

Evaluation of Knowledge-Management Practices and Their Impact on Health-Related Quality of Life in Female Anemic Patients: A Cross-Sectional Study

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Abstract

Background: Anemia, characterized by reduced hemoglobin levels, impairs the body's capacity for efficient oxygen transport to tissues. As a chronic condition, its persistence is exacerbated by limited patient knowledge and suboptimal self-management, ultimately compromising Health-Related Quality of Life (HRQoL). This study aimed to assess anemia-related knowledge, management practices, and their impact on HRQoL among female anemic patients to inform strategies for improved clinical outcomes.

Methodology: A cross-sectional study was conducted at Niazi Medical Complex, Sargodha, utilizing a pre-validated questionnaire alongside the 20-item Short Form Survey (SF-20). Sample size was determined using the Cochran formula, assuming a 31% prevalence and a 95% confidence interval. Data were analyzed using descriptive statistics, Pearson correlation, and Mann-Whitney U and Kruskal-Wallis tests to explore relationships and differences among variables, with statistical significance set at $p < 0.05$, using SPSS version 26.

Results: The majority of participants (59.1%) were aged 16–25 years. Overall, 61.3% ($n=223$) demonstrated poor knowledge, and 87.9% ($n=320$) exhibited inadequate management practices. Higher education was significantly associated with better knowledge and practices ($p=0.001$), while urban residency correlated positively with both ($p<0.05$). Pearson analysis revealed a significant positive correlation between knowledge and practice scores ($r=0.437$, $p=0.001$), suggesting that enhanced knowledge facilitates adoption of better disease management. Furthermore, practice scores were strongly associated with HRQoL outcomes ($p<0.05$), indicating that appropriate practices improve quality of life. Conversely, knowledge showed no direct significant association with HRQoL.

Conclusion: These findings underscore the critical role of education in shaping awareness and health behaviors. Strengthening targeted health education interventions is imperative to improve anemia management and enhance the overall well-being of females in Pakistan.

Keywords: Anemia; knowledge; management practices; Health-Related Quality of Life; HRQoL; female

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Introduction

Anemia is defined as a condition that occurs as a result of low hemoglobin content in red blood cells (RBCs). Hemoglobin (Hb), a transport protein that contains iron, is responsible for carrying oxygen from our lungs to the whole body. The World Health Organization (WHO) defines anemia as Hb levels that are less than 12.0 g/dL in women and less than 13.0 g/dL in males. However, the typical distribution of Hb varies with ethnicity, physiological state, and gender (1). Nutritional deficiency is a key factor in anemia. Nutrition such as iron, folic acid, and different vitamins, i.e., A, B9, B12 plays a pivotal role in managing the anemic situation (2). Parasitic infections, inflammatory and congenital conditions etc. are the other causes of anemia (3, 4). Signs and symptoms of anemia may vary from person to person, but the most common symptoms are listed as lethargy, dizziness, weakness, fatigue, cold skin, palpitation, etc stage. Anemia can be a deadly disease when it gets complicated and ignored; thus, it should be prevented at the earliest stage (2, 5).

According to the research conducted in 2016, approximately 1.6 billion people globally, which equals 24.8 % of the world population, are anemic. (6). According to the study in 2020, the



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overall anemia prevalence ranges from about 22% in Timor-Leste to 63% in the Maldives (7). Females are the most targeted population for anemia amongst all geographical areas and in all age groups. The risk of anemia is much greater in females as compared to males (8). In comparison with geographical areas, Southeast Asia is considered to have the highest rate of prevalence among all groups of women, either pregnant or non-pregnant. On the other side, this rate is lowest in the case of America (9). In Pakistan, the prevalence of mild, moderate, and severe anemia was found to be 28%, 24%, and 43% respectively, among young females (10).

The “knowledge” factor is important for disease management because it provides a base for good practices. If the study participants have insufficient knowledge about anemia, then it will eventually have some impact on their Health-Related Quality of Life (HRQoL). For disease management, not only medical treatment but also patient participation is required. Self-management of the disease is considered to be one of the effective methods for disease management. This involves proper diagnosis of the condition, (11), adherence to the treatment plan, and adopting better and healthier lifestyles (12).

However, the relationship between a patient’s knowledge, management practices, and their overall quality of life is underexplored, especially in the local community. No effective study has been conducted to assess knowledge and management practices among female anemic patients. Moreover, a gap exists in the literature regarding the relationship between these variables. Understanding the link between these variables is essential in designing targeted educational and interventional programs. Therefore, this study aims to assess the level of knowledge and management practices and to evaluate their impact on a patient’s quality of life. The hypothesis for the study includes 1) To demonstrate the relationship between knowledge, management practices, and HRQoL, 2) To find out the relationship of these variables with the subject’s demographics.

