PREVALENCE OF ANAEMIA DURING PREGNANCY, A CASE STUDY OF WOMEN ATTENDING FEDERAL MEDICAL CENTRE MAKURDI AND FAMILY SUPPORT PROGRAMME CLINIC MAKURDI, BENUE STATE.

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ABSTRACT

Anaemia during Pregnancy is the cause of a significant burden of maternal mortality and poor birth outcomes globally especially in developing countries. The aim of this study was to investigate the prevalence of Anaemia among pregnant women and identify its prevalence per trimester among women receiving antenatal care at Federal medical centre and Family support programme clinic. Between the months of July and October, a total of 453 pregnant women between the ages of 18 and 42years were examined for the prevalence of Anaemia during

Introduction:
DEFINITION OF ANAEMIA

The joy of pregnancy is sometimes countered by severe ill-health or often death of the mother or the baby due to the Haematological (blood related) changes in the woman's physiology. These changes are as a result of the secretions of Hormones, development of the embryo, increase in the size of the uterus and development of the

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Pregnancy. Among the 112 (24.72%) who were in their first trimester,54(48.21%) were found to be Anaemic. Out of the 166 (36.64%) who were in their second trimester, 78(46.99%) had Anaemia while from the 175 (38.63%) who were in their third trimesters,94(53.71%) were found to be Anaemic. Thus 226 from the total of 453 pregnant women examined were found to be Anaemic, giving an overall prevalence of 49.89%. Statistical analysis showed that there is no significant difference between the anaemic and the non-anaemic pregnant women (X^2 = 0.856, n=2, P=0.05). This implies that half of the population of pregnant women attending Antenatal clinics at these hospitals are Anaemic. The reason for this prevalence in maternal anaemia is attributed to nutritional deficiencies, late attendance of antenatal clinic and Parasitic diseases such as Malaria. These findings may be significant in availing relevant information towards the control of Anaemia during pregnancy.

breasts for lactation amongst others (Soma-Pillay, 2016). A healthy pregnancy is associated with marked changes in the circulating blood which show wide variations. The physiological adjustments include increased blood volume and alterations in the interacting blood factors involved in the Haemostatsis (system concerned with the arrest of blood loss).

It is also in view of these hyper- dynamic (excessive movement) state that pregnancy is described as a long-lasting volume overload (Vinturache,2021). This marked increase in the volume is actually due to increase in plasma volume such that an apparent Haemodilution (dilution of the blood) occurs with a fall in haemoglobin concentration (Fellmanns, 1992). A fall below normal in

the total circulating haemoglobin mass is suggestive of Anaemia. Therefore, anaemia is described as a condition caused by a lack of red blood cells in the body or a drop below normal in the total circulating haemoglobin mass. A haemoglobin concentration below 11.0gldl or packed cell volume (PCV) of less than 33.0% is regarded as anaemia during pregnancy by the World Health Organization (WHO) (Anorlu, 2006). **Anaemia in pregnancy presents a world-wide problem and is uncommon even in the developed world.** Anaemia, defined as a decrease in red blood cells or haemoglobin, or the reduced capacity of red blood cells to carry oxygen (Younger, 2007) is a common chronic problem in low- to middle-income countries, such as found in the sub-Saharan Africa. It is a product of socio-economic disparity, affecting mostly the poor and less educated (Shisana, 2013). It is most prevalent in the vulnerable: children, adolescents in their growth phase and females of reproductive age (Stevens, 2011). The condition is exacerbated by pregnancy when there is an increased burden to deliver oxygen to the foetus and can result in intra-uterine growth restriction, reduced iron for the baby and increased maternal and perinatal morbidity and mortality (Hoque, 2009).

