

Assessing Morbidity and Socioeconomic Determinants among Pregnant Adolescent Girls in three Districts in Sierra Leone

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Abstract

Aim: To determine the morbidity status of pregnant adolescent girls in three districts in Sierra Leone. (Freetown, Kambia and Moyamba).

Methodology: Quantitative method of data collection was used, where 502 pregnant adolescent girls aged 13–19 years were randomly selected.

Results: It was revealed that, malaria poses a serious threat to maternal health and has a big impact on the course of pregnancy. Malaria transmission among pregnant adolescent girls was lowest in Kambia and greatest in Freetown and Moyamba. Nearly 25% of pregnant teenagers have typhoid fever, which is a significant yet frequently disregarded maternal health burden. In contrast to its lowest malaria frequency, Kambia has the highest typhoid prevalence. Among the districts examined, Moyamba has the greatest frequency of anemia, whilst Freetown reported a moderate prevalence. The chi-square test indicates a statistically significant association between disease condition and study location ($\chi^2 = 36.23$, $df = 4$, $p < 0.001$). This means that the distribution of abdominal pain, malaria, and typhoid is not the same across Freetown, Kambia, and Moyamba. It was also discovered that most of the pregnant adolescent girls did not attain tertiary education and very few of them were married which have great impact on their health status.

Conclusion: Adolescents who were pregnant suffered increased health risks due to pregnancy-related vulnerabilities, nutritional deficits, and infectious illnesses. Typhoid and malaria continue to be serious concerns, and stomach pain may indicate undiscovered illnesses. Pregnant teenage girls' educational attainment and marital status were two important socioeconomic predictors of health.

Keywords: Morbidity, Nutritional challenges, Maternal health, Adolescents, Prevalence

Introduction

The adolescent period is characterized by intense growth physically, psychosocially and cognitively. The intensity of this growth period necessitates the increase in nutritional needs. During this period there is a high demand for iron, especially in the adolescent girl because of the onset of menstruation. Iron deficiency is a major cause of anaemia. The risk for anaemia increases when the adolescent girl becomes pregnant. There are several factors that interact and contribute negatively to the outcome of pregnancy in the adolescent girl. The presence of anaemia, practice of pica and malaria has all been implicated. The presence of these conditions in pregnant adolescent girls can pose greater challenge because of the obvious burden of the pregnancy on the rapidly growing mother which additionally has to cater for another developing foetus. Anaemia affects about 38% of pregnant women globally. The prevalence is about 44.6% in Africa and 56%

in Ghana (World Health Organization [WHO], 2015). The World Health Organization (WHO) considers this prevalence to be unacceptable and of severe public health significance (WHO, 2015). Anaemia in pregnancy is of great concern as it is associated with complications such as low birth weight, preterm delivery, spontaneous abortions and ultimately death (Di Renzo et al., 2015).

There is also an established relationship between pica and anaemia (Young et al., 2010). Pica is a condition involving the consumption of non-food substances. This practice has been found to be common among pregnant women even though it can also be seen among all categories of people including children. Several studies have linked the practice of pica to negative health outcomes such as micronutrient deficiencies particularly iron, zinc and calcium (Young et al., 2010). In Ghana, adolescent pregnancy accounts for about 14% of all

pregnancies. Maternal and infant mortality are still very high. Maternal mortality currently stands at 319 per 100,000 live births and infant mortality 43 per 1,000 live births (World Bank, 2016). Therefore there is the need to ensure that all categories of mothers receive optimum care to help reduce maternal and child mortality as the nation strives to meet the target set by the Sustainable Development Goals.

