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Research Article

# Factors Associated with Vegetable Consumption among Pregnant Women Attending Primary Health Care Facilities in Patani Local Government Area of Delta State, Nigeria

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## Abstract

Vegetables provide key nutrients essential to promoting and maintaining good health. This study aimed to determine the barriers, and factors that improve consumption of vegetables among pregnant women attending Primary Health Care facilities in Patani Local Government Area (L.G.A) of Delta State, Nigeria. This study was a population-based descriptive cross-sectional survey of 368 pregnant women aged 15-49 years conducted in Patani L.G.A, Plateau State, Nigeria using a multi-stage cluster random sampling design. Data were collected by face-to-face interview using a structured questionnaire. The results were expressed as frequency and percentage, level of significance was calculated at a confidence interval of 95% and P<0.05. Of the 368 pregnant women, age group 21-25 years and 26-30 years with a prevalence of 95 (25.8%) and 90 (24.5%) respectively were the highest age groups. Seventy (29.2%) of respondents with secondary education consumed vegetables seven times. There was a significant association between educational status and the number of times vegetables were consumed (P = 0.037). Eight (50.0%) of respondents with no formal education spent N50 – N 100, while 17 (30.9%) of respondents with tertiary education spent above N 400 respectively to purchase vegetables. The association between educational status and the cost of vegetables purchased was statistically significant (P = 0.009). Insufficient income (31.0%), Distance to market (26.4%), and price of vegetables (20.9%) were the most common barriers to vegetable consumption. Educational and financial status significantly influences the number of times vegetables are consumed by respondents. Having your household vegetable garden is recommended to improve vegetable consumption.

**Keywords:** Vegetables; Pregnancy; Primary Health Care; Barriers; Consumption

## Abbreviations

FFQ: Food Frequency Questionnaires; LGA: Local Government Area; ₦: Naira; NCDs: Non-Communicable Diseases

## Introduction

Approximately 2 billion people as reported by the World Health Organization (WHO) are suffering from micronutrient deficiencies as a result of dietary mineral deficiencies with important health consequences in the world [1,2]. The magnitude of these deficiencies had been shown to lower cognitive development, retard foetal and child growth, as well as susceptibility to infections among young children and pregnant women [2]. Green leafy vegetables, due to their easy accessibility, low cost and ease of cooking, have been known to provide the daily micronutrient requirements to a majority of people in developing countries [3]. Leafy vegetables are reach in protein, vitamins, iron, and other nutrients [4]. Vegetable intake provides many health benefits, yet there are barriers such as economic, institutional, behavioral, and sociocultural factors that prevent many people worldwide from consuming the recommended daily 400g minimum of vegetables consumption by the WHO and the Food and Agriculture Organization [5]. In sub-Saharan Africa, estimates of vegetable consumption range from 70-312g per person per day, which is far lower than the WHO recommendation of at least 400g per person per day [6]. Quality and variety are important barriers to vegetable consumption [7]. Studies shows that easy access to affordable, locally grown vegetable facilitate it eating [7]. Adequate knowledge, health benefits, and affordability of leafy vegetables might improve people's perceptions, and thereby promote consumption [4]. Inadequate consumption of vegetable is a risk factor for morbidity and mortality associated with non-communicable diseases (NCDs) [6]. Previous research has shown that determinants of vegetable consumption in sub-Saharan Africa include household income, vegetable availability, the cost and feasibility of home production, consumer preferences, and decision-making processes within households [6]. Cultural beliefs, taboos, and religious beliefs were also found to influence food choices [8].

There is paucity of evidence-based research study on barriers to vegetable consumption in Patani Local Government Area of Delta State, Nigeria. Therefore, this study aimed to identify factors associated with inadequate consumption as well as factors that could possibly increase its consumption among pregnant women of Patani Local Government Area of Delta State, Nigeria.

## Materials and Methods

### Study design and study population

This was a descriptive cross-sectional study of vegetable consumption among 368 randomly selected pregnant women aged 15-49 years attending antenatal care in primary health care facilities in Patani Local Government Area of Delta State, Nigeria. Primary health care facilities were randomly selected from each of the 10 political wards for wide coverage. Data were collected using self-administered questionnaires.

