Vol. 5 No. 1 (2026)

Pakistan Journal of Medical & Cardiological Review

https://pakjmcr.com/index.php/1/about

Online ISSN 3007-2387

Print ISSN 3007-2379

Research On Prevalence Of Microcytic & Hypochromic Anemia Among Patients Visited At Phq Teaching Hospital Gilgit

Sadia Zahra*
Department of Medical Laboratory Sciences, Karakoram International University, Gilgit.
sadiazahara16@gmail.com

Sharafat Malik
Medical Laboratory Technology, Karakoram International University, Gilgit.
sharafat.malik313@gmail.com

Tanveer Hussain
Department of Medical Laboratory Technology, Karakoram International University, Gilgit.
tanveer.hussain.ms2026@gmail.com

Wajahat Ali Qureshi
Medical Laboratory Technology, Karakoram International University, Gilgit.
wajahataliqureshi5@gmail.com

Shahbaz Hussain
Department of Medical Laboratory Technology, Karakoram International University, Gilgit.
shahbazhussain1028@gmail.com

Arshi Zahra
Department of Microbiology, Karakoram International University, Gilgit.
arshizahra62@gmail.com

Author Details

Keywords:

Received on 25 Jan 2026
Accepted on 28 Feb 2026
Published on 10 Mar 2026

Corresponding E-mail & Author*:

Sadia Zahra
Department of Medical Laboratory Sciences, Karakoram International University, Gilgit.
sadiazahara16@gmail.com

Abstract

BACKGROUND

Iron deficiency (ID) is the primary cause of anemia, a global health issue that affects one-third of the world's population .it is most frequently linked to iron deficiency, thalassemia, chronic disease and sideroblastic anemia). Acute and chronic blood loss, poor intestinal absorption of iron, decreased iron intake, and increased iron requirements during pregnancy, significant trauma recovery, and surgical recovery are some possible causes of this .

OBJECTIVES

To find the prevalence of microcytic & hypochromic anemia among the patients visited in Gilgit city hospitals according to age, gender, area, and pregnancy-wise. To find its associated risk factors contributing to the development and progression of microcytic hypochromic anemia.

METHODOLOGY

It was a descriptive cross-sectional study. A cross-sectional study is used to find the prevalence of a particular disease in a population at a specific point in time to investigate the prevelance of microcytic hypochromic anmeia among patients visited in phq hospital gilgit baltistan. Data were collected from 500 participants across all age groups by taking blood sample. structured question are is use to collect data from patients who are positive for microcytic hypochromic anemia.

RESULTS

In this study, the sample was collected from 500 patients from PHQ hospitals at Gilgit city. All of the reported cases were categorized based on age, gender, area, and pregnant or non-pregnant, respectively). According to the findings, the hospital received reports of 300 M.H.A. cases from different districts Gilgit City had the greatest prevalence, 157(66.5%) And even no prevalence was recorded in some districts. The highest prevalence of M.H.A with respect to gender was observed in 169 female (71.61%). The prevalence of M.H.A with respect to age in age group 25-34was found to be the highest among all age groups. While M.H.A was found to be the lowest in <75age group. on occupation the highest prevalence was found in students109(46.19%) and in housewife the prevalence is 94(39.83%). based on tea intake. Highest prevalence of M.H. A were found among those patients who consume tea regularly 130(55.08%). The highest prevalence 140 (59.32%). Based on vegetable and fruit consumption seen in those persons who rarely intake fruits and vegetables in their diet. Apart from this the highest prevalence of M.H.A Among the patient who do not take iron supplements. The other factors like lactation, pregnancy, diabetes or other chronic health conditions greatly influence in the occurrence of M.H.A.

CONCLUSION

understanding the anemia (microcytic hypochromic) burden is essential for the overcome public health care outcomes. Study investigates the pattern of determinants of microcytic hypochromic anemia in patients visited in PHQ hospital Gilgit Baltistan. The findings indicate out
of 237 patients 169 female (71.61%) females are affected with this type of anemia. With the majority of female suffering poor diet, lifestyle, dietary practices, menorrhagia, high altitude, physical activity, and homeostatic abnormalities. There are numerous well-established, reasonably priced strategies to combat anemia, such as treating the underlying causes, bringing the hemoglobin concentration back to normal, and preventing and managing consequences.

