KNOWLEDGE OF EFFECTS OF MATERNAL NUTRITION ON BIRTH OUTCOMES AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE SERVICES IN OWERRI MUNICIPAL LGA, IMO STATE

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Abstract
The study determined knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending antenatal care services (ANCs) in Owerri Municipal LGA, Imo State. Four objectives, four research questions and three null hypotheses guided the study. Descriptive survey research design was used for the study. The target population consisted of an estimated 7,028 pregnant women attending antenatal care services in Owerri Municipal. The sample for the study comprised of 280 pregnant women that attended selected health facilities representing 3.98 per cent of the population. Researcher-designed structured questionnaire was the main instrument for data collection. Validity of the questionnaire was ensured through the verdict of three experts from Department of Public Health, Madonna University Elele, Rivers State. Split-half method was employed to establish the reliability of the instrument using thirty pregnant women attending health facilities in Owerri North LGA. Data were analysed using descriptive statistics as well as inferential statistics of Chi square (χ^2). Findings of the study showed that majority of pregnant women had knowledge of the effects of maternal nutrition on birth outcomes; pregnant women of low educational level had low nutritional knowledge and its corresponding effects on birth outcomes. It was recommended that nutrition intervention programmes such as nutrition education in different villages, health centres, health posts and women organizations should be organized particularly for pregnant mothers in rural communities to increase nutritional knowledge of mothers and promote birth outcomes.

Key words: Maternal Health, Nutrition, Birth outcomes, Knowledge, Malnutrition

Introduction

Nutrition plays a major role in maternal and child health. Poor maternal nutritional status has been related to adverse birth outcomes; however, the association between maternal nutrition and birth outcome is complex and is influenced by many biological, socioeconomic, and demographic factors, which vary widely in different populations (Villar, Merialdi, Gulmezoglu et al., 2003). Understanding the relation between maternal nutrition and birth outcomes provides basis for developing nutritional interventions that will improve birth outcomes. Optimal nutrition is necessary to maintain the health of the mother, to help ensure a normal delivery, and also to reduce the risk of birth defects, sub-optimal foetal development and chronic health problems in childhood (American Dietetic Association, 2008). A healthy diet contributes to a successful pregnancy outcome by reducing complications and promoting adequate growth and development (Fuentes-Afflick & Hessol, 2010).

Pregnancy outcomes rank among the pressing reproductive health challenges globally. Annual estimate of 600,000 women aged 15-49 die of pregnancy related causes, with 99 per cent coming from the developing world (Addai, 2008; Population Reference Bureau, 2009; WHO, 2010) and Nigeria alone accounts for 10% of this total (Okolocha, Chiwuzie, Braimoh, Unuigbe & Olumeko, 2008). Nigeria's antenatal clinics focus on check-ups and laboratory investigations whereas nutrition education, a key component of ante-natal care still remains a neglected area. Nigeria still has an extremely high maternal mortality rate with a ratio of 704 per 100,000 live births. This implies that with about 24 million live births annually, an alarming record of 170,000 Nigerian women die as a result of complications associated with pregnancy and childbirth. This maternal mortality ratio is about a hundred times worse than that in industrialized countries highlighting the widest disparities in international public health (UNICEF, 2011).

The causes of maternal under-nutrition in Nigeria are multidimensional and multifactorial. Some of the main factors implicated include low status of women, which denies them appropriate decision-making power and access to contraception, resulting in frequent and closely-spaced pregnancies and high level of female illiteracy, which is a proxy for poor health-seeking behaviour among Nigerian women. Furthermore, high rate of poverty that predominantly affects women leads to inadequate dietary intakes and reduced access to adequate general and maternity health services (Ogunjuyigbe, Ojofeitimi, Sanusi, Orji, Akinlo, Liasu & Owolabi, 2008). However, in addition to these issues, traditional beliefs regarding foods to be avoided during pregnancy have been considered as a major factor limiting the quality of dietary intake among Nigerian women (Ojofeitimi & Tanimowo, 2008).

A woman who has been well nourished before conception begins her pregnancy with reserves of several nutrients so that the recurrent needs of the growing foetus can be met without adversely affecting her health. Infants, who have been well nourished in the womb, have an enhanced chance of entering life in very good health. Mother's diet should provide adequate nutrients so that maternal stores do not get depleted (Singh, Jain & Choudhary, 2009). Maternal nutrition during pregnancy has a vital influence on the long term health prospects of the foetus. Nutrition during the preconception period, as well as throughout pregnancy, has a major impact on pregnancy outcomes (King, 2010). Maternal malnutrition leads to three major adverse birth outcomes: low birth weight, preterm birth, and intrauterine growth restriction (IUGR). These adverse birth outcomes represent the leading causes of neonatal death among children born without congenital anomalies (Scholl & Johnson, 2010).

Pregnant and nursing women require extra nutrients to fulfill their bodily functions (Imdad & Bhutta, 2012). During pregnancy, for example, women need more food, varied diet and micronutrient supplementation (Imdad & Bhutta, 2012). When energy and other nutrient intake do not increase, the body's own reserves are used, leaving a pregnant woman feeling weak (Imdad & Bhutta, 2012). Energy needs increase in the second and particularly the third trimester of pregnancy. The Institute of Medicine recommends that women who have a BMI below 19.8 before pregnancy gain a total of 28-40 pounds, a woman between 19.8 and 26 BMI gain 25-30 pounds and a woman between 26-29 BMI gain 15-25 pounds during her pregnancy (National Academy Press, 2012).

World Health Organization (2013) defined maternal nutrition as a woman's nutritional status during pregnancy or while lactating. WHO (2013) further asserted that malnutrition occurs when an individual does not consume the proper amounts of micronutrients, vitamins and minerals, and consequently their physical function is impaired. A malnourished woman often finds that the body has difficultly with functions such as growth, pregnancy, lactation, physical work, and immunity. Clinically, malnutrition is characterized by inadequate (under-nutrition) or excess (over nutrition) intake of protein, energy, and micronutrients such as vitamins or minerals and the frequent infections and disorders that result of this malnutrition. One of the veritable tools of combating maternal malnutrition and improving birth outcomes is to ascertain knowledge of effects maternal nutrition on birth outcomes. This is essential to improve maternal and foetal health.

