



RESEARCH ARTICLE

Knowledge, Attitudes, and Practices Regarding Anaemia Among Pregnant Women Attending Antenatal Clinic at the University of Cape Coast Hospital in the Cape Coast Metropolis, Ghana

Kasim Abdulai^{1*}, Safianu Osman Aleboko¹, Jessica Ayensu¹, Nana Ama Frimpomaa Agyapong¹, Awal Seidu Mohammed¹, Christiana Nsiah-Asamoah¹, Moses Kwashie Klevor¹, Gloria Boakyewaa Darko¹ and Patricia Nkrumah¹

¹Department of Clinical Nutrition and Dietetics, School of Allied Health Sciences, University of Cape Coast, Cape Coast, Ghana.

*Correspondence should be addressed to Kasim Abdulai (email: kasim.abdulai@ucc.edu.gh)

Abstract

Background: Despite the adoption of prophylactic programs of iron and folate supplementation (IFAS) to prevent nutritional anaemia in pregnancy, iron deficiency anaemia (IDA) in pregnancy remains a public health issue, especially in developing countries. An efficient strategy that may be helpful prior to establishing the objectives of any nutrition intervention is to assess the knowledge, attitudes, and practices (KAP) of pregnant women before implementing any intervention.

Objective: This assessed KAP of pregnant mothers attending antenatal clinic at the University of Cape Coast Hospital.

Materials and Methods: A descriptive cross-sectional study involving 225 pregnant mothers who visited the antenatal clinic at the University of Cape Coast Hospital in the Cape Coast Metropolis, Ghana was employed. A structured questionnaire from the United Nations' Food and Agriculture Organization was used to evaluate participants' KAPs with reference to anaemia. A simple random sampling method was used to select participants for the study. IBM SPSS Statistics version 26 was used to conduct descriptive statistical analysis, which was summarized by frequency and percentages. A chi-squared test was used to determine the relationship between categorical variables at a significance level of $P = 0.05$.

Results: Overall, a greater proportion of the participants, 124 (55.1%), had poor knowledge on nutritional anaemia in pregnancy. A statistically significant association ($P = 0.003$) was found between the knowledge and attitudes of the pregnant women regarding anaemia.

Conclusion: Findings from this study suggest there is a knowledge deficit among pregnant women attending antenatal clinic at the University of Cape Coast Hospital. The positive attitudes of the study participants regarding anaemia may not translate into their knowledge concerning a health situation.

Keywords: Knowledge, Attitude, Practice, Anaemia, Anaemia in Pregnancy, Pregnant mothers

Citation: Abdulai, K., Aleboko, S. O., Ayensu, J., Agyapong, N. A. F., Mohammed, A. S., Nsiah-Asamoah, C. et al. (2023). Knowledge, Attitudes, and Practices Regarding Anaemia Among Pregnant Women Attending Antenatal Clinic at the University of Cape Coast Hospital in the Cape Coast Metropolis, Ghana. *Integrated Health Research Journal* 1(2), 35-42. <https://doi.org/10.47963/ihrij.v1i2.1372>

Received 11th July, 2023; **Accepted** 30th October, 2023; **Published** 31st December, 2023

Copyright: ©2023 This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

Globally, anaemia is regarded as the most critical health condition confronting pregnant women both in developing and developed countries (Habib et al., 2018; Karami et al., 2022). The World Health Organization (WHO) considers maternal anaemia as a severe public health significance if its prevalence is $\geq 40\%$ (WHO, 2008). A systematic review

and meta-analysis on the global prevalence of anaemia in pregnant women indicated an overall prevalence of 36.8% (Karami et al., 2022). Karami et al., (2022) further reported that the highest prevalence (48.8%) of anaemia occurred in the third trimester of pregnancy. Again, a comparison across regions worldwide, revealed that pregnant African women bear the greatest brunt of anaemia with the highest prevalence of 41.7% (Karami et al., 2022). Hence, anaemia

in pregnancy can be described as an endemic health problem particularly in sub-Saharan Africa (SSA) as reported by several systematic reviews and meta-analysis (Dorsamy et al., 2022; Geta et al., 2022; Getaneh et al., 2021; Fite et al., 2021). For example, the systematic review and meta-analysis by Fite et al., (2021) that included 15,061 pregnant women reported the pooled prevalence of anaemia in pregnancy in Sub Saharan Africa (SSA) to be 35.6%.