### Sampling technique

A total of 368 pregnant women from Patani Local Government Area of Delta State were randomly enumerated for the study. In the first stage, five (5) wards were randomly selected from the 10 wards in the Local Government Areas for the survey. In the second stage, two (2) primary health care facilities were randomly selected from each of the wards. In the third stage, numbers of study participants were assigned to each selected health facility proportional to their twelve (12) months average client size attendance in the registration book of each antenatal care unit. Thus, mathematically, average number of pregnant women aged 15-49 years attending antenatal care in each health facilities multiplied by the total sample size (N = 368), divided by the total number of pregnant women attending the entire antenatal care facilities.

In other words,

Number of participants per facility =

$$\frac{\text{average number of pregnant women aged 15–49 years x 368}}{\text{total number of pregnant women attending the entire facilities (490)}}$$

This resulted in 38, 64, 86, 99 and 81 participants respectively from each of the five (5) facilities, making a total of 368 respondents.

### Method of data collection

Data were collected by face-to-face interview using a structured questionnaire. Food Frequency Questionnaires (FFQ) data were collected to estimate habitual frequency of intake of dark green leafy vegetable for previous 7 days. For example, an item consumed once a week was assigned a score of 1 while items consumed once daily was assigned a score of 7 [9]. Nine (9) common dark green vegetables in Nigeria markets were enlisted for this study.

### Method of data analysis

The statistical data obtained were analyzed using the Statistical Package for Social Sciences (IBM SPSS for Window 10 Version 20.0; SPSS Inc., Chicago, USA). Frequency distribution and descriptive statistics were presented in tables. Cross tabulation, Chi square test and Fisher's exact test were used to determine perception of importance and pattern of vegetable consumption, barriers associated with vegetable consumption and factors that improves vegetable consumption among pregnant women attending antenatal care. All p-values reported were two tailed and statistically significant at $P < 0.05$.

## Results

This study was made up of a total of 368 respondents of pregnant women attending primary health facilities in Patani Local Government Area of Delta State, Nigeria. The age group 21-25 years and 26-30 years with prevalence of 95 (25.8%) and 90 (24.5%) respectively were the highest age groups. While age group 10-15 years with prevalence of 3 (0.8%) was the lowest. Majority of the respondents 306 (83.2%) were married, with secondary educational status of 240 (65.2%). Only 16 (4.3%) had no formal education. Most of the respondents were self-employed 165 (44.8%) and unemployed 150 (40.8%). 266 (72.3%) of the respondents' income per month were less than ₦ 30,000 and 80 (21.7%) were between ₦ 30,000 and ₦ 50,000. 132 (35.9%) had 1-2 children, while 124 (33.7%) had 3-4 children (in Table 1).

In Table 2, 17 (17.9%) of respondents within the age group 21-25 years did not consume vegetable, while 16 (18.8%) consumed vegetable five times. In age group 26-30 years, majority 27 (30.0%) consumed vegetable seven times, while 21 (23.3%) did not consume vegetable. Most of the single respondents 16 (27.1%) did not consume vegetable. Majority of the married respondents 84 (27.5%) consumed vegetable seven times, while 53 (17.3%) did not consume vegetable. The association between age group and marital status, and the number of times vegetables were consumed were not statistically significant (P >.05). Furthermore, 70 (29.2%) of respondents with secondary educational level consumed vegetable seven times, while 44 (18.3%) did not consume vegetable. The association between educational status and number of times vegetables were consumed were statistically significant (P = 0.037). Majority of the respondents privately employed 12 (30.0%) consumed vegetables seven times compare with 4 (30.8%) respondents with government employment that did not consume vegetable. Seventy-six (28.6%) of respondents whose income per month were less than ₦ 30,000 consumed vegetable seven times, while 5 (38.5%) respondents whose income were between ₦ 51,000 – 100,000 did not consume vegetable. Seventeen (30.4%) of respondents that do not have children and 35 (26.5%) of respondents with 1-2 children consumed vegetables seven time respectively, and 1 (33.3%) of respondents having greater than 8 children did not consume vegetable. The association between employment status, minimum income per month, number of children, and the number of times vegetables were consumed were not statistically significant (P >.05).