Guldenberge (1999) described knowledge as a set of structural connectivity patterns its contents have to be viable for the achievement of goals. Knowledge is a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning. Knowledge can refer to a theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic. However, several definitions of knowledge and theories to explain it exist (Atherton, 2013). Knowledge acquisition involves complex cognitive processes: perception, communication, and reasoning; while knowledge is also said to be related to the capacity of acknowledgment in human beings (Atherton, 2013).

This work was anchored on the cognitive dissonance theory, developed by Leon Festinger in 1957. It is concerned with the relationship among cognitions. Cognition, for the purpose of this theory, may be thought of as a piece of knowledge. The knowledge may be about an attitude, an emotion, behaviour, a value, and so on. For example the knowledge that you like the colour red is cognition. People hold a multitude of cognitions simultaneously, and these cognitions form irrelevant, consonant or dissonant relationships with one another. Two conditions are said to be dissonant if one cognition follows from the opposite of one another.

Variables such as age, mothers' level of education, parity and number of pregnancies before current pregnancy have been identified to influence knowledge of effects of maternal nutrition on birth outcomes. Daba, Beyene, Fekadu and Garoma (2013) posited that individuals with higher educational level have better nutrition knowledge. This may be explained by more access to internet, books and magazines. Age and also monthly income during pregnancy were identified as important predictors of knowledge of women on nutrition during pregnancy. Women between the ages of 25-35 years tend to have more knowledge on adequate maternal nutrition than women above 35 years (Daba et al., 2013). Mothers who have experienced previous pregnancies before their current pregnancy have more experience and knowledge on adequate maternal nutrition during pregnancy than women who are pregnant for the first the time. The variables adopted in this study to ascertain knowledge of effects of maternal nutrition on birth outcomes among pregnant mothers include age, level of education and parity.

There exists a dearth of studies and reliable data on knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA, Imo State. Therefore, the question arouse: what level of knowledge do pregnant women attending ANC in Owerri Municipal LGA exhibit in relation to effects of maternal nutrition on birth outcomes? Ascertaining the knowledge level of pregnant women on effects of nutrition during pregnancy on birth outcomes is crucial to promotion of maternal and foetal health and improved birth outcomes. Poor knowledge of effects of maternal nutrition on birth outcomes poses serious threats to pregnant women's health and may impair foetal growth with associated consequences such as low birth weight, preterm birth, and intrauterine growth restriction (IUGR), which can have lifelong consequences for development and quality of life. The location of this study was Owerri Municipal Local Government Area, Imo State. The council has an urban setting with one autonomous community made up of five indigenous kindred (Owerre Nchiise). These are Umuororonjo, Amawom, Umuonyeche, Umuodu, and Umuoyima.

Purpose of the Study

The main purpose of the study was to ascertain knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA, Imo State. Specifically, the study sought to:

1. determine level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA;
2. determine level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA based on age.
3. determine level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri municipal LGA based on level of education, and
4. determine level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri municipal LGA based on parity

Based on the above objectives, the following hypotheses were formulated:

1. There is no significant difference in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA based on age
2. There is no significant difference in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA based on level of education
3. There is no significant difference in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending ANCs in Owerri Municipal LGA based on parity.

Methods

The descriptive survey research design was utilized for the study. According to the 2009 Health Survey by the Health Department of Owerri Municipal Council, Owerri Municipal has a total of 74 health facilities out of which 22 of the facilities offer antenatal care services. Population for this study comprised 7,028 registered pregnant women attending antenatal care services in health facilities in Owerri Municipal. The sample for the study consisted of 280 pregnant mothers attending health facilities in Owerri Municipal LGA. This represented 3.98 per cent of the whole population of 7,028.

A two-stage sampling procedure was used. The first stage involved drawing 10 health facilities from the existing 22 health facilities that offer antenatal care services using simple random sampling of balloting without replacement while second stage involved the use of simple random sampling technique of balloting without replacement to select 28 pregnant women each from the sampled 10 health facilities. This procedure produced a total of 280 pregnant mothers.

A-14 item researcher-designed questionnaire on knowledge of effects of maternal nutrition on birth outcomes among pregnant women referred to as QKEMNBO was used for data collection (See Appendix A). The 14-item QKEMNBO was made up of two sections as follows: Section A contained three socio-demographic variables that described the pregnant women (age, level of education and parity) and Section B contained 11 items for eliciting information on knowledge of effects of maternal nutrition on birth outcomes among pregnant women. The face validity of QKEMNBO was established by three experts in the department of Public Health, Madonna University Nigeria, Elele, Rivers State. Each of the experts was given a drafted copy of the questionnaire and accompanied with specific purposes of the study, research questions and hypotheses. Split-half method of reliability testing was used to determine reliability index of QKEMNBO while Spearman Brown Correction Statistic was employed to establish reliability co-efficient of the instrument. The reliability co-efficient value of 0.87 was obtained. This was adjudged high enough because it was above 0.60. The instrument was administered on thirty pregnant women attending health facilities in Owerri North LGA, Imo State. The health facility was not among the health facilities used for the study.

In other to gain access to the CMDs and reach the respondents, a letter of introduction was collected from the Head, Department of Public Health Madonna University Elele, Rivers State explaining the purpose of the study. This was submitted to the head of each sampled health facilities. The researchers and nurses who served as research assistants administered the copies of the questionnaire to the respondents. In all, 280 copies of the questionnaire were distributed by the researchers and research assistants to the pregnant mothers. The researchers and their research assistants pleaded with the subjects to complete copies of the questionnaire given to them on the spot and return immediately, to ensure high return rate. All 280 copies of the questionnaire were collected back after completion, thus, giving 100 percent return rate. The completion of the questionnaire was done by the pregnant mothers voluntarily. The inclusion criteria included being a registered pregnant woman between January-September, 2014 in the selected 10 health facilities that offered antenatal care services and willingness to participate in the study after given informed consent. The exclusion criteria included not responding to all the items in the copies of the questionnaire, or inappropriate or inconsistent response to the questionnaire items based on the investigators' discretion. Registered pregnant women were not coerced to participate in the study.

