

**BURDEN OF ANEMIA AND ASSOCIATED FACTORS AMONG PREGNANT WOMEN AT KAUSAR HOSPITAL MOTHER AND CHILD HEALTH CARE CENTRE KHAIRPUR MIR'S, PAKISTAN**

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**Abstract:** Anemia is the condition in which hemoglobin level may become lower than normal <11.0g/dl. According to an estimate, about one-third of the world's population (over 2 billion) are anemic. The study aimed to determine the Prevalence of anemia and associated factors among pregnant women at Kausar Hospital Mother and Child Health Care Centre Khairpur Mir's, Sindh, Pakistan. The cross-sectional study was conducted from August to December 2019. A total number of 100 pregnant women were randomly included in this study. A predesigned questionnaire was filled out by face-to-face interviews consisting of socio-demographic characteristics, including Name, Age, gestational age, educational level, occupation, and monthly income. Anemia was classified as per World Health Organisation (WHO) criteria. The prevalence rate of Anemia in the present study was 69%. Minimum Haemoglobin levels were observed at 5.6 g/dL, and maximum Haemoglobin levels were observed at 12.4 g/dL with an average Haemoglobin of 10.05 g/dL  $\pm$ 1.44. Among them, 49% had mild anemia, 17% moderate anemia, and 3% severe anemia. At the same time, the patients were divided into age groups of 15-20 years, 21 to 25 years, 26 to 30 years, and 31-35 years to compare Anemia or Haemoglobin levels. Results showed a higher prevalence of anemia between the ages of 26 and 30. The minimum age was observed to be 20 years and a maximum of 35 years, with an average age of 28.12 years  $\pm$ 2.5 years. It was observed that the prevalence of Anemia was higher in 7-9 gestational months; socio-economic factors (Age, Gestational month, Number of children, and income source) showed significant association with Anemia. The present study concludes that the Prevalence of Anemia and Associated Factors among Pregnant Women at Kausar Hospital was 69%. Among them, 49% had mild anemia, 17% moderate anemia, and 3% severe anemia.

**Keywords:** Pregnant Women, Anemia, Prevalence, Haemoglobin, Pakistan

## Introduction

Anemia is a condition in which the hemoglobin level is lower than the normal <11.0g/dl. According to WHO1, nutritional Anemia is a considerable issue affecting countries with low income, such as Pakistan. Normal hemoglobin levels change with age, sex, weight, physiological status, and altitude (Organization, 2019). Iron deficiency anemia (IDA) is supposed to be the most important reason for anemia. This may be found at all stages of life, but pregnant women and children are primarily affected. As per an assessment, over 2 billion (One-third) of the world's population are anaemic (Who, 2008). The prevalence of Anemia in urban areas of Pakistan is reported to be 90.5% (Baig-Ansari et al., 2008). Our body contains 4.5 to 5.5 liters of blood which circulates. If it is wrong in our blood, it affects our health and life. Blood contains the liquid part of Plasma and the solid parts of blood cells. The watery constituent of blood is Plasma, which carries important hormones, proteins, and nutrients throughout the body. The other blood members are three types of blood cells, i.e., RBCs contain hemoglobin, which supplies oxygen to all body parts from the lungs (Statistics and Research, 2011). Haemoglobin also takes carbon dioxide from the body to the lungs. WBCs are part of the defense system that can fight against infections. Platelets are also constituents of blood and help clotting blood. The bone marrow is a kind of tissue inside the bones where blood cells originate with different life spans, i.e., RBC with 120 days

and platelets with six days. The life span of different types of WBCs is different, i.e., some live about one day, while others may live more than one day (Statistics and Research, 2011). The improper functioning of red blood cells (RBCs) or deficiency of RBCs leads to Anemia, which causes a deficient oxygen-supplying capability. For erythropoiesis, the body requires folic acid, iron, and vitamin B12; deficiency of these constituents or RBCs deficiency leads to Anemia. It may be why, as the pregnancy progresses, the plasma volume expands, resulting in hemoglobin dilution, causing Anemia in women. Blood dilution starts at the 32nd to 34th week of pregnancy naturally (Chowdhury et al., 2014). Zehra et al. six did research work from Karachi to determine the occurrence of Anemia in pregnant women. Similarly, Noreen et al. presented work in the Abbottabad district to explain the incidences of anemia in pregnant women. In the meantime, Manzoor et al. (Maleeha Manzoor et al., 2017) conducted work from Lahore to explain the occurrence of Anemia during pregnancy in women. Still, there is no reported work on the prevalence of anemia in pregnant women from Khairpur city. This work has been planned to determine the maximum intensity of anemic pregnant women at Kausar Hospital Mother and Child Health Care Centre Khairpur Mir's, Sindh, Pakistan.

