

Assess Primary School Students' Mothers Knowledge and Practices regarding Iron Deficiency Anemia

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Abstract

Background: Iron deficiency anemia is a condition that occurs when the body does not have enough iron to produce adequate levels of hemoglobin, the substance in red blood cells that enables them to carry oxygen throughout the body. This type of anemia is the most worldwide and can affect individuals of all ages, particularly women, children, and individuals with poor dietary intake. **Aim:** To assess knowledge and practices of primary school students' mothers regarding iron deficiency anemia. **Research design:** A descriptive study design was used to conduct the study. **Setting:** Saad bin Abi Waqqas and Jarir Primary Schools in South of Riyadh Region, Saudia Arabia. **Sample:** Multi stage random sample used to choose 120 mothers for primary school's students. **Tool of data collection:** One tool used in this study included three parts, **1st part:** Socio-demographic characteristics of primary school students' mothers and child, **2nd part:** Mothers' knowledge, and **3rd part:** Mothers' reported practice regarding iron deficiency anemia. **Results:** Less two thirds of studied mothers had poor total knowledge. While, more than half of them had unsatisfactory total reported practices regarding iron deficiency anemia. There was highly statistically significant relation between studied mothers' total knowledge, total reported practices and all items of socio-demographic characteristics. **Conclusion:** Less than quarter of the them had average total knowledge regarding iron deficiency anemia. Less than half of the studied mothers had a satisfactory level in total reported practices. There was highly statistically significant relation between studied mothers' total knowledge, total reported practices and all items of socio-demographic characteristics. **Recommendations:** Design posters to be available for primary school students' mothers to improve their knowledge and reported practices regarding iron deficiency anemia.

Keywords: Iron Deficiency Anemia, Knowledge, Mothers, Practices, and Primary School Student.

Introduction:

Anemia is a medical condition characterized by a decrease in the number of red blood cells or the amount of hemoglobin in the blood, leading to reduced oxygen delivery to the body's tissues. This condition can result in symptoms as fatigue, weakness, dizziness, shortness of breath, and pale skin. Anemia has various causes, including nutritional deficiencies as iron, vitamin B12, or folic acid, chronic diseases, genetic disorders, or blood loss due to injury or internal bleeding. Severity and type of anemia determine the appropriate treatment, which include dietary changes, supplements, medications, or treatment of the underlying cause. Early diagnosis and proper management are crucial to prevent complications and improve the children quality of life (*Leung et al., 2024*).

The prevalence of Iron Deficiency Anemia (IDA) exceeds 5% of the population. So, it is considered a public health problem. Anemia affects billions of primary school students around the world. IDA is responsible for half of the global prevalence of anemia. It is estimated to affect 20 % to 25 % of primary school children worldwide, with the highest prevalence in South Asia and Africa. IDA is prevalent in Saudi Arabia, particularly among females, preschool children, and pregnant women, with reported prevalence rates ranging significantly but often reaching over 30-40% in these susceptible groups. High rates are attributed to dietary factors, such as low intake of iron-rich foods and high consumption of tea, alongside nutritional deficiencies, parasitic infections, and rapid growth in children. (*Mohamed et al., 2022*).

Iron deficiency anemia can be caused by iron deficiency, which is a type of nutritional deficiency. Iron is a mineral that the body requires in order to produce hemoglobin, the protein in red blood cells that transports oxygen. When children lack iron, their body is unable to produce enough hemoglobin, and may develop anemia. Common symptoms include fatigue, weakness, pale skin, shortness of breath, and poor concentration. Causes may include insufficient iron intake, chronic blood loss, or problems with iron absorption. Early diagnosis through blood tests and proper treatment such as dietary modifications and iron supplementation are essential to restore healthy iron levels and prevent complications (*Yang et al., 2023*).

Iron deficiency anemia plays a vital role in its prevention and management, especially among caregivers and

children at risk. Awareness of the causes, symptoms, prevention methods, and treatment options for IDA can significantly reduce its prevalence. Proper practices, as consuming iron-rich foods, enhancing iron absorption through vitamin C intake, and avoiding substances that hinder absorption like tea and coffee, are essential in maintaining healthy iron levels. However, studies often reveal gaps in knowledge and incorrect practices, particularly in low-resource settings. Educating the public especially mothers, caregivers, and school personnel about the importance of nutrition, early detection, and health-seeking behavior can lead to better health outcomes and a decrease in iron deficiency-related complications (*Tang & Sholzberg, 2024*).

Assessing the knowledge and practices of primary school students' mothers regarding IDA is crucial in promoting child health and preventing anemia at an early age. Mothers play a key role in shaping their children's dietary habits and overall well-being, making their awareness and behaviors critical in the fight against IDA (*Zuair, 2025*). This assessment helps identify the level of understanding mothers have about the causes, symptoms, prevention, and treatment of IDA, as well as their daily practices related to nutrition and healthcare. Findings from such assessments can guide the development of targeted educational programs and interventions aimed at improving maternal knowledge and encouraging healthy practices. Ultimately, empowering mothers with accurate information and practical skills can significantly reduce the risk of IDA among school-aged children and improve their academic performance and quality of life (*Afshari et al., 2025*).

Pediatric nurses play a vital role in conducting screenings and assessments to identify students who may be at risk for IDA. Through routine health checks, monitoring growth patterns, and recognizing symptoms such as fatigue, pallor, and poor concentration, school nurses can detect early signs of IDA among students. Their involvement is crucial in initiating timely interventions, referring at-risk children for medical evaluation, and collaborating with families and healthcare providers (*Atitsogbey et al., 2025*). School nurses often lead health education efforts, raising awareness about proper nutrition and healthy habits that prevent IDA. By serving as a link between the school, home, and healthcare system, school nurses contribute significantly to the early detection, prevention, and management of IDA, supporting the overall health and academic success of students (*Abbasi et al., 2025*).

