



Assessment of Knowledge, Attitude and Practice on Food rich in Iron in the Prevention of Iron Deficiency Anemia Among Pregnant Women attending some Health Care Facilities in Batagarawa Local Government Area, Katsina State.

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ABSTRACT

Iron deficiency anemia (IDA) poses a significant public health challenge globally, particularly among pregnant women, due to its adverse effects on maternal and child health outcomes. This study aimed to assess the knowledge, attitudes, and practices related to IDA among pregnant women in Batagarawa Local Government Area of Katsina State, Nigeria. Data were collected through structured questionnaires distributed to 100 pregnant women attending healthcare facilities. Sociodemographic characteristics, knowledge about IDA, dietary practices, and barriers to consumption of iron-rich foods were assessed. Descriptive statistics and chi-square tests were used for data analysis. The findings revealed a high level of awareness (93%) about IDA among pregnant women, although dietary practices varied. While a substantial proportion reported consuming iron-rich foods and vitamin C-rich fruits regularly, some did not incorporate these into their daily diet. Occupation and monthly income were found to influence dietary habits, emphasizing the importance of socio-economic factors in nutritional outcomes. Attitudes and beliefs towards IDA and dietary practices were generally positive, with most respondents recognizing the seriousness of IDA and the importance of iron-rich foods. In conclusion, the study confirmed positive knowledge, attitude and practice on iron rich foods in the prevention of IDA among pregnant women in the study area. To effectively address IDA in this population, interventions should consider socio-economic factors, cultural beliefs, and individual attitudes towards dietary practices. Targeted education and counseling sessions are recommended to address misconceptions and build confidence in dietary practices during pregnancy.

Keywords: Iron deficiency anemia, pregnant women, dietary practices, socio-economic factors, Nigeria.

INTRODUCTION

Pregnancy is a period of significant increase in iron requirement; the demand for iron is higher due to physiological changes in maternal red blood cell mass and increasing needs of development, placenta and fetus (WHO, 2014). Mineral element Iron is highly needed in significant amount to support maternal and fetal growth. Despite increased iron requirements, pregnancy is also a period of increased risk for different complications such as anemia which is higher than in non-pregnant women. The presence of Iron deficiency anemia (IDA) has been associated with decreased cognitive index, low birth weight and increased neonatal mortality (Chen *et al*, 2013). World Health organization (WHO) define Anemia as “A condition in which the number of red blood cells (RBCs) or their oxygen-carrying capacity is inadequate to meet physiologic demands in the body”. Anemia in pregnancy is identified by the WHO as hemoglobin level less than 11 g/dl (Khusun *et al*, 1999). Anaemia is defined as the condition of having a low number of red blood cells or a low amount of haemoglobin (WHO, 2020).

It is estimated in developed countries, that about 38% of pregnant women had iron depletion (Jack *et al*, 2014). Globally, anemia affects 1.62 billion people (1.62 billion) with prevalence of 24.8%, out of whom an estimated, 56 million (41.8%) of pregnant women had anemia, where iron deficiency is thought to be the most common cause of anemia which account for 75%-95% of cases (WHO, 2011). Conversely, the most common cause of anemia is iron deficiency due to iron depletion. Thus the level of maternal awareness and attitude towards dietary and other prevention practices of anaemia are not well established in the study area. Lack of knowledge concerning nutrition is one of the most significant reasons for nutritional problems and consequently, inappropriate nutritional practices can lead to numerous complications (WHO, 2011). Iron deficiency anemia is one of the great Nutritional concerns worldwide (WHO, 2011).

Micronutrient deficiencies during the first 1000 days of life are associated with poor maternal health and neonatal outcomes like morbidity, mortality, cognitive loss and congenital deformities. Low birth weight from anemia and other causes accounts more than 800, 000 deaths each year in neonatal

death (Bhutta et al, 2013). As such, the research was intended to assess the knowledge, attitude and practice on food rich in iron in the prevention of iron deficiency anemia among pregnant women attending some health care Facilities in Batagarawa Local Government, Katsina State, Nigeria.

Iron Deficiency Anemia Prevalence

Worldwide estimates of IDA showed the prevalence of anemia in Africa, reaches up to 52%. The estimates range from 18% in developed Countries and to 56% in developing countries. Global prevalence of anemia for pregnant women was 38.2% and for all women of reproductive age were 29.4% with an estimated 32.4 million pregnant women was anemic (WHO, 2015).

Iron deficiency in pregnancy is distinguished by the World Health Organization (WHO), as hemoglobin level under 11g/dl and is separated into three levels of seriousness, Mild frailty (Hb level, 9 - 10.9g/dl), Moderate pallor (Hb level, 7 - 8.9g/dl) and extreme anemia (Hb level 7 - 4.5 g/dl) (Margwe, 2015). Press insufficiency sickness commonly comes about when the admission of dietary iron is deficient for hemoglobin combination

Knowledge, Attitudes and Practice on Iron rich Foods

In 2012, a survey conducted in India indicated that only 52.4% women have knowledge regarding iron rich foods and value of iron supplementation during pregnancy. Similarly, the lack of knowledge regarding anemia, iron rich foods and the importance of iron supplementation among pregnant women special effects on the health of pregnant women. Rizvi revealed in his study that pregnant women attitude towards iron supplements are also considered to be hot and overall 25% of women take iron supplements (Rizvi, 2012). Recent statistics revealed that tea, coffee consumption, low intake of eggs and red meat are associated with anemia (Baig-Ansari., et al. 2008). During pregnancy, iron and folate supplements are essential to prevent iron deficiency anemia and the developing countries strictly follows iron supplementation in pregnancy. Iron supplements consider as a standard and routine practice for the prevention of anemia.