## Methodology

This study was conducted at Kausar Hospital Mother and Child Health Care Centre in Khairpur, Sindh, Pakistan. The

eastern province of Pakistan is Sindh, with a small city of Khairpur, which has a population of about 130,000 people, a latitude of 27.52, and a longitude of 68.75. It consists of 8 Talukas, 11 towns, and 6,800 villages. A total number of 100 pregnant women were included in this study. The patients were divided into age groups of 15-20 years, 21-25 years, 26-30 years, and 31-35 years to compare Anemia or Haemoglobin levels. To estimate the total number of frail patients in 2018, the hospital record from January to December 2018 was taken from the Laboratory of Kausar Hospital Mother & Child Health Care Centre Khairpur, Sindh, Pakistan, following the methodology of Akter et al. (Akter et al., 2020).

Face-to-face interviews filled out a predesigned proforma to obtain relevant information. Socio-demographic characteristics were included: age, gestational age, educational level, occupation, monthly income, and Name. According to WHO classification, women who showed hemoglobin <11.0g/dl were labeled anemic. However, the patients were categorized into Mild anemic (Haemoglobin 9.0-10.9 g/dl), moderate (Haemoglobin 7.0-8.9 g/dl), and severe weak (Haemoglobin less than 7.0 g/dl) based on their Haemoglobin levels following the methodology of Singh et al. (Singh et al., 2016)

Only pregnant women were included in the study, while all non-pregnant women and any supplement-taking women were excluded from the current study.

The samples of blood were collected regularly. The blood sample of about 3cc was collected from the vein into EDTA (Ethylene diamine tetra-acetic acid) tubes. The model was taken immediately to the laboratory for analysis. Hb (Haemoglobin), HCT (Haematocrit), MCV (Mean Corpuscular Volume), (MCH Mean corpuscular hemoglobin), MCHC (Mean Corpuscular hemoglobin concentration), RBC (Red blood cell) were determined by

automatic 3-part hematological analyzer model Sysmex-XP-100 and principle of this analyzer are "Lazer beam." Computer software SPSS was applied to estimate Frequencies and percentages; the Chi-square test and correlation between variables were examined to observe the significance of different variables following the methodology of Akter et al.(Akter et al., 2020).

**Results**

The current research was done among Pregnant Women to explore the Prevalence of Anemia at Kausar Hospital Mother and Child Health Care Centre Khairpur Mir’s, Sindh, Pakistan. Randomly, 100 pregnant women were chosen from August 2019 to December 2019. The different hemoglobin levels, with an average level of 10.05 g/dL ±1.44, were obtained in all pregnant women at Kausar Hospital Mother & Child Health Care Centre Khairpur, Sindh, Pakistan. Based on hemoglobin levels, the results showed the ratio of Anemia in the present study was 69%, and 31% was non-Anaemic (Fig. 1), in which the mild Anaemic was 49%, moderate Anaemic was 17% and severe Anaemic was 3% (Fig. 2). The division of patients was done into four age groups of 15-20 years, 21-25 years, 26-30 years and 31-35 years. Observed results of 2.89% were found in 15-20 years, 13.04% in 21-25 years, 76.81% in 26-30 years, and 7.24% in 31-35 years. Among them, the prevalence of anemia was higher in the 26-30 age group (Table 1). However, the obtained average age was 28.12 years ± 2.5 years. The results of gestational months showed that 2.89% of patients were found in 1-3 months, 5.79% in 4-6 months, and 91% in 7-9 months. The maximum prevalence of Anemia was observed in 7-9 gestational months (Table 2).