Significance of the study:

Globally, it affects about 1.74 billion which represent 22.8% of the world's population 305 million which represent 25.4% of this population are school-age children. In Egypt, anemia remains a mild to severe public health problem with prevalence ranging from 7.6% to 43.7%, which the rate among students is 25.4 % and in primary school age children anemia reaches its highest percentage of 47.4 % in Saudia Arabia (*Abd El Ghafar, 2022*).

Mothers' knowledge and practices regarding iron deficiency anemia play a crucial role in preventing and managing this common health problem. Adequate awareness about the causes, symptoms, and consequences of anemia helps mothers recognize early signs and seek timely medical care. Mothers with good knowledge are more likely to adopt healthy dietary practices, such as including iron-rich foods like meat, leafy vegetables, and legumes in daily meals. Mothers also understand the importance of iron supplementation during pregnancy and for their children. Proper practices include regular health check-ups, adherence to prescribed treatments, and maintaining hygiene to prevent infections that worsen anemia. Educated mothers can also influence their families and communities by promoting healthier lifestyles. Ultimately, improving mothers' knowledge and practices significantly reduces the burden of iron deficiency anemia and enhances maternal and child health outcomes (*Delaforce et al., 2023*).

Iron Deficiency Anemia (IDA) can have significant health consequences in children, including impaired cognitive development, decreased academic performance, and reduced physical endurance. Research can provide insights into these consequences, emphasizing the importance of early detection, proper intervention, and adequate intake of diet rich with iron.

Aim of the study:

This study aimed to assess knowledge and practices of primary school students' mothers regarding iron deficiency anemia through the following:

- 1- Assessing primary school student's mothers' knowledge regarding iron deficiency anemia.
- 2- Appraising primary school student's mothers' reported practices regarding iron deficiency anemia.

Research Questions:

- 1- What is the level of primary school students' mothers' knowledge regarding iron deficiency anemia?
- 2- What are primary school students' mothers reported practices regarding iron deficiency anemia?
- 3- Is there a relation between primary school students' mothers' knowledge and their reported practices regarding iron deficiency anemia?
- 4- Is there a relation between primary school students' knowledge, reported practices and their socio-demographic characteristics?

Operational Definition:

Iron Deficiency Anemia is defined as a condition characterized by a reduction in hemoglobin concentration below the normal reference range due to insufficient iron availability, leading to impaired red blood cell production. It is diagnosed based on laboratory indicators, including hemoglobin levels less than 12 g/dl in non-pregnant women, less than 11 g/dl in pregnant women, or less than 13 g/dl in men. Additional diagnostic criteria include low serum ferritin ($<15 \mu\text{g/L}$), low serum iron, increased total iron-binding capacity (TIBC), and microcytic hypochromic red blood cell morphology on peripheral smear.

Subjects & Method:**Research design:**

A descriptive research design was used to achieve the aim of the study.

Study setting:

The study was conducted to mothers for primary school's students at Saad bin Abi Waqqas and Jarir Primary Schools in South of Riyadh Region, Saudia Arabia. Each one that consisted of 2 floors. In the first floor found director office, 3 offices for teachers, 1 office for the school's guard, 3 toilets, 1 library and the playground. The second floor consisted of 5 classes each one contains about 20 students, three rooms one for science laboratories, another for a computer lab and room for interview and meetings.

Type of sample:

Multi stage random sample was used in this study. First stage: There are 12 primary schools in South of Riyadh Region from Saudia Arabia. Second stage: selection of only two primary schools (Saad bin Abi Waqqas primary school, and Jarir primary school). Third stage: selection of 2nd grade from each school and randomly select three classes from this grade, each class contains about 20 students.

Sample size:

The sample conducted to mothers of primary school students equal 120 mothers of primary school's students in academic year 2023/2024.

Tool for data collection:

One tool was used in this study: An interview questionnaire used and it is consisted of three parts as the following:

It was constructed by the investigator after reviewing relevant literature. It was written in simple Arabic language for knowledge and reported practices of primary school students' mothers regarding Iron Deficiency Anemia through the following parts:

Part (I): Socio-demographic characteristics: It was divided into 2 sub-items:

1st: Socio-demographic characteristics of primary school students' mothers consisted of 10 items included: Mothers' age, educational level, occupation, marital status, family income, place of residence.

2nd: Demographic characteristics of the primary school child consisted of 7 items included: Child age, gender, child rank, weekly pocket money, child's weight.

Part (II): Primary school students mothers' knowledge about Iron Deficiency Anemia consisted of 17 closed ended questions included: Concept of anemia meaning, causes, symptoms, risk factors, methods for diagnosing, normal level of iron in the blood, complications, treatment, prevention of iron deficiency anemia.

Scoring system for knowledge

Each statement was assigned score according to mothers' response were: complete correct answer was scored 2 grades; incomplete correct answer was scored 1 grade and wrong or don't know answer was scored 0. Total score were 34 grades from 17 questions. The total scores each item summed up and then converted into percent score **as the following:**

- Poor knowledge ($< 50\%$) = < 17 grades.
- Average knowledge ($50 - < 75\%$) = $17 - < 26$ grades.
- Good knowledge ($\geq 75\%$) = ≥ 26 grades. (Abdelfatth et al., 2022)

Part (III): Primary school students' mothers' reported practices: It was divided into 2 sub-items:

1st: Primary school students' mothers' reported practices regarding general practices for Iron Deficiency Anemia consisted of 13 closed ended questions included: Follow a healthy, iron-rich diet, take nutritional supplements such as vitamin c, get enough sleep, practice any type of sports, wash hands before and after eating, have soft drinks, drink tea or Nescafe immediately after eating, drink milk or nutritional supplements as calcium immediately after eating.

