# Maternal Knowledge and Behavior as Prevention of Anemia in Pregnancy: A Primary Health Care Cross-Sectional Study Design

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**Abstract**
**Objective:** The incidence of Maternal Anemia in Indonesia (48.9%), which exceeds the WHO standard of >40%, signifies a severe public health concern that requires immediate attention and intervention. Consuming iron-rich meals and supplements with regular antenatal care visits in early pregnancy reduces maternal anemia rate. Our study aims to determine the relationship between the level of knowledge and behavior during pregnancy and the incidence of anemia.
**Method:** A descriptive-analytic cross-sectional study was conducted at Sukaindah Primary Health Care Center in September and October 2023. Pregnant women who attended Antenatal Care (ANC) underwent hemoglobin tests. Seventy-eight respondents were selected using consecutive sampling. The knowledge and behaviors of anemic pregnant women were compared to those without anemia. The validated-modified questionnaire consists of twenty questions to measure knowledge and eleven questions to assess behavior.
**Result:** All respondents were dominated by poor knowledge (83%) and fair preventive behavior (61.5%) about anemia in pregnancy. Although the level of knowledge was not significantly associated with the incidence of anemia (p-value: 0.277), women who were found in the level of good (33%) and fair knowledge (55%) showed good behavior (p-value = 0.007) for its prevention. There was a statistically significant association between behavior during pregnancy and the incidence of anemia (p-value = 0.025). Iron supplementation emerged as a critical factor in preventing anemia in pregnancy. (mean: 1.38).
**Conclusion:** Knowledge and behavior are the most important aspects of anemia prevention strategies. Good behavior is based on adequate knowledge, as poor knowledge triggers bad behavior. Behavioral factors play a statistical role in preventing anemia, but knowledge does not show a significant relationship in pregnant women with anemia.

**Keywords:** Anaemia, Pregnancy, Knowledge, Behaviour

# Pengetahuan dan Perilaku ibu hamil sebagai Pencegahan Anemia Kehamilan: Studi Potong Lintang di Fasilitas Kesehatan Primer

**Abstrak**
**Tujuan:** Tingkat kejadian anemia kehamilan di Indonesia sebesar 48.9%. Hal ini merupakan suatu *severe public health problem* berdasarkan WHO (> 40%). Pengaturan pola makan tinggi zat besi, teratur meminum tablet zat besi, dan rutin melakukan ANC pada kehamilan trimester awal ialah faktor penting mengurangi kejadian anemia pada ibu hamil. Perilaku atau tindakan seseorang dibentuk berdasarkan pengetahuan (*knowlegde*) atau kognitif. Studi ini bertujuan mengetahui hubungan tingkat pengetahuan dan perilaku selama hamil terhadap kejadian anemia.
**Metode**: Studi deskriptif analitik dengan metode *cross sectional* ini berpopulasi pada ibu hamil yang melakukan pemeriksaan ANC di Puskesmas Sukaindah selama bulan September dan Oktober 2023 dan melakukan pemeriksaan hemoglobin. Pemilihan sampel secara *consecutive sampling* didapatkan 78 responden Ibu hamil. Modifikasi kuesioner yang sudah tervalidasi terdiri dari dua puluh pertanyaan untuk pengetahuan dan sebelas pertanyaan untuk perilaku.
**Hasil:** Seluruh responden didominasi dengan pengetahuan buruk (83%) dan perilaku yang cukup (61.5%). Studi menunjukkan terdapat hubungan antara perilaku selama hamil dan kejadian anemia (*p value = 0.025*), namun tingkat pengetahuan tidak berhubungan secara signifikan (*p value = 0.277*). Ibu dengan pengetahuan yang baik (33%) dan cukup (55%) berhubungan secara signifikan (*p value= 007*) menghasilkan perilaku pencegahan yang baik. Konsumsi rutin tablet tambah darah berperan sebagai pencegahan kejadian anemia ibu hamil (*mean:* 1.38)
**Kesimpulan:** Perilaku yang baik didasari oleh pengetahuan yang cukup, begitu juga dengan perilaku buruk dipicu oleh kurangnya pengetahuan. Faktor perilaku berperan secara statistik mencegah kejadian anemia, namun pengetahuan tidak menunjukkan hubungan bermakna pada ibu hamil dengan anemia.