INTRODUCTION

Iron deficiency (ID) is the primary cause of anemia, a global health issue that affects one-third of the world's population(1). The most significant subject of dispute for the entire planet is iron-deficient anemia. Iron is crucial for linear growth, and moms who are iron deficient are more likely to experience stillbirth and infant death. Iron deficiency sometimes manifests as a decrease in hemoglobin, red blood cell (RBC) count, packed cell volume (PCV), mean cell volume (MCV), and mean cell hemoglobin. Nutritional deficiencies or underlying diseases often bring it on. (2) insufficiency. The medical definition of anemia changed to its current form with the advancement of microscopy and blood analysis techniques: a disorder characterized by a decrease in red blood cells, hemoglobin concentration, which impairs oxygen transport in the body (3). Anemia is common in people at any age but pregnant women and young children are especially vulnerable, increasing the likelihood of cognitive and physical development impairment and mortality and morbidity (4) The male population is usually resistant to anemia due to circulating testosterone level (5). A combination of laboratory testing, clinical assessment, and occasionally bone in imaging or bone marrow examinations are used to make the diagnosis. Ret-He is one of the better and more accurate hematological markers of ID, per the current study. (5). Additionally, there was a correlation between the incidence of anemia and lifestyle, dietary practices, menorrhagia, high altitude, physical activity, and hemostatic abnormalities. Addressing these factors through proper dietary intake and supplementation can help prevent and manage nutritional anemia effectively [6]. Additionally, it can be combined with biochemical indicators like serum ferritin to enhance IDA diagnosis and screening, hence enabling more effective treatment. Anemia is becoming a growing public health issue in Gilgit Baltistan where both prevalence and risk factors are poorly understood. Despite the increasing burden of anemia in the region, there is limited region-specific data on the extent of the problem. The Gilgit Baltistan face several challenges including geographical isolation, limited access to specialized care and inadequate healthcare infrastructure, all of which hinder early diagnosis and effective treatment. Additionally, the prevalence of anemia was linked to age, gender, and mother's level of education, BMI, smoking status, and employment status.

METHODLOGY

Study design It was a descriptive cross-sectional study. A cross-sectional study is used to find the prevalence of a particular disease in a population at a specific point in time. Observational cross-sectional or descriptive studies are used to find the prevalence of a particular disease over a defined period from a defined population, but they cannot answer the question of why a particular disease occurs. Such studies do not involve case-control samples.

Study area

The investigation took place in Nagar District, Gilgit Baltistan, which includes both central and ruler settlements. This region was selected due to its restricted access healthcare and diagnostic services (28) Gilgit Baltistan consists of seven districts named as Gilgit, Skardu, Astore, Diamer, Ghizar, Nagar and Ghancha. The study was conducted in the PHQ hospital in Gilgit, which is a tertiary care unit which is located in Gilgit city.

Study population

The study population included all patients visiting the Provincial Headquarter Hospital, Gilgit Baltistan, for checkups and admitted to different wards.

Inclusion criteria

5 years and above aged both male and female patients were included in the study, Patients who provide informed consent are included in this study.

Exclusion criteria

The patient below aged of 5 years was not included in the study, The patients who are mentally disabled. Patients who do not provide informed consent are not included in this study

Sampling technique and sampling size

A total of 500participants were recruited for the study. The sample size was calculated using a single-population proportion formula with an assumed prevalence of anemia among pregnant women in Ghana, a 95% confidence level, and a 5% margin of error (7)

Data collection

Data was collected from 500 patients of different ages and sex (male and female) from PHQ hospital Gilgit by taking blood samples the search of having microcytic hypochromic anemia. About 3ml blood sample was collected in a sterile
EDTA tube from every patient and carrying it into the laboratory for a complete blood count test (CBC). Out of 500 suspected patients, 300 patients are considered as positive based on their Hb and cell indices. Out of 300 patients, for further conformation of microcytic hypochromic anemia peripheral blood smear is performed.

Data collection tools and procedure

A structured, pre-tested questionnaire was administered through face-to-face interviews to collect socio-demographic, obstetric, clinical, lifestyle, and healthcare-related information. Venous blood samples (5 mL) were collected aseptically for hematological assessment. Hemoglobin concentration, MCV, and MCH were measured using automated hematology analyzers. (8). Interviews were conducted in Urdu Shina, Brushiski, ensuring cultural and linguistic clarity (9).

Ethical consideration

Approval for the study was obtained from the institution. Each participant was informed about the purpose, procedure, and confidentiality of the study before participation. Written informed consent was taken, and respondents were assured they could withdraw anytime without repercussions. Data privacy was maintained in compliance with the Declaration of Helsinki (10).

Data analysis

All quantitative data were entered and analyzed using SPSS version 25. Descriptive statistics such as means, frequencies, and percentages summarized demographic and clinical variables. Associations between independent variables and microcytic hypochromic anemia status were tested using chi-square and logistic regression analysis (11). Interview transcripts were manually reviewed and coded thematically following (12). A framework analysis approach (13), was applied to classify recurring themes related to disease awareness, risk factors, healthcare barriers, and socio-economic issues.

