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Assessment of Attitude, Knowledge and Prevention of Anemia in Pregnancy among Women Attending Antenatal Care in Udi LGA in Enugu State, Nigeria

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Abstract

This study evaluated the knowledge, attitude and preventive practices towards anemia among women attending ANC in Udi LGA, Enugu State. Anemia is one of the most common nutritional deficiency disorders affecting pregnant women in developing countries, including Nigeria. Anemia during pregnancy is commonly associated with poor pregnancy outcomes and can result in complications that threaten the life of both the mother and fetus. Specific objectives of this study are; to determine the knowledge level of women attending ANC in selected clinics in Udi LGA on anemia, to determine the attitude towards anemia among women attending ANC clinic and to evaluate the knowledge level on preventive measures against anemia among women attending ANC in Udi LGA. A questionnaire-based study was implored to obtain direct information from the respondents and a total of three hundred and eighty-seven (387) respondents were captured. The mean age of the respondents is 32 years. Those between the ages of 26-30 and 31-35 are the highest in number with the frequency of 100 (25.83). Majority of the respondents 159 (46.08) had tertiary education. The results showed that most of the respondents (74.0%) had a good knowledge of anemia in pregnancy. About, 19.2% had an average level of knowledge while 6.8% had a poor knowledge of anemia in pregnancy. It also showed that (59.5%) had a right or excellent attitude towards anemia in pregnancy. About, 27.7% had an average or fair attitude. More so, (75.7%) had an excellent preventive measure towards anemia during pregnancy. Therefore, this study shows that the majority of the respondents have good knowledge, the right attitude and preventive measures towards anemia during pregnancy. Thus more effort is encouraged in sensitization of the public.

Keywords: *Pregnancy, Anemia, Knowledge, Attitude, prevention*

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1. Introduction

Anemia is one of the most common nutritional deficiency disorders affecting pregnant women in developing countries. Anemia during pregnancy is commonly associated with poor pregnancy outcome and can result in complications that threaten the life of both mother and fetus (Suryanarayana *et al.*, 2017). It occurs at all stages of the life cycle, but is more prevalent in pregnant women and young children (Asemota *et al.*, 2013). The average estimates for all-cause anemia attributable mortality were among pregnant mothers as reported by Brabin *et al.* (2001) in his study on an analysis of anemia and pregnancy-related maternal mortality were 6.37, 7.26 and 3.0% for Africa, Asia and Latin America, respectively. Anemia is the second most common cause of maternal death in India and contributing to about 80% of the maternal deaths caused by anemia in South East Asia (Kalaivani, 2009; Mbule *et al.*, 2013). Anemia is also an established risk factor for intrauterine growth retardation, leading to poor neonatal health and perinatal death (Suryanarayana *et al.*, 2017). Among pregnant mothers, the prevalence of anemia in developed countries is 14%, in developing countries 51%, and in India, it varies from 65% to 75% with a high incidence and severity occurring among primigravidae living in malaria endemic areas (Marahatta, 2007; Suryanarayana *et al.*, 2017)

Women often become anaemic during pregnancy because the demand for iron and other vitamins is increased due to physiological burden of pregnancy. The inability to meet the

required level for these substances either as a result of dietary deficiencies or infection give rise to anemia (Miller, 2013).
In pregnancy, anemia has a significant impact on the health of the foetus as well as that of the mother. It is also estimated that anemia is responsible for as much as 20% of all maternal deaths in sub-Saharan Africa. Maternal anemia is a risk factor for infant iron deficiency anemia and, if left uncorrected, can be associated with adverse behavioural and cognitive development in children (Hoque *et al.*, 2007). Fetuses are at risk of preterm deliveries, low birth weights, morbidity and perinatal mortality due to the impairment of oxygen delivery to placenta and foetus (Malhotra *et al.*, 2019). The management and control of anemia in pregnancy is enhanced by the availability of information and sensitization to guide women of child bearing age most especially those already on ANC. Therefore, this study aims at providing Knowledge, attitude and preventive practices towards anemia among women attending ANC in Udi local government area of Enugu state.

