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Nutrition Knowledge and Dietary Practices among Women of Reproductive Age in Michael Okpara University of Agriculture Umudike, Abia State

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Abstract

Background

Nutrition is a crucial component in health and development. According to World Health Organization (WHO), better nutrition is associated to improved infant, child and maternal health, a stronger immune system, safer pregnancy and childbirth, lower risk of non-communicable diseases and durability. Despite overall awareness level of pregnant mothers on nutrition before and during pregnancy, the practices related to proper nutrition and diversified nutrition during pregnancy were found to be poor.

Objective

The study was designed to assess nutrition knowledge, determine their practice towards their nutritional knowledge, and the association of socio-economic and demographic characteristics on the nutrition knowledge among women of reproductive age in Michael Okpara University of Agriculture, Umudike, Abia State.

Methodology

A cross-sectional study was conducted on 436 undergraduate women of reproductive age between the ages of 15-49 in Michael Okpara University of Agriculture, Umudike, Abia State.

The undergraduate women of reproductive age were selected using simple random sampling. Information from students were collected using questionnaire. The data was analyzed using SPSS. Correlation was used to determine the association of socio-economic and demographic characteristics and nutrition knowledge.

Results

The finding outcomes revealed that 78.2% of respondents had tertiary education, 93.3% of the respondents correctly identified that women should make adequate plans for pregnancy while 84.6% were aware of anemia and malnutrition in pregnancy. Also, 84.2% of respondents had adequate nutrition knowledge about pregnancy, and 93.6% didn’t smoke or drink alcohol during pregnancy. However, very few 6.4% smoked/drank alcohol during pregnancy. The study also revealed a significant correlation between level of education of the women and their Nutrition Knowledge.

Conclusion

The results from the study show that majority of the respondents had knowledge on adequate nutrition, however this did not translate to a good dietary practice for about half of the respondents. The result from the study also revealed majority of the respondents were not conversant with good sources of iron rich foods and also a fallacy on unripe plantain being a good source of iron.

Highlights/Key Messages

• Most women of reproductive age had good nutrition knowledge.

• Good nutrition knowledge did not consistently translate into appropriate dietary practices.

• Knowledge gaps were observed regarding iron-rich foods and prevention of nutrition-related deficiencies.

• Educational attainment was significantly associated with nutrition knowledge.

• Targeted nutrition education is needed to improve the translation of nutrition knowledge into healthy dietary practices among women of reproductive age.

INTRODUCTION

Adequate nutrition among women of reproductive age is fundamental to achieving favourable maternal and child health outcomes and may have lasting effects across the life course (Srilakshmi, 2014; Sohni et al., 2014). Women who enter pregnancy with adequate nutritional reserves are better positioned to meet the increased nutrient demands associated with fetal growth and development while maintaining their own health (Srilakshmi, 2014). Maternal nutrition is therefore important not only during pregnancy but also during the period preceding conception.

Optimal maternal nutrition has been identified as an important determinant of women's health and reproductive capacity, as well as the survival, growth, and development of their children (Bloomfield et al., 2013; Nabarro, 2013). The period spanning conception to a child's second birthday, commonly referred to as the first 1,000 days, represents a critical developmental period and an important opportunity to prevent chronic undernutrition, childhood obesity, and health complications that may emerge later in life (Pem, 2015; Mameli et al., 2016). The consequences of maternal undernutrition, however, depend on the specific nutrient involved, the severity and duration of the deficiency, and the stage of pregnancy during which the deficiency occurs (Srilakshmi, 2014). Maternal malnutrition continues to constitute a major global health concern, particularly in low- and middle-income countries (LMICs), where women frequently enter pregnancy with inadequate nutritional status (Sohni et al., 2014). It has been reported that approximately 10.9% of women are underweight around the time of conception, while about 42% are anaemic when they become pregnant (Sohni et al., 2014).

The nutritional and health condition of a woman before conception may also influence placental development and function and, consequently, fetal growth and development (Cetin et al., 2010; King, 2016). The placenta plays a central role in regulating the transfer and availability of nutrients required for fetal development and may therefore contribute to the long-term health of the offspring. Nutritional exposure before conception can also affect offspring health and cognitive development by influencing the early development of critical organs, including the brain, liver, and pancreas, during the initial weeks of pregnancy (Cetin et al., 2010).

