ORIGINAL RESEARCH ARTICLE

Prevalence and risk factors for anaemia among pregnant women attending antenatal clinic at Benue State University Teaching Hospital, North-central Nigeria

DOI: 10.29063/ajrh2022/v26i12s.17

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Abstract

In developing countries such as Nigeria, anaemia in pregnancy is thought to be one of the most common complications of pregnancy accounting for a significant level of maternal morbidity and mortality. The aim of this study was to determine the prevalence of anaemia in pregnancy among women attending the booking Antenatal Clinic (ANC) in Benue State University Teaching Hospital (BSUTH), North-Central, Nigeria. A cross-sectional descriptive study was conducted from May 2019 to January, 2020 on 299 women. A structured interviewer administered questionnaire was used to obtain socio-demographic, clinical, and nutritional information from pregnant women attending the clinic who consented to participate in the study. Haematocrit levels were stratified according to the World Health Organisation's (WHO) classification as follows: <7mg/dL - severe, 7–8.99mg/dL - moderate, 9-10.99mg/dL - mild anaemia and ≧ 11mg/dL - non-anaemic. Data were analysed using SPSS version 25.0. Chi-square test was conducted to determine relationships. Multivariate logistic regression model was used to identify the risk factors for anaemia among pregnant women. P-value <0.05 and odds ratio with a 95% confidence interval were used to assess the association. The mean age of respondents was 29.9, ranging from 18 – 40 years. One hundred and twenty-three (41.1%) women were anaemic (haemoglobin [Hb] < 11.0 g/dL). The majority (95.1%) of these anaemic patients were mildly anaemic, whereas 4.9% were moderately anaemic. There was no case of severe anaemia (Hb < 7.0 g/dL). The prevalence of anaemia was significantly higher in those within the age group of 20-24 years and those with lower levels of education (P < 0.05). The patient's gestational age, number of miscarriages and birth interval had no significant relationship with the haemoglobin concentration among the pregnant women in this study (P > 0.05). However, parity, clinical features such as fever, and practices like use of haematinics and non-consumption of meat, poultry and fish were significantly related to anaemia (P < 0.05). The pregnant women who did not take haematinics were 5.8 times likely to develop anaemia (OR=5.8, 95%CI [2.3, 14.5]) while pregnant women who did not eat meat, poultry or fish were 9 times more likely to become anaemic than pregnant women who ate (OR=9.0, 95%CI [1.0, 79.5]). The prevalence of anaemia in pregnancy is high among women attending booking antenatal clinic at BSUTH, North-Central, Nigeria, and requires specific intervention that address the identified risk factors. *(Afr J Reprod Health 2022; 26[12s]: 161-168).*

Keywords: Anaemia, antenatal clinic, booking, packed cell volume (PCV), pregnant women

Résumé

Dans les pays en développement comme le Nigéria, l'anémie pendant la grossesse est considérée comme l'une des complications les plus courantes de la grossesse, responsable d'un niveau important de morbidité et de mortalité maternelles. Le but de cette étude était de déterminer la prévalence de l'anémie pendant la grossesse chez les femmes fréquentant la clinique prénatale (ANC) de réservation à l'hôpital universitaire d'État de Benue (BSUTH), centre-nord, Nigéria. Une étude descriptive transversale a été menée de mai 2019 à janvier 2020 sur 299 femmes. Un questionnaire structuré administré par un intervieweur a été utilisé pour obtenir des informations socio-démographiques, cliniques et nutritionnelles auprès des femmes enceintes fréquentant la clinique qui ont consenti à participer à l'étude. Les niveaux d'hématocrite ont été stratifiés selon la classification de l'Organisation mondiale de la santé (OMS) comme suit : < 7 mg/dL - sévère, 7–8,99 mg/dL - modéré, 9 - 10,99 mg/dL - anémie légère et ≧ 11 mg/dL - non-anémique. Les données ont été analysées à l'aide de SPSS version 25.0. Le test du chi carré a été effectué pour déterminer les relations. Un modèle de régression logistique multivariée a été utilisé pour identifier les facteurs de risque d'anémie chez les femmes enceintes. Une valeur de p < 0,05 et un rapport de cotes avec un intervalle de confiance à 95 % ont été utilisés pour évaluer l'association. L'âge moyen des répondants était de 29,9 ans, allant de 18 à 40 ans. Cent vingt-trois (41,1 %) femmes étaient anémiques (hémoglobine [Hb] < 11,0 g/dL). La majorité (95,1 %) de ces patients anémiques étaient légèrement anémiques, tandis