| Variables | Options | Frequency (N = 368) | Percentage (%) |
|---|---|---|---|
| Age Group | 10-15 years | 3 | 0.8 |
| | 16-20 years | 43 | 11.7 |
| | 21-25 years | 95 | 25.8 |
| | 26-30 years | 90 | 24.5 |
| | 31-35 years | 80 | 21.7 |
| | 36-40 years | 46 | 12.5 |
| | 40 years and above | 11 | 3.0 |
| Marital Status | Single | 59 | 16.0 |
| | Married | 306 | 83.2 |
| | Divorced | 2 | 0.5 |
| | Widow | 1 | 0.3 |
| Educational Background | No formal Education | 16 | 4.3 |
| | Primary Education | 57 | 15.5 |
| | Secondary Education | 240 | 65.2 |
| | Tertiary Education | 55 | 14.9 |
| Occupational Status | Self Employed | 165 | 44.8 |
| | Privately Employed | 40 | 10.9 |
| | Government Employed | 13 | 3.5 |
| | Unemployed | 150 | 40.8 |
| Minimum Income per Month | < ₦ 30,000 | 266 | 72.3 |
| | ₦ 30,000- ₦ 50,000 | 80 | 21.7 |
| | ₦ 51,000 - ₦ 100,000 | 13 | 3.5 |
| | > 100,000 | 9 | 2.4 |
| Number of Children | None | 56 | 15.2 |
| | 1-2 | 132 | 35.9 |
| | 3-4 | 124 | 33.7 |
| | 5-6 | 50 | 13.6 |
| | 7-8 | 3 | 0.8 |
| | > 8 | 3 | 0.8 |

**Table 1:** Sociodemographic Information of Respondents.

In Figure 1, majority (33.4%) of the respondents spent between N 150- N 200 to purchase vegetable to cook, while 15.8% spent between N 50 – N 100 vegetables to cook.

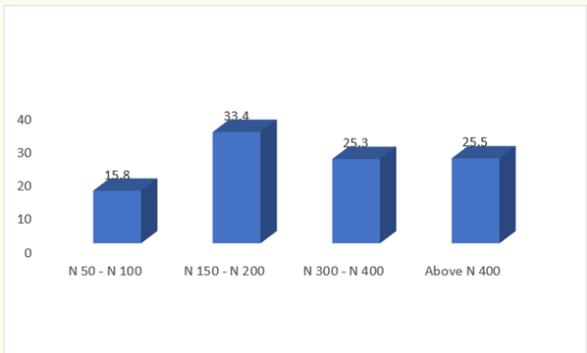


**Figure 1:** Amount of Vegetable in Naira Purchase to Cook.

In Table 3, 21 (21.1%) of respondents age group 21-25 years spent between N50 – N100 to purchase vegetable. In age group 26 – 30 years, 33 (36.7%) of respondents spent between N 150 – N200, and 24 (26.7%) spent above N 400 to purchase vegetable. 101 (33.0%) of married respondents spent between N 150 – N200, and 82 (26.8%) spent above N 400 to purchase vegetable. The association between age group, marital status and cost of vegetable purchased was not statistically significant (P>.05). Majority 8(50.0%) of respondents with no formal education spent between N50 – N100 to purchase vegetable, while 17 (30.9%) of respondents with tertiary education spent above N 400 to purchase vegetable. The association between educational status and cost of