Classification

Anaemia is classified as mild, moderate or severe, based on hemoglobin concentrations. The cut-off values for hemoglobin concentration applicable to women of reproductive age recommended by the World Health Organization (WHO) are shown below:

Classification	Non-pregnant women	pregnant women
No anaemia	≥120	≥110
Mild anaemia	110–119	100–109
Moderate anaemia	80–109	70–99
Severe anaemia	<80	<70

Research Question

The following research question were raised before the commencement of research:

- i) What is the level of knowledge, attitude, and practice regarding iron-rich foods among pregnant women in the study area?
- ii) What is the prevalence rate of iron deficiency anemia among pregnant women in the study area?
- iii) What are the potential barriers hindering the consumption of iron-rich foods among pregnant women in the study area?

Objective of the Study

The specific objectives include:

- i) To assess the pregnant women's knowledge, attitude and practice on iron rich foods
- ii) To investigate the prevalence rate of iron deficiency anemia in the study area.
- iii) To find out the possible barriers toward consumption of iron rich foods among pregnant women in the study area

2. RESEARCH METHOD

Study Area

Batagarawa Local Government is populated by Hausa people and the town is the capital of Mallamawa District in Katsina Emirate, North Western State. The LGA was established in 1991. It has an area of 433 km² and a population of 184,575 at the 2006 census. It has an average annual temperature

of 35 °C (95.0 °F). Wind speed in the area is estimated at 5 km/h while the humidity level is at 11 percent. Batagarawa Local Government has the coordinates of 12°52'05.0"N 7°35'13.0"E (Wikipedia, 2023)

The Research Design

The Study design for this research will be cross sectional survey study to be conducted at some health care facilities in Batagarawa Local Government, Katsina State

The Research population

The population of the study comprises of pregnant and women attending the health clinics for services like antennal care, immunization, or any other service received by pregnant or child bearing mothers. Ultimately, five (5) participants each will be selected from two health facilities of ten (10) wards of Batagarawa Local Government, making 100 participants.

Data collection

A Knowledge, Attitude and Practices (KAP) questionnaire is a tool for identifying what a population already knows (Knowledge), how they feel (Attitude) and what they are doing (Practices) regarding a particular issue.

Data will be collected using structured questionnaire, containing socio demographic, knowledge, attitude and practice related questions on iron rich foods. The tool was prepared by English version and later translated to Hausa for easy understanding. Sets of questions will be adapted from previous studies and literatures will be used to assess knowledge, attitude and practice towards IDA. Daily check-up of the collected data will be done to improve the quality of data.

Sampling Procedure

Batagarawa Local Government has 10 political wards, each ward has about 4-8 health facilities. Simple random sampling will be employed to select two health facilities. Whereas, participants will be selected using systematic random sampling from each health facility.

Data Analysis/Processing

Descriptive statistics will be used for data analysis. The result will be analyzed and presented in tables and figures. Statistical package for social sciences (SPSS) version 22.0 will be used for the data analysis.

3. RESULT AND DISCUSSION

The data collected from attending some health care facilities in Batagarawa Local Government Area of Katsina State will be compiled presented and analyzed. The result will hence be used in drawing inferences and conclusions based on the statistical tools used in the research. About 115 questionnaires were distributed where 103 were successfully retrieved where 100 valid questionnaires among them was used for data presentation and analysis.

Table 3.1 Socio Demographic characteristics of the respondents

Information	Option	f	%
Age of the respondents	15-20	16	16.0
	21-30	40	40.0
	31-40	34	34.0
	41 & above	10	10.0
	Total	100	100.0
Level of education of the respondents	No education	13	13.0
	Primary school	14	14.0
	Secondary school	36	36.0
	Tertiary school	23	23.0
	Islamic school	14	14.0
	Total	100	100.0

Occupation of the respondents	Farming	6	6.0
	Civil servant	27	27.0
	Artisan	9	9.0
	Business	40	40.0
	Labour/hard work	18	18.0
	Total	100	100.0
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Number of Pregnancy	1	18	18.0
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	2-3	36	36.0
	4-5	30	30.0
	>5	16	16.0
	Total	100	100.0
Pregnancy stage	First- trimester	42	42.0
	Second trimester	35	35.0
	Third trimester	23	23.0
	Total	100	100.0
Marital status of the respondents	Married	90	90.0
	Divorced	5	5.0
	Widowed	5	5.0
	Total	100	100.0
Number of live children	All	54	54.0
	Some	31	31.0
	None	15	15.0
	Total	100	100.0
Monthly income	< 20,000	49	49.0
	21,000 - 40,000	29	29.0
	41,000 - 60,000	13	13.0
	> 60,000	9	9.0
	Total	100	100.0

Source: Health survey, 2024

The table (3.1) presents a comprehensive overview of the sociodemographic characteristics of the respondents participating in the study. Starting with age distribution, it reveals that the respondents encompass a broad age range, with the majority falling between 21 to 40 years old, constituting 74% of the sample population. Interestingly, the age distribution is fairly evenly spread across the age groups, indicating a diverse representation.