Evidence from experimental and epidemiological research further demonstrates that maternal nutritional status can influence fetal developmental programming. Dietary restriction experiments in normal-weight and overweight sheep, for example, have demonstrated that maternal nutrition can affect fetal adipose tissue development and the postnatal regulation of the insulin-like growth factor 1 receptor (IGF1R) signalling pathway (Zhang et al., 2013). Similarly, findings from the Dutch Famine Study demonstrated epigenetic alterations among individuals whose mothers experienced acute nutritional deprivation during pregnancy (Tobi et al., 2014). Essential micronutrients such as iron, zinc, folic acid, and other vitamins are involved in processes that can influence genome-wide regulation and epigenetic modifications during organogenesis, a period characterised by rapid cellular differentiation and development (Cetin et al., 2010). Such nutritional influences may subsequently affect body composition, cognitive development, and other health outcomes across the life course (Waterland & Michels, 2007; Chandak et al., 2017). Observational evidence suggests that fetal growth during the first trimester may be particularly responsive to the mother's nutritional status before conception (King, 2016). Furthermore, a systematic review by Young et al. (2018) reported that anaemia before conception was associated with increased risks of low birth weight (LBW) and small-for-gestational-age (SGA) births, whereas anaemia during the first trimester was associated with LBW, preterm birth (PTB), and neonatal mortality.

Maternal nutrition during the preconception and prenatal periods is also closely related to fetal brain development and subsequent cognitive functioning (Mellisa & Usha, 2020). Beginning approximately 2–3 weeks after fertilisation, the developing embryo undergoes a series of highly coordinated processes, including neuronal proliferation and migration, synapse formation, myelination, and apoptosis, which contribute to the formation and maturation of the fetal brain (Tau & Peterson, 2010). Because these processes occur rapidly, the developing brain is particularly sensitive to environmental influences, and adverse exposures during this period may increase susceptibility to neurodevelopmental problems later in life (Linnet et al., 2003; Lyall et al., 2014). Nutrient availability during the preconception and prenatal periods provides essential substrates for brain development and may additionally influence neurological development through epigenetic mechanisms that can confer either vulnerability or resilience to neurological conditions (Prado & Dewey, 2014; Bale et al., 2010). Several nutrients have important roles in prenatal neurodevelopment. Folate, for instance, serves as an essential cofactor in one-carbon metabolism, which is involved in DNA and RNA synthesis as well as DNA methylation. These processes are particularly important during periods of rapid cellular growth and differentiation.

In Nigeria, maternal nutritional challenges remain an important public health concern. Data from the Nigeria Demographic and Health Survey (NDHS, 2013) indicated that 11% of women of reproductive age were thin or undernourished, defined as having a body mass index (BMI) below 18.5 kg/m². At the same time, 17% were overweight, with a BMI of 25–29 kg/m², while 8% were classified as obese, with a BMI of 30 kg/m² or higher. Findings from the Nigerian Nutrition and Health Survey (NNHS, 2018) further indicated that 6.9% of women of reproductive age were acutely malnourished based on a mid-upper arm circumference (MUAC) below 221 mm, while 3.8% were severely malnourished based on a MUAC below 214 mm. The burden was particularly pronounced in the North West and North East regions, where the prevalence of acute malnutrition among women was approximately 11%, with severe acute malnutrition

reported at about 6% in both regions. In comparison, the South East recorded lower prevalence estimates, with acute malnutrition affecting approximately 3.7% and severe acute malnutrition 2.2% of women of reproductive age (NNHS, 2018).

Maternal malnutrition has important implications for both mothers and their offspring. According to the NNHS (2018), poor maternal nutritional status may increase susceptibility to infection, delay recovery from illness, and elevate the risk of adverse pregnancy outcomes, including preterm birth, intrauterine growth restriction, and low birth weight. The consequences may extend beyond pregnancy, as children born to malnourished mothers may experience impaired cognitive development, reduced linear growth, diminished resistance to infection, and increased risks of morbidity and mortality (NBS & UNICEF, 2017). These outcomes highlight the importance of addressing women's nutritional status before and during pregnancy as part of broader strategies for improving maternal, neonatal, and child health.