Out of 280 copies of QKEMNBO distributed and collected back. The data generated were analysed using Statistical Package for Social Sciences (SPSS batch system version 20). The data were analysed on an item- by- item basis. Frequency and percentages were used to analyze data generated from section B. The response option for section B was a dichotomous format of 'True' or 'False'. The null hypotheses were tested using Chi-square (χ^2) statistic at 0.05 level of significance and at the appropriate degrees of freedom.

Results

Table 1: **Frequency and Percentage of Knowledge of Effects of Maternal Nutrition on Birth Outcomes among Pregnant Women (n= 280)**

S/N	Items	True f	True (%)	False f	False (%)
4.	Consumption of alcohol during pregnancy causes foetal alcohol syndrome	152	(54.3)	128	(45.7)
5.	Consumption of inadequate meals during pregnancy affects foetal growth	262	(93.6)	18	(6.4)
6.	Under nutrition hinders adoption of exclusive breastfeeding practices.	106	(37.9)	174	(62.1)
7.	Smoking during pregnancy affects fetal/ infant growth	264	(94.3)	16	(5.7)

8.	Maternal malnutrition can cause protein energy malnutrition (PEM) in infants	142 (50.7)	138 (49.3)
9.	Maternal under nutrition can cause nutritional deficiencies such as kwashiorkor in infants	264 (94.3)	16 (5.7)
10.	Adequate maternal nutrition promotes foetal development and growth	232 (82.9)	48 (17.1)
11.	Adequate maternal nutrition during pregnancy & post-natal period stimulates infant's immunity	152 (54.3)	128 (45.7)
12.	Adequate maternal nutrition prevents low birth weight in infants	208 (74.3)	72 (25.7)
13.	Adequate maternal nutrition enhances proper foetal/ infant brain development	214 (76.4)	66 (23.6)
14.	Adequate maternal nutrition reduces chances of malformations or disabilities in infants	188 (67.1)	92 (32.9)
	% Average	**70.9**	**29.1**

Table 1 shows that overall, 70.9 per cent of pregnant women indicated had knowledge of effects of maternal nutrition on birth outcomes. The table further shows that 54.3 per cent of pregnant women indicated that "consumption of alcohol during pregnancy causes foetal alcohol syndrome", 93.6 per cent of pregnant women affirmed that "consumption of inadequate meals during pregnancy affects the foetus/ infant growth", 37.9 per cent indicated that "under nutrition hinders adoption of exclusive breast feeding practices", 94.3 per cent of pregnant women had knowledge that "smoking during pregnancy affects infant development", 50.7 per cent of pregnant women acknowledged the fact that "maternal nutrition can cause protein energy malnutrition in infants", 94.3 per cent of pregnant women had the knowledge that "maternal under nutrition can cause nutritional deficiencies in infants. Furthermore, results in the table reveal that 94.3 per cent of pregnant women affirmed that "maternal under nutrition can cause nutritional deficiencies in infants and children", 82.9 per cent of pregnant women indicated that "adequate maternal nutrition promotes foetal/ infant growth and development", 54.3 per cent of pregnant women also indicated that "adequate maternal nutrition during pregnancy and postnatal period stimulates infant's immunity", 74.3 per cent of pregnant women affirmed that " adequate maternal nutrition prevents low birth weight in infants", 76.4 per cent of pregnant women had the knowledge that "adequate maternal nutrition enhances proper foetal/ brain development", while 67.1 agreed that "adequate maternal nutrition reduces chances of malformations or disability in infants".

Table 2: Frequency and Percentage of Knowledge of Effects of Maternal Nutrition on Birth Outcomes among Pregnant Women based on Age (n= 280)

		Age					
		15-24yrs (n=106)		**25-34yrs** (n=101)		**35-44yrs** (n=73)	
		True		True		True	
S/N	**Items**	f (%)	False f (%)	f (%)	False f (%)	f (%)	False f(%)
4.	Consumption of alcohol during pregnancy causes foetal alcohol syndrome	32(30.2)	74(69.8)	65(64.4)	36(35.6)	55(75.3)	18(24.7)
5.	Consumption of inadequate meals during pregnancy affects the fetal growth	88(83)	18(17)	101(100)	0 (0.0)	73(100)	0 (0.0)
6.	Under nutrition hinders adoption of exclusive breastfeeding practices	16(15.1)	90(84.9)	45(44.6)	56(55.4)	45(61.6)	28(38.4)
7.	Smoking during pregnancy affects foetal / infants' growth	106(100)	0 (0.0)	85(84.2)	16(15.8)	73(100)	0 (0.0)
8.	Maternal malnutrition can cause protein energy malnutrition in infants	16(15.1)	90(84.9)	66(65.3)	35(34.7)	60(82.2)	13(17.8)
9.	Maternal under nutrition can cause nutritional deficiencies in infants	90(84.9)	16(15.1)	94(93.1)	7 (6.9)	48(65.8)	25(34.2)
10.	Adequate maternal nutrition promotes foetal/ infant growth & development	90(84.9)	16(15.1)	94(93.1)	7 (6.9)	48(65.8)	25(34.2)
11.	Adequate maternal nutrition during pregnancy & postnatal period stimulates infant's immunity	32(30.2)	74(69.8)	65(64.4)	36(35.6)	55(75.3)	18(24.7)

12.	Adequate maternal nutrition prevents low birth weight in infants	72(67.9)	34(32.1)	81(80.2)	20(19.8)	55(75.3)	18(24.7)
13.	Adequate maternal nutrition enhances proper foetal/ infant brain development	72 (67)	34(32.1)	82(81.2)	19(18.8)	60(82.2)	13(17.8)
14.	Adequate maternal nutrition reduces chances of malformations and disabilities in infants	84(79.2)	22(20.8)	62(61.4)	39(38.6)	42(57.5)	31(42.5)
	% Average	**61.2**	**41.2**	**76.0**	**24.0**	**78.9**	**21.1**

Table 2 shows that 61.2 per cent of respondents between the ages of 15-24 years indicated having knowledge that all the outlined factors affect birth outcomes, 76 per cent of respondents in age group 25-34 years had knowledge that all the outlined factor affect birth outcomes, while 78 per cent of the respondents between age range 34-44 years affirmed that all outlined factors affect birth outcomes.

