35.6	0.
	High	61.5	70.1			61.6	61.9	64.5			70.1	53.8			63.1	64.4	
Local produce	Low	19.0	7.5	7.9	0.005*	15.2	9.5	17.1	1.0	0.618	12.3	22.0	7.4	0.006*	16.4	16.0	0.
	High	81.0	92.5			84.8	90.5	82.9			87.7	78.0			83.6	84.0	
Seasonal fruits	Low	13.4	11.2	0.4	0.554	17.6	0.0	11.8	5.9	0.053	11.2	15.4	1.7	0.193	12.5	13.5	0.
	High	86.6	88.8			82.4	100.0	88.2			88.8	84.6			87.5	86.5	
Red meat	Low	44.9	38.3	1.4	0.230	43.2	28.6	44.4	2.0	0.367	35.4	54.9	16.8	<0.0001*	44.3	41.7	0.
	High	55.1	61.7			56.8	71.4	55.6			64.6	45.1			55.7	58.3	
Plant proteins	Low	37.9	26.2	4.9	0.026*	36.8	42.9	33.9	0.9	0.634	26.1	48.4	23.5	<0.001*	36.2	33.1	0.
	High	62.1	73.8			63.2	57.1	66.1			73.9	51.6			63.8	66.9	
Air freighted foods	Low	46.1	38.3	2.0	0.159	54.4	42.9	40.1	7.3	0.026*	39.6	51.1	5.9	0.015*	42.5	47.2	0.
	High	53.9	61.7			45.6	57.1	59.9			60.4	48.9			57.5	52.8	
Sust. fish	Low	21.9	23.4	0.1	0.745	30.4	9.5	19.7	7.9	0.019*	19.4	26.4	3.0	0.081	18.5	28.8	6.
	High	78.1	76.6			69.6	90.5	80.3			80.6	73.6			81.5	71.2	
Food waste	Low	19.0	15.0	0.9	0.347	16.0	19.0	18.8	0.5	0.790	13.8	24.2	7.9	0.005*	18.5	17.2	0.
	High	81.0	85.0			84.0	81.0	81.3			86.2	75.8			81.5	82.8	
Organic produce	Low	28.3	15.9	6.6	0.010*	32.0	14.3	23.4	4.9	0.085	20.1	33.0	9.4	0.002*	25.8	24.5	0.
	High	71.7	84.1			68.0	85.7	76.6			79.9	67.0			74.2	75.5	
Overall	Low	23.9	11.2	8.0	0.005*	20.0	14.3	21.7	0.7	0.691	11.6	34.6	34.8	<0.001*	23.0	17.2	2.
	High	76.1	88.8			80.0	85.7	78.3			88.4	65.4			77.0	82.8	

\*Chi square test significant at  $p < 0.05$

**Table 4 Determinants of perceived benefit of HSD among childbearing age women in Enugu, Nigeria, 2021**

Parameters		B	Sig.	OR	OR	
					Lower	Upper
	Constant	2.75	0.002*	15.57		
Age (Years)	<35 years	-0.94	0.008*	0.39	0.20	0.78
	≥35 years	0 <sup>a</sup>				
Education	Low education	-1.04	0.000*	0.36	0.20	0.63
	High education	0 <sup>a</sup>				
Socio-economic status (SES)	SES		0.000*			
	Poor	-1.71	0.000*	0.18	0.08	0.42
	Moderate	-0.39	0.326	0.68	0.31	1.47
	Rich	0 <sup>a</sup>				
Food choice motives	Health	0.35	0.389	1.41	0.64	3.10
	Cost	-0.12	0.744	0.89	0.44	1.79
	Taste	-0.14	0.710	0.87	0.43	1.78
	Environ	-0.49	0.313	0.61	0.23	1.59
	Availability	0.13	0.723	1.14	0.56	2.29

aSet to zero because this parameter is redundant. \*Significant at p <0.05

**Table 5 Readiness to adopt healthy and sustainable diets disaggregated by women's characteristics in Enugu, Nigeria, 2021**

