

ORIGINAL RESEARCH ARTICLE

Anaemia in pregnancy in Southern Tanzania: Prevalence and associated risk factors

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Abstract

The aim of this study was to screen for and determine the prevalence, severity and determinants of anaemia in pregnant women attending antenatal clinics in south of Tanzania. In this facility-based cross-sectional descriptive study, pregnant women attending antenatal clinics were selected through a convenient non-probability sampling in one district hospital in south of Tanzania. Interviews using standardized questionnaires were conducted, physical examination and determination of haemoglobin levels done. Data analysis was done using SPSS V20.0. A total of 356 pregnant women were included in this analysis. Their mean age was 24.5 ± 2.4 years. The mean haemoglobin level was 10.74 ± 1.39 g/dL and the point-prevalence of anemia in pregnancy was 46.3%. Pregnant women who had severe anaemia were 14(8.5%), while maternal education status, woman's occupation, religion, family average monthly income, breastfeeding patterns and parity were all found to be statistically significant independent predictors for maternal anemia in pregnancy. Anaemia in pregnancy is a serious public health problem in south of Tanzania. We recommend strengthening measures to prevent anaemia in pregnant and women of reproductive age in the study area. (*Afr J Reprod Health* 2020; 24[3]: 154-160).

Keywords: Anemia in pregnancy; Antenatal clinic visit; pregnant women: haemoglobin

Résumé

Le but de cette étude était de dépister et de déterminer la prévalence, la gravité et les déterminants de l'anémie chez les femmes enceintes fréquentant les cliniques prénatales du sud de la Tanzanie. Dans cette étude descriptive transversale basée sur les établissements, les femmes enceintes fréquentant des cliniques prénatales ont été sélectionnées par un échantillonnage non probabiliste pratique dans un hôpital de district du sud de la Tanzanie. Des entretiens à l'aide de questionnaires standardisés ont été menés, un examen physique et une détermination des taux d'hémoglobine ont été effectués. L'analyse des données a été effectuée à l'aide de SPSS V20.0. Au total, 356 femmes enceintes ont été incluses dans cette analyse. Leur âge moyen était de $24,5 \pm 2,4$ ans. Le taux d'hémoglobine moyen était de $10,74 \pm 1,39$ g / dL et la prévalence ponctuelle de l'anémie pendant la grossesse était de 46,3%. Les femmes enceintes qui souffraient d'anémie sévère étaient au nombre de 14 (8,5%), tandis que le niveau de scolarité de la mère, la profession de la femme, la religion, le revenu mensuel moyen de la famille, les modes d'allaitement et la parité étaient tous des prédicteurs indépendants statistiquement significatifs de l'anémie maternelle pendant la grossesse. L'anémie pendant la grossesse est un grave problème de santé publique dans le sud de la Tanzanie. Nous recommandons de renforcer les mesures de prévention de l'anémie chez les femmes enceintes et en âge de procréer dans la zone d'étude. (*Afr J Reprod Health* 2020; 24[3]: 154-160).

Mots-clés: Anémie pendant la grossesse; Visite à la clinique prénatale; femmes enceintes: hémoglobine

Introduction

Anemia in pregnancy is a public health problem in most developing countries and is associated with increased risk of morbidity and mortality in pregnant women and adverse fetal outcomes¹.

Global estimates show that more than 50% of pregnant women in low- and middle-income countries and approximately 30% of the non-pregnant women suffer from anaemia¹. Globally, more than half of pregnant women in Sub-Saharan Africa are anemic while in South America the

problem has been reported in a quarter of pregnant women¹. Previous studies conducted in Tanzania have shown varying prevalence of anemia among pregnant women ranging between 18% and 68%²⁻⁴.

World Health Organization (WHO) defines anaemia during pregnancy as any state in which hemoglobin level concentration is below 11 g/dl⁵. Hemoglobin levels of 11 g/dl in the late first trimester and of 10 g/dl in the second and third trimesters are considered as the lower limits for hemoglobin concentration⁶. World Health Organization considers anaemia to be of a public health problem if prevalence of anaemia in a population is 5.0% or higher, and a severe public health problem if prevalence in a population is 40% or higher⁷.

