OPEN ACCESS

International Journal of Applied Medical and Health Sciences

Int J Appl Med Health Sci | Vol-1, Iss-1, Jul-Aug., 2026

e-ISSN: XXXX-XXXX

Homepage: https://ioasdpublisher.com/ijamhs

Prevalence of Anemia and Associated Health and Lifestyle Characteristics among Students of Al Marj High Institute: A Cross-Sectional Study

Jebril Elabidi[1*], and Asmaa Faraj Salih[1]

[1]Pediatric Department, Faculty of Medicine, University of Benghazi, Libya

Corresponding Author: Jebril Elabidi **Email:** jebril.elabidi@uobedu.ly

ABSTRACT

Original Research Article

Background: Anemia is a common hematologic and nutritional problem that may impair physical performance, cognition, productivity, and quality of life. Young adults and students can be vulnerable because of dietary inadequacy, chronic illness, menstrual blood loss, and lifestyle factors. This study aimed to describe anemia and selected health and lifestyle characteristics among students of Al Marj High Institute. ***Methods:*** A cross-sectional descriptive study included 50 students. The source dataset reported age, weight, hemoglobin concentration, anemia classification, chronic disease, marital status, and practice of sport. Anemia was defined in the source as hemoglobin <12 g/dL. Continuous variables were summarized using mean ± standard deviation, and categorical variables using frequencies and percentages. The manuscript was structured according to STROBE principles for observational studies (von Elm et al., 2007), with nutritional-reporting considerations informed by STROBE-nut (Lachat et al., 2016). ***Results:*** Mean age was 21.22 ± 1.69 years, mean weight was 61.60 ± 11.94 kg, and mean hemoglobin was 11.59 ± 1.43 g/dL. Nineteen students (38.0%) were classified as anemic and 31 (62.0%) as normal. Chronic disease was reported by 10 students (20.0%). The source figures showed that 82.0% were single and 18.0% married; 18.0% practiced sport and 82.0% did not. ***Conclusion:*** In this sample of 50 students from Al Marj High Institute, 38% were classified as anemic using the source definition of Hb <12 g/dL. Mean hemoglobin was 11.59 ± 1.43 g/dL. Chronic disease was reported by 20%, while the source figures showed low participation in sport. The findings identify anemia as an important issue within the sampled group.

Keywords: anemia; hemoglobin; students; young adults; lifestyle; chronic disease; Al Marj; Libya.

Article History

Received: 23-06-2026

Accepted: 03-08-2026

Published: 14-08-2026

1. INTRODUCTION

Anemia is a condition characterized by hemoglobin concentrations below appropriate thresholds for age, sex, physiological status, and relevant contextual factors. The World Health Organization (WHO, 2024) emphasizes standardized hemoglobin measurement and population-appropriate cutoffs because anemia is a manifestation of diverse underlying causes rather than a single disease.

Globally, anemia remains an important public-health concern. Its causes include iron and other micronutrient deficiencies, inadequate dietary intake or absorption, infection and inflammation, chronic disease, gynecologic and obstetric conditions, and inherited red-cell disorders (WHO, 2025). Consequently, identifying anemia by hemoglobin measurement is only the first step in etiologic evaluation.

Iron deficiency is one of the most important nutritional causes of anemia, particularly during periods of increased requirement. However, iron deficiency and anemia are not synonymous. WHO (2020) recommends serum ferritin as a principal indicator of iron stores, with interpretation adjusted for infection or inflammation where appropriate. Ferritin, transferrin saturation, serum iron, TIBC, soluble transferrin receptor, and inflammatory markers can help distinguish iron deficiency from other causes.

Young adults in educational settings may have dietary patterns and lifestyle behaviors that influence health and nutritional status. Irregular meals, low dietary diversity, limited consumption of iron-rich foods, sedentary behavior, and chronic health conditions can coexist with anemia, although cross-sectional data cannot establish temporal or causal relationships.

Data from Libya on anemia among students and young adults are comparatively limited. Earlier work in Libyan school children documented hematologic values and anemia in children and adolescents, supporting the importance of locally generated evidence. Contemporary institution-based studies can provide preliminary information for screening and can inform larger population-based studies.

