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Predisposing Factors Associated with Preventive Practices of Low Birth weight among Women Living Close to Surface Coal Mines in Okura Region, Kogi State, Nigeria

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Abstract

Low birth weight remains a public health concern especially in developing countries as it is a major contributor to neonatal mortality. Investigations on the problem phenomenon have related proximity to surface coal mining to persistent increase in low birth weight. This was a cross-sectional descriptive study. The population were women attending anti-natal clinic in health facilities in Okura region, Kogi state. One hundred and eighty three participants were recruited for the study. A validated structured interviewer-administered questionnaire was used to collect data on the Knowledge, attitude and prevention practices of the respondents measured. Data was collected using a validated 30-item interviewer questionnaire (reliable coefficient of 0.9). The result showed that the median age of the participants was 31 years and majority (42.1%) had at least secondary school education with 7.1% reporting non-formal education. Result also showed level of knowledge about low birth among the women was low with mean (SD) of 4.03(2.00) eighty seven respondents had negative attitudinal disposition towards low birth weight. The mean (SD) of attitude was 9.6(3.35). The preventive practices of the respondents had an aggregated mean of 10.39 ± 1.41. Generally, in this study, respondents had moderate level of knowledge, attitudinal disposition and preventive practices regarding proximity to coal mining and its effects/consequences. This moderate levels are not good enough as an increase in the predisposing factors (knowledge and attitude) is needed for the development of better practices and solutions in order to prevent/reduce the incidence of low birth weight.

Key words: *Cassia sieberiana,* Phytochemical, Antioxidant, Pharmaceuticals

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Introduction

Low birth weight is a major public health problem that contributes to neonatal mortality worldwide (UNICEF, 2019). Through the years 1990 to 2020 neonatal deaths dropped from 5million to 2.4 million. However, the rate of reduction of neonatal mortality is still slower than post-neonatal mortality (Sander, A., Wauer, R., & WHO. 2020). Low birth weight accounts for almost half of perinatal deaths and about a third of infant deaths.

Globally, it was estimated that more than 20 million newborns, which is equivalent to about 15% of all live births in 2015 were low birth weight babies (UNICEF, 2019). The burden of low birth weight remains skewed towards the Sub-Saharan Region of Africa which accounts for nearly all cases of global low birth weight. This region has recorded an increase in the trend of low birth weight from 4.4 million to 5million babies (UNICEF, 2019). In Nigeria, it is estimated that about 5million children are born with low birth weight (Dahliu, Azahar, Oche, & Aziz, 2016). Several personal, biological, and environmental-level factors have been found to contribute to the incidence of low birth weight. They include Maternal nutritional status, anemia, illnesses during pregnancy, short stature, twin births, smoking, alcohol use and other substance abuse, the availability of prenatal care and exposure to various toxic substances (Hendriks., 2018; Nisha, Raynes-Greenow, Rahman, & Alam, 2019).

Recently, surface coal mining has been identified to have an association with the incidence of low birth weight (Ahern, Mullett, Macka, & Hamilton, 2010; Buttling et al., 2021; Small et al., 2021). A study by Small et al., (2021) found surface mining increased in low birth weight and preterm birth in central Appalachia. Surface coal mining causes air pollution that can interfere with many hormone-driven organs in the body and cause disturbance in their functions (Ritz, Yu, Chapa, and Fruin, 2000). Arsenic, a component of coal when leached into water and soil surface can cross the placenta and accumulate in the fetus (Bloom, Neamtiu, Surdu, Pop, Anastasiu, Appletonm & Gurzau, 2016) thereby, causing complications for pregnancies which includes low birth weight and preterm with the baby's birth (Bloom et al., 2016).

Generally, preventive practices have been put in place to curtail low birth weight among newborns. Studies have shown that good diet during pregnancy, the use of antenatal care before the second trimester, avoidance of smoking and taking of alcohol, and limiting exposure to toxin can reduce low birth weight (Chowdury et al., 2017; Kliegman, Rottman, & Behrman, 1990). In addition, preventive practices have been identified to limit the impacts of surface coal mining on pregnancy such as, staying far away from mining site during pregnancy, washing of raw produce with clean water before consumption, consumption of filtered/purify water to reduce chemical that might have leached into the water. Additionally, Pregnant mother care practices which include the timely habit of seeking prenatal care is a vital factor in reducing low birth weight and adequate information on low birth weight and coal mining activities may motivate pregnant women to engage in preventive behaviors (ACOG Committee, 2021) . However, adherence to these practices remain inadequate and poor, especially in those belonging to the lower socio-economic status and the developing countries of the world (Adigun et al., 2018).

