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RESEARCH ARTICLE

PREVALENCE AND PREDICTIVE FACTORS OF ANAEMIA DURING PREGNANCY AT MPENDAE HEALTH CENTRE, ZANZIBAR, TANZANIA

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Abstract

Background: Maternal anaemia is a significant public health concern in sub-Saharan Africa, particularly in Tanzania, where estimates suggest that 40-57% of pregnant women may be affected. This condition during pregnancy can lead to serious health risks, affecting both mothers and their unborn children, ultimately contributing to increased complications and even higher mortality rates.
Objectives: The study aims to assess the prevalence of anaemia in pregnant women attending antenatal care services at Mpendae Health Centre in Zanzibar and associated sociodemographic factors, diet, obstetric factors, and socioeconomic factors.
Methods: A cross-sectional study was conducted in healthcare facilities involving 200 pregnant women. Data on sociodemographic characteristics, dietary habits, obstetric history, and socioeconomic status of families were collected through structured interviews. Correlations were assessed using odds ratios (ORs) and 95% confidence intervals (CIs).
Results: Anaemia prevalence was 84.0% (168/200). Significant dietary predictors included low meal frequency, inadequate intake of iron-rich foods (OR=0.57; 95% CI 0.50–0.65), poor adherence to iron–folic acid supplementation (OR=0.238; 95% CI 0.182–0.312), and pica (OR=27.62; 95% CI 4.01–190.28). Obstetric factors associated with anaemia were high parity, short inter-pregnancy intervals, late ANC initiation, and prior history of anaemia. Socioeconomic determinants included low household income (OR=0.137; 95% CI 0.094–0.200), food insecurity (OR=0.185; 95% CI 0.134–0.254), and limited social support.
Conclusions: Anaemia is very common and multifactorial in this group, resulting from malnutrition, pregnancy and childbirth risks, and low socioeconomic status. Therefore, interventions should include nutritional counseling, iron and folic acid supplementation, obstetric care, and structural strategies such as women's education, economic empowerment, and enhanced social support.
Keywords: Anaemia, antenatal care, dietary intake, iron-deficiency, nutritional status, pregnancy, socioeconomic factors, Zanzibar.

INTRODUCTION

Anaemia in pregnancy continues to pose a significant public health issue, especially in low- and middle-income countries (LMICs), where the burden persists despite decades of intervention[1]. Globally, pregnant women have markedly increased iron requirements, but many start their pregnancy with insufficient iron levels. Recent data from Tanzania suggest that a substantial proportion of pregnant women have depleted iron reserves: nearly 38 percent of pregnant women in a baseline survey had serum ferritin deficiency[2]. In these situations, the likelihood of experiencing anaemia during pregnancy rises notably, especially as pregnancy advances and the maternal iron demand escalates.

The prevalence of anaemia among pregnant women in Sub-Saharan Africa (SSA) remains significantly high. A systematic review and meta-analysis conducted in 2021, reported a pooled prevalence of approximately

35.6 percent, underscoring that more than one in three pregnant women in this region are affected[3]. Some studies further identified key determinants of anaemia, including intestinal parasitic infection, lack of iron and folic acid (Fe/FA) supplementation, and pregnancy in the third trimester. These factors illustrate the multifaceted causes of anaemia during pregnancy, involving nutritional, infectious, and health service-related components[4-6]

Maternal anaemia has profound implications for both maternal and neonatal health. A recent meta-analysis in SSA found a strong association between maternal anaemia and low birth weight (LBW), with anaemic women having over three times the odds of delivering[7] LBW infants (adjusted OR=3.37, 95% CI: 2.66–4.27). Low birth weight, in turn, is a key driver of neonatal morbidity and mortality, contributing substantially to poor perinatal outcomes[8]. In addition, anaemia during pregnancy is linked to preterm delivery, intrauterine growth restriction, and increased risk of perinatal death. These adverse outcomes create a vicious cycle of poor child health, diminished cognitive development, and long-term economic consequences for communities.

