**Maternal and Neonatal Delivery Outcomes in The Gambia: A Hospital-Based Analysis of Socioeconomic Status and Clinical Determinants**

**Abstract**

Maternal and neonatal health outcomes in low-resource settings like The Gambia remain a critical public health concern, with high mortality rates driven by socioeconomic and clinical factors. This hospital-based study at Edward Francis Small Teaching Hospital (EFSTH) examined the interplay of these determinants among 200 Gambian women. Data were collected via structured questionnaires and medical records, analyzing socioeconomic status (SES), clinical variables, and delivery outcomes using SPSS.

Results revealed no significant association between **Socioeconomic Status** (SES) indicators (income, education) and adverse outcomes (*p* > 0.05), likely due to population homogeneity and universal healthcare access. However, clinical factors were pivotal: antenatal care (ANC) participation significantly improved outcomes (*p* = 0.02), though visit frequency was non-significant (*p* = 0.17). Comorbidities like preeclampsia (4%) and neonatal indicators (birth weight, APGAR scores) were strongly linked to complications (*p* < 0.05). Most deliveries were vaginal (82.5%), with 3% stillbirths and 10% low birth weight neonates. The study underscores the dominance of clinical over socioeconomic factors in this cohort, emphasizing the need for quality antenatal care (ANC), early comorbidity management, and community-based education. However, its cross-sectional design limits causal inferences, and convenience sampling at a single hospital reduces generalizability. Additionally, unmeasured confounders (e.g., nutrition, environment) and self-reported socioeconomic status (SES) data may introduce bias. Policymakers should prioritize ANC quality and equitable healthcare access to mitigate risks. Further research should employ longitudinal designs to explore causal relationships and include diverse populations particularly rural communities to enhance generalizability.

***Keywords:* Maternal, Neonatal Outcomes, Socioeconomic Status (SES), Antenatal Care (ANC), Clinical Determinants**

**Introduction**

Maternal and neonatal health remains a critical public health concern, particularly in low-resource settings like The Gambia, where high maternal and infant mortality rates persist despite global advancements (Cresswell *et al.,* 2025; World Health Organization [WHO], 2020). Delivery outcomes including preterm birth, low birth weight, stillbirth, and maternal complications are influenced by a complex interplay of socioeconomic status (SES) and clinical factors during pregnancy (World Health Organization [WHO], 2020). Understanding these relationships is essential for developing targeted interventions to improve maternal and child health in The Gambia.  Sub-Saharan Africa accounted for approximately 70% of global maternal deaths in 2023, with an estimated 182,000 fatalities. The Gambia’s maternal mortality ratio (MMR) stands at 706 deaths per 100,000 live births significantly higher than the global average of 197 per 100,000. To meet the Sustainable Development Goal (SDG) target of reducing the global MMR below 70 by 2030, an annual reduction rate of nearly 15% is required a pace rarely achieved at the national level. Additionally, neonatal mortality in The Gambia remains a critical concern, estimated at 24.4 deaths per 1,000 live births (UNICEF, 2018; WHO, 2024; WHO, 2025). These statistics underscore the urgent need to examine the socioeconomic and clinical factors influencing delivery outcomes in the country.

Existing literature highlights that socioeconomic status (SES) profoundly influences maternal and neonatal health outcomes. Key indicators such as maternal education, household income, and geographic access to antenatal care (ANC) significantly affect birth outcomes (Ahmed *et al.,* 2010; Nicholls-Dempsey *et al.,* 2023; Sui *et al*., 2020; Khatri *et al*., 2022; Emmanuel *et al.,* 2024). Studies in sub-Saharan Africa consistently demonstrate that women with higher education and economic stability experience lower risks of complications such as preterm birth, low birth weight, and stillbirth (Tekeba *et al.,* 2024; Yahaya *et al.,* 2024; Regassa *et al.,* 2024; Some *et al*., 2020; Afulani *et al.,* 2019). However, in The Gambia, where nearly 48.6% of the population lives below the poverty line, financial constraints and limited healthcare access exacerbate adverse outcomes (International Monetary fund, 2021). Additionally, cultural practices, such as home deliveries assisted by traditional birth attendants (TBAs), further contribute to preventable maternal and neonatal complications (Nyanzi *et al*., 2007; Lerberg *et al*., 2014; Lowe *et al.,* 2016; Yaya *et al*., 2020). A significant proportion of Gambian women, particularly in rural areas, rely on traditional birth attendants (TBAs) due to cost constraints, distance to health facilities, or cultural preferences (Nyanzi *et al*., 2007; Jallow *et al.,* 2012; Lerberg *et al*., 2014; Lowe *et al.,* 2016; Rutledge *et al.,* 2024). While TBAs provide essential care in resource-limited settings, their inability to manage obstetric emergencies such as postpartum hemorrhage or neonatal asphyxia contributes to preventable maternal and neonatal deaths.

