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Antenatal Care and Pregnancy Outcomes among Mothers Who Delivered in a Rural Hospital in Nigeria

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Abstract:

Background: Most countries in sub-Saharan Africa are faced with high levels of maternal and infant mortality. The causes of these deaths are mostly preventable through proper care during pregnancy. This care offered during antenatal visits is a public health intervention made available to women during pregnancy to ensure a positive pregnancy outcome while the mother remains healthy.

Aim: The aim of the research is to determine the association between antenatal care attendance and pregnancy outcome and the predictors of baby's birth outcome in a rural hospital in Nigeria.

Methodology: A retrospective cohort study design was used to answer the research question. This is a non-experimental study design that utilises available secondary data obtained routinely in the health facility in the year 2013. IBM SPSS statistical software version 21 was used for statistical analysis. Summary measures were used to describe the study population. Chi squared test was used to establish the association between antenatal care and pregnancy outcomes. Multivariate linear regression model was used to determine the predictors of baby's birth weight, while logistic regression model was used to ascertain the predictors of baby's APGAR score

Findings: 680 records of delivery were analysed. The mean age of women who delivered in the health facility was 24.89 ±5.77 years. A statistically significant association exist between antenatal care and baby's birth outcome ($p= 0.014$), as well as between antenatal care and baby's birth weight ($p= 0.017$). Mother's age ($p= 0.000$, 95% CI 0.005 to 0.017) and booking status ($p= 0.016$, 95% CI -0.205 to -0.021) were significantly associated with baby's weight at delivery. Mothers' age (OR 0.959, 95% CI 0.923 to 0.997) was significantly associated with baby's APGAR score, just as being a student (OR 0.115, 95% CI 0.014 to 0.922) and being booked for antenatal care (OR 0.337, 95% CI 0.150 to 0.756) were significant in predicting baby's birth outcome.

Conclusion: Antenatal care has a positive association with pregnancy outcomes in this setting. Hopefully, the findings of this study will help stakeholders and policy makers recognise the importance of antenatal care on pregnancy outcomes and view antenatal care as a means of attaining the Sustainable Development Goals.

Keywords: Antenatal care, Pregnancy outcome, Delivery, Rural hospital, Nigeria

1. Introduction

Most countries in sub-Saharan Africa are faced with high levels of maternal and infant mortality. The causes of these deaths are mostly preventable through proper care during pregnancy. This care is made up of a series of organized components of reproductive health called antenatal or prenatal care. Antenatal care (ANC) is a public health intervention made available to women during pregnancy to ensure a positive pregnancy outcome while the mother remains healthy^{1, 2}.

Antenatal care visits give health professionals the opportunity to assess the risk involved in the pregnancy in order to put measures in place to reduce any negative outcome that may arise during pregnancy, delivery or after delivery. In developing countries, pregnancy is commonly complicated by hypertension, anaemia, malaria, bleeding and premature delivery so antenatal care is essential to detect these conditions early and prevent them³.

As at the year 2006, maternal mortality was estimated at about 350 000 deaths globally with half of them occurring in six countries which includes Nigeria⁴. Maternal mortality in Nigeria is the second highest in the world with death rates estimated at 840/ 100 000 as shown by the 2008 Nigeria Demographic and Health Survey. Maternal health is closely related to child health therefore maternal mortality is a risk for child survival.

As early as the 20th century, nurses and social reformers started antenatal care in the United States of America which led to a reduction of about 40% in mortality during the infancy period that was attributed to antenatal care. This led to about 75% increased uptake in antenatal care in American women by 1980². At about the same period antenatal care was being developed in England through the pioneering work of James Ballantyne in the early part of the 20th century.

Nigeria being a colony of Britain, it was the efforts of two English men Lawson and Stewart between the 1950s and 1960s that brought about the setting up of organized reproductive health services². Despite the benefits of antenatal care especially in poor and under developed countries, these services are not readily available and in some cases when they are available, access to the services have proven difficult because of individual, family and community factors^{1,2,4}.

