

Maternal nutritional profile among pregnant women in Yenagoa, Bayelsa State, Nigeria

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ABSTRACT: Maternal nutrition during pregnancy is essential for optimal maternal health and fetal development, yet nutritional challenges remain common in many developing countries. This study assessed maternal nutrition during pregnancy among pregnant women in Yenagoa Local Government Area, Bayelsa State. A cross-sectional study design was adopted. The study population comprised pregnant women attending antenatal clinics in selected health facilities, and a sample size of 235 respondents was selected using a multistage sampling technique. Data were collected using a structured questionnaire and anthropometric measurements (weight, height, BMI, and MUAC). Data were analysed using frequencies, percentages, means, and standard deviations. The findings revealed that 51.9% of respondents had normal BMI, 26.8% were overweight, 14.5% were obese, and 6.8% were underweight. The mean BMI was 26.08 ± 4.11 kg/m², while the mean MUAC was 27.94 ± 4.58 cm. Regarding dietary practices, 100.0% ate at least three meals daily, 87.2% consumed fruits and vegetables daily, 63.4% regularly consumed protein-rich foods, 100% took iron and folic acid supplements, and 90.2% reported increased food intake during pregnancy. Knowledge of maternal nutrition was very high: 100% recognised the role of good nutrition in fetal growth, anaemia prevention, reducing pregnancy complications, and child development, while 99.1% agreed that good nutrition reduces illness during pregnancy. The study concluded that pregnant women generally possessed satisfactory nutritional status, good dietary practices, and excellent knowledge of maternal nutrition. The study recommends strengthening antenatal nutrition education and routine nutritional monitoring to guide targeted interventions, inform policy decisions, and improve maternal health outcomes in the area.

Keywords: Diet, nutrition, pregnancy, women.

INTRODUCTION

Poor maternal nutrition during pregnancy has profound consequences for both mother and child. Inadequate intake of essential nutrients increases the risk of maternal anaemia, gestational weight abnormalities, impaired immunity, and pregnancy-related complications (Marshall *et al.*, 2022). Globally, poor maternal nutrition remains a major public health challenge and a key contributor to

maternal morbidity and mortality. UNICEF (2023) reports that over one billion adolescent girls and women worldwide suffer from undernutrition and micronutrient deficiencies, with pregnant women being disproportionately affected. Iron deficiency anaemia alone affects a significant proportion of pregnant women globally and is associated with increased risks of haemorrhage, sepsis, preterm

delivery, and low birth weight (Kassa *et al.*, 2017; 2022; Seid *et al.*, 2023). Maternal nutrition refers to the intake of adequate and balanced nutrients by women before conception, during pregnancy, and after childbirth to support maternal health and optimal fetal growth and development. Adequate maternal nutrition encompasses sufficient macronutrients (carbohydrates, proteins, and fats) and micronutrients such as iron, folate, iodine, zinc, and vitamin A, which are critical for preventing pregnancy-related complications and adverse birth outcomes (Marshall *et al.*, 2022; Emmanuel *et al.*, 2025). During pregnancy, nutritional requirements increase significantly to meet the physiological demands of maternal tissue expansion, placental development, and fetal growth, making nutrition a cornerstone of safe motherhood (Nnam, 2015; Hassen *et al.*, 2015).

In Nigeria, maternal nutrition is a critical concern due to the country's high maternal mortality ratio and widespread nutritional deficiencies among women of reproductive age. National studies have reported high prevalence of anemia, inadequate gestational weight gain, and micronutrient deficiencies among pregnant women (Harika *et al.*, 2017; Johnson *et al.*, 2025). Adeoye and Okekunle (2022) observed that dietary patterns among pregnant women in Ibadan were strongly influenced by socioeconomic status, education, and food availability, with many women failing to meet recommended nutrient intakes. These nutritional inadequacies contribute to preventable complications such as pre-eclampsia, prolonged labour, postpartum haemorrhage, and poor fetal outcomes. Socioeconomic constraints, limited nutrition education, and poor maternal health service utilisation have been identified as key barriers to optimal maternal nutrition in the region (Yoseph *et al.*, 2024). For the fetus, poor maternal nutrition is associated with intrauterine growth restriction, low birth weight, preterm birth, and impaired cognitive development later in life (Tran *et al.*, 2019; Likhar and Patil, 2022). Despite these findings, localised evidence from Yenagoa L.G.A. remains limited, creating a research gap in understanding maternal nutrition status, practices, and determinants within this specific setting. Given the paucity of data specific to Yenagoa and the critical role of maternal nutrition in improving maternal and neonatal outcomes, there is a compelling need for a localised assessment.