The Centers for Disease Control and Prevention (CDC) and WHO defines anaemia during pregnancy as a decrease in hemoglobin (Hb) levels, < 11.0 g/dl in the first trimester, < 10.5 g/dl in the second trimester, and < 11.0 g/dl in the third trimester (Di Renzo et al., 2015). Evidence suggests that iron-deficient women have shorter pregnancy durations, preterm delivery, low birth weight (LBW) babies, and intrauterine growth retardation (IUGR) (Acheampong et al., 2018). According to a joint report from the United Nations Population Fund (UNFPA), WHO, United Nations Children's Fund (UNICEF), and the World Bank, over 800 women die daily from pregnancy complications and childbirth with 99% of these mortalities occurring in developing countries (WHO, 2019).

Ghana is among the West African nations that have implemented preventive iron and folate supplementation (IFAS) programmes to combat nutritional anaemia in pregnant mothers (Yip, 2002). Clinical trials have consistently documented the program's effectiveness (Ahamed et al., 2018; Karakoc et al., 2020; Milman, 2022). Anaemia prevalence is still unacceptably high, albeit in Ghana (Bhatnagar & Padilla-Zakour, 2021). According to the latest Ghana Demographic Health and Survey (GDHS) report in 2014, the prevalence of anaemia among pregnant women in Ghana was 42% (Ghana Statistical Service, 2014). Similarly, the 2017 Ghana Micronutrient survey reported an overall prevalence of anaemia among pregnant women to be 42%. The Ghana micronutrient survey further revealed some differences with respect to the prevalence of anaemia among pregnant women between the three main belts of Ghana – southern belt (50.8%), middle belt (32.1%), and northern belt (43.5%) (University of Ghana, GroundWork, Wisconsin-Madison, KEMRI-Wellcome Trust, UNICEF, 2017). Clearly, the two surveys conducted in 2014 and 2017 suggest that Ghana is not making any substantial progress in reducing the prevalence of anaemia among pregnant women. Among the several causes of anaemia, the WHO highlights that one of the non-nutritional determinants of anaemia among pregnant women is their poor nutritional knowledge levels (WHO, 2020). Hence, perhaps an efficient strategy that will be helpful prior to establishing objectives of any nutrition intervention is to assess knowledge, attitudes, and practices (KAP) of pregnant women before implementing any intervention (Stoltzfus and Dreyfuss, 1998). The body of knowledge regarding anaemia in Ghana, however, has been skewed toward its prevalence and risk factors among pregnant women, according to our evaluation of the literature on anaemia in pregnancy. Studies on the knowledge, attitudes, and practices regarding anaemia among pregnant women in Ghana are limited. The purpose of this study was to evaluate the KAP regarding anaemia

among pregnant women who visit an antenatal clinic in the southern belt of Ghana.

Materials and Methods

Ethical statement

This study received approval from the University of Cape Coast Institutional Review Board (IRB) under approval number (UCCIRB/CHAS/2022/126). Permission was also sought from the health facility's administration prior to the commencement of the data collection. Study participants signed or thumb-printed an informed consent form prior to the commencement of data collection.

Study design

A cross-sectional descriptive study was employed to determine KAP of pregnant women regarding iron deficiency anaemia.

A total of 225 pregnant women who visited the antenatal clinic of University of Cape Coast Hospital during the study's data collection period were included in the study. Pregnant women between the ages of 15 and 49 years were included. The data collection process lasted for eight weeks (5th September, 2022 –28th October, 2022).

Study area

Cape Coast Metropolis is an urban area in the Central Region of Ghana, known for its rich history and cultural significance. It is a hub of education and tourism, featuring landmarks such as the Cape Coast Castle, a prominent historical site in the trans-Atlantic slave trade. The region is characterized by a mix of urban and rural landscapes, with a diverse population engaged in various economic activities, including fishing, tourism, and commerce. The metropolis has educational institutions ranging from primary to tertiary levels, including the University of Cape Coast. The population of Cape Coast according to the 2021 census data for the Cape Coast Metropolitan area is approximately 189,925. This represents an increase from the 169,894 recorded in the 2010 census.