2. Methodology

2.1 Study Area

The study was carried out in Primary Health Care Centres (PHC) in Udi local government area, Enugu State. Udi has a rural urban mix. It has 8 political wards and the population are mainly civil servants. Farmers and fishermen also make up the population of Udi. The LGA has 18 Primary Health Care Centers, 18 secondary health facility and other private secondary health facilities. The area has an area of about 897km2 and Population of 234,002 at the 2006 census. From this local government four new development centers were created by Governor Chimaroke Nnamani Administration in the year 2003. These development centers include: Ezedike, Ojebeogene, Udi and Ugwunye local government development centers. Udi Local Government is bounded by the Coordinates: 60191N 70261E, 6.3170N 7.4330E. It is bounded on the North by Igbo-Etiti, on the South by Enugu North, on the East by Enugu East and on the West by Eziagu local government area all in Enugu State.

2.2 Scope of the study

The study was focused on women attending antenatal Care Clinics in selected Primary health Care Centers in Udi.

2.3 Study Design

The study adopted the descriptive design involving cross sectional study because it aims at collection of specific data from a group of people. Cross sectional study is adequate for this study because it focuses on examining the prevalence of certain characteristics or behaviors in population and is useful in estimating disease prevalence and identifying risk factors.

2.4 Study Population

The population for this study covers all women attending ANC within Udi, Enugu State.

2.5 Sample Size Determination

The sample size for this study was calculated using Fisher's formula for cross-sectional studies (Fisher *et al.*, 2002). An average prevalence of anemia in pregnancy in developing countries including Nigeria is put at 60.0% (Ejiofor *et al.*, 2019).

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

Where *n* is the desired sample size
Z- the standard normal variate of confidence interval (95% = 1.96)
P the proportion of pregnant women with anemia

Thus;
n = $1.96^2 \times 0.6(1\text{-}0.6)/0.05\text{^}2$
=1.96 × 1•96 × 0.6 × 0.4/ 0.05 × 0.05
=0.921984/0.0025
=368
To account for no-response, the sample size will be increased by 5%

$$\text{Sample size (n)} = \frac{n}{1 - NRR} = \frac{n}{1 - 0.05} = 387$$

2.6 Sampling Procedure

The researcher purposively selected 9 viable PHCs in udi. Respondents were conveniently selected from the facilities.

2.7 Instrument for Data Collection

Instrument for data collection was a semi-structured questionnaire consisting of four sections which are: Socio-demographic characteristics of the respondents, knowledge of anemia, attitudes towards anemia and preventive measures for anemia.

2.8 Pre- Testing Of Data Collection Instrument (Validity)

Prior to the onset of this research, a pretest was carried out in one of the PHCs in Udi using 10% of the sample size. However, the PHC for the pretest was excluded from the actual study. Pretesting is to ascertain the reliability of the instrument and help to determine the relevance of questions and variables under measurement, remove ambiguity where it exists and train field assistants. It also helps to estimate the maximum time for completion of each questionnaire.

2.9 Data Collection Procedure

Data collection was through interviewer administered questionnaire. This was done through the help of trained data collectors.

2.10 Method of Data Analysis

The Statistical Product for service solution (SPSS) version 22 was used for analysis of data. Information from analyzed data has been presented as descriptive statistics using proportion, percentages, tables and charts.

2.11 Ethical Consideration

A certificate of ethical approval was obtained from the department of Public Health, University of Calabar, and used to apply for ethical clearance from the ethics committee. The purpose and benefits was explained to the respondents and they were assured of keeping their information confidential.

3. Results

3.1 Sociodemographic characteristics of respondents

Table 1 shows the Socio-demographic characteristics of the respondents. Those between the ages of 26-30 and 31-35 are the highest in number with frequency of 100 (25.83%). Those within the range 26-30 at the time of marriage are the highest; 130 (33.59%). Majority of the respondents 159 (46.08%) had tertiary education. In Table 1, those that had number of children within 1-2 are the highest with the frequency of 228 (62.8%). Those with single foetus are 348 (89.92%) bearing the highest percentage. Most of the respondents 275 (71.05%) registered within first trimester. Majority of respondents 155 (40.05%) were in their first trimester. 271 (70.02%) had no previous history of miscarriage, 348 (89.92%) did not suffer from any hemorrhagic disease. Major respondents 194 (50.12%) did not suffer from stress. Also 194 (50.12%) had a light and normal nature of work but Majority had an average hour 5-6hrs of rest per day.