Beyond nutritional status itself, women's knowledge and dietary practices are important components of maternal nutrition. Evidence from Zerfu and Biadgilign (2018) indicates that pregnant women may have inadequate knowledge regarding appropriate nutrition before and during pregnancy, particularly concerning dietary sources of essential micronutrients such as iron and vitamin A and the importance of consuming adequate and diverse diets. Correspondingly, appropriate dietary practices and consumption of diversified foods during pregnancy have been reported to be inadequate (Zerfu & Biadgilign, 2018). These gaps in nutritional knowledge and practice underscore the need for effective nutrition education, counselling, and other interventions that promote appropriate dietary behaviours among women during the preconception and pregnancy periods.

Maternal nutrition is crucial for good pregnancy outcomes and in improving children’s nutritional status. Therefore, this study seeks to create awareness of adequate nutrition in pregnancy among women of reproductive age.

METHODS

Study Design and Participants

The study was a cross-sectional study of women of reproductive age 15–49 in Michael Okpara University of Agriculture, Umudike, Abia State.

Population of the Study

The study population consists of four colleges which has the highest number of women of reproductive age within the ages of 15–49 years in Michael Okpara University of Agriculture, Umudike, Abia state.

Sampling and Sample Technique

A multi-stage sampling technique was used to select the study sample. In the first stage, Michael Okpara University of Agriculture, Umudike Abia State was purposively selected as the study area, four colleges from the eleven colleges: College of Applied Food Science and Tourism (CAFST), College of Natural Sciences (COLNAS), College of Education (COED) and College of Management Sciences (COLMAS) were purposively selected as the study area. In the second stage, a simple random sampling method was used in the selection of 436 women of reproductive age from each of the colleges in Michael Okpara University of Agriculture, Umudike, Abia State. One hundred and fifty (150) women of reproductive age from COLNAS, one hundred (100) from CAFST, one hundred (100) from COLMAS and Eighty-six from COED (86) were selected which made up a total of 436 respondents for the study.

Ethical declarations

Informed Consent / Ethnical Approval

Permission on behalf of the students was obtained from the Heads of Department. The participants used for the study gave informed consent before enrolling, and they were assured of the confidentiality of the data obtained. It was stated orally during the administration of questionnaires that the study was for educational purposes, and that the outcome will be published. The purpose of the study was carefully explained to subjects in the school and those who agreed to be investigated were selected for detailed study. Ethical approval was gotten from Federal Medical Center (FMC), Umuahia, Abia State with reference number FMC/QEH/G.596/VOL.10/520 dated 10th October 2022. This was done in accordance to the declaration of Helsinki.

Data Collection

Data were collected using pretested questionnaires. The questionnaires were validated by lecturers in the Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State. Before the questionnaires were administered to the participants, the questions were explained to ensure that the respondent understand the questions. After collecting the information, it was checked properly to ensure they were properly filled. The questionnaire consists of socio-economic/demographic data, nutrition knowledge questions, and practices-based data.

Statistical Analysis

The data collected were sorted and analyzed statistically using SPSS (statistical package for social science) Version 22 and Chi-square test. The data were presented in frequencies and percentage using descriptive statistics.

RESULTS

Socio-economic and demographic characteristics of respondents

Table 1 presents the socio-economic and demographic characteristics of women of reproductive age. The study found that 70.6% of the respondent of reproductive age were between the ages of 20–24 years, 8.0% were between 15–19 years, 17.7% were between 25–29 years. The lowest proportion of the respondents (3.0%, 0.5% and 0.2%) belonged to the age ≥ 30. Majority of respondents were single (84.6%), 13.3% were married while 1.3% and 0.5% were co-habituating and divorced respectively. Vast majority (97.9%) are Christians, 1.4% are Muslim while 0.5%, 0.2% are traditional worshipper and other religion.

The data revealed that 78.2% of respondents had tertiary education, 17.0% had higher education, while 3.0%, 1.4% and 0.5% have secondary education, no formal education and primary education respectively. Concerning monthly income, results showed that more than half of respondents (64.7%) have income less than 30,000, 27.3% have income between 30,000- 50, 000, 3.4%, 2.3% and 2.3% have income between 51, 000 - 70, 000, 71, 000 - 100, 000 and above 100,000 respectively. More than half (57.8%) of the respondents have household size of 4–6 persons, 24.8% of have household size of 1–3 persons while few 16.7% and 0.7% consist of 7–10 persons and above 11 persons respectively. Data also revealed that 93.8% belong to the Igbo tribe, followed by the Yoruba tribe with 5.5% and 0.7% Hausa respectively. Greater percentage of the respondents (87.8%) source water from tap while 6.7%, 3.0% and 2.5% source water from community borehole, well and stream respectively. Majority (95.4%) of the respondents use water closet with very few (3.9%) and (0.7%) use pit latrine and others types respectively.