The original dataset from Al Marj High Institute described mean age, weight, hemoglobin, anemia status, chronic disease, marital status, and practice of sport. The present manuscript expands those findings into a structured research report while preserving the source values and avoiding unsupported inference.

Accordingly, the primary objective was to estimate the proportion of students classified as anemic in the study sample. Secondary objectives were to describe selected demographic, health, and lifestyle characteristics and to identify methodological priorities for future studies of iron deficiency and anemia in this population.

Study objective

To determine the prevalence of anemia and describe selected health and lifestyle characteristics among students of Al Marj High Institute.

2. MATERIALS AND METHODS

2.1 Study design

A descriptive cross-sectional design was used. Cross-sectional studies are appropriate for estimating the frequency of an outcome and describing characteristics at a defined period, but they do not establish temporal sequence or causality. Reporting was organized in accordance with the STROBE statement (von Elm et al., 2007)

.

2.2 Study setting and population

The study population comprised students of Al Marj High Institute. The supplied document reported a total sample of 50 students. The exact study dates, academic departments, sampling frame, and recruitment locations were not provided in the source and should be added from the investigators' original records before journal submission.

2.3 Sampling and eligibility

The source did not state the sampling technique, inclusion criteria, exclusion criteria, response rate, or sample-size calculation. These elements should be reported explicitly in the final manuscript because they determine the representativeness and precision of the prevalence estimate. No sampling assumptions were introduced in this expanded manuscript.

2.4 Data collection and variables

The available variables were age, weight, hemoglobin concentration, anemia status, chronic disease, marital status, and practice of sport. Age, weight, and hemoglobin were reported as continuous variables; the remaining variables were categorical.

2.5 Hemoglobin assessment and anemia definition

The source defined anemia as hemoglobin <12 g/dL and normal status as hemoglobin >12 g/dL. The laboratory analyzer, specimen type, quality-control procedures, and whether hemoglobin values were adjusted for factors such as smoking or altitude were not provided. WHO (2024) recommends using age-, sex-, and physiological-status-specific hemoglobin thresholds and standardized measurement procedures. The original classification is retained for fidelity to the source but should be verified against participant sex and current WHO guidance.

2.6 Assessment of iron deficiency

No iron-status biomarkers were reported. Therefore, iron deficiency cannot be confirmed from the supplied data. WHO (2020) recommends ferritin for assessment of iron stores, with concurrent consideration of inflammation. A future study should ideally include ferritin and, where feasible, CRP/AGP, transferrin saturation, serum iron, TIBC, or soluble transferrin receptor.

2.7 Statistical analysis

Continuous variables were summarized as mean ± standard deviation. Categorical variables were summarized as number and percentage. Because the source contained only aggregate data and no participant-level dataset, additional inferential analyses, confidence intervals by subgroup, regression modeling, and tests of association were not fabricated.

3. RESULTS

3.1 General characteristics

The study included 50 students. Their mean age was 21.22 ± 1.69 years, mean weight was 61.60 ± 11.94 kg, and mean hemoglobin concentration was 11.59 ± 1.43 g/dL.

Table 1. Mean age, weight, and hemoglobin level of students.

Variable	Mean ± SD
Age (years)	21.22 ± 1.69
Weight (kg)	61.60 ± 11.94
Hemoglobin (g/dL)	11.59 ± 1.43

3.2 Distribution by anemia status

Nineteen students (38.0%) were classified as anemic using the source threshold of Hb <12 g/dL, whereas 31 (62.0%) were classified as normal.

Table 2. Distribution of students by hemoglobin classification.