Sampling procedure

The pregnant women chosen for the study were selected using a simple random sampling strategy at the time of the data collection period. A preliminary investigation had revealed that an average of 30 pregnant women visit University of Cape Coast Hospital on antenatal clinic (ANC) days. 20 participants were randomly selected through balloting on each of the ANC clinic days at University of Cape Coast Hospital until the required number of 225 was attained. Saturation was achieved in the last week of the data collection period; all antenatal patients that visited the health facility met the researchers and had earlier participated in the sampling process. For each of the clinic days, potential study participants who met the inclusion criteria were made to randomly pick from a box containing folded pieces of paper in which was written either "YES" or 'NO', the number of YESs were 20. The rest of the papers contained NO. Anyone who picked YES, and consented to take part in the research was recruited.

Research instrument

The United Nations' Food and Agriculture Organization questionnaire for assessing KAP on anaemia was used for the study (Fautsch Macas et al., 2014). Food choices in the original FAO KAP questionnaire to assess the knowledge of the participants were modified to meet Ghanaian food sources. Exotic foods not known in Ghana were eliminated. The research instrument was pretested with 15 study participants to check its validity. There were no changes made after the pretest of the questionnaire. The questionnaire comprises both open-ended and closed-ended questions. The questionnaire was composed of sections including sociodemographic information, knowledge, attitudes, and practices of pregnant women regarding iron deficiency anaemia. There were eight questions in the section of the questionnaire assessing the knowledge of pregnant women. The knowledge section included themes on awareness, consequences, causes, prevention of anaemia, and food sources of iron. A three-point Likert scale was used for the themes of 'perceived susceptibility', 'perceived severity', 'perceived benefits', and 'perceived barriers' to assess the attitudes of the pregnant women. The dietary practices section comprised four main questions. After the interviews, the questionnaires were checked for completeness at the end of the administration to ensure there were no missing data. The pretested, structured questionnaire was prepared and distributed in the English language.

Data analysis

Descriptive statistics tests were run using IBM SPSS Statistics version 26, and the results were summarized into frequencies and percentages. Chi-squared test was used to determine the relationship between categorical variables. Knowledge score criteria of 'know' and 'don't know' were used to grade the participants' knowledge regarding IDA. A participant was said to have knowledge of a question if she was able to give a correct answer to the question. The overall knowledge performance of the participants was computed by treating the knowledge responses as a continuous variable. Each correct response to a question was awarded a point, and the total sum of correct responses was found. A mean score value was then calculated for each participant by dividing the sum of correct responses by the total number of knowledge questions asked (eight questions). A mean value of knowledge score was found for all the study participants. Participants that scored a mean (knowledge) below the study population mean (knowledge) were classified as having 'poor knowledge', and those with a value higher than the study population mean (knowledge) were classified as having 'good knowledge'. Similarly, the attitudes of participants regarding IDA were assessed as a continuous variable. A positive response (a desired response) was given a point of three, a neutral two points, and a negative one point. The total score for each participant was summed and divided by the total attitude questions (four questions) to find a mean value. Each participant was then classified as having a positive, neutral, or negative attitude using the range for a three-point Likert scale, where the lower range was said to be a negative attitude and the highest range was a positive attitude. The attitudes of the participants' regarding IDA were classified

into positive, negative, and neutral categories. A thematic description of the participants' practices regarding IDA was employed. A p-value <0.05 was considered statistically significant at the 95% confidence level.

Results

Socio-demographic characteristics of participants

Socio-demographic characteristics on the study participants is presented in Table 1. The study included 225 pregnant women attending the antenatal clinic of University of Cape Coast Hospital. The average maternal age of the participants was 30.3 ± 5.0 years.