Table 3. **Frequency and Percentage of Knowledge of Effects of Maternal Nutrition on Birth Outcomes among Pregnant Women based on Level of Education (n= 280)**

		Level of Educ.							
		Non-formal (n=16)		**Primary (n=49)**		**Secondary (n=69)**		**Tertiary (n=146)**	
S/N	**Items**	**True** f(%)	**False** f(%)	**True** f(%)	**False** f(%)	**True** f(%)	**False** f(%)	**True** f(%)	**False** f(%)
4.	Consumption of alcohol during pregnancy causes foetal alcohol syndrome	0(0.0)	16(100)	0(0.0)	49(100)	12(17.4)	57(82.6)	140(95.9)	6(4.1)
5.	Consumption of inadequate meals during pregnancy affects the foetal growth	8(50)	8(50)	39(79.6)	10(20.4)	69(100)	0(0.0)	146(100)	0(0.0)
6.	Under nutrition hinders adoption of exclusive breastfeeding practices	0(0.0)	16(100)	0(0.0)	49(100)	28(40.6)	41(59.4)	78(53.4) 68(46.6)	
7.	Smoking during pregnancy affects foetal growth	16(100)	0(0.0)	34(69.4)	15(30.6)	68(98.6)	1(1.4)	146(100)	0(0.0)
8.	Maternal malnutrition can cause protein energy malnutrition in infants	0(0.0)	16(100)	0(0.0)	49(100)	12(17.4)	57(82.6)	130(89)	16(11)
9.	Maternal under nutrition can cause nutritional deficiencies in infants	8(50)	8(50)	41(83.7)	8(16.3)	69(100)	0(0.0)	146(100)	0(0.0)
10.	Adequate maternal nutrition promotes foetal/ infant growth & development	8(50)	8(50)	41(83.7)	8(16.3)	53(76.6)	16(23.2)	130(89)	16(11)
11.	Adequate maternal nutrition during pregnancy & postnatal period stimulates infant's immunity	0(0.0)	16(100)	16(32.7)	33(67.3)	28(40.6)	41(59.4)	108(74.0)	38(26)
12.	Adequate maternal nutrition prevents low birth weight in infants	8(50.0)	8(50)	10(20.4)	39(79.6)	44(63.8)	25(36.2)	146(100)	0.(0.0)
13.	Adequate maternal nutrition enhances proper foetal/ infant brain development	8(50)	8(50)	26(53.1)	23(46.9)	34(49.3)	35(50.7)	146(100)	0.(0.0)
14.	Adequate maternal nutrition reduces chances of malformations and disabilities in infants	8(50)	8(50)	10(20.4)	39(79.6)	40(58.0)	29(42.0)	130(89.0) 16(11.0)	
	% Average	**36.4**	**64.0**	**33.7**	**66.3**	**60.2**	**39.8**	**90.0**	**10.0**

Data in Table 3 show that only 36.4 per cent of the respondents with no formal education had knowledge of the effects of maternal nutrition on birth outcome, 33.7 per cent of the respondents with primary education had knowledge of the effects of maternal nutrition on birth outcomes, 60.2 per cent of the respondents with secondary level of education had knowledge of effects of maternal nutrition on birth outcomes while 90 per cent of the respondents with tertiary level of education had knowledge of the effects of maternal nutrition on birth outcomes.

Data in Table 4 shows that 66.2 per cent of the respondents who had 1-2 children had knowledge of effects of maternal nutrition on birth outcomes, 72 per cent of the respondents with 3-4 children had knowledge of the effects of maternal nutrition on birth outcomes, while 86.6 per cent of respondents with 5 children and above had knowledge of effects of maternal nutrition on birth outcome.

Table 4. **Frequency and Percentage of Knowledge of Effects of Maternal Nutrition on Birth Outcomes among Pregnant Women based on Parity Status (n = 280)**

		Parity status					
		1-2 children (n=165)		**3-4 children (n=72)**		**>or 5 children (n=43)**	
		True	**False**	**True**	**False**	**True**	**False**
S/N	**Item**	f (%)	f (%)	f(%)	f(%)	f(%)	f(%)
4.	Consumption of alcohol during pregnancy causes foetal alcohol syndrome	71 (43)	94 (57)	50(69.4) 22(30.6)		31(72.1)	12 (27.9)
5.	Consumption of inadequate meals during pregnancy affects foetal growth	147(89.1) (10.9)	18	72(100) (0.0)	0	43(100) (0.0)	0
6.	Under nutrition hinders adoption of exclusive breastfeeding practice	41(24.8) 124(75.2)		22(30.6) 50(69.4)		43(100) (0.0)	0
7.	Smoking during pregnancy affects foetal / infants' growth	149(90.3) (9.7)	16	72(100) 0(0.0)		264(94.3) (5.7)	16
8.	Maternal malnutrition can cause protein energy malnutrition in infants	55(33.3) 110(66.7)		56(77.8) 16(22.2)		31(72.1) (27.9)	12
9.	Maternal under nutrition can cause nutritional deficiencies in infants	165(100) (0.0)	0	56(77.8) 16(22.2)		43(100) (0.0)	0
10.	Adequate maternal nutrition promotes foetal/ infant growth & development	146(88.5) 19(11.5)		56(77.8) 16(22.2)		30(69.8) 13(30.2)	
11.	Adequate maternal nutrition during pregnancy & postnatal period stimulates infant's immunity	75 (45.5) 90(54.5)		34(47.2) 38(52.8)		43(100)	0 (0.0)
12.	Adequate maternal nutrition prevents low birth weight in infants	115(69.7) 50(30.3)		56(77.8) 16(22.2)		37(86)	6 (14)
13.	Adequate maternal nutrition enhances proper foetal/ infant brain development	115(69.7) 50(30.3)		56(77.8) 16(22.2)		43(100) (0.0)	0
14.	Adequate maternal nutrition reduces chances of malformations and disabilities in infants	123(74.5) 42(25.5)		40(55.6) 32(44.4)		25(58.1) (41.9)	18
	% Average	**66.2**	**33.8**	**72.0**	**28.0**	**86.6**	**13.4**