The World Health Organisation (WHO) in 2001 recommended focus antenatal care model for developing countries, which minimises the number of investigations and clinical visits by women^{5,6}. This model divides women who present at the health facilities for antenatal care into two categories. The first category constitutes of about 75% of women who require only four recommended visits during the duration of their pregnancy, one each in the first and second trimester and two in the third trimester⁷. Women in this category do not usually present with symptoms or pregnancy complications and antenatal care is utilized as an entry point for interventions to improve maternal and child health care and intervention services such as prevention of mother to child transmission (PMTCT) of Human Immunodeficiency Virus (HIV), family planning and contraceptive services are offered^{8,9}. The second category of women make up 25% of antenatal care attendance and are considered as high risk and therefore require more frequent visits in order to receive more specialist care, additional evaluation or follow up based on their individual needs^{7,10}.

It is globally accepted by the scientific community that antenatal care has a positive effect on pregnancy outcome through the early detection and prompt treatment of complications or by identification and/ or modification of risk factors identified during such care^{11,12,13}. Findings have shown that ANC affords health workers the opportunity to identify mothers at risk of adverse pregnancy outcomes such as preterm delivery or growth retarded babies and to provide health educational, nutritional and medical services to reduce the risk^{14,15}. When ANC is started early in pregnancy, it has a tendency to influence some socio-demographic variables to have favourable pregnancy outcomes^{11,12,13,15}. This is achieved through its positive influence in reversing the triad of ignorance, disease and poverty. Despite these, the effectiveness of antenatal care as an intervention in improving adverse pregnancy outcome is still not clear^{13,16-20}. There is a difference in antenatal care provided in the western countries as opposed to that provided in the developing countries. Whereas in the developed countries women book early, have more visits and attendance rate is nearly 100%, same cannot be said of the developing countries where it varies in terms of quality and quantity of care¹⁴ and pregnancy outcome is usually directly related to the care provided during ANC visits^{13,14}.

Recent Randomized Controlled Trials (RCTs) that evaluated antenatal care programmes were carried out in three different locations in Zimbabwe, London and Colorado. In the trial conducted in Colorado²¹ 2764 low risk women were randomized into an experimental group who had nine scheduled ANC visits and a control group who had 14 or more ANC visits based on their needs. Findings from the intention to treat analysis showed no significant difference between the groups in terms of pregnancy outcomes like low birth weight, caesarean section rates, pre-eclampsia and preterm delivery. Likewise, no difference was observed in terms of quality of ANC and women's satisfaction with services.

The second RCT was conducted in London,²² 2794 women were randomly allocated into a traditional or new model group. The traditional group had 13 ANC visits, while in the new model group, nulliparous women had six visits to seven visits done by multiparous women. Results showed no significant difference in the clinical outcome and caesarean section rates between the two groups. However, in the new model group women complained of fewer number of visits and inadequate time to talk and be listened to during visits.

The trial conducted in Zimbabwe²⁰ was in seven primary care clinics. Three of the clinics with 6138 women booked for antenatal care were randomly allocated into standard care, while four of the clinics with 9394 women enrolled were allocated to a new treatment programme. The new programme consisted of fewer but more focussed antenatal visits with less procedures. Findings showed four median number of visits in the new programme compared with six visits for the traditional. The new visit also had significantly fewer antenatal referrals and preterm delivery. Other pregnancy outcomes showed no significant difference between the groups.

These RCTs showed that it is not just attendance at antenatal or the number of visits made that determines pregnancy outcomes, rather how good activities with proven efficacy are implemented. This should form the basis for planning and implementing antenatal care services.

Based on information from the literature reviewed, it is clear that certain factors act as possible confounders between antenatal care and birth outcomes. These factors were looked at with a view to understanding their roles. This literature review showed the relationship between antenatal care and pregnancy outcomes. However, there are no studies which have considered the relationship between attendance/ number of ANC visits and birth outcomes while controlling for other factors.

