



Knowledge of Causes and Preventive Measures of Maternal Mortality among Childbearing Mothers in Owerri Municipal Council of Imo State, Nigeria

Kalu Mgbo Okeke
excelkalu01@gmail.com, 08038858749

Veronia O. Charles–Unadike
veraokwy@gmail.com

Stella C. Eze-Ufodiama
08033740052, stellaeze99@gmail.com

Chinyere K. Nwachukwu
08060631555

Department of Health Education, Alvan Ikoku Federal college of Education, Owerri

Abstract

Maternal mortality remains a public health concern. This study investigated knowledge of causes and preventive measures of maternal mortality among childbearing mothers in Owerri Municipal Council of Imo State. Four research questions and two null hypotheses guided the study. The study adopted a descriptive cross-sectional survey research design. The population for the study consisted of 42,141 CBMs in Owerri Municipal Council. The sample size was 480 CBMs drawn using two stage sampling procedures. A validated questionnaire titled “Knowledge of Causes and Preventive Measures of Maternal Mortality Questionnaire (KCPMMM) was used as instrument for data collection. Descriptive statistics of frequency, percentage and chi-square were used to answer and analyse the research questions and hypotheses respectively. Results showed that CBMs in Owerri Municipal Council possessed average knowledge (49.0%) and high knowledge (62.7%) of causes and preventive measures of maternal mortality respectively. CBMs with non-formal education possessed VLK (14.5%) and LK (35.6%) respectively on knowledge of causes and preventive measures of MM, those with primary and secondary education possessed AK while mothers in tertiary education possessed HK and VHK on same issue. Furthermore, the result revealed that there were significant differences in the knowledge of causes and preventive measures of maternal mortality among CBMs Owerri Municipal Council based on level of education. The study recommended among others that women need to be educated on the importance of antenatal visits so that they can have more regular attendance and get informed about safety measures to take during pregnancy and delivery in order to prevent complications and hence reduce maternal mortality.

Key words: Knowledge, maternal mortality, preventive measures, childbearing mothers.

Introduction

Maternal mortality is a major public health problem which has claimed the lives of many mothers across the globe. Despite numerous strategies taken by the international community to curb maternal mortality, it still remains a public health concern in developing countries, particularly in sub-Saharan Africa where one of every 16 women die of pregnancy and childbirth related causes during her life time compared with one in 2,800 women in developed countries (Endalamaw, 2012). United Nations (2009) reported that globally more than 1,500 women die each day from pregnancy-related causes resulting in an estimated 550,000 maternal deaths annually. Majority of these deaths (99 percent) occur in the developing countries where the life time risk of maternal death is one in six (Silvia, Rekha, Asuhan & Charles, 2010). The situation is most severe in Nigeria, where a woman is subjected to a lifetime risk of dying from pregnancy and childbirth causes to the ratio of one in eight pregnancies (Obinna, 2010). The author maintained that Nigeria has the highest number of death of mothers within the African region. Fredrick and Chimaraoke (2017) reported that Nigeria is the largest contributor of maternal deaths after Indian with an estimated 40,000 maternal deaths which accounts for 14 per cent of the global total death among childbearing mothers.

Maternal mortality refers to the death of mothers due to complications related to pregnancy and childbirth. Faduyile and Soyemi, Emiogun and Obafunwa (2017); Ogu and Ephraim – Emmanuel (2018) defined maternal

mortality as the death of a woman during pregnancy or within 42 days of termination of pregnancy irrespective of gestational age and site of the pregnancy. It is the death of a woman traceable to pregnancy or the way it was handled. Maternal mortality is conceptualized in this study as the percentage of mothers dying as a result of pregnancy-related complications or post-delivery complications every year in Imo State.

Maternal mortality is caused by many underlying factors which include obstetric haemorrhage, unsafe abortion, hypertensive disorder in pregnancy (such as pre-eclampsia, eclampsia etc), obstructed labour and puerperal sepsis (Wadhwa, Gupta, & Jain, 2013; Say, Chou, Gemmill et al., 2014). Obstetric haemorrhage refers to bleeding that is associated with pregnancy and childbirth. Trikha and Singh (2018) described obstetric haemorrhage as any kind of bleeding usually related to pregnancy in a parturient. Bleeding related to pregnancy can be classified into antepartum and postpartum haemorrhages. Antepartum haemorrhage occurs after 24 weeks gestation and before delivery while postpartum haemorrhage occurs within 24 hours of delivery or between 24 hours to six weeks after delivery. Postpartum haemorrhage is the leading cause of nearly one-quarter of maternal deaths globally (Say, Chou, Gemmill et al. 2014). Haemorrhage after delivery is associated with risks such as obesity, heart disease, fever and antepartum haemorrhage.