In Tanzania, despite national efforts to reduce maternal anaemia, the problem remains persistent. According to a pooled analysis of the 2004/05 and 2015 Tanzania Demographic and Health Surveys, approximately 57 per cent of pregnant women were anaemic, and this prevalence showed little decline over time[9,10]. Differences in anaemia across regions and demographic groups highlight the uneven impact of interventions, as well as underlying social determinants, including education, food insecurity, and access to antenatal care.

More recently, a community-based study in Ilala Municipality, Dar es Salaam, found that 57.2 percent of pregnant women were anaemic[11]. Some studies identified a range of associated factors: third trimester, short inter-pregnancy interval, inadequate uptake of antenatal preventive services (such as Fe/FA supplementation and intermittent preventive treatment for malaria, IPTp), poor appetite, low dietary diversity (especially low consumption of meat/fish, dairy, vegetables, and fruits), and low educational level. These findings underscore how socioeconomic, behavioural, and service related factors intersect to maintain a high anaemia burden even with preventive programs in place[12,13].

In addition, infection remains an important contributor. A recent multi-country analysis of 17 sub-Saharan African nations (using results from Malaria Indicator studies from 2016–2022) found the prevalence of malaria–anaemia comorbidity in pregnant women was as high as 39 per cent[14] . Key risk factors included poor household wealth, lack of education, rural residence, and inadequate use of preventive measures such as insecticide-treated nets or indoor residual spraying[15]. This co-occurrence of malaria and anaemia illustrates the layered vulnerability of pregnant women in endemic settings and points to the need for integrated, multisectoral strategies[16].

These high prevalence rates and complex drivers highlight that emerging interventions must go beyond biomedical approaches. Although iron supplementation, IPTp, deworming, and health education have been scaled up nationwide in Tanzania, evidence suggests that the problem is far from resolved. For example, national health data show that while haemoglobin testing coverage among pregnant women has improved, severe anaemia has not declined substantially, signaling ongoing gaps in clinical management, service delivery, or social determinants[17].

Given this background, there is a pressing need to reassess the current epidemiology of maternal anaemia in Tanzania in light of existing programs, shifting socio-economic contexts, and evolving health system capacities. Localized, up-to-date data are critical to tailor interventions more effectively. Such data can help identify high-risk subgroups, whether by gestational age, dietary behaviour, or access to preventive services, and inform targeted policies[9].

Therefore, the study aims to investigate the occurrence, intensity, and contributing factors of anaemia among pregnant women residing in Zanzibar. By filling this knowledge gap, we hope to provide evidence to support context-specific strategies to reduce maternal anaemia, improve pregnancy outcomes, and ultimately strengthen maternal and child health in Tanzania.

METHODS

An analytical and descriptive cross-sectional study was carried out over a three-month period at Mpendae Health Centre in Zanzibar. The study included all pregnant women who sought antenatal services during this timeframe. A total of 200 participants were selected through non-probability convenience sampling, with the sample size determined using Cochran's formula for cross-sectional studies: n=1 + Nn0 - 1n0. Previous research estimated that 20.3% of the target population would fall within this group[18].

Eligible participants were pregnant women who provided informed consent, while those with chronic illnesses unrelated to anaemia were excluded. Data were gathered through a structured questionnaire administered by an interviewer. This assessed socio-demographic characteristics, dietary habits, healthcare utilization, cultural beliefs, obstetric history, and relevant medical conditions. The researchers developed a structured questionnaire based on WHO antenatal care guidelines (WHO, 2016), the DHS standard questionnaire (ICF, 2018), FAO dietary assessment tools (FAO, 2011), and previous literature on anaemia in pregnancy[19-21]. Additional information, including haemoglobin levels, antenatal visit patterns, and adherence to supplementation, was obtained from medical records.

Laboratory tests included venous blood sampling to measure hemoglobin concentration and to screen for malaria and parasitic infections. Anaemia was classified according to World Health Organization (WHO) criteria as mild (10.0–10.9 g/dL), moderate (7.0–9.9 g/dL), and severe (<7.0 g/dL) (22). The dependent variables were Anaemia status, while the

independent variables included socioeconomic, birth, nutritional, and demographic factors. Data were entered and analyzed using SPSS software, with descriptive statistics used to summarize participant characteristics and Anaemia prevalence, and inferential analyses (chi-squared tests and logistic regression) to identify associated factors.