Table 1: Socio-demographic characteristics of study participants

Sociodemographic variable	Frequency (n)	Percentage (%)
Marital status		
Single	46	20.4
Married	167	74.2
Cohabiting	12	5.3
Occupation		
Working	188	83.6
Housewife	37	16.4
Educational level		
None	2	0.9
Primary	18	8
Secondary	97	43.1
Tertiary	108	48
Gravida		
First pregnancy	83	36.9
Second pregnancy	63	28
Others	79	35.1
Gestational stage		
First trimester	33	14.7
Second trimester	72	32
Third trimester	120	53.3

Knowledge of participants regarding iron deficiency anaemia

The results of the knowledge of participants regarding iron deficiency anaemia (IDA) is presented in Table 2. Out of the 225 pregnant women that were asked if they have heard about IDA, the majority, 177 (78.7%), had heard about IDA. A greater proportion of participants, 173 (76.9%), had no idea on the consequences of IDA in infants and young children. The majority of participants, 206 (91.6%), did not know about foods that decrease iron absorption. Regarding the overall knowledge performance of the study participants, less than half of the participants, 101 (44.9%), were rated as having good knowledge.

Association between sociodemographic variables and overall knowledge performance

Table 3 presents results on the association between overall knowledge performance and sociodemographic characteristics of the participants. Chi-square analysis revealed there were significant associations between overall knowledge performance and educational level ($X^2=40.849$, $p < 0.001$), as well as gestational stage ($X^2 = 9.764$, $p = 0.008$).

However, there was no significant association found between marital status, occupation, and gravida with overall knowledge performance.

Table 2: Knowledge of study participants regarding iron deficiency anaemia (IDA)

Question	Frequency (n)	Percentage (%)
Have you heard about IDA?		
Yes	177	78.7
No	21	9.3
Don't know	23	10.2
Signs and symptoms of IDA		
Knows	130	57.8
Don't know	95	42.2
Consequences of IDA for infants and young children		
Knows	50	22.2
Don't know	173	76.9
Consequences of IDA for pregnant women		
Knows	68	30.2
Don't know	157	69.8
Causes of IDA		
Knows	119	52.9
Don't know	106	47.1
Prevention of IDA		
Knows	124	55.1
Don't know	101	44.9
Iron-rich foods		
Knows	158	70.2
Don't know	67	29.8
Foods that increase iron absorption		
Knows	29	12.9
Foods that decrease iron absorption		
Knows	19	8.4
Don't know	206	91.6
Overall knowledge performance		
Good	101	44.9
Poor	124	55.1
N=225; Note. IDA represents iron deficiency anaemia		

Attitudes of study participants regarding iron deficiency anaemia (IDA)

Results of the attitudes of the pregnant women regarding IDA are presented in Table 4. It highlights results from the perceived susceptibility, severity, benefit and barriers to anaemia. A significant proportion of the participants (42.2%) reported that they were likely to be anemic. Majority of the participants (82.2%) reported that anaemia was a serious condition. Out of the 225 participants, majority (78.2%) reported that it was good to prepare meals with iron rich foods. Overall, a greater proportion of the study participants (90.3%) had a positive attitude towards anaemia.

Practices of study participants regarding IDA

Results of the practices of pregnant women are present in Table 5. Regarding consumption of vitamin C rich foods, majority (96.4%) of the participants reported to have been

consuming vitamin C rich foods.

Association between overall knowledge performance and attitude of study participants

The association between the overall knowledge performance and attitude of the study participants was investigated. Chi-square analysis revealed there was significant association between the overall knowledge and attitudes of the pregnant women regarding anaemia ($X^2 = 11.791, p = 0.003$). Table 6 presents the results of the association between knowledge and attitude of pregnant women.

Discussion

Anaemia in pregnancy remains a public health problem in developing countries. Our research study assessed the knowledge, attitudes, and practices of pregnant women towards iron deficiency anaemia (IDA). Regarding the overall knowledge performance of the study participants, a greater proportion (55.1%) had poor knowledge on iron deficiency anaemia. Results from our study agree with a similar study in Saudi Arabia, where a greater proportion (66.7%) of pregnant women involved were found to have poor knowledge regarding iron deficiency anaemia (Aboud et al., 2019). Also, findings in our study support those of Ahamed et al. (2018), who found that a majority (60%) of participants in Egypt had poor knowledge regarding iron deficiency anaemia. Our study's results are also in agreement with those reported by Jayanthigopal and Demisie (2018) in Ethiopia. Furthermore, a study in Iraq also reported insufficient knowledge among pregnant women (Alabedi et al., 2020).