3.2 Knowledge of Anemia in Pregnancy

Table 2 describes the level of Knowledge of Anemia among pregnant women attending ANC. The majority of respondents 348 (89.92%) have heard about anemia and also know what anemia is 193(49.87%). Most of them 232 (60.1%) are aware that anemia is not a fatal condition. The majority 155 (40.05%) know what level of heamoglobin is regarded as normal range. A large number of them 193 (49.87%) are aware of the common symptoms of anemia.

Figure 1 illustrate the Level of Knowledge on anemia among pregnant women attending ANC in Udi and the results showed that most of the respondents (74.0%) had a good knowledge of anemia in pregnancy. About, 19.0% had an average level of knowledge while 7.0% had a poor knowledge of anemia in pregnancy.

Table 1: Sociodemographic characteristics of respondents (387)

Variables	Frequency	Percentages
Present Age (years)		
Less than 20	42	10.8
21 – 25	73	18.8
26 – 30	100	25.8
31 – 35	100	25.8
36 – 40	42	10.8
41 – 45	27	6.9
46 – 50	3	0.7
	387	**100**
Age at time of Marriage		
Less than 20	53	13.6
21 – 25	130	33.5
26 – 30	101	26.0
31 – 35	80	20.6
36 – 40	20	5.1
41 – 45	3	0.7
46 – 50	0	0
	387	**100**
Level of Education		
Primary	35	10.1
Secondary	143	41.4
Tertiary	159	46.0
No formal education	8	2.3
	345	**100**
Number of children		
One - Two	228	62.8
Three – Four	89	24.5
Above 4	23	6.3
None	23	6.3
	363	**100**
Type of Pregnancy		
Single	348	89.9
Twin	27	6.9
Triplet	12	3.1
Quadruplet	0	0
	387	**100**
Gestational month when registered for ANC?		
1-3 months	275	71.0
4-6months	89	22.9
7-9 months	23	5.9
	387	**100**
Present gestational month?		
1-3 months	155	40.0
4-5months	97	25.0
6-7 months	116	29.9
8-9 months	19	4.9
	387	**100**
Previous history of Miscarriage		
Yes	116	29.9
No	271	70.0
	387	**100**
Suffering from any sort of hemorrhagic disease		
Yes	39	10.0
No	348	89.9
	387	**100**
Suffering from stress		
Yes	193	49.8
No	194	50.1
	387	**100**
Nature of work		
Light and normal	193	49.7
Exhaustive	194	50.1
	387	**100**

Table 2: Knowledge of Anemia among pregnant women attending ANC

Variables	Frequency	Percentages
Ever heard about anemia?		
Yes	340	84.8
No	30	7.7
May be	17	4.37
	387	**100**
What is anemia		
Increase RBC count/hemoglobin concentration	39	10.0
Decrease RBC count/hemoglobin concentration	193	49.8
Increase WBC count	58	14.9
Decrease WBC count	97	25.06
	387	**100**
Is anemia a fatal condition		
Yes	38	9.8
No	232	60.1
Maybe	116	30.0
	386	**100**
What is haemoglobin		
Lipid	116	29.9
Sugar	77	19.8
Transport protein	155	40.0
None of the above	39	10.0
	387	**100**
Normal range of hemoglobin		
12.0-15.0gm/dl	194	50.1
15.0-18.5gm/dl	77	19.8
8.5-11.0gm/dl	58	14.9
6.0-8.0gm/dl	58	14.9
	387	**100**
The common symptoms of anemia		
Pale skin	97	25.0
Tiredness	193	49.8
Both a and b	97	25.0
Icterus	0	0
	387	**100**

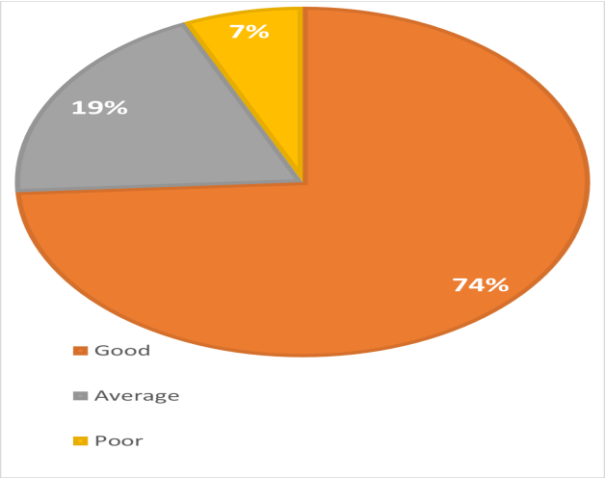

Figure 1: Level of Knowledge on anemia among pregnant women attending ANC in Udi
Score based on, 0-4 points = Poor, 5-6 = average, 7-9 = good