Anaemia in pregnancy may affect both the mother and fetus causing maternal morbidity and mortality, birth complications and even fetal deaths⁶. Effects of anaemia during pregnancy are related to its severity. Mild anaemia, for example, may not affect the index pregnancy or labour but may reduce maternal iron stores and affect subsequent pregnancies. Moderate anemia on the other hand may present with significant signs and symptoms which may interfere with daily life of the pregnant woman, while severe anemia is associated with poor maternal and fetal outcome including increased incidences of fetal death, pre-eclampsia, pre-term labour, heart failure and maternal sepsis^{4,6}.

Demographic, economic, obstetrics and socio-cultural factors play a role in the level of hemoglobin among pregnant women¹⁻³. Assessment of these factors is important for effective management of anaemia during pregnancy. Hospital records in the south of Tanzania indicate most pregnant women receiving antenatal care are anemic; however, no studies have been conducted hence the true magnitude of the problem is largely unknown. This study was aimed to screen for and determine the prevalence, severity and determinants of anaemia among pregnant women attending antenatal clinics at a district hospital, south of Tanzania.

Methods

Study design and setting

This cross-sectional hospital-based study was conducted among pregnant women attending antenatal clinics in Mkomaindo District Hospital, Masasi District, Mtwara, Tanzania. The hospital serves as a referral centre to local communities around the district, and an average of 1100 women deliver at the hospital per year.

Sample size and population

The sample size was 356 women of all ages regardless of parity and gestation age. Other inclusion criterion was willingness to participate. Exclusion criteria were pregnant women who were severely ill; women with known chronic disorders like diabetes, previous bad obstetrics history with a known cause; women planned for natal follow-up and delivery to other hospitals; and women who refused to participate.

Data collection

A pre-tested structured questionnaire was used to collect socio-demographic, reproductive and obstetrics data. To assess determinants of anaemia, detailed medical, gynecological, obstetric, family and social history was collected. Potential predicting variables were categorized into two socio-demographic characteristics and reproductive and obstetrics characteristics. *Socio-demographic variables* consisted of woman and family characteristics including age of the woman, residence, woman's level of education, religion, family size, average monthly family income, marital status and woman's occupation. *Woman obstetric variables* included timing of first antenatal clinic visit (first booking), number of antenatal clinics visits, history of breastfeeding and abortion, parity, and gestation age. Physical examination to assess general condition of the patient was done, and vital signs and physical findings recorded. Pregnancy of below 12 weeks was confirmed by clinical assessment, pregnancy test and ultrasonography.

Table 1: Socio-demographic characteristics of pregnant women in southern Tanzania (2017) *

Characteristic	n (%)	
Age (years)		
Mean \pm SD	24.5 \pm 4.9	
<30	263	(73.9)
\geq 30	93	(26.1)
Religion		
Christianity	171	(48.0)
Islam	180	(50.6)
Other	5	(1.4)
Residence		
Urban	152	(42.7)
Rural	204	(57.3)
Education status		
Illiterate	11	(3.1)
Primary	259	(72.8)
Secondary	62	(17.4)
Post-secondary	24	(6.7)
Marital status		
Single	79	(22.2)
Married	261	(73.3)
Divorced	6	(1.7)
Widowed	10	(2.8)
Occupation		
Employed	27	(7.6)
Businesswoman	62	(17.4)
Peasant	267	(75.0)
Household size (members)		
<5	119	(33.4)
\geq 5	237	(66.6)
Average monthly family income (Tanzanian shs)		
<100,000	179	(50.3)
>100,000	177	(49.7)

*, Total number examined was 356; SD, standard deviation

Table 2: Obstetric characteristics of pregnant women in southern Tanzania (2017) *

Characteristic	n (%)	
Timing of the first antenatal visit (months)		
<4	198	(55.6)
4 – 5	113	(31.7)
>5	45	(12.7)
Number of antenatal clinic visits		
\leq 4	293	(82.3)
>4	63	(17.7)
Gravidity		
Primigravid	147	(41.3)
Multigravid	209	(58.7)
Gestational age		
First trimester	64	(18.0)
Second trimester	85	(23.9)
Third trimester	207	(58.1)
Breastfeeding		
Yes	345	(96.9)
No	11	(3.1)
History of abortion(s)		
Yes	49	(13.8)
No	307	(86.2)