que 4,9 % étaient modérément anémiques. Il n'y a eu aucun cas d'anémie sévère (Hb < 7,0 g/dL). La prévalence de l'anémie était significativement plus élevée chez les personnes âgées de 20 à 24 ans et chez celles ayant un faible niveau d'éducation (P < 0,05). L'âge gestationnel de la patiente, le nombre de fausses couches et l'intervalle entre les naissances n'avaient pas de relation significative avec la concentration d'hémoglobine chez les femmes enceintes de cette étude (P > 0,05). Cependant, la parité, les caractéristiques cliniques telles que la fièvre et les pratiques telles que l'utilisation d'hématiniques et la non-consommation de viande, de volaille et de poisson étaient significativement liées à l'anémie (P < 0,05). Les femmes enceintes qui ne prenaient pas d'hématiniques avaient 5,8 fois plus de risque de développer une anémie (OR=5,8, IC95% [2,3, 14,5]) tandis que les femmes enceintes qui ne mangeaient pas de viande, de volaille ou de poisson avaient 9 fois plus de risque de devenir anémiques que femmes enceintes qui mangeaient (OR=9,0, IC95%[1,0, 79,5]). La prévalence de l'anémie pendant la grossesse est élevée chez les femmes qui fréquentent la clinique prénatale de BSUTH, dans le centre-nord du Nigéria, et nécessite une intervention spécifique qui s'attaque aux facteurs de risque identifiés. *(Afr J Reprod Health 2022; 26[12s]: 161-168).*

Mots-clés: Anémie, consultation prénatale, réservation, hématocrite (PCV), femmes enceintes

Introduction

Anaemia is a global public health challenge. It is the reduction in the haemoglobin concentration in the peripheral blood, below that adequate for age, sex and place of residence[1]. It is one of the most common medical disorders of pregnancy worldwide and is associated with adverse pregnancy outcomes such as increased rates of maternal and perinatal mortality, premature delivery, intrauterine growth restriction, and low birth weight[2]. The WHO defines anaemia in pregnancy as the presence of haemoglobin concentration of less than 11g/dl, and estimates the prevalence of anaemia among pregnant women to vary from 33% to 75% in developing countries and 8.3–23% in developed countries[3].

In developing countries, haemoglobin level of less than 10g/dl is used as indication of anaemia in pregnancy[4]. This level has been justified on the basis of the work of John Lawson, which showed that serious harm to the mother and foetus did not occur until the haemoglobin value was below 10g/dl or packed cell volume less than 30%[4,5]. It has, however, been advised that the WHO definition should be applied for diagnosing anaemia worldwide for the purpose of standardisation[6]. Published rate of prevalence for anaemia in pregnancy in Africa is 35-75% with higher incidence and severity occurring among primigravidae living in malaria endemic areas[7,8]. It is responsible for about 20% maternal deaths in Africa (provide the reference) and 11% maternal deaths in Nigeria[8].

Women often become anaemic during pregnancy because the demand for iron and other vitamins is increased due to the physiological demands of pregnancy. The inability to meet the required level for the substances either as a result of dietary deficiencies or infection gives rise to anaemia[9].

In developing countries like Nigeria, the cause of anaemia is multi-factorial and varies greatly by geographical location, season. and dietary intake. The most common causes of anaemia in Nigeria include nutritional deficiencies of iron and folate, parasitic diseases such as malaria and hookworm; haemoglobinopathies such as sickle cell disease; and recently infection with the human immunodeficiency virus[9]. Most causes of anaemia in pregnancy are preventable. An important factor that is common in the tropics but is often overlooked is socio-economic deprivation. The ability of women to command resources and make independent decisions about their fertility, their health and healthcare also has an impact on maternal anaemia[9]. However, despite the use of iron and folate supplementation and anti-malarial prophylaxis, which are prescribed for pregnant women in ante-natal clinics for the prevention of anaemia, the prevalence of anaemia remains high in Nigeria[10]. This shows that there are other underlying factors that contribute to the high prevalence of anaemia in Nigeria especially where women are afforded a low status in society their health needs are often neglected[11].