Table 1
Socio-economic and demographic characteristics of Respondents

Variables	Frequency	Percent
Age		
15-19yrs	35	8.0
20-24yrs	308	70.6
25-29yrs	77	17.7
30-39yrs	13	3.0
40-45yrs	2	0.5
45-50yrs	1	0.2
Total	**436**	**100**
Marital status		
Single	369	84.6
Married	58	13.3
Co-habiting	7	1.6
Divorced	2	0.5
Total	**436**	**100**
Religion		
Christian	427	97.9
Muslim	6	1.4
Traditional worshipper	2	0.5
Others	1	0.2
Total	**436**	**100**
Educational Status		
No formal education	6	1.4
Primary	2	0.5
Secondary	13	3.0
Tertiary	341	78.2
Higher	74	17.0

Variables	Frequency	Percent
Age		
Total	**436**	**100**
Income per month (in naira)		
Less than 30,000	282	64.7
30,000–50,000	119	27.3
51,000-70-000	15	3.4
71,000 -100,000	10	2.3
Above 100,000	10	2.3
Total	**436**	**100**
Household size		
1–3	108	24.8
4–6	252	57.8
7–10	73	16.7
Above 11	3	0.7
Total	**436**	**100**
Ethnicity		
Yoruba	24	5.5
Igbo	409	93.8
Hausa	3	0.7
Total	**436**	**100**
Source of water		
Tap	383	87.8
Well	13	3.0
Stream/river	11	2.5
Community borehole	29	6.7
Total	**436**	**100**
Toilet type		
Water closet	416	95.4

Variables	Frequency	Percent
Age		
Pit latrine	17	3.9
Others	3	0.7
Total	**436**	**100**

Percentage of Correct Responses of the Women on their Nutrition Knowledge

Table 2 displays the percentage correct response on nutrition knowledge of women of reproductive age. The results revealed that 93.3% of the respondents correctly answered that women should make adequate plans for pregnancy. Majority of the respondents (84.6%) were aware of anemia and malnutrition in pregnancy.

Data showed that more than half of the respondents (58.9%) had correct response of when a woman should start preventing anemia and malnutrition. The result shows a good level of knowledge on the side of the women. The study revealed that 52.3% of the respondents had correct response on nutrient and nutritional supplements that are important in preventing anemia and malnutrition in pregnancy. More than half of the respondents (73.2%) had correct response on poor nutrition have a long-lasting effect on the child and 77.1% had correct response on due to added responsibility of catering for the fetus, the nutritional need of a pregnant women. Also, more than half (84.9%) had correct response on alcohol during pregnancy. The study revealed that 74.5% of the respondents correctly agree on how a woman can prevent anemia. However, very few (11.2%) of the respondents correctly agree on food rich in iron. The majority (96.6%) of the respondents correctly agree to enough water intake essential in pregnancy.

Table 2
Nutrition Knowledge about Pregnancy of Respondents

Variables	Frequency	Percent
Should women make adequate plans for pregnancy		
Wrong	29	6.7
Correct	407	93.3
Total	**436**	**100**
Are you aware of anemia and malnutrition in pregnancy		
Wrong	67	15.4
Correct	369	84.6
Total	**436**	**100**
When should a women start preventing anemia and malnutrition		
Wrong	179	41.1
Correct	257	58.9
Total	**436**	**100**
Important nutrients and nutritional supplements in preventing anemia and malnutrition in pregnancy		
Wrong	208	47.7
Correct	228	52.3
Total	**436**	**100**
Health risks that occurs when a woman lacks essential nutrients needed during pregnancy		
Wrong	270	61.9
Correct	166	38.1
Total	**436**	**100**
Can poor nutrition of the mother have a long lasting effect on the child even when they become adults		
Wrong	117	26.8
Correct	319	73.2
Total	**436**	**100**
nutritional need of a pregnant woman		

Variables	Frequency	Percent
Should women make adequate plans for pregnancy		
Wrong	100	22.9
Correct	336	77.1
Total	**436**	**100**
Alcohol during pregnancy		
Wrong	66	15.1
Correct	370	84.9
Total	**436**	**100**
How can a woman prevent anemia during this period		
Wrong	111	25.5
Correct	325	74.5
Total	**436**	**100**
Food rich in iron		
Wrong	387	88.8
Correct	49	11.2
Total	**436**	**100**
Is enough water intake essential in pregnancy		
Wrong	15	3.4
Correct	421	96.6
Total	**436**	**100**

Overall Nutrition Knowledge about Pregnancy

Table 3 revealed that majority (84.2%) of the respondents had adequate nutrition knowledge about pregnancy.