Literature has shown that prevention of low birth weight is associated with maternal level such as maternal age, smoking, educational status, socio-economic status and parity (Micheal, Keith & Juhua 2020). In addition, Chowdgury et al., (2017) reported that poor knowledge of the mother's on low birth weight and its preventive practices can influence birth outcomes. Studies also revealed that mother's practices to prevent low birth weight newborns can be

influenced by their attitudes towards the risk factors for Low birth weight. Furthermore, a study also revealed unawareness of the preventive practices for low birth weight is associated with carrying out Low birth weight preventive practices (Nisha et al., 2019).

Okaba is a residential area in Okura region, Kogi state, Nigeria with highly active coal mining sites and a residential area to many people. Despite the dangers of low birth weight and the effect of living in close proximity to the coal mines in pregnancy, many people inclusive of women of reproductive age continue to live close to the mining sites making them more vulnerable to low birth weight. This could be due to easy access to products from the mines which could serve as source of livelihood (Mishra et al., 2009). People living in close proximity to coal mining sites are often vulnerable to various health challenges including conditions of low birth weight (Ahern et al., 2011). Although several studies (Ahern et al., 2011; Buttling et al., 2021; Small et al., 2021) have sought to identify factors associated with low birth weight, there continue to be dearth of information on the knowledge, attitude and prevention practices of low birth weight among women living close to surface coal mines in Kogi state. In understanding factors that predisposes pregnant mothers to low birth weight preventive practices, the constructs of the IMB theory was utilized in this study to elucidate the problem phenomenon. Thus, this study therefore sought assess the predisposing factors associated with preventive practices towards low birth weight among pregnant women living in this region.

Methodology

Study design and area

A cross sectional descriptive study in Okura, a community in Anpka local government area Kogi East. The study location is in the North central Nigeria with a population of 220,438 as at the 2016 population census. The predominant people are the Igala speaking people of the Kwararafa Empire in North central Nigeria. The region is a major area for coal mining activities in Kogi state and produces about 10.3 million tons yearly. Other occupations of the Okura people are farming, and civil service.

Sample size determination and Sampling

The required sample size was determined using Leslie Kish formula with 5% margin error and 12.3% of population proportion as the prevalence of low birth weight. Moreover, 10% non-response rate was added and the total calculated sample size was 183. The three major health facilities in Okura was purposely selected for this study and a two stage sampling technique was employed in the selection of the participants. In the first stage the participants were distributed in proportions and in the second, the participants were selected using convenience sampling. Inclusion selection criteria of the respondents were pregnant women attending antenatal clinics in Okura region, pregnant women living close to the surface coal mining areas in Okura, Kogi East and pregnant women who were fit to participate in the study. The study excluded men living in Okura, Kogi East, women who live far from the coal mining site and women who were ill, or unfit to participate in the study.

Data collection technique

Following the explanation of the research, confidentiality was assured and consent of the participants was taken. Quantitative data were then collected using a reliable 30-item questionnaire. The variables measured in the study were the socio-demographic characteristics of the pregnant women. This included age, occupation, number of pregnancies, ethnicity, and religion of pregnant mothers. Other variables included the knowledge, attitude and prevention practices of low birth weight among the women living close to the mine. The questionnaire which was originally written in English was translated to Igala language which is the primary language of the respondents.

Measures

The instrument measured knowledge of the others on low birth weight, its risk factors and prevention practices on a dichotomous 8-point rating scale. It also measured the attitudinal disposition of the respondents towards low birth weight, its risk factors and prevention practices using a 4-response type Likert scale ranging from *Strongly Agree, Agree, Disagree, Strongly Disagree*, on a 21-point rating scale. The preventive practices of respondents towards low birth weight was measured on a 4-response type Likert scale ranging from *Always, Occasionally, Rarely, Never* on a 18-point rating scale.

Data analysis

Data from the study were analyzed using SPSS vs. 21. Descriptive statistics was used to analyze the objectives of the study. The association between the independent variable was analyzed using Pearson's correlation. A p value of < 0.05 would be accepted as significant.