MATERIALS AND METHODS

Study design

This study adopted a cross-sectional study design. The cross-sectional approach was used to assess the nutritional status, dietary patterns, and associated factors among pregnant women attending antenatal care services in Yenagoa Local Government Area at a single point in time. This design is appropriate because it allowed for the evaluation of relationships between maternal nutrition and key determinants without requiring long-term follow-up.

Study area

This study was conducted in Yenagoa Local Government Area (LGA), Bayelsa State, Nigeria, the administrative headquarters and largest urban centre of Bayelsa State in the Niger Delta region of southern Nigeria. Yenagoa LGA is located between 4°55' and 5°05' N latitude and 6°15' and 6°25' E longitude, with its administrative headquarters situated at approximately 4°55'29" N, 6°15'51" E. The Local Government covers an area of approximately 706 km² and had an official population of 352,285 according to the 2006 National Population and Housing Census conducted by the National Population Commission (NPC, 2006).

Yenagoa experiences a humid tropical rainforest climate characterised by two distinct seasons: a long rainy season (March–November) and a short dry season (December–February). Annual rainfall ranges from 2,500 to over 4,000 mm, relative humidity is generally above 80%, and mean annual temperatures range from 26 to 28°C. The Local Government is traversed by numerous rivers, creeks, and wetlands, reflecting its location within the Niger Delta ecosystem.

The population of Yenagoa is predominantly composed of the Ijaw ethnic group, although the city has become increasingly cosmopolitan due to urbanisation and economic opportunities associated with its status as the state capital. The major occupations include civil service, trading, fishing, farming, artisanal activities, and small-scale entrepreneurship. The LGA hosts several public and private healthcare facilities, including the Federal Medical Centre, Yenagoa, the Niger Delta University Teaching Hospital (Okolobiri), the Bayelsa State Specialist Hospital, and numerous primary healthcare centres that provide routine antenatal, delivery, and postnatal services. These healthcare institutions attract pregnant women from both urban and surrounding rural communities, making Yenagoa LGA an appropriate setting for assessing the maternal nutritional profile of pregnant women during pregnancy.

Study population

The study population consists of all adult pregnant women (aged 18 years and above) attending antenatal care services at selected health facilities within Yenagoa LGA during the study period. Eligible participants include women who were willing to participate and provided informed consent.

Sample size determination

The sample size for this study was determined using the Cochran formula:

$$n = \frac{Z^2 pq}{d^2}$$

Where: n = Sample size (?), Z^2 = Z-score value (1.96), p = From Tafasa *et al.* (2023) reported prevalence (p) of maternal undernutrition among pregnant women, 17.7% on a systematic review of evidence from similar populations in Ethiopia and sub-Saharan Africa, q = 100% - Previous prevalence, and d^2 = margin of error

$$n = \frac{1.96^2 \times 17.7 \times (100 - 17.7)}{5^2}$$

$$n = \frac{1.96^2 \times 17.7 \times 68}{5^2} = \frac{5,596.097136}{25}$$

$$n = 223.84 \approx 224 + 5\% \text{ non-response rate.}$$

$n = 224 + 11 = 235$ respondents were selected for the study.

Sampling technique

A multistage sampling approach was employed to recruit study participants. In the first stage, the sampling frame comprised all health facilities providing antenatal care (ANC) services in Yenagoa Local Government Area, as obtained from the Bayelsa State Ministry of Health. From this list of approximately 20 facilities, five health facilities were selected using simple random sampling. In the second stage, eligible pregnant women attending ANC clinics at the selected facilities were recruited through simple random sampling. Participant allocation was proportionate to community population size, with 65 pregnant women selected from each of the two most populous communities and 35 from each of the less populated communities to ensure adequate representation across the study area.

Instrument for data collection

Data were collected using a structured questionnaire specifically designed for this study and divided into the following sections; section A contained data on socio-demographic characteristics and obstetric history; section B contained data on nutritional status (weight, height, and mid-upper arm circumference), section C contained data on dietary pattern and feeding practices, and section D contained data on knowledge on the effects of maternal nutrition on pregnancy outcome.

Validity of the Instrument

The validity of the instrument was ensured through face and content validity. The questionnaire was reviewed by experts in public health and community health nursing to assess clarity, relevance, and appropriateness of items.