**Table 1. Shows the prevalence of Anaemia in different age groups among pregnant women**

Age	Anaemic		Total
	Yes	No	
15-20	2(2.89%)	1(6.45%)	3
21-25	9(13.04%)	5(16.12%)	14
26-30	53(76.81%)	25(80.64%)	78
31-35	5(7.24%)	0	5
Total	69	31	100

(P-value = 0.029)

**Table 2. Shows the prevalence of Anaemia in different gestational months among Pregnant Women**

Gestational Months	Anaemic		Total
	Yes	No	
1-3	2(2.89%)	1(3.23%)	3
4-6	4(5.79%)	7(22.58%)	11
7-9	63(91.30%)	23(74.19%)	86
Total	69	31	100

**Table 3. Shows the frequency and percentage of patients with their educational level.**

Education	Anaemic		Total
	Yes	No	
Primary education	10(14.49)	4(12.90)	14
Middle Education	6(8.69)	3(9.67)	9
Secondary education	8(11.59)	2(6.45)	10
Graduation	2(2.89)	3(9.67)	5
Un-educated	43(62.32)	19(61.2)	62
Total	69	31	100

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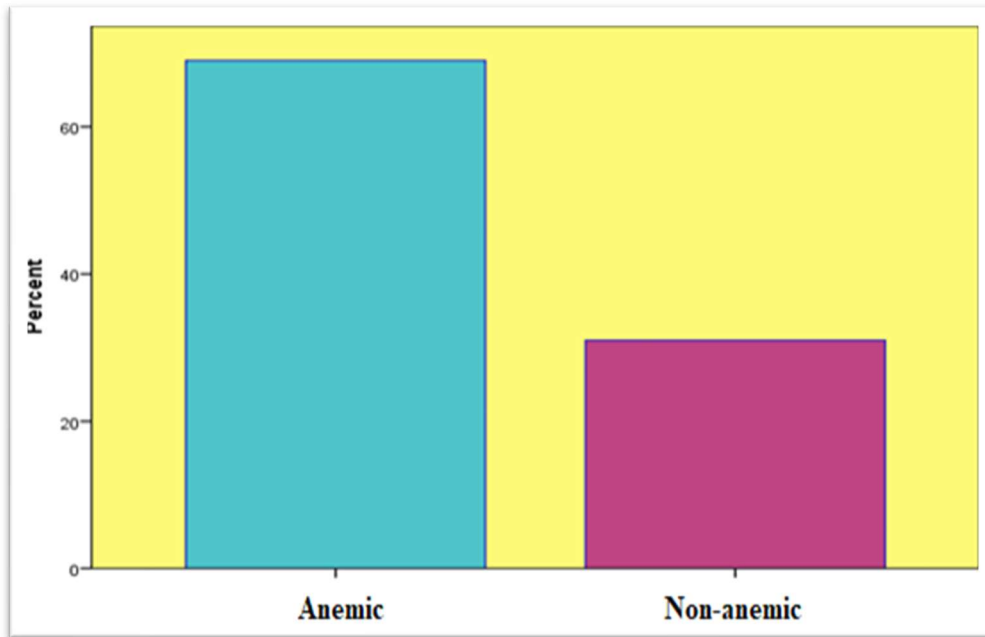


Figure 1. Shows the percentage of Anaemic and non-Anaemic patients at Kausar Hospital Mother & Child Health Care Centre Khairpur Mir’s, Sindh, Pakistan.

