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Determinants of birth weight: a retrospective analysis at the University of Cape Coast Hospital

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Abstract

Background: Although birth weight continues to be a key factor in determining the future physical and mental development of children, there is little surveillance data, especially in low-income settings where the incidence of low birth weight remains high. This present study aims to examine and model the probable association between maternal obstetric and socio-demographic factors and the birth weight of newborns born to mothers delivering at the University of Cape Coast Hospital in the Central Region of Ghana.

Materials and methods: This cross-sectional retrospective study analyzed birth records of 1030 deliveries at the Maternity Ward of the University of Cape Coast Hospital for the period of November 2020 through March 2022. The census sampling technique was used. The multiple linear regression method was used to model the association. Data were processed using *SPSS v 22* and *EViews 12* software packages.

Results: A total of 539 (52.33%) male and 491 (47.67%) female neonates were in the study sample. The mean birth weight was 3.21 kg [SD = .5 kg]. Low birth weight prevalence was 5.5%. Male newborns (3.24 kg) were significantly heavier ($p < .001$) than the females (3.18 kg). The best-fit model on the association between newborn birth weight (BW) and maternal obstetric and socio-demographic factors was: BW = 2.988 - .112Gender + .077Tertiary education + .042Sulphadoxine-pyrimethamine (IPTp-SP) dose + .039Parity + .113Gestation.

Conclusion: Public health interventions aimed at improving birth weight should focus on encouraging women education, preventing preterm deliveries and increasing uptake of Sulphadoxine-pyrimethamine prophylaxis against malaria.

Keywords: association, birth weight, maternal factors, Cape Coast

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Introduction

Birth weight is a critical indicator of morbidity and mortality throughout childhood and adulthood stages of human development [1]. It serves as a key anthropometric index reflecting both physical and mental health outcomes in children [2]. Researchers in epidemiology have strongly indicated that the birth weight of a newborn is a precursor to the potential development of the newborn. Studies have shown that the weight of a baby at birth is strongly associated with the risk of mortality in the first year, childhood developmental problems, and the risk of various diseases in adulthood [3]. According to the World Health Organization (WHO), newborns are categorized by birth weight into three main groups: high, normal, and low [4]. The high and low categories are considered abnormal and therefore require special attention and treatment for their survival after birth. Hence, newborns weighing 4.0kg and above are considered high birth weight or macrosomia babies, those weighing 2.5kg to less than 4.0kg are considered normal birth weight whereas those weighing below 2.5kg are classified as low birth weight (LBW) babies [5]. Despite global efforts to reduce the prevalence of low birth weight and improve maternal and child healthcare, many countries in sub-Saharan Africa, including Ghana and Nigeria, continue to report significant rates of LBW [6].

Several studies have demonstrated an association between birthweight and socio-demographic and/or maternal factors [7-10]. Such associations have been found between birth weight and maternal BMI [8], education, residence, and antenatal care visits[7] and maternal smoking [10]. In Ghana, representative studies on the association of birth weight and socio-demographic and maternal factors were conducted in some specific areas and selected facilities in the country, with only a few being conducted in the central region of Ghana [9,11]. Also, a previous study by Prah et al.[9] conducted in the same setting established empirical support for the link between low birth weight and some maternal factors. Health authorities in this region have introduced many interventions in the past five years to improve maternal health indicators, including birth weight. These interventions have included training on safe motherhood for midwives, doctors, and anaesthetists. There is a need to determine if these interventions have impacted birthweight and its maternal determinants, and to provide surveillance data that reveals factors that continue to significantly affect the birth weight of newborns.

This study aimed to examine and model the probable association between maternal obstetric and socio-demographic factors and the birth weight of babies born at the University of Cape Coast Hospital in the Central Region of Ghana.

Materials and Methods

Study setting

The study was conducted at the University of Cape Coast, a public institution located in Cape Coast, Central Region, Ghana. The university is uniquely positioned on a hill overlooking the Gulf of Guinea. The University of Cape Coast Hospital serves the healthcare needs of the university community and surrounding areas. It offers year-round specialist services in obstetrics and gynecology, including comprehensive antenatal and postnatal care.

Study design and duration

This was a retrospective cross-sectional study carried out in April 2022. It reviewed birth records from the University Hospital's Maternity Ward over a 17-month period, from November 2020 through March 2022. The choice of this design was driven by the need to assess patterns in birth weight without the logistical complexities of prospective cohort studies.