| | | Number of time vegetables were consumed in the last 7 days [N = 368 (%)] | | | | | | | | □2 | P-Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | None | Once | Twice | Thrice | Four times | Five times | Six times | Seven times | | |
| Age Group | 10-15 years | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1 (33.3) | 0 (0) | 2 (66.7) | 53.238 | 0.115 |
| | 16-20 years | 4 (9.3) | 2 (4.7) | 8 (18.6) | 4 (9.3) | 6 (14.0) | 3 (7.0) | 2 (4.7) | 14 (32.6) | | |
| | 21-25 years | 17 (17.9) | 7 (7.4) | 16(16.8) | 12(12.6) | 10(10.5) | 16(18.8) | 1(1.05) | 16(16.8) | | |
| | 26-30 years | 21(23.3) | 8(8.9) | 9(10.0) | 11(12.2) | 9(10.0) | 5(5.6) | 0 (0) | 27(30.0) | | |
| | 31-35 years | 13(16.3) | 4(5.0) | 11(13.8) | 11(13.8) | 7(8.8) | 7(8.8) | 3(3.8) | 24(30.0) | | |
| | 36-40 years | 10(21.7) | 2(4.3) | 3(6.5) | 12(26.1) | 4(8.7) | 1(2.2) | 0 (0) | 14(30.4) | | |
| | > 40 years | 5(45.5) | 2(18.2) | 0 (0) | 1(9.1) | 1(9.1) | 1(9.1) | 0 (0) | 1(9.1) | | |
| Marital Status | Single | 16(27.1) | 4(6.8) | 8(13.6) | 7(11.9) | 7(11.9) | 4(6.8) | 0 (0) | 13(22.0) | 14.634 | 0.841 |
| | Married | 53(17.3) | 21(6.9) | 39(12.7) | 44(14.4) | 30(9.8) | 29(9.5) | 6(2.0) | 84(27.5) | | |
| | Divorced | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 1(50.0) | 0 (0) | 1(50.0) | | |
| | Widow | 1(100.0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | | |
| Educational Background | No formal | 7(43.8) | 0 (0) | 2(12.5) | 1(6.3) | 1(6.3) | 1(6.3) | 1(6.3) | 3(18.8) | 33.909 | 0.037 |
| | Primary | 9(15.8) | 9(15.8) | 9(15.8) | 6(10.5) | 4(7.0) | 3(5.3) | 3(5.3) | 14(24.6) | | |
| | Secondary | 44(18.3) | 13(5.4) | 30(12.5) | 31(12.9) | 25(10.4) | 26(10.8) | 1(0.4) | 70(29.2) | | |
| | Tertiary | 10(18.2) | 3(5.5) | 6(10.9) | 13(23.6) | 7(12.7) | 4(7.3) | 1(1.8) | 11(20.0) | | |
| Employment Status | Self-Employed | 26(15.8) | 10(6.1) | 22(13.3) | 22(13.3) | 18(10.9) | 21(12.7) | 2(1.2) | 44(26.7) | 16.279 | 0.754 |
| | Privately Employed | 9(22.5) | 1(2.5) | 3(7.5) | 8(20.0) | 3(7.5) | 3(7.5) | 1(2.5) | 12(30.0) | | |
| | Government Employ | 4(30.8) | 1(7.7) | 2(15.4) | 1(7.7) | 0 (0) | 1(7.7) | 1(7.7) | 3(23.1) | | |
| | Unemployed | 31(20.7) | 13(8.7) | 20(13.3) | 20(13.3) | 16(10.7) | 9(6.0) | 2(1.3) | 39(26.0) | | |
| Minimum Income per Month | < N 30,000 | 46(17.3) | 19(7.1) | 40(15.0) | 32(12.0) | 26(9.8) | 22(8.3) | 5(1.9) | 76(28.6) | 18.260 | 0.632 |
| | N 30,000 –N 50,000 | 18(22.5) | 5(6.3) | 5(6.3) | 15(18.8) | 8(10.0) | 10(12.5) | 1(1.3) | 18(22.5) | | |
| | N51,000 - N100,000 | 5(38.5) | 0 (0) | 1(7.7) | 2(15.4) | 2(15.4) | 0 (0) | 0 (0) | 3(23.1) | | |
| | > 100,000 | 1(11.1) | 1(11.1) | 1(11.1) | 2(22.2) | 1(11.1) | 2(22.2) | 0 (0) | 1(11.1) | | |
| Number of Children | None | 7(12.5) | 5(8.9) | 7(12.5) | 7(12.5) | 6(10.7) | 7(12.5) | 0 (0) | 17(30.4) | 45.323 | 0.114 |
| | 1-2 | 31(23.5) | 6(4.5) | 26(19.7) | 9(6.8) | 12(9.1) | 10(7.6) | 3(2.3) | 35(26.5) | | |
| | 3-4 | 23(18.5) | 11(8.9) | 13(10.5) | 26(21.0) | 14(11.3) | 10(8.1) | 1(0.8) | 26(21.0) | | |
| | 5-6 | 8(16.0) | 3(6.0) | 1(2.0) | 9(18.0) | 5(10.0) | 7(14.0) | 2 (4.0) | 15 (30.0) | | |
| | 7-8 | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 3(100.0) | | |
| | > 8 | 1(33.3) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 0 (0) | 2(66.7) | | |