Parameters		Readiness to adopt a healthy and sustainable diet						X2	p-value
		PC/C (n=86)		P/R (n=96)		A/M (n=268)			
		n	%	n	%	n	%		
Age (years)	<35	78	22.7	61	17.8	204	59.5	18.5	<0.001*
	≥35	8	7.5	35	32.7	64	59.8		
Education	Low	56	30.8	50	27.5	76	41.8	43.5	<0.001*
	High	30	11.2	46	17.2	192	71.6		
Leaving with a child	Yes	54	18.8	66	23.0	167	58.2	1.3	0.519
	No	32	19.6	30	18.4	101	62.0		
Marital status	Single	26	20.8	23	18.4	76	60.8	1.6	0.806
	Others	3	14.3	6	28.6	12	57.1		
	Married	57	18.8	67	22.0	180	59.2		
Socio-economic status	Poor	14	37.8	13	35.1	10	27.0	20.6	<0.001*
	Moderate	9	22.0	11	26.8	21	51.2		
	Rich	63	16.9	72	19.4	237	63.7		
Health	No	53	46.1	35	30.4	27	23.5	98.6	<0.001*
	Yes	33	9.9	61	18.2	241	71.9		
Cost	No	15	11.0	22	16.2	99	72.8	14.8	0.001*
	Yes	71	22.6	74	23.6	169	53.8		
Taste	No	16	8.4	42	22.1	132	69.5	25.2	<0.001*
	Yes	70	26.9	54	20.8	136	52.3		
Environment	No	82	20.4	86	21.4	234	58.2	4.4	0.110
	Yes	4	8.3	10	20.8	34	70.8		
Availability	No	20	10.9	36	19.6	128	69.6	16.8	<0.001*
	Yes	66	24.8	60	22.6	140	52.6		
Perceived benefit of HSD	Low	43	45.7	27	28.7	24	25.5	70.2	<0.001*
	High	43	12.1	69	19.4	244	68.5		