**Kata kunci:** Anemia, Kehamilan, Pengetahuan, Perilaku.

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## Introduction

Anemia is one of the significant global issues. Maternal anemia is defined by the hemoglobin level of pregnant women in the first and third trimesters lower than 11 g/dl and 10.5 g/dl in the second trimester.[1] According to the World Health Organization (WHO), the incidence of anemia in women is 29.9%. The incidence of anemia among pregnant women was reported at 37%, with an average age of 15-49 years in 2019. Anemia poses a significant challenge in developing countries, impacting around 106 million women and 103 million children in Africa, along with 244 million women and 83 million children in Southeast Asia.[2]

The high rate of anemia in pregnant women causes this issue to be called a "*potential danger to mother and child."* This is due to the adverse effects on the mother and fetus, such as premature birth, low birth weight, and maternal death.[3] Low birth weight children are at risk of having poor nutritional status, such as stunting. The Ministry of Health, based on the results of the Indonesian Nutrition Status Survey (SSGI), reported the prevalence of stunting in Indonesia was 21.6% in 2022. The high stunting rate is influenced by the condition of mothers with anemia, who are four times more likely to have stunted children.[4]

Developing countries have approximately 33-75% rates of maternal anemia.[5] Indonesia contributes a relatively high rate of anemia among pregnant women, 48.9%, according to the Ministry of Health in 2019. This rate exceeds the anemia prevalence (40%), leading this issue to be a severe public health problem, which also affects the Maternal Mortality Rate (MMR) in Indonesia.[6]

The most common cause of maternal anemia is iron deficiency in about 75-90% of cases. Low intake of iron foods, such as red meat and green vegetables, is one of the factors of anemia in pregnant women.[7] Sariestya R demonstrated that pregnant women with Fe consumption <90 tablets were at risk of anemia compared to those who consumed ≥90 tablets. In addition, causes of anemia include hemoglobinopathies, chronic diseases and infections, hookworm infections, and deficiencies in other nutrients such as vitamin B12 and folic acid. Based on research by Verrayanti R, of the 25 anemic respondents, 64% had negative behavior in the form of a lack of taking blood supplement tablets with a p-value = 0.004.[8] In addition to low iron food intake, other factors contributing to anemia in pregnant women are low consumption of Fe supplement and poor compliance of antenatal care services.[3]

Appropriate preventive behavior is needed based on the lack of iron intake. Setting a high iron diet, regularly taking iron tablets, and routinely performing ANC in the early trimester of pregnancy are good behaviors in reducing the incidence.[9] A person's behavior or action is formed based on knowledge or cognition. Several previous studies have shown that the level of knowledge influences the incidence of anemia. In one study in Northern Tanzania, women's low education level became an independent factor associated with anemia during pregnancy.[10] Rojulani H in research on the relationship between knowledge of pregnant women and the incidence of pregnancy anemia at Batang Bulu Health Center, Padang, showed significant results of knowledge and the incidence of anemia (p = 0.001).[11] According to the prior study, the association between knowledge and anaemia-related behaviours remains ambiguous. The present study aims to ascertain the relationship between the level of knowledge and behavior among pregnant women with anemia in the Sukaindah Primary Health Care Center, thereby aiding in the prevention strategy of reducing the incident.

## Method

This research is an analytical descriptive study with a cross-sectional method at the Sukaindah Primary Health Care Center (PUSKESMAS). The study population was pregnant women who came for routine ANC examinations at the Puskesmas from September to October 2023.

The study used consecutive sampling techniques, namely pregnant women who fit the inclusion and exclusion criteria. Respondents were explained about this study before signing the informed consent. All Pregnant women were tested for hemoglobin and were willing to be respondents, which were included in the inclusion criteria. On the other hand, respondents who did not complete the questionnaire data and repeated ANC visits during the study period were excluded.

Data were collected from a validated questionnaire consisting of twenty questions for knowledge and eleven questions for behavior. The correct answer to each question will be given a value of 1; if it is wrong, it will be given a value of 0 according to the Likert scale. Assessment was done by comparing the number of answer scores with the expected score (highest). The dependent variable of the study is the incidence of anemia. The dependent variable was anemia knowledge and anemia prevention behavior of pregnant women. Data were analyzed with the Kruska-Wallis statistical test. The variables have a statistically significant relationship if the calculation results show a p-value < (0.05). Cross-tabulation analysis explained the association (relationship) between the dependent and independent variables.