Study population, sample, and data source

The study population included all birth records of mothers who were delivered at the maternity ward of the university hospital for the period of November 2020 through March 2022. Data on neonates and maternal obstetric and socio-demographic factors were retrieved. Data were subjected to rigorous quality checking. Data were retrieved from the delivery register of the maternity ward of the hospital. All birth records in the hospital for the specified period were 1,397 and were all considered for analysis. However, after excluding records which were potential sources of bias, the analysis was finally conducted on a sample of 1,030 remaining birth records.

Potential sources of bias

Birth weight is known to be affected by maternal medical conditions such as sickle cell disease, severe anaemia, HIV and hypertensive disorders of pregnancy which may lead to low birth weight. Whilst maternal pre-gestational and gestational diabetes usually lead to high birth weight babies. Also, multiple pregnancies lead to the birth of babies with smaller weights compared to singleton pregnancies. Fetuses with chromosomal abnormalities may develop abnormal birth weights. In order to address these potential sources of bias, records of all these maternal and fetal conditions were excluded from the study as well as records with missing data.

Study variables

The study design had only one response variable with nine explanatory variables. In this cross-sectional study, the response or dependent variable is a metric scale variable which is the newborn birth weight measured in kilograms (Kg) immediately after the delivery of the baby. The explanatory or independent variables included two dummy variables (gender of baby and locality of mother), one categorical but ordinal variable (maternal educational level), one categorical but nominal variable (maternal occupation), and five metric scale variables: maternal age at delivery, parity, gestation, uptake of Intermittent Preventive Treatment in pregnancy with Sulphadoxine-Pyrimethamine (IPTp-SP), and the number of antenatal care visits.

Statistical analysis

Continuous variables were summarized using means and standard deviations and comparisons between groups were made using the t-tests. Frequencies and percentages were used to summarize categorical variables. The association between babies' weight and maternal obstetric and socio-demographic factors was estimated using multiple linear regression analysis. Adjusted analyses were performed with multivariable linear regression. In dealing with the problem of multicollinearity, the independent variables with a bivariate correlation of more than 0.70 were not included in the multiple regression analysis. The final multiple linear regression model was diagnosed and evaluated for fitness and robustness using a number of indicators and tests. Backward regression analysis was deployed to succinctly eliminate collinear as well as non-significant predictors in the model so as to arrive at the best-fitting model for the data. The data processing was performed using both *EViews 12* and *SPSS v 22* computer software packages. Statistical significance was set at 5% and 95% confidence interval (CI).

Ethical consideration

Ethical approval was obtained from the University of Cape Coast Institutional Review Board (UCCIRB/EXT/2022/03). Additional permission was secured from hospital management. To ensure ethical compliance, privacy, anonymity, and confidentiality were strictly maintained. A coding system replaced personal identifiers, and research staff received training to uphold these standards.

Results

There was a total of 1,397 deliveries during the period under review. After excluding records with missing data (n = 125), maternal medical conditions such as diabetes, pre-eclampsia, HIV, sickle-cell disease, and anaemia (n = 212), and multiple gestations (n = 30), 1,030 records remained available for analysis. A tabular representation of maternal socio-demographic characteristics is displayed in Table 1.

As shown in Table 1 the mean maternal age of the mothers who delivered at the UCC Hospital for the study period was 30.29 years with a standard deviation (SD) of 5.24 years. Twenty-five (2.4%) were teenage mothers, 829 (80.5%) were in the (20–35) year age class, whereas 176 (17.1%) of the mothers were above 35 years of age. In the area of maternal educational status, 21 (2.04%) had no formal education, 26 (2.52%) had primary education, 501 (48.64%) had secondary or high school education, and 482 (46.8%) had tertiary education. Neonatal and Obstetric characteristics of mothers who delivered at the UCC Hospital Maternity Ward for the study period are also presented in Table 2.

As shown in Table 2, a total of 539 (52.33%) male and 491 (47.67%) female neonates were in the study sample. The mean birth weight was 3.21 kg, [SD = .5 kg] for the study period in the given area. Normal birth weight constituted 923 (89.6%) of the newborn population at the facility for the period and about 10% made up for the abnormal birth weight population with a 5.5% prevalence of LBW. Almost all of the women in the study, about 98%, had 4 or more antenatal care visits and 979 (95%) gave birth after 36 weeks of gestation. The mean gestational age at birth was 38.92 (SD = 1.61) weeks. The majority of mothers were para 1-3; 659 (64%), and 257 (25%) were first-time mothers with about 114 (11.1%) of the mothers having 4 or more children. In order to protect and insulate women from getting malaria during pregnancy Intermittent Preventive Treatment with Sulphadoxine-Pyrimethamine (IPTp-SP) doses of up to five (5) times are administered to every pregnant woman in the full course of her pregnancy. However, the study results showed that 229 (22.2%) of the women failed to take the medicine, 128 (12.4%) had between 1-3 doses of the medicine, and 673 (65.3%) of the women who were the majority had ≥ 4 doses of the IPTp-SP medicine.