Malaria and typhoid fever are two significant infectious diseases that disproportionately affect tropical and subtropical regions. Malaria is caused by *Plasmodium* parasites, transmitted to humans through the bites of infected *Anopheles* mosquitoes, and the global burden of malaria is estimated at over 240 million cases annually (Doku et al., 2023). Sub-Saharan Africa bears the brunt of this burden, accounting for the vast majority of malaria cases and deaths. Malaria is characterized by recurrent fever, chills, and potentially severe complications such as cerebral malaria, which can be fatal if not promptly treated. Efforts to control malaria have led to significant reductions in incidence and mortality, but challenges such as drug resistance, insecticide resistance, and incomplete coverage of preventive measures persist. Typhoid fever, caused by the bacterium *Salmonella enterica* serotype Typhi, is endemic in many low- and middle-income countries, especially in areas with poor sanitation and limited access to clean drinking water. It is characterized by prolonged fever, abdominal pain, and gastrointestinal symptoms (Oliveira-Ferrer, et al., 2022). The global burden of typhoid fever is estimated at around 11 million cases annually, with significant morbidity and mortality, particularly in children and young adults. Recent increases in drug-resistant strains of *Salmonella* Typhi have further complicated treatment and control efforts. Pregnant women are uniquely vulnerable to infectious diseases due to physiological changes that alter immune function and increase susceptibility to infections. The immune system undergoes significant adaptations during pregnancy to support the developing fetus while maintaining the mother's health (Okon et al., 2022). These changes can make pregnant women more susceptible to severe outcomes from infections. Malaria in pregnancy can lead to serious complications for both the mother and the fetus, including anemia, maternal mortality, and preterm delivery. Malaria also poses significant risks to the fetus, including low birth weight, stillbirth, and neonatal mortality. Typhoid fever in pregnancy can result in more severe symptoms and complications, such as prolonged fever, gastrointestinal bleeding, and liver dysfunction. The risk of transmission to the infant and the impact on maternal health necessitate careful management and monitoring (Kungu et al., 2023).

Abdominal pain is a frequent reason for consultation in the pediatric emergency department. Symptoms are usually self-limiting, secondary to minor pathologies (gastroenteritis, constipation, etc.), and only a small percentage requires hospital admission or surgery (Smith et al., 2016). However, in adolescent females, certain pathologies should be considered and require a particular diagnostic and therapeutic approach. Pelvic inflammatory disease (PID) is a polymicrobial infection,

which affects the uterus, ovaries, and other female reproductive organs. In most cases, it is considered a sexually transmitted disease, and *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, and *Mycoplasma genitalium* are the commonly involved microorganisms. The main risk factors for its development are the period of adolescence, sexual promiscuity, immunological immaturity, or risky sexual practices (Greydanus et al., 2022). The latest data from Western countries show that about 1%-2% of sexually active females aged 15-24 years are diagnosed with PID, and this incidence is higher in the USA and in lower socio-economic classes (Greydanus et al., 2022). Clinical presentation varies widely, ranging from asymptomatic cases to severe symptoms with intense abdominal pain, hemodynamic instability, and shock. The most frequent symptoms are hypogastric pain, dysuria, metrorrhagia, and leukorrhea. Fever and gastrointestinal symptoms (nausea, vomiting, or diarrhea) may be present. The Centers for Disease Control and Prevention (CDC) established diagnostic criteria for PID in 2015, although these are not always present and the diagnosis may not be simple (Baquedano Mainar et al., 2020). The most specific diagnostic criteria are laparoscopic findings, though laparoscopy is not indicated except for doubtful severe cases or torpid evolution (Risser et al., 2017). It is therefore important to establish a diagnosis of suspected PID in sexually active females with risk factors in order to initiate a prompt treatment and avoid possible complications or sequelae such as chronic pelvic pain, ectopic pregnancy, or infertility.

Within Sierra Leone, malaria transmission occurs year-round with seasonal intensification during the rainy season (May-November), and malaria constitutes a leading cause of morbidity and mortality across all population groups (WHO, 2023). Pregnant adolescents face compounded malaria risk due to prim gravidity status (first pregnancies associated with reduced antimalarial immunity), inadequate utilization of preventive interventions (intermittent preventive treatment in pregnancy [IPTp], insecticide-treated bed nets), delayed care-seeking for febrile illnesses, and coexistent nutritional deficiencies that exacerbate disease severity (Brabin et al., 2004).

Poverty represents the fundamental structural determinant of nutritional inadequacy, constraining household capacity to procure sufficient quantities and diversity of nutritious foods necessary to meet the elevated nutritional requirements of pregnancy. Sierra Leone's national poverty rate of 56.8%, with rural poverty exceeding 70% in certain districts, creates pervasive household food insecurity affecting most pregnant adolescents, particularly those from socio-economically disadvantaged backgrounds (World Bank, 2023).