Anaemia is a major public health problem with about two billion people being anaemic worldwide (WHO, 2001). The global prevalence of anaemia in pregnancy is estimated to be approximately 41.8% varying from a low of 5.7% in the United State of America to a high of 75% in Gambia (Chathuranga, 2014) The average prevalence of anaemia in pregnancy in developing countries including Nigeria is put at 60.0%

Some women are anaemic even before they become pregnant, and others become progressively anaemic during pregnancy (Goonewardene, 2012). Infectious diseases such as malaria,

helminths infestations, and HIV have been implicated in the high prevalence of anemia in sub-Saharan Africa (Rush, 2000)

Anaemia is an important risk factor in pregnancy, and it is associated with an increased incidence of both maternal and foetal morbidity and mortality. More than three percent of maternal mortality in Africa are directly attributable to anaemia (Khan, 2006). Maternal anaemia also contributes to an increase in perinatal mortality, low birth weight, still birth and foetal wastage. Anaemia in pregnancy reduces tolerance to blood loss and leads to impaired function and cardiac failure (Bondevik, 2000).

Anaemia prevalence data remains an important indicator in public health since anaemia is related to morbidity and mortality in the population groups usually considered to be the most vulnerable; pregnant women and children under five. Anaemia prevalence study is also useful to monitor the progress of reproductive health. Despite efforts being made to reduce the burden of anaemia, its prevalence is still high in developing countries. Thus, the objective of this study was to

    a. Provide data on the prevalence of anaemia among pregnant women attending ANC at FMC and FSP Makurdi

    b. Show the prevalence of anaemia at each trimester of pregnancy,

    c. determine the prevalence of anaemia among pregnant women attending ANC in FMC and FSP Makurdi and

    d. provide verifiable information that will be relevant towards the control of anaemia during pregnancy in Makurdi metropolis of Benue state Nigeria.

MATERIALS AND METHODS
Study Area, Design, Population and Subjects

This study was conducted at the Federal Medical centre Makurdi and Family support Programme Clinic in Makurdi from July to October.

FMC is the best government owned secondary health care facilities in the city of Makurdi. It is patronized by people from all over the State. It also serves as a major referral centre for both government and private owned hospitals in Makurdi and its surroundings. FSP clinic is among the best primary health care centers in Makurdi providing very good quality services especially Antenatal Care. These two health care facilities are both along Abubakar Atiku road and Makurdi separated by a distance of about a kilometer. Makurdi Metropolis is located in North Central Nigeria along the River Benue. It lies at Latitude: 7° 43' 32" N and Longitude: 8° 33' 51" E. Makurdi is the capital of Benue State and covers an area of 34,059 km^2 and an estimated population of 500,797 (Vange, 2019)

This study was an institution based and descriptive type with a cross sectional design involving 453 pregnant women between the ages of 18 and 42 years who attended ANC at these Health care centers.

Ethical Permission

Ethical Clearance was obtained from the Ministry of Health and Human Resources Makurdi Benue State. Participants' consents were obtained with an assurance that all personal information obtained were to be used only for this study and kept confidential.

DATA COLLECTION AND ANALYSIS

Data were collected over a period of sixteen weeks (July–October); during that time 453 pregnant women who attended ANC were examined. The women were formally informed of the study and their consent obtained before proceeding. Necessary information for the study was then obtained from them through organized set of questions such as date of birth/Maternal age, pregnancy stage, last menstruation, age of last child, level of Education, occupation,

spouse's level of education and occupation etc. and recorded in a notebook.

Sample blood collection was done by a professional Laboratory personnel using the Venipuncture method as described by Brian Bull in procedure for determining PCV by Microhematocrit Method. Two third of the length of the capillary tube labelled for each subject was filled with blood. One end of each of these tubes was then taped in plasticine to seal it. These tubes were then placed in the Hematocrit machine/centrifuge and spun (1000 revs/minute) for 5minutes before they were read on the microhematocrit. Any PVC reading that was less than 33% was termed Anaemic.

Chi-square statistical methods were used to analyze data using probability value (p-value) of less than $0.05 = 5.991$, $n = (3-1) = 2$.

RESULTS

Out of the 112 pregnant women in their first Trimester, 54 were found to have anaemia. This gives the percentage prevalence of 48.21% as shown below.

