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Research Article

Assessment of the Nutritional Status and Risk Factors of Malaria among Pregnant Mothers in Owerri Rural Communities, Southeastern Nigeria

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Abstract

Malaria during pregnancy remains a serious public health problem, with substantial risk for the mother, her fetus and the new born. A cross-sectional study was conducted in Owerri rural hospitals among 150 pregnant mothers in Emekuku and Uratta rural communities in Owerri, Imo State using questionnaire. Ninety (90) pregnant women from Holy Rosary Hospital Emekuku and 60 pregnant women from Redeemed Jesus People hospital and maternity, Uratta, Owerri within the age range of 20-50 years were involved in this study. Anthropometric data, age, weight and height were collected using standard scale and the meter rule. Cluster analysis was applied for the identification of the groups with similar nutritional habits and anthropometric parameters. At the end of the data collection and analysis, it was obtained that 40.7% of the women lived in a moderately bushy environment, 13.3% in a very bushy environment, 6.6% lived in a bushy environment while 39.4% however lived in a very clean environment. In assessing the nutritional status the result indicates that 45.3% skipped meals while 54.7% do not. 82.7% of the women had a history of malaria while 17.3% had none. 22% of the pregnant women were malaria positive while 78% were negative. 56.7% of the women had mosquito net while 43.3% did not. 53.3% of the women disliked some food, 82% took supplement, and 36.7% took multivitamins. About 50 % of the pregnant women were overweight. The anthropometric characteristics of respondents showed that women from 40-50 years had high mean in their respective variables and no significant difference ($p>0.05$) in their ranges. The use of Insecticide-Treated Mosquito nets (ITNs) was found to be associated with malaria infection; pregnant women who did not use ITNs frequently were more affected by malaria as compared to those who did.

Keywords: Malaria; Risks; Pregnant women; Rural Community; Nutrition

Introduction

Malaria is a major public health problem in 97 countries and territories in the tropics and subtropics. Globally, approximately 214 million cases of malaria occur annually and 3.2 billion people are at risk of infection [1]. Approximately 438,000 deaths were attributed to malaria in 2015, particularly in sub-Saharan Africa, where an estimated 90 % of all malaria deaths occur [1]. As a critical target of the Millennium Development Goals, in 2005, the World Health Assembly established a goal of reducing malaria cases and deaths by 75% between 2005 and 2015 [2]. Hence, over the past decade, there has been greatly renewed interest in research and innovations in diagnostic methods, drugs and vaccines, and the development of control measures to eradicate malaria [3]. As a result, between 2000 and 2013, the incidence rates of malaria fell by 30% globally, and by 34% in Africa [4].

Nigeria suffers the world's greatest malaria burden, with approximately 51 million cases and 207,000 deaths reported annually (approximately 30% of the total malaria burden in Africa), while 97% of the total population (approximately 173 million) is at risk of infection [5]. Moreover, malaria accounts for 60% of outpatient visits to hospitals and led to approximately 11% maternal mortality and 30% child mortality, especially among children less than 5 years [6,7]. Studies have shown that 40% of pregnant African women present for the first time to antenatal clinics in the second trimester of their pregnancy [9]. The ITNs, part of the prevention package delivered during the first antenatal clinic visit would provide additional protection for the mother during the remaining trimesters of pregnancy and into the post-partum period, as well as protection for the newborn through at least the first year of life [9].

In Africa, 30 million women living in malaria endemic areas become pregnant each year. For these women, malaria is a threat both to themselves and to their babies, with up to 2 million newborn deaths each year as a result of malaria in pregnancy [9]. Pregnancy exacerbates malaria through a non-specific activity of the immune system. The protective anti-plasmodial activity is suppressed at pregnancy, which has clinical consequences with important public health implications on pregnant women [10,11]. The symptoms and complications of malaria during pregnancy differ with the intensity of malaria transmission and the level of immunity the pregnant women has acquired [9]. Malaria infection of the mother may result in a range of adverse pregnancy outcomes [7].