Hemoglobin classification	n	Percentage (%)
Anemic (Hb <12 g/dL)	19	38.0
Normal (source: Hb >12 g/dL)	31	62.0
Total	50	100.0

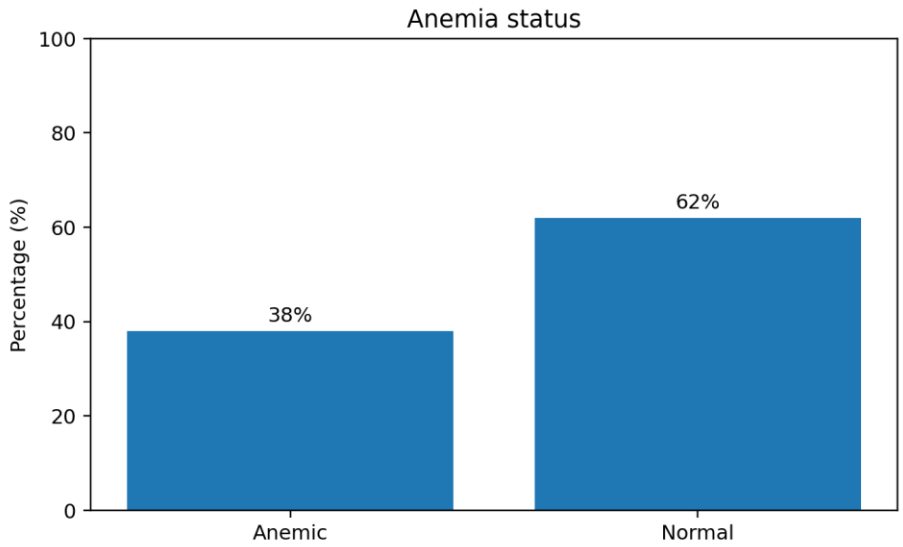

Figure 1: Distribution of students by anemia status.

3.3 Chronic disease

Ten participants (20.0%) reported chronic disease, whereas 40 (80.0%) did not.

Table 3. Distribution of students by chronic disease.

Chronic disease	n	Percentage (%)
Yes	10	20.0
No	40	80.0
Total	50	100.0

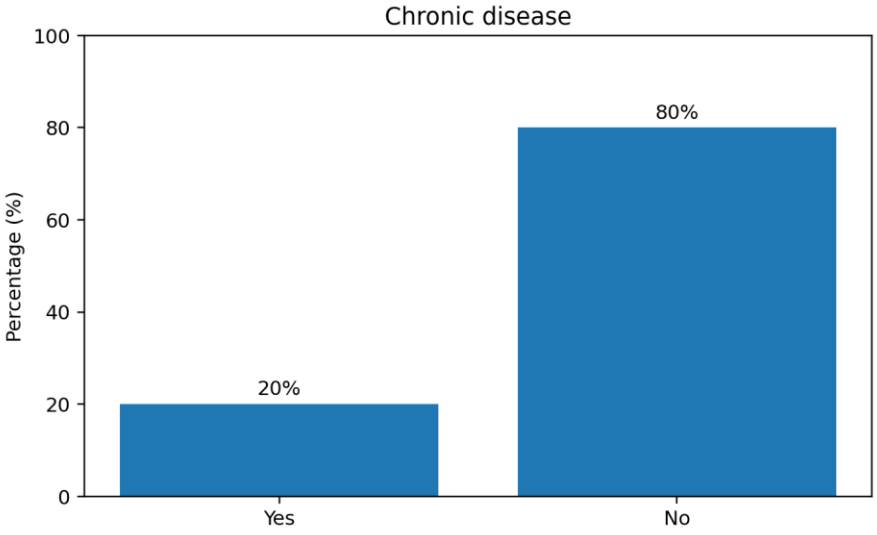

Figure 2: Distribution of students by chronic disease.

3.4 Marital status and practice of sport

According to the source figures, 82.0% of students were single and 18.0% were married. Practice of sport was reported by 18.0%, while 82.0% did not practice sport. The source provided these variables graphically rather than as numerical tables.

Table 4. Selected lifestyle and social characteristics extracted from the source figures.