Beyond socioeconomic barriers, clinical determinants significantly influence maternal and neonatal survival. Clinical determinants, including maternal age, parity, and pre-existing medical conditions, are well-documented risk factors for adverse birth outcomes (Nigatu *et al*., 2023; Daniels-Donkor *et al*., 2024). Adolescent pregnancies, which account for nearly 30% of all births in The Gambia, are associated with higher risks of preterm delivery, low birth weight, and eclampsia (Ogbo *et al*., 2019; Tamir *et al.,* 2024; Ahmed *et al.,* 2024). Conversely, advanced maternal age (≥35 years) increases the likelihood of gestational hypertension, postpartum hemorrhage, obstructed labor, and stillbirths ([Correa-de-Araujo](https://pubmed.ncbi.nlm.nih.gov/?term=%22Correa-de-Araujo%20R%22%5BAuthor%5D), and [Yoon](https://pubmed.ncbi.nlm.nih.gov/?term=%22Yoon%20SS%22%5BAuthor%5D), 2021; Nyongesa *et al.,* 2023; Masembe *et al.,* 2024; Ye *et al.*, 2024). Furthermore, infections such as malaria and HIV, prevalent in The Gambia, are associated with intrauterine growth restriction and preterm delivery (Uneke *et al.,* 2009*;* Saito *et al.,* 2024; Ssentongo *et al,* 2020; Obase, *et al*., 2020; Fall *et al*., 2015; Ekuma *et al.,* 2023). Additionally, gestational diabetes and hypertensive disorders contribute to complications such as preeclampsia and cesarean deliveries ([Yang](https://pubmed.ncbi.nlm.nih.gov/?term=%22Yang%20Y%22%5BAuthor%5D) and [Wu](https://pubmed.ncbi.nlm.nih.gov/?term=%22Wu%20N%22%5BAuthor%5D), 2022; Onuoha *et al.,* 2024; Li *et al*.,2025; John-Emaimo *et al.,* 2025). Despite these documented risks, there remains a paucity of localized studies examining the intersection of socioeconomic and clinical factors in shaping maternal and neonatal outcomes in The Gambia. This study seeks to bridge this gap by analyzing how socioeconomic status and clinical risk factors collectively influence delivery outcomes. By identifying key modifiable determinants, the findings will inform targeted interventions to improve maternal and neonatal survival rates in The Gambia.

**Materials and methods**

**Study area**

This study was carried out at Edward Francis Small Teaching Hospital (EFSTH) in Banjul, The Gambia (13°27′27″N, 16°34′39″W). As The Gambia's largest tertiary care facility, EFSTH plays a pivotal role in the national healthcare system, delivering essential obstetric and neonatal services (John-Emaimo *et al.,* 2025).

**Ethical Consideration**

Ethical approval for this study was obtained from the Research and Ethics Committee of Edward Francis Small Teaching Hospital (EFSTH) in Banjul, The Gambia, prior to data collection. The study involved accessing patients' antenatal cards and delivery notes from hospital records, ensuring compliance with institutional and national ethical guidelines.

The research adhered to the ethical principles outlined in the World Medical Association (WMA) Declaration of Helsinki (World Medical Association, 2024), safeguarding the rights, dignity, and welfare of all participants. Written informed consent was obtained from each participant, with clear explanations provided regarding the study's objectives, procedures, and their right to withdraw at any time without consequences.