Ethics approval and consent from participants

Ethical approval for this study was obtained from the Zanzibar Health Research Institute (ZAHRI; approval number ZAHREC/02/ST/MAR/2025/235), and informed consent was obtained from all the participants.

RESULTS

Among the 200 pregnant women included in the study, 168 women (80.8%) reported being told by a healthcare provider that they had anaemia during the current pregnancy, while 32 women (15.4%) reported not having anaemia. This indicates a high prevalence of anaemia among pregnant women attending the hospital. These findings suggest that anaemia is a common health concern in this population, highlighting the need for strengthened antenatal screening and nutritional interventions. Table 1, shows the Socio-demographic factors associated with anaemia. The Cross-tabulation analysis revealed that age, marital status, education, occupation, and parity were all significantly associated with anaemia during pregnancy (p<0.001 for all). Women aged 20–29 years and those in their first or second pregnancies showed the highest prevalence of anaemia. Married and self-employed women also demonstrated higher anaemia rates compared with widows or salaried employees. Lower educational attainment was linked to increased anaemia prevalence, with women having no formal or primary education disproportionately affected. These findings underscore the critical influence of socio-demographic determinants on maternal anaemia, highlighting the need for targeted interventions that consider age, parity, education, and occupational status to improve maternal health outcomes in antenatal populations.

Table 1: Cross-tabulation of socio-demographic factors associated with anaemia during pregnancy at Mpendae Hospital, Zanzibar (n=168).

Factor	Prevalence of anaemia (%)	χ^2 (df)	*p*-value	Likelihood ratio/OR (*p* value)
Age	<20 yrs: 25 (14.8) 20–29 yrs: 95 (56.6%) 30–39 yrs: 48 (28.6 %) ≥40 yrs: 0	128.571 (3)	<0.001	LR=115.82, p<0.001
Marital status	Unmarried: 19 (11.3%) Married: 134 (79.8%); divorced: 15 (8.9 %) widow: 0 (0%)	146.121	<0.001	LR=135.70, p<0.001
Level of education	No formal: 11 (6.5%), primary: 79 (47.0%) Secondary: 78 (46.5%), University: 0 (0%)	120.923	<0.001	LR=98.54, p<0.001
Occupation	Unemployed: 72 (42.9%); self-employed: 96 (57.1%); salaried: 0 (0%)	92.541	<0.001	LR=80.16, p<0.001
Number of pregnancies	1: 26 (15.4%) 2–3: 96 (57.2%) ≥4: 46 (27.4%)	59.585	<0.001	LR=70.26, p<0.001

Table 2: An association between dietary factors with anaemia at Mpendae Hospital, Zanzibar (n=168).

Factor	Prevalence of anaemia (%)	χ^2 (df)	*p* value	OR/Likelihood ratio (95% CI, *p* value)
Meals per day	1–2: 95 (56.6%) 3: 53 (31.5%) >3: 20 (11.9 %)	108.425 (2)	<0.001	LR=106.575, p<0.001
Food frequency	Every day: 24 (14.2%); 2–3 days/week: 37 (22.1%) Rarely: 107 (63.7%); never: 0 (0%)	79.949 (3)	<0.001	LR=68.999, p<0.001
Vitamins/supplements	Yes: 40 (23.8%) No: 128 (76.2%)	67.725 (1)	<0.001	OR=0.238 (0.182–0.312),
Food cravings/aversions	Yes: 145 (99.3%), No: 23 (42.6%)	94.369 (1)	<0.001	OR=27.62 (4.01–190.28),
Specific cravings	Clay: 65 (38.7%) Ice: 45 (26.8%); Lime/chalk: 35 (28.8%) None: 23 (13.7%)	100.433 (3)	<0.001	LR=101.101, p<0.001
Dietary counselling	Yes: 168 (100%), No: 0 (0%)	85.135 (1)	<0.001	OR=1.88 (1.36–2.61)
Consuming enough iron-rich foods	Yes: 72 (42.9%) No: 96 (57.1%)	21.429 (1)	<0.001	OR=0.57 (0.50–0.65), p<0.001
Tea/coffee with meals	Yes: 164 (97.6%) No: 4 (2.4%)	173.545 (1)	<0.001	OR=0.024 (0.009–0.063)