Unsafe abortion accounts for about 15 percent of all maternal deaths. Fredrick and Chimaraoke (2017) opined that abortion is unsafe when pregnancy is terminated either by persons lacking the minimal skills or in an environment lacking minimal clinical standard. Bitew, Katema, Worku, Hamu and Loha (2013) reported that out of the 42 million pregnancies terminated annually; about 20 million occur in the developing countries where abortion is not legalized thus done in an unsafe ways. This unhygienic termination results in haemorrhage, maternal infection, uterine perforations among others.

Hypertensive disorder in pregnancy includes pre-eclampsia, eclampsia, heart failure, excessive thickening of the heart muscles etc. Tsigas (2017) reported that every year nearly 76,000 mothers die as a result of hypertensive disorder globally. It present features such as headache, swollen face, weight gain, difficulty in breathing among others. Severe features include a systolic blood pressure of 110mmHg or higher, impaired liver function, pulmonary oedema and probable onset of cerebral disturbance.

Obstructed labour refers to a condition where the presenting part fails during delivery despite uterine contraction. It accounts for about 11 per cent of all maternal deaths as it predisposes mothers to severe complications such as haemorrhage. Islam, Ara & Choudhury, (2012). It is caused by mal-presentation and mal-position, bony obstruction and large size foetus as well as co-joint twins.

Puerperal sepsis is an infection of the genital tract after delivery. Globally, maternal infection accounts for 26.3 per cent of all maternal deaths and the second leading cause of maternal deaths after haemorrhage (Audu, Takai & Buker (2010). Puerperal sepsis can present fever and other symptoms like pelvic pain, foul smell, vaginal discharge and delayed reduction of uterine size. Momoh, Ezegwone and Ezeigwe (2010) submitted that mothers are predisposed to puerperal sepsis due to anaemia, prolonged labour, frequent vaginal examinations under unsterilized circumstances and premature rupture of membrane for prolonged labour.

Other factors include: malaria, anaemia, heart disease among others accounts for over 10,000 maternal deaths particularly in sub-Saharan Africa (WHO, 2009). Malaria in pregnancy contributes to significant perinatal morbidity and mortality. Regardless the required immunity of adults in malaria endemic areas, most pregnant women in Nigeria suffers malaria due to immune-compromised state of pregnancy and placental sequestration of infected erythrocytes. Pregnant women are 3 times more likely to suffer from severe diseases as a result of malarial infection compared with their non-pregnant counterparts, and have a mortality rate from severe disease that approaches 50 per cent (Scharntz-Dunn & Nour, 2009). Malaria is known to cause higher rates of miscarriages, intrauterine death, prematurity delivery, low-birth-weight neonates and neonatal death.

Anaemia in pregnancy is a very serious problem that is a leading cause of 20 -40 per cent of maternal deaths especially in Africa. This is because most African women enter pregnancy in a state of nutritional deficit and are unprepared to cope with the extra physiological demands and thus become anaemic (Kama, Oucho & Nwalili, 2019). Anaemia in pregnancy occurs when the haemoglobin concentration of a pregnant woman is less than 110 gram per litre in the venous blood predominantly due to nutritional deficiencies as well as infections such as malaria and Aids (Vikram, 2019). Christian, Mullany, Hurley et al. (2015) submitted that anaemia is associated with complications such as haemorrhage, circulatory decompensation, circulatory shock and decreased cardiac output. The high incidence of maternal mortality that is noticed in our society presently can successively be reduced using adequate preventive measures.

Preventive measures are actions taken to avoid something from happening. Salama (2017), described preventive measures as actions aimed at stopping a situation from occurring. These measures can be achieved through modification or removal of risk factors for a health condition. Contextually, preventive measures refer to



steps taken to ensure that a potentially non-conformity challenges which can result to maternal death does not occur during pregnancy and childbirth.

The aim is to protect the health of mothers against any unforeseen circumstances that may occur during pregnancy and childbirth. These can be achieved through early detection of warning sign of some health conditions that may lead to maternal mortality and taken appropriate intervention strategies to curb it. Early detection and adoption of appropriate intervention strategies of some health problems can help to save a mother from dying during pregnancy and childbirth. The prevention of maternal mortality will depend much on the knowledge childbearing mothers have on the causes and preventive measures of maternal mortality.

Knowledge refers to information, facts, skills and understanding gained through learning or experience. It is a powerful concept that is true and justified. Sanni, Udoh, Okediji, Modo and Ezech, (2012) defined knowledge as understanding of someone or something such as facts, information, description or skills which is acquired through expertise or education by perceiving, discovering or learning. The process of acquiring knowledge should begin early in people's lives as it is all about a person's level of a subject. Knowledge is conceptualized in this study as the amount of information CBMs in Owerri Municipal Council have about the causes and preventive measures of maternal mortality.