To protect participant confidentiality, all identifiable information was anonymized during data collection and analysis. Data were stored securely and accessed only by the research team. The study employed standard obstetric methodologies and maintained transparency in reporting findings to contribute meaningfully to maternal and neonatal health research. No financial incentives were offered to participants, and the study posed minimal risk, aligning with its cross-sectional, observational design.

**Inclusion and Exclusion Criteria**

This study included women aged 18–45 years who delivered at Edward Francis Small Teaching Hospital (EFSTH) between December 16, 2021, and January 20, 2022, provided informed consent, and had complete medical records, while excluding women who used alternative health systems for delivery, had incomplete records, declined to participate, or delivered outside the specified study period.

#### **Study Design**

#### This study employed a **prospective, cross-sectional, descriptive design** to assess the role of socioeconomic and clinical determinants in maternal and neonatal delivery outcomes among women at Edward Francis Small Teaching Hospital (EFSTH) in The Gambia. The cross-sectional approach allowed for the collection of data at a single point in time, providing a snapshot of the relationships between variables. The study focused on analyzing both **socioeconomic status (SES) indicators (**e.g., income, education, occupation) and **clinical variables** (e.g., antenatal care participation, comorbidities, neonatal health metrics) to determine their association with delivery outcomes (e.g., mode of delivery, neonatal survival, complications).

#### **Sampling Selection**

**Sampling Method:** A**convenience sampling** technique was used to recruit participants. This non-probability method was chosen due to its practicality in a hospital setting, where accessibility and time constraints were considerations.

**Sample Size:** The study included **200 women** who delivered at EFSTH during the study period (December 16, 2021, to January 20, 2022). **This hospital-based study in The Gambia used the Cochrane formula to calculate a sample size of 200 women, ensuring 95% confidence and 5% margin of error to assess socioeconomic and clinical factors affecting maternal-neonatal outcomes.** The sample size accounted for finite population correction at this tertiary hospital and included a 10% buffer for attrition.

**Data Collection**

Data were collected using a pretested, validated structured questionnaire administered to assess:

1. **Socioeconomic Status (SES) Indicators:** Household income, education level, occupation, and healthcare access (distance to facility).
2. **Pregnancy-Related Clinical Variables:** Antenatal care attendance, pre-existing medical conditions (hypertension, diabetes, anemia), gestational age at delivery, parity, and pregnancy complications (e.g., preeclampsia, infections) [Table 1].

Hospital delivery records were reviewed to extract:

1. Mode of delivery (vaginal or cesarean)
2. Birth weight
3. APGAR scores (neonatal health assessment)
4. Maternal complications (postpartum hemorrhage, preeclampsia) [Table 2]

Two trained research assistants from the Medical School facilitated data collection. Participants were counseled, and written informed consent was obtained. Data were collected from antenatal record cards and labor ward delivery notes at EFSTH using a structured data extraction tool covering sociodemographic and clinical variables.

**Statistical analysis**

Statistical analysis was performed using SPSS Version 23. Continuous variables were analyzed using the Chi-square test, whereas categorical variables were assessed descriptively using pie charts, bar charts, tables, and histograms. A 95% confidence interval was applied, and statistical significance was set at p < 0.05.

**Table 1:** Socio-Demographical variable of the mother includes:

|  |  |  |
| --- | --- | --- |
| Variables | Types | Dimension |
| Age | Quantitative discrete | <18  18 to 25  26 to 40  > 40 |
| Religion | Qualitative nominal | Islam  Christianity  Others |
| Marital status | Qualitative nominal | Singled  Married |
| Maternal education  Paternal Education | Qualitative ordinal | Non formal/vocational  Primary  Junior  Senior  Tertiary |
| Occupation | Qualitative nominal | Health Care  Non Health Care  Not Employed |
| Number of children | Quantitative discrete | 1  2  3 to 5  > 5  non |