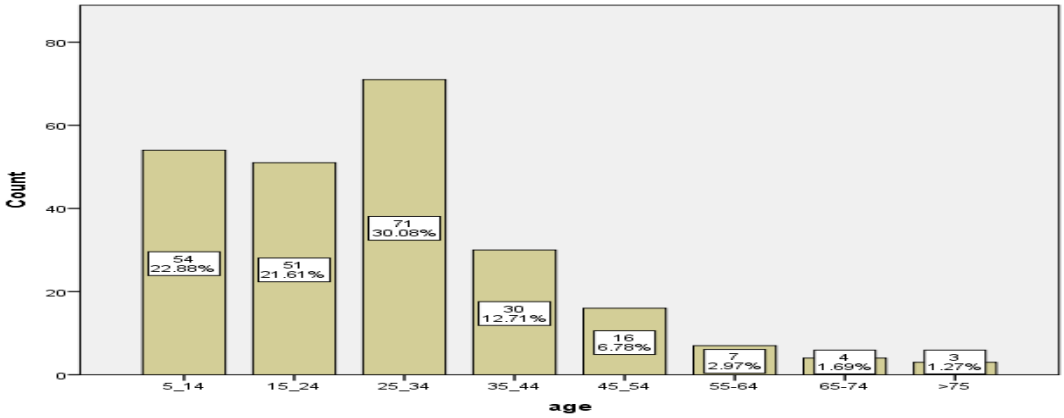
Results and discussions

In this study, the sample was collected from 500 patients from PHQ hospitals at Gilgit city.

The data includes M.H.A suspected cases from 1 May to 1 July 2025. All of the reported cases were categorized based on age, gender, area, and pregnant or non-pregnant, respectively). Out of 500 suspected patients, 300 patients are considered as positive on the basis of their Hb and cell indices. Out of 300 patients, 237 patients are confirmed as microcytic hypochromic anemia by peripheral blood smear.

Figure:1 the age wise distribution

to check age wise distribution 8 groups are formed from 5 up to 75, 5-14 years,15-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, 65-75 years,> 75 year.



adolescents, especially girls, face increased risk from growth spurts and menstruation. Women of reproductive age are vulnerable due to menstrual losses and pregnancy. Older adults face increased risk from decreased iron absorption and chronic diseases 30.08% individuals aged 25-34 group age are most affected by microcytic hypochromic anemia. (14)

The bar chart illustrates the distribution based on age group among a surveyed population.

Figure:2 gender wise distribution

Gender Male and female two groups were form to check the gender wise distribution of condition.

Women of reproductive age are at higher risk of microcytic hypochromic anemia due to menstrual blood loss. Pregnancy and lactation increase iron demands, exacerbating deficiency. Dietary factors and restrictive eating patterns can also contribute to iron deficiency in women.

The bar chart shows the distribution of individuals based on gender. (15).71.61% (169 female) were affected.27.97% (66 male) were affected.

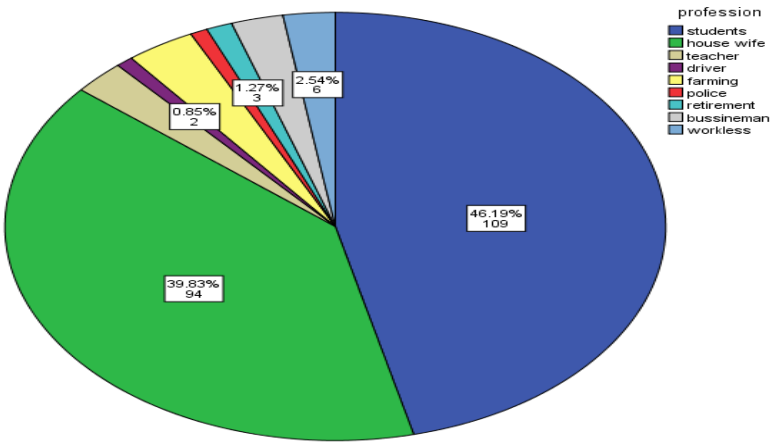
Figure:3 Area-wise distribution

The prevalence of disease in in 7 districts of Gilgit Baltistan was checked through distribution of cases in this area.