Moving on to educational attainment, the data suggests a varied educational background among the respondents. While a notable proportion (13%) reported no formal education, indicating a certain level of educational disparity within the sample, a significant portion (36%) have completed secondary education, with 23% having tertiary qualifications.

In terms of occupation, the respondents are engaged in a diverse array of professions, with business activities being the most prevalent (40%), followed by civil service (27%) and labor-intensive work (18%) as shown in figure 1. This distribution highlights the occupational diversity within the sample, which may have implications for factors such as income levels and access to resources.

Regarding reproductive health and status, the data sheds light on the fertility history and pregnancy status of the respondents. A considerable portion of respondents (36%) reported having 2-3 pregnancies, while a smaller proportion (16%) reported having more than five pregnancies, suggesting varying levels of reproductive experience within the sample. Additionally, the distribution of respondents across different pregnancy stages indicates a mix of pregnancy statuses, with the majority (42%) in the first trimester, followed by 35% in the second trimester and 23% in the third trimester. This information is crucial for understanding the reproductive health needs and requirements of the target population.

Furthermore, the table provides insights into the marital status and family composition of the respondents. The majority of respondents (90%) reported being married, while a smaller proportion identified as divorced (5%) or widowed (5%). This distribution reflects the diversity of marital statuses within the sample and underscores the importance of considering family dynamics and support structures in the context of the study.

Lastly, the table outlines the income distribution among the respondents, with nearly half (49%) earning less than 20,000 thousands naira, followed by 29% earning between 21,000 and 40,000 thousands naira as shown in figure 2. This income distribution reflects the socioeconomic diversity within the sample and highlights the potential influence of income levels on various health and social outcomes.

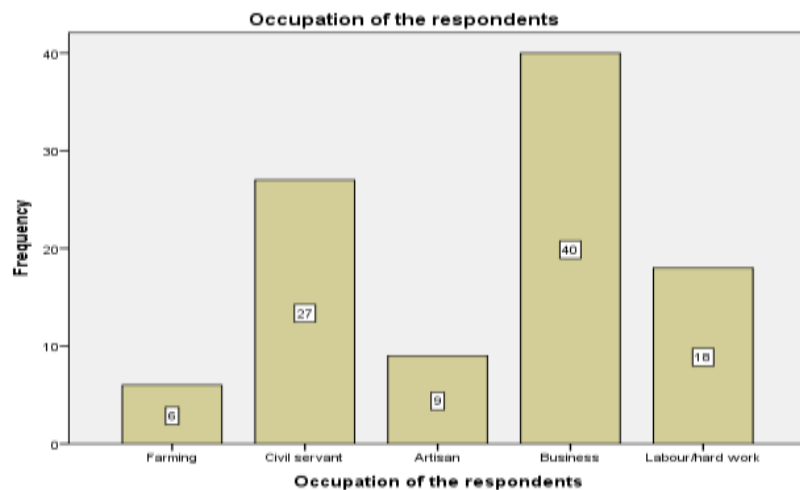


Figure 1: Occupation of the respondents

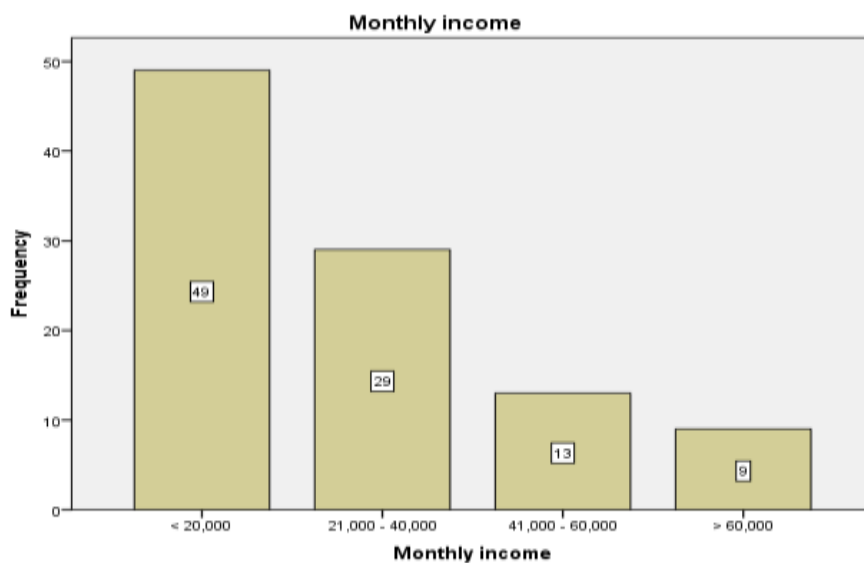


Figure 2: Monthly Income of the respondents

3.2 KNOWLEDGE ON FOOD RICH IN IRON IN THE PREVENTION OF IRON DEFICIENCY ANEMIA AMONG PREGNANT WOMEN

Table 4.2 Have you heard about iron-deficiency anemia?