3.3 Attitude towards Anemia

Table 3 shows the attitude of pregnant women attending ANC towards anemia in the study area. A large proportion of women 232 (59.94%) opined that it is possible not to have anemia during pregnancy; most of the respondents 348 (89.92%) know that anemia is not the fate of pregnant women while the majority 365 (95.09%) were of the opinion that anemia does not make pregnancy easy and also a large number 310 (80.1%) know that anemia makes the act of giving birth difficult.

A large number of respondents 348 (94.82%) are aware that anemia makes pregnant women too tired to work. Also, 194 (50.12%) opined that a decrease in growth, development, muscle strength, and IQ are the effects of anemia, 194 (50.12%) knows the causes of anemia.

Figure 2 illustrate the attitude of pregnant women attending ANC in Udi towards anemia in pregnancy and the results showed that most of the respondents (59.5%) had a right or excellent attitude towards anemia in pregnancy. About, 27.7% had an average or fair attitude while 12.8% had a poor attitude towards anemia in pregnancy.

3.4: Preventive Measures for Anemia in Pregnancy

Table 4 describes Preventive Measures of Anemia in Pregnancy. Here, majority of the respondents 348 (89.12%) are aware that pregnant women need to take dietary measures to prevent anemia and most of them 232 (59.94%) know that iron rich food can be incorporated into their food. Meanwhile, highest number of respondents 166 (42.89%) ate 4 times a day, Highest number of respondents 224 (57.88%) took fresh fruit and vegetable daily. Majority of the respondents 348 (89.92%) know that pregnant woman need double diet. Then, 388 (89.92%) do not know about cheap alternative of diet

All the respondents 387 (100 %) are knowledgeable that some food and supplements can be recommended to prevent anemia. Almost all 348 (89.92%) have the view that it is not ideal for pregnant woman to avoid fruits and vegetables and more than half of them 155 (40.05%) opined that vitamin C are recommended as well.

Table 3: Attitude towards anemia in pregnancy

Variables	Frequency	Percentages
Possible not to have anemia when pregnant		
Yes	232	59.9
No	19	4.9
Maybe	136	35.1
	387	**100**
Anemia is the fate of pregnant woman		
Yes	12	3.1
No	348	89.9
Maybe	27	6.9
	387	**100**
Anemia does not make pregnancy easier		
Yes	368	95.0
No	0	0
Maybe	19	4.9
	387	**100**
Anemia makes giving birth difficult		
Yes	310	80.1
No	19	4.9
Maybe	58	14.9
	387	**100**
Anemia makes pregnant women too tired to work		
Yes	348	94.8
No	0	0
Maybe	19	5.17
	367	**100**
If your hemoglobin level is 10g/dl, are you considered as anemic		
Yes	39	10.0
No	309	79.8
Maybe	39	10.0
What are the effects of anemia?		
Decrease muscle strength and IQ	96	24.8
Both a and b	194	50.1
Renal failure	0	0
	387	**100**
What causes Anemia		
Poor diet	116	29.9
Intestinal worm infestation	19	4.9
Severe blood loss	194	50.1
All the above	58	14.9
	387	**100**

Figure 3 depicts the attitude of pregnant women attending ANC in Udi towards anemia. The result shows that majority of the pregnant women have right attitude towards anemia in pregnancy (79%).

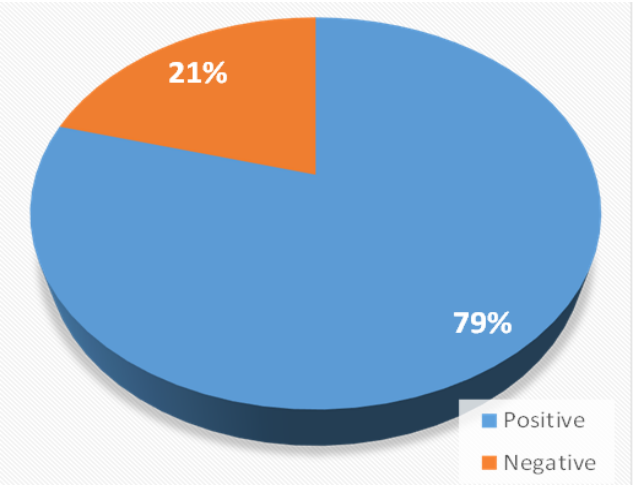

Figure 3: Attitude pregnant women attending ANC in Udi towards anemia in pregnancy
Score based on, 0-4 points = Poor, 5-6 = Fair, 7-9 = good