Educational attainment demonstrates strong, consistent associations with reproductive health outcomes, nutritional behaviors, and overall health status across diverse contexts, operating through multiple pathways including enhanced health literacy, improved decision-making capacity, delayed marriage and childbearing, increased employment opportunities, and greater autonomy (Gakidou et al., 2010). Within Sierra Leone, female literacy rates remain substantially lower than male

rates, with only 32.4% of women aged 15-24 years classified as literate, reflecting persistent gender disparities in educational access and attainment (UNESCO, 2024).

Aim

To determine the morbidity status of pregnant adolescent girls in three districts in Sierra Leone. (Freetown, Kambia and Moyamba).

Objectives

- To assess the prevalence of morbidity among pregnant adolescent girls in the study areas.
- To identify the common types of morbidity experienced during adolescent pregnancy.
- To examine socio economic factors associated with morbidity in pregnant adolescents.

Methodology

This study aims at determining the morbidity status of pregnant adolescent girls in three districts in Sierra Leone. (Freetown, Kambia and Moyamba). These districts were purposefully selected to represent varying socio-economic and geographic contexts, including rural, semi-urban, and urban populations. Pregnant adolescent girls are particularly vulnerable to malnutrition due to their increased nutritional demands during both adolescence and pregnancy. In Freetown, study sites included St. Anthony's Clinic in the Urban Area and Waterloo Community Health Centre in the rural settlement. In Kambia District, study sites comprised Kambia Government Hospital and peripheral health units in Mafaray Health Centre. In Moyamba District, study sites encompassed Moyamba Government Hospital and peripheral health units in the United Methodist Church (UMC) Taiama Health Centre Kori chiefdom. In order to maximize resource usage and preserve data quality, data was collected sequentially in each of the three districts during the fieldwork phase, which ran from October to December 2024.

502 pregnant teenage girls between the ages of 13 and 19 were chosen at random as part of the quantitative method approach. To give a quick overview of morbidity trends and nutritional difficulties among pregnant teenagers, a descriptive cross-sectional design which is well-known in nutritional research was employed. A systematic questionnaire was employed to collect data for the study. The data were presented in both tabular and graph form, and statistical techniques like descriptive statistics, frequencies, and percentages were employed in the analysis. In order to provide a thorough analysis of the various aspects of health outcomes experienced by pregnant teenage girls in the three different geographical locations of Kambia, Moyamba, and Freetown in Sierra Leone, this methodological configuration was carefully chosen.

The selection of these three districts was purposive and criterion-based, reflecting considerations of ecological diversity (urban versus rural contexts), adolescent pregnancy prevalence, and accessibility for fieldwork operations, and representativeness of broader regional patterns documented in national health surveys (Palinkas et al., 2015; Statistics Sierra

Leone & ICF, 2020). Freetown, as the capital city, represented an urban context with relatively superior healthcare access; Kambia exemplified a northern rural district with documented high adolescent pregnancy rates; and Moyamba typified a southern rural district with persistent food insecurity challenges (UNICEF Sierra Leone, 2018; World Bank, 2020).

Regardless of gestational age, parity, marital status, educational attainment, or socioeconomic status, the target population for this study included all pregnant teenage girls between the ages of 13 and 19 who lived within the borders of the three districts that were chosen: Kambia, Moyamba, and Freetown (Sawyer et al., 2018). Using Cochran's method Cochran (1977), the sample size of the teenage population in the three districts was 502 pregnant teenage girls who were chosen at random to take part in the study. In the three districts, the researcher trained volunteers to distribute surveys and gather data. The data collected was analyzed using the Scientific Programme for Social Sciences (SPSS) version 15.

$$n = \frac{z^2}{3e^2}$$

Where:

n = sample size

p = the population proportions

e = acceptable sampling error (=0.05)

z = z value at the reliability level or significance level.