## Result

A total of 78 pregnant women were selected using a consecutive sampling method. Respondent characteristics, including age, education, parity, and gestational age, are shown in **Table 1**. The majority of pregnant women in this study were in early adulthood (26-35 years), namely 27 people (47.4%). Based on educational level, most respondents were educated at the Senior High School Level (SHS), as many as 41 people (52.5%). Respondents with a history of pregnancy >1 or dominated by multipara were 53 people (67.9%). Based on gestational age, it was found that forty-six pregnant women (59%) were in the third trimester (gestational age> 28 weeks)

The description of knowledge and behavior was divided into three categories. Table 1 shows that 32 respondents know or have heard about anemia (41%), while 46 others have never known about anemia (46%). The average respondent learned about anemia from the internet (25.3%). On the other hand, only some of the respondents received information directly from health workers (8.9%).

The overall score of knowledge about anemia was 65 pregnant women (83.3%) had poor knowledge, followed by ten people (12.8%) with fair knowledge and 3 with good knowledge (3.8%). However, the characteristic level of prevention looks better than the level of knowledge. There were 48 pregnant women (61.5%) with a fair level of behavior, 16 respondents (20.5%) with poor behavior, and 14 respondents (17.9%) with good behavior. This research showed 18 pregnant women with anemia, 11 with mild anemia (14.1%), and 6 (7.7%) with moderate anemia. However, 61 pregnant women had normal Hb levels according to gestational age (78.2%).

Pregnant women with moderate anemia have more knowledge at the level of poor (7.7%) and fair (10%) compared to good knowledge. Respondents with mild anemia all have poor knowledge (16.9%). Based on the bivariate analysis results with the Kruska-Wallis test, the p-value for trend =

**Table 1 Distribution of Respondent by Sociodemographic and Maternal Status**

| | Frequency (N:78) | Precentage (%) |
|---|---|---|
| **Age** | | |
| Early Adolescence (12-16 th) | 2 | 2.6 % |
| Adolescences (17-25 th) | 33 | 42.3 % |
| Early Adult (26-35 th) | 37 | 47.4 % |
| Adult (36-45 th) | 6 | 7.7 % |
| **Educational Level** | | |
| Elementary school | 11 | 14.1 % |
| Junior High School | 18 | 23.1 % |
| Senior High School | 41 | 52.6 % |
| Bachelor | 3 | 3.8 % |
| Not identified | 5 | 6.4 % |
| **Parity** | | |
| Nullipara | 1 | 1.3 % |
| Primipara | 24 | 30.8 % |
| Multipara | 53 | 67.9 % |
| **Gestational Age** | | |
| 1st Trimester (1-13 week) | 13 | 16.7 % |
| 2nd Trimester (14-27 week) | 19 | 24.4 % |
| 3rd Trimester (> 28 week) | 46 | 59 % |
| **Information of Anemia** | | |
| Know | 32 | 41 % |
| Not Know | 46 | 59 % |
| **Information accessed** | | |
| Internet | 20 | 25.3% |
| Television | 8 | 10.1% |
| Relative | 5 | 6.3% |
| Health workers | 7 | 8.9% |
| **Anemia Status** | | |
| Moderate Anemia | 6 | 7.7% |
| Mild Anemia | 11 | 14.1% |
| Normal | 61 | 78.2% |
| Total | 78 | 100% |
| **Knowledge** | | |
| Poor | 65 | 83.3 % |
| Fair | 10 | 12.8 % |
| Good | 3 | 3.8 % |
| **Behavior** | | |
| Poor | 16 | 20.5 % |
| Fair | 48 | 61.5 % |
| Good | 14 | 17.9 % |

0.277 (p>0.05), so no statistically significant relationship was found. **(Table 2)**
Pregnant women with moderate anemia were dominated by poor preventive behavior (25%), and no one had good behavior (0%). In mild anemia, there were also more with fair (20.8%) and poor (6.3%) preventive behavior. Based on the bivariate analysis results, the p-value for trend = 0.025 (p<0.05) so that there is a relationship between.