In our study, with respect to participants' awareness of IDA, most of them had heard about IDA (78.7%). The participants' awareness level towards IDA in our study is, however, lower compared to a similar study done in Ethiopia (Oumer & Hussein, 2019). The level of IDA awareness in our study is higher than what was recorded in a similar study in India. The awareness of IDA in that study was 39.9% (Nivedita & Shanthini, 2015). The awareness of pregnant women about IDA can influence their attitude and practices towards IDA (Adznam et al., 2018).

Our study found that the educational status and gestational features of the participants were significantly associated with their overall knowledge performance. This may be a contributing factor to anaemia in pregnancy based on the assumption that sociodemographic factors of pregnant women make them more vulnerable to anaemia than the general population. A similar study that examined the association between the knowledge of pregnant women and anaemia found that the knowledge score was positively correlated with blood hemoglobin ($R = 0.23, p < 0.05$) (Zhang & Rojhani, 2018). The knowledge score was also a predictor of blood hemoglobin levels ($R = 0.364, P = 0.02$) (Zhang & Rojhani, 2018). Sociodemographic characteristics of pregnant women were also significantly associated with knowledge and practice regarding anaemia in another similar study done in Ethiopia (Jayanthigopal and Demisie, 2018). A statistically significant association between knowledge score and marital status, educational level, and occupation of participants was also observed in Baghdad,

Table 3: Association between sociodemographic variables and overall knowledge performance regarding anaemia of study participants.

Sociodemographic variable	Overall knowledge performance		X ²	p-value
	Good, n (%)	Poor, n (%)		
Marital status				
Single	17 (16.8)	29 (23.4)	1.615	0.446
Married	79 (78.2)	88 (71)		
Cohabiting	5 (5)	7 (5.6)		
Occupation				
Working	86 (85.1)	102 (82.3)	0.338	0.561
Housewife	15 (14.9)	22 (17.7)		
Gestational stage				
First trimester	8 (7.9)	25 (20.2)	9.764	0.008
Second trimester	29 (28.7)	43 (34.7)		
Third trimester	64 (63.4)	56 (45.2)		
Educational level				
No formal education	1 (1)	1 (0.8)	40.849	0
Primary	3 (3)	15 (12.1)		
Secondary	25 (24.8)	72 (58.1)		
Tertiary	72 (71.3)	36 (29)		
Gravida				
First pregnancy	36 (35.6)	47 (37.9)	1.275	0.529
Second pregnancy	32 (31.7)	31 (25)		
Third pregnancy or above	33 (32.7)	46 (37.1)		

Table 4: Attitudes of study participants towards iron deficiency anaemia, N=225

Question	Frequency (n)	Percentage (%)
Perceived susceptibility		
Likely	95	42.2
Not likely	81	36.0
Not sure	49	21.8
Perceived severity		
Serious	185	82.2
Not serious	3	1.3
Not sure	37	16.4
Perceived benefits		
Good	176	78.2
Not good	11	4.9
Not sure	38	16.9
Perceived barriers		
Difficult	10	4.4
Not difficult	194	86.2
Not sure	21	9.3

Iraq (Al-Sattam et al., 2022). The sociodemographic characteristics of pregnant women may influence their knowledge regarding anaemia.

The overall attitude of the pregnant women in this present study was good and satisfactory. However, their attitudes did not reflect their knowledge as 44.9% of the participants had good knowledge on iron deficiency anaemia. This is however in contrast to a similar study reporting there was a negative attitude and practices among pregnant women in Lahore (Habib et al., 2018). The attitude of the pregnant women in this present study agrees with a positive attitude to IDA found in Saudi Arabia and Egypt (Aboud et al., 2019; Ahamed et al., 2018). Less than 43% of the participants perceived that they were likely to become anemic. This