Research Questions

Four research questions were formulated to guide the study:

1. What is the knowledge of causes of maternal mortality among childbearing mothers in Owerri Municipal Council?
2. What is the knowledge of preventive measures of maternal mortality among childbearing mothers?
3. What is the knowledge of causes of maternal mortality among CBMs based on level of education?
4. What is the knowledge of preventive measures of maternal mortality among CBMs based on level of education?

Hypotheses

Two null hypotheses were postulated guide the study:

1. There is no significant difference in the knowledge of causes of maternal mortality among CBMs in Owerri Municipal Council based on level of education.
2. There is no significant difference in the knowledge of preventive measures of maternal mortality among CBMs in Owerri Municipal Council based on level of education.

Methods

Research Design: The study adopted cross-sectional survey research design. Cross-sectional research design is an observational research that analyses data of variables collected at one given point in time across a sample population.

Area of the Study: The study was conducted in Owerri Municipal Council which is one of the local government areas in Imo State. The council is made up of five (5) communities known as Owerri Nchise: Umuoronjo, Amawom, Umuonyeche, Umuodu and Umuonyima. The researchers observed that mothers from these communities die in their numbers due to pregnancy and childbirth. Thus the researchers deemed the area appropriate for the study.

Population for the Study: The population for the study comprised mothers 15 – 49 years living in Owerri Municipal Council and have experienced pregnancy or childbirth. The estimated population of mothers aged 15 - 49 years who have experienced pregnancy or childbirth is 42, 141 in the 5 communities that make up the council (Owerri Municipal Council, 22 per cent Upgrade Record, 2019).

Sample for the Study: The sample for the study consisted of 480 CBMs living in Owerri Municipal Council, Imo State. The sample was selected by the aid of Cohen, Mainon, and Morrison (2011) standardized table for sample size, confidence levels and confidence intervals for random samples. Two stage sampling procedure was employed to draw the sample size for the study. In the first stage, 3 out of the 5 communities in Owerri Municipal Council were drawn using simple random sampling technique of balloting without replacement. In the second stage, purposive sampling technique was used to select 160 mothers who were experienced enough to give accurate information needed in the study from each of the 3 selected communities. This gave a total of 480 CBMs selected for the study.

Instrument for Data Collection: Researchers' designed Knowledge of Causes and Preventive Measures of Maternal Mortality Questionnaire (KCPMMM) was used for data collection. The KCPMMM consisted of three sections, A, B and C. Section A consisted of two items on the respondent's demographic variables of age and level

of education. Section B consisted of 16 items on causes of maternal mortality while section C consisted of 7 items on preventive measures of maternal mortality. Three experts all from the Department of Health Education, Alvan Ikoku Federal College of Education, Owerri validated the instrument. The experts' suggestions were used in producing the final draft of the questionnaire. Test re-test method using Spearman Brown Order Correlation coefficient formula was used to analyze the data generated. A reliability index of .078 was obtained and adjudged reliable for the study.

Method of Data Collection: Copies of the questionnaire were administered to 480 CBMs, out of which 448 were returned which gave a return rate of 93.3 percent. Out of the 448 copies that were returned, 28 were not properly filled and were discarded. Only 420 copies duly filled were used for analysis.

Method of Data Analysis: Data generated were analyzed using frequency counts, percentage and chi-square statistics. The research questions were answered using percentages while the null hypotheses were tested using Chi-square (χ^2) at .05 level of significance. In determining knowledge, Okafor (1997) criterion was adopted. By these a score below 20 per cent was interpreted very low knowledge (VLK), a score 21 -39 per cent was interpreted low knowledge (LK), a score of 40 -59 per cent was interpreted average knowledge (AK), a score 60 – 80 per cent was interpreted high knowledge (HK) and a score above 80 per cent was interpreted very high knowledge (VHK).

Results

Research question one

What is the knowledge of causes of maternal mortality among childbearing mothers in Owerri Municipal Council Imo State? Data answering this research question are contained in table 1.