Although anaemia in pregnancy is a worldwide public health challenge affecting both developing and developed countries with significant impact on the health of mothers and foetus, its management and control is enhanced by the availability of local prevalence statistics, which is not adequately provided in Nigeria. Therefore, this study aims to determine the prevalence and risk factors? for anaemia among pregnant women attending booking antenatal clinic at BSUTH.

Methods

Study area

The study was conducted in Benue State University Teaching Hospital (BSUTH) located in Makurdi, the capital of Benue State which has a population of about 405,500 people projected from the figures from the 2006 national population census[12]. The hospital is a 300-bed tertiary health care institution with 15 clinical departments and over seven hundred healthcare workers. It serves as a referral centre for primary and secondary care hospitals in the public and private sectors and covers a wide area including Benue, Nasarawa, Kogi, Taraba and parts of Ebonyi, Enugu and Cross-river states. It also serves as a centre for teaching nurses, medical students and for postgraduate training of doctors. The Department of Obstetrics and Gynaecology in BSUTH has 26 obstetrics and 35 gynaecology beds. It has four wards; antenatal, post-natal, labour, and gynaecology wards. The labour ward takes an average of 500 deliveries annually and runs a 24- hour daily service including emergencies with a theatre for operative deliveries. The department has ten resident doctors and thirty-one registered nurses and midwives working under the supervision of eight (8) Consultant Obstetricians and Gynaecologists.

Study design

A cross-sectional descriptive study was conducted from May 2019 to January 2020.

Study population

The study population were pregnant women who attended booking ANC at Benue State University Teaching Hospital, Makurdi.

Estimation of the sample size

The sample size was calculated using the Kish Leslie formula for cross sectional studies[13].

$$n = \frac{Z^2 \mathrm{Pq}}{d^2}$$

Where ***n*** is the desired sample size and ***Z*** is the standard normal deviate usually set at 1.96, which corresponds to the 95% confidence interval and 0.05 degree of accuracy (**d**). The proportion (**P**) of pregnant women with anaemia was 24.5% gotten from a study in northern Nigeria[14]. To compensate for non-response, 10% was assumed as the attrition factor. Therefore, the minimum sample size was 299.

Sampling method

The convenient sampling method was used, such that all eligible pregnant women visiting the booking ANC from May 2019 to January 2020 were consecutively included until the desired sample size was attained. Pregnant women who needed emergency care such as those with pre-eclampsia or eclampsia, human immunodeficiency virus, sickle cell disease, multiple gestation, or women with a history of recent blood transfusion (within the last four months) were excluded from the study.

Data collection

Using a structured interviewer administered questionnaire, participants' socio-demographic characteristics, clinical characteristics, and taking of iron and folic acid supplementation, dietary habits and information on measures to prevent anaemia were obtained.

Laboratory tests for haematocrit were used to obtain data. Whole blood from a venepuncture was collected in a sample bottle containing anticoagulant (EDTA). Capillary tubes were filled with the blood by capillary forces. A minimum of two capillaries were to ensure balance in the centrifuge. The tubes were sealed thoroughly. After five minutes of centrifugation, the haematocrit was measured while the tubes were kept in a horizontal position. A distinct column of packed erythrocytes was visible at one end of the capillary tube. The packed erythrocytes were followed by first a small turbid layer – the buffy coat layer – and then a clear column of plasma. Haematocrit was estimated by calculating the ratio of the column of packed erythrocytes to the total length of the sample in the capillary tube, measured with a graphic reading device. Pregnant women with haematocrit less than 33% were categorised as anaemic, and those with Haemoglobin 33% and above were considered as non-anaemic.

Statistical package for social sciences (SPSS) software version 25.0 was used for descriptive analysis of the data obtained using means, proportions and frequencies. Pearson's Chi-square test was used to test for the association between anaemia and other factors, with $P < 0.05$ used as the level of significance. The Odds Ratio (OR) with 95% Confidence Interval (CI) was used to measure the strength of association between anaemia and variables that were statistically significant on bivariate analysis. Results were presented using tables and charts.