Data collection

Data were collected through face-to-face interviews with consenting pregnant women at the selected ANC clinics. The step-by-step procedures were:

1. Participants were approached in the ANC waiting area.
2. The purpose of the study was explained, and written informed consent was obtained.
3. Using the questionnaire, trained research assistants administered structured interviews.
4. Responses were recorded directly on the questionnaire.
5. Weight, height, and Mid-Upper-Arm-Circumference (MUAC) were measured using a calibrated scale (to the nearest 0.1 kg).
6. Height was measured using a stadiometer.

Data analysis

Data were entered and analysed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics such as frequencies, percentages, means, and standard deviation were used to summarise socio-demographic, dietary, and nutritional variables.

Ethical approval

An institute's ethical approval was obtained from the Research and Ethics Committee of the University of Port Harcourt.

RESULTS

Presentation of demographic data

Table 1 shows the demographic characteristics of the pregnant women. The findings revealed that respondents aged less than 20 years were 5(2.1%), those aged 20–29 years were 58(24.7%), respondents aged 30–39 years were 137(58.3%), while those aged 40 years and above were 35(14.9%). 21(8.9%) respondents were single, 212(90.2%) were married, while 2(0.9%) were divorced. 3(1.3%) respondents had no formal education, 29(12.3%) had primary education, 130(55.3%) had secondary education, while 73(31.1%) had tertiary education. 34(14.5%) respondents were unemployed, 188(80.0%) were traders, 13(5.5%) were civil servants, while none of the respondents was artisans or students, accounting for 0(0.0%) respectively. 233(99.1%) respondents were Christians while 2(0.9%) were Muslims.

Obstetric characteristics among pregnant women

The findings (Table 2) revealed that 89(37.8%) respondents

Table 1. Characteristics of the response on demographic profile.

S/N	Characteristics	Response	Frequency (n=235)	Percentage (%=100)
1	Age	<20years	5	2.1
		-20-29years	58	24.7
		-30-39years	137	58.3
		>40years	35	14.9
2	Marital Status	Single	21	8.9
		Married	212	90.2
		Divorced	2	0.9
3	Educational Level	No Formal Education	3	1.3
		Primary	29	12.3
		Secondary	130	55.3
		Tertiary	73	31.1
4	Occupation	Unemployed	34	14.5
		Trader	188	80.0
		Civil servant	13	5.5
		Artisan	0	0.0
		Student	0	0.0
5	Religion	Christianity	233	99.1
		Islam	2	0.9

Source: Field Work (2026).

Table 2. Distribution of response by obstetric characteristics.

S/N	Characteristics	Response	Frequency (n=235)	Percentage (%=100)
1	Parity	None	89	37.8
		1-2	108	46.0
		3-4	34	14.5
		5 and above	4	1.7
2	Gestational age	1st Trimester	59	25.1
		2nd Trimester	147	62.6
		3rd Trimester	29	12.3
3	Number of antenatal visits	1-2	78	33.2
		3-4	130	55.3
		5 and above	27	11.5

Source: Field Work (2026).

had no previous childbirth, 108(46.0%) had 1–2 children, 34(14.5%) had 3–4 children, while 4(1.7%) had 5 children and above. 59(25.1%) respondents were in their first trimester, 147(62.6%) were in their second trimester, while 29(12.3%) were in their third trimester. Concerning

antenatal clinic attendance, 78(33.2%) respondents had attended antenatal clinic 1–2 times, 130(55.3%) had attended 3–4 times, while 27(11.5%) had attended 5 times and above. This indicates that most respondents had attended the antenatal clinic between 3 and 4 times.

Table 3. Nutritional status of pregnant women.

BMI Category	Frequency (n=235)	Percentage (%=100)
Normal	122	51.9
Obesity	34	14.5
Overweight	63	26.8
Underweight	16	6.8

Source: Field Work (2026).

Table 4. Nutritional profile of the study population.

S/N	Characteristics	Mean $\pm$ Standard Deviation
1	Weight (kg)	70.27 $\pm$ 11.13
2	Height (m)	1.64 $\pm$ 0.08
3	Body Mass Index (kg/m ²)	26.08 $\pm$ 4.11
4	Mid-Upper-Arm-Circumference (cm)	27.57 $\pm$ 2.73

Source: Field Work (2026).

Table 5. Distribution of responses on dietary pattern and feeding practices.