Reliability level 95% or significance level 0.05; z = 1.94

Reliability level 99% or significance level 0.01; z = 2.58

$$n = \frac{1.94^2}{3(0.05)^2} = 501.813 = 502$$

Inclusion Criteria

The inclusion criteria for the study subjects included all pregnant adolescent girls aged 13-19 years in the three districts. The focus was on those who attended the health facilities.

Exclusion Criteria

The exclusion criteria for this study were any known cases of chronic disease among the target group, including HIV/AIDS, diabetes, hypertension and tuberculosis, as established from the clinical card. Pregnant women who were 20 years and above were excluded.

Ethical Consideration in Research Involving Human Participation

The researcher informed respondents about the purpose of the study, emphasizing that it was conducted solely for academic purposes. Participation was clearly stated to be voluntary, with respondents free to decline or withdraw at any point during the research period. No coercion was involved in the recruitment process. Furthermore, respondents were assured that their privacy would be safeguarded through strict adherence to standards of anonymity.

Results

Morbidity Status of Pregnant Adolescent Girls

Morbidity during pregnancy poses significant risks to maternal health, fetal development, and long term outcomes for both mother and child. Assessing the disease burden among

pregnant adolescents is therefore critical for informing effective healthcare interventions and preventing avoidable conditions. This study investigates the morbidity status of pregnant adolescents in the districts of Freetown, Kambia, and Moyamba in Sierra Leone, highlighting prevalent health conditions, variations across districts, and their implications for maternal and child health.

The findings from the three regions show a variety of disease conditions among participants. In Freetown, malaria was the most prevalent condition, affecting 38.3% of the participants, followed by typhoid at 28.7%. Abdominal pain was reported by 26.9% of participants. Kambia has a high prevalence of malaria at 15.6% and typhoid at 31.7%. Abdominal pain also affects 16.8% of pregnant adolescent girls in Kambia. Moyamba's data shows malaria as the leading condition at 38.7%, with typhoid at 13.7%. Additionally, abdominal pain affects 10.7% of the participants in this region. In general, the total disease conditions across all regions show that the most common issues were malaria, abdominal pain, and typhoid. The total percentage of participants reporting disease conditions was highest in Kambia at 97.6%, followed by Freetown at 93.4% and Moyamba at 86.3%. The percentage of pregnant girls with no disease condition was 7.6%, indicating that most participants were experiencing some form of illness, underlining the need for improved healthcare and disease prevention strategies for pregnant women in these regions.

The results from the three locations indicate that individuals had a range of illnesses. With 38.3% of participants, malaria was the most common illness in Freetown, followed by typhoid

at 28.7%. Of the individuals, 26.9% reported having abdominal pain. Typhoid (31.7%) and malaria (15.6%) are highly prevalent in Kambia. In Kambia, 16.8% of pregnant teenage girls have abdominal pain. According to Moyamba's report, typhoid is at 13.7% and malaria is at 38.7%. Additionally, 10.7% of participants in this location report having abdominal pain. Overall disease conditions in all locations indicate that typhoid, malaria, and abdominal pain were the most prevalent problems. Kambia had the greatest overall percentage of persons reporting medical issues (97.6%), followed by Freetown (93.4%) and Moyamba (86.3%). The majority of participants had some kind of illness, as seen by the 7.6% of pregnant girls who had no disease condition. This highlights the need for better healthcare and disease preventive measures for expectant mothers in these areas.

Malaria was the most common illness among pregnant teenagers, with almost one-third (30.9%) reporting having it. This illness poses a serious threat to maternal health and has a big impact on how pregnancies turn out. Nearly one-quarter (24.7%) of pregnant teenagers have typhoid fever, which is a significant but frequently disregarded maternal health burden. In contrast to its lowest malaria incidence (15.6%), Kambia has the highest typhoid prevalence (31.7%). Different disease ecology and water/sanitation conditions are suggested by this inverted trend. Overall, 18.1% of pregnant teenagers experience abdominal pain, with a notable urban prevalence (26.9% in Freetown). Abdominal discomfort may be influenced by urban-related factors, as indicated by the distinct gradient (Freetown > Kambia > Moyamba).