Table 3
Overall Nutrition Knowledge about Pregnancy of respondents

Variables	Frequency	Percent
Knowledge score		
Poor Knowledge (< 40)	18	4.1
Fair knowledge (40-69.9)	51	11.7
Good Knowledge (≥ 70)	367	84.2
Total	**436**	**100**

PRACTICES TOWARDS THEIR NUTRITION KNOWLEDGE

Table 4 below illustrates the practice towards their nutrition knowledge. About 51.8% of respondents take iron and folic acid supplements daily. More than half (72.5%) of the respondents indicated to consume animal product in the last 24hrs, about 53.4% consumed dark leafy vegetable in the last 24hrs, while 46.3% consumed citric fruits after eating leguminous and dark leafy vegetables, and 56.2% consumed more food now as compared to when they were not pregnant. The study outcome indicated that 64.9% of the respondents did not skip breakfast, 70.6% did not skip lunch, while 82.1% did not skip dinner, and majority (93.6%) didn’t smoke or drink alcohol during pregnancy. However, very few 6.4% smoked/drank alcohol during pregnancy.

Table 4
Practices of nutrition knowledge during early pregnancy of Respondents

Questions	Frequency	%
Do you take your iron and folic acid supplements daily		
Yes	226	51.8
No	210	48.2
Total	**436**	100
Did you consume any animal product in the last 24hrs		
Yes	316	72.5
No	120	27.5
Total	**436**	100
Did you consume any dark leafy vegetable in the last 24hrs		
Yes	233	53.4
No	203	46.6
Total	**436**	100
Do you consume citric fruits after eating leguminous and dark leafy vegetables		
Yes	202	46.3
No	234	53.7
Total	**436**	100
Do you consume more food now as compared to when you were not pregnant		
Yes	245	56.2
No	191	43.8
Total	**436**	100
Do you skip breakfast		
Yes	153	35.1
No	283	64.9
Total	**436**	100
Do you skip lunch		
Yes	128	29.4

Questions	Frequency	%
Do you take your iron and folic acid supplements daily		
No	208	70.6
Total	**436**	100
Do you skip dinner		
Yes	78	17.9
No	358	82.1
Total	**436**	100
Do you smoke or drink alcohol during pregnancy		
Yes	28	6.4
No	408	93.6
Total	**436**	100
Have you done any form of exercise in the past one week ?		
Yes	298	68.3
No	138	31.7
Total	**436**	100

Relationship between the Level of Education of the women their Nutrition Knowledge

Table 5 shows that a significant relationship existed between level of education of the women and their Nutrition Knowledge at P = 0.009. (0.9%, 2.3%, 67%, 14%) of the respondents had good Nutrition Knowledge.

Table 5

Variable	No Education	Primary	Secondary	Tertiary	Higher	Total	X^2-value	P-value
	F %	F %	F %	F %	F %	F %		
Poor	1 0.2	0 0.0	1 0.2	11 2.5	5 1.1	18 4.1	20.523	0.009
Average	1 0.2	2 0.5	2 0.5	38 8.7	8 1.8	51 11.7		
Good	4 0.9	0 0.0	10 2.3	292 67.0	61 14.0	367 84.2		
TOTAL	**6**	**2**	**13**	**341**	**74**	**436**		

Relationship between the Level of Education of the women and their Nutrition Knowledge

DISUSSION

This study provides insight into the knowledge and practices of adequate nutrition during pregnancy among women of reproductive age in Michael Okpara University of Agriculture, Umudike, Abia State. Findings from the study indicated that the majority of respondents demonstrated good nutrition knowledge and relatively positive nutrition practices during pregnancy.