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Human malaria is caused by the protozoan parasite of the genus Plasmodium. It lives in the red blood cells and is transmitted by the female anopheles mosquito [12]. Malaria is a disease with major health problems that has attracted global concerns; hence it is regarded as the most important parasitic disease [11], which causes spontaneous abortion, neonatal death, low birth weight and intrauterine growth retardation [8]. In these areas, the principal impact of malaria infection is associated with malaria related anaemia in the mother and with the presence of the parasites in the placenta. The resultant impairment of foetal nutrition contributing to low birth weight is a leading cause of poor infant survival and development [13].

More than 90% of the total Nigerian population is at risk of malaria and at least 50% of the population suffers from at least one episode of malaria each year [14]. The initiative 'Roll Back Malaria' launched in 1998 in partnership with the United Nations Children's Fund (UNICEF), WHO and many other non-governmental agencies seems not to be producing effective results in some malarial endemic communities of Nigeria as malaria problem is still on the increase. Many studies have reported high prevalence rates of malaria in pregnancy in different parts of Nigeria, ranging from 19.7 to 72.0% [9,15,16]. With such reported high prevalence, there is a need to determine the extent of infection by *Plasmodium falciparum* in endemic communities of Nigeria as this will help in the proper management of the disease. The major objective of the study will be to assess the nutritional status and risk factors of malaria among pregnant mothers in Owerri rural communities. The results of the above study will be of immense significance to nutritionists-dietitians as it will provide knowledge on the risk factors of malaria and suggest avenues to combat them. Government policies can be channeled towards alleviating malaria in the community.

Materials and Methods

Study area

The above study was carried out at Holy Rosary Hospital Emekuku and Redeemed Jesus People Hospital and Maternity Uratta rural communities in Owerri, Imo State. Owerri geographically lies within latitude 5.4891° N and longitude 7.0176° E and is the capital city of Imo state in Southeastern, Nigeria, with a populace of 1,401,873 as at 2006, which has expanded significantly after over 10 years. The daytime temperatures of the territory extend from 18-34 °C [17]. Every day mean most reduced temperatures of 19°C and most elevated temperature of 28°C are normally seen in the region. The region has assessed evapotranspiration pace of 1450-1460 mm/yr. Additionally, there is typically low relative humidity from January to March just as of in November to December which are the long stretches of dry period. In the long periods of April to October, which are generally the wet period, relative humidity estimations of 97% are recorded [18]. Precipitation has stayed a significant ecological element, which could fundamentally impact natural examinations. The long periods of July and August are the time of concentrated precipitation in the examination zone coordinated by toward the north development of nautical air from the Atlantic Ocean. Exchange times of precipitation and daylight conditions are seen in the territory because of the zone claiming to the set up attributes of the overwhelming precipitation. The initiation of precipitation is in the period of April which last up to October. The yearly mean precipitation is inside 2500-4000 mm, with over 89% of the precipitation saw in the long stretch of May to October [18]. The power and consistency of the rainfalls just as the huge shallow spillover because of the steep water storehouses bring about genuine flooding of the territory. Frequently, the rainfalls are joined by genuine tempests along with overwhelming flooding and water flood.

Study design

A cross-sectional study was conducted among 150 pregnant mothers in Emekuku and Uratta rural communities in Owerri, Imo State, Nigeria. A predesigned and pretested questionnaire was used in the data collection to assess nutritional status and risk factors of malaria among of the respondents. The anthropometrical parameters included the measurement of body weight and height as well as waist, hip and arm circumferences (assessed with the means of a flexible tape with an approximation of 0.1 mm). BMI parameter was calculated to identify the underweight, overweight and obesity within the studied group.

Sample size determination

The sample for this study comprised of 150 pregnant mothers that was drawn from 2 rural communities in Owerri (Emekuku and Uratta), Imo State. Cluster analysis was applied for the identification of the groups with similar nutritional habits and anthropometric parameters. The population size was 230 and margin of error /test of significant =0.05 and from calculated as described by Okwa [9] and Onyeneke et al. [19], a sample size was estimated to be 150. Hence 150 pregnant mothers among 230 was used for the study.