*, Total number examined was 356

Table 3: Prevalence and severity of anemia among pregnant women in southern Tanzania (2017) *

Characteristic	n (%)	
Mean Hb concentration (g/dL)		
Mean \pm SD	10.7 \pm 1.4	
Anemia status		
Anemia	165	(46.3)
Non-anemic	191	(53.7)
Anemia severity**		
Mild	57	(34.5)
Moderate	94	(57.0)
Severe	14	(8.5)

* Total number examined was 356; ** Calculated for anemic women; SD, standard deviation; Hb, hemoglobin

Haemoglobin level estimation and Complete Blood Counts analysis: Using 75% ethanol-alcohol as disinfectant and sterile single-use disposable lancet to finger-prick, we collected capillary blood sample from the fingertip of each pregnant woman. We used a portable hemoglobinometer (HemoCue AB, Angelhom, Sweden) to determine hemoglobin concentration from the collected samples of capillary blood of each pregnant woman. Adequate control measures were taken on each test procedure to ensure safety of subjects and reliability of the results.

Statistical analysis

Statistical analyses were performed using SPSS version 20.0, Chicago, USA. Descriptive characteristics (mean \pm standard deviation) and percentages were performed separately for each parameter. Chi-square tests and logistic regression analyses were performed to assess the association between variables. The strength of association was measured by unadjusted odds ratio (OR) and 95% confidence interval (CI). The differences in mean hemoglobin levels within different groups of pregnant women were analyzed by one-way analysis of variance (ANOVA). All statistical tests were conducted at a 0.05 level of significance.

Results

Sociodemographic characteristics and prevalence of anemia among pregnant women

The mean age of pregnant women participating in this study was 24.5 \pm 4.9 years (range 14-48),

Table 4: Factors associated with anemia among pregnant women seeking ANC in southern Tanzania (2017) *

Variable	N	n	(%)	OR (95% CI)	P value
Age					
<30	263	123	74.5	1.1(0.7 – 1.7)	0.8
≥30	93	42	25.5		
Residence					
Urban	152	72	43.6	1.1(0.7 – 1.6)	0.7
Rural	204	93	56.4		
Education					
Primary	270	138	83.6	2.3(1.4 – 3.8)	0.001
Post-primary	86	27	16.4		
Occupation					
Employed (public or private)	89	25	15.2	0.4(0.2 – 0.6)	<0.0001
Peasants	267	140	84.8		
Household size (members)					
<5	119	49	29.7	0.7 (0.5 – 1.1)	0.2
≥5	237	116	70.1		
Average monthly family income (Tanzanian shs)					
<100,000	179	116	70.1	4.8(3.1 – 7.5)	<0.0001
>100,000	177	49	29.7		
Timing of the first antenatal visit (months)					
<5	311	144	87.3	1.0(0.5 – 1.8)	1.0
>5	45	21	22.7		
Number of antenatal clinic visits					
≤ 4	293	136	82.4	1.0(0.6 – 1.8)	1.0
>4	63	29	17.6		
Gravidity					
Primigravid	147	56	33.9	0.6(0.4 – 0.9)	0.01
Multigravid	209	109	60.1		
Breastfeeding					
Yes	345	164	99.4	9.1(1.1 – 71.6)	0.01
No	11	1	0.6		
History of abortion(s)					
Yes	49	21	12.7	0.8(0.5 – 1.6)	0.6
No	307	144	87.3		
Gestational age					
Below third trimester	149	49	29.7	0.4(0.3 – 0.6)	<0.0001
Third trimester	207	116	70.1		

N, Number examined; n, number anemic; OR, odds ratio; CI, confidence interval

where the majority (73.9%) were aged younger than 30 years. Table (1) shows that most women were rural residents (57.3%), with primary education (72.8%), married (73.3%), peasants (63.8%) and residing in households with five or more members (66.6%).

Obstetric characteristics of the study population

Table (2) shows that the majority of pregnant women were multigravid (58.7%), were in the third trimester of pregnancy (58.1%), visited the ANC clinic before more than four months

(55.6%), visited the ANC clinics four times or less (82.3%), breastfed in the past (84.5%) and had no history of abortion (86.2%).

