

Prevalence of Anaemia among Pregnant Women Attending Antenatal Care Services in Selected Health Facilities in the West B Region, Zanzibar

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<https://doi.org/10.62049/jkncu.v6i2.551>

Abstract

Anaemia during pregnancy remains a major global public health challenge, with high prevalence in sub-Saharan Africa. Understanding its magnitude among pregnant women receiving antenatal care (ANC) is essential for targeted interventions. This study determined the prevalence of anaemia among pregnant women attending ANC services in selected health facilities in the West B Region, Zanzibar. A cross-sectional descriptive study was conducted among 352 pregnant women attending ANC clinics in selected public and private facilities from March to October 2025. Participants were selected using stratified random sampling of facilities and systematic random sampling of eligible women. Data were collected using structured questionnaires, and haemoglobin levels were obtained from ANC records. Anaemia was defined as haemoglobin <11.0 g/dL based on WHO criteria. Data were analysed using IBM SPSS version 27 with descriptive and bivariate statistics (Chi-square and Fisher's exact tests), with significance at $p < 0.05$. The prevalence of anaemia was 62.2% ($n=219$). Anaemia increased with gestational age ($p < 0.001$), from 32.1% in the first trimester to 77.3% in the third. Higher prevalence occurred among women practicing pica (76.2%), multiparous women (73.3%), those with birth intervals <2 years (68.3%), and those with previous anaemia (72.6%). Anaemia remains a severe public health problem, necessitating early screening, nutritional counselling, improved birth spacing, and strengthened iron supplementation programs.

Keywords: Anaemia, Pregnant Women, Antenatal Care, Prevalence, Zanzibar, Haemoglobin, Gestational Age

Introduction

Anaemia during pregnancy represents one of the most prevalent nutritional deficiencies affecting maternal health globally (WHO, 2021). According to the World Health Organization (WHO, 2025), anaemia remains one of the most prevalent nutritional disorders globally, affecting approximately 37% of pregnant women worldwide. The burden remains disproportionately concentrated in low- and middle-income countries, particularly in sub-Saharan Africa and South Asia, where nutritional deficiencies, infectious diseases, and socioeconomic inequalities continue to contribute to high prevalence rates. Recent evidence from Sub-Saharan Africa further demonstrates substantial geographical disparities in maternal anaemia, with socioeconomic status, educational attainment, parity, and healthcare access remaining important predictors of disease burden (Nyarko et al., 2023). Anaemia is characterized by reduced haemoglobin concentration or red blood cell count, leading to impaired oxygen transport capacity, which during pregnancy poses serious risks to both maternal and foetal health (Wagh et al., 2024).

The consequences of maternal anaemia extend beyond the pregnancy period. For mothers, anaemia increases the risk of fatigue, reduced work capacity, increased susceptibility to infections, postpartum haemorrhage, and in severe cases, maternal mortality (Brittenham et al., 2023). For the foetus and newborn, maternal anaemia is associated with intrauterine growth restriction, preterm birth, low birth weight, impaired cognitive development, and increased perinatal mortality (Owais et al., 2021). The long-term effects include developmental delays and reduced educational achievement in affected children, perpetuating intergenerational cycles of poor health and poverty (Kumar et al., 2022).

In Tanzania, including the semi-autonomous region of Zanzibar, anaemia among pregnant women remains a persistent concern despite ongoing efforts by the government and health development partners to strengthen maternal health services (Sunguya et al., 2022). Previous studies in mainland Tanzania have reported prevalence rates ranging from 40% to over 60% across different regions (Abdallah et al., 2022; Konje et al., 2022). National survey findings continue to identify maternal anaemia as a significant public health concern in Tanzania despite improvements in antenatal care utilization and maternal health services (NBS & ICF, 2023). However, region-specific data from Zanzibar, particularly the West B Region, remain limited, hampering the development of targeted, context-appropriate interventions.

The West B Region of Zanzibar presents a unique setting for investigating maternal anaemia. As the second-largest region in Zanzibar with a population of 380,579, it hosts a mix of urban and semi-urban communities served by one district hospital, 11 health centers, and approximately 49 private facilities. Despite improvements in healthcare infrastructure and antenatal care coverage over recent years, anecdotal reports from healthcare providers suggest that anaemia remains a significant challenge among pregnant women in the region. The complex interplay of dietary practices, infectious diseases (particularly malaria and helminth infections), socioeconomic factors, and reproductive patterns may contribute to the persistence of anaemia in this population (Ngimbudzi et al., 2021).