**Table 2:** Sociodemographic by Number of Times Vegetables were Consumed in Last 7 Days.

| Variables | | Cost of vegetables purchase in Naira (₦), N = 368 (%) | | | | □2 | P-Value |
|---|---|---|---|---|---|---|---|
| | | ₦50 – ₦100 | ₦150 – ₦200 | ₦300 – ₦400 | Above ₦400 | | |
| Age Group | 10-15 years | 0(0) | 1(33.3) | 2(66.7) | 0 | 23.4980 | 0.172 |
| | 16-20 years | 10(23.3) | 17(39.5) | 7(16.3) | 9(20.9) | | |
| | 21-25 years | 20(21.1) | 31(32.6) | 23(24.2) | 21(22.1) | | |
| | 26-30 years | 11(12.2) | 33(36.7) | 22(24.4) | 24(26.7) | | |
| | 31-35 years | 14(17.5) | 25(31.3) | 24(30.0) | 17(21.3) | | |
| | 36-40 years | 2(4.3) | 15(32.6) | 11(23.9) | 18(39.1) | | |
| | > 40 years | 1(9.1) | 1(9.1) | 4(36.4) | 5(45.5) | | |
| Marital Status | Single | 9(15.3) | 22(37.3) | 16(27.1) | 12(20.3) | 7.362 | 0.599 |
| | Married | 48(15.7) | 101(33.0) | 75(24.5) | 82(26.8) | | |
| | Divorced | 1(50.0) | 0(0) | 1(50.0) | 0(0) | | |
| | Widow | 0(0) | 0(0) | 1(100.0) | 0(0) | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Educational Status | No formal Education | 8(50.0) | 0(0) | 4(25.0) | 4(25.0) | 22.119 | 0.009 |
| | Primary Education | 10(17.5) | 22(38.6) | 16(28.1) | 9(15.8) | | |
| | Secondary Education | 33(13.8) | 82(34.2) | 61(25.4) | 64(26.7) | | |
| | Tertiary Education | 7(12.7) | 19(34.5) | 12(21.8) | 17(30.9) | | |
| Occupational Status | Self Employed | 20(12.1) | 66(40.0) | 36(21.8) | 43(26.1) | 25.415 | 0.003 |
| | Privately Employed | 4(10.0) | 7(17.5) | 17(42.5) | 12(30.0) | | |
| | Government Employed | 1(7.7) | 1(7.7) | 4(30.8) | 7(53.8) | | |
| | Unemployed | 33(22.0) | 49(32.7) | 36(24.0) | 32(21.3) | | |
| Minimum Income per Month | < N 30,000 | 47(17.7) | 93(35.0) | 69(25.9) | 57(21.4) | 14.399 | 0.109 |
| | N 30,000-N 50,000 | 6(7.5) | 25(31.3) | 19(23.8) | 30(37.5) | | |
| | N 51,000 - N 100,000 | 4(30.8) | 2(15.4) | 3(23.1) | 4(30.8) | | |
| | > 100,000 | 1(11.1) | 3(33.3) | 2(22.2) | 3(33.3) | | |
| Number of Children | None | 11(19.6) | 16(28.6) | 16(28.6) | 13(23.2) | 11.049 | 0.749 |
| | 1-2 | 21(15.9) | 49(37.1) | 28(21.2) | 34(25.8) | | |
| | 3-4 | 19(15.3) | 35(28.2) | 37(29.8) | 33(26.6) | | |
| | 5-6 | 5(10.0) | 20(40.0) | 12(24.0) | 13(26.0) | | |
| | 7-8 | 1(33.3) | 1(33.3) | 0 | 1(33.3) | | |
| | > 8 | 1(33.3) | 2(66.7) | 0(0) | 0(0) | | |