Table 2 showed that all dietary factors were significantly associated with anaemia during pregnancy (p<0.001). Women who consumed fewer meals per day or rarely ate nutrient-rich foods were more likely to be anaemic. Supplement use was low, and those not taking iron/folate tablets had higher prevalence of anaemia (OR=0.238, 95% CI 0.182–0.312). Cravings for non-food items such as clay or ice were strongly associated with anaemia (OR=27.62, 95% CI 4.01–190.28), suggesting potential pica and micronutrient deficiencies. Despite high dietary counselling coverage (92.5%), many women reported inadequate intake of iron-rich foods (OR=0.57, 95% CI 0.50–0.65). Tea or coffee consumption with meals, which inhibits iron absorption, was highly prevalent (82%) and strongly correlated with anaemia (OR=0.024, 95% CI 0.009–0.063). These findings highlight the critical role of dietary behaviors in maternal anaemia and the need for targeted nutrition interventions during pregnancy. Table 3, shows the Obstetrics factors associated with anaemia: Analysis of obstetric factors revealed signify-cant associations with anaemia during pregnancy (p<0.001). Women with higher parity or short inter-pregnancy intervals were more likely to develop anaemia. Inadequate antenatal care attendance and advanced gestational age were also associated with increased risk. Pregnancy complications, especially heavy bleeding and severe abdominal pain, showed strong correlation with anaemia (OR=0.077, 95% CI 0.046–0.130).

Table 3: Cross-tabulation of obstetric factors with anaemia during pregnancy (n=168) at Mpendae Hospital, Zanzibar (N=200).

Factor	Prevalence of anaemia (%)	χ^2 (df)	*p* value	OR/Likelihood ratio (95% CI, *p* value)
Number of pregnancies	1st: 83 (49.4%) 2–3: 74 (44.1%) ≥4: 11 (6.5%)	139.092 (2)	<0.001	LR=126.966, p<0.001
Time since last pregnancy	<1 yr: 95 (56.5%) 1–2 yr: 35 (20.9%) >2 yr: 38 (22.6%)	70.748 (2)	<0.001	LR=79.342, p<0.001
Antenatal care attendance	Regular: 135 (80.4%) Not regular: 33 (19.6%)	79.121 (1)	<0.001	OR=0.196 (0.145–0.267),
Gestational age	1st trimester: 35 (20.9%) 2nd: 65 (38.6%) 3rd: 68 (40.5%)	38.095 (2)	<0.001	LR=50.494, p<0.001
Pregnancy complications	Yes: 155 (92.3%) No: 13 (7.7%)	131.217 (1)	<0.001	OR=0.077 (0.046–0.130),
Type of complications	Heavy bleeding: 77 (45.8%) Severe abdominal pain: 84 (50%) Severe headache/other: 7(4.2%)	157.265 (2)	<0.001	LR=139.160, p<0.001
Iron supplements in previous pregnancies	Yes: 168 (100%) No: 0 (0%)	200.000 (1)	<0.001	LR=175.868, p<0.001
History of anaemia in previous pregnancies	Yes: 123 (73.2%) No: 45 (26.8%)	60.853 (1)	<0.001	OR=0.268 (0.209–0.344)

Table 4: Socioeconomic factors and anaemia during pregnancy (N=200) at Mpendae Hospital, Zanzibar (n=168).