This research is useful because delay or lack of antenatal care may have an untoward consequence on pregnancy both to the mother and unborn baby. No such research has been carried out in North Central Nigeria and the little documented work done in Africa was not in standard hospital settings where delivery is conducted by skilled manpower so that all mothers could be assessed under similar conditions.

The outcome of the research would be useful to policy makers and relevant stake holders who plan maternal and child health programs in Nigeria so that emphasis will not only be placed on whether women had antenatal care or the number of visits they made during pregnancy alone, but also implementing activities with proven efficacy during such visits. Research findings would help the federal government through its relevant agencies to formulate policies that could lead to improving maternal health and reducing childhood mortality which would improve the health related Sustainable Development Goals.

The main objectives of the research are to determine the prevalence of antenatal care attendance among women who delivered at Comprehensive Health Centre, Gindiri, their pregnancy outcome and the association between antenatal care and pregnancy outcome

2. Methodology

Nigeria is located in the sub-Saharan region of Africa with a population estimate of over 160 million people in 2010 making it the seventh most populous country in the world²³. It is divided into six geo-political zones with 36 states and the federal capital territory, Abuja.

The geo-political zones divide Nigeria into Northern Nigeria made up of North central, North east and North West zones, and southern Nigeria made up of South west, South and South east zones. Women in the southern zone of the country are predominantly Christians and more economically endowed and better educated than their northern counterparts who are predominantly Muslims, still bound by cultural norms that encourages early marriage and high parity with little autonomy. Since employment, higher educational level and autonomy have been associated with better reproductive health outcomes, women from the southern zones therefore enjoy better health outcomes than those from the northern zones²⁴.

Despite a rich abundance of natural and agricultural resources, over 70% of the Nigerian population live below the poverty line. The Gross Domestic Product is 289.9 billion USD but only 5% is allocated to health²⁵. Most of the health expenditure is out of pocket with a regressive and inequitable health financing system.

Nigeria has a density of 16 midwives per 10 000 population and a doctor density of 4 doctors per 10 000 population which falls short of the World Health Organization (WHO) minimum threshold of 23 doctors, midwives and nurses per 10 000 population²⁶. Most of the skilled health man power have moved to developed countries in search of greener pastures and those who remain concentrate in the urban areas to the detriment of the rural areas which has more than half of the country's population. This has left a critical health workers' void in the rural areas which is where this study is set.

2.1. Study Design

This is a retrospective cohort study that utilised routinely collected data to look at the relationship between antenatal care visits and pregnancy outcomes in a health facility in Nigeria. Quantitative study design was chosen in order to address the objectives of the study which sought to know the prevalence of antenatal care among women who delivered at the health facility, their pregnancy outcomes, factors that determine pregnancy outcome among them and the strength of association using statistical methods.

The primary pregnancy outcome measure (dependent variable) is the baby's weight at birth, while secondary outcomes were APGAR score and pregnancy outcomes (Alive/ Death). The independent variables were maternal age, educational level, booking status, number of ANC visits, mother's weight, mother's height and parity.

These variables were selected because they were found to be associated with pregnancy outcome in other related studies. Other variables routinely collected in the health facility were also used in the analysis.

2.2. Sample Size and Sampling Criteria

All available records of delivery in the year 2013 were assessed. A data extraction form was used to extract relevant information from the register. The data was then entered into a spread sheet in Microsoft excel and cleaned.

The sample includes women who delivered in the health facility between 1st January and 31st December 2013 whose antenatal and delivery records were available in the register. Women whose delivery records are incomplete (especially when the outcome variables are missing) were excluded. Likewise, women with multiple gestation, preterm and post term deliveries were excluded from the study. The data was cleaned and transferred into formats that are suitable for statistical analysis.

Subsequently, total number of antenatal visits by booked and unbooked women was recorded from discrete to ordinal variables as none, inadequate and adequate visits according to WHO criteria^{27, 28}. Mother's parity was recoded from discrete variable into categorical variable as primigravida (primip), multigravida (multip) and grand multiparous (grand multip). Distance to health facility was coded from being a continuous variable into a binary variable as near and far based on WHO criteria. Birth weight was also transformed from continuous variable to a binary variable using 2.5kg as the cut-off point. Babies weighing < 2.5kg at birth were coded as low birth weight while those weighing \geq 2.5kg were coded as others for normal and obese babies.