Data analysis

One hundred (150) questionnaires was distributed among pregnant mothers and measurement was taken. Body height and mass was measured using a digital scale, with approximations of 0.5 cm and 0.1 kg, respectively. Circumferences of waist, hip and arm will be assessed. Numbers was used in the data collected from the respondents through questionnaire and will be analysed in frequencies and percentages.

Data collection

A validated pretested questionnaire was used to collect relevant data from the respondents on their personal data, nutritional status and risk factors of malaria.

Anthropometry: Anthropometric measurements of weight and height were obtained from all subjects. Weight was measured in light indoor clothing to the nearest 0.1 kg with a beam balance scale. Height was measured without shoes to the nearest 0.1 cm using a portable stadiometer. The researcher explained the exercise in a manner that the respondents would understand and participate actively.

Height measurements: A measuring rod or stadiometer was used to measure the height of the respondents. Shoes, socks and hair grips were removed. The back of the head, shoulder blades, buttocks, calves and heels was touching the vertical board. Legs were straight, with the head looking straight ahead. The horizontal line from the ear canal to the lower border of the eye socket will run parallel to the baseboard. Measurements were taken twice and average recorded.

Weight measurements: Weight was obtained using a weighing scale (bathroom scale). The weighing must be accurate to ± 0.1kg and calibrated frequently using standard. Weight was measured in

Kilogram (kg). The scale was placed on a flat, hard, even surface, preferably not on a loose carpet or rug. The respondent being measured stood in the middle of the scale, feet slightly apart and remained still until the weight appeared on the display. Record was taken to the nearest 0.1 kg [1]. Measurements will be taken twice and average recorded.

Body Mass Index (BMI): BMI (Body mass index) is generally considered as a good indicator and used for the assessment of chronic energy deficiency of adults, especially in developing countries [20]. It is highly correlated with fat and fat-free mass and so the protein and fat reserves of body can be estimated [20]. The BMI (kg/m^2) is computed as the ratio of the body weight in kg to height in m^2. Standard according to World Health Organization [1] for BMI classification is as follows; <18.5 as underweight, 18.5-24.9 as normal, 25-29.9 as overweight, 30-34.9 as obesity class I, 35-39.9 as obesity class II and >40 as gross obesity.

Waist circumference: It was measured with a flexible non-stretch tape measure, which was placed on the smallest area below the rib cage and at the level of belly button (umbilicus) around the waist, with the subject standing erect. Abdominal muscles relaxed arms by the side and feet together. The tape was held firm and the readings taken twice to the nearest 0.1 cm at the end of normal expiration (breathing out) and average recorded.

Hip circumference: A flexible non-stretch measure was used and it was placed at the point of greatest circumference around the hip region with the subject standing erect, arms at the sides. The rope was tightened to make close contact with the body but without indenting the soft tissues. The reading was taken twice to the nearest 0.1 cm and average recorded.

Waist-hip-ratio: The Waist to Hip Ratio (WHR) was calculated by dividing the waist Circumference (cm) by the height Circumference (cm). When WHR for men >0.95 cm and women >0.8cm indicates android obesity which means excess fat deposition around the waist and upper abdomen. It indicates high risk for diabetes and cardiovascular diseases. The classification for WHR for male and female is presented is as follows; when it is ≤0.95 or below for male and ≤0.80 for female is considered low risk; when it is 0.95-1.0 for male and 0.81-0.85 for female it is considered moderate and when >1.0 for male and >0.85 for female it is considered high risk [19,20].

Dietary assessment using 24hr recall: Food consumption pattern was assessed with the 24hr recall method. During the interview, samples of local household dishes and utensils (different sizes of bowls, plates, cups, glasses and spoons) was displayed to the participants. The 24hr recall method required participants to recall all food and beverages consumed during the previous 24hrs, food samples was used during the completion of these questionnaires to assist the participants in estimating portion sizes. One 24hr recall was completed for food consumed during the week and one completed for food consumed over the weekend. The weekend dietary intake may be different and therefore may not be the representative of the usual dietary pattern for most days. The questionnaire was completed in an interview situation.