Hypothesis 1

There is no significant difference ($p<0.05$) in the knowledge of effects of maternal nutrition on birth outcomes among pregnant women according to age in Owerri municipal. Data testing the hypothesis are contained in Table 5.

Table 5. **Summary of Chi-square Analysis of No Significant Difference in the Level of Knowledge of Effects of Maternal Nutrition on Birth Outcomes Based on Age**

		Age (years)									
		15-24yrs		25-34yrs		35-44yrs					
S/N	Items	True O (E)	False O (E)	True O (E)	False O (E)	True O (E)	False O (E)	$\chi^{2\text{-cal}}$	P-value	Dec.
4.	Item 4	32 (57.5)	74(48.5)	65 (54.8)	36 (46.2)	55(39.4)	18 (33.4)	41.973	0.001	*

5.	Item 5	88 (99.2)	18 (6.8)	101(94.5)	0 (6.5)	73 (68.3)	0 (4.7)	31.577	0.001	*
6.	Item 6	16 (40.1)	90 (65.9)	45 (38.2)	56 (62.8)	45 (27.6)	28 (45.4)	42.829	0.001	*
7.	Item 7	106(99.9)	0 (6.1)	85 (95.2)	16 (5.8)	73 (68.8)	0 (4.2)	30.075	0.001	*
8.	Item 8	16 (53.8)	90 (52.2)	66 (51.2)	35 (49.8)	60 (37.0)	13 (36.0)	91.397	0.001	*
9.	Item 9	106(99.9)	0 (6.1)	98 (95.2)	3 (5.8)	60 (68.8)	13 (4.2)	27.653	0.001	*
10.	Item 10	90 (87.8)	16 (18.2)	94 (83.7)	7 (17.3)	48 (60.5)	25 (12.5)	22.763	0.001	*
11.	Item 11	32 (57.5)	74 (48.5)	65 (54.8)	36 (46.2)	55 (39.6)	18 (33.4)	41.973	0.001	*
12.	Item 12	72 (78.7)	34 (27.3)	81 (75.0)	20 (26.0)	55 (54.2)	18 (18.8)	4.136	0.126	**
13.	Item 13	72 (81.0)	34 (25.0)	82 (77.2)	19 (23.8)	60 (55.8)	13 (17.2)	6.871	0.032	*
14.	Item 14	84 (71.2)	22 (34.8)	62 (67.8)	39 (33.2)	42 (49.0)	31 (24.0)	11.610	0.003	*
	Overall							**32.078**	**0.015**	*****

*Significant ** Not Significant

Key

ITEM 4 = Consumption of alcohol during pregnancy causes foetal alcohol syndrome
ITEM 5 = Consumption of inadequate meals during pregnancy affects the foetal/infant growth
ITEM 6 = Under nutrition hinders adoption of exclusive breastfeeding practices
ITEM 7 = Smoking during pregnancy affects foetal / infants' growth
ITEM 8 = Maternal malnutrition can cause protein energy malnutrition (PEM) in infants
ITEM 9 = Maternal under nutrition can cause nutritional deficiencies in infants
ITEM 10 = Adequate maternal nutrition promotes foetal/ infant growth & development
ITEM 1 = adequate maternal nutrition during pregnancy & postnatal period stimulates infant's immunity.
ITEM 12 =Adequate maternal nutrition prevents low birth weight in infants
ITEM 13 =Adequate maternal nutrition enhances proper foetal/ infant brain development
ITEM 14 =Adequate maternal nutrition reduces chances of malformations and Disabilities in infants

Table 5 indicates that the calculated χ^2 values and their respective corresponding p-values for the following indices of knowledge of effects of maternal nutrition on birth outcomes, which include consumption of alcohol during pregnancy cause foetal alcohol syndrome (χ^2 =41.973, p = 0.001), consumption of inadequate meal during pregnancy affects foetal/infant growth (χ^2 =31.577, p = 0.001), under nutrition hinders adoption of exclusive breastfeeding practices (χ^2 =42.829, p = 0.001), smoking during pregnancy affects foetal/infant growth (χ^2 =30.075, p = 0.001), maternal malnutrition can cause protein energy malnutrition in infants(χ^2 =91.397, p = 0.001), maternal under nutrition can cause nutritional deficiencies in infants and children (χ^2 = 27.653, p = 0.001), adequate maternal nutrition promotes foetal/infant growth and development (χ^2 = 22.763, p = 0.001), adequate maternal nutrition during pregnancy and postnatal period stimulates infant immunity (χ^2 = 49.973, p = 0.001), adequate maternal nutrition prevents low birth weight in infants (χ^2 = 4.136, p = 0.126), adequate maternal nutrition enhances proper foetal /infant brain development(χ^2 =6.871, p = 0.032), adequate maternal nutrition reduces chances of malformations or disabilities in infants(χ^2 =11.610, P=0.003). The table further shows the overall χ^2 calculated value with its corresponding p-value for pregnant women's knowledge on effects of maternal nutrition on birth outcome (χ^2 =32.1, p = 0.015). Since the overall p-value (p = 0.015) is less than .05 level of significance, the null hypothesis of no significant difference in the knowledge of effects of maternal nutrition on birth outcomes among pregnant women based on age, is therefore accepted. This implies that knowledge of effects of maternal nutrition among pregnant women attending antenatal care in Owerri Municipal is not dependent on their ages.