Area with limited access to iron-rich foods or prevalent parasitic infections increase microcytic hypochromic anemia risk. Poor sanitation and hookworm infections in rural areas contribute to iron deficiency. Dietary habits and cultural practices also play a role in regional anemia prevalence. Limited healthcare access can delay diagnosis and treatment in disadvantaged areas. (16)

The bar chart illustrates the distribution based on area of residence among a surveyed population. 66.53% were from Gilgit city,16.10% were from Diamer,7.81% were from Nagar,1.27% were from Astore,0.85% were from Skardu

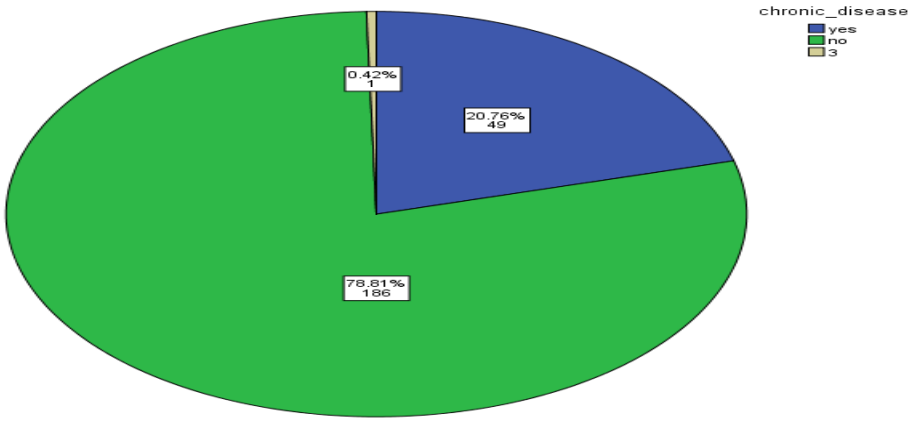
Figure:4 Occupation wise distribution



Certain occupations like mining or battery manufacturing involve exposure to lead, impairing heme synthesis and contributing to anemia. Jobs with frequent injuries can lead to chronic blood loss and iron deficiency. Poor nutrition or limited access to iron-rich food also increases risk in some occupations. Workers in these fields should prioritize iron intake and health check-ups.(17)

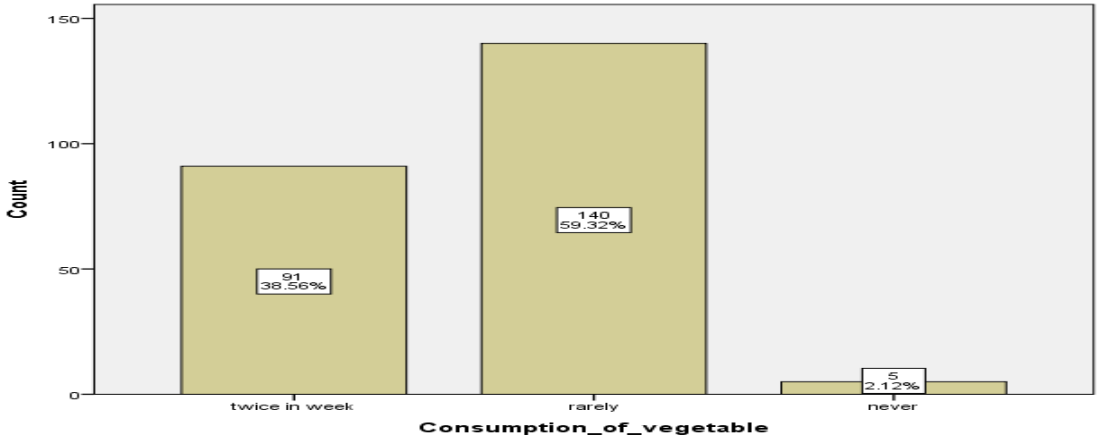
The pie chart shows the distribution of individuals based on occupation 46.19% (109 individuals) were students,39.83% (94 individuals)were house wife's

Figure:5 Health conditions comorbidities



Chronic diseases like kidney disease and rheumatoid arthritis contribute to anemia through inflammation and impaired iron use. Gastrointestinal disorders like celiac disease or Crohn's disease impair iron absorption, exacerbating deficiency. Chronic infections like tuberculosis also lead to anemia of inflammation. Managing underlying conditions can help alleviate anemia symptoms. The pie chart shows the distribution of individuals based on presences of chronic conditions. (18).20.76% (49 individuals) were found to have a history of chronic condition.
78.81% (186 individuals) were not found to have a history of chronic condition.