Food frequency questionnaire: A food frequency questionnaire was used to express the data obtained from 24 hour dietary recall on each participant's diet over a day period. All participants completed the FFQs in an individual interview with the assistance of a fieldworker or the researcher.

The participants were asked to provide detailed information regarding the types and amounts of all foods, beverages and nutritional supplements consumed over a period. All related foods were grouped together. Participants were asked to indicate their frequency of consumption of items per day.

Risk factors of malaria: Data on the risk factors of malaria such as respiratory distress, concomitant pneumonia, severe anemia, enlarged liver, low blood sugar, and hemoglobin in the urine with renal failure and acute respiratory distress syndrome. The knowledge of malaria preventions by the use of insecticide treated nets, mosquito repellants, draining standing water and environmental hygiene; and management such as use of malarial drugs like Artemeter, Lumefantrine, Mefloquine, or Sulfadoxine/Pyrimethamine tablets will be determined by the distribution of a validated and pretested questionnaire. Data was also collected on symptoms of the disease such as fever, headache, and tiredness and vomiting.

Data analysis

Statistical analysis of the data obtained from the study was carried out using IBM SPSS version 21. The Pearson's correlation was carried out to determine the relationship between knowledge of the risk of malaria and nutritional status of the pregnant mothers.

Results and Discussion

Table 1 showed the basic characteristics of the women, 2% of the women are single, a higher number of them are married (95.3%) and only 2.7% of the women are divorced. The result also showed that 12% of the women are civil servants, 14.7% were house wives and 73.3% were traders. Because the research was carried out in the eastern part of Nigeria where Christianity is the main religion 98.7% of the women are Christians and only 1.3% are Muslims. 100% of them are from Igbo ethnic group. An age range of 20-50 was used in this research and 37.3% of the women are in the age range of 20-30, 61.3% were in the age range of 30-40 while 1.3% of the women were in the age range of 40-50 respectively.

The general information of the women is also presented in Table 1. Result showed that 6.6% of the women lives in a bushy environment, 13.3% lives in a very bushy environment, a higher percent of the women (40.7%) lives in a moderately bushy environment and 39.3% lives in a very clean environment respectively. 10.0% of the women stores water in jerrycans, 6.7% in buckets, 27.3% stores water in drums while a higher percent of 56.0% stores water in tanks. A higher percent of the women (66.7) covers their water containers, 6.0% do not, 13.3% covers their water containers sometimes while 14.0% of the women had some of their water containers covered and others not covered. 42.7% of the women were 1-12 weeks pregnant, 34.7% were 13-24 weeks pregnant while 22.6% were 25-36 weeks pregnant. The result also had it that 28.0% of the women have health issues during pregnancy while 72.0% have no health issues during pregnancy. The bushiness of the environment increases the rate of mosquitoes in the environment hereby increasing the risk of malaria transmission. A study in Uganda observed that the high rate of malaria episodes among its respondents was attributed to the poor household

Table 1: Personal Data of respondents.

Variables	Frequency (N)	Percentage (%)
Marital status		
Single	3	2
Married	143	95.3
Divorced	4	2.7
Total	150	100
Occupation		
Civil servant	18	12
House wife	22	14.7
Trader	110	73.3
Total	150	100
Religion		
Christianity	148	98.7
Islam	2	1.3
Total	150	100
Ethnic group		
Igbo	150	100
Age		
20-30	56	37.3
30-40	92	61.3
40-50	2	1.3
Total	150	100
What is the general cleanliness of your surroundings		
Bushy	10	6.6
Very busy	20	13.3
Moderately bushy	61	40.7
Very clean	59	39.3
Total	150	100
In what do you store water		
Tanks	84	56
Drums	41	27.3
Buckets	10	6.7
Jerry cans	15	10
Total	150	100
Do you cover water container		
Yes	100	66.7
No	9	6
Sometimes	20	13.3
Some are covered while some are not	21	14
How many weeks pregnant are you		
1-12weeks	64	42.7
13-24weeks	52	34.7
25-36weeks	34	22.6
Total	150	100
Do you have health issues during pregnancy		
Yes	42	28
No	108	72
Total	150	100

Table 2: Maternal dietary practices results of respondents.