	Frequency	Percent
Yes	93	93.0
No	7	7.0
Total	100	100.0

Source: Health survey, 2024

The majority of respondents (93%) reported having heard about iron-deficiency anemia, while a small percentage (7%) indicated they had not. This suggests a relatively high level of awareness about the condition among the surveyed population.

Table 3.3 If Yes: Can you tell me how you can recognize someone who has anemia?

Response	Frequency	Percentage	Rank
Less energy/weakness	38	38	1 st
Paleness/pallor	25	25	2 nd
Spoon nails/bent nails	8	8	3 rd
More likely to become sick (less immunity to infections)	6	6	4 th
Other	11	11	3 rd
Don't know	35	35	-

Table 4.3 contains respondent's way of recognizing someone who has anemia. The first way among the ranking with 38% of the respondents was that of less energy/weakness from the person with anemia, the second sign was paleness/pallor 25%, the third way was Spoon nails/bent nails. The fourth was that the person with anemia is more likely to become sick (less immunity to infections) with 6% where 11% can only recognize the person with anemia through other methods while 35% did not know any way of recognizing someone with anemia.

Table 3.4 what are the health risks for pregnant women of a lack of iron in the diet?

	Frequency	Percent
Risk of dying during or after pregnancy	32	32.0
Difficult delivery	31	31.0
Other	5	5.0
Don't know	32	32.0
Total	100	100.0

Table 4.4: According to this table, respondents identified various health risks associated with iron deficiency during pregnancy, including Risk of dying during or after pregnancy (32%) and "Difficult delivery (31%). A significant portion (32%) indicated they did not know the health risks associated with iron deficiency during pregnancy.

Table 3.5 what causes anemia?

Response	Frequency	Percentage	Rank
Lack of iron in the diet/eat too little, not much	55	55.0	1 st
Sickness/infection (malaria, hookworm infection, other infection such as HIV/AIDS)	30	30	2 nd

Heavy bleeding during menstruation	20	20	3 rd
Other	3	3.0	-
Don't know	25	25.0	-

Among the pregnant women interviewed, 55% said the major cause of anemia was lack of iron in the diet/eat too little, not much. Similarly, Sickness/infection (malaria, hookworm infection, other infection such as HIV/AIDS) with 30% was the second while heavy bleeding during menstruation was considered the third by the pregnant women interviewed.

Table 3.6 Do you experienced iron deficiency diseases/disorder in your previous or current pregnancy

	Frequency	Percent
Yes	32	32.0
No	68	68.0
Total	100	100.0

Table 3.6 shows that a subset of respondents (32%) reported experiencing iron deficiency diseases/disorders during their previous or current pregnancy, while the majority (68%) did not as shown in figure 3.

Do you experienced iron deficiency diseases/disorder in your previous or current pregnancy

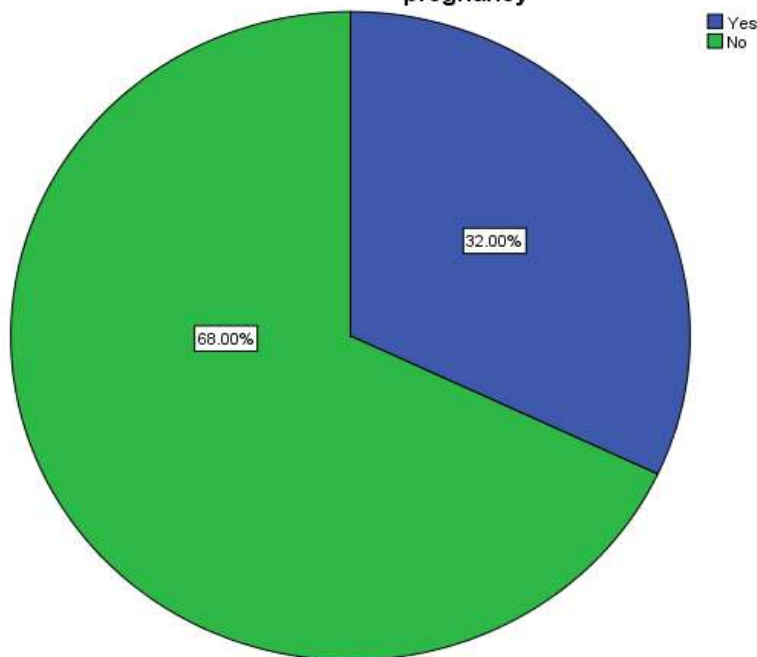


Figure 3 iron deficiency diseases/disorder experienced in woman's previous or current pregnancy

Table 3.7 if yes how seriously it was

	Response	Frequency	Percentage
No		68	68.0
Yes	Severely	5(15.6%)	5.0
	Moderately	13(40.6%)	13.0
	Mildly	14(43.75)	14.0
	Total	100	100.0

Among those that experienced iron deficiency diseases/disorder in previous or current pregnancy, 5 respondents (15.6%) said the disorder was severely serious, 13 respondents (40.6%) said the disorder was moderately serious while 14(43.75%) said the disorder was mildly serious as shown in figure 4.