The data obtained was entered into IBM SPSS statistical software version 21 which was used for statistical analysis. Summary measures were used to describe the study population. Mean and standard deviation was used for normally distributed continuous variables, while median and inter quartile range were used for skewed continuous variables. Categorical variables were described using proportions and percentages. Tables, graphs and charts were also used to describe and project variables when necessary.

Association between socio-demographic variables and other variables that affect pregnancy outcome were determined using chi squared test for categorical variables. Association between birth weight and other variables was determined using linear regression. Multiple regression was used to see how different variables interact with each other to affect the outcome. Statistics significance was set at \leq 0.05 level.

3. Findings

3.1. Baseline Characteristics of Participants

Table 1 shows the baseline characteristics of participants. Of the 680 antenatal and delivery records analysed in this study, the mean age of women who delivered at the health facility was 24.89 ± 5.77 years.

Most of them, 665 (97.8%) were married, 59.0% had no formal education, 9.2% had primary education, and 19.0% had secondary education. Most women (69.8%) who delivered in the health facility were full time house wives, while 83.8% of mothers stayed close to the health facility. Most (93.5%) had a spontaneous vaginal delivery, while 6.5% were delivered by caesarean section.

Analysis of the outcome variables showed that 95.9% of the babies were delivered alive, 86.8% had a normal APGAR score at birth and 5.5% of the babies had low birth weight at delivery.

3.2. Antenatal Care and Socio- Demographic Variables/ Birth Outcomes

The association between antenatal care in relationship to some socio- demographic variables and birth outcomes was established (table 2). Overall 107 (15.8%) of participants did not register or had any antenatal care, while 570 (84.2%) registered and had antenatal care during pregnancy. Of the 520 participants who had antenatal care, 320 (47.3%) had adequate, while 250 (36.9%) had inadequate number of visits.

Attendance for antenatal care was more among married than single mothers. Nearly half (47.6%) of married women had adequate number of antenatal visits, although marital status was not significantly associated with antenatal care ($p = 0.160$).

Those with no formal education had the highest frequency among participants with 173 (44.2%) of them having had adequate antenatal care. Of the other educational groups, 27 (44.3%), 69 (54.8%) and 44 (51.8%) of those who had primary, secondary and tertiary levels of education respectively had adequate antenatal care visits, however, relationship between antenatal care and educational status is not statistically significant ($p = 0.346$).

Among the occupational groups, full time housewives had the highest frequency among the participants although the relationship between antenatal care visits and occupation is not statistically significant ($p = 0.242$). 218 (46.4%) of housewives, 9 (33.3%) of traders, 22 (59.2%) of tailors, 38 (47.5%) of students, 18 (56.3%) of teachers and 9 (50.0%) of civil servants among participants had adequate antenatal care.

When compared with the pregnancy outcomes, antenatal care had a statistically significant relationship with baby's birth outcome ($p = 0.014$) and baby's birth weight ($p = 0.017$). However, relationship between antenatal care and baby's APGAR score among study participants was not statistically significant ($p = 0.618$).

3.3. Risk Factors for Babies' Birth Outcome

Out of the 680 participants included in the analysis, 652 (95.9%) were delivered of live babies, while 28 (4.15) had their babies' dead.

Univariate analysis (logistic regression)

Each individual factor was analysed singly. At the univariate level, only mothers' occupation and booking status were significantly associated with baby's birth outcome (table 3).

Being a student (odds ratio 0.115, 95% CI 0.014 to 0.922) suggests that students have a 15% likelihood of not having a live baby compared to other occupations. Also, being booked for ANC (odds ratio 0.337, 95% CI 0.150 to 0.756) suggests that booked mothers are 37 times less likely to have a still birth babies compared with unbooked mothers.