**Table 3:** Sociodemographic by Cost of Vegetables Purchased in Naira to Cook.

vegetable purchased was statistically significant (P = 0.009). While 33 (22.0%) unemployed respondents spent between N50 – N100 to purchase vegetable, 7 (53.8%) of respondents with government employment spent above N 400 to purchase vegetable. The association between occupational status and cost of vegetable purchased was statistically significant (P = 0.003). Findings showed that 4 (30.8%) of respondents whose minimum income per month were between N 51,000 – N 100, 000 spent between N50 – N100 to purchase vegetable and 30 (37.5%) of respondents whose minimum income per month were between N 30,000 – N 50, 000 spent above N 400 to purchase vegetable. The association between occupational status and cost of vegetable purchased was not statistically significant (P = 0.109). While 1 (33.3%) of respondents with 7-8 and greater than 8 children respectively spent between N50 – N100 to purchase vegetable, 37 (29.8%) of respondents with 3-4 children spent between N 300 - N 400 to purchase vegetable. The association between number of children and cost of vegetable purchased was not statistically significant (P = 0.749).

### Barriers to consumption of vegetables

In Table 4, insufficient income 114 (31.0%), price of vegetable 77 (20.9%) and distance to market 97 (26.4%) were the most common barriers to consumption of vegetables among the respondents. Allergy 4 (1.1%), unpleasant taste 4 (1.1%) and scarcity in the market 12 (3.3%) were the least barriers to consumption of vegetables among the respondents.

### Factors that Improve Consumption of Vegetables

In figure 2, majority (91.3%) of the respondents indicated that having your own household vegetable garden can improve consumption. Likewise, 93.2% indicated that teaching community on vegetable farming and its importance can improve consumption of vegetables.

## Discussion

The International Food Policy Research Institute of the World Health Organization (WHO) reported that household consumption of fruits and vegetables in Sub-Saharan Africa is often determined by knowledge of the benefits of fruits and vegetable consumption, the level of income, preferences, personal experience, and cultural norms [6]. This study shows that 29.2%) of respondents with secondary educational level consumed vegetable seven times. The association between educational status and number of times vegetables were consumed were statistically significant (P = 0.037). In other words, educational background significantly influences the number of times vegetables were consumed by respondents (P = 0.037). Similar studies showed that vegetable consumption varies between educational groups across Europe, with larger differences in Northern European countries than in Mediterranean countries [10]. However, a higher level of education is overall associated with a higher consumption of vegetables [11]. This study also showed that 50.0% of respondents with no formal education spent between ₦ 50 – ₦ 100 to purchase vegetable, while 30.9% of respondents with tertiary education spent above ₦ 400 to purchase vegetable. The association between educational status and cost of vegetable purchased was statistically significant (P = 0.009). Finding showed that a higher socioeconomic status and the intention to lose weight represented independent factors associated with more favourable vegetable consumption [12]. The results of this study showed that insufficient income (31.0%), Distance to

| Variables | Options | Frequency (N = 368) | Percentage (%) |
|---|---|---|---|
| Insufficient Income | Yes | 114 | 31.0 |
| | No | 254 | 69.0 |
| Price of Vegetables | Yes | 77 | 20.9 |
| | No | 291 | 79.1 |
| Distance to Market | Yes | 97 | 26.4 |
| | No | 271 | 73.6 |
| Poor Road Access to Market | Yes | 17 | 4.6 |
| | No | 351 | 95.4 |
| Personal Dislike | Yes | 19 | 5.2 |
| | No | 349 | 94.8 |
| Allergy | Yes | 4 | 1.1 |
| | No | 364 | 98.9 |
| Unpleasant Taste | Yes | 4 | 1.1 |
| | No | 364 | 98.9 |
| Lack of time to wash and slice | Yes | 28 | 7.6 |
| | No | 340 | 92.4 |
| Scarcity in the market | Yes | 12 | 3.3 |
| | No | 356 | 96.7 |
| Not enough land space in your environment | Yes | 36 | 9.8 |
| | No | 332 | 90.2 |