Hypothesis 2

There is no significant difference ($p<0.05$) in the level knowledge of effects of maternal nutrition on birth outcomes among pregnant women of various levels of education in Owerri municipal LGA. Data testing the hypothesis are contained in Table 6.

Table 6. **Summary of Chi-square Analysis of No Significant Difference in the Level of Knowledge of Effects of Maternal Nutrition on Birth Outcomes Based on Level of Education (n =280)**

		Level of Education													
		NFE		PRY ED		SEC ED		TER ED							
S/N	Items	True	False	True	False	True	False	True	False						
		O (E)	O (E)	O (E)	O (E)	O (E)	O (E)	O (E)	O (E)	$X^{2\text{-cal}}$	P-val	Dec			
4.	ITEM 4	0 (18.7)	16 (7.3)	0 (26.6)	49 (22.4)	12 (37.5)	57 (31.5)	140 (79.3)	6 (66.7)	216.870	0.001	*	**		
5.	ITEM 5	8 (15.0)	8 (1.0)	39 (45.9)	10 (3.2)	69 (64.5)	0 (4.4)	146 (136. 6)	0 (9.4)	81.187	0.001	*	**		
6.	ITEM 6	0 (6.1)	16 (9.9)	0 (18.6)	49 (30.5)	28 (26.1)	41 (42.9)	78 (55.3)	68(90.7)	54.855	0.001	*	**		
7.	ITEM 7	16 (15.1)	0 (9)	34 (46.2)	15 (2.8)	68 (65.1)	1 (3.9)	146 (137.7)	0 (8.3)	68.527	0.001	*	**		
8.	ITEM 8	0 (8.1)	16 (7.9)	0 (24.9)	49 (24.2)	12 (35.0)	57 (34.0)	130 (74.0)	16(72.0)	183.342	0.001	*	* *		
9.	ITEM 9	8 (15.1)	8 (9)	41 (46.2)	8 (2.8)	69 (65.1)	0 (3.9)	146 (137.7)	0 (8.3)	81.515	0.001	*	* *		
10	ITEM 10	8 (13.3)	8 (2.7)	41 (40.6)	8 (8.4)	53 (57.2)	16 (11.8)	130 (121)	18(25.0)	17.890	0.001	*	* *		
11	ITEM 11	0 (8.7)	16 (7.3)	16 (26.6)	33 (22.4)	28 (37.5)	41 (31.5)	108 (79.3)	38(66.7)	56.265	0.001	*	* *		
12	ITEM 12	8 (11.9)	8 (4.1)	10 (36.4)	39 (12.6)	44 (51.3)	25 (17.7)	146 (108.5)	0 (37.5)	133.936	0.001	*	* *		
13	ITEM 13	8 (12.2)	8 (3.8)	26 (37.5)	23 (11.6)	34 (52.7)	35 (16.3)	146 (111.6)	0 (34.4)	94.322	0.001	*	**		
14	ITEM 14	8 (10.7)	8 (5.3)	10 (32.9)	39 (16.1)	40 (46.3)	29 (22.7)	130 (98.0)	16(48.0)	85.009	0.001	*	* *		
	Overall									**97.611**	**0.001**	*			

*Significant ** Not Significant

Table 6 indicates that the calculated χ^2 values and their respective corresponding P-value for indices of effects of maternal nutrition on birth outcomes, which includes consumption of alcohol during pregnancy cause foetal alcohol syndrome (χ^2 = 216.870, P = 0.001), consumption of inadequate meal during pregnancy affects foetal/infant growth (χ^2 = 81.178, P = 0.001), under nutrition hinders adoption of exclusive breastfeeding practices (χ^2 =54.855, P = 0.001), smoking during pregnancy affects foetal/infant growth (χ^2 = 68.527, P = 0.001), maternal malnutrition can cause protein energy malnutrition in infants(χ^2 =183.342, P = 0.001), maternal under nutrition can cause nutritional deficiencies in infants and children (χ^2 = 81.515, P = 0.001), adequate maternal nutrition promotes foetal/infant growth and development (χ^2 =17.890, P = 0.001), adequate maternal nutrition during pregnancy and postnatal period stimulates infant immunity (χ^2 = 56.265, P = 0.001), adequate maternal nutrition prevents low birth weight in infants (χ^2 =133.936, P = 0.001), adequate maternal nutrition enhances proper foetal /infant brain development(χ^2 = 94.322, P = 0.001), adequate maternal nutrition reduces chances of malformations or disabilities in infants (χ^2 = 85.009, P = 0.001). The table further shows the overall calculated χ^2-value with its corresponding p-value for pregnant women's knowledge on effects of maternal nutrition on birth outcomes (χ^2 = 97.61, P = 0.001). Since the overall p-value (P = 0.001) is less than .05 level of significance, the null hypothesis of no significant difference among pregnant women of various levels of knowledge, is therefore accepted. Therefore there is no significant difference among pregnant women of different levels of education in their knowledge of effects of maternal nutrition on birth outcomes. This implies that knowledge of effects of maternal nutrition on birth outcome among pregnant women attending antenatal care in Owerri Municipal was not dependent on their level of education.

Hypothesis 3

There is no significant difference ($p<0.05$) in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women based on parity in Owerri municipal LGA. Data testing the hypothesis are contained in Table 7.