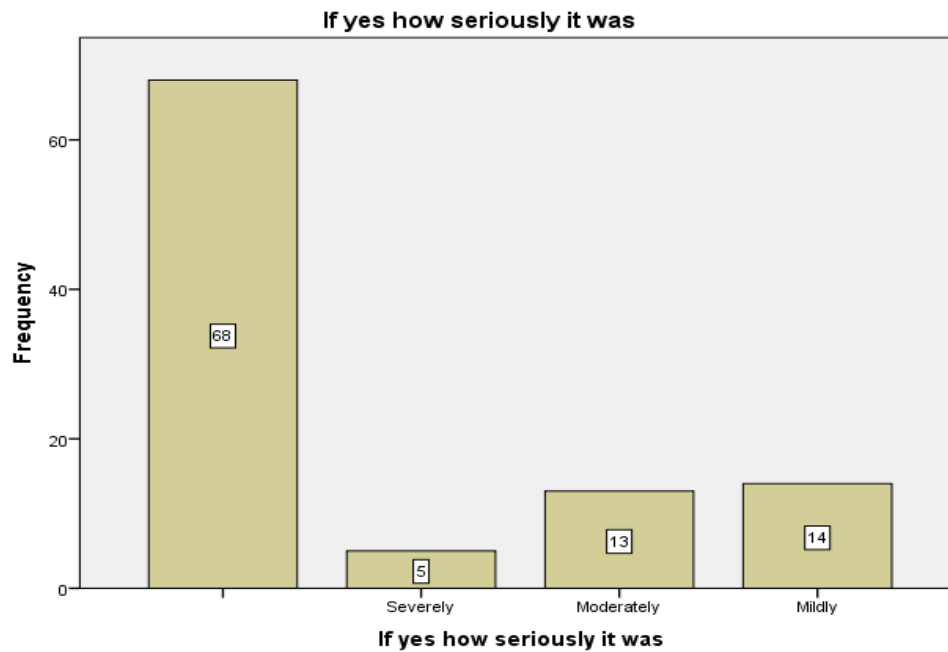


Figure 4 level of iron deficiency diseases/disorder experienced in woman's previous or current pregnancy

Table 3.8 Have you undergone any screening or testing for iron deficiency anaemia during current pregnancy

	Frequency	Percent
Yes	57	57.0
No	43	43.0
Total	100	100.0

Table 4.8 shows that 57% of the pregnant women have undergone screening or testing for iron deficiency anemia during their current pregnancy while 43% have not.

Table 3.9 how can anemia be prevented?

Response	Frequency	Percentage	Rank
Eat/feed iron-rich foods/having a diet rich in iron	57	57.0	1 st
Eat/give vitamin-C-rich foods during or right after meals	30	30.0	2 nd
Take/give iron supplements if prescribed	22	22.0	3 rd
Treat other causes of anaemia (diseases and infections) – seek health-care assistance	21	21.0	4 th
Continue breastfeeding (for infants 6–23 months old)	4	4.0	5 th
Other	2	2.0	-
Don't know	23	23.0	-

Table 3.9 shows that 57% of the respondents said to prevent anemia a pregnant woman should eat/feed iron-rich foods/having a diet rich in iron which ranked the first among the advices, 30% said she should eat/give vitamin-C-rich foods during or right after meals, 22% said she should take/give iron supplements if prescribed, 21% said a pregnant woman should treat other causes of anemia (diseases and infections) – seek health-care assistance while 4% said she should continue breastfeeding (for infants 6–23 months old).

Table 3.10 Can you list examples of foods rich in iron?

Response	Frequency	Percentage	Rank
Beef	43	43.0	1 st
Lamb	28	28.0	4 th
Goat	15	15.0	5 th
Chicken	30	30.0	3 rd
Fish	38	38.0	2 nd

From table 3.10, the respondents were on the view that Beef 43% was the first food rich in iron among the list followed by Lamb 28%. The third among the rank of the food rich in iron was Goat 15% followed by Chicken 30% while fish 38% was considered to be the least. This shows that pregnant women were aware of the best food rich in iron.

Table 3.11 when taken during meals, certain foods help the body absorb and use iron. What are those foods?

Response	Frequency	Percentage
1 Vitamin-C-rich foods, such as fresh citrus fruits (orange, lemons, Green Leafy Vegetables)	51	51.0
2 Other	11	11.0
3 Don't Know	38	38.0
Total	100	100.0

From the above table, when asked about foods that enhance iron absorption, respondents mentioned Vitamin-C-rich foods, such as fresh citrus fruits and green leafy vegetables (51%).

Table 3.12 some beverages decrease iron absorption when taken with meals. Which ones?

Response	Frequency	Percentage	Rank
1 Coffee	39	39.0	1 st
2 Tea	19	19.0	2 nd
3 Other	12	12.0	-
4 Don't know	42	42.0	-

Participants 39% believed that coffee was the best beverage that decrease iron absorption when taken with meals while a small number of them 19% said tea was the beverage that decrease iron absorption when taken with meals. This shows that pregnant women know the best beverage that decrease iron absorption when taken with meals.