The pregnant women with poor preventive behavior had a poor knowledge level (24.6%). Good preventive behavior is dominated by a fair (50%) and good (33.3%) level of knowledge. In our study, knowledge and behavior had a significant relationship with p-value = 0.007 (p< 0.05). **Table 3**

The highest percentage of correct answers (81%) from the questionnaire was when respondents were asked if it was true or false that dizziness is a sign of anemia, followed by a statement that anemia can be prevented by eating high-iron food (78%). Most of the respondents falsely answered the statement about pale nails as a sign of anemia (76%), and 68% of the respondents did not know that anemia can cause miscarriage (**Table 4**). Based on the behavioral assessments, it was found that taking iron tablets not close to tea time in pregnant women had a better mean value (1.68 ± 0.655) than other questions **(Table 5)**

**Table 2 Bivariate Analysis of Knowledge and Behavior with Anemia**

| | Anemia Status | | | | | | Total | | *P value* |
|---|---|---|---|---|---|---|---|---|---|
| | Moderate | | Mild | | Normal | | | | |
| **Knowledge** | | | | | | | | | |
| Poor | 5 | 7.7% | 11 | 16.9% | 49 | 75.4% | 65 | 100% | 0.277 |
| Fair | 1 | 10% | 0 | 0 | 9 | 90% | 10 | 100% | |
| Good | 0 | 0% | 0 | 0 | 3 | 100% | 3 | 100% | |
| **Behavior** | | | | | | | | | |
| Poor | 4 | 25% | 1 | 6.3% | 11 | 68.8% | 16 | 100% | **0.025** |
| Fair | 2 | 4.2% | 10 | 20.8% | 36 | 75% | 48 | 100% | |
| Good | 0 | 0% | 0 | 0% | 14 | 100% | 14 | 100% | |

**Table 3 Relationship Between Knowledge and Preventive Behavior Of Maternal Anemia.**

| Level of Knowledge | Behavior | | | | | | Total | | *P value* |
|---|---|---|---|---|---|---|---|---|---|
| | Poor | | Fair | | Good | | | | |
| **Poor** | 16 | 24.6% | 41 | 63.1% | 8 | 12.3% | 65 | 100% | **0.007** |
| **Fair** | 0 | - | 5 | 50% | 5 | 50% | 10 | 100% | |
| **Good** | 0 | - | 2 | 66.7% | 1 | 33.3% | 3 | 100% | |

**Table 4 Respondent's Response toward Knowledge about Anemia.**

| Question | Correct (%) | Incorrect (%) |
|---|---|---|
| Haemoglobin levels in Anemia maternal was less than 11 gr/dl | 45% | 55% |
| Malnutrition cause Anemia in pregnancy | 56% | 44% |
| Dizziness and nausea are sign of anemia | **81%** | 19% |
| Pregnant women with anemia usually feel fatigue | 41% | 59% |
| Pale eyelids is sign of anemia | 47% | 53% |
| Pale nails were found in women with anemia | 24% | **76%** |
| Nausea and vomiting at first trimester are sign of anemia maternal | 32% | 68% |
| Drowsy is a sign of anemia | 32% | 68% |
| Anemia in pregnancy may cause miscarriage | 28% | **72%** |
| Anemia in pregnancy may cause fetal growth restriction | 46% | 54% |
| Anemia in pregnancy may lead to premature birth | 37% | 63% |
| Maternal Anemia cause low birth weight | 47% | 53% |
| The Development of Fetal Brain is not associated with Anemia during pregnancy. | 32% | 68% |
| Taking iron supplement do not prevent anemia in pregnancy | 37% | 63% |
| Anemia can be prevented by eating high iron food | **78%** | 22% |
| Taking Pregnancy-related Hb level testing can help avoid anemia. | 67% | 33% |
| Eating animal protein (eggs, lean meat, fish, and seafood) cannot prevent anemia in pregnancy | 49% | 51% |
| Food sources of iron are more in animal foods than plant foods (tofu, tempeh, spinach, kale) | 60% | 40% |
| Taking iron supplements routinely when teenagers can prevent anemia | **62%** | 38% |
| Coffee and tea inhibit iron absorption | 60% | 40% |