2nd: Primary school students' mothers' reported practices regarding dealing with eating habits consisted of 6 closed ended questions included: Fast food, that lacks important nutrients, Canned foods, that lack important nutrients, reduce the consumption of added sugars, that may affect child's appetite for healthy food.

Scoring system for reported practices items:

Each statement was assigned score according to mothers' response were "Done", "Not done", and were scored 1 and 0, respectively. Total score were 19 grades for 19 items. The scores of items summed up and then converted into percentage score **as the following:**

- ≥ 60 was considered satisfactory reported practices = ≥ 11.4 grades.
- < 60 was considered unsatisfactory reported practices = < 11.4 grades. (Refat et al., 2025).

I. Operational item:

It was included preparatory phase, content validity and reliability, pilot study and field work.

A. Preparatory phase:

Preparing the study tool was based on related literature review and tested its content validity and reliability.

Validity and reliability:

Content validity:

The revision of the tool for clarity, relevance, comprehensiveness, understanding and applicability was done by a panel of five experts all of them Faculty of Nursing from Community Health Nursing and Pediatric Health Nursing department to measure the content validity of the tool and the necessary modifications were done accordingly.

Tool reliability:

Reliability was tested statistically by using the appropriate statistical tests to assure that the tool was reliable before data collection. Answers from the repeated testing were compared r- test Cronbach's Alpha reliability was 0.82 for knowledge, and reliability was 0.890 for reported practices.

Pilot study:

A pilot study conducted on 10 % of the samples equal 12 mothers were under the study to assess the feasibility, practicability, clarity and objectivity of the tool. Mothers in the pilot study were included in the main study sample because no modifications were done.

Ethical considerations:

An official permission to conduct the proposed study obtained from the Scientific Research Ethical Committee. Participation in the study is voluntary and subjects given complete full information about the study and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating

the possibility to withdraw at any time, confidentiality of the information where it was not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs were respected.

Field work:

- An official letter issued from the Dean of Faculty of Nursing Helwan University, to official permission obtained from Saudi Embassy, then the health cluster affiliated with the Ministry of Health, Education Department in Riyadh region, and the director of Saad bin Abi Waqqas primary school, and Jarir primary school in Riyadh region, in Saudia Arabia including the aim of the study to obtain permission. Each subject was interviewed individually by the investigator to explain the study purpose.
- Data collected within 6 months from first of August 2024 until end of January 2025 two days per week Tuesday- Wednesday at the previously mentioned setting from 9am- 2pm, till the needed sample was completed.
- Informed consent was obtained from mothers after the investigator introduce himself for each mother, then explain the purpose of the study to assess mothers' awareness regarding Iron Deficiency Anemia. Data was collected through structure face to face interview and the entire tool filled by the investigator it took for 30 -40 minutes during meeting the mothers.
- The investigator interviewed 5 mothers each week, thus about 20 mothers per month, so, the total number of mothers who have been interviewed through six months = 120 mothers.

III- Administrative item:

An approval to carry out this study obtained from Faculty of Nursing Dean at Helwan University and official permission obtained from Saudi Embassy, then the health cluster affiliated with the Ministry of Health, Education Department in Riyadh region, and the director of Saad bin Abi Waqqas primary school, and Jarir primary school in Riyadh region, Saudia Arabia.

IV- Statistical item:

Upon completion of data collection, data computed and analyzed by using Statistical Package for the Social Science (SPSS), version 24 for analysis. The P value set at 0.05. Descriptive statistics tests as numbers, percentage, mean \pm standard deviation (\pm SD), used to describe the results. Appropriate inferential statistics such as "F" test or "t" test used as well.

Significance of the results:

-Highly significant at p-value < 0.01 .

-Statistically significant at p-value 0.05.

-Non-significant at p-value > 0.05 .

Results:

Table (1): Frequency Distribution of Studied Mothers according to Socio-demographic Characteristics (n=120).

Socio-demographic characteristics	No.	%
Mother's age		
25- > 35 years	20	16.7
35- > 45 years	75	62.5
≥ 45 years	25	20.8
Mean \pm SD 38.4 \pm 1.7 years		
Mother's educational level		
Reads and writes	15	12.5
Basic education	33	27.5
University education or more	72	60.0
Mother's occupation		
Work	30	25.0

Not work	90	75.0
Marital status		
Married	100	83.3
Divorced	15	12.5
Widowed	5	4.2
Family income		
Not enough for basic needs	3	2.5
Enough for basic needs	50	41.7
Enough and saved	67	55.8
Number of home rooms		
<3	10	8.3
3-5	98	81.7
>5	12	10.0
Mean \pm SD 4.4 \pm 0.3 members		
Number of family members		
<3	11	9.2
3-5	101	84.2
>5	8	6.6
Mean \pm SD 4.9 \pm 1.8 rooms		
Home crowdedness rate (no. of rooms/ no. of members)		
From 2 to 3	10	8.3
From 4 to 5	105	87.5
> 5	5	4.2
Family type		
Central	110	91.7
Extended	10	8.3

Table (1): Illustrated that, the mean age of studied mothers were 38.4 ± 1.7 years. Also, 60.0 % of the studied mothers' educational level was university education or more and 75.0 % of the studied mothers did not work. Additionally, 83.3 % of the studied mothers' marital status were married, and 91.7 % of the studied mother were live in central family. While, 81.7 % of them number of home rooms between 3 to 5 rooms, 84.2 % of them number of family members between 3 to 5 rooms, and 87.5 % of them home crowdedness rate from 4 to 5.

Table (2): Frequency Distribution of Child's Demographic Characteristics (n=120).