The study showed that most respondents (93.3%) agreed that women should make adequate plans for pregnancy. This demonstrates a high level of awareness concerning the importance of preparation before conception. Maternal nutritional status before conception is important because adequate nutrient reserves support fetal growth and maternal wellbeing during pregnancy (Srilakshmi, 2014). However, this finding contrasts with the report by Zerfu and Biadgilign, (2018), who found that pregnant women generally had limited awareness regarding adequate nutrition before and during pregnancy, especially concerning micronutrient sources and dietary diversity.

The study showed that majority of the respondents (93.3%) agreed that women should make adequate plans for pregnancy. This demonstrates a high level of awareness concerning the importance of preparation before conception. Maternal nutritional status before conception is important because adequate nutrient reserves support fetal growth and maternal wellbeing during pregnancy (Srilakshmi, 2014). However, the findings contrast with Zerfu and Biadgilign, (2018) which showed that the overall awareness level of pregnant mothers on nutrition before and during pregnancy, particularly their knowledge about sources of key micronutrient (Iron and Vitamin A) and an adequate or diversified diet was limited.

The findings of the study shows that many of the women had good knowledge on making adequate plans for pregnancy majority of the women (84.6%) been aware of anemia and malnutrition in pregnancy. while 58.9% correctly identified when preventive measures should begin. Furthermore, result showed a good level of knowledge on the side of the women with more than half of the women (52.3%) had correct response on nutrient and nutritional supplements that are important in preventing anemia and malnutrition in pregnancy. The findings are in contracts with Zerfu and Biadgilign, (2018) who showed that the overall awareness level of pregnant mothers on nutrition before and during pregnancy, particularly their knowledge about sources of key micronutrient (Iron and Vitamin A) and an adequate or diversified diet was limited. Despite the generally good knowledge demonstrated, only 38.1% of respondents correctly identified the health risks associated with inadequate nutrient intake during pregnancy. The study is in line with Senbanjo et al. 2015 who suggested significant gaps in understanding the consequences of poor maternal nutrition with high prevalence of 44% for both under nutrition and over nutrition, as well as nutrient deficiencies, including iron, folate, vitamin D and vitamin A. Maternal nutritional deficiencies have been associated with increased risks of anemia, poor fetal growth, low birth weight, and pregnancy complications (Senbanjo et al., 2015).

It was observed that 73.2% of respondents understood that poor maternal nutrition has a long-lasting effect on the child. This finding aligns with Mellisa and Usha, (2020), who reported that maternal nutrition before and during pregnancy significantly influences fetal brain development and long-term cognitive functioning. Poor maternal nutrition has also been linked to childhood growth problems and increased risks of chronic diseases later in life (Pem, 2015). More than half (77.1%) of the women had correct response on due to added responsibility of catering for the fetus, the nutritional need of a pregnant women and 84.9% of respondents correctly acknowledged the harmful effects of alcohol consumption during pregnancy. This finding supports previous studies indicating that alcohol exposure during pregnancy adversely affects fetal development and can result in fetal alcohol syndrome, miscarriage, stillbirth, and developmental abnormalities (Lo et al., 2017; Muggli et al., 2017). Similarly, the finding that 93.6% of respondents avoided alcohol and smoking during pregnancy is consistent with recommendations by health authorities, which advocate complete abstinence from alcohol during pregnancy because no safe level of alcohol intake has been established (Williams and Smith, 2015).

Although 74.5% of respondents correctly identified methods of preventing anemia, only 11.2% identified iron-rich foods, and 96.6% correctly identified that enough water intake essential in pregnancy. This finding indicates that while respondents may understand general preventive measures, practical nutritional knowledge regarding dietary sources of important nutrients remains poor. Iron deficiency during pregnancy is a major public health concern and contributes to adverse maternal and neonatal outcomes (Cetin et al., 2011).

Based on adequate nutrition knowledge, majority of respondents (84.2%) had adequate nutrition knowledge about pregnancy. The findings differ from Zerfu and Biadgilign, (2018) which stated that the overall awareness level of pregnant mothers on nutrition before and during pregnancy, particularly their knowledge about sources of key micronutrient (Iron and Vitamin A) and an adequate or diversified diet

was limited. The difference observed may be due to the high educational attainment among respondents in the present study, as most participants had tertiary education. This assumption is supported by the significant relationship observed between educational level and nutrition knowledge ($p = 0.009$), suggesting that education positively influences knowledge acquisition and health behaviors.