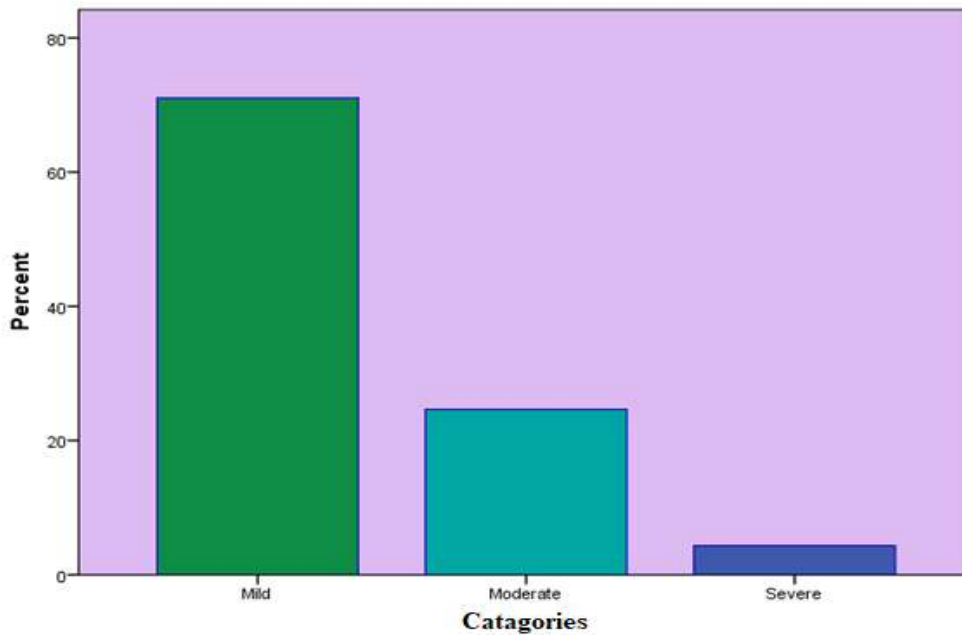


Figure 2. Shows the categories of anemia based on hemoglobin levels in pregnant women at Kausar Hospital Mother & Child Health Care Centre Khairpur Mir’s, Sindh, Pakistan.

Table 4. Shows the frequency and percentage of patients with net monthly income.

Net monthly income	Anaemic		Total
	Yes	No	
Less than10000	40(57.97)	15(48.39)	55
11000-20000	26(37.68)	15(48.39)	41
21000-30000	3(4.35)	1(3.23)	4
Total	69	31	100

(P-value = 0.617)

Meantime, in this study, about 14.49% of pregnant women have primary education, 8.69% have middle education, 11.59% have secondary education, 2.89% have graduated,

and 62.32% were uneducated (Table 3), with a monthly income of their guardians were found to be 57.97% guardian of pregnant women with net income of less than 10,000,

37.68% having 11000-20000 and 4.35% having 21000-30000 (Table 4).

The source of their monthly income was 10.15% with government employment, 18.84% with private job, 20.29%

self-employed, 4.35% unemployed, and 46.38% laborers (Table 5).

**Table 5. Shows the frequency and percentage of income sources of patients**

Income Source	Anaemic		Total
	Yes	No	
Government employee	7(10.15%)	3(9.68%)	10
Private employee	13(18.84)	2(6.45%)	15
Self-employee	14(20.29)	9(29.03%)	23
Un-employed	3(4.35%)	2(6.45%)	5
Laborer	32(46.38%)	14(45.16%)	46
Any other	0	1(3.23%)	1
Total	69	31	100

(P-value = 0.030)

The patients with children of 1-3 were found to be 81%, 17% had 4-7 children, and 2% had above seven children. While the patients with a miscarriage history were 41% and 59% had a previous history of miscarriages. In the present study, 55% of patients were observed who take fresh fruits, vegetables, meat, and milk daily, 17% were observed who take fresh fruits, vegetables, meat, and dairy two times a week, 13% were observed who take fresh fruits, vegetables, meat, and milk weekly and 15% were observed who take

fresh fruits, vegetables, meat, and milk rarely. The employment status results were that 6% of women were employed, 94% were doing housework, 9% of patients had stress, and 90% were found to have no pressure. Whereas 59% were having frequent nausea and vomiting, 41% had no nausea and vomiting, and a total of 37% of patients were taking rest for 5-6 hours per day, 61% of patients were taking rest for 7-8 hours, and 2% were taking rest for above 8 hours (Table 6).