**Table 2:** Clinical variables

|  |  |  |
| --- | --- | --- |
| Variables | Types | Dimension |
| Antenatal card participation | Qualitative nominal | Unbooked  Booked |
| Number of antenatal visits | Quantitative discrete | 0  1-2  3 - 4  5 - 6  7 -8 |
| Gravida | Quantitative discrete | 1  2-3  4-5  6-7  More than 7 |
| Parity | Quantitative discrete | 0  1  2-3  4-5  5-7  More than 7 |

|  |  |  |
| --- | --- | --- |
| Abortion | Quantitative discrete | 0  1-2 |
| Comorbidities | Qualitative nominal | Non  Preeclampsia  Asthma |
| Reason for admission | Qualitative nominal | Active phase of labour  Abruption placentae |
| Age on admission | Qualitative ordinal | Preterm <37 weeks  Full term 37 to 40 weeks  Post term >41 |
| Delivery | Qualitative nominal | Vaginal delivered  Emergency |
| Delivery Outcomes | Qualitative nominal | Normal  Postpartum hemorrhage  Preeclampsia |
| Neonatal outcome | Qualitative nominal | Alive  Stillbirth |
| APGAR 5 Mins | Quantitative discrete | 1-3  4-6  7-10  0 |
| Birth weight | Quantitative discrete | < 2.5kg  2.5 to 3.9 kg  4 kg  > 4kg |
| Anomalies | Qualitative nominal | Non  Hydrosfetalis |
| Emergencies | Qualitative nominal | CPD  Obstructed labour  Fetal distress  Abruption placentae  Retained second twin  Previous caesarean section  Abnormal lie  Severe preeclampsia  No emergency |

## Result

**Figure 1**: The bar chart shows the frequency of **age distribution of** the respondents.

**Figure 2:** The stack column shows the marital status of the respondents.

**Figure 3**: The pie chart shows the **religion** of respondents

**Figure 4**: The area chart shows the **Nationality** of respondents

**Figure 5**: The pie chart shows Spouse educational level of the respondents

**Figure 6:** The pie chart shows the maternal education level of the respondents

**Figure 7:** The stack column shows the distribution of the respondents based on their ethnic groups.

**Figure 8**: The stack column shows the differences in distance covered to facilities

**Figure 9:** The pie chart shows the variation of the respondents based on their monthly income.

**Figure 10:** Thestack column shows the number of children of the respondents

**Figure 11**: The pie chart shows the percentages of other underlying illness/es of the respondents.

**Figure 12:** The clustered column shows the variation of pregnancy/ies of the respondents.

**Figure 13:** The stacked column shows the number of previous deliveries of the respondents.

**Figure 14**: The clustered column shows the frequency and percentage of miscarriage (ies) of the respondents.

**Figure 15**: The pie chart shows the reasons for admission of the respondents.

**Figure 16:** The clustered column shows estimated gestational age of the respondents.

**Figure 17**: The pie chart shows the mode of delivery of the respondents.

**Figure 18**: The stacked column shows the responses of the respondents delivery outcome.

**Figure 19:** The stacked column shows the neonate outcome for the respondents.

**Figure 20**: The stacked column shows APGA 5 minutes score

**Figure 21:** The clustered column shows the frequency distribution and percentage of the respondents on birth weight.

**Figure 22**: The pie chart shows the percentage of the respondents on Anomalies detected.

### **Table 3: Delivery Outcome vs. Family Monthly Income**

| **Delivery Outcome** | **Undetermined Income** | **D3000–D5000** | **D5000–D10,000** | **>D10,000** | **Total** | **χ² (p-value)** |
| --- | --- | --- | --- | --- | --- | --- |
| **Normal** | 72 (37.9%) | 100 (52.6%) | 17 (8.9%) | 1 (0.5%) | 190 (95%) | **0.93** |
| **Postpartum Hemorrhage** | 2 (66.7%) | 1 (33.3%) | 0 (0%) | 0 (0%) | 3 (1.5%) |  |
| **Preeclampsia** | 3 (42.9%) | 4 (57.1%) | 0 (0%) | 0 (0%) | 7 (3.5%) |  |
| **Total** | 77 (38.5%) | 105 (52.5%) | 17 (8.5%) | 1 (0.5%) | 200 (100%) |  |

The overall p-value (**0.93**) indicates **no significant association** between delivery outcomes and family income (p > 0.05).