Regarding nutritional practices, slightly above half (51.8%) of respondents reported taking iron and folic acid supplements daily. This finding is consistent with Cetin et al. (2011), who noted that iron requirements increase progressively during pregnancy due to increased maternal and fetal demands. Furthermore, the study outcomes shows that 72.5% consumed any animal product in the last 24hrs, about 53.4% consume any dark leafy vegetable within the previous 24 hours, reflecting relatively healthy dietary practices. However, fewer respondents consumed citrus fruits alongside iron-containing foods, which may negatively affect iron absorption while 56.2% consume more food now as compared to when you were not pregnant.

Meal consumption practices among respondents were generally favorable as most did not skip breakfast (64.9%), lunch (70.6%), or dinner (82.1%). In addition, more than half (68.3%) engaged in physical activity within the previous week. These findings indicate relatively positive lifestyle practices among respondents. However, majority (93.6%) didn't smoke or drink alcohol during pregnancy. The finding aligned with Williams and Smith, (2015) they stated that Alcohol readily crosses the placenta with fetal blood alcohol levels approaching maternal levels within 2 hours of maternal intake. As there is known safe level of alcohol consumption during pregnancy, and alcohol is a known teratogen that can impact fetal growth and development during all stages of pregnancy, the current recommendation from the American College of Obstetricians and Gynecologists, Center for Disease Control (CDC), Surgeon General, and medical societies from other countries including the Society of Obstetricians and Gynecologists of Canada all recommend complete abstinence during pregnancy, more than half (63.8%) of the women exercise in the past one week.

Overall, the findings suggest that although respondents demonstrated satisfactory knowledge and generally favorable practices concerning maternal nutrition, notable gaps remain regarding specific nutrient sources and consequences of nutritional deficiencies. Therefore, targeted nutrition education programs emphasizing practical dietary knowledge and healthy nutrition practices are necessary to improve maternal nutritional outcomes.

CONCLUSION

The results from the study show that majority of the respondents had knowledge on adequate nutrition, however this did not translate to a good dietary practice for about half of the respondents. The result from the study also revealed majority of the respondents were not conversant with good sources of iron rich foods and also a fallacy on unripe plantain being a good source of iron.

RECOMMENDATIONS

This study recommends urgent multi sectorial approach in the creation of awareness and the dissemination of information through several channels for good nutrition in pregnancy. This study also recommends the following:

1. Further research on the area of the knowledge, attitude and practice of good nutrition in pregnancy.
2. Sensitization and awareness creation during antenatal and post-natal periods should be sustained through multi-sectoral efforts.
3. Also, community leaders and members should invest in agriculture so as to enable increased access to fresh organic agricultural products such as fruits and vegetables
4. Media support is also needed on educating the masses of the common sources of nutrient dense foods.

DECLARATIONS

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Author Contributions

CVE: Conception, methodology, investigation, data curation, writing original draft, manuscript preparation and revision.

UBI: Conception, methodology, investigation, data curation, writing original draft, manuscript preparation and revision.

MMO: Investigation, resources.

Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

AI was used to comprise and correct grammatical. CHATGPT and quillbot was used.

Availability of data and materials

The data and materials supporting the findings of this study are available from the corresponding author upon reasonable request.

Declaration of Conflict of Interests

The authors have declared no conflicts of interest.