Variables	Frequency (N)	Percentage (%)
How many times do you eat in a day		
Once	2	1.3
Twice	23	15.3
Three times	85	56.7
Four times	40	26.7
Total	150	100
Do you skip meals?		
Yes	27	18
No	82	54.7
Sometimes	41	27.3
Total	150	100
If yes what are your reasons		
Because I do not feel like eating	47	31.3
Because there is no food	80	54
Because I am fasting	17	11.3
Because I want to save money	5	3.3
How often do you eat legumes and cereals		
Everyday	14	9.3
Whenever it is available	98	65.3
Once in two days	18	12
Once in a week	20	13.3
Total	150	100
How often do you eat		
fruits and vegetables		
Everyday	20	13.3
Whenever it is available	74	49.3
Once in two days	39	26
Once in a week	17	11.3
Total	150	100
What is your favorite food?		
Any food	11	7.3
Yam	20	13.3
Beans	26	17.3
Ukwa	3	2
Plantain	5	3.3
Rice	55	36.7
Soup	18	12
Spaghetti	2	1.3
Fruit salad	4	2.7
Okpa	2	1.3
Total	150	100
What is your favorite food		
Bread fruit	2	1.3
Noodles	2	1.3
Total	150	100
If any, how often do you eat it		
Everyday	30	20

Whenever it is available	61	40.7
Once in two days	50	33.3
Once in a week	9	6
Total	150	100
Do you dislike any food		
Yes	80	53.3
No	70	46.7
Total	150	100
If yes what are your reasons		
No reason	49	32.7
Because of the aroma	32	21.3
It causes heartburn	6	4
I do not just like it	55	36.7
It makes me to vomit	8	5.3
Do you take vitamins and supplements		
Yes	123	82
No	27	18
Total	150	100
If yes, how often do you take it per week		
Daily	94	62.7
Alternate days	27	18
Anytime I remember	29	19.3
Total	150	100
What kind of supplement		
Multivitamin	55	36.7
Vitamin C	13	8.7
Vitamin A	28	18.7
Vitamin D	10	6.7
Iron	14	9.3
Calcium	30	20
Total	150	100

environment. 100% of the respondents stored their water in covered containers, 9% of other respondents indicated that their storage facilities were uncovered, 20% of the respondents cover their water containers sometimes. This finding contradicted a similar study the by Kabiru (2018) who reported that 62.7% of the respondents stored their water in covered containers.

The result of the maternal dietary practices is presented in Table 1 and showed that 26.7% of the women eat four times a day, 56.7% eat three times daily, 15.3% eat two times daily and 1.3% eat once daily. 18.0% skip meal, 54.7% do not skip meal while 27.3% skip meals sometimes. 31.3% of the women skip meal because they feel like eating, 54.0% skip meals because there is no food, 11.3% is because they were fasting and 3.3% because they want to save money. A total percent of 9.3% of the women eat cereals everyday, 65.4% eat cereals whenever it is available, 12.0% eat it once in two days while 13.3% once in a week. 13.3% of the women eats fruits and vegetables everyday, 49.3% eat fruits and vegetables whenever it is available, 26.0% once in two days while 11.3% eat fruits and vegetables once in a week. 53.3% of the women dislike some food while 46.6% do not

Table 3: Health information of respondents on malaria.