Methodology

This cross-sectional study was conducted in Niazi Medical Complex, Sargodha, in the year 2025. This study includes 1) female patients diagnosed with anemia, 2) aged 16 or above, 3) who are willing to participate in the study, and 4) Individuals exhibiting the ability to comprehend the language spoken at a local or national level. Eligible participants were identified through medical records and outpatient visits. After receiving detailed information about the study, informed consent was obtained from all participants. Exclusion criteria include males, children, any female below the age of 16, or any participant with cognitive impairment. The sample size was calculated using the Cochran formula with a prevalence of approximately 31% and a confidence interval of 95 % (13). The total sample size was 364, by adding a 13% drop-off ratio. Consecutive sampling technique is used for this study.

A self-designed questionnaire based on KAP assessment was developed in accordance with the literature review and expert advice by the editors and authors of the article published in *Frontiers* under the title “Knowledge, attitudes, and

practices among patients with anemia towards disease management,” in the year 2024 (14). This questionnaire consists of 14 knowledge-based questions (about causes, symptoms, treatment options, etc.), each with 1 point for a correct response and 0 points for an incorrect response. This scoring will establish a possible range of 0-14. In this questionnaire, the number of practice questions is 10, which are scored on a five-point Likert scale, making a possible range of practice scores from 10 to 50. The binary outcomes of good and adequate knowledge (≥ 11.2 points) and proactive practice (≥ 40) were used (14, 15).

A health survey questionnaire called the Short Form 20 (SF-20) (16, 17) was used to assess health-related quality of life (HRQoL) in six important domains: pain, mental health, role functioning, social functioning, physical functioning, and health perceptions (18). A compressed version of the extensive SF-36 is the SF-20. Each of these domains’ scores is shown on a scale from 0% to 100%, where 0% is the lowest possible score and 100% the highest score, showing the best quality of life in the respective domain (19). One of the studies demonstrated that participants with a total transformed score less than 25 % indicated abnormal or poor quality of life in that domain (20). For analyzing the quality of life in various domains, we characterized the score into three categories: poor (0-33), moderate (34 -66), and good (67-100)(21).

The questionnaires’ scores were calculated using a Microsoft Excel spreadsheet and subsequently imported into SPSS version 26 for further analysis. Descriptive statistics were employed to calculate the means, standard deviation, frequencies, and percentages for the demographics and study variables. The association between variables was assessed using the chi-square test and Phi Cramer’s V test. Spearman’s Rank correlation and Pearson correlation were employed to ascertain the magnitude and direction of the link. The Kruskal-Wallis H and Mann-Whitney U test were used to determine the statistical disparities between various groups of an independent variable, taking into account their average ranks. The study was conducted in compliance with the protocols established by Bioethics Committee with reference number SU/ORIC/898. Before collecting data, all study participants were provided with information regarding the purpose and objectives of the study. Data was gathered after the participants’ provision of consent

Results

The total number of participants involved in this study was 364. Out of 364 participants, 59.1 % belonged to the age group of 16-25. Concerning educational level, the percentage of uneducated, primary, undergraduate, and graduate or above was 7.4 %, 13.5 %, 36.8 % and 42.3% respectively. On the other hand, 60.7 % of patients were single or unmarried, while 36.8 % were married. In the study population, the percentage of pregnant women was 19.2 % while that of non-pregnant women was 80.8 %. Most of the study population belonged to urban areas, with a percentage of 61.5.

The mean knowledge and management practices scores was 10.07 ± 3.22 (possible range: 0–14) and 29.34 ± 8.55 (possible range: 10–50), respectively. The variable of the SF-20 questionnaire was divided into six different domains. The variable of the SF-20 questionnaire was divided into six different

domains. The mean scores of physical functioning (14.52 ± 3.00), pain perception (3.57 ± 1.29), role functioning (4.56 ± 1.39), social functioning (3.75 ± 1.34), mental health (18.34 ± 3.62), and health perception (15.02 ± 3.09)

According to the results, 38.7 % exhibit good knowledge regarding causes of anemia, its symptoms, triggers, prevention, and treatment, while the remaining 61.3 % have poor knowledge about anemia. Moreover, for practice variables, 87.9 % of the total study population had bad practices for disease management, and only 12.1 % of them exhibited good management practices such as compliance with doctors' advice regarding physical and mental health, medication, and treatment plan.