Understanding the current prevalence of anaemia among pregnant women receiving antenatal care in the West B Region is essential for several reasons. First, it provides baseline data necessary for monitoring progress toward national and global maternal health targets, including Sustainable Development Goal 3, which aims to reduce maternal mortality and improve maternal health outcomes (United Nations, 2020). Second, prevalence data enable healthcare planners and policymakers to allocate resources appropriately

and prioritize interventions. Third, documenting the distribution of anaemia across different demographic and clinical subgroups can reveal vulnerable populations requiring targeted support.

This study therefore aimed to determine the prevalence of anaemia among pregnant women attending ANC services in selected health facilities in the West B Region, Zanzibar, and to describe its distribution across demographic and clinical characteristics. The findings are expected to inform evidence-based strategies for anaemia prevention and management within the region's maternal health services.

Materials and Methods

Study Design and Setting

This was a cross-sectional descriptive study conducted from March to October 2025 in the West B Region, Zanzibar, Tanzania. The West B Region comprises both urban and semi-urban areas and is served by public and private health facilities offering antenatal care services. The region was selected due to its demographic diversity, substantial ANC attendance, and limited existing data on maternal anaemia.

Study Population and Eligibility

The target population comprised all pregnant women of any gestational age attending ANC clinics at selected health facilities in the West B Region during the study period. Inclusion criteria were: (1) confirmed pregnancy, (2) receiving ANC services at a participating facility, and (3) voluntary provision of informed consent. Exclusion criteria included: (1) known haematological disorders unrelated to nutritional anaemia (e.g., thalassemia), and (2) critically ill women unable to provide informed responses.

Sample Size Determination

The sample size was calculated using the Kish and Leslie (1995) formula for prevalence studies. This yielded a sample of 308, which was increased by 10% to account for potential non-responses, resulting in a final sample size of 339. A total of 352 pregnant women were eventually recruited, exceeding the minimum required.

Sampling Procedure

A two-stage sampling strategy was employed. First, health facilities in the West B Region were stratified into public and private categories, and facilities from each stratum were randomly selected to ensure representativeness. Second, systematic random sampling was used to select eligible pregnant women attending ANC at the chosen facilities. Every second woman meeting the inclusion criteria on clinic days was invited to participate until the sample size was achieved.

Data Collection

Data was collected using a structured, pre-tested questionnaire administered in Kiswahili by trained research assistants. The questionnaire captured sociodemographic characteristics (age, education, occupation, income, marital status), obstetric history (parity, gestational age, previous anaemia history, birth spacing), behavioral factors (pica practice, iron supplement use, dietary habits), and healthcare factors (ANC attendance, deworming, malaria testing).

Haemoglobin (Hb) levels were extracted from participants' ANC records, where routine testing is conducted as part of standard care in Zanzibar. According to WHO criteria, anaemia in pregnancy was defined as Hb <11.0 g/dL. Participants without documented Hb results were excluded from prevalence calculations but retained for descriptive analysis where applicable.

Operational Definitions

- Anaemia: Haemoglobin concentration <11.0 g/dL (WHO, 2021)
- Gestational age: Calculated from the first day of the last menstrual period and categorized as 1st trimester (≤ 12 weeks), 2nd trimester (13–27 weeks), or 3rd trimester (≥ 28 weeks)
- Pica: Self-reported consumption of non-food substances such as clay or soil during current pregnancy
- Regular ANC attendance: Attending visits as recommended by healthcare providers

Data Analysis

Data were entered, cleaned, and analysed using IBM SPSS Statistics version 27. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participant characteristics and anaemia prevalence. The overall prevalence of anaemia was calculated as the proportion of participants with Hb <11.0 g/dL among those with available test results.

Bivariate analysis using Chi-square tests (or Fisher's exact test where appropriate) was performed to assess associations between anaemia status and various demographic, obstetric, and behavioral variables. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the Zanzibar Health Research Ethics Committee (ZAHREC) and Kampala International University. Permission to conduct the study was secured from the West B Regional Medical Officer and participating health facilities. All participants provided written informed consent after receiving clear explanations in Kiswahili about the study's purpose, procedures, risks, and benefits. Participation was voluntary, and participants were free to withdraw at any time without affecting their healthcare services. Confidentiality and anonymity were maintained by using unique identification codes and securing all data.