Table 1. Childbearing Mothers' Knowledge of Causes Maternal Mortality (n = 420)

S/n	Items on Causes of Maternal mortality	Knowledge responses	
		Yes f (%)	No f (%)
1.	Excessive loss of blood during pregnancy can lead to maternal mortality.	277(66.0)	143(34.0)
2.	Excessive loss of blood during childbirth can lead to maternal death.	261(62.1)	159(37.9)
3.	Termination of pregnancy through unsafe ways can result to the death of a mother.	259(61.9)	161(37.1)
4.	Contraction of infection during childbirth can cause death of a childbearing mother	220(52.4)	200(47.6)
5.	Having pre-eclampsia during pregnancy can cause maternal death.	181(43.1)	239(56.9)
6.	Obstructed labour is one of the causes of maternal mortality.	222(52.9)	198(47.1)
7.	Malaria during pregnancy can cause maternal mortality.	145(34.5)	275(65.5)
8.	Anaemia in pregnancy can cause death of mothers.	192(45.7)	228(54.3)
9.	Excessive thickening of the heart muscle can cause maternal death.	173(41.2)	247(58.8)
10.	Domestic accident such as falls during pregnancy can lead to maternal death.	180(42.9)	240(57.1)
11.	Intimate partner violence especially during pregnancy can cause maternal death.	203(48.3)	217(51.7)
12.	Gestational diabetes mellitus is one of the causes of maternal mortality.	191(45.5)	229(54.5)
13.	Untimely access to maternal health services can lead to maternal death.	193(46.0)	227(54.0)
14.	Delivery by unskilled birth attendants may lead to maternal death.	193(46.0)	227(54.0)
15.	Pre-existing heart disease can cause maternal death	205(48.8)	215(51.2)
16.	Hypertension in pregnancy can cause maternal death.	221(52.6)	199(47.4)
Overall percentage		49.0	51.0

Key for interpretation:

Below 20% = Very low knowledge (VLK), 20 – 39% = Low knowledge (LK), 40 -59% = Average knowledge (AK), 60 – 80% = High knowledge (HK) and 81% and above = Very high knowledge (VHK).

Results in Table 1 showed that overall percentage of CBMs' knowledge of causes of maternal mortality was 49.0 per cent. This implies that childbearing mothers in Owerri Municipal Council possessed, average knowledge that excessive loss of blood during pregnancy and childbirth, termination of pregnancy through unsafe ways, contraction of infection during childbirth, having pre-eclampsia, obstructed labour, malaria, anaemia, domestic accident such as falls, intimate partner violence, untimely access to maternal health service, delivery by unskilled birth attendants, pre-existing heart diseases and hypertension are causes of maternal mortality.

Research question two

What is the knowledge of preventive measures of maternal mortality among childbearing mothers in Owerri Municipal Council? Data answering this research question are contained in table 2.

Table 2: Childbearing Mothers' Knowledge of Preventive Measures of Maternal Mortality (n = 420).

S/n	Items on preventive Measures of maternal mortality	Knowledge responses	
		Yes f (%)	No f (%)
1.	Adequate nutrition before pregnancy can help prevent death of CBMs.	275(65.5)	145(34.5)
2.	Adequate nutrition during pregnancy can help prevent maternal mortality.	303(72.1)	117(27.9)
3.	Having regular moderate exercise during pregnancy is one of the ways of preventing maternal mortality.	251(59.8)	169(40.2)
4.	Delivery under skilled birth attendant is a measure for preventing maternal deaths.	252(60.0)	168(40.0)
5.	Regular and early antenatal care can help prevent maternal mortality.	267(63.6)	153(36.4)
6.	Adequate intake of fruit during pregnancy prevents maternal mortality.	266(63.3)	154(36.7)
7.	Adequate intake of vegetables during pregnancy helps to prevent death of childbearing mothers.	232(55.2)	188(44.8)
Overall percentage		62.7	37.2

Result in Table 2 showed that overall percentage of CBMs knowledge of preventive measures of maternal mortality was 62.7 per cent. This implies that CBMs in Owerri Municipal Council possessed high knowledge that adequate nutrition before and during pregnancy, having regular moderate exercise during pregnancy, delivery under skilled attendants, regular and early antenatal care, adequate intake of fruit and vegetables during pregnancy are preventive measures of maternal mortality.

Research question three

What is the knowledge of causes of maternal mortality among childbearing mothers in Owerri Municipal Council Imo State based on level of education? Data answering this research question are contained in table 3.

Table 3: Childbearing Mothers' Knowledge of Causes of Maternal Mortality Based on Level of Education (n = 420)

S/n	Items on Causes of maternal mortality	Knowledge responses			
		Non-formal education n = 90 f (%)	Primary education n = 44 f (%)	Secondary education n =156 f (%)	Tertiary Education n = 130 f (%)
1.	Excessive loss of blood during pregnancy can lead to maternal mortality.	22(24.4)	35(79.5)	98(62.8)	122(93.8)
2.	Excessive loss of blood during childbirth can lead to maternal death.	18(20.0)	30(68.2)	89(57.1)	124(95.4)
3.	Termination of pregnancy through unsafe ways can result to the death of a mother.	19(21.1)	29(65.9)	89(67.1)	122(93.8)
4.	Contraction of infection during childbirth can cause death of a childbearing mother	12(13.3)	24(54.5)	78(50.0)	166(81.5)
5.	Having pre-eclampsia during pregnancy can cause maternal death.	7(7.8)	24(54.5)	59(37.8)	91(70.0)