Table 1: Morbidity Status of Participants (percentage distribution)

Row Labels	Freetown	Kambia	Moyamba	Average
<i>No disease condition</i>	6.6	2.4	13.7	7.6
Abdominal pain	26.9	16.8	10.7	18.1
Anemia	10.2	8.4	11.3	10.0
Back ache	0.6	0.0	0.0	0.2
Common cold	3.0	0.6	0.0	1.2
Fever and headache	3.6	1.2	3.6	2.8
General body weakness	1.8	0.0	0.0	0.6
Hypertension	0.0	0.0	0.6	0.2
Malaria	38.3	15.6	38.7	30.87
Morning sickness	1.2	0.6	6.5	2.8
Odema	1.8	0.0	0.0	0.6
STI	0.0	0.0	1.2	0.4
Typhoid	28.7	31.7	13.7	24.7
<i>Total disease condition</i>	122.7	77.3	100	100.01

Expected Frequencies and Chi-square Test of Morbidity Status on the Pregnant Girls.

The expected frequencies represent the number of cases that would be expected in each location if there were **no association** between disease condition and study location.

Comparison of the observed and expected frequencies reveals several notable differences. For example:

- **Abdominal pain in Freetown** had **50 observed cases** compared with **41.47 expected**, indicating more cases than expected under the assumption of no association.
- **Malaria in Kambia** recorded **26 observed cases**, which was substantially lower than the **44.23 expected cases**, suggesting that malaria occurred less frequently than expected in this district.

- **Malaria in Moyamba** showed **65 observed cases**, compared with an expected **43.81**, indicating a much higher occurrence than expected.
- **Typhoid in Kambia** had **53 observed cases**, considerably higher than the **35.38 expected**, while **Moyamba recorded only 23 cases** compared with an expected **35.05**, indicating fewer cases than expected.

These deviations between observed and expected frequencies contributed to the overall Pearson chi-square statistics. The chi-square analysis produced a value of $\chi^2 = 36.23$ with **4 degrees of freedom**. Since the calculated chi-square value exceeds the **critical value of 9.488** at the **5% significance level**.

The chi-square test indicates a **statistically significant association between disease condition and study location** ($\chi^2 = 36.23$, $df = 4$, $p < 0.001$). This means that the distribution of abdominal pain, malaria, and typhoid is not the same across Freetown, Kambia, and Moyamba. In particular, typhoid was more prevalent than anticipated in Kambia, although malaria was more common than anticipated in Moyamba and less common in Kambia. These results imply that the pattern of morbidity among participants in the three research districts is influenced by contextual and geographic factors.

Table 1b: Percentage Distribution of Morbidity Status of Pregnant Adolescent Girls.

Row Labels	Freetown	Kambia	Moyamba	Average
Abdominal pain	26.9	16.8	10.7	18.1
Malaria	38.3	15.6	38.7	30.9
Typhoid	28.7	31.7	13.7	24.7
Total disease condition	93.9	64.1	63.1	73.7

Source: Field Data 2024

Table 1c: Raw Score Distribution of Morbidity Status of Pregnant Adolescent Girls.

Row Labels	Freetown (167)	Kambia (167)	Moyamba (168)	Total
Abdominal pain	50	28	18	96
Malaria	64	26	65	155
Typhoid	48	53	23	124
Total disease condition	162	107	106	375

Places Where Sick Pregnant Women Sought Medication Based on District Level in the Study Area.

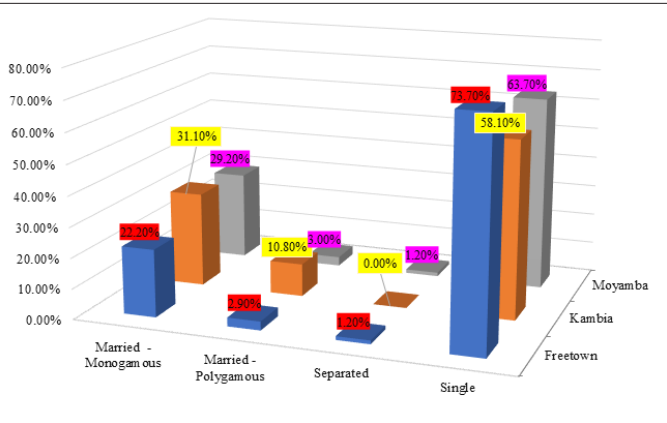
The results show how healthcare preferences are distributed throughout various geographical areas. A sizable percentage of pregnant teenage females in Freetown (55.1%) and Kambia (37.1%) prefer to seek medical attention in health centers.