Results

A total of 352 pregnant women participated in this study. The majority (73.6%, $n=259$) were aged 17-30 years, while 26.4% ($n=93$) were aged 31-40 years. Nearly all participants (94.0%, $n=331$) were married, and most had attained secondary education (79.5%, $n=280$). Regarding employment, 52.6% ($n=185$) were unemployed, 42.0% ($n=148$) were self-employed, and 5.4% ($n=19$) were formally employed. Monthly household income was below TZS 50,000 for 49.1% ($n=173$) of participants.

In terms of gestational age, 8.0% ($n=28$) were in the first trimester, 48.3% ($n=170$) in the second trimester, and 43.8% ($n=154$) in the third trimester. Regarding parity, 30.1% ($n=106$) were primigravidae, 52.8% ($n=186$) had 2-4 previous pregnancies (gravida 2-4), and 17.0% ($n=60$) had five or more previous pregnancies (grand multiparas).

Nearly all participants (90.1%, n=317) reported attending ANC visits regularly as recommended. The majority (86.4%, n=304) had been tested for malaria during the current pregnancy, though only 1.3% (n=4) tested positive. Deworming medication had been received by 44.6% (n=157). Regarding birth spacing among multiparous women, 17.9% (n=63) had interpregnancy intervals of less than 2 years, while 52.3% (n=184) reported 2 years or more.

Behavioural practices included iron and folic acid supplementation, with 42.0% (n=148) reporting taking supplements three times weekly, though 61.6% (n=217) admitted sometimes forgetting doses. A notable 40.6% (n=143) reported consuming non-food substances such as clay or soil (pica) during pregnancy. Previous history of anaemia in a past pregnancy was reported by 32.1% (n=113).

Overall Prevalence of Anaemia

Among the 352 pregnant women, anaemia prevalence was 62.2% (n=219), indicating that approximately six out of every ten pregnant women attending ANC services in the West B Region were anaemic (Figure 1). This prevalence falls within the WHO classification of a severe public health problem (prevalence $\geq 40\%$).

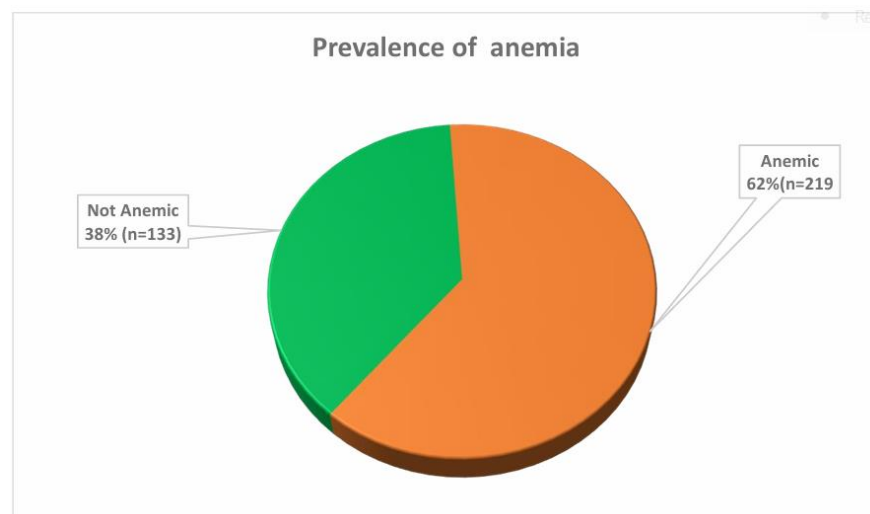


Figure 1: Pie Chart Showing Overall Anaemia Prevalence

Prevalence of Anaemia by Demographic Characteristics

Anaemia prevalence was slightly higher among women aged 31–40 years (68.8%, n=64) compared to those aged 17–30 years (59.8%, n=155), though this difference was not statistically significant ($p=0.13$) (Table 1).

Marital status showed some variation, with divorced women showing 100% anaemia prevalence, though the small sample size (n=4) limits interpretation. Among married women, prevalence was 61.6% (n=204). No statistically significant association was found between marital status and anaemia ($p>0.05$).

Educational attainment showed minimal variation in anaemia prevalence across categories: 62.5% among those with no formal education, 66.0% among primary-educated women, 62.1% among secondary-

educated women, and 50.0% among those with higher education. These differences were not statistically significant ($p=0.75$).