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### **Table 4: Chi-square Results for Socio-Demographic Variables**

| **Variable** | **χ² (p-value)** |
| --- | --- |
| Age | 0.97 |
| Marital Status | 0.97 |
| Maternal Education | 0.45 |
| Paternal Education | 0.81 |
| Ethnicity | 0.50 |
| Family Income | 0.93 |

**Key**: All p > 0.05 (non-significant).

### **Table 5: Significant Clinical Variables Affecting Delivery Outcomes**

**(n=200)**

|  |  |  |
| --- | --- | --- |
| **Clinical variables** | **Delivery Outcomes** | |
| **χ² (p-value)** | **Cramer’s V (Effect Size)** |
| Delivery | *0.54* | *0.79* |
| **\***Newborn | ***\*****0.00* | *0.46* |
| **\***Antenatal care participation | ***\*****0.02* | *0.20* |
| Gravidity | *0.76* | *0.11* |
| Parity | *0.68* | *0.13* |
| Abortion | *0.71* | *0.06* |
| **\***Comorbidities | ***\*****0.00* | *0.37* |
| **\***Reason for admission | ***\*****0.00* | *0.81* |
| **\*** Estimated Gestaional Age on admission | ***\*****0.01* | *0.18* |
| **\***APGAR 5 minutes score | ***\*****0.00* | *0.35* |
| **\***Birth weight | ***\*****0.03* | *0.18* |
| Anomalies | *0.97* | *0.02* |
| **\***Emergencies | ***\*****0.02* | *0.28* |

**Key**: Asterisks (\*) indicate p < 0.05 (significant).

### **Table 6: Antenatal Visits vs. Delivery Outcomes**

| **Antenatal Visits** | **Normal** | **Postpartum Hemorrhage** | **Preeclampsia** | **Total** | ***p*-value** |
| --- | --- | --- | --- | --- | --- |
| 1–2 | 15 (8%) | 1 (0.5%) | 2 (1%) | 18 (9%) | 0.17 |
| 3–4 | 82 (41%) | 2 (1%) | 5 (3%) | 89 (44.5%) |  |
| 5–6 | 71 (36%) | 0 (0%) | 0 (0%) | 71 (36%) |  |
| 7–8 | 21 (11%) | 0 (0%) | 0 (0%) | 21 (11%) |  |
| 0 | 1 (0.5%) | 0 (0%) | 0 (0%) | 1 (0.5%) |  |

**Note**: Non-significant association (p > 0.05). Percentages are column-based (total = 200).

**Figure 23**: Cluster Column illustrating the delivery outcome related to number of Antenatal visits of women that visited EFSTH Obstetric unit for delivery.

#### **A. Socio-Demographic Characteristics**

**Age Distribution**: Most respondents (61%) were 18–28 years, followed by 29–38 years (33%). Older age groups (39 and above) were minimally represented (3%) (Figure 1). **Marital Status**: Nearly all respondents (99.5%) were married (**Figure 2)**.

**Religion and Nationality**: All respondents identified as Muslims and were Gambian nationals (Figures 3 and 4). Underrepresentation of certain groups (e.g., older women, non-muslims) may affect generalizability.

**Education Levels**: **Spouse Education**: Exactly, 93 respondents 46.5% had secondary certificates, 44 (22.0%) of them had non-formal/ vocational training, 40 (20%) had primary certificates, 20 (10%) of them had junior certificate, while only 0.5% had tertiary education (Figure 5). **Maternal Education**: 51% had formal/vocational training, 34% had senior certificates, 8% had no formal education, 5% had junior cert, and 2% had tertiary education (Figure 6).