Demographic characteristics	No.	%
Child age (9-12) years		
9- > 10	19	15.8
10- > 11	98	81.7
11- > 12	3	2.5
Mean \pm SD 10.46 \pm 0.9 years		
Gender		
Male	100	83.3
Females	20	16.7
Order between sibling		
First	63	52.5
Second	40	33.3
Third	13	10.9
Others	4	3.3
Weekly pocket money		
Enough and saved	60	50.0
Not enough	60	50.0
Child's weight (kg)		
24-30	7	5.8
31-39	88	73.3
40-45	11	9.2
> 45	14	11.7
Mean \pm SD 33.06 \pm 3.9 kg		

Child's height (cm)		
115 – 124	67	55.8
125 – 132	33	27.5
133 – 137	20	16.7
Mean \pm SD 117.46 \pm 3.1 Cm		
Child's body mass index = weight in kilograms / height in meters ²		
Underweight	5	4.2
Ideal body weight	109	90.8
Overweight	6	5.0

Table (2): Shows that, the mean age of child was 10.46 ± 0.9 years, 83.3 % of the children were male, 52.5 % of the child rank was first and 50.0 % of the child's weekly pocket money was enough and saved. According to body mass index of children 90.8 % of them had ideal body weight.

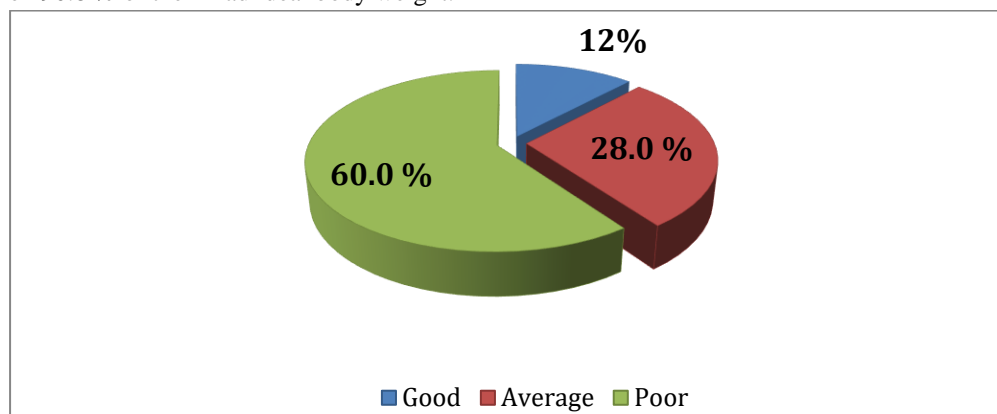


Figure (1): Percentage Distribution of the Studied Mothers' Total Level of Knowledge regarding Iron Deficiency Anemia (n= 120).

Figure (1): Observe that, 60.0 % of the studied mothers had poor total level of knowledge regarding Iron Deficiency Anemia. Also, 28.0 % of the them had average total level of knowledge regarding Iron Deficiency Anemia. While, 12.0 % of the them had total good level of knowledge regarding Iron Deficiency Anemia.

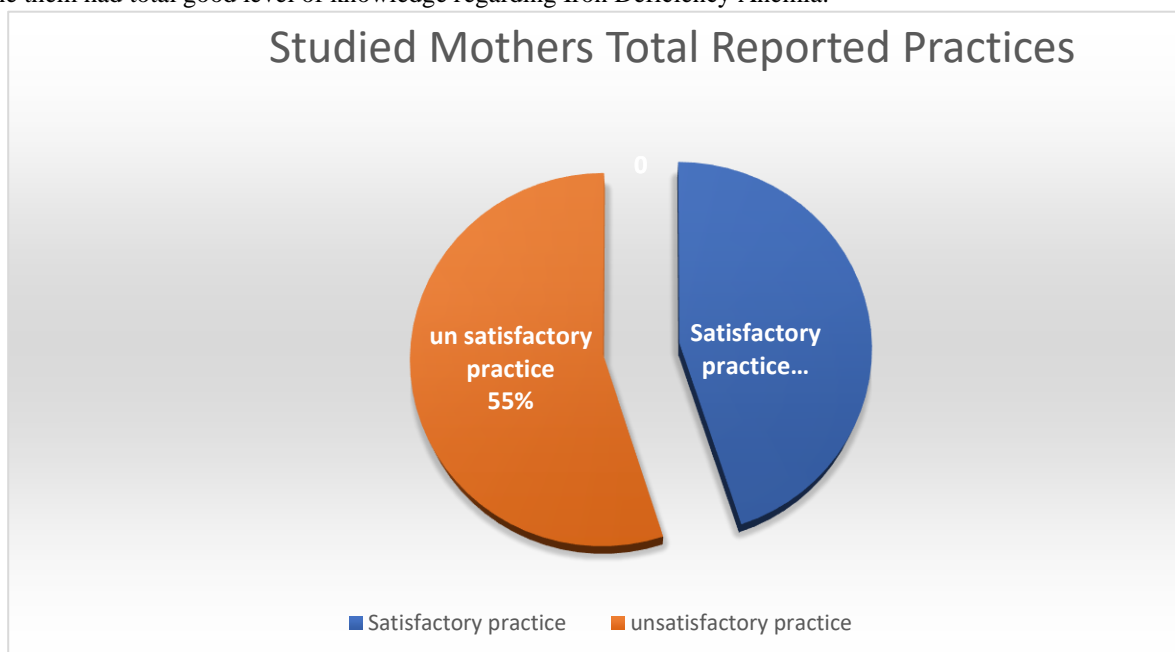


Figure (2): Percentage Distribution of the Studied Mothers' Total Level of Reported Practices regarding Iron Deficiency Anemia (n=120).

Figure (2): Illustrated that, 45.0 % of the studied mothers had a satisfactory level in total reported practices regarding Iron Deficiency Anemia. While 55.0 % of them had unsatisfactory total reported practices.

Table (3): Relation between Studied Mothers' Socio-Demographic Characteristics and their Total Knowledge (n=120).