Variable	Frequency (N)	Percentage (%)
Do you have any history of malaria		
Yes	124	82.7
No	26	17.3
Total	150	100
Are you witnessing any symptom of malaria		
Yes	33	22
No	117	78
Total	150	100
Have you had malaria test		
Yes	87	58
No	67	42
Total	150	100
What was the result		
Positive	32	21.3
Negative	118	78
When positive what medications do you take		
No medication	33	22
Malaria medicine	117	78
Total	150	100
When last did you take malaria drugs		
Less than 1 month	73	48.7
2 month ago	16	10.6
3 month ago	33	22
Above 3 months ago	28	18.7
Total	150	100
Did the doctor notice any changes		
Yes	10	6.7
No	140	93.3
Total	150	100
If yes, what are the changes or effects		
No changes	140	93.3
Feeling uncomfortable	10	6.7
Do you have a mosquito net		
Yes	85	56.7
No	65	43.3
Total	150	100
What do you do to prevent malaria		
Cleaning my surrounding	25	16.7
Nothing	34	22.7
Net	54	36
Spray	35	23.3
Absence of dirty water	2	1.3
Total	150	100

dislike any food. The women had different reasons for disliking the food, 21.3% is because of the aroma, 4.0% is because it causes them heartburn, 36.7% do not just like the food while 5.3% said the food makes them to vomit. 82% of the women takes supplement while

Table 4: Anthropometric indices of the respondents.

BMI	Frequency (N)	Percentage (%)
Underweight (<18.5)	3	2
Normal (18/5-24.9)	54	36
Over weight (25.0-29.9)	75	50
Obese (>30)	18	12
Total	150	100

18.0% do not take any supplements. 62.7% take the supplements daily, 18.0% take it in alternative days while 19.3% take it anytime they remember, 36.7% takes multivitamin, 8.7% takes vitamin C, 18.7% takes vitamin A, while 6.7% takes vitamin D respectively. This finding is in accordance with that of Ademuyiwa (2013) who reported that 54% of the pregnant women ate three times daily, 28% ate more than three times daily while the rest respondents ate once or twice daily. The table showed that high percentage of the respondents consumes rice a lot. This could be because rice is a major staple in Nigeria. However, high rate of rice consumption by pregnant women in Nigeria in this study is contrary to the findings of Nyaruhucha (2009), who reported this food commodity to be one of the most avoided foods of selected studied pregnant women in Dar ea Salaam City, Tanzania. This shows that a higher number of the pregnant women took mostly carbohydrate food.

The result for health information on malaria is presented in Table 3 and showed that 82.7% of the pregnant women have a history of malaria, 17.3% do not have a history of malaria. 22.0% are currently witnessing the symptoms of malaria, 58.0% have had a malaria teat while 42.0% have not. 21.3% are malaria positive while 78.7% are negative. 22.0% do not take malaria medications while 78.0% take. 48.7% of the women took malaria medications with one month age, 10.7% took it two months ago, 22.0 % took it three months ago while 18.7 took it above three months ago. 56.7% of these women have mosquito nets while 43.3% do not have any. 3.0% of the women makes use of the mosquito net to prevent malaria, 23.3% uses mosquito repellents while 16.7% keeps the environments clean. The use of Insecticide-Treated Nets (ITNs) decreases both the number of malaria cases and malaria deaths in pregnant women. In this study, the use if Insecticide-Treated Nets (ITNs) was found to be associated with malaria infection, pregnant women who did not use Insecticide-Treated Nets (ITNs) frequently were more affected by malaria as compared to those who did. A previous study conducted in Otukpo also indicated that the rate of malaria increases with a proportionate decrease in the use of Insecticide-Treated Nets (ITNs). The prevalence of malaria infection among pregnant women in Emekuku and Uratta was found to be 21.3%. These findings corroborated with the results in Maidugari where the prevalence of 22.1% was reported among the pregnant women [16]. It also contrasts sharply with the findings in Lagos where the prevalence rate of 7.7% among pregnant women attending antenatal clinic for the first time during current pregnancy report. Though the rate of malaria in the area was not that high there still urgent need to review the control measures available, with a view to possibly redesign the control programmes.