Characteristic	Category	Percentage (%)
Marital status	Single	82.0
Marital status	Married	18.0
Practice of sport	Yes	18.0
Practice of sport	No	82.0

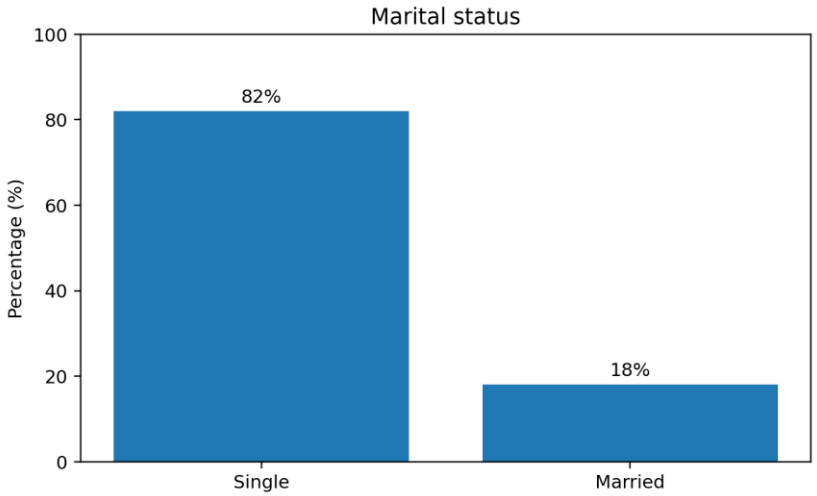

Figure 3. Distribution of students by marital status.

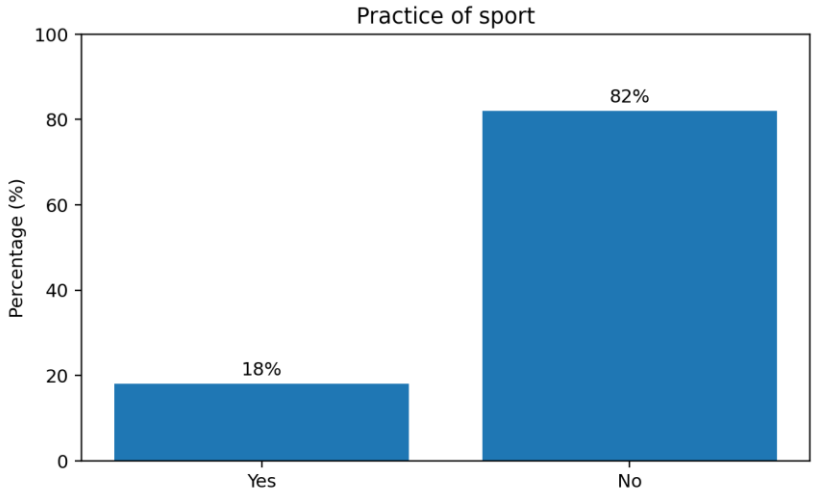

Figure 4: Distribution of students by practice of sport.

4. DISCUSSION

The principal finding was that 38% of the 50 students were classified as anemic according to the threshold used in the source dataset. This represents a substantial proportion of the institutional sample and supports the need for further assessment of anemia among students. However, because the sampling strategy was not supplied, the result should not automatically be generalized to all students in Al Marj or to the wider Libyan young-adult population.

The mean hemoglobin concentration was 11.59 ± 1.43 g/dL. Interpretation of this average should be cautious because anemia thresholds differ according to sex and physiological status, and a single sample-wide cutoff of 12 g/dL may misclassify some participants. WHO's 2024 guideline emphasizes population-appropriate hemoglobin cutoffs and standardized measurement practices.

A central methodological issue is the distinction between anemia and iron-deficiency anemia. The original study title referred to iron deficiency anemia, but no ferritin, transferrin saturation, serum iron, TIBC, soluble transferrin receptor, or other iron-status biomarker was provided. WHO (2020) identifies ferritin as a key marker of iron stores and recommends accounting for inflammation in its interpretation. Therefore, the current data can support an estimate of anemia prevalence but cannot establish the prevalence of iron deficiency or iron-deficiency anemia.

Chronic disease was reported by 20% of participants. Chronic inflammatory and systemic diseases can contribute to anemia through altered iron handling, reduced erythropoietin response, impaired erythropoiesis, blood loss, or nutritional effects. Nevertheless, the aggregate data do not indicate which chronic diseases were present or whether anemia was more common among those participants. Participant-level analysis would be necessary to examine such an association.