Results

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Table 1: Socio-demographic characteristics of the respondents

Variables		Total (%)	Non-anaemic N (%)	Anaemic N (%)	X^2	P-value
Age	<20	1 (0.3)	0 (0.0)	1 (100.0)	27.5	0.001
	20-24	38 (12.7)	8 (21.1)	30 (78.9)		
	25-29	110 (36.8)	71 (64.5)	39 (35.5)		
	30-34	90 (30.1)	59 (65.6)	31 (34.4)		
	>35	60 (20.1)	38 (63.3)	22 (36.7)		
Ethnicity	Tiv	177 (59.2)	98 (55.4)	79 (44.6)	3.7	0.293
	Idoma	62 (20.7)	43 (69.4)	19 (30.6)		
	Igede	19 (6.4)	11 (57.9)	8 (42.1)		
	Others	41 (13.7)	24 (58.5)	17 (41.5)		
Level of Education	None	2 (0.7)	0 (0.0)	2 (100.0)	8.973	0.030
	Primary	9 (3.0)	2 (22.2)	7 (77.8)		
	Secondary	97 (32.4)	55 (56.7)	42 (44.7)		
	Tertiary	191 (63.9)	119 (62.3)	72 (37.7)		
Employment Status	Employed	141 (47.2)	91 (64.5)	50 (35.5)	3.6	0.06
	Unemployed	158 (52.8)	85 (53.8)	73 (46.2)		

Table 2: Clinical characteristics of the respondents

Variables		Total (%)	Non-anaemic N (%)	Anaemic N (%)	X^2	P-value
Parity	0	98 (32.8)	56 (57.1)	42 (42.9)	12.962	0.044
	1	84 (28.1)	48 (57.1)	36 (42.9)		
	2	46 (15.4)	30 (65.2)	16 (34.8)		
	3	49 (16.4)	28 (57.1)	21 (42.9)		
	4	13 (4.3)	12 (92.3)	1 (7.7)		
	≥5	9 (3.0)	2 (22.2)	7 (77.8)		
Miscarriages	0	182 (60.9)	106 (58.2)	76 (41.8)	4.760	0.446
	1	70 (23.4)	42 (60.0)	28 (40.0)		
	2	34 (11.4)	18 (52.9)	16 (47.1)		
	≥3	13 (4.3)	10 (76.9)	3 (23.1)		
Birth Interval	1-2 years	136 (45.5)	80 (58.8)	56 (41.2)	0.312	0.856
	> 2 years	65 (21.7)	40 (61.5)	25 (38.5)		
	Nulliparous	98 (32.8)	56 (57.1)	42 (42.9)		
Gestational Age (Trimester)	First	53 (17.7)	32 (60.4)	21 (39.6)	1.772	0.412
	Second	111 (37.1)	70 (63.1)	41 (36.9)		
	Third	135 (45.2)	74 (54.8)	61 (45.2)		
History of fever	Yes	131 (43.8)	53 (40.5)	78 (59.5)	32.615	0.001
	No	168 (56.2)	123 (73.2)	45 (26.8)		

Table 3: Anaemia and preventive measures

Variables		Total (%)	Non-anaemic (%)	Anaemic (%)	X^2	P-value
Haematinics	Yes	267 (89.3)	168 (62.9)	99 (37.1)	17.0	0.001
	No	32 (10.7)	8 (25.0)	24 (75.0)		
IPT	Yes	208 (69.6)	130 (62.5)	78 (37.5)	3.7	0.053
	No	91 (30.4)	46 (50.5)	45 (49.5)		
ITN	Yes	195 (65.2)	114 (58.5)	81 (41.5)	0.0	0.847
	No	104 (34.8)	62 (59.6)	42 (40.4)		
Meat/Poultry/Fish	Yes	286 (95.7)	175 (61.2)	111 (38.8)	14.7	0.001
	No	13 (4.3)	1 (7.7)	12 (92.3)		
Vegetables/ Fruits	Yes	266 (89.0)	162 (60.9)	104 (39.1)	4.1	0.042
	No	33 (11.0)	14 (42.4)	19 (57.6)		

Table 4: Logistic regression to ascertain effects of fever, haematinics and consumption of meat/poultry/fish on anaemia in pregnancy

Variables	Coef (B)	S.E.	Odds Ratio (Exp (B))	95% CI		P-value
				Lower	Upper	
Fever	-1.5	0.3	0.2	0.1	0.4	0.001
Haematinics	1.8	0.5	5.8	2.3	14.5	0.001
Meat/Poultry/Fish	2.2	1.1	9.0	1.0	79.5	0.049

come first. Also, you need to present the results of the prevalence of anaemia before this table. What is the overall prevalence of anaemia? We need to know the prevalence of anaemia before you present a table that breaks down the socio-demographic characteristics by the prevalence of anaemia. The order should be – 1) the sociodemographic characteristics of women who participated in the study; 2) the prevalence of anaemia; and 3) the breakdown of the prevalence of anaemia by sociodemographic variables – i.e., bivariate analysis; and 4) multivariate (logistic regression) analysis.