Factor	Prevalence of anaemia (%)	χ^2 (df)	*p* value	OR/likelihood ratio (95% CI, *p* value)
Household income	<50,000 TZS: 145 (86.4%) 50,000–100,000 TZS: 23(13.6%)	100.433 (1)	<0.001	OR=0.137 (0.094–0.200),
Primary source of water	Piped water: 162 (96.4%) Borehole/well: 6 (3.6%)	162.406 (1)	<0.001	OR=0.036 (0.016–0.078), p<0.001
Access to healthcare facility	Yes: 134 (79.8%) No: 34 (20.2%)	77.345 (1)	<0.001	OR=0.202 (0.150–0.273), p<0.001
Distance to nearest health facility	<5 km: 56 (33.3%) 5–10 km: 79 (47.1%) >10 km: 33 (19.6%)	79.121 (2)	<0.001	LR=85.774, p<0.001
Household assets ownership	Bicycle: 99 (58.9%) Motorbike: 69(41.1%) Car: 0 (0%)	123.942 (2)	<0.001	LR=107.912, p<0.001
Primary income earner in household	Yes: 38 (22.6%) No: 130 (77.4%)	8.936 (1)	0.003	OR=0.774 (0.713–0.840), p=0.003
Household food insecurity	Yes: 137 (81.5%) No: 31 (18.5%)	82.842 (1)	<0.001	OR=0.185 (0.134–0.254), p<0.001
Membership in community support groups	Yes: 54 (32.1%) No: 114 (67.9%)	14.090 (1)	<0.001	OR=0.679 (0.612–0.753), p<0.001

A history of anaemia in previous pregnancies further increased susceptibility (OR=0.268, 95% CI 0.209–0.344). Receipt of iron supplements in previous pregnancies appeared protective, although all women who received supplements in this sample reported anaemia, highlighting potential issues with adherence or timing of supplementation. Overall, the findings emphasize the important role of obstetric history and pregnancy management in mitigating maternal anaemia.

Socioeconomic factors associated with anaemia (Table 4): Socioeconomic analysis showed a significant association between maternal anaemia and household factors (p<0.05). Women from lower-income households (<50,000 TZS) were more likely to have anaemia (OR=0.137, 95% CI 0.094–0.200). Limited access to safe water sources, poor proximity to healthcare facilities, and lack of access to household assets also increased anaemia risk. Food insecurity was strongly associated with anaemia (OR=0.185, 95% CI 0.134–0.254). Women who were not the primary income earners or members of community support groups had higher anaemia prevalence. These findings highlight the influence of socioeconomic conditions on maternal anaemia, underscoring the need for integrated social and health interventions.

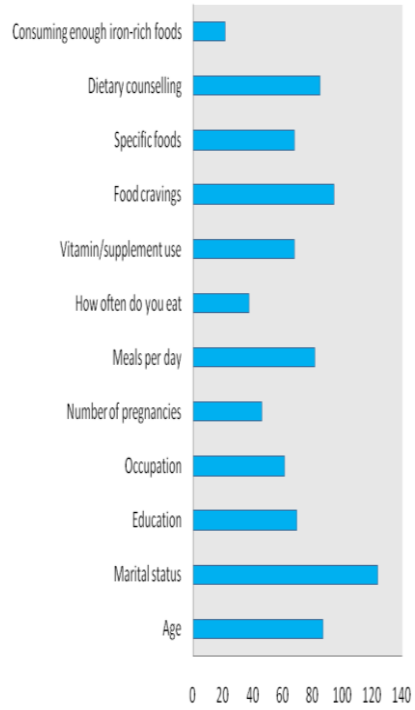

Figure 1: Univariate Logistic Regression, associations of potential factors with anaemia in pregnancy.

Figure 1, illustrates the univariate logistic regression. It indicates the strength of association between various maternal, dietary, obstetric, and socioeconomic factors and anaemia in pregnancy, expressed as chi-square (χ^2) statistics. Overall, nearly all variables demonstrated highly significant associations (p<0.001), but the magnitude of the χ^2 scores highlights which factors contributed most strongly. Among dietary factors, drinking tea or coffee with meals and consuming insufficient iron-rich foods showed some of the highest χ^2 values, indicating a strong relationship between poor dietary iron availability and anaemia. Obstetric variables such as being previously given iron, history of complications, and specific obstetric complications also showed strong associations, reflecting the influence of pregnancy-related medical conditions on anaemia risk. Sociodemographic indicators such as marital status, source of water, and income ranked highly, suggesting that socioeconomic disadvantage plays a substantial role in anaemia vulnerability. In contrast, factors such as being the primary income earner and membership in community support groups showed lower χ^2 values, indicating weaker but still significant associations. Overall, the figure reveals that anaemia in pregnancy is a multifactorial condition shaped by intersecting nutritional, obstetric, and socioeconomic determinants.