The findings reveal that 62.9 % of the study participants enjoy good QoL in the context of Physical Functioning. 204 out of 364 (56 %) of the respondents have moderate QoL while taking into account the pain perception. Half of the females (52.7%) exhibit good QoL in the context of Role Functioning. Most of the study participants have a moderate quality of life, with 56%, 75%, and 72% for Social Functioning, Mental Health, and Health Perception, respectively.

Table 1 highlights the results of cross-tabulation with demographics by Chi-Square and Pi Cramer, demonstrating the association of different variables with demographics. The knowledge of the participant had a significant association with the education of the females ($p=0.001$), while age had a significant association with HRQoL domains. The table also shows that the educational level of female anemic patients had no significant association with some HRQoL domains such as physical functioning, social functioning, and mental health. But the other domains, such as role functioning ($p=0.03$), and pain perception ($p=0.04$) had a significant association with that of educational level. The marital status of study participants had a significant association with most of the HRQoL domains ($p < 0.05$).

Table 1: Cross-tabulation of variables score with Demographics by Chi-square and Pi Cramer

Variables	Age	Educational level	Marital Status	Pregnancy	Residence
	p-value				
Knowledge Score	0.001	0.001	0.001	0.027	0.121
Practice Score	0.197	0.004	0.361	0.430	0.071
Physical Functioning	0.001	0.360	0.002	0.305	0.468
Pain Perception	0.002	0.040	0.001	0.001	0.039
Role Functioning	0.021	0.034	0.001	0.014	0.507
Social Functioning	0.254	0.117	0.003	0.004	0.859
Mental health	0.476	0.897	0.666	0.563	0.409
Health Perception	0.071	0.084	0.001	0.031	0.244

Table 2 shows Spearman's rank correlation between knowledge, practices, and quality of life domains with demographics. The age of female anemic patients has a negative correlation with physical functioning ($p = 0.003$, $\rho = -0.156$), indicating that physical activities are limited with advancing age. It is also negatively related to patients' perceptions of their health ($p = 0.001$, $\rho = -0.278$). The educational status of patients has a positive moderate association with knowledge ($p = 0.001$, $\rho = 0.415$), and a weak positive correlation with practice ($p = 0.001$, $\rho = 0.303$). The knowledge level of female anemic patients has a negative correlation with marital status ($p = 0.001$, $\rho = -0.250$). On the other hand, the pregnancy status of female has a weak negative correlation with the perception about their health ($p = 0.014$, $\rho = -0.308$). The marital status of the study participants had no relation with that of practice score ($p = 0.193$).

Table 2: Spearman Rank Correlation between variables score and demographics

Variables	Age		Educational Status		Marital Status		Pregnancy		Residence	
	Rho	p-value	Rho	p-value	Rho	p-value	Rho	p-value	Rho	p-value
Knowledge Score	-0.232	0.001	0.415	0.001	-0.250	0.001	0.056	0.283	-0.158	0.002
Practice Score	-0.058	0.268	0.303	0.001	-0.068	0.193	0.025	0.632	-0.179	0.001
Physical Functioning	-0.156	0.003	0.103	0.049	-0.085	0.106	-0.094	0.075	-0.065	0.218
Pain Perception	0.173	0.001	-0.132	0.012	0.065	0.213	0.164	0.002	0.162	0.002
Role Functioning	0.039	0.458	0.046	0.384	0.084	0.109	-0.163	0.002	-0.046	0.381
Social Functioning	-0.113	0.032	0.015	0.768	-0.103	0.049	0.035	0.508	0.015	0.779
Mental health	0.056	0.290	0.105	0.046	0.022	0.670	-0.001	0.987	-0.049	0.353
Health Perception	-0.278	0.001	0.261	0.001	-0.308	0.001	0.129	0.014	-0.098	0.063

Table 3 shows that Pearson correlation analysis shows that there exists a moderate positive correlation between knowledge and practices ($r = 0.437$, $p = 0.001$). The knowledge level of patients also has a significant association with different domains of SF-20. Knowledge and Physical Functioning have a weak positive correlation ($r = 0.138$, $p = 0.001$). Higher knowledge is slightly associated with better physical functioning. The knowledge score of participants is found to have a weak positive correlation with health perception ($r = 0.153$, $p = 0.003$). People who know more about anemia tend to perceive their health more positively.

The weak negative correlation ($r = -0.198$, $p = 0.001$) is present between practice score and pain perception. Those who report more pain tend to have poorer anemia-related practices. This could indicate that higher pain may interfere with the ability or motivation to engage in healthy behaviors. There exists a very weak but significant positive correlation ($r = 0.116$, $p = 0.026$) between mental health and management practices related to anemia. Better mental health is slightly associated with better practice, but the effect is very small.