Multivariate model using logistic regression

All the variables were included in a multivariate analysis. After adjusting for all variables, only mothers who booked for antenatal care, $p = 0.015$ (CI of 0.146 to 0.810) was significantly associated with baby's birth outcome (table 7).

Only being a student (odds ratio 0.115, 95% CI 0.014 to 0.922) and being booked for antenatal care (odds ratio 0.337, 95% CI 0.150 to 0.756) were predictors of baby's birth outcome.

However, taking other factors into consideration, only being booked for antenatal care was a predictor of baby's birth outcome.

4. Discussions

The study retrieved data from 600 women who delivered at the Comprehensive Health Centre, Gindiri in North Central Nigeria from 1st January to 31st December 2013.

Of these, 557 (82.6%) were booked for antenatal care, 117 (17.4%) were not. 250 (36.9%) had inadequate antenatal care visits while 320 (47.35) had adequate visits.

The dependent variables were the women's pregnancy outcomes namely baby's birth weight, baby's APGAR scores at 1- minute of birth and baby's birth outcome. The independent variables included: mothers age, marital status and occupation. Others are highest level of education attained by mothers, distance from their homes to the health facility and whether or not they booked for antenatal care.

APGAR score was recoded from discrete to binary variable as being good or poor (low). Birth weight was also recoded from continuous to binary variable as LBW or others (normal birth weight, over weight, etc.).

Persons chi squared test was used to establish the association between antenatal care and pregnancy outcomes. A statistically significant association exists between antenatal care and baby's birth outcome, as well as between antenatal care and baby's birth weight.

Logistic regression model was again used to ascertain the predictors of baby's birth outcome. The findings showed that being a student and being booked for antenatal care were significant in predicting baby's birth outcome. However, in adjusting for other variables only being booked for antenatal care was statistically significant, thus suggesting that being booked for antenatal care is the strongest predictor of baby's birth outcome.

Findings from the study showed that the prevalence of antenatal care among women who delivered at the health facility is 82.6%. These findings corroborate previous research in Nigeria which reported 83.4%²⁹. Other studies from developing countries reported similar prevalence, Owolabi et al reported 87%³⁰, Chigbu et al 71%³¹, while studies in Kenya reported 76% - 92%^{32,33}. However, this finding is not in agreement with findings in the Nigeria Demographic and Health Survey (2008)³⁴ which found the prevalence of antenatal care among women at 58% in Nigeria. A study done in Kenya reported a prevalence of 32%³⁵, while another study in India also reported a low prevalence of 33.6%³⁶.

This higher prevalence may be associated with previous research findings which showed that women who attended antenatal care are most likely to deliver in a health facility^{36,37}. Therefore, women who did not book for antenatal care may have delivered outside at home or in other places as is the common practice in northern Nigeria where labour is seen as a test of a woman's strength; it's a symbol of pride for a woman to deliver at home assisted by a traditional birth attendant or older women with experience in childbirth³³.

Furthermore, the study showed that antenatal care has a positive association with pregnancy outcomes. Mothers who had antenatal care are more likely to deliver live babies and less likely to deliver LBW babies. This is in agreement of findings from Stella et al in Nigeria¹⁴ and collaborates previous research done in other parts of the world by Ru- Xin et al³⁸, Ahmed et al³⁹, Adela et al¹³, Stavros et al¹², Lawrence et al³⁷ and Maureen et al⁴⁰ which demonstrates the positive association between antenatal care and pregnancy outcomes.

However, this finding is contrary to a research which did not find an association between antenatal care and pregnancy outcome⁴¹. Perhaps some of the reasons why a positive relationship exists between antenatal care and pregnancy outcomes is due to the behavioural decisions that follow antenatal care attendance. As part of the ANC package, women are routinely given haematinics and anti- malarial. United Nations Children Funds (UNICEF) and WHO also introduced distribution of Insecticide Treated Nets to women at antenatal clinics. These privileges are offered to these women who are mainly full time housewives, unskilled and from low socio-economic backgrounds at no cost, and they are not likely to get them outside the health facility. They therefore look forward to attending these clinics because of the incentives they will likely benefit from. These women are therefore, less likely to suffer from anaemia or malaria in pregnancy and other complications which may affect pregnancy outcomes negatively.