**Table 5 Distribution of Preventive Behavior Assessment about Anemia toward Women who attended ANC.**

| Variables | | Mean | SD |
|---|---|---|---|
| **Diet** | Three Meals Times A Day | 1.62 | 0.515 |
| | Not Drinking Coffee or Tea | 1.17 | 0.653 |
| | Eating fruits and vegetables everyday | 1.33 | 0,501 |
| | Consuming high protein food (meat or eggs) | 1.23 | 0.533 |
| **Compliance of taking iron supplements** | Taking an iron supplements regularly | 1.38 | 0.769 |
| | Taking an iron supplements at night | 1.31 | 0.795 |
| | Taking an iron supplement with vitamin C to reduce nausea | 0.47 | 0.659 |
| | Taking an iron tablets not close to tea time | **1.6**8 | **0.655** |
| **Frequency of Attending ANC in Public Health Center** | First attendance of ANC | 0.76 | 0.432 |
| | Total attendance of ANC during pregnancy | 0.79 | 0.406 |

## Discussion

In this study, most pregnant women had poor knowledge about anemia. A poor level of knowledge also dominated respondents with anemia. This study aligns with research by Titik, who found more anemic respondents with a poor level of knowledge (27.8%).[12] The possible reason is related to the average educational level of respondents, which was senior high school. According to Notoatmodjo (2007), a lack of education will hinder the development of a person receiving information so that he gets little knowledge. Educational factors were also shown in a study done in North Tanzania, where women with low educational levels were an independent factor associated with anemia in pregnancy.[10]

However, the bivariate analysis did not show significant results between knowledge and the incidence of anemia (p = 0.277). A study by Meta regarding the level of knowledge on the incidence of anemia among pregnant women in the third trimester also showed insignificant results (p = 0.503).[11] Otherwise, Rojulani H showed a significant association between knowledge and the incidence of anemia at the Batang Bulu Health Center (p=0.001).[8] The difference in statistical results is due to the unbalanced number of respondents in the study between anemia and normal, where the number of normal respondents (78.2%) was more than anemia (21.8%). In addition, several different socio-demographic factors between regions of studies influence the level of knowledge.

Low sources of information about anemia play a role as a factor related to the poor level of knowledge. Fifty-nine percent of respondents had yet to learn about anemia (**See Table 1**). Benin and Sierra mentioned that low information about anemia prevention affects the anemia status. Therefore, it is necessary to study where the most common source of information from respondents.[13,14] The Internet was the common medium where the mother was exposed to information about anemia. Spreading information through social media could be a prevention strategy. A flyer or poster could focus on spreading information about symptoms and complications due to most incorrect answers from Table 4.

**Table 2** illustrates the incidence of anemia is impacted by the level of behavior (p = 0.025). Verranti R revealed that 64%

of pregnant women with anemia had negative behavior in the form of taking iron supplements with a p-value = 0.004.[8.] These results were in line with the respondents of anemic pregnant women in this study who had poor and fair levels of behavior. Meta R, in his research, showed that 25 respondents who were anemic mostly behaved negatively (64%) with a p-value of 0.004.[8.] Behavior is a risk factor affecting anemia because it is directly related to the respondent. Meanwhile, a study by Ferdanna A and Cormack M in Sierra Leone, West Africa, showed the behavior of the anemia and control groups was not statistically significant.[14] This finding could be due to data collection in different districts. The disparities in some studies do not deny that preventive behavior still impacts reducing the incidence of anemia.

According to this study, poor knowledge significantly leads to negative behavior (**Table 3**). The USA, Yerevan, and Nepal study found that most mothers with low knowledge had negative behavior. This is in line with Research by Oumer A., which showed a correlation between maternal knowledge and prevention of iron deficiency anemia with r=0.45 and p<0.001.[15.] Otherwise, women with good knowledge about anemia adhere to good prevention behavior. Most Respondents (78%) agreed that consuming high-iron food could prevent anemia **(See Table 4)**. This investigation strengthens Indonesia's Health Ministry program (Kemenkes) on anemia prevention by giving at least 90 tablets of Fe supplements during pregnancy.

From the entire assessment of the behavior in **Table 5**, taking iron tablets not close to tea time had a better mean value than other questions (1,68 ±0.655). Most respondents agreed that iron tablets should not be combined with tea. This statement aligns with 60% of respondents who answered correctly that coffee and tea could inhibit iron absorption **(Table 4)**. Despite our results, Oumer A and Hussein A in Harar City, Ethiopia, found that almost 70% of their pregnant women respond negatively to the fact that fiber, coffee, and tea after meals reduce the fractional absorption of iron. Then, 46% of their respondents habitually consume coffee and tea immediately after a meal. [15]

## Conclusion

Various factors were related to anemia in pregnant women, including the level of knowledge and behavior. Our studies reveal that knowledge of pregnant women was not significantly associated with the incidence of anemia, whereas behavior showed a significant relationship with anemia. Poor levels of knowledge were dominant among the participants, which might have been caused by low educational level as one of the social-demographic factors of our study. Thus, providing information about the definition, signs, symptoms, and ways to prevent anemia should be equivalent to strategies for improving women's education levels in Indonesia.