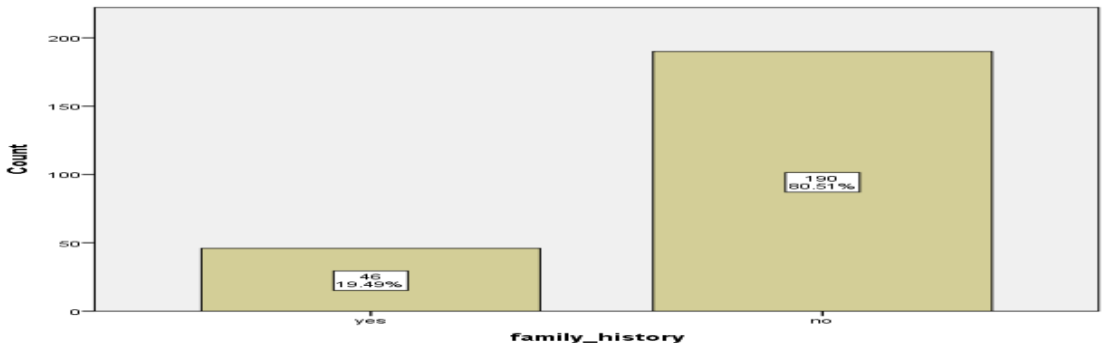
Figure:6 Vegetable consumption status



Vegetables like spinach and kale are rich in non-heme iron, supporting hemoglobin production. However, phytates in some veggies can inhibit iron absorption. Vitamin C-rich veggies like bell peppers can boost non-heme iron absorption. A balanced diet with iron-rich veggies and enhancers can help prevent microcytic hypochromic anemia. (19).
The bar chart shows the distribution of individuals based on consumption of vegetable.59.32% (140 individuals) were found to have rare consumption of vegetables,38.56% (91 individuals) were not found to have rare consumption of vegetable

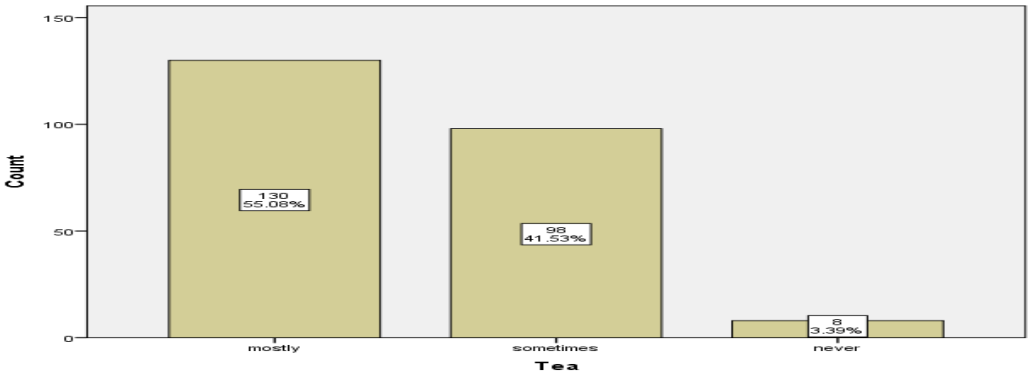
Figure:7 Family history

Study show that only 63(21%) of the study population had family history of anemia.



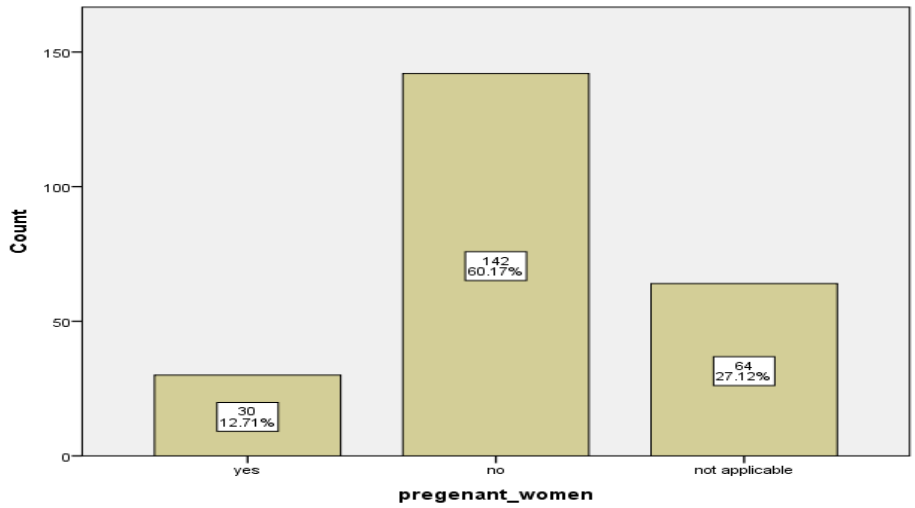
Family history contributes to microcytic hypochromic anemia through genetic factors like beta-thalassemia trait or hereditary sideroblastic anemia. Inherited disorders affect hemoglobin production, leading to anemia. (20). The bar chart shows the distribution of individuals based on consumption of vegetable.80.51% (190 individuals) were found to have no family history,19.49% (46 individuals) were not found to have family history

Figure:8 Tea intake status



Tea's tannins bind to non-heme iron, reducing absorption and potentially exacerbating deficiency. Black tea's effect is more pronounced due to higher tannin content (21). The bar chart shows the distribution of individuals based on tea consumption.55.08% (130 individuals) were consuming tea at regular basis,41.53% (98 individuals) consuming tea rarely or sometimes.