As explained earlier, women who attend ANC are likely going to deliver in a health facility under skilled attendance, thereby re-enforcing the benefits of antenatal care. Booking for antenatal care which was found in this study to be the strongest predictor of birth outcomes, therefore, could be an important intervention in improving pregnancy outcomes in Nigeria and other developing countries.

5. Strengths and Limitations of Study

This research work used routinely collected data from a health facility which has not been used before. This makes it novel, looking at things that were not analysed before in this settings.

Perhaps due to the retrospective design of the study, it has several limitations: some of the data are missing and some are inappropriately recorded. The number of variables are limited as only those recorded are available and some cannot be analysed. This limited size of the data and settings of the research makes it not generalizable to other parts of Nigeria or Africa. For example, it will have been interesting to get information on their gestational age at booking and their socio- economic status. Likewise, this being a hospital based study does not access the true practice of Gindiri people who due to their cultural bias have a preference for home delivery.

This research not being funded had limited budget, larger database of the hospital could not be assessed, thereby limiting the statistical analysis that could be done. For example, it would have been nice to see how the breakdown of antenatal care visits into none, inadequate and adequate relates to pregnancy outcomes and other variables which was not done because of the small sample size.

6. Conclusion

The major objectives of the research are to determine the prevalence of antenatal care among women that delivered in a rural health facility in Nigeria and the relationship between antenatal care and pregnancy outcomes. Antenatal care was found to be 82% and has a positive association with pregnancy outcomes in this settings.

Hopefully, the findings of this study will help stakeholders and policy makers recognise the importance of antenatal care on pregnancy outcomes and view antenatal care as a means of attaining the Sustainable Development Goals.

7. Recommendation

Despite the relatively high prevalence of antenatal care found in this study, efforts should be made to ensure that all pregnant women book and receive care during pregnancy to reduce the unacceptably high maternal and perinatal mortality in Nigeria.

Traditional birth attendants should be incorporated in the campaign to educate and encourage women to come for antenatal care during pregnancy since they are seen as important members of the community whose views on health issues are taken highly.

The management of Jos University Teaching hospital and Nigerian government should make antenatal care services available and affordable in order to remove all barriers that militate against its utilization.

Finally, future research should go beyond quantifying the number of antenatal visits and relating it with pregnancy outcomes. An instrument should be developed to measure the quality of antenatal care so that emphasis shall be placed on contents and not mere number of ANC visits.

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Annexure

Variables	Number (Percentage) of participants	
Age (years) 24.89 ± 5.77		
Marital Status		
Single	15	(2.2)
Married	665	(97.8)
Highest Level of Education		
None	392	(59.0)
Primary	61	(9.2)
Secondary	126	(19.0)
Tertiary	85	(12.8)
Occupation		
House wife	473	(69.8)
Business/ Trader	27	(4.0)
Tailoring	37	(5.5)
Student	80	(11.8)
Teacher	32	(4.7)
Civil Servant	18	(2.7)
Others	11	(1.6)
Booking Status		
Booked	557	(82.6)
Not Booked	117	(17.4)
Distance to Health Facility		
Near	569	(83.8)
Far	110	(16.2)
Number of ANC attended		
None (0)	107	(15.8)
Inadequate (1-3)	250	(36.9)
Adequate (≥ 4)	320	(47.3)
APGAR Score		
Low	90	(13.2)
Normal	591	(86.8)
Baby's birth outcome		
Alive	652	(95.9)
Death	28	(4.1)
Baby's Birth Weight		
Low Birth Weight (LBW)	37	(5.5)
Others (Normal/ Overweight)	639	(94.5)