Table 5: Practices of study participants towards iron deficiency anaemia, N=225

Question	Frequency (n)	Percentage (%)
Consumption of Vitamin C rich foods		
Yes	217	96.4
No	8	3.6
Frequency of consumption of Vitamin C rich foods		
Daily	111	49.3
Twice weekly	91	40.4
Monthly	9	4
Twice monthly	6	2.7
Consumption of Coffee/Tea		
Yes	78	34.7
No	146	64.9
Timing of Coffee/Tea intake		
2hrs or more before meal	19	8.4
Right after meal	44	19.6
Right before meal	16	7.1
2hrs or more after meal	1	0.4
Intake of locally made drinks to prevent/manage anaemia		
Yes	111	49.3
No	114	50.7
Consumption of Pica		
Yes	41	18.2
No	184	81.8
Frequency of Pica consumption		
Daily	9	4
Twice weekly	16	7.1
Monthly	13	5.8
Twice Monthly	1	0.4

Table 6: Association between knowledge and attitude of study participants

	Attitude performance				X ²	P-value
	Positive	Neutral	Negative			
Overall knowledge performance						
Good, n (%)	99 (98)	2 (2)	0 (0)	11.791	0.003	
Poor, n (%)	105 (84.7)	17 (13.7)	2 (1.6)			

compares lower to 53.8% of participants perceiving that they were more vulnerable to anaemia in a study conducted in India (Nivedita & Shanthini, 2015). Their perception of susceptibility to IDA was based on religious reasons in that the condition was not a good condition and hence they would not wish to say they are susceptible to it. Others were also of the view that they consumed healthy meals and hence cannot become anemic. This is in contrast to the scientific fact that dietary intake of iron is not sufficient to prevent anaemia in pregnancy because of the significant increase in demand. Hence the use of iron supplements (Skolmowska et al., 2022).

Regarding the study participants' practices, nearly 96% of them consumed vitamin C-rich foods. Vitamin C has been well established to enhance the absorption of nonheme iron (Wallace, 2016). However, about half (49.4%) of those who reported consuming vitamin C-rich foods consumed them daily. About half (49.3%) of the pregnant women in this present study reported the practice of using locally made drinks such as turkey berry juice in combination with milk to manage and prevent anaemia. This practice is contrary to the scientific principle of iron absorption. Milk is a poor source of iron and also contains substances such as calcium and casein that can inhibit iron absorption (Milman, 2020). This study has the drawback of not being an exploratory study but a descriptive cross-sectional study. It also employs a single-study design. We recommend conducting exploratory studies and employing triangulation to examine the factors that influence expectant mothers' knowledge, attitudes, and practices regarding anaemia in this region.

Recommendations

Results from our study suggest that knowledge level is below the FAO reference recommendation of 70%, and therefore a nutrition strategy may be necessary. In the propagation of educational messages, effort should be made to improve knowledge regarding iron deficiency anaemia. As part of an integrative health care delivery, a Registered Dietitian /Nutritionist should be involved in the antenatal care delivery to enable appropriate communication of nutrition-related issues related to iron deficiency anaemia (IDA).

Conclusion

The findings from this study suggest there is a knowledge deficit among pregnant women. The positive attitudes of the study participants regarding anaemia may not translate into their knowledge concerning a health situation.

Abbreviations

SSA: Sub-Saharan African; CDC: Centers for Disease Control and Prevention; WHO: World Health

Organization; GDHS: Ghana Demographic Health and Survey; Hb: Hemoglobin; LBW: Low-Birth Weight; IUGR: Intrauterine Growth Retardation; UNFPA: United Nations Population Fund; UNICEF: United Nations Children's Fund; IFAS: Iron and Folic Acid Supplementation; KAP: Knowledge, Attitudes and Practices; IDA: Iron Deficiency Anaemia; FAO: Food and Agriculture Organization.

Data availability

Underlying data

Repository name: Knowledge, attitudes and practices regarding anaemia among pregnant women: [https://doi:10.17632/9mynkm782s.1](https://doi.org/10.17632/9mynkm782s.1).

The project contains the following underlying data:

- Safianu, Glor, Pat.xlsx (The attached XLS file contains data from a study that assessed the knowledge, attitudes, and practices of pregnant women regarding anaemia using a validated questionnaire from the United Nations Food and Agricultural Organization).
- Safianu, Glor, Pat (The file contains data on the sociodemographic profile, the knowledge, attitudes, and practices of pregnant women regarding anaemia using a validated questionnaire from the United Nations Food and Agricultural Organization).