DISCUSSION

In this facility-based sample of 200 pregnant women who attend antenatal care (ANC) at Mpendae Health Centre, the prevalence of anaemia was alarmingly high, with 168/200 (84.0%) of women diagnosed during the index pregnancy. This rate far exceeds recent national and regional estimates, highlighting a major public health concern. National surveys and facility-based studies in Tanzania typically report prevalence between 25.5–57%, while some urban centers, including Dar es Salaam, report rates between 40–60%[9,23]. The prevalence observed in Ethiopia (25.6%) is not aligned with our findings.

Dietary insufficiencies emerged as a major contributor to anaemia in our study. Women with low dietary diversity, infrequent consumption of iron-rich foods, or fewer daily meals had significantly higher anaemia prevalence, with poor self-reported intake of iron-containing foods associated with increased risk. These findings align with multiple studies in South Africa showing that inadequate dietary diversity and low intake of animal-source foods are strong predictors of maternal anaemia[24,25]. Low adherence to iron–folic acid supplementation (IFAS) was also strongly associated with anaemia consistent with Tanzanian evidence of sub-optimal coverage due to late ANC initiation, supply gaps, and side-effect concerns[18,26]. Additionally, culturally embedded practices such as pica were highly prevalent and strongly linked to anaemia (OR=27.62; 95% CI 4.01–190.28). In a fascinating study, researchers found that pregnant women who consumed soil had notably lower levels of ferritin at ($p = 0.001$) prior to conception and at concentrations diagnostic of iron deficiency ($p = 0.022$) compared to women who did not eat soil. Geophagia was therefore associated with lower ferritin ($p \leq 0.001$) and lower haemoglobin ($p < 0.05$)[27]. Furthermore, habitual consumption of tea or coffee with meals, reported by 97.6% of parti-cipants, demonstrated a negative association with haemoglobin p<0.001 in line with the known inhibitory effects of tannins on non-heme iron absorption[28-31].

Obstetric factors also played a crucial role in our study. Higher parity and short inter-pregnancy intervals were associated with increased anaemia risk, consistent with evidence across SSA that closely spaced pregnancies exacerbate maternal iron depletion[32,33]. Women with a history of anaemia in prior pregnancies had a higher likelihood of recurrence (OR=0.268; 95% CI 0.209–0.344), reflecting insufficient postpartum iron repletion and family planning support[34]. Late ANC initiation and advanced gestational age were linked to increased prevalence of anaemia, likely due to reduced exposure to preventive interventions such as IFAS, malaria prophylaxis, and deworming, compounded by physiological haemodilution and increased fetal iron demands in later trimesters[35-37]. Obstetric complications, particularly antepartum bleeding and severe abdominal pain, were presented in about half of patients with anaemia (OR=0.077; 95% CI 0.046–0.130) χ^2, $p<0.001$**,** reinforcing evidence that hemorrhagic events are direct proximate causes of maternal iron loss in SSA[38].

Sociodemographic and socioeconomic factors further influenced anaemia risk. Younger women (20–29 years), those with lower educational attainment, married women, and those who were self-employed exhibited higher prevalence, reflecting patterns of socioeconomic vulnerability documented in Tanzania and across SSA[39]. Wealth status was a strong predictor: women from households earning <50,000 TZS (86.4%) had markedly higher association to anaemia $p<0.001$ echoing multi-country analyses showing that poverty constrains access to nutrient-rich foods, health services, and preventive interventions. Aligning with our study, Wanjiku in Gambia and Sunguya in Tanzania, found a significant association between the husband's occupation and anaemia status, which therefore reflects the importance of considering household economic factors in anaemia prevention[40,41]. Similar to reports from Nigeria, Tanzania and Sub-Saharan Africa[42-45]. Food insecurity was similarly associated with elevated risk (OR=0.185; 95% CI 0.134–0.254), and limited access to safe water and healthcare facilities likely compounded susceptibility through increased exposure to infections such as malaria and helminths, which impair iron status[46-48]. Notably, women who were not primary household earners or not involved in community support groups had higher anaemia prevalence, suggesting that financial autonomy and social capital facilitate better dietary practices and health-seeking behavior[49].