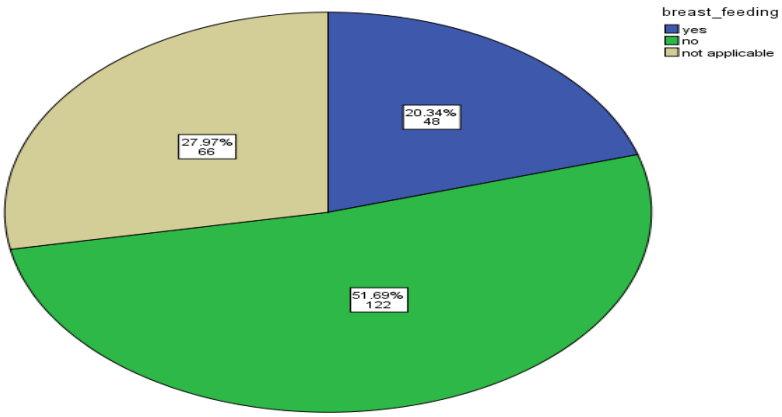
Figure:9 Pregnancy wise distribution.



Pregnancy increases iron demands due to expanded maternal blood volume and fetal growth, potentially leading to iron deficiency. Inadequate iron intake or stores can cause microcytic hypochromic anemia, common in pregnancy(22) The study shows that only 37(12.33%) of M.H.A is noted in pregnant woman The bar chart shows the distribution

of individuals based on pregnancy. (24).60.17% (142 individuals**)** female are not pregnant.12.71% (30 individuals**)** females are pregnant.27.12% (64) are not applicable**.**

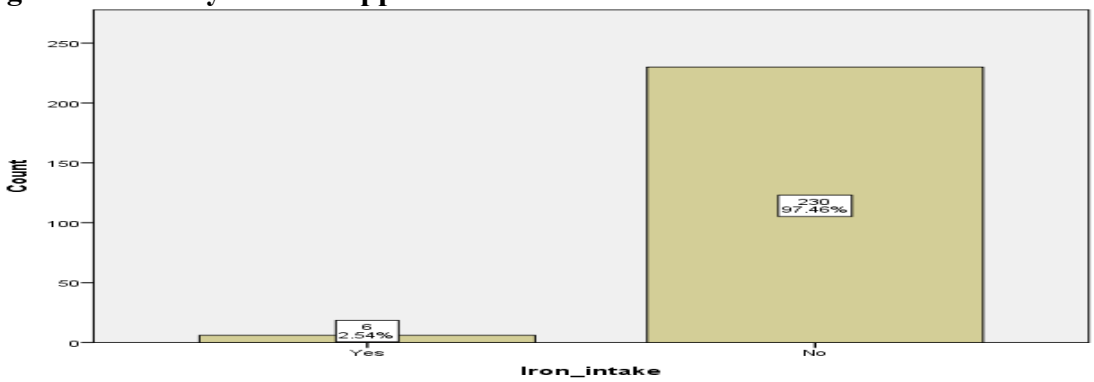
Figure:10 Breast feeding history



Breastfeeding increases iron demands due to maternal iron secretion in breast milk, potentially exacerbating iron deficiency. Poor maternal iron status during lactation can lead to decreased iron stores, contributing to microcytic hypochromic anemia

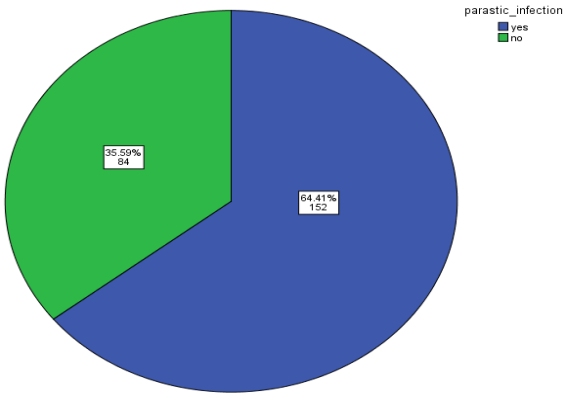
The pie chart shows the distribution of individuals based on breast feeding (23).20.34% (48 individuals) were breast feeding mothers,51.69% (122 individuals**)** were not breast-feeding mothers**.**