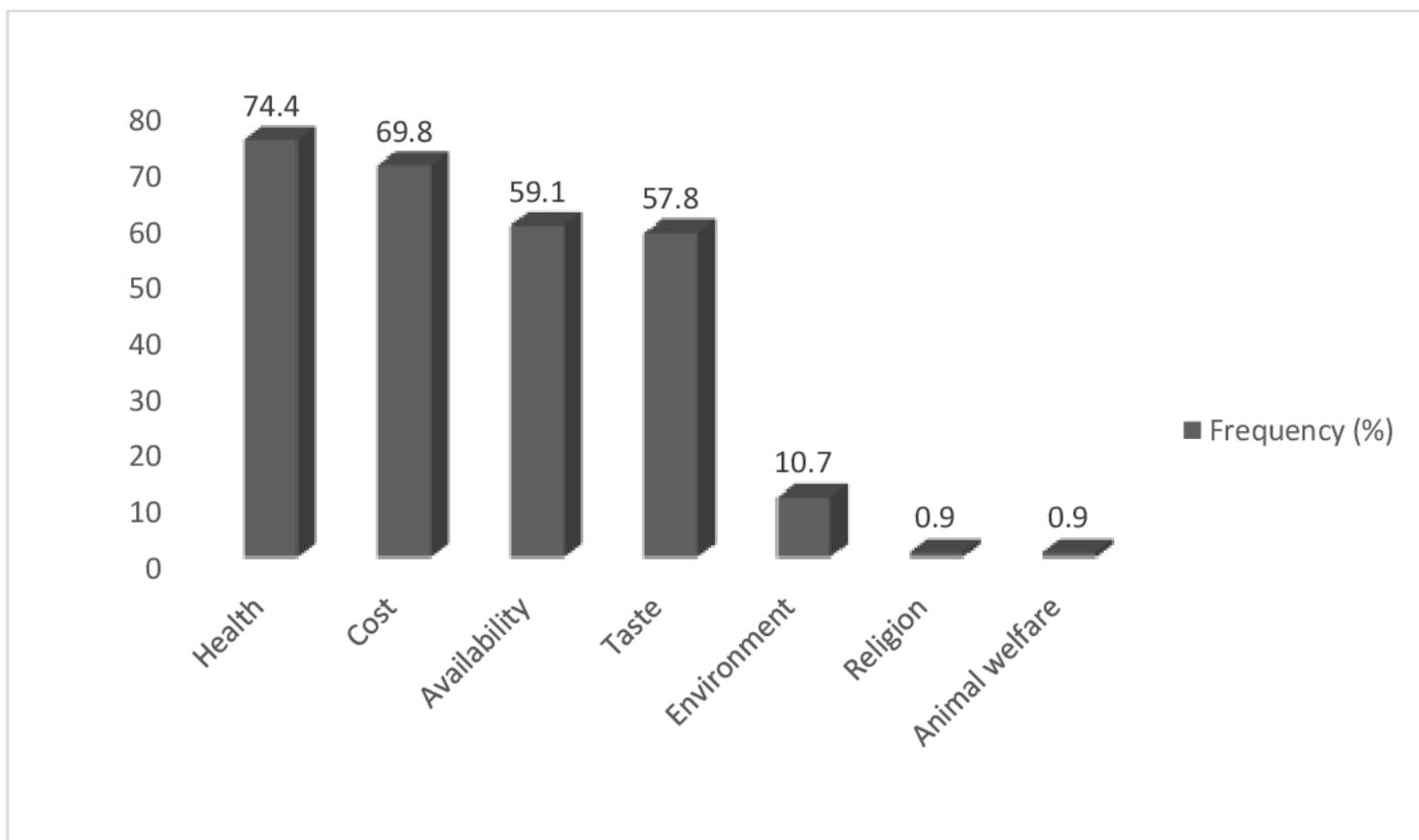
Significant at p <0.05

**Table 6 Predictors of readiness to adopt healthy and sustainable diets among women in Enugu State, Nigeria, 2021**

Readiness to adopt SHD <sup>a</sup>	Predictors	PC/C				P/R					
		B	Sig.	OR	95% Confidence Interval for OR		B	Sig.	OR	95% Confidence Interval for OR	
					Lower Bound	Upper Bound				Lower Bound	Upper Bound
	Intercept	-3.32	0.001				.37	.586			
Food motives	Health	-1.95	<0.001*	0.14	0.06	0.36	-1.80	<0.001*	0.17	0.08	0.35
	Cost	0.59	0.161	1.80	0.79	4.09	0.17	0.600	1.18	0.63	2.20
	Taste	1.38	0.003*	3.96	1.61	9.75	0.00	0.994	1.00	0.53	1.90
	Availability	0.83	0.064	2.30	0.95	5.54	-0.20	0.558	0.82	0.42	1.60
Perceived benefit	Low	2.31	<0.001*	10.07	4.78	21.22	1.37	<0.001*	3.92	1.99	7.73
	High	0 <sup>b</sup>					0 <sup>b</sup>				
Socio-economic status	Poor	0.33	0.588	1.39	0.42	4.59	0.82	0.123	2.26	0.80	6.40
	Moderate	-0.61	0.283	0.54	0.18	1.66	-0.06	0.890	0.94	0.37	2.35
	Rich	0 <sup>b</sup>					0 <sup>b</sup>				
Age (years)	<35	0.78	0.094	2.19	0.88	5.46	-0.74	0.010*	0.48	0.27	0.84
	≥35	0 <sup>b</sup>					0 <sup>b</sup>				
Education	Low	0.92	0.010*	2.51	1.25	5.04	0.60	0.049*	1.82	1.00	3.29
	High	0 <sup>b</sup>					0 <sup>b</sup>				

<sup>a</sup>Reference stage: Action/Maintenance; <sup>b</sup>Reference parameter; \*Significance at p <0.05

**Figures**



## Figure 1

Motivations for food choices among childbearing age women in Enugu, Nigeria, 2021

## Supplementary Files

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