As shown in Table 3, to approach and examine the maternal obstetric and socio-demographic factors associated with newborn birth weight a multiple linear regression analysis was performed to evaluate the prediction of Birth Weight (BW) from gender of the neonate, maternal educational status, maternal occupation, maternal locality, maternal age, antenatal care visits, iptp-sp dose, maternal parity, and gestation. The regression results revealed maternal educational status, maternal occupation, maternal locality, maternal age, antenatal care visits, and IPTp-SP dose not to be statistically significant predictors of the model ($p > .05$). However, the results of the multiple linear regression analysis revealed a statistically significant association between BW and gender of the neonate, maternal parity, and gestation. The predictors explained 18.10% of the variance and a collective significant effect was found. $F(14, 776) = 12.29$, $p < .001$, $R^2 = .181$. Collinearity statistics indicated the phenomenon existed in the model. Hence, a stepwise regression approach that begins with a full

Table 1. Descriptive statistics of maternal socio-demographic factors at UCC Hospital Maternity Ward for the period of November 2020 through March 2022 (N = 1030)

Background Characteristics	Number	Percentage
Maternal age (completed years)		
< 20	25	2.4
20-35	829	80.5
> 35	176	17.1
Mean (SD)	30.29 (5.24)	
Maternal educational status		
No formal education	21	2.04
Primary education	26	2.52
Secondary/High school	501	48.64
Tertiary	482	46.8
Maternal occupation		
Employed (Gov't/Private)	444	43.11
Trader/Self-employed	442	42.91
Farming	2	0.19
Student	62	6.02
Unemployed	65	6.31
Maternal Locality		
Urban	691	67.09
Rural	339	32.91

Table 2. Descriptive statistics of neonates and obstetric characteristics of mothers delivering at UCC Hospital Maternity Ward for the period of November 2020 through March 2022 (N = 1030)

Background Characteristics	Number	Percentage
Newborn's gender		
Male	539	52.33
Female	491	47.67
Birth weight (kg)		
< 2.5 (LBW)	57	5.5
2.5-4.0 (Normal birth weight)	923	89.6
> 4.0 (HBW) or macrosomia	50	4.9
Mean (SD)	3.21 (0.5)	
Antenatal care visits		
< 5 visits	61	5.9
≥ 5 visits	969	94.1
Gestational age (completed weeks)		
< 28 weeks	2	0.2
28-36 weeks	49	4.8
> 36 weeks	979	95
Mean (SD)	38.92 (1.61)	
Maternal Parity		
First-time mother	257	25
1-3 previous deliveries	659	64
≥ 4 previous deliveries	114	11.1
Number of IPTp-SP doses		
None	229	22.2
1-3 doses	128	12.4
≥ 4 doses	673	65.3

(saturated) model and at each step gradually eliminates variables from the regression model to find a reduced model that best explains the data was deployed. Results of the best fit model derived are shown in Table 4.

The final regression model derived indicated that the significant predictors explained 17.10% of the variance and a collective significant effect was found, $F(5, 785) = 32.32$, $p < .001$, $R^2 = .171$. Collinearity statistics indicated the phenomenon did not exist in the model anymore.

The intercept of the simultaneous multiple linear regression model as shown in Table 3 is given as [β = 2.714, 95% CI (2.402, 3.025), p < .001]. This represents the conditional BW mean of a male neonate whose mother had no formal education, unemployed, was a rural dweller, never attended antenatal care, never received Sulphadoxine-Pyrimethamine (IPTp-SP) dose, and was a first-time mother.

After adjusting for the effect of multicollinearity in the model maternal age, antenatal care visits, and maternal locality all remained insignificant predictors of newborn birth weight.