Result

Demographic Characteristics of Pregnant women

As shown in Table 1, in the age categories, women between the ages 24-35 (123; 67.3%) dominated the study as data showed that they accounted for more than half of the population. The age group with the least women was ages 17-23 (19; 10.1%). Majority of the women had secondary education (77; 42.1%), followed by those that had tertiary education (70; 38.3%) while 13 (7.1%) had no formal education. In terms of ethnic group distribution, the Igala ethnic group dominated the population (132; 72.1%) despite the mix of ethnic groups like Yoruba, Igbo and Hausa. The Igbo ethnic group accounted for 26 (14.2%) of the women. Also, the table showed the marital status of the study population. Majority of the women were married (164; 89.6%). This was followed by the number of separated and widowed women (8; 4.4%). Women that were divorced accounted for 3 (1.6%). In terms of the number of children, 48 (26.2%) respondents had more than one child and more than half of the respondents (101; 55.2%) reported to have between two to three children. Minority 32 (17.5%) of the women affirmed that they had four to five children. Most of the respondents were traders 65 (35.5%), followed by house wives 50 (27.3%). Few stated that they were teachers 29 (15.8%), civil servants 23 (12.6%) and self-employed 16 (8.7%). Furthermore, about a third of the respondents 61 (33.3%) reported that live not too far from the coal mining area while majority 66 (36.1%) reported that they live very close to the coal mining area.

Table 1: Demographic Characteristics of Pregnant women

VARIABLES	Respondents in this study N= 183	
	Frequency (N)	Percent (%)
Age		
17	1	.5
18	1	.5
19	3	1.6
20	5	2.7
21	1	5
22	5	2.7
23	3	1.6
24	11	6.0
25	7	3.8

26	7	3.8
27	11	6.0
28	12	6.6
29	8	4.4
30	14	7.7
31	12	6.6
32	3	1.6
33	18	9.8
34	8	4.4
35	12	6.6
36	8	4.4
37	8	4.4
38	8	4.4
39	6	3.3
40	7	3.8
41	3	1.6
42	1	.5
Ethnicity		
Yoruba	14	7.7
Igbo	26	14.2
Hausa	10	5.5
Igala	132	72.1
Others	1	.5
Educational Attainment		
Non-formal	13	7.1
Primary	23	12.6
Secondary	77	42.1
Tertiary	70	38.3
Marital Status		
Married	164	89.6
Divorced	3	1.6
Separated	8	4.4
Widowed	8	4.4
Number of children alive		
1	48	26.2
2	55	30.1
3	46	25.1
4	19	10.4
5	13	7.1
6	2	1.1
Occupation		
Civil Servant	23	12.6
Self-employed	16	8.7
Trader	65	35.5
Housewife	50	27.3

Teacher	29	15.8
Distance to coal mining area		
Not too far	56	30.6
Close	61	33.3
Very close	66	36.1

Predisposing factors to low birth weight

Knowledge of Low Birth Weight

Table 2 revealed that majority of the respondents 137 (74.9%) confirmed that low birth weight means giving birth to a baby that weighs less than 2.5kg and 138 (75.4%) reported that low birth weight can be caused by poor nutrition. One hundred and twenty-five (68.3%) respondents reported that a mother's lifestyle can increase the risk of low birth weight while 58 (31.7%) responded to the same statement with a negative response (No). Of the respondents, 163 (89.1%) affirmed that low birth weight can kill a baby and 131 (71.6%) stated that low birth weight cannot make a child have developmental problems. Regarding the knowledge about living close to a coal mining site, 141 (77.0%) stated that this could not result in giving birth to a low weight baby and only about a fifth (16.9%) knew that coal mining emits harmful chemicals that can harm an unborn baby. Among the respondents, 161 (88.0%) stated that attending antenatal care regularly is not essential in preventing low birth weight. Also, 156 (85.2%) didn't know that eating unwashed fruits and vegetables can increase the risk of low birth weight in coal mining areas.

Table 2: Knowledge of Low Birth Weight

Knowledge Variable	**Yes**	**No**
Low birth weight means giving birth to a baby that weighs less than 2.5kg	137(74.9%)	46(25.1%)
Low birth weight can be caused by poor nutrition	138(75.4%)	45(24.6%)
A mother's lifestyle can increase the risk of low birth weight	125(68.3%)	58(31.7%)
Low birth weight cannot kill a newborn baby	20(10.9%)	163(89.1%)
Low birth weight can make a child have developmental problems	52(28.4%)	131(71.6%)
Living close to a coal mining site can increase the risk of giving birth to a low weight baby	42(23.0%)	141(77.0%)
Activities of coal mining has harmful chemical that can harm an unborn child	31(16.9%)	152(83.1%)
Attending antenatal care regularly is essential in preventing low birth weight	22(12.0%)	161(88.0%)

Eating unwashed fruits and vegetables can increase the risk of low birth weight in coal mining areas	27(14.8%)	156(85.2%)

Table 3 showed the level of knowledge among the respondents. The level of knowledge was measured on a 9-point rating scale and the respondents scored a total mean of 4.03 ± 2.00. The knowledge of the respondents was divided into poor (0 – 3), average (4 -6) and good (7 – 9) knowledge. Majority (56.5%) of the respondents fell within the range of average knowledge.