Table 7. **Summary of Chi-square Analysis of No Significant Difference in the Level of Knowledge of Effects of Maternal Nutrition on Birth Outcomes Based on Parity Status**

		Parity Status											
		1-2 (n= 165)				3-4 (n = 72)				> 5 children (n = 43)						
		True		False		True		False		True		False		$\chi^{2\text{-cal}}$	P-val.	Dec
S/N	Items	O	(E)	O	(E)	O	(E)	O	(E)	O	(E)	O	(E)			
4.	ITEM 4	71	(89.6)	94	(75.4)	50	(39.1)	22	(32.9)	31	(23.3)	12	(19.7)	20.584	0.001	*
5.	ITEM 5	147	(154.4)	16	(10.6)	72	(67.4)	0	(4.6)	43	(40.2)	0	(2.8)	13.407	0.001	*
6.	ITEM 6	41	(62.5)	124	(102)	22	(27.3)	50	(44.7)	43	(16.3)	0	(26.7)	84.085	0.001	*
7.	ITEM 7	149	(155.6)	16	(9.4)	72	(67.9)	0	(4.1)	43	(40.5)	16	(16.0)	11.827	0.001	*
8.	ITEM 8	55	(83.7)	110	(81.3)	56	(36.5)	16	(35.5)	31	(21.8)	12	(21.8)	48.904	0.001	*
9.	ITEM 9	165	(155.6)	0	(9.4)	56	(67.9)	16	(4.1)	43	(40.5)	0	(2.5)	49.904	0.001	*
10.	ITEM 10	146	(136.7)	19	(28.3)	56	(59.7)	16	(12.3)	30	(35.6)	13	(7.4)	10.174	0.006	*
11.	ITEM 11	75	(89.6)	90	(75.4)	34	(39.1)	38	(32.9)	43	(23.3)	0	(19.7)	42.843	0.001	*
12.	ITEM 12	115	(122.6)	50	(42.4)	56	(53.5)	16	(18.5)	37	(31.9)	6	(11.1)	5.392	0.670	**
13.	ITEM 13	115	(126.1)	50	(38.9)	56	(55.0)	16	(17.0)	43	(32.9)	0	(10.1)	17.485	0.001	*
14.	ITEM 14	123	(110.8)	42	(54.2)	40	(48.3)	32	(23.7)	25	(28.9)	18	(14.1)	10.060	0.007	*
	Overall													**28.605**	**0.063**	**

*Significant
** Not Significant

Table 7 indicates the calculated χ^2 values and their respective corresponding p-values for indices of knowledge of effects of maternal nutrition on birth outcomes, which include consumption of alcohol during pregnancy cause foetal alcohol syndrome (χ^2 =20.584, p = 0.001), consumption of inadequate meal during pregnancy affects foetal/infant growth (χ^2 =13.497, p = 0.001), under nutrition hinders adoption of exclusive breastfeeding practices (χ^2 = 84.085, p = 0.001), smoking during pregnancy affects foetal/infant growth (χ^2 =11.827, p = 0.003), maternal malnutrition can cause protein energy malnutrition in infants(χ^2 = 48.904, p = 0.001), maternal under nutrition can cause nutritional deficiencies in infants and children (χ^2 = 49.024, p = 0.001), adequate maternal nutrition promotes foetal/infant growth and development (χ^2 = 10.174, p = 0.006), adequate maternal nutrition during pregnancy and postnatal period stimulates infant immunity (χ^2 = 42.843, p = 0.001), adequate maternal nutrition prevents low birth weight in infants (χ^2 = 5.392, p = 0.67), adequate maternal nutrition enhances proper foetal /infant brain development(χ^2 =17.485, p = 0.001), adequate maternal nutrition reduces chances of malformations or disabilities in infants(χ^2 =10.060, P=0.007). The table further shows the overall χ^2 calculated value with its corresponding p-value for pregnant women's knowledge on effects of maternal nutrition on birth outcome (χ^2 =28.61, p = 0.063). Since the overall p-value (p = 0.063) is greater than .05 level of significance, the null hypothesis of no significant in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women based on parity status, is therefore, rejected. This implies that knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending antenatal care in Owerri Municipal is dependent on parity.

Discussion of Findings

These findings are being discussed based on the research questions and hypotheses that guided the study. Four research questions were developed from four objectives of the study. The research questions were answered using frequency and percentages, while the null hypotheses were tested using inferential statistic of Chi-square. The main purpose of the study was to ascertain the knowledge of effects of maternal nutrition on birth outcomes among pregnant women attending antenatal care services (ANCs) in Owerri Municipal LGA of Imo State.

Research question one sought to determine level of knowledge of effects maternal nutrition on birth outcomes among pregnant women attending antenatal care service (ANCs) in Owerri Municipal LGA. Data in Table 1 indicated that majority (70.9%) of the pregnant women possessed knowledge of

effects of maternal nutrition on birth outcomes. This result is in consonance with the findings of Ayesha, Farwa and Ghazia (2012) who conducted a study on impact of maternal education, and socioeconomic status on maternal nutritional knowledge and practices regarding iron rich foods and iron supplements among pregnant women attending Gynaecology and Obstetrics Out-patient Department of Federal Government Services Hospital in Islamabad, Pakistan. Their study highlighted a good level of awareness regarding anemia but poor knowledge about its causes and prevention among pregnant women. Even in this study, women had considerable level of knowledge of effects of maternal nutrition on birth outcomes. It has been shown however that despite having knowledge, pregnant women do not pay particular attention to their diet and hardly change their eating habits (Kozłowska-Wojciechowska, & Wujec, 2002).

Research question two sought to determine the level of knowledge of effects maternal nutrition on birth outcomes among pregnant women attending antenatal care service (ANCs) in Owerri Municipal LGA based on age. Results in Table 2 show that 61.2 per cent of pregnant women within the ages of 15-24 years had knowledge of the effects of maternal nutrition on birth outcomes, 76 per cent of pregnant women within the ages of 25-34years had knowledge of effects of maternal nutrition on birth outcomes while 78 per cent of pregnant women within the ages of 35-44 years had knowledge of effects of maternal nutrition on birth outcomes. This result is in consonance with the findings of Sharma (2012) who conducted a study on knowledge, attitude and belief of pregnant women towards safe motherhood in rural Indian setting. The findings of her study showed awareness for maternal practices across women specifically ≤ 18 years, 19-25 years, 26-30 years. The higher knowledge level demonstrated among older women on effects of maternal nutrition on birth outcomes is not a surprising issue in this study because older women especially multiparous women had participated in several antenatal clinics which might have exposed them to nutrition education and counselling which are usually given by healthcare workers such as nurses, nutritionists or health educators as an integral part of the ANC services. This may account for higher level of knowledge demonstrated by women in age groups 25-34years and 35-44 years respectively.