Table 1. Percentage Prevalence of Anaemia at 1st Trimester

Age(years)	Total Number Examined	Number Anaemic	% Prevalence of Anaemic women
18-42	112	54	48.21

Table 2. Percentage Prevalence of Anaemia at 2nd Trimester

From the 166 women in their 2nd Trimester, 78 of them were anaemic. This gives a percentage prevalence of 46.99 as shown below.

Age(years)	Total Number Examined	Number Anaemic	% Prevalence of Anaemic women
18-42	166	78	46.99

Table 3. Percentage Prevalence at 3rd Trimester

For those in their 3rd Trimester, 94 out of the 175 were found to have anaemia giving a percentage prevalence of 53.71%.

Age(years)	Total Number Examined	Number Anaemic	% Prevalence of Anaemic women
18-42	175	94	53.71

The overall prevalence of Anaemia for this study was 89.89% as shown in Table 4 below.

Table 4. Overall prevalence of Anaemia during Pregnancy

Age(years)	Total Number Examined	Number Anaemic	% Prevalence of Anaemic women
18-42	453	226	49.89

From the total of 453 women who were examined, 226 were found to have Anaemia (49.89) while 227 were without Anaemia (50.11%)

Table 5. Per Trimester comparism of Anaemia During Pregnancy

Trimester	Anaemic		Non-Anaemic		Total	Anaemic				Non-Anaemic		
	O	E	O	E		O-E	$(O-E)^2$	$\frac{(O-E)2}{2}$		$(O-E)^2$	$\frac{(O-E)2}{2}$
1st	54	55.876	58	56.124	112	-1.876	3.519	0.063	1.876	3.519	0.063

2nd	78	82.817	88	83.183	166	-4.817	23.203	0.280	4.817	23.203	0.276
3rd	94	87.307	81	87.693	175	6.693	44.796	0.513	-6.693	44.796	0.511
Total	226		227		453			0.856			

$X^2=0.856$, n= (3-1) =2, P 0.05=5.991   E=Expected, O=Observed

It was observed that there was an increase in attendance to ANC as pregnancy progressed. There were 112 women in their first trimester who came for ANC while 166 women in their 2nd Trimester were booked for ANC. The highest number of bookings for ANC were women in their 3rd Trimester. It was also found that from the 5 age classes/groups from each Trimester, women in the age class of 23-27 years had the highest cases of anaemia. In the 1st Trimester 30 were found to have anaemia, in the 2nd Trimester 45 were Anaemic while 46 women were anaemic from the 3rd Trimester, all from this same age class(23-27years) (Fig.5)