Items	Total Level of Knowledge						Test of Significance	
	Good n=14		Average n=34		Poor n=72		X ²	P – value
	No.	%	No.	%	No.	%		
Mother's age								
25- > 35 years	4	28.6	10	29.4	6	8.3	12.324	0.0001*
35- > 45 years	5	35.7	10	29.4	60	83.4		
≥ 45 years	5	35.7	14	41.2	6	8.3		
Mother's educational level								
Read and write	10	71.4	5	14.7	0	0.0	10.245	0.000*
Basic education	4	28.6	26	76.5	3	4.2		
University education	0	0.0	3	8.8	69	95.8		
Mother's occupation								
Working	10	71.4	20	58.8	0	0.0	17.239	0.000**
Not work	4	28.6	14	41.2	72	100.0		
Marital status								
Married	7	50.0	30	88.2	63	87.5	16.274	0.000**
Divorced	7	50.0	4	11.8	4	5.6		
Widowed	0	0.0	0	0.0	5	6.9		
Family income								
Not enough for basic needs	0	0.0	0	0.0	3	4.2	13.325	0.001*
Enough for basic needs	10	71.4	30	88.2	10	13.9		
Enough and saved	4	28.6	4	11.8	59	81.9		
Place of residence								
Rural	4	28.6	4	11.8	2	2.8	9.365	0.001*
Urban	10	71.4	30	88.2	70	97.2		
Number of home rooms								
<3	4	28.6	0	0.0	6	8.3	18.199	0.000**
3-5	2	14.3	30	88.2	66	91.7		
>5	8	57.1	4	11.8	0	0.0		
Number of family members								
<3	1	7.1	0	0.0	11	15.3	15.239	0.000**
3-5	13	92.9	29	85.3	61	84.7		
>5	0	0.0	5	14.7	0	0.0		
Home crowdedness (no. of rooms/ no. of members)								
From 2 to 3	0	0.0	10	29.4	0	0.0	16.365	0.001**
From 4 to 5	9	64.3	24	70.6	72	100.0		
More than 5	5	35.7	0	0.0	0	0.0		
Family type								
Central	4	28.6	34	100.0	72	100.0	12.554	0.000**
Extended	10	71.4	0	0.0	0	0.0		

**Highly statistically significant at p-value <0.001

Table (3): Shows that, there were highly statistically significant relation between studied mothers' total knowledge and all items of socio-demographic characteristics, where (P = < .0001).

Table (4): Relation between Studied Mothers' Socio-Demographic Characteristics and their Total Reported Practices (n=120).

Items	Total Level of Reported Practices				Test of Significance	
	Satisfactory n=66		Unsatisfactory n=54		X ²	P – value
	No.	%	No.	%		
Mother's age						
25- > 35 years	10	15.2	10	18.5	10.444	0.0001*
35- > 45 years	35	53.0	40	74.1		
≥ 45 years	21	31.8	4	7.4		
Mother's educational level						
Read and write	11	16.7	4	7.4	11.240	0.000*
Basic education	20	30.3	13	24.1		
University education	35	53.0	37	68.5		
Mother's occupation						
Working	20	30.3	10	18.5	12.021	0.005**
Not work	46	69.7	44	81.5		
Marital status						
Married	56	84.8	44	81.5	10.246	0.000**
Divorced	5	7.6	10	18.5		
Widowed	5	7.6	0	0.0		
Family income						
Not enough for basic needs	1	1.5	2	3.7	7.668	0.001*
Enough for basic needs	10	15.2	40	74.1		
Enough and saved	55	83.3	12	22.2		
Place of residence						
Rural	5	7.6	5	9.3	8.220	0.005*
Urban	61	92.4	49	90.7		
Number of home rooms						
<3	5	7.6	5	9.3	6.652	0.000**
3-5	55	83.3	43	79.6		
>5	6	9.1	6	11.1		
Number of family members						
<3	6	9.1	5	9.3	9.008	0.000**
3-5	60	90.9	41	75.9		
>5	0	0.0	8	14.8		
Home crowdedness (no. of rooms/ no. of members)						
From 2 to 3	10	15.2	0	0.0	14.210	0.001**
From 4 to 5	51	77.3	49	90.7		
More than 5	0	0.0	5	9.3		
Family type						
Central	61	92.4	49	90.7	8.220	0.005*
Extended	5	7.6	5	9.3		

**Highly statistically significant at p-value <0.001

Table (4): Observe that, there were highly statistically significant relation between studied mother's total reported practices and all items of socio-demographic characteristics, where (P = < .0001).

Table (5): Correlation between Studied Mothers' Total Knowledge, and Total Reported Practices (n= 120).

Variables	Total Knowledge		Total reported practices	
	r	P-value	r	P-value
Total Knowledge	-----	-----	0.168	0.094
Total reported practices	0.168	0.094	-----	-----

**Highly statistically significant at p ≤ 0.0001

Table (5): Illustrates that, there were statistically significant positive correlation between total knowledge, and total reported practices level regarding Iron Deficiency Anemia where P-value equal 0.094.

Discussion:

Iron Deficiency Anemia (IDA) is a common nutritional disorder caused by insufficient iron levels in the body, leading to reduced red blood cell production and impaired oxygen transport. It is a major public health concern, particularly among children. Common causes include inadequate dietary iron intake, poor iron absorption, chronic blood loss, and increased iron demands during growth. Symptoms may include fatigue, weakness, pale skin, shortness of breath, dizziness, and impaired cognitive function, especially in children (*Rahman et al., 2024*). If left untreated, IDA can negatively impact physical and mental development, immune function, and work productivity. Prevention strategies include consuming iron-rich foods (such as red meat, leafy greens, beans, and fortified cereals), enhancing iron absorption with vitamin C, and, when necessary, iron supplementation. Early diagnosis through blood tests and proper treatment are crucial to managing IDA and preventing long-term complications. Public health efforts focusing on nutrition education and food fortification play a key role in reducing the global burden of this preventable condition (*Chandrasekar et al., 2025*).