**Table 6. Sociodemographic characteristics of pregnant women at Kausar Hospital Mother and Child Health Care Centre Khairpur Mir's, Sindh, Pakistan**

Variables	Frequency	Anemia prevalence	P-value
<b>Number of children</b>			
1-3	81	81%	0.018
4-7	17	17%	
Above 7	2	2%	
<b>History of miscarriage</b>			
Yes	41	41%	0.500
No	59	59%	
<b>Employment status</b>			
Employed	6	6%	0.778
Doing housework	94	94%	
<b>Stress or worry</b>			
Yes	10	10%	0.805
No	90	90%	
<b>Diet (Fresh fruits, vegetables, meat, and milk)</b>			
Daily	55	55%	0.478
2times a week	17	17%	
Weekly	13	13%	
Very rare	15	15%	
<b>Nausea Vomiting</b>			
Yes	59	59%	0.85
No	41	41%	
<b>Rest per Day</b>			
5-6 hours	37	37%	0.478
7-8 hours	61	61%	
Above 8	2	2%	

Meantime, patients were distributed based on CBC parameters. Out of 100 patients, Hb was high (<11.0g/dl) in 69 women and normal (> 11.0 g/dl) in 31 women. MCV was <76fl in 39 women, normal (76-96 fl) in 58, and>76.96 fl in 03 women. MCHC was Low (<32g/dL) in 31 women and Normal (32-36g/dL) in 69 women. MCH was Low (<27Pg)

in 65 women, Normal (27-32Pg) in 33 women, and it was high (>32Pg) in 02 women. HCT was <40% in 97 women and normal (40-54%) in 3 women. R.B.C was Low (<4.5\*10E12/L) in 50 women, and it was Normal (4.5-6.5\*10E12/L) in 50 women (Table 7).

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**Table 7. Distribution of patients based on CBC parameters**

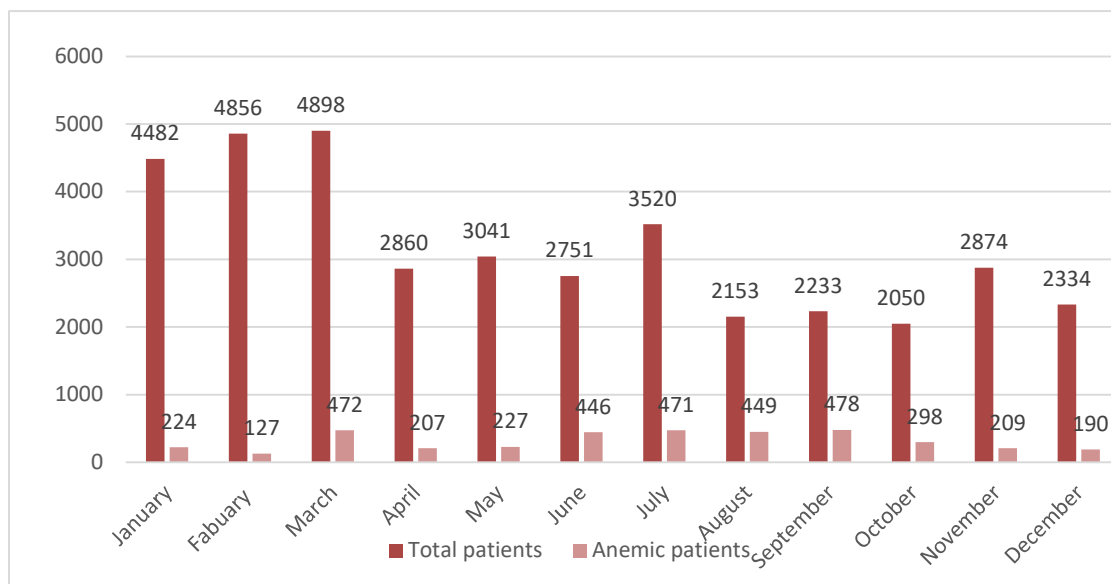
No.	Variable	Range of variable	No. of patients n=100	Mean ± SD (Range)
1	Hb	Anaemic (<11.0g/dl)	69	9.33±1.10(5.6-10.9)
		Non-anaemic (> 11.0 g/dl)	31	11.68±0.43(11-12.6)
2	MCV	Low (<76 fl)	39	68.4±4.74 (57-75.8)
		Normal (76-96 fl)	58	81.06±3.61 (76.1-90.00)
		High (>76.96 fl)	03	101.86±3.29(89.4-106.3)
3	MCHC	Low (<32g/dL)	31	30.43±1.29 (27.3-31.9)
		Normal (32-36g/dL)	69	33.70±1.01 (32-36.00)
		High (>36g/dL)	Nil	Nil
4	MCH	Low (<27Pg)	65	23.60±2.81 (16.5-26.9)
		Normal (27-32Pg)	33	28.66±1.18 (27.2-31.9)
		High (>32Pg)	02	36.35±1.85 (34.5-38.2)
5	PCV (HCT)	Low (<35%)	90	29.96±3.20(20.50-34.90)
		Normal (35-47%)	10	36.18±0.89(35.00-38.20)
		High (>47%)	Nil	Nil
6	R.B.C	Low(<4.5*10E12/L)	50	3.63±0.34 (2.29-4.04)
		Normal (4.5-6.5*10E12/L)	50	4.45±0.40 (4.08-6.32)
		High (>6.5*10E12/L)	Nil	Nil