Regarding occupation, unemployed women had the highest anaemia prevalence (67.6%, $n=125$), followed by self-employed (56.8%, $n=84$) and employed women (52.6%, $n=10$), though these differences did not reach statistical significance ($p=0.087$). Similarly, monthly income levels showed no significant association with anaemia prevalence ($p=0.18$), though women earning below TZS 50,000 had slightly higher prevalence (66.5%, $n=115$).

Prevalence by Gestational Age

Anaemia prevalence increased markedly with advancing gestational age ($p<0.001$). In the first trimester, 32.1% ($n=9$) of women were anaemic, rising to 53.5% ($n=91$) in the second trimester and reaching 77.3% ($n=119$) in the third trimester (Table 1). This represented a 2.4-fold increase from first to third trimester.

Prevalence by Obstetric and Reproductive Factors

Parity showed a significant association with anaemia ($p=0.005$). Primigravid women had the lowest prevalence (50.0%, $n=53$), while those with 2–4 previous pregnancies had 65.6% ($n=122$) prevalence, and grand multiparas (≥ 5 pregnancies) had the highest at 73.3% ($n=44$).

Birth spacing also significantly influenced anaemia status ($p=0.003$). Women with interpregnancy intervals of less than 2 years had 68.3% ($n=43$) anaemia prevalence, while those with intervals of 2 years or more had 67.9% ($n=125$) prevalence. First-time pregnancies showed lower prevalence at 48.6% ($n=51$).

Previous history of anaemia in pregnancy was strongly associated with current anaemia status ($p=0.002$). Among women who had experienced anaemia in a previous pregnancy, 72.6% ($n=82$) were currently anaemic, compared to 63.1% ($n=89$) of those without previous anaemia and 49.0% ($n=48$) of first-time mothers.

Prevalence by Behavioral and Health Service Factors

Women who consumed non-food substances (pica) had significantly higher anaemia prevalence (76.2%, $n=109$) compared to those who did not practice pica (52.6%, $n=110$; $p=0.001$).

Frequency of iron and folic acid supplementation showed an unexpected pattern: women taking supplements 2–3 times weekly had higher anaemia prevalence (68.0%, $n=174$) than those taking them 0–1 times (46.9%, $n=45$; $p=0.001$). This likely reflects reverse causality, whereby women already diagnosed with anaemia are prescribed and take supplements more regularly.

Surprisingly, women who received deworming medication had higher anaemia prevalence (75.2%, $n=118$) than those who did not (51.8%, $n=101$; $p=0.001$). This may indicate targeted treatment of women already at higher risk or with existing anaemia.

Malaria testing showed a strong association ($p<0.001$): 69.1% ($n=210$) of women tested for malaria were anaemic, compared to only 18.8% ($n=9$) of those not tested. This pattern likely reflects healthcare seeking behavior and provider practices rather than causation.

Prevalence by Knowledge and Perceptions

Women who identified frequent pregnancies as a cause of anaemia had the highest prevalence (84.1%, $n=90$; $p<0.001$), followed by those mentioning malaria and infections (92.3%, $n=24$; $p=0.001$), and poor diet (66.6%, $n=191$; $p=0.001$). These associations likely reflect that women who have experienced or are at high risk of anaemia are more informed about its causes.

Similarly, women who mentioned taking iron and folic acid supplements as a preventive measure had 70.2% ($n=127$) anaemia prevalence, and those mentioning balanced diet had 66.1% ($n=189$) prevalence ($p=0.001$ and $p=0.002$ respectively).

Table 1: Prevalence of Anaemia among Pregnant Women by Demographic and Clinical Characteristics (N=352)