Fig. 1 Prevalence of anaemia in 1st Trimester

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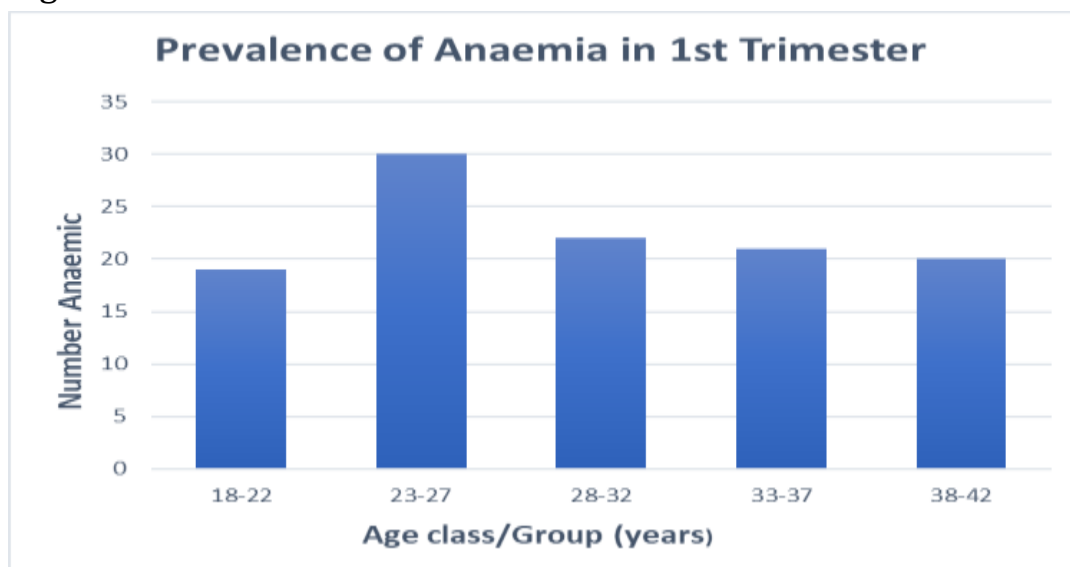
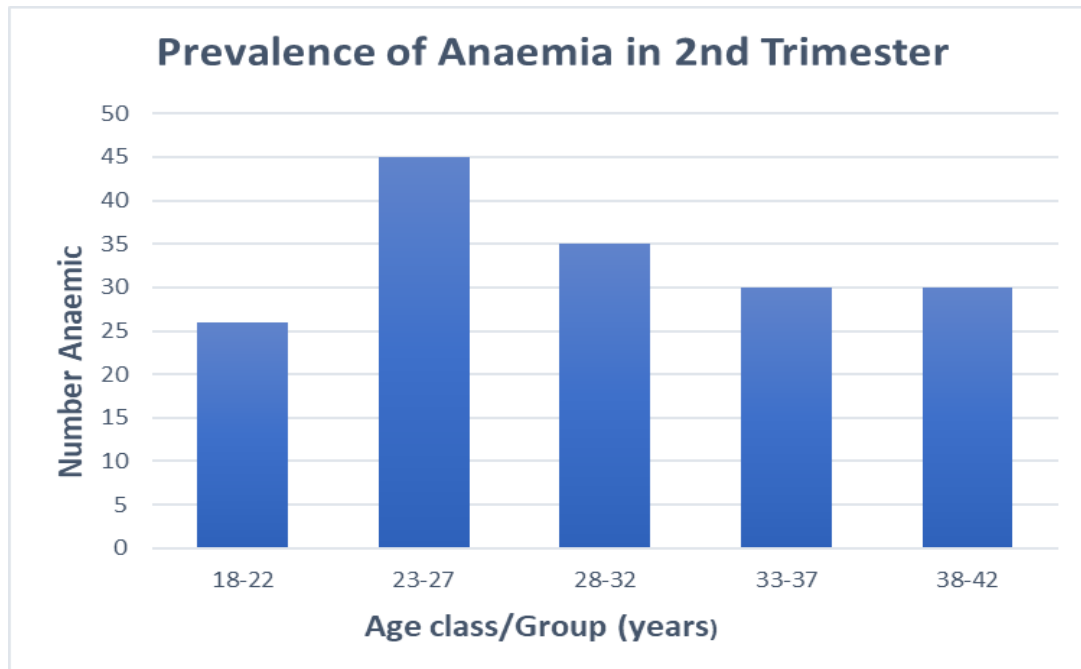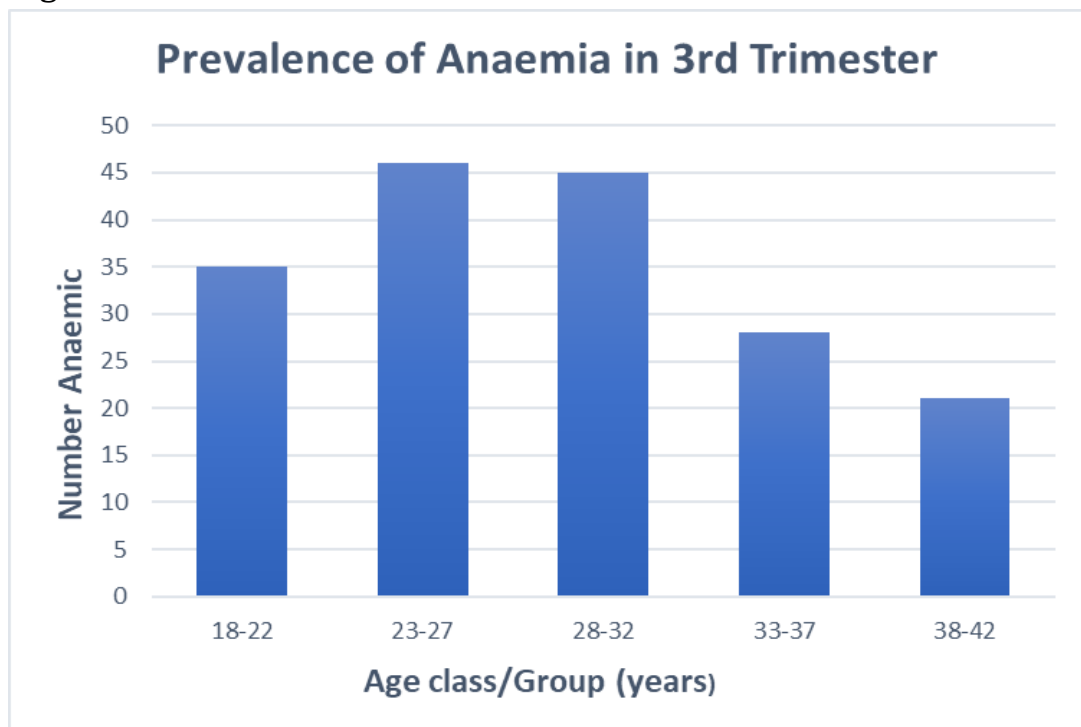**ISSN: 1211-4401**