6.	Obstructed labour is one of the causes of maternal mortality.	14(15.6)	23(52.3)	74(47.4)	111(85.4)
7.	Malaria during pregnancy can cause maternal mortality.	4(4.4)	20(45.5)	43(27.6)	78(60.0)
8.	Anaemia in pregnancy can cause death of mothers.	11(12.2)	24(54.5)	63(40.4)	94(72.3)
9.	Excessive thickening of the heart muscle can cause maternal death.	9(10.0)	24(54.5)	57(36.5)	83(63.8)
10.	Domestic accident such as falls during pregnancy can lead to maternal death.	10(11.1)	16(36.4)	60(38.5)	94(72.3)
11.	Intimate partner violence especially during pregnancy can cause maternal death.	18(20.0)	16(36.4)	67(42.9)	102(78.5)
12.	Gestational diabetes mellitus is one of the causes of maternal mortality.	12(13.3)	16(36.4)	64(41.0)	99(76.2)
13.	Untimely access to maternal health services can lead to maternal death.	11(12.2)	14(31.8)	65(41.7)	103(79.2)
14.	Delivery by unskilled birth attendants may lead to maternal death.	11(12.2)	13(29.5)	57(36.5)	112(86.2)
15.	Pre-existing heart disease can cause maternal death	16(16.7)	20(45.5)	72(46.2)	98(75.4)
16.	Hypertension in pregnancy can cause maternal death.	16(17.8)	21(47.7)	78(50.0)	106(81.5)
Overall percentage		14.5	50.0	45.2	79.1

Results in Table 3 showed that overall percentage affirmed that CBMS with non-formal education possessed very low knowledge (14.5%) of causes of maternal mortality, those with primary and secondary education possessed average knowledge (50.0% and 45.2%) respectively while CBMs with tertiary education possessed high knowledge (79.1%) on the same issue.

Research question four

What is the knowledge of preventive measures of maternal mortality among childbearing mothers in Owerri Municipal Council Imo State based on level of education? Data answering this question are contained in table 4

Table 4: Childbearing Mother's Knowledge of Preventive Measures of Maternal Mortality Based on Level of Education (n = 420)

S/n	Items on Preventive Measures of maternal mortality	Knowledge responses			
		Non-formal education n = 90 f (%)	Primary education n = 44 f (%)	Secondary education n = 156 f (%)	Tertiary Education n = 130 f (%)
1.	Adequate nutrition before pregnancy can help prevent death of CBMs.	27(30.0)	32(72.7)	100(64.1)	116(89.4)
2.	Adequate nutrition during pregnancy can help prevent maternal mortality.	33(36.7)	31(70.5)	116(74.4)	123(94.6)
3.	Having regular moderate exercise during pregnancy is one of the ways of preventing maternal mortality.	24(26.7)	25(56.8)	90(57.7)	112(86.2)
4.	Delivery under skilled birth attendant is a measure for preventing maternal deaths.	24(26.7)	24(54.5)	87(55.8)	117(90.0)
5.	Regular and early antenatal care can help prevent maternal mortality.	29(32.2)	27(61.4)	88(56.4)	123(94.6)

6. Adequate intake of fruit during pregnancy prevents maternal mortality.	41(45.6)	25(56.8)	86(55.1)	114(87.7)
7. Adequate intake of vegetables during pregnancy helps to prevent death of childbearing mothers.	46(51.1)	17(38.6)	69(44.2)	100(76.9)
Overall percentage	35.6	58.8	58.2	88.5

Results in Table 4 showed that overall percentage affirmed that CBMs with non-formal education possessed low knowledge (35.6%) of preventive measures of maternal mortality, those with primary and secondary education possessed average knowledge (58.8% and 58.2%) respectively while CBMs with tertiary education possessed very high knowledge (88.5%) on the same issue.

Hypothesis one

There is no significant difference in the knowledge of causes of maternal mortality among childbearing mothers in Owerri Municipal Council of Imo State Based on level of education. Data testing this hypothesis are contained in table 5.

Table 5: Summary of Chi-square Analysis of No Significant Difference on Knowledge of Causes of Maternal Mortality among CBMs Based on Level of Education (n = 420)

Variable	N	Knowledge responses		χ^2	df	P - value
		Yes O(E)	No O(E)			
Non-formal education	90	14(52.1)	76(37.9)	129.770	3	.000
Primary education	44	33(25.5)	11(18.5)			
Secondary education	156	79(90.3)	77(65.7)			
Tertiary education	130	17(75.2)	13(54.8)			

Data in Table 5 showed the chi-square value for the hypothesis of no significant difference in the knowledge of causes of maternal mortality ($\chi^2 = 129.770$, $df = 3$, $p = .000 < .05$). Since the p-value was less than .05 level of significance at 3 degree of freedom, the hypothesis was therefore rejected. This implies that significant difference existed in the knowledge of causes of maternal mortality among childbearing mothers in Owerri Municipal Council based on level of education in Owerri Municipal Council.