The final multiple linear regression model as shown in Table 4 had a new intercept value of [β = 2.988, 95% CI (2.838, 3.139), p < .001] which represents the conditional BW mean of a male neonate born to a first-time mother who attained tertiary educational level. This value had fallen at the grand mean of gestational age. Hence, the mathematical representation of the best fit model on the association between birth weight (BW) and maternal obstetric and socio-demographic factors at the University of Cape Coast Hospital in the Central Region of Ghana is given as;

$$\widehat{BW}_i = 2.988 - .122\,Gender_i + .077\,Tertiary\ Education_i + .042\,Sulphadoxine - Pyrimethamine\ (IPTp - SP)\ dose_i + .039\,Parity_i + .133\,Gestation_i$$

The model indicated that there is a significant difference in the conditional BW mean between male and female neonates with female neonates scoring .112 kg lower than their male neonates counterparts [β = -.112, 95% CI (-.175, -.048), p < .001]. Maternal educational status became a significant predictor of BW after the backward elimination regression method was deployed. The coefficient of the tertiary education category [β = .077, 95% CI(.013, .141), p < .05] indicated that the conditional BW mean of the tertiary education category was .077 kg higher than that of the no formal education group and that this difference was statistically significant. The coefficient of Sulphadoxine-Pyrimethamine (IPTp-SP) dose also became a significant predictor of BW. The new coefficient [β = .042, 95% CI(.010, .074), p < .05] indicated that for any additional dose of IPTp-SP the conditional BW mean increased significantly by .042 kg. Similarly, the new coefficient of maternal parity [β = .039, 95% CI(.018, .061), p < .001] indicated that every additional previous delivery made after 28 weeks of gestation, the conditional BW mean increased by .039 kg. This new coefficient is relatively statistically more significant. Finally, the new coefficient of gestational age [β = .113, 95% CI(.094, .133), p < .001] is also relatively statistically more significant. The coefficient indicated that for every additional week of gestational age the conditional BW mean increased significantly by .112 kg.

The standardized beta coefficients which compare the

Table 3. Neonatal and maternal obstetric and socio-demographic factors associated with newborn weight in UCC Hospital Maternity Ward over November 2020 through March 2022 (N=1030)

	Unstandardized Coefficients		Standardized Coefficients	t-stats	p-value	95% Confidence Interval for β		Collinearity Statistics	
Model	B	SE(β)	Beta			LB	UB	Tolerance	VIF
(Constant)	2.714	0.159		17.103	0.000	2.402	3.025		
Gender of Neonate									
Male	Ref								
Female	-0.116	0.033	-0.117	-3.556	0.000	-0.179	-0.052	0.974	1.027
Maternal Educational Status									
No Formal Education	ref								
Primary Education	0.22	0.156	0.067	1.412	0.158	-0.086	0.527	0.473	2.114
Secondary Education	0.177	0.119	0.179	1.485	0.138	-0.057	0.411	0.072	13.829
Tertiary Education	0.208	0.125	0.21	1.667	0.096	-0.037	0.453	0.066	15.078
Maternal Occupation									
Unemployed	Ref								
Student	0.056	0.093	0.028	0.598	0.550	-0.127	0.239	0.489	2.045
Trader/Self-employed	0.067	0.069	0.068	0.971	0.332	-0.069	0.204	0.216	4.633
Employed (Public/Private)	0.11	0.073	0.11	1.501	0.134	-0.034	0.253	0.196	5.095
Farming	-0.089	0.469	-0.006	-0.189	0.850	-1.009	0.832	0.924	1.082
Type of Locality									
Rural	Ref								
Urban	0.047	0.034	0.045	1.361	0.174	-0.021	0.114	0.983	1.017
Maternal Age	0.003	0.004	0.031	0.694	0.488	-0.005	0.011	0.513	1.951
Antenatal Care Visits	0.008	0.011	0.028	0.746	0.456	-0.013	0.029	0.775	1.291
IPTp-SP dose	0.032	0.017	0.065	1.855	0.064	-0.002	0.066	0.858	1.166
Maternal Parity	0.036	0.014	0.11	2.524	0.012	0.008	0.065	0.557	1.794
Gestation	0.112	0.011	0.363	10.387	0.000	0.091	0.133	0.864	1.157
†Dependent Variable: Birth Weight (BW) in kilograms (kg)									

strength of the effect of each individual predictor variable to the dependent variable presented in Table 4 indicated that for every unit increase in the standard deviation of the IPTp-SP dose the conditional BW mean increased by .08 standard deviations. Similarly, maternal Parity, as well as gestation predictors, would each affect .119 and .369 increments respectively in the standard deviation of the conditional BW mean for every unit increase in their respective standard deviations. Hence, a comparative analysis of the impact of the significant regressor variables on BW revealed that among all the significant predictors, neonatal gender and maternal obstetric factors had the most impact on the anthropometric index BW than maternal socio-demographic factors.