Fig. 2   Prevalence of anaemia in 2nd Trimester
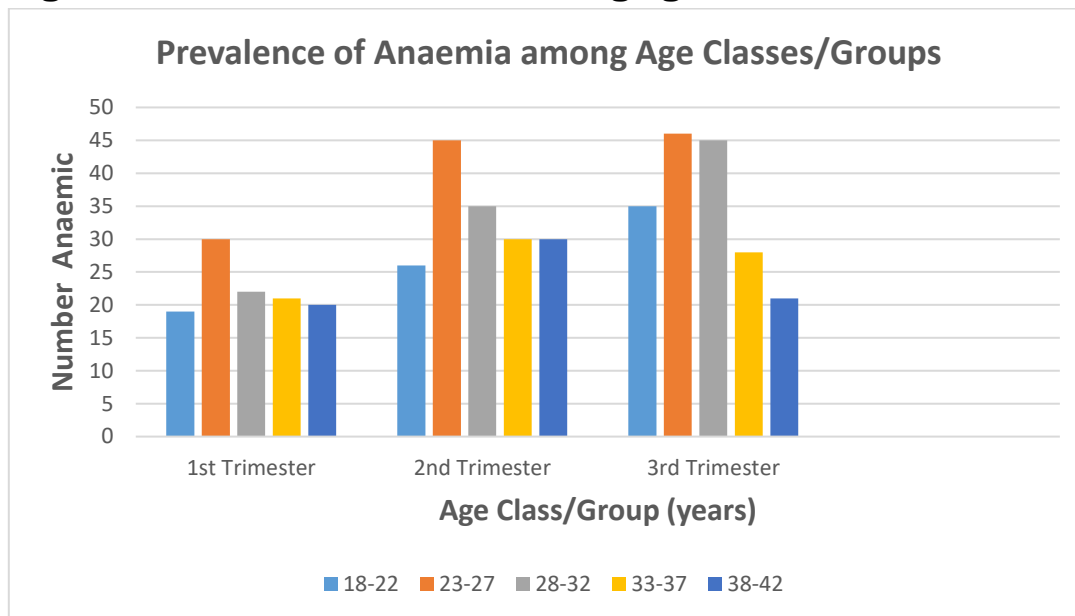