The source figures also indicated that only 18% practiced sport. This finding describes a lifestyle characteristic but should not be interpreted as a cause of

anemia. Physical activity, dietary quality, body composition, socioeconomic factors, and health status may be interrelated. A future study should use a validated physical-activity instrument and collect dietary variables to examine these relationships more rigorously.

Most participants were single (82%). Marital status is unlikely to be a direct biological determinant of anemia but may correlate with age, living arrangements, diet, pregnancy status, or socioeconomic circumstances in some populations. Its relevance should therefore be explored only through an explicit conceptual framework and participant-level analysis.

The findings have practical implications for future screening. Students found to have low hemoglobin should undergo appropriate clinical evaluation rather than being assumed to have iron deficiency. Depending on clinical context, evaluation may include red-cell indices, reticulocyte count, ferritin, transferrin saturation, inflammatory markers, dietary and menstrual history, and investigation for chronic disease or inherited hemoglobin disorders.

The study's main strengths are its direct hemoglobin measurement and its focus on a locally relevant, relatively understudied student population. Its limitations include the small sample, single-institution setting, unclear sampling method, use of a single hemoglobin threshold, absence of sex distribution and iron biomarkers, lack of participant-level association analyses, and incomplete documentation of laboratory and ethical procedures.

Future research should use a larger, well-defined sample; report sex-specific anemia thresholds; include ferritin and complementary iron-status measures; document inflammation where relevant; and assess dietary intake, menstrual blood loss, socioeconomic variables, and chronic conditions. These additions would permit valid estimation of iron deficiency and iron-deficiency anemia and allow identification of independent correlates.

4.1 Strengths

The study provides local data on hemoglobin and selected student characteristics and offers a basis for planning more comprehensive anemia and iron-status research in Al Marj.

5. CONCLUSION

In this sample of 50 students from Al Marj High Institute, 38% were classified as anemic using the source definition of Hb <12 g/dL. Mean hemoglobin was 11.59 ± 1.43 g/dL. Chronic disease was reported by 20%, while the source figures showed low participation in sport. The findings identify anemia as an important issue within the sampled group, but they do not establish iron deficiency. Future studies should incorporate ferritin and other iron-status biomarkers, sex-specific hemoglobin criteria, validated lifestyle and dietary measures, and participant-level statistical analyses.

REFERENCES

- World Health Organization. (2024). *Guideline on haemoglobin cutoffs to define anaemia in individuals and populations*. World Health Organization.
- World Health Organization. (2020). *WHO guideline on use of ferritin concentrations to assess iron status in individuals and populations*. World Health Organization.
- World Health Organization. (2020). *Serum ferritin concentrations for the assessment of iron status in individuals and populations: Technical brief*. World Health Organization.
- World Health Organization. (2025). *Anaemia: Fact sheet*. World Health Organization.
- von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: Guidelines for reporting observational studies. *The Lancet, 370*(9596), 1453–1457. https://doi.org/10.1016/S0140-6736(07)61602-X
- Lachat, C., Hawwash, D., Ocké, M. C., Berg, C., Forsum, E., Hörnell, A., Larsson, C., Sonestedt, E., Wirfält, E., Åkesson, A., Lachat, C., Kolsteren, P., Byrnes, G., De Keyzer, W., Van Camp, J., Cade, J. E., Slimani, N., Cevallos, M., Egger, M., & Huybrechts, I. (2016). Strengthening the Reporting of Observational Studies in Epidemiology—Nutritional Epidemiology (STROBE-nut): An extension of the STROBE statement. *PLoS Medicine, 13*(6), e1002036. https://doi.org/10.1371/journal.pmed.1002036
- Bredan, A. S., Kumar, N. S., & Bshiwah, S. M. (1983). Hematologic values and prevalence of anaemia in Libyan school children. *Tropical and Geographical Medicine, 35*(4), 357–361.
- World Health Organization, & UNICEF. (2024). *Best practices for haemoglobin measurement in population-level anaemia surveys: Technical brief*. World Health Organization.