Model Diagnostics

Normality of residuals was performed using both Shapiro-Wilk and Kolmogorov-Smirnov test of normality with Lilliefors Significance Correction. The results were significant ($p < .001$) indicating non-normality of the residual of the model. However, the non-normality of the multiple regression residual is inconsequential considering that the sample size (N = 1030) is very large. The Durbin-Watson statistic (DW = 1.980) is within the acceptable range of $1.5 \le DW \le 2.5$ indicating that residuals of the final multiple linear regression model are not auto-correlated. The Breusch-Pagan-Godfrey test of heteroskedasticity in the model was performed. A non-significant chi-squared test statistic for the Breusch-Pagan test [$\chi^2 = 1.1097$, $p = .9532$] was found indicating constant variance. Multicollinearity was also examined using the variance inflation factor (VIF) and Tolerance factor. Problematic if VIF > 10 and Tolerance < .1. However, collinearity statistics results in Table 4 did not show any VIF > 10 nor any Tolerance < .1 for which the assumption of no multicollinearity in the model would be violated. Therefore, model diagnostics indicated that the final regression model is free from auto-correlation, heteroskedasticity, as well as multicollinearity.

Discussion

This study examined the associations between maternal obstetric and socio-demographic factors and birth weight at the University of Cape Coast Hospital, Ghana. The findings provide essential contributions to the existing body of evidence by revealing the nuanced roles of parity, gestational age, maternal education, and IPTp-SP prophylaxis in influencing birth weight in a coastal Ghanaian context.

The mean birth weight observed (3.21 kg) aligns closely with what was found (3.25kg) among the same population in an earlier study [9]. Using nationally representative data, Boateng et al.[12] and He et al.[13] found mean birth weights of 3.15 kg and 3.25 kg, respectively. Notably, the prevalence of low birth weight in this study (5.5%) is significantly below the 2020 WHO global estimate of 14.7%[6], the national average of 14.4% in Ghana [6], and in sub-Saharan Africa, 13.9%[6]. A study by Boateng et al.[12] and He et al.[13] also recorded higher LBW rates of 7.2% and 10.2%, respectively, for Ghana. This may reflect the exclusion of high-risk pregnancies, for example, preeclampsia, and sickle cell

Table 4. Significant Neonatal and Maternal Obstetric and Socio-demographic Predictors of Newborn Birth Weight in UCC Hospital over November 2020 through March 2022 (N = 1030)

	Unstandardized Coefficients		Standardized Coefficients	t-stats	p-value	95% Confidence Interval for β		Collinearity Statistics	
Model	B	SE(β)	Beta			LB	UB	Tolerance	VIF
(Constant)	2.988	0.077		39.021	0	2.838	3.139		
Gender of Neonate									
Male	Ref								
Female	-0.112	0.032	-0.113	-3.466	0.001	-0.175	-0.048	0.991	1.009
Maternal Educational Status									
No Formal education	Ref								
Tertiary Education	0.077	0.033	0.078	2.359	0.019	0.013	0.141	0.974	1.027
IPTp-SP dose	0.042	0.016	0.084	2.554	0.011	0.01	0.074	0.967	1.034
Maternal Parity	0.039	0.011	0.119	3.603	0	0.018	0.061	0.971	1.03
Gestation	0.113	0.01	0.369	11.156	0	0.094	0.133	0.965	1.036

†Dependent Variable: Birth Weight (BW) in kilograms (kg)

disease, from the current study as well as its hospital-based nature, which ensured that all the mothers were antenatal clinic attendants, unlike the population-based nature of the earlier studies. Despite these differences, there is an indication of a positive impact of the many interventions, such as regular training of midwives and doctors on safe motherhood, as the LBW prevalence among the same population has improved from the 7.7% found in an earlier study[9].

Gestational age was the strongest determinant of birth weight, with each additional week of gestation associated with a 113g increase in birth weight. This is consistent with earlier studies in Ghana[14,15] affirming gestation as the most influential modifiable factor for birth weight. These findings underscore the importance of preventing preterm births as a critical public health priority.

Male neonates weighed significantly more than female neonates on average, consistent with established biological patterns observed globally[16,17].