Prevalence and severity of anemia among pregnant women

Table (3) shows that the mean Hb concentration among pregnant women seeking ANC in southern Tanzania was 10.7 ± 1.4 g/dL, where 46.3% of women were anemic. Of anemic women, more than half had moderate anemia followed by those having mild (34.5%) and severe (8.5%) anemia.

Determinants of anemia among pregnant women

Table (4) shows that socio-demographic factors associated with anemia were level of education ($p=0.001$), occupation status ($p<0.0001$), and average monthly family income ($p<0.0001$); whereas obstetrics factors were gravidity ($p=0.001$), breastfeeding ($p=0.001$) and gestational age ($p<0.0001$).

Discussion

The overall prevalence of anaemia among pregnant women in this cross-sectional study was 46.3%. According to WHO classification of the public health importance of anaemia⁷, the observed figure implies anaemia in pregnancy is a serious public health problem in the study setting. This overall prevalence of anemia is higher than those reported in northern Tanzania (18.0%), Turkey (27.1%) and Ethiopia (21.6%)^{2,8,9}. However, it is lower than those reported in eastern Sudan (62.6%) and southwest Ethiopia (53.9%), respectively^{14,15}. Such differences could be attributed to the differences in geographical locations and diseases pattern in the study settings. For example, the high prevalence of malaria in eastern Sudan and southwest Ethiopia likely contributed to the observed high prevalence rates of anemia in the two study areas.

The finding that 8.5% of Tanzania pregnant women were severely anemic (haemoglobin levels less than 7g/ dl) is four-fold higher than that reported in northern Tanzania and eight-fold higher than that reported in Addis Ababa, Ethiopia (1.19%)^{2,14}; but lower than that reported in southeast Ethiopia (12.5%) and southeast Nigeria (12.9%)^{10,15}. This discrepancy could be attributed to sociocultural, economic and nutritional factors differences among pregnant women in the study settings. The high proportion of severe anemia cases in southern Tanzania compared to other parts of the country could also be attributed to other factors that worsen or weaken the implementation of anemia preventive measures.

Different socio-demographic factors play a role in the occurrence of anaemia in pregnancy.

In this study, anemia was reported to be associated with socio-demographic factors such as being illiterate or having a primary level of education ($p=0.001$), occupation status of the pregnant woman ($p<0.0001$), and average monthly family income ($p<0.0001$). The high prevalence of anemia observed in these women might be due to poverty and lack of proper knowledge on how to prevent anaemia. These findings are similar to those reported elsewhere^{2,8,17}.

Similarly, gravidity ($p=0.01$), breastfeeding ($p=0.01$) and gestational age ($p<0.0001$) were associated with anemia in pregnancy. However, factors such as timing of the first antenatal visit, number of clinic visits, and history of abortion were found to be non-determinants of anemia. The findings are in-line with those reported elsewhere^{3,9,17}. Being multipara and having breastfed babies have effect on the contribution of anemia to the next pregnancies.

Limitations

This study is limited by being hospital-based in a single ANC clinic and adopting convenience sampling. As a result, its findings cannot be generalized to the whole population. In addition, it mainly assessed socio-demographic and obstetric factors but did not include hematological, hereditary, household and dietary factors. Therefore, the contribution of these important factors in the causation of anemia remains unknown. It is therefore recommended that further studies that will involve other hematological and biochemical investigations should be conducted to identify the specific causes of anemia in the pregnant mothers to enable proper management of women with the problem.

Conclusion

Anemia is a serious public health problem among pregnant women seeking ANC in southern Tanzania, with the majority being moderately anemic. It is therefore recommended to provide health education on anemia and to strengthen preventive measures against anemia among pregnant women and those of child-bearing age.

Ethical Consideration

The study protocol was approved by the Institutional Review Board of Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China and the Internal Ethical Committee of the Archbishop James University College, Songea, Tanzania. Written informed consent was obtained from all participants.

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Authors' Contributions

JRC and WSSK conceived and designed the research. JRC, FPM, MMM and WSSK performed the experiments, analyzed the collected data, and drafted the manuscript. FPM and JM provided critical revisions of the manuscript. All authors contributed to the writing of the manuscript and approved the final manuscript.

Competing Interests

All authors declare that they have no potential conflicts of interests.

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