S/N	Characteristics	Response	Frequency (n=235)	Percentage (%=100)
1	Do you eat at least three meals daily during pregnancy?	Yes	235	100
		No	0	0.0
2	Do you eat fruits and vegetables every day?	Yes	205	87.2
		No	30	12.8
3	Do you eat protein-rich foods such as fish, meat, eggs, or beans regularly?	Yes	149	63.4
		No	86	36.6
4	Do you take iron and folic acid tablets as prescribed?	Yes	235	100
		No	0	0.0
5	Do you avoid certain foods because of cultural or personal beliefs?	Yes	65	27.7
		No	170	72.3
6	Do you eat more food now than before you became pregnant?	Yes	212	90.2
		No	23	9.8
7	Do you receive nutrition advice during antenatal clinic visits?	Yes	235	100
		No	0	0.0

Source: Field Work (2026).

Nutritional status of pregnant women

The findings (Table 3) revealed that 122(51.9%) respondents had normal Body Mass Index (BMI), 63(26.8%) were overweight, 34(14.5%) were obese, while 16(6.8%) were underweight.

Nutritional status parameters of pregnant women

The findings (Table 4) revealed that the mean weight of

respondents was 70.27 $\pm$ 11.13 kg, the mean height was 1.64 $\pm$ 0.08 m, the mean BMI was 26.08 $\pm$ 4.11 kg/m², while the mean Mid-Upper Arm Circumference (MUAC) was 27.57 $\pm$ 2.73 cm.

Dietary pattern and feeding practices

The findings (Table 5) revealed that all respondents, 235(100%), reported eating at least three meals daily during pregnancy, while none, 0(0.0%), reported otherwise.

Table 6. Maternal distribution response outcomes on the knowledge effects of nutrition during pregnancy.

S/N	Characteristics	Response	Frequency (n=235)	Percentage (%=100)
1	Does good nutrition help the baby grow well during pregnancy?	Yes	235	100
		No	0	0.0
2	Can poor nutrition cause anaemia in pregnancy?	Yes	235	100
		No	0	0.0
3	Can poor maternal nutrition lead to low-birth-weight babies?	Yes	235	100
		No	0	0.0
4	Can poorly feeding increase pregnancy complications?	Yes	235	100
		No	0	0.0
5	Does good nutrition reduce illness during pregnancy?	Yes	233	99.1
		No	2	0.9
6	Can poor nutrition in pregnancy affect child development?	Yes	235	100
		No	0	0.0
7	Does nutrition education help pregnant women eat better?	Yes	235	100
		No	0	0.0

Source: Field Work (2026).

A total of 205(87.2%) respondents reported eating fruits and vegetables daily, while 30(12.8%) did not. 149(63.4%) respondents reported consuming protein-rich foods regularly, while 86(36.6%) did not. All respondents, 235(100%), reported taking iron and folic acid supplements as prescribed, while none, 0(0.0%), reported otherwise. 65(27.7%) respondents avoided certain foods because of cultural or personal beliefs, whereas 170(72.3%) did not avoid foods. 212(90.2%) respondents reported eating more food during pregnancy than before pregnancy, while 23(9.8%) did not. 235(100%) reported receiving nutrition advice during antenatal clinic visits, while none, 0(0.0%), reported otherwise.

Knowledge of the effects of maternal nutrition on pregnancy outcomes

The findings (Table 6) revealed that all respondents, 235(100%), agreed that good nutrition helps babies grow well during pregnancy, while none, 0(0.0%), disagreed. All respondents, 235(100.0%), agreed that poor nutrition can cause anaemia during pregnancy, poor maternal nutrition can lead to low-birth-weight babies, poor feeding can increase pregnancy complications, poor nutrition can affect child development, and nutrition education can improve feeding practices. 233(99.1%) respondents agreed that good nutrition reduces illness during pregnancy, while only 2(0.9%) disagreed.

DISCUSSION

Nutritional status of pregnant women

The findings revealed that the majority [122(51.9%)] of pregnant women had a normal nutritional status based on their Body Mass Index classification. However, a considerable proportion of the respondents were overweight and obese, while only a small proportion was underweight. The nutritional status parameters further showed that the average BMI of the respondents was slightly above the normal of 18.5-24.9kg/m², indicating a tendency toward overweight among the study population. The mean Mid-Upper Arm Circumference (MUAC) of 27.57±2.73 cm also suggested that most of the respondents had adequate nutritional reserves and were not suffering from maternal undernutrition. These findings indicate that the nutritional status of most pregnant women in the study area was generally satisfactory. The relatively low proportion of underweight women may be attributed to regular antenatal attendance, nutritional counselling, and improved food consumption during pregnancy. However, the observed prevalence of overweight and obesity suggests a growing concern regarding excessive weight gain during pregnancy, which may predispose women to pregnancy-related complications such as gestational diabetes, hypertension, and difficult labour. The findings contrast with the study conducted by Fadare *et al.* (2019), who reported a high prevalence of undernutrition among