**Table 4:** Barriers to Consumption of Vegetables by Respondents.

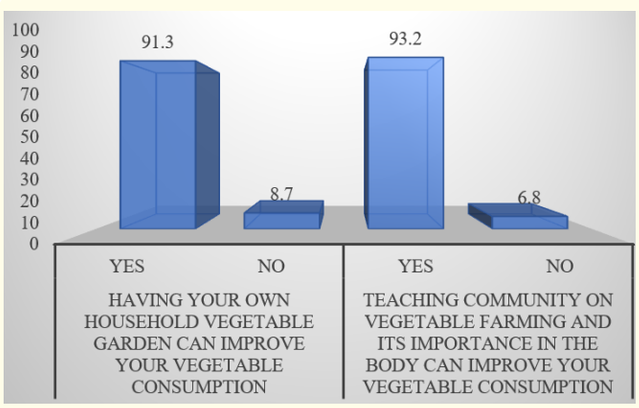


**Figure 2:** Factors that Improve Consumption of Vegetables among Respondents.

market (26.4%), price of vegetables (20.9%) and lack of adequate land space (9.8%) were the most common barriers to consumption of vegetables among the respondents. Similar studies affirmed that the reasons for inadequate intake of vegetables are related to socioeconomic factors, such as income levels, marital status, age and educational attainment [13,14]. Further study have indicated that the relatively high price of vegetable is a barrier to healthy eating for people with low incomes [15]. On factors that improves vegetable consumption, 91.3% of the respondents indicated that having your own household vegetable garden can improve vegetable consumption. Likewise, 93.2% indicated that teaching community on vegetable farming and its importance can improve consumption of vegetables. In similar suggestions, Lim., *et al.* in 2018, emphasized the necessity to give prenatal mothers the adequate information about nutrition intake during pregnancy which may result into mother and baby health outcomes [16]. On the contrary, other research findings showed that financial incentives can increase vegetable purchasing as well as consumption for people experiencing food insecurity and low income [17]. Social support such as spouse eating vegetable together with his pregnant partner can create an enabling environment for prenatal vegetable behaviour change [18–20].

This study also shows that 72.3% of the respondents' income per month were less than ₦ 30,000 and 31.0% of respondents stated that insufficient income was a barrier to consumption of vegetable. Lack of enough land space was a barrier to 9.8% of the respondents. Poverty and a shortage of land were mentioned frequently as reasons why rural participants could not obtain enough vegetables [21], which may be influenced by superstitions and social norms. There are many myths in both the rural and urban areas regarding what not to eat during pregnancy [21]. For example, pregnant women are forbidden to drink coconut water, as superstition holds that 'those who violate these rules, their kids' eyes will be white' [21]. Similarly, pregnant women are not allowed to eat bamboo shoots, as there is a superstition that doing so will cause one's child to 'look like a monkey' [21]. Large portions of land in rural communities of Nigeria are dedicated to certain idols and declared sacred. Fruits and vegetables from such sacred land are taboos especially when consumed by women. Though, food taboos may serve as a unifying factor to maintain group identity and create a sense of belonging for its members [22], however, some food taboos may be harmful to health due to restrictions placed on otherwise nutritious and healthy food, leading to nutritional deficien-

cies. Most food taboos put the underprivileged and most vulnerable people, such as pregnant women, children, and the elderly at a nutritional disadvantage [23].

## Conclusion

Insufficient income, Distance to market, price of vegetables, and lack of adequate land space were the most common barriers to consumption of vegetables among the respondents. Having your own household vegetable garden is recommended to improve vegetable consumption. Reducing cost and improving quality, variety, and convenience of fresh fruits and vegetables may increase consumption and reduce pregnancy related complications. Policy makers should consider supporting programs that address these barriers in low-income communities. This may be done by encouraging vegetable stores to locate in these communities. Additionally, policy makers should consider decreasing vegetable prices, either through subsidies or vouchers, to address cost barriers. Policy makers should invest in culturally appropriate nutrition programs that focus on increasing vegetable consumption among low-income people and pregnant women.

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## Competing Interests

Authors have declared that no competing interests exist.

## Authors' Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Lilian E. Okogba and John E. Moyegbone. Josiah O. Adjene managed the literature searches. The first draft of the manuscript was written by Lilian E. Okogba and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

## Consent

Informed consent was obtained from all participants included in this study after detailed explanation of the study procedure both in English Language and local dialect.

## Ethical Approval

Ethical approval for this study was obtained from the research and ethics committee of Novena University, Ogume, Delta State. Permission was taken from the chairman of Patani Local Government Council. Informed consent was obtained from all participants after detailed explanation of the study procedure with assurance of confidentiality of the information that was collected. All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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