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Clinical trial number

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Consent to publish

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REFERENCES

1. Bale T, Baram T, Brown A, Goldstein J, Insel T, McCarthy M, Nemeroff C, Reyes T, Simerly R, Susser E. Early life programming and neurodevelopmental disorders. Biol Psychiatry. 2010;68:314–9.
2. Bloomfield FH, Spiroski AM, Harding JE. Fetal growth factors and fetal nutrition. Seminar Fetal Neonatal Med. 2013;18:118–23.
3. Cetin I, Berti C, Calabrese S. Role of micronutrients in the periconceptional period. Hum Reprod Update. 2010;16(1):80–95.
4. Cetin I, Berti C, Mandò C, Parisi F. Placental iron transport and maternal absorption. Annals Nutr Metabolism. 2011;59:55–8.
5. Chandak G, Silver M, Saffari A, Lillycrop K, Shrestha S, Sahariah SA. Protocol for the EMPHASIS study; epigenetic mechanisms linking maternal pre-conceptional nutrition and children's health in India and Sub-Saharan Africa. BioMed Cent Nutr. 2017;3(1):81.
6. King J. A Summary of Pathways or Mechanisms Linking Preconception Maternal Nutrition with Birth Outcomes. J Nutr. 2016;146(7):S1437–44.
7. Linnet KM, Dalsgaard S, Obel C, Wisborg K, Henriksen TB, Rodriguez A, Kotimaa A, Moilanen I, Thomsen PH, Olsen J, Jarvelin MR. Maternal lifestyle factors in pregnancy risk of attention deficit hyperactivity disorder and associated behaviours. Am J Psychiatry. 2003;160(6):1028–40.
8. Lo J, Schabel M, Roberts V. First trimester alcohol exposure alters placental perfusion and fetal oxygen availability affecting fetal growth and development in a non-human primate model. Am J Obstetric Gynecol. 2017;216:e3021–8.
9. Lyall K, Schmidt R, Hertz-Picciotto I. Maternal lifestyle and environmental risk factors for autism spectrum disorders. Int J Epidemiol. 2014;43:443–64.
10. Mameli C, Mazzantini S, Zuccotti G. (2016). Nutrition in the first 1000 days: the origin of childhood obesity. Int J Environ Resour Public Health;13(9).
11. Mellisa Y, Usha R. Maternal undernutrition before and during pregnancy and offspring health and development. Annals Nutr Metabolism. 2020;76(suppl 3):41–53.
12. Muggli E, Matthews H, Penington A. Association between prenatal alcohol exposure and craniofacial shape of children at 12 months of age. JAMA Pediatrician. 2017;171:771–80.
13. Nabarro D. Global child and maternal nutrition - the SUN rises. Lancet. 2013;382:666–7.

14. National Bureau of Statistics (NBS) and United Nation Children Emergency Fund (UNICEF). Multiple indicator Cluster survey finding Report. Abuja Nigeria; 2017.
15. National Nutrition and Health survey (NNHS). 2018, Report on the Nutrition and Health situation of Nigeria.
16. Pem D. Factors Affecting Early Childhood Growth and Development: Golden 1000 Days. Adv Pract Nurs. 2015;1:101. https://doi.org/10.4172/2573-0347.1000101.
17. Prado E, Dewey K. Nutrition and brain development in early life. Nutr Rev. 2014;72:267–84.
18. Senbanjo IO, Olayiwola IO, Afolabi WA, Senbanjo OC. Maternal and child under-nutrition in rural and urban com- munities of Lagos state, Nigeria: the relationship and risk factors. Biomed Cent Research Notes. 2013;6:286.
19. Sohni V, Lassi S, Imam A, Bhutta A. Preconception care: nutritional risks and interventions. Reproductive Health. 2014;11(Suppl 3):S3.
20. Srilakshmi B. (2014). Dietetics. 7th Edition, New age international publisher, New Delhi, 313.
21. Tau G, Peterson B. Normal development of brain circuits. Neuropsychopharmacology. 2010;35:147–68.
22. Tobi EW, Goeman J, Monajemi R, Gu H, Putter H, Zhang Y. DNA methylation signatures link prenatal famine exposure to growth and metabolism. Natl Community. 2014;5:5592.
23. Waterland RA, Michels KB. Epigenetic epidemiology of the development origins hypothesis. Nutrition. 2007;27:363–88.
24. Williams J, Smith V. Committee on substance abuse. Fetal alcohol spectrum disorders. Pediatrics. 2015;136:e1395–406.
25. Young M, Nguyen P, GonzalezCasanova I, Addo O, Tran L, Nguyen S. (2018). Role of maternal preconception nutrition on off- spring growth and risk of stunting across the first 1000 days in Vietnam: A prospective cohort study. PLoS One. 2018; 13(8):e0203201.
26. Zerfu T, Biadgilign S. Pregnant mothers have limited knowledge and poor dietary diversity practices, but favorable attitude towards nutritional recommendations in rural Ethiopia: evidence from community-based study. BioMedical Cent Nutr. 2018;4:43.
27. Zhang S, Morrison J, Gill A, Rattanatray L, MacLaughlin S, Kleemann D. Maternal dietary restriction during the periconceptional period in normal-weight or obese ewe's results in adrenocortical hypertrophy, an up-regulation of the JAK/STAT and down-regulation of the IGF1R signaling pathways in the adrenal of the postnatal lamb. Endocrinology. 2013;154(12):4650–62.