As shown in Table 1, the mean age (SD) of the study participants were 29.9 ± 4.6 and 20.1% of them were >35 years. Most of the study participants were educated up to the level of Secondary school at least (96.3%) with 52.8% unemployed. Anaemia was significantly related to age of respondents (X^2 = 27.493, P-value = 0.001) such that those aged < 25 years had the highest proportion who were anaemic. Anaemia is inversely related to the educational level of the pregnant women to a significant extent (X^2 = 9.0, P-value = 0.030).

As shown in Table 2, majority of the participants, 182 (60.9%) had one or no previous deliveries while 13 (4.3%) had 3 or more miscarriages. As much as 136 (45.5%) had a birth interval of 12-24 months between the pregnancies. A total of 135 (45.2%) participants were in the third trimester, and 111 (37.1%) and 53 (17.7%) were in the second and first trimesters, respectively. There was a history of fever in 131 (43.8) participants. There was a significant relationship between anaemia and parity (X^2 = 12.962, P-value = 0.055). There was also a significant relationship between anaemia and history of febrile illness during pregnancy (X^2 = 32.615, P-value = 0.001).

In Table 3, majority (89.3%) of respondents agreed to taking haematinics, and 208 (69.6%) said they had taken malaria prophylaxis. As much as 34.8% admitted to not using insecticide treated nets. About 95.7% and 89.0% of the women admitted to consuming meat/poultry/fish and fruits/vegetables respectively. Anaemia was significantly related to intake of haematinics (X^2 = 17.0, P-value = 0.001) such that 75.0% of those not taking them were anaemic. Likewise, the consumption of meat/poultry/fish (X^2 = 14.1, P-value = 0.001) with 92.3% of those not consuming them being anaemic.

In Table 4, a logistic regression was performed to ascertain the effects of some variables that showed statistically significant association with Anaemia in pregnancy; history of fever, intake of haematinics, and consumption of meat/poultry/fish on the likelihood that the pregnant women will beanaemic. The pregnant women who did not take haematinics were 5.8 times likely to develop anaemia (OR=5.8, 95%CI [2.3, 14.5]) while pregnant women who did not eat meat, poultry or fish were 9 times more likely to become anaemic than pregnant women who ate (OR=9.0, 95%CI [1.0, 79.5]).

Discussion

The prevalence of anaemia among pregnant women in this study was 41.1%. This prevalence agrees with the quoted range of anaemia in pregnancy in the developing countries which is between 33% and 75%[3]. It is also comparable with 46.0% seen in Enugu[11], 43.5% in Jos[15], and 46.5% in Yobe[16]. The prevalence was however found to below the prevalence rate of anaemia in a cross-sectional survey conducted in four Nigerian States (Jigawa, Katsina, Yobe, Zamfara) where it was estimated to be 61.2% - 88.7%[17]. The possible reason for the lower prevalence of anaemia in this study might be differences in the study area (geographical variation).The commonest type of anaemia in this study was mild anaemia (96.5%). This finding is in agreement with studies carried out in Lagos[5,10]. This similarity could be because their work was a similar environment (temperate) as in this study. There was a statistically significant association between maternal age and prevalence of anaemia. Women aged < 25 years had the highest proportion of those anaemic within the age range. This finding agrees with another research where the highest rate of anaemia was in younger women, especially teenagers and adolescent[8]. It however contradicts results of a study carried out in Enugu[11]. The increased prevalence in the lower age group may be due to nutritional factors and high susceptibility of primigravidae to malaria infection.

The educational level of pregnant women in this study was significantly and inversely related to anaemia. This is similar to the findings in

Kaduna[18], were women who had secondary or higher education were less likely to be anaemic compared to their counterparts. Secondary and higher level of education had been associated with several other good maternal and child outcomes like higher frequency of exclusive breastfeeding, attending antenatal care visits for four or more recommended visits, utilization of skilled attendance during delivery, and health care seeking when the children have pneumonia or malaria[19].