The evidence highlights that maternal anaemia in this group is influenced by a complex mix of factors related to diet, pregnancy history, and socioeconomic status. The challenges of insufficient nutrition, low adherence to iron and folic acid supplements, cultural practices, high number of previous pregnancies, delayed antenatal care visits, financial constraints, and lack of social support all contribute to this issue. To tackle anaemia effectively, it's essential to go beyond just providing iron supplements. Comprehensive programs should focus on improving dietary variety and encouraging consistent use of supplements.

Additionally, providing culturally appropriate education on practices such as pica and on which foods might block iron absorption is crucial. Access to timely, high-quality antenatal care is also vital. On top of that, broader structural changes, such as promoting women's education, enhancing economic independence, and ensuring better access to clean water and healthcare, are key to reducing inequalities and supporting lasting improvements in maternal health.

Limitations of the study

This study has a few limitations to keep in mind when interpreting the results. First, the cross-sectional design limits the ability to infer causal relationships between the identified risk factors and anaemia during pregnancy. Second, anaemia status was based on self-report ("being told by a healthcare provider"), which may introduce recall or reporting bias and may not fully reflect actual haemoglobin levels. Third, some socioeconomic variables, such as household income and food insecurity, relied on participant self-assessment and may be subject to social desirability bias. Fourth, the study was conducted at a single health facility (Mpandae Health Centre), which may limit the generalizability of the findings to other regions of Zanzibar or Tanzania. Lastly, potential confounding factors such as malaria infection, worm infestations, or genetic haemoglobin disorders were not assessed, although these are known contributors to anaemia in pregnancy in sub-Saharan Africa.

CONCLUSIONS AND RECOMMENDATIONS

The findings from this study reveal that a significant number of pregnant women attending antenatal care at Mpandae Health Centre (80.8%), are experiencing anaemia during their current pregnancies. A range of factors influences this issue. Socioeconomic conditions play a big role, with challenges such as low income, food insecurity, limited access to safe drinking water, and a lack of community support significantly contributing to the problem. On the nutritional side, many women face inadequate dietary intake and limited use of supplements, while habits like drinking tea or coffee with meals and engaging in pica also add to their risks. Further complicating matters are high parity, short intervals between pregnancies, and various obstetric complications, which increase the likelihood of anaemia. These insights emphasize that maternal anaemia is a complex issue with multiple causes. It's therefore crucial to take a comprehensive approach that addresses both the medical aspects and the broader social factors at play to tackle this health concern effectively.

To reduce the high prevalence rate of anaemia among mothers, an integrated approach is necessary. Antenatal screening should be made stronger. This will be facilitated by early haemoglobin analysis, periodic follow-up among anaemic mothers, and improved compliance with iron-folic acid supplementation, which should be enhanced by advice and reminders. Moreover, specific nutritional programs, particularly individualized nutritional advice regarding dietary sources of iron, must be optimized, along with

community programs that address food insecurity. Socioeconomic assistance should be reinforced with enlarged support groups and income-generating projects for mothers from lower socioeconomic classes. Access to health care and clean water should be improved by reducing the distance to attend antenatal care sessions, in addition to facilitating clean water and good hygiene practices that prevent infection-caused anaemia. Obstetric risks should be dealt with through advice regarding ideal timing between births, with health assistance for mothers with previous anaemia or associated dangers. Lastly, additional studies using validated haemoglobin testing, infection screening, haemoglobinopathy screens, and multi site studies can provide clearer information regarding underlying mechanisms.

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AUTHOR'S CONTRIBUTIONS

Okafor CJ: conceptualization, data curation, methodology, investigation, supervision, validation, writing original draft, writing, review, editing. **Makame RH:** conceptualization, data curation, methodology, validation**. Bayard RIB:** data curation, methodology, investigation, validation, writing original draft**. Martin DM:** data curation, validation**. Orihuela LB:** writing original draft. **Obeagu EI:** methodology, validation. Final manuscript was checked and approved by all authors.

DATA AVAILABILITY

The empirical data used to support the study's results can be obtained upon request from the corresponding author.

CONFLICT OF INTEREST

None to declare.

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