Health centers are similarly the most popular option in Moyamba, albeit with a lower rate of 22.0%. Only 2.2% of participants in all locations chose pharmacies, indicating that they are not widely used in any of the regions. Compared to Kambia (4.8%), traditional herbs are significantly more popular in Freetown (18.6%) and Moyamba (19.0%). Furthermore, compared to the other regions, where the percentage is still significantly smaller, Moyamba has a higher preference for hospitals (17.9%).

Table 2: Places Where Pregnant Women Sought Medication based on District level (percentage distribution)

Row Labels	Freetown	Kambia	Moyamba	Average
At home	16.8	37.1	20.8	24.9
Health center	55.1	43.7	22.0	40.2
Hospital	3.0	12.0	17.9	11.0
Pharmacy	0.0	0.0	6.5	2.2
Traditional herbs	18.6	4.8	19.0	14.1

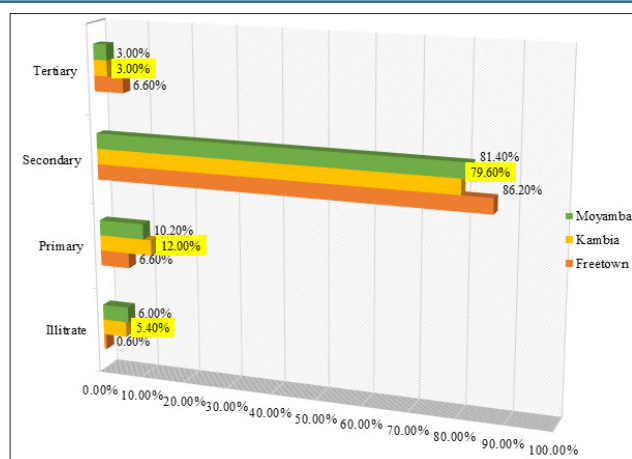
Socio-Economic Status of Pregnant Adolescent Girls in the Study Area. Marital Status of Pregnant Adolescent Girls in the Study Area.



Source: Field Data 2024 N = 502

Figure 1: Distribution by percentage of the Marital Status of Pregnant Adolescent Girls

Figure 1 depicts the marital status distribution of the pregnant adolescent girls, expressed as percentages across categories. From the study, in Freetown, 25.1% were married in which 22.2% were in Monogamous Married while 2.9% were in Polygamous, 1.2% were separated and 73.7% were Single; In Kambia district, 41.9% were married in which 31.1% were in Monogamous Married while 10.8% were in Polygamous, and 58.1% were Single; and in Moyamba district, 31.2% were married in which 29.2% were in Monogamous Married while 3% were in Polygamous, 1.2% were separated and 63.7% were Single; The figure likely indicates that a considerable proportion of pregnant adolescents were unmarried (single or possibly cohabiting), while a smaller proportion were formally married.



Source: Field Data 2024 N = 502

Figure 2: Distribution by percentage of the Educational Status of Pregnant Adolescent Girls

Figure 2 presents the educational status of the pregnant adolescent respondents as percentages across different levels of schooling like illiterate or no formal education, primary, junior secondary, senior secondary, and tertiary or higher Education. This figure describes the formal education levels achieved by the respondents at the time of the study. Educational status is a key socioeconomic indicator; this percentage-based analysis likely highlights the correlation between school dropout rates or limited educational attainment and adolescent pregnancy within the study area.

From the study, in Freetown, 0.6% were illiterate, 6.6% have primary education, 86.2% have secondary Education and 6.6% have tertiary education; in Kambia district, 5.4% were illiterate, 12% have primary education, 79.6% have secondary Education and 3.0% have tertiary education; and in Moyamba District, 6% were illiterate, 10.2% have primary education, 81.4% have secondary Education and 3.0% have tertiary education;

The figure demonstrated that a substantial proportion of respondents have only primary or junior secondary education, with relatively few having completed senior secondary or tertiary education.