3.3 PRACTICE

Table 4.13 Heme iron-intake yesterday

Responses	Frequency	Percent
Yes	48	48.0
No	52	52.0
Total	100	100.0

The data presented in Table 4.13 explores the heme iron intake of respondents on the previous day. It reveals that nearly half of the respondents (48.0%) reported consuming heme iron, while slightly more than half (52.0%) did not. This indicates a mixed pattern of heme iron consumption among the surveyed population, with a significant portion not consuming heme iron on the specified day.

Table 3.14 Consumption of vitamin C rich fruits usually

Responses	Frequency	Percent
Yes	70	70.0
No	30	30.0
Total	100	100.0

Table 3.14 focuses on the habitual consumption of vitamin C-rich fruits among respondents. The findings demonstrate that a substantial majority (70.0%) of respondents usually consume these fruits, while the remaining 30.0% do not. This suggests that a significant proportion of the surveyed population incorporates vitamin C-rich fruits into their diet as part of their regular eating habits.

Table 3.15 If yes in Q2, Do you consume vitamin C rich fruits daily?

Responses	Frequency	Percent
Yes	49	49.0
No	21	21.0
Total	70	70.0

Among respondents who reported usually consuming vitamin C-rich fruits, Table 4.15 investigates the frequency of daily consumption. The results indicate that nearly half (49.0%) of these respondents consume vitamin C-rich fruits daily, while 21.0% do not. This suggests that while a considerable portion of respondents consume such fruits usually, not all of them incorporate them into their diet on a daily basis.

Table 3.16 If yes in Q2, When do you usually eat fresh citrus fruits?

Responses	Frequency	Percent
Don't know	12	12.0
Before meal	26	26.0
During meal	16	16.0
After meal	14	14.0
Total	70	70.0

Table 3.16 explores the timing of fresh citrus fruits consumption among respondents who reported usually consuming them. The data reveals varied preferences in terms of when respondents consume these fruits. Some consume them before (26.0%), during (16.0%), or after (14.0%) meals, while a notable proportion (12.0%) is uncertain about the timing.

Table 3.17 Consumption of tea/coffee usually

	Frequency	Percent
Yes	81	81.0
No	19	19.0
Total	100	100.0

Regarding the consumption of tea or coffee, Table 4.17 indicates that a majority (81.0%) of respondents reported usually consuming these beverages, while a minority (19.0%) do not. This suggests that tea or coffee is a commonly consumed beverage among the surveyed population

Table 3.18 If consuming tea/coffee, is it daily?

	Frequency	Percent
Yes	25	25.0
No	56	56.0
Total	81	81.0

Among respondents who usually consume tea or coffee, Table 4.18 examines the frequency of daily consumption. The data shows that a relatively small proportion (25.0%) of these respondents consume tea or coffee daily, while the majority (56.0%) do not. This indicates variability in the daily consumption habits of tea or coffee among the surveyed population.

Table 3.19 If consuming tea/coffee, When do you usually drink tea/coffee?

	Frequency	Percent
Don't know	29	29.0
Before meal	28	28.0
During meal	14	14.0
After meal	10	10.0
Total	81	81.0

Finally, Table 4.19 investigates the timing of tea or coffee consumption among respondents who usually consume these beverages. The results reveal diverse preferences, with some respondents consuming them before (28.0%), during (14.0%), or after (10.0%) meals, while others are unsure about the timing (29.0%).

3.4 ATTITUDES

Table 3.20:

Attitudes	Options	F	%
How likely do you think you are to be iron deficient/anemic?	Not likely	24	24.0
	Not sure	60	60.0
	Likely	16	16.0
	Total	100	100.0
How serious do you think iron deficiency/anaemia is?	Not serious	7	7.0
	Not sure	29	29.0
	Serious	64	64.0
	Total	100	100.0
How good do you think it is to prepare meals with iron-rich foods?	Not good	13	13.0
	Not sure	21	21.0
	Good	66	66.0
	Total	100	100.0
How difficult is it for you to prepare meals with iron-rich foods?	Difficult	26	26.0
	So-so	28	28.0
	Not difficult	46	46.0
	Total	100	100.0
How confident do you feel in preparing meals with iron-rich foods?	Not confident	17	17.0

	Ok	47	47.0
	Confident	36	36.0
	Total	100	100.0
How much does you like the taste of iron-rich food item?	Dislike	11	11.0
	I am not sure	34	34.0
	Like	55	55.0
	Total	100	100.0

Table 3.20 shows that 24% of the respondents said they were Not likely to be iron deficient/anemic, 60% said they were Not sure to be iron deficient/anemic while 16% said they were likely to be iron deficient/anemic.

However, 7% of the pregnant women said iron deficiency/anemia is not a serious issue, 29% were not sure while majority of them 64% believed that iron deficiency/anemia was a very serious issue on pregnant women.

In the case of how good pregnant women think it is to prepare meals with iron-rich foods by pregnant women, 13% said it is not good , 21% said they were not sure of its goodness while a large number 66% believed that to prepare meals with iron-rich foods to be good. A small number 26% of the pregnant women added that it is difficult for them to prepare meals with iron-rich foods, 28% of them said it is so-so difficult for them to prepare meals with iron-rich foods, 46% said it is not difficult for them to prepare meals with iron-rich foods. This shows that it not difficult for the pregnant women to prepare meals with iron-rich foods.