Then, 232 (59.94%) knows that it is ideal to take adequate folic acid and also 310 (80.1%) respondents have the idea that certain foods hinder iron absorption.
A large proportion 310 (80.1%) know that herbal remedies can be used to prevent anemia, also a larger percentage 232 (59.94%) know that certain groups of pregnant women are susceptible to anemia due to their selective attitude towards vegetables and other rich iron sources.
Lastly, a larger proportion 348 (90.15%) are aware that anemia has some warning signs and can be prevented**.**

4. Discussion

Anemia is one of the most common nutritional deficiency disorders affecting pregnant women in developing countries. Anemia during pregnancy is commonly associated with poor pregnancy outcome and can result in complications that threaten the life of both mother and fetus (Suryanarayana *et al.*, 2017). In order to overcome this, the question of whether the necessary actions that ought to be taken at every stage of pregnancy will help to address and possibly prevent the unfavorable outcomes. Thus this present study which was aimed to determine the knowledge, attitude and preventive practices towards anemia among women attending ANC in Udi LGA, Enugu State.
From our study it was observed that among the respondents, above 50% of the attendees of ANC were of the combination of the ages of 26-30years and 31-35 years. These represent the greater portion of the child bearing age. These were so because from our study, the ages of most of these women at the time of marriage fell at the range of 21- 25years (33.59%).
This research shows that pregnant women attending ANC in Udi have good (74%) level of knowledge on anemia, which could be attributed to the fact majority of them had formal education. This contradicts study by Idowu et al., (2005) which showed a poor knowledge of anemia and pregnancy outcome

among those that visit traditional birth attendants. This research also contradicts the study that was carried out in western northern region of Ghana which showed that 86.5% of pregnant women had insufficient knowledge of anemia. The reason associated to this is the fact that there was education and sensitisation on good nutritional in the diet of pregnant women.

Table 4: Preventive measures for anemia in pregnancy

Variables	Frequency	Percentages
Do pregnant women need to take dietary measures to prevent anemia		
Yes	348	89.9
No	39	10.0
Maybe	0	0
	387	**100**
Can iron rich food be incorporated into a pregnant woman's diet		
Yes	232	59.9
No	19	4.9
Maybe	136	35.1
	387	**100**
Are there specific foods and supplements that can be recommended to prevent anemia during pregnancy		
Yes	387	100
No	0	0
Maybe	0	0
	387	**100**
It is ideal for women to avoid intake of fruits and vegetables?		
Yes	0	0
No	348	89.9
Maybe	39	10.7
	387	**100**
Vitamin C and iron are not recommended for pregnant women		
Yes	116	29.9
No	116	29.9
Maybe	155	40.0
	387	**100**
It is not ideal for a pregnant woman to take adequate folic Acid		
Yes	116	29.9
No	232	59.9
Maybe	39	10.0
	387	**100**

Table 4: *Cont'd*

Is it important for pregnant women to avoid certain foods? and substances as they hinder iron absorption		
Yes	310	80.1
No	19	4.9
Maybe	58	14.9
	387	**100**
Can some Herbal remedies and alternative therapies be used to prevent anemia during pregnancy		
Yes	310	80.1
No	19	4.9
Maybe	58	14.9
	387	**100**
There are certain groups of pregnant women who are susceptible to anemia		
Yes	232	59.9
No	39	10.0
Maybe	116	29.97
	387	**100**
Anemia has some warning signals and can be prevented		
Yes	348	90.1
No	19	4.9
Maybe	19	4.9
	386	**100**

Discussion (*Cont'd*)

Also, majority of pregnant women who attend ANC in Udi LGA, have right attitude towards anemia in pregnancy (79%), which could be attributed to their life style that supports the position of Oumer and Hussein (2019) on right attitude among pregnant women.