Iron deficiency anemia is a significant health concern especially among primary school children, affecting their physical growth, cognitive function, and academic performance. Since mothers are primarily responsible for their children's nutrition, assessing their knowledge and reported practices regarding IDA is crucial for prevention and management. Studies indicate that while some mothers recognize common symptoms like fatigue, paleness, and poor concentration, many lack comprehensive understanding of dietary sources of iron, bioavailability enhancers (like vitamin C), and inhibitors (such as tea and phytates) (*Verulava & Gogua, 2024*). Although some mothers practice preventive measures, such as including green leafy vegetables and meat in meals, gaps remain in consistent iron-rich food preparation and timely medical consultation. Socioeconomic factors, cultural beliefs, and limited health education further influence these practices. Strengthening maternal awareness through community-based nutrition programs, school health initiatives, and targeted counseling can improve dietary practices and reduce IDA prevalence among children (*Pourhaji et al., 2023*).

Socio-demographic characteristics of the studied mothers.

Regarding age of the studied mothers, the current study result revealed that, the mean age of studied mothers was 38.4 ± 1.7 years. This result is in the same line with *Ibrahim et al., (2022)* who carried out a study in Egypt about "Mothers' awareness regarding iron deficiency anemia among school age children: an assessment study", and found that, mean \pm SD of the studied samples were 37.8 ± 2.2 years.

Regarding level of education, the current study revealed that, less than two thirds of the studied mothers were university education or more. This finding was in accordance with *Rajak et al., (2025)* who conducted a study in India about "A Cross-sectional Study on Anaemia Related Knowledge and Dietary Practices in School Going Adolescents in Gaya District of Bihar, India " and found that, 48.6 % of studied sample's mothers were basic education. **From the investigator's point of view**, education gives women confidence and skills to participate in household and community decisions. Educated women are more likely to stand up for their rights, delay early marriage, and plan their families effectively.

Concerning occupation, the current study result revealed that, three quarters of the studied mothers were housewife (not working). This result in the same line with *Edison et al., (2023)* who carried out a study conducted in Saudi Arabia about " Knowledge about iron deficiency anemia in university girls: A perspective for an educational booklet ", they showed that, 73.7 % of studied sample's mothers were housewife. **From the investigator's point of view**, many women married early and focused on domestic duties as expected by family and society. Staying at home was seen as a way to protect women's modesty (hijab in a broader sense) and family reputation.

According to marital status, the current study result revealed that, majority of the studied mothers were married. This result is in the same line with *Pourhaji et al., (2023)* who carried out a study conducted in Egypt about " Impact of family-centered study: a theory-based intervention to promote preventative behaviors for iron deficiency anemia in primary students: A randomized controlled trial protocol", and found that, 82.1 % of mothers were married. **From the investigator's point of view**, in many societies, marriage is seen as a key life milestone, and family or societal pressure

can influence a woman's decision. Many women desire a lifelong partner for love, emotional support, and shared life experiences.

Corresponding to family income, the current study result revealed that, more than half of the studied mothers have enough and saved from family income. This result in the same line with **Edison et al., (2023)** they showed that, 73.7 % of studied sample's mothers had housewife. **From the investigator's point of view**, many families may have both parents working, increasing the total household income and allowing for savings.

Concerning place of residence, the current study result revealed that, most of the studied sample were live in urban area. This result in the same line with **Almaghrabi, (2024)** who carried out a study conducted in Saudi Arabia about "Knowledge, attitude, and practice on prevention of iron deficiency anaemia among various regions in the Kingdom of Saudi Arabia ", and showed that, 73.7 % of studied samples were live in urban area. **From the investigator's point of view**, urban areas have more industries, businesses, and services, offering diverse employment options in sectors like technology, finance, healthcare, and education. Reliable electricity, water supply, public transport, and internet connectivity make life more convenient.

In relation to family type, the current study revealed that, most of the studied mothers were live in central family. This finding was accordance with **Khatib & Joho, (2022)** who conducted a study in Zanzibar, Tanzania about " Prevalence of anaemia and caregivers' knowledge, practice and attitude towards its prevention among under-fives in Zanzibar, Tanzania: A cross-sectional study " and found that, 90.2 % of studied samples were live in central family. **From the investigator's point of view**, central families provide a nurturing environment where members can share love, care, and support. This emotional bond is vital for mental and emotional well-being. Parents and children living together in a central family make caregiving and parenting more practical. Parents can provide direct supervision, guidance, and education to their children.

Regarding age of the studied mothers' child, the current study result revealed that, the mean age of children were 10.46 ± 0.9 years. This result is in the same line with **Ejoh et al., (2024)** who carried out a study in West and Littoral Regions of Cameroon about " Mothers' awareness regarding iron deficiency anemia among school age children: an assessment study", and found that, mean \pm SD of the studied samples were 9.21 ± 1.3 years. **From the investigator's point of view**, children at this age are particularly vulnerable to Iron Deficiency Anemia (IDA) due to several physiological and lifestyle factors. At this age, children experience rapid growth and development, which increases their body's demand for iron to support expanding blood volume, muscle growth, and overall development.

As regarded to gender of the studied mothers' child, the current study result revealed that, majority of children were male. This result is in the same line with **Guye et al., (2024)** who carried out a study Southeast Ethiopia about " Anemia and associated factors among public elementary school children in Asella Town, Southeast Ethiopia: A Facility-Based Cross-Sectional Study ", and found that, 80.4 % of the children were male. **From the investigator's point of view**, the percentage of males is higher than the percentage of females.

Studied mothers' knowledge about Iron Deficiency Anemia. (Answered research question number Q1).