A small number 17% among the pregnant women interviewed said they were not confident in preparing meals with iron-rich foods, 47% said it is ok for them to prepare meals with iron-rich foods while 36% were confident in preparing meals with iron-rich foods where 11% said they don't like the taste of iron-rich food item, 34% were not sure while a large number of the respondents said they like the taste of iron-rich food item.

3.5 DETERMINATION OF THE POSSIBLE BARRIERS TOWARD CONSUMPTION OF IRON RICH FOODS AMONG PREGNANT

S/n	Barriers	Some habits of consumption of iron rich foods among pregnant women	χ^2	df	P-value	Remark
1	Age	When taken during meals, certain foods help the body absorb and use iron. What are those foods?	12.566	9	0.183	Not Sig.
		Heme iron-intake yesterday	5.233	3	0.156	Not Sig.
		Consumption of vitamin C rich fruits usually	2.714	3	0.438	Not Sig.
		Consumption of tea/coffee usually	3.972	3	0.264	Not Sig.
		How difficult is it for you to prepare meals with iron-rich foods?	6.080	6	0.414	Not Sig.
2	Level of Education	When taken during meals, certain foods help the body absorb and use iron. What are those foods?	15.887	12	0.196	Not Sig.
		Heme iron-intake yesterday	5.333	4	0.255	Not Sig.
		Consumption of vitamin C rich fruits usually	9.833	4	0.430	Not Sig.
		Consumption of tea/coffee usually	1.163	4	0.884	Not Sig.
		How difficult is it for you to prepare meals with iron-rich foods?	7.686	8	0.465	Not Sig.

Woman's age was expected to play a role or serves as a barrier towards consumption of iron rich foods. Five habits of consumption of iron rich foods among pregnant women were selected and their hypotheses were tested. The result shows that there is no significant relationship between woman's age and awareness of the foods rich in iron with $p\text{-value} = 0.183 > 0.05$, There is also no significant relationship between woman's age and yesterday's intake of heme iron with $p\text{-value} = 0.156 > 0.05$,

There is also no significant relationship between woman's age and woman's usual consumption of vitamin C rich fruits with $p\text{-value} = 0.438 > 0.05$. There is also no significant relationship between woman's age and woman's usual consumption of tea/coffee with $p\text{-value} = 0.264 > 0.05$. However, there is also no significant relationship between woman's age and the level of difficulty is it for pregnant women to prepare meals with iron-rich foods with $p\text{-value} = 0.414 > 0.05$.

Level of pregnant woman's education was also tested with some habits of consumption of iron rich foods. The result shows that there is no significant relationship between woman's level of education and awareness of the foods rich in iron ($p = 0.196 > 0.05$), and yesterday's intake of heme iron ($p = 0.255 > 0.05$), and woman's usual consumption of vitamin C rich fruits ($p = 0.430 > 0.05$), and woman's usual consumption of tea/coffee ($p = 0.884 > 0.05$), and the level of difficulty is it for pregnant women to prepare meals with iron-rich foods ($p = 0.465 > 0.05$).

S/n	Barriers	Some habits of consumption of iron rich foods among pregnant women	χ^2	df	P-value	Remark
3	Occupation	When taken during meals, certain foods help the body absorb and use iron. What are those foods?	20.925	12	0.051	Not Sig.
		Heme iron-intake yesterday	0.431	4	0.980	Not Sig.
		Consumption of vitamin C rich fruits usually	4.674	4	0.322	Not Sig.
		Consumption of tea/coffee usually	3.154	4	0.012	Sig.
		How difficult is it for you to prepare meals with iron-rich foods?	9.657	8	0.030	Sig.
4	Monthly income	When taken during meals, certain foods help the body absorb and use iron. What are those foods?	8.809	9	0.455	Not Sig.
		Heme iron-intake yesterday	3.361	3	0.001	Sig.
		Consumption of vitamin C rich fruits usually	2.961	3	0.002	Sig.
		Consumption of tea/coffee usually	3.849	3	0.000	Sig.
		How difficult is it for you to prepare meals with iron-rich foods?	6.095	6	0.030	Sig.

Pregnant woman's occupation was tested with habits of consumption of iron rich foods. The result shows that there is no significant relationship between woman's occupation and awareness of the foods rich in iron ($p = 0.051 > 0.05$), and yesterday's intake of heme iron ($p = 0.980 > 0.05$), and woman's usual consumption of vitamin C rich fruits ($p = 0.322 > 0.05$). There is significant relationship between woman's occupation and woman's usual consumption of tea/coffee ($p = 0.012 < 0.05$), and the level of difficulty is it for pregnant women to prepare meals with iron-rich foods ($p = 0.030 < 0.05$). It can be concluded that women's occupation played a role in their usual tea/coffee consumption and its simplicity to prepare meals with iron-rich foods.