Participants knowledge about anemia causes, prevention, and treatments need to be addressed, If knowledge is lacking, this could be problematic for respondents to make decisions based on sound information to reduce anemia risk. As more than three-quarters of participants indicated that they could agree that they know the right form of diet and attitudinal characteristics expected of a pregnant woman in order to overcome anemia.

Evaluation of knowledge of anemia in pregnancy during antenatal care included knowledge that focuses on intake of iron-rich foods, iron supplementation, malaria prophylaxis and also focuses on addressing myths that have potential detrimental effects. For example, blood tonics that contain

alcohol can have a negative effect on the fetus, such as fetal alcohol syndrome.

In the research that was carried out, it was observed that the Level of Knowledge on anemia among pregnant women attending ANC in Udi showed that most of the respondents (74.0%) had a good knowledge of anemia in pregnancy and reason is attributed to the fact that majority had a formal education. About, 19.2% had an average level of knowledge while 6.8% had a poor knowledge of anemia in pregnancy. This strongly contradicts a study that was carried out in Juaboso in western-northern region, Ghana which showed that 86.5% of pregnant women had insufficient knowledge of anemia. The reason that was associated with this is the fact that there was poor education and sensitisation on good nutritional practices in the diet of pregnant women. Also, a study to assess the knowledge and risk factors of anemia among pregnant women in Libya revealed that all of the women had moderate knowledge on anemia.

Majority of the respondents have good preventive measures following their adherence to WHO, 2016 on strategies to prevention of anemia in pregnancy which supports the research by Wondu et al., (2023).

Maternal deaths due to anemia in pregnant women have been reported, Suryanarayana, *et al*. (2017) in his study reported gravida, and education of pregnant women, and bad obstetric history were significantly associated with anemia. A study by Chowdhury *et al* (2015) in Bangladesh also found that education of women was significantly associated with anemia in pregnancy (Chowdhury *et al*.2015) whereas in a study by Singh *et al*. (2015) observed an insignificant association between anemia and gravid.

Conclusion

High prevalence of anemia in pregnant women indicates that anemia continues to be a major public health problem. Anemia in pregnancy increases the maternal and fetal risks. Gravida status, female literacy, and bad obstetric history were important risk factors contributing for anemia in pregnant women. To improve maternal and fetal outcome, it is recommended that the primary health care has to be strengthened and high priority has to be given to certain aspects such as knowledge enhancement, healthy life style, prevention, early diagnosis of high risks pregnancies, and treatment of anemia in pregnancy. This study has shown that pregnant women who attend ANC in Udi LGA, Enugu state have relatively good level of knowledge, right attitude and preventive measures towards anemia in pregnancy.

References

Adeyemi EO, Ojo TO, Quinn M, Brooks B, Oke OA. What factors are associated with anaemia in pregnancy among Nigerian women? Evidence from a national survey. Afri Health Sci. 2023;23(1):373-83. https://dx.doi.org/10.4314/ahs.v23i1.39

Ahmad N. The prevalence of anaemia and associated factors in rural Indian community. Australas Med J 2010;1:276-80.

Allen LH. Anaemia and iron deficiency: Effects on pregnancy outcome. Am J Clin Nutr 2000;7:1280-4.

Anorlu RI, Oluwole AA, Abudu OO. Sociodemographic factors in anaemia in pregnancy at booking in Lagos, Nigeria. *J Obstet Gynaecol*. 2006; 26: 773-776. doi:10.1080/01443610600963846

Asemota, E.A., Antai, & Usanga (2013). Prevalence of Iron Deficiency Anaemia among Pregnant Women in Calabar, Cross River State Nigeria.

Brabin, B. J., Hakimi, M., & Pelletier, D. (2001). An analysis of anemia and pregnancy-related maternal mortality. *The Journal of nutrition*, *131*(2S-2), 604S–615S. https://doi.org/10.1093/jn/131.2.604S

Brodsky, R.A. and Jones, R.J., 2005. Aplastic anaemia. Lancet. 365(9471):1647-56.

Bekele A, Tilahun M, Mekuria A. Prevalence of anemia and its associated factors among pregnant women attending antenatal care in health institutions of Arba Minch town, Gamo Gofa Zone, Ethiopia: A Cross-sectional study. Anemia 2016;2016:1073192.