Table 3: Level of knowledge of pregnant women

Knowledge of women

		Mean= 4.03, S.D = 2.00	
Scale	**Score**	Frequency	Percentage (%)
Poor	0 – 3	59	32.1
Average	4 - 6	104	56.5
Good	7 – 9	20	10.9

Attitudinal disposition toward low birth weight

The frequency distribution (See Table 4) for the attitude towards low birth weight and its prevention revealed that out of the 183 pregnant women more than a quarter of the respondents (46.4%) agreed that they were not worried about birthing a low birth weight baby. Ninety-two (50.3%) of the respondents agreed that traditional herb is more effective in making sure their baby is healthy.

About a-third of the participants (25.7%) disagreed that going for antenatal care is very tiring and time-wasting.

Table 4: Descriptive Statistics of attitudinal disposition towards low birth weight

Attitude towards low birth weight and its prevention	**SA**	**A**	**D**	**SD**
From my knowledge of low birth weight, I am not worried about birthing a low birth weight baby	28(15.3%)	85(46.4%)	56(30.6%)	14(7.7%)
I can easily use traditional herbs to ensure my baby is healthy	45(24.6%)	92(50.3%)	43(23.5%)	3(1.6%)
Going for antenatal care is tiring and time-wasting	19(10.4%)	114(62.3%)	47(25.7%)	3(1.6%)
Diet in pregnancy is different from every other person's diet.	68(37.2%)	100(54.6%)	14(7.7%)	1(0.5%)
I am not at more risk of giving birth to a low birth weight baby because I reside close to a mining site,	43(23.5%)	87(47.5%)	51(27.9%)	2(1.1%)
If anybody will be affected by the effect of surface coal mining, it should	40(21.9%)	86(47.0%)	52(28.4%)	5(2.7%)

be me and not my unborn baby				
I do not have to take any precautionary measure to protect my child from low birth weight	17(9.3%)	60(32.8%)	66(36.1%)	40(21.9%)

Level of attitudinal disposition among pregnant

The mean score for attitudinal disposition was 9.6 ± 3.35 on a 21-point reference scale (Table 5). The variable was divided into two categories; negative and positive attitudinal disposition. Most of the respondents, 96(52.6%) had negative attitudinal disposition.

Table 5: Level of attitudinal disposition among pregnant women

Attitudinal Disposition of women	**Mean= 9.60, S.D= 3.35**	
Scale	Frequency	Percentage (%)
Negative	96	52.6
Positive	87	47.4

Prevention practices of low birth weight among women

The frequency distribution (See Table 6) for the prevention practices of low birth weight showed that only 59 (32.2%) always attend antenatal schedules and adhere to all instructions given by health workers while 116 (63.4%) of the respondents occasionally performed this preventive practice. Ninety-six (52.5%) respondents never purified their water before consumption while only 1(0.5%) always purified their water before consuming it. More than half 106 (57.9%) of the respondents reported that they occasionally wash their fruits/vegetables before eating them. Majority 105 (57.4%) of the respondents responded that they occasionally use traditional herbs to ensure that their baby is strong and healthy. Furthermore, when asked about if they stayed far away from the mining site in their condition, 94 (51.4%) responded that they never did while 108 (59.0%) of the participants stated that they ensured the cleanliness of their house and surfaces every day.

Table 6: Descriptive Statistics of prevention practices towards low birth weight

Prevention practices of low birth weight among Women	N	R	O	A
I attend all my antenatal schedules and adhere to all instructions I am given by health workers	-	8(4.4%)	116(63.4%)	59(32.2%)
I filter (purify) my water before consumption	96(52.5%)	71(38.8%)	15(8.2%)	1(0.5%)
I wash my fruits/vegetables before eating it	-	26(14.2%)	106(57.9%)	51(27.9%)
I use traditional herbs to ensure that my baby is strong and healthy	-	2(1.1%)	105(57.4%)	76(41.5%)
I stay far away from the mining site	94(51.4%)	64(35.0%)	23(12.6%)	2(1.1%)
I clean my house and surface of my furniture everyday	-	3(1.6%)	108(59.0%)	72(39.3%)

On an 18-point rating scale (Table 7), the prevention practices of the respondents had an aggregated mean of 10.39 ± 1.41. The prevention practices of the respondents was divided into poor (0 – 6), average (7- 12) and good (13 -18). A high proportion of respondents (88.6%) had average prevention practices

Table7: Level of prevention practices among pregnant women

Variable	Score	Frequency	Percentage	Mean	S.D
Poor	0 – 6	54	29.5		
Average	7 – 12	113	61.7	10.39	1.41
Good	13 – 18	16	8.7		

Discussion of findings

This research employed a cross-sectional study to understand how knowledge and attitude influence low birth weight prevention practices among women living close to surface mines in Okura region, Kogi State.