Fig. 3   Prevalence of anaemia in 3rd Trimester

Fig.4   Prevalence of Anaemia Among Age Class at each Trimester

Prevalence of Anaemia among Age Classes/Groups

DISCUSSION

The overall prevalence of Anaemia from this study is (49.89%). This is comparable to the results obtained in similar works in Benue State (47%) (Amali, 2011), Enugu (40.4%) (Ikeanyi, 2015) and 40% reported by Dim and Onah for Enugu state in Southern Nigeria. The result is also consistent with the work of Tulu (44.4%) in Ethiopia and Wemakor (50.8%) in Ghana. The World Health Organisation (WHO) estimated that 56% of all pregnant women in developing countries are anaemic (Kayode, 2012). Maternal anaemia is still a public health challenge. This could be due to failure to book for ANC early. This was observed in the larger number of women attending ANC in their third Trimester, a time when the women are heavily burdened by Anaemia. The high prevalence of Anaemia recorded here may also be because the two Health facilities where the research was undertaken are government owned and provide the cheapest services and therefore patronized mostly by those who are of low and mid socio-economic class. It may also be due to their proximity to settlements like Wadata, Demekpe, Kwata and Northbank where most residents are of the low socio-economic class (Abah, 2014). It was also observed that the age

class 23-27 had the highest prevalence of anaemia. This may be firstly because this is the commonest age for marriage and secondly due to the difference in the average age at first marriage and first birth (NPC, 2014).

CONCLUSION

Booking for ANC should be done early and women booking for ANC should be examined for Anaemia so the cases can be identified early and handled appropriately.

REFERENCE

Abah, H., (2014). Nigeria: The Stinking Slums of Makurdi. Daily Trust. https://dailytrust.com

Adam, A. H. Khamis, and M. I. Elbashir. (2005) "Prevalence and risk factors for anaemia in pregnant women of eastern Sudan," Transactions of the Royal Society of Tropical Medicine and Hygiene, vol. 99, no. 10, pp. 739–743, 2005

Amali, O., Okwori, G., Awodi, N.O. (2011) *Nigerian Journal of Parasitology*, Vol. 32 [2] September 2011, pp.193-196

Anorlu R. I., Oluwole A. A. and Abudu O. O. (2006) "Sociodemographic factors in anaemia in pregnancy at booking in Lagos, Nigeria," Journal of Obstetrics and Gynaecology, vol. 26, no. 8, pp. 773–776, 2006

April K. (2019). Haemolytic Anaemia. Healthline Media. Red Venture Company. UK

Asrie F. (2017) Prevalence of anemia and its associated factors among pregnant women receiving antenatal care at Aymiba Health Centre, northwest Ethiopia. *J Blood Med*. 2017; 8:35-40 https://doi.org/10.2147/JBM.S134932

Bhatia, P., & Chhabra, S. (2018). Physiological and anatomical changes of pregnancy: Implications for anaesthesia. Indian journal of anaesthesia, 62(9), 651–657. https://doi.org/10.4103/ija.IJA_458_18

Bondevik G.T, Eskeland B, Ulvik R.J, Ulstein M, Lie R.T, Schneede J, Kvale G., (2000) Anaemia in pregnancy: possible causes and risk factors in Nepali women. Eur J Clin Nutr. 2000;54(1):3–8

Bukar M., Audu B M., Sadauki H.M., Elnafaty H.M, and Mairiga A. G. (2009) "Prevalence of iron deficiency and megaloblastic anaemia at booking in a secondary Health facility in North-eastern Nigeria.," Nigerian Journal of Medicine, vol. 50, no. 2, pp. 33–37.