Charles AM, Campbell-Stennett D, Yatich N, Jolly PE. Predictors of anemia among pregnant women in Westmoreland, Jamaica. Health Care for Women International. 2010. doi:10.1080/07399331003710541

Chowdhury HA, Ahmed KR, Jebunessa F, Akter J, Hossain S, Shahjahan M. Factors associated with maternal anaemia among pregnant women in Dhaka city. BMC Women Health 2015;15:77.

Ejiofor CC, Ozokono RU, Ugwu JI. Prevalence of Anaemia among pregnant women attending 82 division Nigerian army hospitals, Enugu. *Gynecol Obstet Res Open J*. 2019; 6(1): 1-5. doi: 10.17140/GOROJ-6-148.

Ezzati, M, Lopus, A.D., Dogers, A., Vander, H.S., Murray C., 2002. Selected major risk factors and global and regional burden of disease. Lancet 360 : 1347-60.

Gautam VP, Bansal Y, Taneja DK, Saha R, Shah B, Marg Z, *et al*. Prevalence of anaemia amongst pregnant women and its socio-demographic associates in a rural area of Delhi. IJCM 2002;27:157-60.

Guidelines for the management of iron deficiency anaemia, British Society of Gastroenterology (March 2011)

Harper, J.L., Marcel, E.C. and Emmanuel, C. B., 2015. Iron Deficiency Anemia:Practice essentials, Pathophysiology and Etiology.Medscape.

http://www.health24.com/Medical/Anaemia/Anaemia-20130216-2,

20113 Journal of science and technology investigation -ISSN: 2456-8082 **Soundarya, N** et.al JOSTI-Vol-1-1-November-2016: 10- 17

Hoque M, KwaZulu-Natal Kader SB, & l Hoque E SA Fam Pract 2007;49(6):16

Idowu, O. A., Mafiana, C. F., & Dapo, S. (2005). Anaemia in pregnancy: a survey of pregnant women in Abeokuta, Nigeria. *African health sciences*, *5*(4), 295–299. https://doi.org/10.5555/afhs.2005.5.4.295

Ivan EA, Mangaiarkkarasi A.. Evaluation of anaemia in booked antenatal mothers during the last trimester. J Clin Diagn Res. 2013;7:2487–90.

Iyengar K. Early postpartum maternal morbidity among rural women of Rajasthan, India: A community-based study. J Health Popul Nutr 2012;30:213-25.

Kalaivani K. Prevalence and consequences of anaemia in pregnancy. Indian J Med Res 2009;130:627-33.

Kapur, D., Agarwal, K.N., Sharma, S., Kela, K., Kaur, I., 2002. Iron status of children aged 9-36 months in an urban slum Integrated Child Development Services project in Delhi. Indian Pediatr. 139:136-44.

Kilbridge, J., Bakea, T.G., Parapia, L.A., Khoury, S.A., Shugaidef, S.W., Jerwood, D., 1999. Anaemia during pregnancy as a risk factor for iron-deficiency anaemia in infancy: a case-control study in Jordan. Int. J. Epidemiol 28:461-8.

Marahatta R. Study of anaemia in pregnancy and its outcome in Nepal medical college teaching hospital, Kathmandu.

Mbule MA, Byaruhanga YB, Kabahenda M, Lubowa A. Determinants of anaemia among pregnant women in rural Uganda. Rural Remote Health 2013;13:2259.

Mello, J., Gans, K., Risica, P., Kirtania, U., Strolla, L., & Fournier, L. (2010). How is food insecurity associated with dietary behaviors? An analysis with low-income, ethnically diverse participants in a nutrition intervention study. *J Am Diet Assoc.* 110:1906-1911. doi:10.1016/j.jada.2010.09.011.

Miller J. L. (2013). Iron deficiency anemia: a common and curable disease. *Cold Spring Harbor perspectives in medicine*, *3*(7), a011866. https://doi.org/10.1101/cshperspect.a011866

Ministry of Family and Health Welfare. 2002/2003. *District-Level Household Survey*. New Delhi, Government of India.

Mukherjee, K.L., Ghosh, S., 2012. Medical laboratory Technology. Procedure Manual for Routine Diagnostic Tests. Vol I (Second edition), 263-266.