The body mass index of the subjects is presented in Table 4. The results showed that 25% of pregnant women are under weight, 36% are normal, 50% are overweight and 12% of the subjects are obese.

Table 5: Mean and Standard Deviation of Anthropometric Characteristics of the Subjects.

Variables	X±SD	T-Value	P-Value
WEIGHT			
20-30	70.60±8.82	3.036	0.305
30-40	67.95±8.82		
40-50	77.00±0.00		
HEIGHT			
20-30	1.63±0.08	0.128	0.898
30-40	1.61±0.10		
40-50	1.63±0.00		
BMI			
20-30	25.85±3.80	1.142	0.258
30-40	25.77±3.74		
40-50	28.90±0.00		

The present study fairly corresponds with the report of Bradford [21] which stated in his study that approximately 40% of reproductive-age women are overweight. The present study also slightly corresponds with the reports of Chigbu (2011) and Ezennochie (2011) who stated in their study's that in Nigeria, prevalence ranging between 7.4% and 10.7% of pregnant women are obsessed. Weight gain in pregnancy remains matter of great concern for women and health care providers. This worry about weight exits because of the influence of inappropriate weight or Gestational Weight Gain (GWG) on pregnancy outcome [22].

Table 5 presented the mean and the standard deviation of anthropometric characteristics of the respondents. Analysis of the table shows the weight of the women from 20-30 years have the mean and standard deviation of 70.60±8.82, women from 30-40 years have the mean and standard deviation of 67.95±8.82 while women from 40-50 years have the mean and standard deviation 77.00±0.00. Further showing the height of the women from 20-30 years have the mean and standard deviation of 1.63±0.08, women from 30-40 years have the mean and standard deviation of 1.61±0.10 while a woman from 40-50 years have the mean and standard deviation 1.63±0.00. The height of the women from 20-30 years have the mean and standard deviation of 25.85±3.80, women from 30-40 years have the mean and standard deviation of 25.77±3.74 while a woman from 40-50 years have the mean and standard deviation 28.90±0.00. There was no significant difference in their ranges ($p>0.05$). This present findings slightly correspond with that of [23] who stated in his study on the maternal anthropometric characteristics as determinants of birth weight, that the mean maternal weight of his respondents was 72.03±11kg. It also shows the height of the women from 20-30 years have the mean and standard deviation of 1.63±0.08m; women from 30-40 years have the mean and standard deviation of 1.61±0.10m while women from 40-50 years have the mean and standard deviation 1.63±0.00m. A similar research by Kordi showed the height of respondents from 20-30 years had the standard deviation of 1.61±0.07m. [24]. The body mass index of the women from 20-30 years have the mean and standard deviation of 25.85±3.80kg.m, women from 30-40 years have the mean and standard deviation of 25.77±3.74kg.m while a woman from 40-50 years have the mean and standard deviation

28.90±0.00kg,m. This findings is slightly different from a similar work by Kordi. His work showed the body mass index of his respondents from 20-30 as 30.3±2.21kg.m, from 30-40 as 26.4±3.1kg.m and 40-50 as 21.5±0.77kg.m respectively [24].

Conclusion and Recommendation

The present study shows that a high number of the pregnant women are overweight. Majority of the women relied on carbohydrate food because of availability while some food were avoided because of lack of nutritional information and body reactions. Also most of these women use uncovered water containers which can be used as habitants and breeding place for mosquitoes. Many of the pregnant women do not have mosquito net because they did not get it when it was distributed in the communities while some that had the net do not sleep in the net because they do not feel comfortable in the net. The present study also showed that some women skip meal, this was because most of the women are traders; they get so busy that they postpone their meal time. Also some of the women skipped meal to avoid being overweight and the baby getting too fat. The importance of making available, use of Insecticide-Treated Nets (ITNs), and keeping a clean environment so as to prevent mosquito bites and breeding should be stressed to pregnant women in the course of antenatal care. Proper nutrition education should be given to pregnant women in the course of antenatal care, to reduce overweight and obesity.

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