Monthly income among the participants was tested with the habits of consumption of iron rich foods. The result shows that there is no significant relationship between woman's monthly income and their knowledge in the foods rich in iron ($p = 0.455 > 0.05$). But there is significant relationship between woman's monthly income yesterday heme iron intake ($p = 0.001 < 0.05$), and woman's usual consumption of vitamin C rich fruits ($p = 0.002 < 0.05$). There is also significant relationship between woman's monthly income and woman's usual consumption of tea/coffee ($p = 0.000 < 0.05$), and the level of difficulty is it for pregnant women to prepare meals with iron-rich foods ($p = 0.030 < 0.05$). It can be concluded that women's monthly income played a role in their yesterday's heme intake, usual consumption of vitamin C rich fruits and usual tea/coffee consumption and its simplicity to prepare meals with iron-rich foods.

Discussion of finding

Iron deficiency anemia (IDA) is a significant public health concern globally, particularly among pregnant women, due to its adverse effects on maternal and child health outcomes. The study conducted in Batagarawa Local Government Area of Katsina State, Nigeria, sheds light on various aspects related to IDA among pregnant women.

Knowledge and Awareness: The findings reveal a relatively high level of awareness about IDA among pregnant women in the study area, with 93% of respondents reporting familiarity with the condition (Table 4.2). This aligns with international research indicating that awareness campaigns and health education programs have contributed to increased awareness of IDA among pregnant women (Smith et al., 2013).

Dietary Practices: Despite awareness of IDA, the study identifies mixed dietary practices among pregnant women regarding iron-rich foods and vitamin C-rich fruits. While a substantial proportion of respondents reported consuming these foods regularly (Tables 4.13 and 4.14), a significant portion did not consume heme iron or vitamin C-rich fruits daily (Tables 4.15 and 4.16). This finding underscores the need for targeted nutritional interventions and behavior change communication strategies to promote consistent consumption of iron-rich foods during pregnancy (Milman, 2011).

Barriers to Consumption: The research also explores potential barriers to the consumption of iron-rich foods among pregnant women, including occupation and monthly income. While occupation and income level were found to influence dietary habits, age and education level did not significantly affect knowledge or practices related to iron-rich foods (Table 4.5). This suggests the importance of addressing socio-economic factors in designing interventions to improve dietary intake among pregnant women, as supported by international studies highlighting the role of socio-economic status in nutritional outcomes (Darnton-Hill & Mkparu, 2015).

Attitudes and Beliefs: The study further examines attitudes and beliefs towards IDA and dietary practices among pregnant women. While the majority of respondents recognized the seriousness of IDA and the importance of preparing meals with iron-rich foods, some expressed uncertainty or difficulty in meal preparation (Table 4.20). This underscores the importance of targeted education and counseling sessions to address misconceptions and build confidence in dietary practices during pregnancy (Galloway et al., 2002).

In summary, the findings of the research highlight the complexity of factors influencing dietary practices and awareness of IDA among pregnant women in Batagarawa Local Government Area, Katsina State. To effectively address IDA in this population, interventions should consider socio-economic factors, cultural beliefs, and individual attitudes towards dietary practices, while drawing on insights from both national and international research on maternal nutrition and anemia prevention.

CONCLUSION

The study provides valuable insights into the knowledge, practices, and attitudes related to iron deficiency anemia (IDA) among pregnant women in Batagarawa Local Government Area, Katsina State. Despite a high level of awareness about IDA, there are notable gaps in dietary practices and understanding of preventive measures among pregnant women in the region. While some women regularly consume iron-rich foods and vitamin C-rich fruits, others exhibit inconsistent dietary habits, potentially contributing to the prevalence of IDA in the population. Socio-economic factors such as occupation and income level also influence dietary behaviors, highlighting the need for targeted interventions to address disparities in nutritional intake. Furthermore, attitudes and beliefs towards IDA vary among pregnant women, indicating the importance of tailored education and counseling programs to promote healthy dietary practices during pregnancy. Overall, the findings underscore the multifaceted nature of IDA prevention and the importance of comprehensive strategies that consider socio-economic, cultural, and individual factors.

RECOMMENDATION

Based on the findings, the following recommendations are proposed to improve IDA prevention and management among pregnant women in Batagarawa Local Government Area:

1. **Nutrition Education Programs:** Implement community-based nutrition education programs aimed at raising awareness about the importance of iron-rich foods and vitamin C-rich fruits in preventing IDA. These programs should emphasize the role of nutrition during pregnancy and provide practical guidance on meal planning and preparation.
2. **Income Generation Activities:** Support income-generating activities for pregnant women, particularly those from low-income households, to improve access to nutritious foods. Microfinance initiatives and skills development programs can empower women economically and enhance their ability to afford a diverse and balanced diet.
3. **Healthcare Provider Training:** Provide training and capacity-building workshops for healthcare providers on IDA prevention and management. Equipping healthcare professionals with the knowledge and skills to identify and address IDA risk factors during antenatal care visits can improve maternal and child health outcomes.
4. **Community Engagement:** Foster community engagement and participation in IDA prevention efforts through community health workers and local leaders. Engage community members in decision-making processes and promote peer support networks to reinforce positive health behaviors.

5. **Policy Advocacy:** Advocate for policies and programs that prioritize maternal nutrition and IDA prevention at the national and local levels. Collaborate with government agencies, non-governmental organizations, and other stakeholders to integrate nutrition interventions into existing maternal and child health programs.

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