Characteristic	Total N (%)	Anaemic N (%)	Not Anaemic N (%)	P-value
Overall prevalence	352 (100)	219 (62.2)	133 (37.8)	-
Age (years)				0.13
17–30	259 (73.6)	155 (59.8)	104 (40.2)	
31–40	93 (26.4)	64 (68.8)	29 (31.2)	
Gestational age				<0.001*
1st trimester	28 (8.0)	9 (32.1)	19 (67.9)	
2nd trimester	170 (48.3)	91 (53.5)	79 (46.5)	
3rd trimester	154 (43.8)	119 (77.3)	35 (22.7)	
Marital status				0.36
Single	11 (3.1)	6 (54.6)	5 (45.4)	
Married	331 (94.0)	204 (61.6)	127 (38.4)	
Divorced	4 (1.1)	4 (100.0)	0 (0.0)	
Widowed	6 (1.7)	5 (83.3)	1 (16.7)	
Education level				0.75
No formal education	8 (2.3)	5 (62.5)	3 (37.5)	
Primary	50 (14.2)	33 (66.0)	17 (34.0)	
Secondary	280 (79.5)	174 (62.1)	106 (37.9)	
Higher	14 (4.0)	7 (50.0)	7 (50.0)	
Occupation				0.087
Unemployed	185 (52.6)	125 (67.6)	60 (32.4)	
Employed	19 (5.4)	10 (52.6)	9 (47.4)	
Self-employed	148 (42.0)	84 (56.8)	64 (43.2)	
Characteristic	Total N (%)	Anaemic N (%)	Not Anaemic N (%)	p-value
Monthly income (TZS)				0.18
<50,000	173 (49.1)	115 (66.5)	58 (33.5)	
50,000–100,000	70 (19.9)	36 (51.4)	34 (48.6)	
100,000–200,000	87 (24.7)	55 (63.2)	32 (36.8)	
>200,000	22 (6.2)	13 (59.1)	9 (40.9)	
Parity				0.005*
Primigravida	106 (30.1)	53 (50.0)	53 (50.0)	
Gravida 2–4	186 (52.8)	122 (65.6)	64 (34.4)	

Gravida ≥ 5	60 (17.0)	44 (73.3)	16 (26.7)	
Birth spacing				0.003*
<2 years	63 (17.9)	43 (68.3)	20 (31.7)	
≥ 2 years	184 (52.3)	125 (67.9)	59 (32.1)	
First pregnancy	105 (29.8)	51 (48.6)	54 (51.4)	
Pica practice				0.001*
Yes	143 (40.6)	109 (76.2)	34 (23.8)	
No	209 (59.4)	110 (52.6)	99 (47.4)	
Iron supplement frequency				0.001*
0–1 times/week	96 (27.3)	45 (46.9)	51 (53.1)	
2–3 times/week	256 (72.7)	174 (68.0)	82 (32.0)	
Received deworming				0.001*
Yes	157 (44.6)	118 (75.2)	39 (24.8)	
No	195 (55.4)	101 (51.8)	94 (48.2)	
Tested for malaria				<0.001*
Yes	304 (86.4)	210 (69.1)	94 (30.9)	
No	48 (13.6)	9 (18.8)	39 (81.2)	
Previous anaemia history				0.002*
Yes	113 (32.1)	82 (72.6)	31 (27.4)	
No	141 (40.1)	89 (63.1)	52 (36.9)	
First pregnancy	98 (27.8)	48 (49.0)	50 (51.0)	

*Statistically significant at $p < 0.05$

Discussion

This study found that 62.2% of pregnant women attending ANC services in the West B Region of Zanzibar were anaemic, representing a severe public health problem according to WHO classification (WHO, 2021). This prevalence is substantially higher than the global estimate of approximately 40% (Baldi & Pasricha, 2022) and aligns with findings from other sub-Saharan African settings where anaemia in pregnancy remains endemic despite decades of intervention efforts.

Comparison with Regional and National Data

The prevalence observed in this study is consistent with reports from mainland Tanzania, where studies have documented anaemia prevalence ranging from 40% to over 60% among pregnant women (Abdallah et al., 2022; Konje et al., 2022; Sunguya et al., 2022). Specifically, Abdallah et al. (2022) reported 57.2% prevalence in Mbeya region, while Konje et al. (2022) found 48.4% in Mwanza City. Recent multi-country analyses continue to show that maternal anaemia remains highly prevalent across Sub-Saharan Africa, with socioeconomic disadvantage, high parity, and limited access to quality maternal healthcare emerging as consistent predictors (Nyarko et al., 2023). The higher prevalence in the West B Region suggests possible regional variations in risk factors, dietary practices, infection burden, or quality of antenatal care services.

Compared to neighboring East African countries, this prevalence is similar to rates reported in Ethiopia (44.6% by Gebremedhin et al., 2014) and Kenya (56% in some regions; Mwaniki et al., 2020), but higher than rates in some areas of Uganda. The consistency across East African settings points to shared underlying determinants, including nutritional inadequacy, high infectious disease burden, and socioeconomic challenges common to the region.