Hypothesis two

There is no significant difference in the knowledge of preventive measures of maternal mortality among childbearing mothers in Owerri Municipal Council based on level of Education. Data testing this hypothesis are contained in table 6.

Table 6: Summary of Chi-square Analysis of No Significant Difference on Knowledge of Preventive Measures of Maternal Mortality among CBMs in Owerri Municipal Council based on Level of Education (n = 420)

Variable	N	Knowledge responses		χ^2	df	P - value
		Yes O(E)	No O(E)			
Non-formal education	90	23(55.9)	67(34.1)	119.962	3	.000
Primary education	44	29(27.3)	15(16.7)			
Secondary education	156	84(96.9)	72(59.1)			
Tertiary education	130	125(80.8)	5(49.2)			

Data in Table 6 showed the Chi-square value for the hypothesis of no significant difference in the knowledge of preventive measures of maternal mortality among childbearing mothers based on level of education ($\chi^2 = 119.962$, $df = 3$, $P = .000 < .05$). Since the p-value is less than .05 level of significance at 3 degree of freedom, the hypothesis was therefore rejected. This implies that a significant difference existed in the knowledge of

preventive measures of maternal mortality among childbearing mothers in Owerri Municipal Council based on level of education.

Discussion

The findings of the study in Table 1 showed that CBMS in Owerri Municipal Council possessed average knowledge (49.0%) of causes of maternal mortality. The causes include excessive loss of blood during pregnancy and childbirth, termination of pregnancy through unsafe ways, contraction of infection during childbirth, having pre-eclampsia, hypertension. Obstructed labour, malaria, anaemia, excessive thickening of the heart muscle, and domestic accident during pregnancy and childbirth, gestational diabetes, untimely access to maternal health services, delivery by unskilled birth attendants, pre-existing heart diseases and hypertension. The findings were expected and therefore not surprising because studies have consistently indicated that the aforementioned problems are responsible for maternal mortality. The average knowledge of mothers on the causes of maternal mortality may be due to ignorance.

The findings were in line with the finding of Amoo and Ajayi (2019) who reported that unsafe abortion, anaemia, infection, hypertensive disorders and care rendered by unskilled medical practitioners are causes of maternal mortality. The findings agree with the assertion of Say, Chou, and Gemmiill et al. (2014) that postpartum haemorrhage is a primary cause of nearly one quarter of maternal deaths globally. The findings were in line with the explanation of Audu, Takai and Buker (2010) who reported that globally, maternal infections accounts for about 26.3 per cent of maternal deaths and the second leading cause after haemorrhage. The findings also agree with the finding of Tsigas (2017) who reported that every year nearly 76,000 mothers die as a result of hypertensive disorder in pregnancy.

The findings of the study in table 2 showed that CBMs in Owerri Municipal Council possessed high knowledge (62.7%) of preventive measures of maternal mortality. The preventive measures include: adequate nutrition before and during pregnancy, having regular moderate exercise during pregnancy, delivery under skilled attendant, regular and early antenatal care, adequate intake of fruit and vegetables during pregnancy among others. The findings were not surprising and therefore expected because studies have shown that the measures identified above can help prevent maternal mortality. The findings agree with the explanation of Singh and Choudhary (2009) who reported that adequate nutrition before and during pregnancy has a greater potential for a long term health of both mother and child. Eating well during pregnancy will make the mother to feel better, give her energy, lowers her chances of having health problems and to keep her weight in check. The findings were in line with the assertion of Dana (2012) who reported that eating well during pregnancy can ensure that the baby grows and develops properly, and that the mother experiences fewer complications from pregnancy. The findings were in line with the explanation of Michelle (2011) who reported that exercise during pregnancy lowers the risk of pregnancy complications. Regular exercise during pregnancy may improve sleep, ease and prevent aches and pains like backaches, constipation and varicose veins. The findings also agree with the findings of Mark, Joanne, Grant, Van and Jocelyn (2015) who reported that with regular antenatal care, health care providers can spot health problems early. It also allows for early treatment which can cure many problems and prevent others. The high knowledge of mothers on the preventive measures of maternal mortality may be due to high awareness campaign going on in our society on the preventive measures of maternal mortality.