Hb: Haemoglobin, MCV: Mean corpuscular volume, MCHC: Mean corpuscular hemoglobin concentration, MCH: Mean corpuscular hemoglobin, HCT: Haematocrit, RBC: Red Blood Cell count.

In the current study, a significant association was observed between Haemoglobin levels and Age, between Haemoglobin levels and Gestational month, between Haemoglobin levels and Number of children, between Haemoglobin levels and History of miscarriage with p values (p=0.029, p=.000, p=.018, p=.500, <0.05) respectively. However, the obtained results showed no significant association between Haemoglobin levels and diet, between hemoglobin, nausea, and vomiting, between Haemoglobin levels and rest per day, between Haemoglobin levels and Stress or worry, between Haemoglobin levels and Education, between Haemoglobin levels and Employment status, between Haemoglobin levels and Net monthly income with p values as (p=.478, p=.85, p=.487, p=.805, p=.839, p=.778, p=.617, >0.05) respectively. At the same time, the Hb levels were also compared with different age

groups, with gestational months, with number of children, with history of miscarriages of the pregnant women, with routine intake of diet, frequencies of the pregnant women having frequent nausea or vomiting, with the pregnant women taking rest for different hours or not taking rest per day, with the frequencies of pregnant women having stress or any worry, with education, with employment status and with Net monthly income at Kausar Hospital Mother and Child Care Centre Khairpur, Sindh, Pakistan.

However, the total prevalence of anaemic patients was 3798 from January 2018 to December 2108. The minimum of weak patients was 127 in February, and a maximum of 478 patients were found in September at Kausar Hospital Mother & Child Health Care Centre Khairpur, Sindh, Pakistan (Fig. 3).



**Figure 3. Shows the total prevalence of anemic patients from January 2018 to December 2018 at Kausar Mother and Child Health Care Centre Khairpur, Sindh, Pakistan**

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## Discussion

The present work was done at Kausar Hospital Mother and Child Health Care Centre Khairpur Mir's, Sindh, Pakistan, to determine the Prevalence of Anemia and Associated Factors among Pregnant Women. According to WHO, anemia is a significant problem affecting developed and developing countries. About one-third of the global population (over 2 billion) are Anaemic (Hashim et al., 2014; Organization, 2007). The present study was conducted based on hemoglobin levels; 100 pregnant women were selected randomly, and 69% of pregnant women were found to be Anaemic. Our findings were similar to the findings of Jaleel and Khan (Jaleel and Khan, 2008), who have also found a similar prevalence of 69.9% of anemic pregnant women in Karachi. Since results of this work were higher than the studies on the majority of Anemia conducted from different areas of Pakistan as well as other countries such as form Abbottabad, Pakistan, 60% Anaemic pregnant women were observed (Naz et al., 2011), Karak, Khyber Pakhtunkhwa, Pakistan, 67.6% Anaemic (Irfan Ullah et al., 2013), Muzafarabad 19% Anaemic (Adnan et al., 2018) and the rural areas of North India 56.8% Anaemic pregnant women were observed (Kumari, 2018). Changes in the study plan, sample size, and techniques may be the reason for slight differences in the prevalence of anemia. Socioeconomic status or socio-demographic characteristics and geographical may also be the reason for variations in present results (Gebreweld et al., 2019). In the current results, women with mild Anemia were 49%, with moderate Anemia were 17%, and with severe Anemia 3%; this showed that most women had mild Anemia. These values were comparable to a work done in Karachi, which showed pregnant women with a higher ratio of mild Anemia<sup>6</sup> and in comparison to severe Anemia, similar results were observed in the study of Suryanarayana et al. (Suryanarayana et al., 2016), which was conducted in Kolar District, Karnataka, India.