**Ethnicity**: The findings indicated the distribution of respondents by ethnic group, with the largest proportion being Wolof (28.5%), followed by Fula (19.5%) and Jola (13.5%). The Mandinka and Serahule ethnic groups each accounted for 11.5% (23 respondents each), while the Serere 17 (8.5%) and Aku 14 (7.0%) groups represented the smallest proportions among the respondents (Figure 7).

**Distance to facility**: It is shown that 2 (1.0%) are walking, 48 (24.0%) have less than a 30-minute drive, and 134 (67.0%) are up to an hour to the facility while 16 (8.0%) of the respondents drove for more than an hour to the facility respectively (Table 8).

**Income**: Over half 105 (52.5%) earned between D3000–D5000 monthly, 17 (8.5%) earned between D5000-D10,000 per month, 1 (0.5 %) earned more than D10,000 per month, while 77 (38.5%) had undetermined income (Figure 9).

#### **B. Clinical and Obstetric History**

**Pregnancy and Delivery**: The findings revealed that regarding the number of children among the respondents, 36 (18.0%) had one child, 41 (20.5%) had two children, 52 (26.0%) had three to five children, and 12 (6.0%) had more than five children while 59 (29.5%) reported having no children. (**Figure 10)**. **Figure 11**: The results indicated the frequency and percentages of other underlying illnesses among the respondents. It was found that 191 (95.5%) had no underlying illnesses, 8 (4.0%) had preeclampsia, and 1 (0.5%) had asthma. **Number of pregnancies/IES**: The findings revealed that 73 (36.5%) of the respondents had 2–3 pregnancies, 54 (27.0%) had 4-5 pregnancies, 13 (6.5%) had 6-7 pregnancies, while 3(1.5%) had more than 7 pregnancies (Figure 12).  The results showed the distribution of the number of deliveries among the respondents. It was found that 54 (27.0%) had no deliveries, 33 (16.5%) had one delivery, 88 (44.0%) had between two and three deliveries, 14 (7.0%) had four to five deliveries, 10 (5.0%) had six to seven deliveries, and 1 (0.5%) had more than seven deliveries (Figure 13**). Percentage of miscarriage**; The findings revealed that the vast majority of respondents (94%) reported having no miscarriages, while a small proportion (6%) reported experiencing 1-2 miscarriages (Figure 14).

#### **Admission and Delivery**: Our results revealed that 198 (99%) of the respondents were admitted due to active labor; 2 (1%) had abruptio placentae (Figure 15). Gestation age: It shows that 18 (9.0%) of the respondents were preterm <37 weeks, 181 (90.5%) were full-term 37-40 weeks, while 1(0.5 %) were post-term >41 (Figure 16). **Mode of delivery**: Vaginal delivery was predominant 160 (82.5%), with 35 (18.5%) requiring emergency intervention (Figure 17). The high prevalence of vaginal deliveries and full-term births reflects positive maternal care standards. **Delivery outcome:** Our findings indicated that 190 (95.0%) of the respondent'smodes of delivery were “normal”, 3 (1.5%) “Postpartum”, and 7 (3.5%) “Preeclampsia” respectively (Figure 18). **Neonatal Outcomes**: Our results indicate that 194 (97%) of neonates were born alive; 6 (3%) were stillbirths (Figure 19). Most of the respondents, 185 (92.5%) had APGAR scores of 7–10 at 5 minutes, followed by 2 (1.0%) of the respondents had 1-3 minutes score, 6 (3.0%) had 4-6 minutes score, 185 (92.5%) had 7-10 minutes score while 7 (3.0%) of them had 0 minutes score respectively (Figure 20). 174(87%) of newborns weighed 2.5–3.9 kg; 20 (10%) were under <2.5kg, 41 (2.0%) had 4kg, while 2 (1.0%) had 4kg birth weight and above (Figure 21). Anomalies detected: The result shows that 199 (99.5%) of the respondents had no anomalies while 1 (0.5%) had *Hydros fetalis* (Figure 22).