Gestational Age and Physiological Demands

The progressive increase in anaemia prevalence with advancing gestational age from 32.1% in the first trimester to 77.3% in the third trimester represents one of the most striking findings of this study. This pattern is well-documented in the literature and reflects the physiological hemodilution of pregnancy, wherein plasma volume expands disproportionately to red cell mass, particularly in the second and third trimesters (Gebre et al., 2015). Additionally, iron requirements increase substantially during pregnancy to support fetal growth, placental development, and expansion of maternal red cell mass, rising from approximately 0.8 mg/day in the first trimester to 6-7 mg/day in the third trimester (WHO, 2015).

This finding underscores several programmatic implications. First, early initiation of ANC during the first trimester is critical to establish baseline haemoglobin status and commence iron supplementation before physiological demands peak. Second, intensified monitoring in the third trimester is essential for detecting and managing anaemia before delivery, when haemorrhage risk is highest. Third, postpartum follow-up should be strengthened, as women entering delivery with severe anaemia face elevated risks of maternal mortality and prolonged postpartum anaemia affecting breastfeeding and infant outcomes.

Parity and Reproductive Stress

The significant association between increasing parity and anaemia prevalence (50.0% in primigravidae rising to 73.3% in grand multiparas) reflects the cumulative nutritional depletion associated with repeated pregnancies. Each pregnancy draws upon maternal iron stores, and without adequate recovery time and nutritional rehabilitation between pregnancies, women progressively deplete their reserves (Tamakloe et al., 2024). This pattern has been consistently observed across multiple African settings (Yaw Addo et al., 2018; Fite et al., 2021).

Similarly, the elevated anaemia prevalence among women with short interpregnancy intervals (<2 years: 68.3%) confirms the importance of birth spacing for maternal nutritional recovery. The WHO recommends a minimum of 24 months between pregnancies to allow iron store repletion and reduce anaemia risk (WHO, 2018). However, implementation of this recommendation requires strengthened integration of family planning services within ANC and postpartum care, an area where gaps persist in many low-resource settings.

Pica and Geophagia

The finding that 76.2% of women practicing pica were anaemic, compared to 52.6% of non-pica consumers, highlights a critical but often overlooked behavioral factor. Pica, particularly geophagia (consumption of soil or clay), is common in pregnancy across many African communities and may be driven by cultural beliefs, sensory cravings, or physiological responses to micronutrient deficiencies (Young et al., 2011). However, pica can both reflect and exacerbate anaemia through multiple mechanisms: clay and soil contain

non-absorbable substances that bind iron and reduce bioavailability, may harbor parasites (particularly hookworms) that cause intestinal blood loss, and may contain heavy metals that further impair erythropoiesis (Nyanza et al., 2023).

Addressing pica requires culturally sensitive counseling during ANC visits. Healthcare providers must create non-judgmental spaces where women feel comfortable disclosing these practices, and education should explain the risks while offering alternative coping strategies for pregnancy-related cravings. Some programs have successfully reduced pica through peer education and community-based approaches that normalize discussions around the practice (Boateng et al., 2010).

The Paradox of Supplementation and Deworming

The observation that women taking iron supplements 2–3 times weekly and those who received deworming medication had higher anaemia prevalence appears counterintuitive but likely reflects reverse causality and targeted treatment patterns. Healthcare providers typically prescribe more frequent supplementation and deworming to women already identified as anaemic or at high risk, making these variables markers of anaemia severity rather than causes (Onyeneho & Igwe, 2018). This interpretation is supported by the fact that these women likely had lower baseline haemoglobin levels prompting more intensive intervention.

This finding highlights an important methodological consideration: cross-sectional designs cannot establish temporal sequence or causality. It also points to potential issues with supplement adherence, bioavailability of iron formulations used, or insufficient dosage given the severity of deficiency. Studies have shown that gastrointestinal side effects, forgetfulness, and misperceptions about supplement necessity contribute to poor adherence, even when supplements are provided free of charge (Lema & Seif, 2023).

Previous Anaemia History

The strong association between previous anaemia in pregnancy and current anaemia (72.6% vs. 49.0% in first pregnancies) suggests inadequate postpartum anaemia treatment and ongoing risk factor exposure. Many women complete one pregnancy with unresolved anaemia, enter subsequent pregnancies with depleted iron stores, and face recurrent anaemia without intervention. This pattern underscores the need for strengthened postpartum and inter-conception care, including iron supplementation continuation post-delivery, nutritional counseling, and addressing underlying conditions such as parasitic infections and dietary inadequacy (Abdullahi et al., 2019).