Extended data

Repository name: KAP Questionnaire: [https://doi:10.17632/vzfn5vngby.1](https://doi.org/10.17632/vzfn5vngby.1)

Competing interests

No competing interests were disclosed.

Grant information

The authors declared that no grants were involved in supporting this work.

References

1. Aboud, S. A. E. H., El Sayed, H. A. E., & Ibrahim, H. A. F. (2019). Knowledge, Attitude and Practice Regarding Prevention of Iron Deficiency Anaemia among Pregnant Women in Tabuk Region. *International Journal of Pharmaceutical Research & Allied Sciences*, 8(2).
2. Acheampong, K., Appiah, S., Baffour-Awuah, D., & Arhin, Y. S. (2018). Prevalence of anaemia among pregnant women attending antenatal clinic of a selected hospital in Accra, Ghana. *International Journal of Health Sciences Research*, 8(1), 186-193.
3. Adznam, S. N. H., Sedek, R., & Kasim, Z. M. (2018, April). Assessment of knowledge level on anaemia among pregnant women in Putrajaya. In *AIP Conference Proceedings* (Vol. 1940, No. 1, p. 020104). AIP Publishing

LLC.

4. Ahamed, F., Yadav, K., Kant, S., Saxena, R., Bairwa, M., & Pandav, C. S. (2018). Effect of directly observed oral iron supplementation during pregnancy on iron status in a rural population in Haryana: A randomized controlled trial. *Indian Journal of Public Health*, 62(4), 287-293.
5. Ahamed, N. H., Kotb, S. A., & Hassanen, R. H. (2018). Knowledge and attitude of pregnant women about iron deficiency anaemia in Assist University Women Health Hospital, Egypt. *Journal of Nursing and Health Science*, 7(3), 49-58.
6. AlAbedi, G. A., Arar, A. A., & Alridh, M. S. A. (2020). Assessment of pregnant women knowledge and practices concerning iron deficiency anaemia at Al-Amara City/Iraq. *Medico-legal Update*, 20(3), 151.
7. Al-Sattam, Z., Hassan, S., Majeed, B., & Al-Attar, Z. (2022). Knowledge about Anaemia in Pregnancy among Females Attending Primary Health Care Centers in Baghdad. *Open Access Macedonian Journal of Medical Sciences*, 10(B), 785-792.
8. Bhatnagar, R. S., & Padilla-Zakour, O. I. (2021). Plant-based dietary practices and socioeconomic factors that influence anaemia in India. *Nutrients*, 13(10), 3538.
9. Di Renzo, G. C., Spano, F., Giardina, I., Brillo, E., Clerici, G., & Roura, L. C. (2015). Iron deficiency anaemia in pregnancy. *Women's Health*, 11(6), 891-900.
10. Dorsamy, V., Bagwandeem, C., & Moodley, J. (2022). The prevalence, risk factors and outcomes of anaemia in South African pregnant women: a systematic review and meta-analysis. *Systematic Reviews*, 11(1), 1-16.
11. Fautsch Macías, Y., Glasauer, P., & Food and Agriculture Organization of the United Nations. (2014). Guidelines for assessing nutrition-related knowledge, attitudes and practices: KAP manual. Food and Agriculture Organization of the United Nations. Retrieved from <https://www.fao.org/3/i3545e/i3545e.pdf>
12. Fite, M. B., Assefa, N., & Mengiste, B. (2021). Prevalence and determinants of Anaemia among pregnant women in sub-Saharan Africa: a systematic review and Meta-analysis. *Archives of Public Health*, 79, 1-11.
13. Fite, M. B., Roba, K. T., Oljira, L., Tura, A. K., & Yadeta, T. A. (2021). Compliance with Iron and Folic Acid Supplementation (IFAS) and associated factors among pregnant women in Sub-Saharan Africa: A systematic review and meta-analysis. *PLoS One*, 16(4), e0249789.
14. Geta, T. G., Gebremedhin, S., & Omigbodun, A. O. (2022). Prevalence and predictors of anaemia among pregnant women in Ethiopia: Systematic review and meta-analysis. *PloS One*, 17(7), e0267005.
15. Getaneh, T., Negesse, A., Dessie, G., Desta, M., Assemie, M. A., & Tigabu, A. (2021). Predictors of malnutrition among pregnant women in Ethiopia: a systematic review and meta-analysis. *Human Nutrition & Metabolism*, 26, 200131.