Research question three sought to determine level of knowledge of effects maternal nutrition on birth outcomes among pregnant women attending antenatal care service (ANCs) in Owerri Municipal LGA based on level of education. Results in Table 3 show that 36.4 per cent of pregnant women with no formal education had knowledge of effects of maternal nutrition on birth outcomes, 33 per cent of pregnant women with primary level of education had knowledge of effects of maternal nutrition on birth outcomes, 60.2% of pregnant women with secondary level of education had knowledge of effects of maternal nutrition on birth outcomes while 90 per cent of pregnant women with tertiary level of education had knowledge of effects of maternal nutrition on birth outcomes. The finding agreed with the findings of Ayesha, Farwa, and Ghazia (2012) who found a significant relationship between nutritional awareness and educational status of their respondents. In their study, a vast majority of the subjects were aware of iron supplements and were consuming them regularly as prescribed irrespective of educational status. Similarly, in this study, a substantial proportion of women had knowledge of effects of maternal nutrition on birth outcomes. Furthermore, the knowledge about effects of maternal nutrition on birth outcomes was higher in highly educated group as compared to women with primary education and illiterate group. The is supported by a study which showed that women attending the antenatal clinics were capable of recognizing iron tablets and took them as prescribed Galloway, Dusch, Elder, Achadi, Grajedar, & Hurtado, 2002).

Research question four sought to determine level of knowledge of effects maternal nutrition on birth outcomes among pregnant women attending antenatal care services (ANCs) in Owerri Municipal LGA based on parity. The result of the study in Table 4 showed that 66.2% of pregnant women with 1-2 children had knowledge of effects of maternal nutrition on birth outcomes, 72 per cent of pregnant women with 3-4 children had knowledge of effects of maternal nutrition on birth outcomes while 87 per cent of pregnant women with 5 children and above had knowledge of effects of maternal nutrition on birth outcomes. The result contradicted those of Ayesha, Farwa, and Ghazia (2012) whose study's results indicated that a significant relationship ($p<0.001$) was observed between nutritional awareness and educational status of the respondents but parity and gestational age bore no relationship with nutritional knowledge and practices. Though there are other social and behavioural factors that clearly may augment women's knowledge such as previous experiences with previous births, attendance at ANC clinics, access to nutrition education or information but parity is an important determinant of the

outcome of a pregnancy and birth. The similarities may be attributed to subject composition though study settings differed.

Hypothesis one states that there is no significant difference in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women based on age. Data in Table 5 show the overall χ^2 calculated value with its corresponding p-value for pregnant women's knowledge on effects of maternal nutrition on birth outcome (χ^2 =32.1, p = 0.015). Since the overall p-value was less than 0.05 level of significance, the null hypothesis, therefore, was accepted. This implies that knowledge of effects of maternal nutrition on birth outcomes among pregnant women is not dependent on age. This result is in consonance with the findings of Sharma (2012) who conducted a study on knowledge, attitude and belief of pregnant women towards safe motherhood in rural Indian setting. The findings of her study showed awareness for maternal practices across women specifically ≤ 18 years, 19-25 years, 26- 30 years. Results of the study showed that no significant difference for knowledge was found between the age groups, F (2, 97) = .437, p=.647. This shows that differences in the means are most likely due to chance and unlikely to be due to age. As enunciated earlier, older women had higher knowledge level of effects of maternal nutrition on birth outcomes. This is not a surprising issue because all the women especially multiparous women had participated in several antenatal clinics which might have exposed them to nutrition education and counselling which are usually given during ANC services. The similarities may be attributed to subject composition though study settings differed.

Hypothesis two states that there is no significant difference in the knowledge level of effects of maternal nutrition on birth outcomes among pregnant women of various levels of education. Data in Table 6 show the overall calculated χ^2-value with its corresponding p-value for pregnant women's knowledge on effects of maternal nutrition on birth outcomes (χ^2 = 97.61, P = 0.001). Since the overall p-value (p = 0.001) is less than .05 level of significance, the null hypothesis of no significant difference among pregnant women of various levels of knowledge, is therefore accepted. The finding disagreed with the findings of Ayesha, Farwa, and Ghazia (2012) who found a significant relationship between nutritional awareness and educational status of their respondents. Although, this study showed that substantial proportion of women had knowledge of effects of maternal nutrition on birth outcomes across level of education the percentage scores may most likely be attributed to chance or other personal or behavioural factors and not entirely level of education. The disparity may be due to disparity in subject composition and location of study.

Hypothesis three states that there is no significant difference in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women of different parity status. Data in Table 7 show the overall χ^2 calculated value with its corresponding p-value for pregnant women's knowledge of effects of maternal nutrition on birth outcome (χ^2 =28.61, p = 0.063). Since the overall p-value (p = 0.063) is greater than .05 level of significance, the null hypothesis of no significant in the level of knowledge of effects of maternal nutrition on birth outcomes among pregnant women based on parity status, is therefore, rejected. This implies that pregnant women attending antenatal care in Owerri Municipal differed significantly in their knowledge of effects of maternal nutrition on birth outcomes based on parity. This result is in consonance with the findings of Sharma (2012) who conducted a study on knowledge, attitude and belief of pregnant women towards safe motherhood in rural Indian setting. Sharma concluded that there was significant difference between the knowledge of primary and secondary gravid women. In this study, this is not a surprising issue because all women particularly multiparous women who exhibited higher level of knowledge of effects of maternal nutrition on birth outcomes had participated in several antenatal clinics which might have exposed them to nutrition education and counselling which are usually given during ANC services. Thus, pregnant women differed significantly in their knowledge of effects of maternal nutrition on birth outcomes based on parity. The similarity in findings may be ascribed to subject composition of both studies though study settings differed.

Conflict of Interest

The authors have no conflict of interest

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