The finding in table 3 showed that CBMs with non-formal education possessed very low knowledge (14.5%) of causes of maternal mortality, those with primary and secondary education possessed average knowledge (50% and 45.2%) respectively while CBMs with tertiary education possessed high knowledge (79.1%) on the same. The finding in table 5 showed that there was significant difference in the knowledge of causes of maternal mortality among CBMs in Owerri Municipal Council based on level of education. The finding was expected and therefore not surprising because several studies have indicated that maternal education is associated with knowledge of causes of maternal mortality. The findings agree with the findings of Nafiu, Kabir and Adiukwu (2016) who reported that high maternal mortality is associated with low maternal education. The finding is in line with the finding of Amoo and Ajayi (2019) who reported that educational background is a barrier to knowledge acquisition. The findings agree, with the assertion of Adai (2000) who reported that maternal education relate positively with the utilization of maternal health services. The higher a woman's level of education, the more likely she is to utilize maternal health care services, and to take better care of herself which consequently may improve her economic power and ensure a better social and legal status for her. The findings agree with the finding of Rahana, Muhammad, Azhar and Saleem (2011) who reported that educational level had strong association with the occurrence of anaemia and its severity. The findings were also in line with the findings of Dinglas, Lardner, Homchaudhrin, Briggs, Passafaro and Cho (2011) who reported that there was a significant association between

education and number of signs and symptoms of pre-eclampsia. Mothers with no education were seven times more likely to have all six signs and symptoms of pre-eclampsia than those with more years of education.

The finding in table 4 showed that CBMS with non-formal education possessed low knowledge (35.6%) of preventive measures of maternal mortality, those with primary and secondary education possessed average knowledge (58.8% and 58.2%) respectively while CBMs with tertiary education possessed very high knowledge (88.5%) on the same issue. The findings in table 6 showed that there was significant difference in the knowledge of preventive measures of maternal mortality among CBMs in Owerri Municipal Council based on level of education. The findings were expected and therefore not surprising because several studies have indicated that educational level of a woman is a strong determinant of her level of exposure to causes and preventive measures of maternal mortality. The findings agree with the finding of Tomal, Khan, Hossain and Shabuz (2005) who reported that education of mothers and their visit during antenatal period was positively associated with identifying causes of pregnancy problems. The findings agree with the findings of Yar'zever and Said (2013) who reported that knowledge of use of maternal health services was higher among those with formal education than those without formal education.

Conclusion

Based on the findings, the following conclusion were drawn

1. CBMs in Owerri Municipal Council of Imo State possessed average knowledge (49.0%) of causes maternal mortality.
2. CBMs in Owerri Municipal Council possessed high knowledge (62.7%) of preventive measures of maternal mortality.
3. CBMs with non-formal education possessed very low knowledge (14.5%) of causes of maternal mortality, those with primary and secondary education possessed average knowledge (50% and 45.2%) respectively while those with tertiary education possessed high knowledge (79.1%) on the same issue.
4. CBMs with non-formal education possessed low knowledge (35.6%) of preventive measures of maternal mortality, those with primary and secondary education possessed average knowledge (58.8% and 58.2%) respectively while those with tertiary education possessed very high knowledge (88.5%) on the same issue.
5. There were significance differences in the knowledge of causes and preventive measures of maternal mortality among CBMs in Owerri Municipal Council based on level of education.

Recommendations

Based on the findings and conclusion of the study, the following recommendations were made:

1. Government should employ qualified health professionals and provide medical subsidy to ensure that pregnant women get quality care throughout the period of pregnancy and delivery.
2. Federal Ministry of health should collate a list of registered and licensed health care facilities and distributed them accordingly, to ensure that women get medical treatment from the right sources.
3. There is need to educate women on the importance of antenatal visits so that they can have more regular attendance and get informed about safety measures to take during pregnancy and delivery in order to prevent complications and hence reduce maternal mortality.
4. There should be sensitization of woman on the importance of antenatal visit by making free, health services and welfare to mothers so as to reduce high rate of maternal mortality.

References

- Addai, I. (2000). Determinants of use of maternal child health services in rural Ghana. *Journal of Biosocial Sciences*, 32(1).
- Amoo, T. B., & Ajayi, O. S. (2019). Maternal mortality and factors affecting it among pregnant women in Abeokuta South, Nigeria. *Clinical Journal of Obstetrics and Gynaecology*, 071 – 078.
- Audu, B. M., Takai, U. I., & Buker, U. (2010). Trends in maternal mortality at University of Maudguri Teaching Hospital Maiduguri, Nigeria. *A five year Review*, 5(14); 147–151.
- Bitew, S., Katema, S., Worku, M., Hamu, M., & Loha, E. (2013). Knowledge and attitudes of women of childbearing age towards legislation of abortion in Ethiopia. *Journal of Scientific and Innovation Research*, 2 (2); 192 – 203
- Christian, P., Mullany, L. C., Hurley, K. M., Katz, J., & Black, R. E. (2015). Nutrition and maternal, neonatal and child health. *Semi Perinata*, 39, 361 – 372.