## Limitation and recommendation

The short data collection time posed some limitations to our study. We recommend continuing this study to find which behaviors significantly prevent anemia in pregnancy

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## Reference

1. Sarwono, P. (2005), Buku Acuan Nasional Pelayanan Kesehatan Maternal dan Neonatal, Edisi pertama, Bina

Pustaka Sarwono Prawirohardjo, Jakarta, Indonesia
2. World Health Organization. Anaemia [Internet]. WHO. 2023 [cited 2023 Sep 18]. Available from: https://www.who.int/
3. World Health Organization. Haemoglobin Concentrations for the Diagnosis of Anaemia and Assessment of Severity. World Health Organization (2011).
4. Widyaningrum D, Romadhoni D. Riwayat anemia kehamilan dengan kejadian stunting pada balita di Desa Ketandan Dagangan Madiun. Medica Majapahit [Internet]. 2018;10(2):90–4. Available from: http://ejournal.stikesmajapahit.ac.id/index.php/MM/article/view/291
5. Irianti, B dkk. (2014), Asuhan Kehamilan Berbasis Bukti, Edisi Pertama, Sagung Seto, Jakarta, Indonesia
6. Kusumastuti E. Anemia dalam Kehamilan [Internet]. Kemenkes. 2022 [cited 2023 Sep 24]. Available from: https://yankes.kemkes.go.id/
7. Abd Rahman R, Idris IB, Isa ZM, Rahman RA, Mahdy ZA. The Prevalence and Risk Factors of Iron Deficiency Anemia Among Pregnant Women in Malaysia: A Systematic Review. Front Nutr. 2022;9(April):1–9.
8. Reni Meta. Skripsi Hubungan Tingkat Pengetahuan Dan Perilaku Konsumsi Tablet Tambah Darah Dengan Kejadian Anemia Pada Ibu Hamil Trimester III. J Chem Inf Model. 2017;53(9):1689–99.
9. Ndegwa, S.K. (2019) ' Anemia & Its Associated Factors Among Pregnant Women Attending Antenatal Clinic At Mbagathi County Hospital, Nairobi County, Kenya', African Journal of Health Sciences, 32(1), pp. 59-73
10. Stephen, G., Mgongo, M., Hussein Hashim, T., Katanga, J., Stray-Pedersen, B., & Msuya, S. E. (2018). Anaemia in Pregnancy: Prevalence, Risk Factors, and Adverse Perinatal Outcomes in Northern Tanzania. Anemia, 2018, 1846280. https://doi.org/10.1155/2018/1846280
11. Minta Rojulani H. Hubungan pengetahuan ibu hamil dengan kejadian anemia dalam kehamilan di puskesmas batang bulu kec. barumun selatan kab. padang lawas tahun 2022. Fak Kesehat Univ Aufa Royhan Di Kota Padangsidimpuan. 2022;
12. Purwati, Titik. "Hubungan tingkat pengetahuan ibu hamil tentang tablet Fe dengan kejadian anemia di wilayah kerja Puskesmas Mondokan Kecamatan Mondokan Kabupaten Sragen".Skripsi. Fakultas Kesehatan Masyarakat Universitas Sebelas Maret Surakarta.2013
13. Salifou et al."factors associated with anemia in pregnant women in 2014 in Parakou ". Journal pregnant child health Vol 2 Issue 4. 2015
14. M'Cormack, Fredanna A.D and Drolet, Judy C."Assessment of anemia knowledge, attitudes and behaviors among pregnant women in Sierra Leone". The Health Educator Vol 44 Issue 2 . 2012
15. Abdu AO, Hussein AH. Pregnant Mothers' Knowledge, Attitude and Practice Towards Preventions of Iron Deficiency Anemia in Harar Town, Ethiopia. Int J Public Heal Sci. 2019;8(2):202–10.