Socioeconomic Factors

Although not reaching statistical significance in bivariate analysis, the trend toward higher anaemia prevalence among unemployed women (67.6%) and those with lowest incomes (66.5% among those earning <TZS 50,000) aligns with extensive literature documenting socioeconomic determinants of maternal anaemia (Stevens et al., 2013; Mwangi et al., 2018). In addition, these findings are consistent with recent evidence demonstrating that poverty, educational inequalities, and disparities in healthcare access remain major drivers of maternal anaemia across Sub-Saharan Africa (Nyarko et al., 2023). Poverty limits access to diverse, nutrient-dense foods, particularly animal-source proteins rich in bioavailable heme iron. Women from lower socioeconomic strata also face greater barriers accessing healthcare services, are more

vulnerable to infectious diseases, and have less bargaining power within households regarding food distribution and health resource allocation.

These socioeconomic gradients in anaemia prevalence point to the need for interventions that address structural inequalities, not merely individual-level nutritional education. Cash transfer programs, food supplementation schemes for pregnant women, and economic empowerment initiatives have shown promise in improving maternal nutrition outcomes in several settings (Saaka & Abdulai, 2017).

Limitations

Several limitations should be considered when interpreting these findings. The cross-sectional design precludes causal inference; associations observed do not establish causality or temporal sequence. Self-reported data on dietary habits, supplement intake, and pica practice may be subject to recall and social desirability biases. Haemoglobin values were extracted from routine ANC records, which may vary in quality and standardization across facilities, though all participating facilities used certified laboratory methods.

The facility-based sampling limits generalizability to pregnant women not attending ANC, who may have different anaemia risk profiles. Additionally, the study did not measure serum ferritin, folate, or vitamin B12 levels, limiting ability to distinguish iron-deficiency anaemia from other causes. Seasonal variations in food availability and infection patterns were not accounted for given the relatively short data collection period.

Despite these limitations, the large sample size, inclusion of both public and private facilities, and use of standardized WHO criteria for anaemia definition strengthen the validity of prevalence estimates and provide a robust basis for programmatic planning.

Conclusion

Anaemia affects nearly two-thirds of pregnant women attending antenatal care services in the West B Region of Zanzibar, representing a severe public health problem. The marked increase in prevalence with advancing gestational age, from one-third in the first trimester to over three-quarters in the third trimester, highlights critical intervention windows. Associations with pica practices, high parity, short birth intervals, and previous anaemia history point to modifiable risk factors amenable to intervention through strengthened ANC services.

The high burden persists despite relatively good ANC attendance (90.1%), suggesting that contact with health services alone is insufficient without high-quality, comprehensive care addressing nutrition, infection control, birth spacing, and harmful behaviors. The findings underscore the need for multi-sectoral approaches combining health system strengthening with community-based interventions, economic support for vulnerable women, and culturally sensitive behavior change communication.

Recommendations

Based on these findings, the following recommendations are proposed:

- Early ANC initiation and intensified third-trimester monitoring: Strengthen community mobilization to encourage first-trimester ANC booking, enabling early anaemia detection and prophylaxis before physiological demands peak. Implement mandatory haemoglobin testing in all trimesters with particular attention to the third trimester.
- Culturally sensitive pica counseling: Train ANC providers to routinely screen for pica practices in non-judgmental ways and deliver evidence-based counseling on associated risks. Develop community education materials addressing cultural beliefs while promoting safer alternatives.
- Integration of family planning with ANC: Strengthen linkages between antenatal, postpartum, and family planning services to promote adequate birth spacing (≥ 24 months) and reduce grand multiparity. Ensure immediate postpartum contraceptive counseling and provision.
- Enhanced iron supplementation programs: Review and optimize iron supplementation protocols, including formulation selection to minimize side effects, dosage adjustment based on baseline haemoglobin, and structured adherence support (SMS reminders, community health worker follow-up).
- Comprehensive infection control: Strengthen routine deworming and malaria prevention strategies (ITN distribution and IPTp) integrated within ANC, with particular focus on women with previous anaemia history or risk factors.

Competing Interests

The authors declare no competing interests.

Acknowledgments

The authors express gratitude to the West “B” Regional Medical Officer, health facility administrators, and healthcare providers who facilitated this study. Special thanks to all pregnant women who participated. We acknowledge Dr. Mary Mosha, Director of Postgraduate Studies and Research at Kampala International University, for her oversight and support.

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