Cantor A.G., Bougatsos C, Dana T, Blazina I, McDonagh M. (2015) Routine iron supplementation and screening for iron deficiency anemia in pregnancy: a

systematic review for the U.S. Preventive Services Task Force. Ann Intern Med. 2015 Apr 21;162(8):566–76.Article Google Scholar

Chathuranga G, Balasuriya T, Perera R. (2014) Anaemia among female undergraduates residing in the hostels of University of Sri Jayewardenepura, Sri Lanka. Anemia. 2014. doi:10.1155/2014/526308

Derek, L. (1986) Fundamentals of obstetrics and Gynecology 4TH Ed-Obstetrics London, English Language Book Society (ELBS and Edward Arnold Pg. 239-244)

Dim C.C. and H. E. Onah, (2007). "The prevalence of anaemia among pregnant women at booking in Enugu, South-eastern Nigeria," Medscape General Medicine, vol. 9, p. 11, 2007.

Eunhee Chung, Leslie A. Leinwand. (2014) Pregnancy as a cardiac stress model, *Cardiovascular Research*, Volume 101, Issue 4, 15 March 2014, Pages 561–570, https://doi.org/10.1093/cvr/cvu013

Fellmann N. (1992) Hormonal and plasma volume alterations following endurance exercise. A brief review. Sports Med. 1992 Jan;13(1):37-49. doi: 10.2165/00007256-199213010-00004. PMID: 1553454.

Goonewardene M, Shehata M, Hamad A. (2012) Anaemia in pregnancy. Best Pract. Res. Clin. Obstet & Gynaecol. 2012;26(Suppl 1):3–24. doi:10.1016/j.bpobgyn.2011.10.010.

Haider B.A, Olofin I, Wang M, Spiegelman D, Ezzati M, Fawzi W.W. (2013) Anaemia, prenatal iron use, and risk of adverse pregnancy outcomes: systematic review and meta-analysis. BMJ. 2013 Jun 21;346: f3443.

Harewood J, Ramsey A, Master S.R. (2021) Haemolytic Transfusion Reaction. [Updated 2021 Jul 18]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK448158/

Hoque M. (2009) Risk factors for anaemia in pregnancy in rural KwaZulu-Natal, South Africa: implication for health education and health promotion: original research. 2009 [cited 2015 Nov 14]; Available from: http://reference.sabinet.co.za/document/EJC80328.

Hoy D, Brooks P, Woolf A, Blyth F, March L, Bain C, et al. (2012) Assessing risk of bias in prevalence studies: modification of an existing tool and evidence of interrater agreement. J Clin Epidemiol. 2012 Sep;65(9):934–9.

Ikeanyi E.M., Ibrahim A.I. (2015) Does antenatal care attendance prevent anemia in pregnancy at term? *Niger J Clin Pract.* 2015; 18:323–7. [PubMed] [Google Scholar]

Kayode O.O. & Adeolu O.O. (2012). Anaemia in Developing Countries: Burden and Prospects of Prevention and Control. DOI:10.5772/29148

Khan K.S, Wojdyla D, Say L, Gülmezoglu A.M, Van Look P.F. (2006) WHO analysis of causes of maternal death: a systematic review. Lancet.2006.doi:10.1016/s0140-6736(06)68397-9

Kidanto, H.L. I. Mogren, G. Lindmark, S. N. Massawe, and L. Nystrom. (2009) "Risks for preterm delivery and low birth weight are independently increased by severity of maternal anaemia," South African Medical Journal, vol. 99, no. 2, pp. 98–102, 2009 www.mayoclinic/diseases/anemia/causes

Meda N, Mandelbrot L, Cartoux M, Dao B, Ouangre A, Dabis F. (1999) Anaemia during pregnancy in Burkina Faso, west Africa, 1995-96: prevalence and associated factors. DITRAME Study Group. Bull World Health Organ. 1999;77(11):916- 22), 50.8% in Anthony Wemakor et al. (Ghana),14 Jharkhand

Mkhize BT, Mabaso M, Mamba T, Napier CE, Mkhize-Kwitshana ZL. (2017) The Interaction between HIV and Intestinal Helminth Parasites Coinfection with Nutrition among Adults in KwaZulu-Natal. South Africa. BioMed Res Int. 2017 Mar 22;2017: e9059523.