Discussions

Malaria is the most common illness, with nearly one-third of pregnant teenage girls reporting having it. This poses a serious threat to maternal health and has a big impact on how pregnancies turn out. The notable disparity between Kambia and Freetown/Moyamba points to either: varying levels of malaria transmission, inconsistent access to preventative measures, disparate diagnostic procedures, or seasonal or temporal variations in data collecting. Surprisingly, urban Freetown's malaria prevalence is comparable to that of rural Moyamba, refuting the notion that urban areas have less transmission. Malaria is a major source of illness and mortality for all demographic groups in Sierra Leone, where it spreads year-round with seasonal intensification during the rainy season (May–November) (WHO, 2023). Pregnant teenage girls in five

sub-Saharan African nations had a roughly 1.7-fold increased risk of clinical malaria during pregnancy compared to adult women, according to a multicounty individual participant data meta analysis conducted by Pons Duran et al. (2022).

Nearly 25% of pregnant teenagers have typhoid fever, which is a significant yet frequently disregarded maternal health burden. In contrast to its lowest malaria frequency, Kambia has the highest typhoid prevalence. Different disease ecology and water/sanitation conditions are suggested by this inverted trend. Water, sanitation, and hygiene (WASH) conditions are reflected in the typhoid pattern: Unsafe water sources, open defecation, inadequate hand hygiene, contaminated food, and cramped living quarters are risk factors. Adolescents may be more susceptible to typhoid because they share food and water sources, eat outside the home, have little awareness about food safety, and practice poor hand hygiene. Age-stratified data from Nigeria, which suggest that pregnant teenagers and young women may bear an especially heavy burden, lend credence to this study. Once more, women under the age of 19 had a 100% seroprevalence of *Salmonella Typhi* in the Shabu community, whereas the 15–24 age range in Niger State had a 66.7% seroprevalence (Reuben et al., 2010). Although no study has specifically focused on pregnant teenagers or looked at dietary and socioeconomic factors in this group, these findings imply that teenage girls may be more susceptible to typhoid in endemic environments.

Overall, 18.1% of pregnant teenagers experience abdominal pain, with a notable urban predominance. Abdominal discomfort may be influenced by urban-related factors, as indicated by the distinct gradient (Freetown > Kambia > Moyamba). Physical immaturity, insufficient uterine development, elevated anxiety, and a lack of prior pregnancy experience are all contributing factors. Pregnancy-related abdominal pain is a frequent symptom that can vary from benign physiological discomfort to potentially fatal obstetric or surgical crises. Clinical guidelines for adolescent girls stress that the differential diagnosis of abdominal discomfort must always take pregnancy and its complications—such as ectopic pregnancy, miscarriage, and premature labor—into account (Vayngortin & Kant, 2019). Reviews of acute abdomen in pregnancy describe a broad spectrum of obstetric and non obstetric causes, and highlight the importance of timely evaluation to reduce maternal and fetal morbidity (Zachariah et al., 2019). However, most studies on abdominal pain in pregnancy include women of all ages, and there is a lack of adolescent specific cohort studies examining the prevalence, causes, and outcomes of abdominal pain in pregnant adolescent girls.

Among the districts examined, Moyamba has the greatest anemia prevalence. This suggests a substantial public health concern, implying that a considerable section of the population may be impacted by anemia, potentially impacting general health and nutritional status. Although Freetown's anemia prevalence was lower than Moyamba's, it nevertheless shows that a significant proportion of pregnant teenage girls in this metropolitan area might be suffering from anemia,

underscoring the need for additional research and possible treatments. Out of the three districts, Kambia has the lowest anemia prevalence (8.4%). Even though it was the lowest, it nevertheless represents a legitimate public health concern that might need attention, especially with regard to eating habits and health education. Anemia was present in 10.0% of districts on average. This summary measure highlights the need for community-wide health activities by showing that anemia may affect a sizable fraction of the population overall. One of the most frequently reported morbidities among teenage girls who are pregnant is anemia. Research that focuses on pregnant adolescents in particular reports high rates of anemia and identifies important factors like low household income, food insecurity, poor dietary diversity, inadequate prenatal care, and insufficient iron-folic acid supplementation (Pinho Pompeu et al., 2017). Infection-related causes, such as intestinal parasites and malaria, exacerbate nutritional deficiencies in this population. However, few therapies have been created and assessed especially for pregnant teenagers, and the majority of the evidence comes from cross-sectional research.