Figure:11 History of iron supplement intake



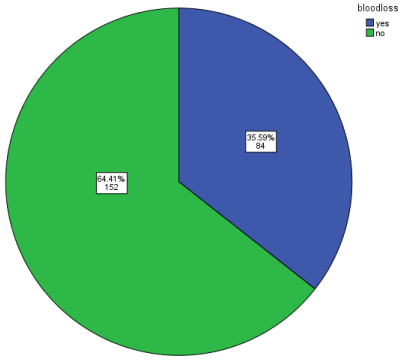
Inadequate dietary iron intake depletes iron stores, impairing hemoglobin production and causing microcytic hypochromic anemia. Increased iron demand during pregnancy or growth spurts can exacerbate deficiency. Poor iron absorption due to conditions like celiac disease also contributes to anemia risk. Iron supplementation and dietary changes can help restore iron stores and treat deficiency. (24). The bar chart illustrates the distribution of iron intake among a surveyed population.97% of individuals reported no iron intake, only 2.54% of individuals reported iron intake

Figure:12 History of parasitic infection



Parasitic infections, like hookworm, whipworm, or schistosomiasis, cause chronic blood loss in the gut or urinary tract. This blood loss leads to iron deficiency, as the parasites consume iron or cause intestinal bleeding. Iron deficiency impairs hemoglobin production, resulting in microcytic hypochromic anemia. Treatment involves antiparasitic medication and iron supplementation to restore iron stores (25). The pie chart shows the distribution of individuals based on the presence of parasitic infection**.**64.41% (152 individuals) were found to have a parasitic infection, 35.59% (84 individuals) were not infected**.**

Figure:13 History of blood loss



Blood loss depletes iron stores, essential for hemoglobin production. Reduced iron impairs hemoglobin synthesis, leading to microcytic hypochromic anemia. Chronic bleeding, like menstrual or gastrointestinal loss, can cause this condition. Iron supplementation and addressing the underlying cause are key treatments. (26) This pie chart shows the distribution of responses related to blood loss The majority of participants, 84 individuals (35.59%)**,** reported as blood loss.152individuals (64.41%) indicated they did not experience blood loss

CONCLUSIONS

Hypochromic cells were the common morphological types of anemia. Factors associated with microcytic hypochromic anemia included unemployment, parasitemia, and the presence of sickle hemoglobin. to age, gender, and mother's level of education, BMI, smoking status, a prevalence of anemia in children admitted at PHQ hospital is high, Microcytic d employment status. Severe anemic patients can receive effective treatment if a diagnosis is made as soon as possible. The diagnostic tests, which include blood smears, reticulocyte counts, and complete blood counts, will be examined first, followed by more focused tests such bone imaging or bone marrow investigations. Anemia is usually a self-limiting condition that can be cured with a few simple steps, such as increasing your intake of fruits, vegetables, and bananas. If the patient's iron level remains low, Blood

transfusions and oral iron supplements are among the treatments used in severe cases to alleviate the symptoms of anemia. With an iron-rich diet, which would include iron-fortified cereals and other foods, they might be addressed with oral iron supplements. There are several ways to increase human iron intake, but the most effective way to prevent iron deficiency anemia is by food fortification and iron-rich dietary variety.

REFERENCES

1Eliwa, N. A. M., Salama, M. A. S., ElDomiaty, B. A. F., Abo Elwafa, R. A. H., & El Chazli, Y. F. (2025). Clinical and laboratory characteristics of refractory microcytic hypochromic anemia pediatric patients. *Alexandria***.** *Journal of Medicine*, *61*(1), 44–49. https://doi.org/10.1080/20905068.2024.2424709

2.Muhammad Faisal, Sajid Mustafa, Muhammad Yasin, and Jovaria Saeed. 2023. "Frequency of Iron Deficiency in Children with Hypochromia and Microcytosis on Blood Smears." Pakistan Postgraduate Medical Journal 34(03):162–65.

Rao, H. R. Sohan, and SadiaMari. 2024. "Diagnostic Utility of Reticulocyte Hemoglobin Equivalent Parameter in the Evaluation of Microcytic Hypochromic Anemia - Our Experience from Northeast India." Annals of African Medicine 23(2):222–28. doi:10.4103/aam.aam_8_23.

Kharche, K., & Bhake, A. (2023). Hemoglobin Variants in Patients With Microcytic Hypochromic Anemia: A Review of Indian Studies. *Cureus*, *15*(4).

Lv, J., Li, J., Ren, X., Huang, Q., & Deng, S. (2025). Machine Learning for Discriminating Microcytic Hypochromic Anemia Based on Erythrocyte Parameters. *International Journal of Laboratory Hematology*.