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. (2015) Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

Msuya, S.E., Hussein T. H., Uriyo J., Sam, N. E., and Stray-Pedersen B. (2011) "Anaemia among pregnant women in northern Tanzania: prevalence, risk factors and effect on perinatal outcomes.," Tanzania Journal of Health Research, vol. 13, no. 1, pp. 33–39, 2011

National Population Commission [Nigeria] and ICF International. 2014. Nigeria Demographic and Health Survey 2013. Rockville, Maryland, USA: National Population Commission and ICF International.

Okoh D.A, Iyalla C, Omunakwe H, Iwo-Amah R.S, Nwabuko C. (2016) A retrospective study of the prevalence of anaemia in pregnancy at booking in Niger Delta, Nigeria. J Obstet Gynaecol. 2016;36(5):594–7

Omigbodun A. O. (2004) "Recent trends in the management of anaemia in pregnancy," Tropical Journal of Obstetrics and Gynaecology, vol. 21, no. 1, pp. 1–3, 2004.

Osungbade, K & Oladunjoye, A (2012) Anaemia in Developing Countries: Burden and Prospects of Prevention and Control. Doi:10.5772/29148. 978-953-51-0138-3

Rush D. (2000) Nutrition and maternal mortality in the developing world. Am J Clin Nutr. 2000;72(Suppl 1):212–40.

Shisana O. (2013) South Africa, Department of Health, Human Sciences Research Council,

South African Medical Research Council. The South African National Health and Nutrition Examination Survey: SANHANES-1. Cape Town: HSRC Press; 2013.

Soares Magalhães R.J, Clements A.C. (2011) Spatial heterogeneity of haemoglobin concentration in preschool-age children in sub-Saharan Africa. Bull World Health Organ. 2011;89(6):459–68.

Soma-Pillay, P., Nelson-Piercy, C., Tolppanen, H., & Mebazaa, A. (2016). Physiological

changes in pregnancy. Cardiovascular journal of Africa, 27(2), 89–94. doi: 10.5830/CVJA-2016-021. PMID: 27213856; PMCID: PMC4928162. https://doi.org/10.5830/CVJA-2016-021

Srikanth N. (2021) What is the global prevalence of megaloblastic anemia. Medscape 1994-2021 *http://medscap/health/Megaloblasticanaemia*

Stevens F.M.M, De-Regil L.M, Paciorek CJ., Flaxman S.R, Branca F, et al. (2011) 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. Lancet Glob Health. 2013;1(1): e16–25.

Tulu B.D, Atomssa E.M, Mengist H.M (2019) Determinants of anemia among pregnant women attending antenatal care in Horo Guduru Wollega Zone, West Ethiopia: Unmatched case-control study. PLoS ONE 14(10): e0224514. https://doi.org/10.1371/journal.pone.0224514

Van den Broek N. R., and Letsky E. A., (2000) "Etiology of anemia in pregnancy in south Malawi," The American Journal of Clinical Nutrition, vol. 72, supplement 1, pp. S247–S256.

Vange, O., Umeh, E. U., & Azua, E. T. (2019). Predisposing factors and cost Implications of pulmonary tuberculosis in patients attending federal medical centre Makurdi, Nigeria. African Journal of Microbiology Research, 13(27), 474-482.

Vinturache A., Khalil A, (2021) Global library of women's medicine. 2021, ISSN: 1756-2228; DOI 10.3843/GLOWM.411323

Wemakor A., (2019) Prevalence and determinants of anaemia in pregnant women receiving antenatal care at a tertiary referral hospital in Northern Ghana. BMC Pregnancy and Childbirth (2019) 19:495 https://doi.org/10.1186/s12884-019-2644-5

Younger P. Stedman's Medical Dictionary, 28th ed. (2007) 34 Stedman's Medical Dictionary, 28th ed. Philadelphia, PA: Lippincott Williams and Wilkins 2006. l+2170 pp.+appendices 176 pp. £26.95; $49.95, ISBN: 0 7817 3390 1 Includes CD-ROM. Ref Rev. 2007;21(1):41–2.