- Dinglas, D., Lardner, A., Hormchauduri, C., Briggs, C., Passaforo, M., & Cho, E. (2011). Relationship of reported clinical features of pre-eclampsia and postpartum haemorrhage to demographic and other variables. *West African Journal of Medicine*, 30(2); 84 – 88.
- Endalamaw, M. (2012). *The level of awareness on danger signs of pregnancy and associated factors among ANC attendant pregnant women in Debarb Town, North West Ethiopia*. Accessed from <http://orji-orji/oirj/tmb>.
- Faduyile, F. A., Soyemi, S. S., Emiogum, F. E., & Obafunwa, J. O. (2017). A 10 years autopsy-based study on maternal mortality in Lagos State University Teaching Hospital Lagos. *Nigeria Journal of Clinical Practice*, 20; 131 – 135.
- Fredrick, W., & Chimaraoke, I. (2017). Maternal health in Nigeria. *African Population and Health Research*, 3 (12); 60 – 69.
- Kama, O. Ouch, J., & Mwalili, P. (2019). Maternal mortality: disease and mortality in sub-Saharan Africa. Accessed from <https://www.ncbi.nlm.nih.gov/books/NBK228/>.
- Mark, C. C., Joanne, M. B., Grant, M. G., Van, H. V., & Jocelyn, H. S. (2015). *Prenatal care*. Accessed from <https://www.med.umich.edu/info/FHP/Practiceguide/newpnc/PNC.pdf>.
- Momoh, A. M., Ezegworie, O. J., & Ezeigwe, H. O. (2010). Causes and management of puerperal sepsis: the personal view point. *Advanced Biological Research*, 4(3); 154–158.
- Nafiu, L. A., Kabir, U. K., & Adiukwu, R. N. (2016). Risk factors of maternal mortality in Nigeria. *Pacific Journal of Science and Technology*, 17(2); 310 – 20.
- Obinna, C. (2010). *Malaria: a pregnant woman's enemy*. Vanguard, Feb 19. Accessed from [http://www.vanguardngr.com/2011/02/mania-in-a-pregnant-woman ---](http://www.vanguardngr.com/2011/02/mania-in-a-pregnant-woman---)
- Ogu, R. N., & Ephraim – Emmanuel, B. C. (2018). Prevention of maternal mortality in Nigeria: public health to the rescue. *Journal of Gynaecology and Women's Health*, 10 (1); 1 -4.
- Rahana, S., Muhammad, M. M., Azhar, A. S., & Saleem, A. (2011). Relationship of anaemia during pregnancy with education and trimester in pregnancy. *Medical Forum Monthly. A Journal for all Specialists*, 23(8), 226 – 230.
- Salama, R. (2017). *Modern concepts of prevention in community health*. Egypt: Suez Canal University Press.
- Sanni, F., Udoh, F., Okediji, D., Modo, D., & Ezeh, R. (2012). *The selfish brain: learning from addiction*. Washington D.C.: Halzelden Information Education.
- Say, L., Chou, D., Gemmill, A., Tuncalp, O., Moller, A. B., Daniels, J., Gulmezoglu, A. M., Temmer, M., & Alkema, I. (2014). Global Causes of maternal deaths: a WHO systematic analysis. *Lancet Global Health*, 323 – 333.
- Schantz-Dunn, J., & Nour, N. A. (2009). Malaria and pregnancy. A global health perspective *Journal of Obstetrics and Gynaecology*.
- Silvia, P., Rehka, M., Asuhan, K., & Charles, A. (2010). *Targeting poverty and gender inequality to improve maternal health*. International Centre for Research on women.
- Tisgas, E. (2017). *Pre-eclampsia day: reducing preventable deaths from pre-eclampsia*. Pre-eclampsia Foundation.
- Tomal, J. H., Khan, A., Hossain, M. Z., & Shabuz, M. Z. R. (2005). Factors associated with pregnancy complications during antenatal period: An extended GEE Approach. *Brac University Journal*, 11 (2); 13 – 22.
- Trikha, S. K., & Singh, P. M. (2018). Management of major obstetric haemorrhage. *Indian Journal of Anesthesia*.
- Vikram, S. T. (2019). *Anaemia in pregnancy: the global library of women's medical in university college hospital*. London.
- Wadhwa, L., Gupta, S., & Jain, A. (2013). Demographic and aetiological profile of maternal mortality causes in a tertiary care centre of India. *Journal of Obstetrics and Gynaecology*, 1(1); 46 – 51.