Table 1: Demographic variables of Patients that delivered in Health Facility

Variables	None N (%)	Inadequate N (%)	Adequate N (%)	X ²	df	p-value
Marital Status						
Single	5 (33.3)	5 (33.3)	5 (33.3)	3.666	2	0.160
Married	102 (15.4)	245 (37.0)	315 (47.6)			
Highest Level of Education						
None	79 (20.2)	139 (35.5)	173 (44.2)	20.585	2	0.002
Primary	11 (18.0)	23 (37.7)	27 (44.3)			
Secondary	12 (9.5)	45 (35.7)	69 (54.8)			
Tertiary	3 (3.5)	38 (44.7)	44 (51.8)			
Occupation						
Housewife	83 (17.7)	169 (36.0)	218 (46.4)	14.993	12	0.242
Business/ Trader	6 (22.2)	12 (44.4)	9 (33.3)			
Tailor	5 (13.5)	10 (27.0)	22 (59.5)			
Student	11 (13.8)	31 (38.8)	38 (47.5)			
Teacher	0 (0.0)	14 (43.8)	18 (56.3)			
Civil Servant	1 (5.6)	8 (44.4)	9 (50.0)			
Others	1 (5.6)	6 (54.5)	4 (36.4)			
Baby's birth outcome						
Alive	99 (15.3)	236 (36.4)	314 (48.4)	8.489	2	0.014
Death	8 (28.6)	14 (50.0)	6 (21.4)			
Baby's birth weight						
LBW	12 (32.4)	12 (32.4)	13 (35.1)	8.155	2	0.017
Others	95 (14.9)	236 (37.1)	305 (48.0)			

Table 2: Antenatal care in relation to pregnancy outcomes and socio- demographic variables

Predictor	Coefficient	P- value	Odds ratio (Exp β) (95% CI)
Age in years	-0.003		0.923 0.997 (0.993 to 1.065)
Marital Status			
Single	Reference		
Married	-18.078	0.999	0.000 (0.000)
Occupation			
Housewife	-1.516	0.062	0.220 (0.045 to 1.077)
Business/ Trader		-19.699	0.998 0.000 (0.000)
Tailor	-1.358	0.203	0.257 (0.032 to 2.084)
Student	-2.159	0.042	0.115 (0.014 to 0.922)
Teacher	-19.699	0.998	0.000 (0.000)
Civil Servant	-19.699	0.998	0.000 (0.000)
Others	Reference		
Highest Level of Education			
None	0.854	0.255	2.349 (0.540 to 10.214)
Primary	-0.369	0.766	0.692 (0.061 to 7.804)
Secondary	-0.401	0.691	0.669 (0.092 to 4.846)
Tertiary	Reference		
Distance to Health Facility	0.024	0.186	1.024 (0.989 to 1.060)
Booking Status			
Booked	-1.088	0.008	0.337 (0.150 to 0.756)
Unbooked	Reference		

Table 3: Individual factors that affects babies birth outcome

Predictor	Coefficient	P- value	Odds ratio (Exp β) (95% CI)
Age in years	-0.019	0.617	0.982 (0.913 to 1.056)
Marital Status			
Single	Reference		
Married	-17.785	0.999	0.000 (0.000)
Occupation			
Housewife	-01.223	0.312	0.294 (0.027 to 3.160)
Business/ Trader	-19.447	0.998	0.000 (0.000)
Tailor	-0.853	0.540	0.426 (0.069 to 8.252)
Student	-1.305	0.337	0.271 (0.019 to 3.886)
Teacher	-19.115	0.998	0.000 (0.000)
Civil Servant	0.980	0.998	0.000 (0.000)
Others			
Highest Level of Education			
None	-0.074	0.948	0.929 (0.100 to 8.646)
Primary	-1.177	0.435	0.308 (0.160 to 5.902)
Secondary	-0.930	0.421	0.395 (0.410 to 3.799)
Tertiary	Reference		
Distance to Health Facility	0.029	0.163	1.029 (0.988 to 1.072)
Booking Status			
Booked	-1.069	0.015	0.344 (0.146 to 0.810)
Unbooked	Reference		

Table 4: Summary of multivariate logistic regression, adjusting for covariates