In relation to the studied mothers' total knowledge regarding Iron Deficiency Anemia, the current study showed that, less than two thirds of them had poor knowledge, more than one quarter had average knowledge and more than tenth of them had good knowledge, this result agrees with **Firat & Bildiren, (2024)** who conducted a study in Malaysia titled "Developmental characteristics of children with learning disabilities aged 0–6 based on parental observations", they found that, 62.1 % of the studied sample had good total knowledge. Also, 26.0 % had average knowledge and 11.9 % of them had good knowledge. **From the investigator's point of view**, traditional beliefs sometimes contradict scientific knowledge. Gender roles may limit women's health education access especially in Arab societies as Saudia Arabia.

Studied mothers' reported practices regarding iron deficiency anemia. (Answered research question number Q2).

Cross ponding to the studied mothers' total reported practices regarding Iron Deficiency Anemia, the current study showed that, less than half of them had satisfactory level, and more than half had unsatisfactory level in total reported practices, was supported by **Abdel-Rasoul et al., (2025)** who conducted a study in Egypt titled "Epidemiology of iron-deficiency anemia among primary school children (6–11 years), Menoufia governorate, Egypt", and found that, 42.1 % of the studied sample had satisfactory level in total reported practices. Also, 57.9 % had unsatisfactory level in total reported practices. **From the investigator's point of view**, mothers may know about iron-rich foods but fail to

regularly include them in meals due to cost barriers (meat, fish, fortified foods are expensive), time constraints (no time to cook iron-rich meals), and child's food preferences (picky eaters rejecting greens/meat).

Relation and correlation between the studied variables (Answered research question No (3 and 4))

Additionally, to relation between studied mothers' socio-demographic characteristics and total level of knowledge, the current study revealed a highly statistically significant between all items of the studied mother's socio-demographic characteristics and their total knowledge scores. This result agrees with the study done by **Mokhtar et al., (2023)** who conducted a study in Egypt about "Evidence-based Egyptian clinical practice guidelines: for the prevention and management of iron deficiency and Iron Deficiency Anemia in infants, children and adolescents", and found that, there was a statistically significant relation between samples and all items of socio-demographic characteristics. **From the investigator's point of view**, mothers with higher formal education likely scored better (they can access/understand health info). Income/economic status, wealthier mothers may afford iron-rich foods, health checkups, and supplements. Urban mothers often have better access to clinics, media, and fortified foods.

As regards to relation between the studied mothers' socio-demographic characteristics and total reported practices, the current study indicated that there a highly statistically significant relation between all items of studied mothers' socio-demographic characteristics and their total reported practices. This result was reported by the study done by **Ocktariyana et al., (2024)** who conducted a study in Indonesia about "Risk factors for Iron Deficiency Anemia among mothers of adolescents in developing countries: study literature review", and found that, a statistically significant relation between samples all items of socio-demographic characteristics and their total reported practices scores. **From the investigator's point of view**, higher education, better ability to translate knowledge into action (e.g., actually cooking iron-rich meals). Wealthier families can afford iron-rich foods (meat, fish, fortified products) and healthcare visits.

Conclusion:

Based on the results, it can be concluded that:

Less two thirds of the studied mothers had poor total knowledge. Also, less than quarter of the them had average total knowledge regarding iron deficiency anemia. Less than half of the studied mothers had a satisfactory level in total reported practices. While more than half of them had unsatisfactory total reported practices regarding iron deficiency anemia. There was highly statistically significant relation between studied mothers' total knowledge, total reported practices and all items of socio-demographic characteristics. Also, there were statistically significant positive correlation between total knowledge, and total reported practices level regarding iron deficiency anemia.

Recommendations:

In the light of the result of this study, the following recommendations were suggested:

1. Implementing a health education program for primary school students' mothers regarding iron deficiency anemia.
2. Dissemination of booklets regarding iron deficiency anemia for primary school students' mothers.
3. Design posters to be available for primary school students' mothers to improve their knowledge and reported practices regarding iron deficiency anemia.
4. Further research should be applied on large sample and in other different settings for generalization.

References:

- Abbasi, M., Aziz, K. T., & Abbasi, A. (2025).** Weaning Practice in Children with Iron Deficiency Anemia. *Indus Journal of Bioscience Research*, 3(4), 7-11.
- Abd El Ghafar, S. S. (2022):** Assessment of Primary School Students knowledge, practice and health beliefs regarding Prevention of Iron Deficiency Anemia. *Helwan International Journal for Nursing Research and Practice*, 1(1), 58-75.
- Abdelfatth, E., Ismaiel, S., & Mahmoud, E. (2022).** Mothers' Knowledge and Practices Regarding Their Children Suffering from Iron Deficiency Anemia during Weaning: An Assessment Study. *International Journal of Novel Research in Healthcare and Nursing*, 9(1), 345-52.
- Abdel-Rasoul GM, El Bahnasy RE, El Shazly HM, Gabr HM, Abdel-Aaty NB (2025).** Epidemiology of iron-deficiency anemia among primary school children (6–11 years), Menoufia governorate, Egypt. *Menoufia Med J*. 2025; 28:663-9. <https://doi.org/10.4103/1110-2098.165127>