The study showed that the majority (74.9%) of the participants knew that a newborn with birth weight less than 2.5kg has a low birth weight. This is similar to findings of a study by Chowdury et al (2017) who found that majority of the respondents had knowledge about low birth weight. When assessed on the causes of low birth weight, majority of the respondents reported poor nutrition and lifestyle of mothers can cause low birth weight. However, respondents didn't know that low birth weight could kill a baby or cause developmental problem. This may be

attributed to the fact that many of the women do not always attend antenatal sessions where they might have gotten more detailed information on low birth weight and its risk factors. Furthermore, majority of the respondents do not know that living in close proximity to coal mining sites puts them more at risk of low birthweight. The effect of low birthweight in coal mining sites may have not been elucidated to respondents. This reiterates the need to create awareness of the implications of living in coal mining sites during pregnancy. Overall, the study found no significant relationship between knowledge and prevention practices (r = -0.024, p value > 0.05).

Findings from the study showed that majority of the pregnant women had negative attitude towards low birth weight and its prevention practices. More than average of the respondents reported not being worried about low birth weight. When assessed about their attitude about the use of traditional herbs, more than two third of the respondents felt that the use of herbal concoctions make their children healthy. This is similar to the findings of Nwaiwu and Oyelade (2016) who reported that 100% of their participants believed in the self-efficacy of herbal concoctions for their neonates and children. This may be the reason for the results of the findings of the use of herbal concoctions as majority of the participants employs its use. Antenatal sessions is a very important aspect of care for the unborn and mother. Findings showed that majority of the women (72.3%) found attendance of antenatal sessions tiring and stressful. This may have translated to their poor attendance of antenatal sessions. This is contrary to a study by Ibrahim, Borgy, and Mohammed (2014) who reported that majority of their respondents had a positive attitude towards attending antenatal care and a high percentage (76.4%) attended antenatal sessions. This highlights the need for increasing information that will encourage antenatal session attendance. In addition, respondents also had a negative attitude towards the influence of coal mining on the health of the unborn child. They believed if anyone would be affected by toxins from coal mine they should be the one. The study showed a significant relationship between attitude and prevention practices (r = 0.206, p < 0.05). It is an indicator that in this high risk population, there is a need to tailor interventions to ensure that women develop better attitudes towards low birth weight, its prevention and the risks they are exposed especially because they live close to coal mining sites.

Furthermore, results showed that mothers had average levels of prevention practices. The worse practice among mothers was purification of water before consumption and the best practice was cleaning of surfaces. According to ACOG Committee, mining sites often leave water bodies and raw agricultural produce with deposits of toxic chemicals, thus the need to ensure that water is purified and raw produce like fruits and vegetables washed. This suggests that efforts should be made to ensure that these women have better source of water that is safe for consumption. In addition, majority of the women made use of traditional herbs. This is similar to the findings of Nwaiwu and Oyelade (2016) who reported majority of their participants used herbal concoctions for neonates which can be unsafe for both the mother and child.

Findings of the study indicates that concerted efforts is to be tailored to addressing the predisposing factors and preventive practices of women who live close to coal mining sites to ensure that newborns are at minimal risk of being born with low weight.

Conclusion

Generally, in this study, respondents had a moderate level of knowledge, negative attitudinal disposition and an average level of prevention practices. The moderate/average levels are not good enough as an increase in the predisposing factor (knowledge) is needed for the performance of better prevention practices and solutions in order to prevent/reduce the incidence of low birth weight.

This study therefore conclude that to ensure better health outcomes for newborns in Nigeria, targeted interventions must take into account the health of both the mother and child while improving their quality of life.

Recommendations

Based on the findings of the research, the following recommendations were suggested to reduce the incidence of low birth weight:

1. Mothers should be educated in order to improve their knowledge and prevention practices to reduce/prevent complications.
2. Key and effective interventions are required to reduce the incidence of low birth weight.
3. There is a need to provide further evidence of the exposure pathways linked to increased risk in the exposed populations.
4. Further research is needed to better understand the health impacts and identify policies that can help in sustaining positive initial health impacts of mining projects.

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