pregnant women attending antenatal clinics in Nigeria. Similarly, Likhari and Patil (2022) also observed that many pregnant women in Bangladesh had low BMI and poor nutritional status due to inadequate dietary diversity and low household income. The better nutritional status observed in the present study may be due to improved access to antenatal services and nutrition education. The findings also disagree with González-Fernández *et al.* (2019), who reported poor nutritional status and severe anaemia among many pregnant women in Northern Nigeria. The difference may be attributed to variations in socioeconomic conditions, healthcare access, and nutritional awareness among study populations. However, the findings support Keats *et al.* (2021), who observed that nutritional interventions and supplementation programs significantly improve maternal nutritional status and pregnancy outcomes. The generally good nutritional status recorded among respondents may reflect the positive impact of routine antenatal care services and nutritional supplementation.

Dietary patterns and feeding practices among pregnant women

The findings revealed that the majority of respondents practised healthy dietary behaviour during pregnancy. Most respondents reported eating at least three meals daily, consuming fruits and vegetables regularly, taking iron and folic acid supplements as prescribed, eating more food during pregnancy, and receiving nutrition education during antenatal clinic visits. The findings also showed that a majority did not avoid foods because of cultural beliefs, although some respondents still practised food restrictions. Furthermore, while many respondents consumed protein-rich foods regularly, a notable proportion did not. These findings suggest that most pregnant women in the study area demonstrated relatively good dietary practices and adherence to recommended maternal nutrition guidelines. The widespread use of iron and folic acid supplements and the universal exposure to nutrition education during antenatal care indicate effective implementation of maternal health programmes within the study setting. The findings disagree with Nguyen *et al.* (2017), who reported inadequate dietary diversity and low consumption of fruits and protein-rich foods among pregnant women in Vietnam. Similarly, Nguyen *et al.* (2017) reported that many pregnant women in sub-Saharan Africa consumed predominantly carbohydrate-based diets with inadequate intake of micronutrient-rich foods. The present findings also contrast with Fadare *et al.* (2019), who found that many pregnant women regularly skipped meals because of financial difficulties and pregnancy-related discomforts. Likewise, WHO (2022) reported that many pregnant women consumed fewer than three meals daily and had poor dietary diversity. However, the findings partially agree with Ibikunle *et al.* (2021), who identified cultural food restrictions among pregnant

women. Although food taboos were present among some respondents in the present study, the majority did not avoid foods because of cultural beliefs, suggesting improved nutritional awareness. The relatively positive feeding practices observed in this study may be attributed to frequent antenatal visits, effective nutrition counselling, and increased awareness of the importance of adequate nutrition during pregnancy.

Knowledge of the effects of maternal nutrition on pregnancy outcomes

The findings revealed that respondents possessed a very high level of knowledge regarding the effects of maternal nutrition on pregnancy outcomes. Nearly all respondents understood that good nutrition promotes fetal growth, reduces illness during pregnancy, prevents anaemia, reduces pregnancy complications, supports child development, and contributes to better pregnancy outcomes. Respondents also acknowledged the importance of nutrition education in improving dietary practices during pregnancy. These findings indicate that nutritional awareness among pregnant women in the study area was remarkably high. Such knowledge is important because it influences food choices, dietary behaviours, compliance with supplementation, and overall maternal health practices during pregnancy. The findings agree with Della Líbera *et al.* (2017), who reported that many pregnant women understood the importance of proper nutrition for healthy fetal growth and maternal well-being. The findings also support Keats *et al.* (2021), who observed that nutritional counselling provided during antenatal care significantly improved maternal knowledge and feeding practices. The present findings, however, differ from González-Fernández *et al.* (2024), who reported relatively poor knowledge regarding the effects of maternal nutrition on pregnancy outcomes among pregnant women in Northern Nigeria. Similarly, Tafasa *et al.* (2023) found poor awareness of balanced diets and maternal nutrition among pregnant women in Ethiopia. The higher level of knowledge observed in the present study may be attributed to consistent antenatal attendance and regular nutrition education sessions provided during antenatal clinic visits. This is further supported by the finding that all respondents reported receiving nutritional advice during antenatal care. Furthermore, the findings contrast with Okafor *et al.* (2021), who reported inadequate understanding of recommended dietary requirements among some pregnant women. The present study demonstrates that respondents were highly knowledgeable about maternal nutrition and its implications for pregnancy outcomes.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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