- Afshari, G., Omidvar, S., & Kordbagheri, M. (2025).** The role of health literacy in the relationship between mothers' knowledge and practices of iron supplementation in children (aged 12 to 24 months): A structural equation model. *PloS one*, 20(4), e0319845.
- Almaghrabi, R. (2024).** Knowledge, Attitude, and Practice on Prevention of Iron Deficiency Anaemia among Various Regions in The Kingdom of Saudi Arabia. *Egyptian Academic Journal of Biological Sciences. C, Physiology and Molecular Biology*, 16(2), 317-327.
- Atitsogbey, P., Kyereh, E., & Steiner-Asiedu, M. (2025).** Nutrition education improves households' knowledge, attitudes, and practices towards consuming indigenous green leafy vegetables and legumes in Accra, Ghana. *Scientific African*, e02710.
- Chandrasekar, C., Pareek, P., Thorat, A., Khanna, P., & Kulkarni, R. (2025).** Development and Validation of Iron Deficiency Anemia-Related Knowledge, Attitude, and Practices Questionnaire for Adolescents: A Psychometric Analysis. *International Journal of Nutrition, Pharmacology, Neurological Diseases*, 15(1), 100-105.
- Delaforce, A., Farmer, S., Duff, J., Munday, J., Miller, K., Glover, L., & Hurst, C. (2023).** Results from a type two hybrid-effectiveness study to implement a preoperative anemia and iron deficiency screening, evaluation, and management pathway. *Transfusion*, 63(4), 724-736.
- Edison, J. S., Alreshidi, M., Alrashidi, N., MAlshammari, E. B., Alshammari, M., Alrashidi, A. S. S., & Hamed, L. A. (2023).** Knowledge about iron deficiency anemia in university girls: A perspective for an educational booklet. *Int. J. Adv. Appl. Sci*, 10, 203-210.
- Ejoh, A. R., Nwachan, B. M., & Noumo, N. T. (2024).** An assessment of the nutritional status of internally displaced school children in the West and Littoral Regions of Cameroon. *Food Science & Nutrition*, 12(6), 4086-4099.
- Firat, T., & Bildiren, A. (2024).** Developmental characteristics of children with learning disabilities aged 0–6 based on parental observations. *Current Psychology*, 43(4), 2909-2921.
- Guye, A. H., Hansa, K., Ketema, K., Moroda, M., & Shambi, D. B. (2024).** Anemia and Associated Factors among Public Elementary School Children in Asella Town, Southeast Ethiopia: A Facility-Based Cross-Sectional Study. *Anemia*, 2024(1), 1519382.
- Ibrahim, S., Ibrahim Abd El-Moniem, I., & Fathy El-Sayed, Z. (2022).** Mothers' Awareness regarding Iron Deficiency Anemia among School Age Children: An Assessment study. *Egyptian Journal of Health Care*, 13(3), 749-759.
- Khatib, A. H., & Joho, A. A. (2022).** Prevalence of anaemia and caregivers' knowledge, practice and attitude towards its prevention among under-fives in Zanzibar, Tanzania: A cross-sectional study. *International journal of africa Nursing Sciences*, 16, 100416.
- Leung, A. K., Lam, J. M., Wong, A. H., Hon, K. L., & Li, X. (2024).** Iron deficiency anemia: An updated review. *Current Pediatric Reviews*, 20(3), 339-356.
- Mohamed Abdallh Ali, R., Ahmed Abdel-Aziz, N., & Mohamed Sayed, S. (2022).** Life Style of Female Students Nurses with Iron Deficiency Anemia. *Egyptian Journal of Health Care*, 13(4), 982-996.
- Mokhtar, G., Youssef, A., Abdel Baky, A., El Khashab, E. K., Raafat, E., Youssry, I., ... & El Gendy, Y. G. (2023).** Evidence-based Egyptian clinical practice guidelines: for the prevention and management of iron deficiency and iron deficiency anemia in infants, children and adolescents. *Bulletin of the National Research Centre*, 47(1), 162.
- Oektariyana, O., Flora, R., Yuliasuti, M. E., Zulkarnain, Z., & Lasepha, A. (2024).** Risk Factors for Iron Deficiency Anemia Among Mothers of Adolescents in Developing Countries: Study Literature Review. *Indonesian Journal of Global Health Research*, 6(3), 1343-1354.
- Pourhaji, F., Delshad, M. H., & Khorasani, N. (2023).** Impact of family-centered study: a theory-based intervention to promote preventative behaviors for iron deficiency anemia in primary students: A randomized controlled trial protocol. *Journal of Preventive and Complementary Medicine*, 2(2), 111-119.

Rahman, M. J., Rahman, M. M., Sarker, M. H. R., Kakehashi, M., Tsunematsu, M., Ali, M., ... & Shimpuku, Y. (2024). Prevalence and influencing factors with knowledge, attitude, and practice toward anemia among school-going adolescent girls in rural Bangladesh. *PloS one*, 19(11), e0313071.

Rajak, B. K., Sheoraj, S., Vidyarthi, A. R., & Ranjan, S. K. (2025). A Cross-sectional Study on Anaemia Related Knowledge and Dietary Practices in School Going Adolescents in Gaya District of Bihar, India. *European Journal of Cardiovascular Medicine*, 15, 246-254.

Refat Ali Harb, H., Mohamed Sobhy Elsayed, D., & Atta Mohamed Ahmed, W. (2025). Mothers' Awareness regarding Risk Factors about Iron Deficiency Anemia during Infancy period. *Journal of Nursing Science Benha University*, 6(1), 260-275.

Tang, G. H., & Sholzberg, M. (2024). Iron deficiency anemia among women: An issue of health equity. *Blood reviews*, 64, 101159.

Verulava, T., & Gogua, I. (2024). Pregnant Mothers' Knowledge, Attitude, and Practice Towards Prevention of Iron Deficiency Anemia in Georgia. *AL-Kindy College Medical Journal*, 20(3), 222-231.

Yang, J., Li, Q., Feng, Y., & Zeng, Y. (2023). Iron deficiency and iron deficiency anemia: potential risk factors in bone loss. *International Journal of Molecular Sciences*, 24(8), 6891.

Zuair, A. A. (2025). Assessment of a school-based, nursing-lead program to combat iron deficiency anemia among Saudi female adolescents: a pilot exploratory study. *Discover Public Health*, 22(1), 1-13.