#### **C. Statistical Relationships**

**Socio-Demographic Variables**: No significant association was found between delivery outcomes and age, marital status, education, ethnicity, or income (*p > 0.05*) (Tables 3, and 4). **Clinical Variables**: in Table 5, Significant associations (*p < 0.05*) were observed between delivery outcomes and: Newborn status (alive/stillbirth), Antenatal care participation, Comorbidities (e.g., preeclampsia), Reason for admission (e.g., abruptio placentae). Gestational age, APGAR scores, and birth weight. The significant impact of clinical factors (e.g., comorbidities, gestational age) underscores the need for targeted prenatal monitoring.

**Antenatal Visits**: No significant link was found between the number of antenatal visits and delivery outcomes (*p = 0.17*), though most women with normal outcomes attended 3–4 visits (41%) (Table 6). Despite high antenatal visit rates, their non-significance suggests qualitative aspects (e.g., care quality) may be more critical than frequency.

**Discussion**

The present study sought to elucidate the relationship between socioeconomic status (SES), pregnancy-related clinical variables, and delivery outcomes among women delivering at Edward Francis Small Teaching Hospital (EFSTH) in The Gambia. The findings contribute to the growing body of literature on maternal and neonatal health in low-resource settings, offering critical insights into the modifiable factors that influence obstetric outcomes. Below, we contextualize the results within existing evidence, discuss their implications for policy and clinical practice, and outline recommendations for future research.

* 1. ***Socioeconomic Status and Maternal Health Outcomes***

Contrary to well-established global evidence (Ahmed *et al.,* 2010; Nicholls-Dempsey *et al.,* 2023; Sui *et al*., 2020; Khatri *et al*., 2022; Emmanuel *et al.,* 2024; Adeyemo *et al.,* 2024), our analysis did not detect a statistically significant association between SES indicators such as income, education, and occupation and adverse delivery outcomes (*p* > 0.05). This finding may be attributed to several factors:

1. Homogeneity of the Study Population: Nearly all participants (99.5%) were married, 100% identified as Muslim, and all were Gambian nationals. This demographic uniformity may have limited the variability required to detect SES-related disparities. Underrepresentation of certain groups (e.g., older women, non-Muslims) may affect generalizability.
2. Income distribution was heavily skewed toward lower brackets, with 52.5% earning between D3000–D5000 monthly (approximately 50–50–85), reflecting widespread economic constraints.
3. Universal Healthcare Access: The Gambia’s government-funded maternal healthcare system may mitigate some SES-related barriers, as evidenced by the high proportion of women receiving antenatal care (ANC). However, qualitative research is needed to assess whether financial constraints still influence care-seeking behaviors indirectly.
4. Measurement Limitations: Self-reported SES data are susceptible to recall bias, and the study’s cross-sectional design precludes causal inferences. Future studies should incorporate longitudinal SES assessments and objective economic indicators (e.g., asset-based wealth indices) to enhance robustness.

Contrary to our finding earlier report revealed that socioeconomic status was a significant factor affecting delivery outcome. The study reiterate that expectant mothers from economically disadvantaged households are more likely to experience stillbirths compared to those from wealthier families. Previous research conducted in SSA (Terefe *et al.,* 2025; Adeyemo *et al.,* 2024), East Africa (Tesema *et al.,* 2021, Uganda (Kujala *et al.,* 2017), Ethiopia (Jena *et al.,* 2020), and Nepal (Kc *et al.,* 2016) have confirmed.

Despite the non-significant findings, SES remains a critical social determinant of health. The lack of observed association in this study should not diminish its policy relevance but rather prompt further investigation into how structural inequities manifest in this specific context.

* 1. ***Clinical Determinants of Delivery Outcomes***

The study identified several clinically significant predictors of delivery outcomes, aligning with global maternal health literature:

Antenatal Care (ANC) Utilization

1. ANC participation was significantly associated with improved delivery outcomes (*p* = 0.02), reinforcing WHO (2020) guidelines on the importance of prenatal visits.
2. However, the number of ANC visits (1–2 vs. 3–4) did not yield significant differences (*p* = 0.17), suggesting that the quality of care such as screening for hypertension, anemia, and infections may be more impactful than frequency alone. This finding resonates with studies emphasizing the need for standardized, high-content ANC in low-resource settings (Nigatu *et al*., 2023; Daniels-Donkor *et al*., 2024; John-Emaimo *et al*., 2025).