Nair M, Choudhury MK, Choudhury SS, Kakoty SD, Sarma UC, Webster P, *et al.* Association between maternal anaemia and pregnancy outcomes: A cohort study in Assam, India. BMJ Glob Health 2016;1:e000026.

Natasha, S., Yasmin G., 2010. Inkosi Albert Luthuli Central Hospital. Proceedings of South African Thalassaemia Association.

Nepal. Nepal Med Coll J 2007;9:270-4.

Nirman kanna de , Dhanush , Reshma, Bettina Lavanya Magdaline, &Subbulakshmi packirisamy, 2022. A questionnaire-based online survey on knowledge and awareness of anaemia Among female health-care professional students in tamilnadu, Assian Journal Of Pharmaceutical And Clinical Research. Doi: http://dx.doi.org/10.22159/ajpcr.2022v15i8.44979.

Pasricha SR, Flecknoe-Brown SC, Allen KJ, et al; Diagnosis and management of iron deficiency anaemia: a clinical update. Med J Aust. 2010 Nov 1;193(9):525-32.

Prema R., 1992. Anaemia in pregnancy. In: Ratnam SS, Bhasker Rao K, Arulkumaran S, editors. Obstetrics and gynaecology for postgraduates, Vol 1. Madras: orient Longman.42-53.

Prema, R., 1989. Nutrition in Pregnancy. In: Gopalan C, Kaur S, editors. Women and nutrition in India, Special Publication No. 5. New Delhi: Nutrition Foundation of India:153-93.

Sangeetha VB, Pushpalatha S. Severe maternal anemia and neonatal outcome. Sch J Appl Med Sci 2014;2:303-9.

Singh R, Singh AK, Gupta SC, Singh HK. Correlates of anaemia in pregnant women. Indian J Community Health 2015;27:351-5.

Scheinberg, P. and Young, N.S., 2012. How I treat acquired aplastic anemia. Blood. 120(6):1185-96

Soundarya N and Suganthi P. 2016, A review on anaemia – types, causes, symptoms and their treatments, journal of science and technology investigation -issn: 2456-8082 josti-vol-1-1-november-2016: 10- 17

Stevens GA, Finucane MM, De-Regil LM, Paciorek CJ, Flaxman SR, Branca F,(2013).Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995-2011: A systematic analysis of population-representative data. The Lancet Global Health.. doi:10.1016/S2214-109X (13)70001-9.

Suryanarayana, R., Chandrappa, M., Santhuram, A. N., Prathima, S., & Sheela, S. R. (2017). Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. *Journal of family medicine and primary care*, *6*(4), 739–743. https://doi.org/10.4103/jfmpc.jfmpc_33_17

Toteja, G.S. and Singh, P., 2004. Micronutrient profile of Indian population. New Delhi: Indian Council of Medical Research.

Turner MR, Talbot K; Functional vitamin B12 deficiency. Pract Neurol. 2009 Feb;9(1):37-41.

U.S. Department of Health & Human Services, https://www.nhlbi.nih.gov/health/health-topics/topics/anemia/

Vemulapalli B, Rao KK. Prevalence of anaemia among pregnant women of rural community in Vizianagaram, North Coastal Andhra Pradesh, India. Asian J Med Sci 2013;5:21-5.

Viveki RG, Halappanavar AB, Viveki PR, Halki SB, Maled VS.Prevalence of anaemia and its epidemiological determinants in pregnant women. Al Ameen J Med Sci 2012;5:216-23.

Wemakor A. Prevalence and determinants of anaemia in pregnant women receiving antenatal care at a tertiary referral hospital in Northern Ghana. BMC Pregnancy and Childbirth. 2019. doi:10.1186/s12884-019-2644-5

WHO (2004). Micronutrient deficiency: Battling iron deficiency anaemia: the challenge. Available from: http://www.who.int/nut/ida.htm, accessed on April 24, 2008

WHO, 2005. Worldwide prevalence of anaemia 1993–2005 : WHO global database on anaemia / Edited by Bruno de Benoist, Erin McLean, Ines Egli and Mary Cogswell.

World Bank. Prevalence of anemia among pregnant women (%) - Nigeria | Data. 2016. https://data.worldbank.org/indicator/SH.PRG.ANEM?locations=NG. Accessed 21 June 2023

World Health Organization, Prevention and Management of Severe Anaemia in Pregnancy: report of a technical working group. Geneva: 1994. WHL/FHE/MSM/93.3.