In the present study, the mean age of pregnant women was 28.12±2.5 years. The current findings closely resembled the mean age of 28.7±5.8 years of the pregnant women of Ethiopia<sup>18</sup>. The pregnant women were further divided into age groups: 15-20, 21-25, 26-30, and 31-35. It was observed that the prevalence of anemia was higher in the 26-30 years age group in the present study. These findings were similar to the study of Gebreweld and Tsegaye (Gebreweld and Tsegaye, 2018) conducted in Ethiopia. In our research, the Average hemoglobin levels of pregnant women were 10.05 ±1.44, identical to the findings found in Raichur with average Haemoglobin levels of 10.63±1.41 of pregnant women (Bh et al., 2017). The results of the prevalence of anemia in the gestational month were that 3% of pregnant women were found in 1-3 months, 11% were found in 4-6 months, and 86% were found in 7-9 months. It was seen that the prevalence of Anemia was higher in 7-9 gestational months. These findings were similar to the conclusions of District Faisalabad, Pakistan, which showed Anemia was found to be more prevalent in the third trimester at 89.3% (Anjum et al., 2015).

In the present study, Anemia was significantly associated with Age, gestational month, income source, and the number of children. The results were similar to a survey

conducted in Dhaka city, Bangladesh, which showed Anemia was significantly associated with Age and income (Chowdhury et al., 2015), and the association of Anemia with the number of children was similar to the findings in Eastern Ethiopia, which showed Anemia is significantly associated with the number of pregnancies (Addis Alene and Mohamed Dohe, 2014). The association of anemia with gestational month was identical to the work of Suryanarayana et al. (Suryanarayana et al., 2016), conducted in Kolar District, Karnataka, India. It showed that anemia is significantly associated with gestational age.

The limitation of this work was that this study was based on a cross-sectional type of nature. This work lacks the link between the independent variables and Anemia. Because of these limitations and the availability of sources, it was impossible to find the concentration of serum ferritin, concentration of soluble transferrin receptors, level of folate, level of B12 vitamin and thalassemia, and deficiency of G6PD. That might have formed a basis for the cause of Anemia. Secondly, health centers were found to be the limitation of this work. Thus, a study based on the community level may be conducted; that finding may represent the entire community population. Despite these limitations, the present work determined the enormity and recognized factors of Anemia in pregnant women at Kausar Hospital Mother and Child Health Care Hospital Khairpur, Sindh, Pakistan (Gebreweld et al., 2019).

## Conclusion

The present study concludes that the Prevalence of Anemia among Pregnant Women in Kausar Hospital Mother and Child Health Care Centre Khairpur Mir's, Sindh, Pakistan, was found to be 69%. Among them, 49% had mild anemia, 17% moderate anemia, and 3% severe anemia. The results showed a higher prevalence of Anemia between the ages of 26 and 30. It was observed that most anemia cases were higher in 7-9 gestational months. The socioeconomic factors (Age, Gestational month, Number of children, and income source) showed a significant association ( $p < 0.05$ ) with Anemia. The study concluded that Anemia is common in pregnancy and is a chief public health issue in developing countries.

## Declarations

### Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

### Ethics approval and consent to participate

Approved by the department Concerned.

### Consent for publication

Approved

### Funding

Not applicable

## Conflict of interest

The authors declared absence of conflict of interest.

## Author Contribution

**NEELAM BALOUCH**

Manuscript drafting.

Data entry and Data analysis, drafting article.

Coordination of collaborative efforts.

**SAPNA WAHEED**

Manuscript revisions, critical input.

Data acquisition and analysis.

**TASKEEN WAHEED**

Manuscript drafting.

Data entry and Data analysis, drafting article.

Coordination of collaborative efforts.

**KHADIM HUSSAIN MEMON**

Study Design, Review of Literature.

Conception of Study, Development of Research

Methodology Design, Study Design, Review of manuscript,

final approval of manuscript.

Conception of Study, Final approval of manuscript.

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