The graph shows that while a lesser percentage of pregnant teenagers were legally married, a significant part were unmarried (single or possibly cohabiting). This tendency is in line with data from other low- and middle-income environments, where adolescents may form unions informally (cohabitation) or become pregnant outside of official marriage (UNICEF, 2021). On the other hand, a large percentage of married respondents in the figure would indicate situations where child marriage is common and teenage pregnancy frequently happens in early relationships (UNFPA, 2020).

The marital status distribution is relevant for understanding social support, legal rights, and access to services. Married adolescents may have some support from spouses and extended families but can also be more exposed to power imbalances, restricted autonomy, and intimate partner violence (WHO, 2018). Unmarried pregnant adolescents may face intense stigma, school dropout, or expulsion from home, which can restrict their ability to seek antenatal and nutrition services (Chandra-Mouli et al., 2015). Thus, the percentages in Figure 1 provides essential context for interpreting patterns in antenatal attendance, nutritional practices, and household support.

The majority (30%) of pregnant adolescents were married, suggesting that early marriage is a significant driver of adolescent pregnancy in this context, as is common in many sub-Saharan African settings (Gyan, 2019). The 65% who were singles may face heightened social stigma and potentially less financial or social support, which can act as barriers to accessing antenatal care (ANC) (Owolabi et al., 2017).

Marital status (e.g., single, married, cohabiting) is a key social determinant of health. It influences access to resources, social support, and autonomy in health-seeking decisions. A high percentage of unmarried adolescents may indicate different support needs and potential stigma, whereas married adolescents might face distinct dynamics regarding spousal influence and household decision-making (Gyan, 2019).

The graph demonstrated that a substantial proportion of respondents have only primary or junior secondary education, with relatively few having completed senior secondary or tertiary education. Limited educational attainment among pregnant adolescents is widely documented and is both a determinant and a consequence of early pregnancy (Wodon et al., 2017). Adolescents with lower levels of education are more likely to marry early, have limited access to reproductive health information, and be less empowered to negotiate safe sexual practices (UNESCO, 2016).

Educational status is also closely linked with health literacy and nutritional knowledge. Adolescents with higher education are generally more likely to understand the importance of antenatal care, dietary diversity, and micronutrient supplementation, and they may be better able to interpret health messages (WHO, 2016). Conversely, low education may be associated with inadequate knowledge about nutritional needs during pregnancy, which is explored later in Figure 2. Therefore, the distribution shown in Figure 4.4 provides a critical backdrop for understanding variations in knowledge and practices among the respondents.

The graph shows the highest level of education attained (Secondary). Educational attainment is strongly correlated with health literacy, economic potential, and empowerment. Lower levels of education are often associated with reduced knowledge of prenatal care and nutrition, perpetuating a cycle of poor health outcomes (Fotso et al., 2021). This data is vital for targeting educational interventions.

Conclusion

According to the morbidity analysis, Sierra Leone's pregnant adolescent population faces serious and almost universal health issues. Significant awareness gaps for anemia and hypertension point to the need for improved screening programs, while the predominance of infectious diseases (typhoid 24.7%, malaria 30.9%) shows weaknesses in the healthcare and environmental systems. Overall, 18.1% of pregnant teenagers experience abdominal pain, with a notable urban predominance. One important social influencer of health is socioeconomic circumstances, such as the pregnant teenage females' marital status. Married people receive more support from their wives and engage in more health-seeking actions. Nutritional awareness and health literacy are also strongly correlated with educational attainment. The study population had relatively little postsecondary education, which led to poor nutritional understanding and health issues.

The district-specific patterns provide evidence for targeted interventions: malaria prevention in Moyamba and Freetown, WASH improvements in Kambia, and universal screening programs across all districts. Addressing this morbidity burden is essential for improving maternal and newborn outcomes in this vulnerable adolescent population.

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