Kumi, R. O., Ayitey, E., Ntim, R. O. A., Agbenyegah, S. A., Kumi, A., Oti, B., & Kporha, I. (2026). Epidemiology and Risk Stratification of Microcytic Hypochromic Anemia in Pregnancy: A Cross-sectional Study in Takoradi, Ghana. *International Blood Research & Reviews*, *17*(1), 1-8.

Hussain, R., Karim, A., & Shah, Z. (2022). Socio-cultural barriers to healthcare access in northern Pakistan: A qualitative exploration. *Frontiers in Public Health, 10*, 925134. https://doi.org/10.3389/fpubh.2022.925134World Medical Association. (2023).

World Medical Association. (2023). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA, 330*(9), 879–886. https://doi.org/10.1001/jama.2023.12678

11.Yasir, M., Shah, S., & Jadoon, M. (2022). Determinants of kidney function decline among Pakistani adults: A hospital-based analysis using SPSS. *Cureus, 14*(8), e28492. https://doi.org/10.7759/cureus.28492

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide.* SAGE Publications

Ritchie, J., Lewis, J., McNaughton Nicholls, C., & Ormston, R. (2022). *Qualitative research*

14 Harrison, T. R., & Kasper, D. L. (2018). Harrison's principles of internal medicine (20th ed.). McGraw-Hill Education.

15 Pasricha, S. R., & Dhalaria, P. (2020). Iron deficiency anaemia: A public health problem of global proportions. Journal of Hematology & Oncology, 13(1), 1-13. doi: 10.1186/s13045-020-00972-1

Rehman, A., Khan, Y., Khan, S., Ahmad, R., Ullah, M., Ahmad, F., Khan, I. U., Ullah, K., & Ullah, W. (2024).

Hess, S. Y., Owais, A., Jefferds, M. E. D., Young, M. F., Cahill, A., & Rogers, L. M. (2023). 7.Accelerating action to reduce anemia:

Gupta, R., & Sinha, A. (2022). Iron deficiency anemia: A prevalent cause of microcytic hypochromic anemia. Journal of Family Medicine and Primary Care, 11(9), 5145-5151. doi: 10.4103/jfmpc.jfmpc_123_22

Kumar, A., & Sharma, S. (2022). Microcytic hypochromic anemia: Etiological spectrum in Indian population. Journal of Laboratory Physicians, 14(2), 153-158. doi: 10.1055/s-0041-1740551

Cao, A., & Galanello, R. (2023). Beta-Thalassemia. Genetics in Medicine, 25(3), 100-108. doi: 10.1038/s41436-022-01279-1 [1]

21 - Kolarš, B., Mijatović Jovin, V., Živanović, N., Minaković, I., Gvozdenović, N., Dickov Kokeza, I., & Lesjak, M. (2025). Iron Deficiency and Iron Deficiency Anemia: A Comprehensive Overview of Established and Emerging Concepts. Pharmaceuticals, 18(8), 1104. https://doi.org/10.3390/ph18081104

22- Microcytic Hypochromic Anemia - StatPearls - NCBI Bookshelf - NIH (2026). Discusses evaluation and management of microcytic hypochromic anemia.

Sultan, S., & Bibi, S. (2022). Iron deficiency anemia in lactating women: A major public health issue. Journal of Family Medicine and Primary Care, 11(9), 5152-5157. doi: 10.4103/jfmpc.jfmpc_124_22

24 Ankur, K., Sandhya, G., Nidhi, S., & Kumar, S. P. (2022). Pattern analysis of the hemoglobin variants in western India by HPLC: Strategies and practical implication for pursuing rare hemoglobins. Asian Hematology Research Journal, 11, 12-20.25.

Nerune, D., et al. (2024). Optimizing the Diagnosis of Microcytic Hypochromic Anemia: A Comparative Evaluation of Erythrocyte and Reticulocyte Parameters. Cureus, 16(9), e69244. doi: 10.7759/cureus.69244 {{IE_0}}[1]{{/IE_0}}

Tabassum, S., Khakwani, M., Fayyaz, A., & Taj, N. (2022). Role of Mentzer index for differentiating iron deficiency anemia and beta thalassemia trait in pregnant women. Pakistan Journal of Medical Sciences, 38(4), 878-882. doi: 10.12669/pjms.38.4.

Bakry, S., & Elhefny, M. 29.(2022). The prevalence and risk factors of microcytic hypochromic anaemia among students in the Kingdom of Saudi Arabia. A mini-review study: The prevalence and risk factors of anaemia. *Saudi Medical Horizons Journal*, *2*(2), 62-69

28.Baker, M., Johnson, L., & Green, T. (2022). Lifestyle determinants of chronic kidney disease: A population-based study. *BMC Public Health, 22*(1), 1341. https://doi.org/10.1186/s12889-022-1341