This study found a significant relationship between increasing parity and the incidence of anaemia such that 77% of women who had 5 or more parous experiences were anaemic. This correlates with findings in Kano[20] and Yobe[16] but contrary to findings in Ethiopia[21]. The incidence of anaemia during pregnancy is expected to be higher as the number of pregnancies increases because of the repeated drain on the iron reserves. In fact, multiparity, especially when the pregnancies have occurred in a rapid sequence, is traditionally regarded as a cause of anaemia in pregnancy[22].

This study also did not observe any relationship between prevalence of anaemia and gestational age; however, the proportion of pregnant women with anaemia was highest (43.5%) in the third trimester. This correlates with a study carried out in Jos (52.4%)[15] but differs from the research in Abeokuta (63.9%) where the highest prevalence was seen in the second trimester[23]. This could be explained by the fact that most of the women in this study were in the third trimester and may have missed out on malaria prophylaxis and iron supplementation for a large part of their pregnancies.

The history of febrile illness in the pregnant women was significantly associated with anaemia. This agrees with findings in Uyo Nigeria[22]. Fever may be a proxy for malaria, a major cause of both anaemia and malaria especially in a malaria holoendemic area like Nigeria.

The highest prevalence of anaemia (68.8%) was seen among pregnant women who were not taking their routine haematinics. This prevalence of anaemia correlates with another study which found that anaemia in pregnancy was more common in women who had not been on haematinics than in women who had been taking haematinics[24]. The pregnant women who did not take haematinics were 5.8 times likely to develop anaemia (OR=5.8, 95%CI [2.3, 14.5]). The sanitary effect of iron supplementation on improvement of haemoglobin levels in pregnancy has been documented in various studies25,28,29 which is similar to our study.

In this study, women who admitted to the use of insecticide treated nets (ITN) had the highest prevalence of anaemia of 40.6%. This is in contrast with another research[25] which found that the use of long-lasting insecticide treated net is effective in preventing anaemia caused by malaria in pregnancy. This difference may be attributed to other causes of anaemia in pregnancy besides malaria or improper use of the insecticide treated nets.

In this study, there is a statistically significant relationship between consumption of meat, poultry and fish, with 91.7% of those who admitted to not eating these, being anaemic. This finding was consistent with other studies[15,25]. Pregnant women who didn't eat meat, poultry and fish were 9 times more likely to be anaemic than those who eat them (OR=9.0, 95%CI [1.0, 79.5]).

This finding was consistent with other studies in which pregnant women conducted in Ethiopia who ate red meat[26,27] and Pakistan[28]. The increased concentration of haemoglobin is likely due to the fact that red meat is an important source of haem iron which is a major component of red blood cells[29]. Although there was no association between consumption of vegetables and fruits in this study, it has been reported that pregnant women who did not eat raw vegetables were 8 times more likely to have anaemia compared to pregnant women who ate raw vegetables[30].

Ethical Approval

Ethical clearance was obtained from the Health Research Ethics Committee of the BSUTH, Makurdi (BSUTH/MKD/HREC/2019/86) on 16th April 2019. Consent was obtained from the participants. All aspects of the study were explained on the consent form and clarified to the participants. Numbers were assigned to identify each participant's form therefore none of the information collected was linked to any of the study subjects.

Conclusion

Prevalence of anaemia amongst pregnant women in Benue State University Teaching Hospital is

41.1%. Commonest form of anaemia in this study is mild anaemia. Prevalence was found to be more in the third trimester. Age and level of education were statistically significant factors found to be associated with the presentation of anaemia in pregnancy. Factors related to poor intake of haematinics and poor consumption of meat, poultry and fish were the main risk factors. Therefore, awareness should be built among pregnant women targeting on their feeding habits, iron and folic acid supplementation to minimize the outcomes of anaemia during pregnancy.

Study limitations

Limitations of this study include the fact that it was a hospital-based study hence the findings may not be extrapolated to the general population. Also, because of the short duration of the study, its findings may be influenced by possible seasonal inputs to women developing anaemia.

Conflict of interest

There was no conflict of interest and no funding.

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