Comorbidities and Pregnancy Complications

1. Preeclampsia (4.0%) and asthma (0.5%) were significantly linked to adverse outcomes (*p* < 0.05), corroborating evidence that hypertensive disorders and chronic conditions elevate obstetric risks (Fall *et al*., 2015; Mwilike *et al.,* 2024; John-Emaimo *et al*., 2025).
2. The high prevalence of unbooked cases (i.e., women without ANC records) warrants targeted interventions, such as community-based hypertension screening and patient education programs (Comfort *et al.,* 2019; USAID SQALE *et al.,* 2019; Maryline-Mireku *et al.,* 2019; Karuga *et al.,* 2019; Alhassan *et al*., 2024).

Neonatal Health Indicators

1. Birth weight and APGAR scores were significant predictors (*p* = 0.03 and *p* < 0.05, respectively), with 10% of neonates classified as low birth weight (<2.5 kg). These underscore the importance of neonatal health metrics in assessing delivery success. This aligns with regional data linking malnutrition and malaria to intrauterine growth restriction (Uneke *et al.,* 2009*;* Saito *et al.,* 2024; Ssentongo *et al,* 2020; Obase, *et al*., 2020; Fall *et al*., 2015).
2. The 3% stillbirth rate, though lower than some Sub-Saharan African pooled estimates prevalence of stillbirths of 1.54% per 100 [95% CI 1.19-2.01] (Terefe *et al.,* 2025), underscores the need for enhanced intrapartum monitoring and emergency obstetric care.

**Limitations and Methodological Considerations:**

1. **Study Design**: The cross-sectional design limits causal inference. Prospective cohort studies would better delineate temporal relationships between SES, clinical factors, and outcomes.
2. **Sampling Bias**: Convenience sampling at a single tertiary hospital may not represent rural populations or women utilizing lower-level health facilities.
3. **Unmeasured Confounders**: Factors such as nutritional status, intimate partner violence, and environmental stressors were not assessed but may mediate SES-outcome relationships.
4. **Enhancing ANC quality**: While ANC attendance was high (90.5% delivered at full term), optimizing care content (e.g., malaria prophylaxis, nutritional counseling) could further improve outcomes
5. **Addressing comorbidities**: Screening and management of conditions like preeclampsia (4% of respondents) should be prioritized in prenatal programs.
6. **Community-based education**: Given the low variability in SES, community health campaigns could uniformly elevate health literacy and access (Mbuagbaw *et al*., 2015; Karuga *et al.,* 2019; Adeyemo *et al.,* 2024).

**Policy and Practice Implications**

1. **Strengthening ANC Quality**:
   1. Beyond increasing visit frequency, ANC programs should integrate routine screening for gestational diabetes, anemia, and hypertensive disorders, coupled with patient education.
2. **Community-Based Interventions**:
   1. Mobile health clinics and community health workers could improve early detection of high-risk pregnancies, particularly in rural areas with limited facility access (Bawadi *et al.,* 2023; Mwilike *et al.,* 2024).
3. **Health System Financing**:
   1. While maternal care is government-funded, indirect costs (transport, lost wages) may still deter care-seeking. Conditional cash transfers or transportation vouchers could mitigate these barriers.

**Conclusion**

This study highlights the predominant role of clinical factors particularly ANC participation, comorbidities, and neonatal health indicators in shaping delivery outcomes in The Gambia. While SES did not emerge as a significant predictor in this cohort, its broader societal impact warrants further exploration through mixed-methods research. Policymakers and clinicians should prioritize:

1. Quality-optimized ANC
2. Early detection and management of obstetric complications
3. Equity-focused health system strengthening

Future studies should employ longitudinal designs and geographically diverse samples to better capture the interplay of socioeconomic and clinical determinants in this setting.

**Ethical Approval:** Ethical approval for this study was obtained from the relevant institutional review board. Documentation is available from the corresponding author upon reasonable request.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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