Tertiary education was significantly associated with higher birth weights. An earlier study in the Democratic Republic of the Congo reported that higher maternal education levels were associated with increased utilization of maternal healthcare services, such as antenatal care and skilled birth deliveries[18]. Another study emphasized how maternal education reduced disparities in prenatal care utilization, particularly among disadvantaged groups[19]. Educated mothers may possess greater health literacy, autonomy, and economic empowerment, all of which positively affect prenatal care utilization and nutrition. This reinforces broader evidence supporting maternal education as a social determinant of child health outcomes.

Higher parity was positively associated with birth weight. This aligns with evidence from earlier studies that explored the association between parity and birth weight and found that infants born to nulliparous women had lower mean birth weight compared to that of multiparous women[20,21]. This may be due to some physiological adaptations from earlier pregnancies, which could enhance fetal growth. typically have better obstetric outcomes due to uterine conditioning and experiential knowledge. However, other studies have noted that as parity increases, maternal resources decrease, increasing the risk for low birth weight infants[22].

Malaria Prophylaxis (IPTp-SP): The number of IPTp-SP doses was a significant predictor of birth weight. This confirms the protective effect of malaria prevention during pregnancy on fetal growth, as observed in earlier studies in Papua New Guinea[23] and Ghana[24]. Given Ghana's high malaria burden, this finding reaffirms the necessity of improving compliance with WHO's recommendation of at least three IPTp-SP doses.

Maternal age, locality, antenatal care visit count, and employment status were not significant predictors in the final model. This may be due to the high antenatal coverage (>94% had ≥4 visits), the urban-rural proximity in the Cape Coast municipality, and strong baseline maternal health education in the cohort. Previous studies have shown mixed results on these variables[7,25], often depending on context.

The final model accounted for 17.1% of the variance in birth weight. While this is statistically robust, it suggests that other unmeasured factors such as genetics, environmental pollutants, maternal stress, or detailed nutritional intake also play substantial roles. Because it directly affects intrauterine growth and birth weight, adequate maternal nutrition is essential for fetal development[26]. Detailed dietary assessments, which could have provided a more in-depth understanding of the relationship between nutrition and birth weight, were not included in this study.

It is commonly known that birth weight is heritable, and that both maternal and paternal genetic factors have a major impact on the growth patterns of newborns[27]. Although genetic predisposition was not evaluated in this study, family history information could be used in subsequent studies to enhance prediction models.

It has been demonstrated that reduced birth weight and preterm deliveries are linked to prolonged stress during pregnancy[28]. The dataset's exclusion of mental health evaluations, regrettably, restricted the investigation of psychosocial factors that influence birth weight.

According to research from Ghana's cities, air pollution has a major negative impact on perinatal outcomes[29]. Given the urban-rural mix of Cape Coast, more information on the factors influencing birth weight may be obtained by looking into environmental exposures.

Future research should explore these additional dimensions through longitudinal designs and mixed-methods approaches.

The findings of this study have many public health implications: The findings support continued investments in girl child education, particularly at secondary and tertiary levels. There should be community health campaigns to improve coverage of IPTp-SP. Efforts must be made to detect and manage preterm risks to extend gestational age.

Despite its many strengths, this study has some limitations. The retrospective cross-sectional design restricts conclusions to associations rather than clear causal links, so limiting the capacity to create causality. The study was also done at one site, which could affect its generalizability to other healthcare environments in Ghana where demographic and clinical traits differ. The prevalence estimates of low birth weight may have been affected by the exclusion of high-risk pregnancies, such as maternal conditions and multiple gestations, so they underrepresent extreme cases. Excluded were unmeasured variables such as maternal nutritional status, genetic predisposition, psychosocial stress, and environmental exposures, which could cause birth weight differences outside the ones studied. Future studies should use mixed-method frameworks, longitudinal designs, and multi-center strategies to investigate a more complete spectrum of factors influencing birth weight.

Conclusion

This study contributes valuable empirical evidence to the growing literature on maternal and neonatal health by modeling the specific associations between maternal obstetric and socio-demographic factors and birth weight in a primary hospital setting in Ghana. By analyzing a substantial dataset of 1,030 births, the study has demonstrated that gestational age, maternal parity, neonatal sex, tertiary education, and IPTp-SP prophylaxis significantly influence birth weight, jointly explaining approximately 17% of its variance.

Conflict of Interest

The authors declare no conflict of interest.

Authors' Contributions

McAdams Abu Bakr and James Kojo Prah: conception, design, acquisition, and interpretation of data and drafting the manuscript; Mary Boadi-Kusi and Beth Offei-Awuku: acquisition of data and reviewing of several drafts of the manuscript. All authors have read and agreed to the final manuscript.

Data Availability

Data is available upon request from the authors.

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