16. Habib, A., Afzal, M., Parveen, K., Hussain, M., & Gilani, S. A. (2018). *Medicine and Nursing*. International Peer-reviewed Journal, 50. Retrieved from www.iiste.org
17. Jayanthigopal, M., & Demisie, M. D. B. (2018). Assessment of Knowledge and Practice Towards Prevention of Anaemia Among Pregnant Women Attending Antenatal Care at Government Hospitals in West Shoa Zone, Ethiopia. *Assessment*, 50.
18. Karakoc, G., Orgul, G., Sahin, D., & Yucel, A. (2022). Is every other day iron supplementation effective for the treatment of the iron deficiency anaemia in pregnancy? *The Journal of Maternal-Fetal & Neonatal Medicine*, 35(5), 832-836.
19. Karami, M., Chaleshgar, M., Salari, N., Akbari, H., & Mohammadi, M. (2022). Global Prevalence of Anaemia in Pregnant Women: A Comprehensive Systematic Review and Meta-Analysis. *Maternal and Child Health Journal*, 26(7), 1473-1487.
20. Milman, N. T. (2020). A review of nutrients and compounds, which promote or inhibit intestinal iron absorption: making a platform for dietary measures that can reduce iron uptake in patients with genetic haemochromatosis. *Journal of Nutrition and Metabolism*, 2020.
21. Milman, N. T. (2022). Iron supplementation in pregnant Danish women revisited: Effects on prepartum and postpartum iron deficiency, anaemia, serum erythropoietin; including iron status, erythropoietin and anthropometrics in newborns. A randomized, placebo-controlled study. *Journal of Neonatal-Perinatal Medicine*, (Preprint), 1-14.
22. Nivedita, K., & Shanthini, F. (2015). Is it safe to provide abortion pills over the counter? A study on outcome following self-medication with abortion pills. *Journal of Clinical and Diagnostic Research*, 9(1), QC01.
23. Oumer, A., & Hussein, A. (2019). Knowledge, attitude and practice of pregnant mothers towards preventions of iron deficiency anaemia in Ethiopia: Institutional based cross sectional study. *Health Care Current Review*, 7(1), 1-7.
24. Skolmowska, D., Głabska, D., Kołota, A., & Guzek, D. (2022). Effectiveness of Dietary Interventions in Prevention and Treatment of Iron-Deficiency Anaemia in Pregnant Women: A Systematic Review of Randomized Controlled Trials. *Nutrients*, 14(15), 3023.
25. Statistical Service, G. (2014). *Demographic and Health Survey*.
26. Stoltzfus, R. J., & Dreyfuss, M. L. (1998). Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia (Vol. 2). Washington, DC: Ilsi Press.
27. University of Ghana, GroundWork, Wisconsin-Madison, KEMRI-WellcomeTrust, UNICEF, Ghana Micronutrient Survey (2017). Accra, Ghana.
28. Wallace, D. F. (2016). The regulation of iron absorption and homeostasis. *The Clinical Biochemist Reviews*, 37(2), 51.
29. World Health Organization. (2008). Worldwide prevalence of anaemia 1993-2005; WHO Global Database

of anaemia.

30. World Health Organization. (2019). Trends in maternal mortality 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division.

31. World Health Organization. (2020). Global anaemia reduction efforts among women of reproductive age: impact, achievement of targets and the way forward for optimizing efforts.

32. Yip, R. (2002). Forging Effective Strategies to Combat

Iron Deficiency Iron Supplementation: Country Level Experiences and Lessons Learned. Retrieved from <https://academic.oup.com/jn/article/132/4/859S/4687284>

33. Zhang, Q., Rojhani, A., Gulló-Rivera, A., & Kwak, S. (2018). Prevalence and knowledge of anemia among pregnant women enrolled in Women, Infants and Children supplemental food program. *Nutrition & Food Science*, 48(6), 990-1002.