Table 3: Pearson correlation analysis between test variables

Variable	Practice Score		Knowledge Score	
	r	p-value	r	p-value
Knowledge Score	0.437	0.001	–	–
Physical Functioning	-0.045	0.395	0.138	0.001
Pain perception	-0.198	0.001	-0.249	0.001
Role Functioning	-0.206	0.001	0.082	0.120
Social Functioning	-0.175	0.001	0.058	0.266
Mental Health	0.116	0.026	0.035	0.501
Health Perception	0.134	0.011	0.153	0.003

The Mann-Whitney U test for residence highlights that there is a statistically significant difference in anemia-related knowledge and management practice scores between urban and rural residents ($p = 0.003, 0.001$), while the health domains have no concern with residence status as discussed in Table 4.

Table 4: Mann-Whitney U test for test variables and demographics

	Residence	Rank	p-value
Knowledge Score	Urban	195.58	0.003
	Rural	161.56	
Practice Score	Urban	197.38	0.001
	Rural	158.69	
Physical Functioning	Urban	187.82	0.217
	Rural	173.98	

Table 5: Kruskal-Wallis H test for test variables and demographics

	Grouping variable (Age)	Rank	p-value	Education	Rank	p-value	Marital status	Rank	p-value
Knowledge Score	16-25	199.72	0.001	Uneducated	76.15	0.001	Single	203.02	0.001
	26-35	183.20		Primary	101.72		Married	153.32	
	36-45	121.86		Undergraduate	191.34		Divorced	174.13	
	Above 45	135.14		Graduate & above	219.16		Widow	64.30	
Practice Score	16-25	185.97	0.255	Uneducated	113.11	0.001	Single	188.02	0.589
	26-35	191.23		Primary	136.93		Married	175.21	
	36-45	152.93		Undergraduate	177.40		Divorced	166.38	
	Above 45	171.56		Graduate & above	213.60		Widow	146.80	
Physical Functioning	16-25	188.55	0.001	Uneducated	162.04	0.268	Single	188.36	0.052
	26-35	219.79		Primary	171.35		Married	178.91	
	36-45	149.28		Undergraduate	177.15		Divorced	81.63	
	Above 45	87.05		Graduate & above	194.29		Widow	100.60	
Pain Perception	16-25	171.00	0.001	Uneducated	242.52	0.001	Single	178.62	0.027
	26-35	179.09		Primary	209.72		Married	182.13	
	36-45	202.18		Undergraduate	168.03		Divorced	290.50	
	Above 45	245.55		Graduate & Above	175.91		Widow	277.60	
Role Functioning	16-25	177.09	0.164	Uneducated	173.20	0.756	Single	174.26	0.014
	26-35	200.03		Primary	170.37		Married	200.91	
	36-45	195.07		Undergraduate	184.76		Divorced	127.00	
	Above 45	160.50		Graduate & Above	186.02		Widow	97.70	
Social Functioning	16-25	190.13	0.024	Uneducated	143.09	0.126	Single	191.27	0.174
	26-35	189.24		Primary	184.38		Married	167.95	
	36-45	139.77		Undergraduate	193.52		Divorced	214.50	
	Above 45	163.81		Graduate & Above	179.22		Widow	159.10	
Mental Health	16-25	176.46	0.058	Uneducated	161.44	0.219	Single	180.17	0.704
	26-35	202.71		Primary	175.55		Married	187.84	
	36-45	155.53		Undergraduate	174.49		Divorced	188.88	
	Above 45	203.77		Graduate & Above	195.38		Widow	137.20	
Health Perception	16-25	201.15	0.001	Uneducated	153.83	0.001	Single	207.03	0.001
	26-35	193.56		Primary	121.62		Married	151.48	
	36-45	135.09		Undergraduate	179.16		Divorced	10.25	
	Above 45	84.33		Graduate & Above	209.81		Widow	67.60	

	Residence	Rank	p-value
Pain Perception	Urban	169.42	0.002
	Rural	203.43	
Role Functioning	Urban	186.18	0.380
	Rural	176.61	
Social Functioning	Urban	181.30	0.778
	Rural	184.41	
Mental Health	Urban	186.54	0.352
	Rural	176.04	
Health Perception	Urban	190.59	0.063
	Rural	169.55	

The Kruskal-Wallis H test in Table 5 shows that knowledge of anemia varies significantly across all three demographics, i.e., Graduates & above have the highest level of knowledge. With reference to age and marital status, younger people (16–25) and singles tend to have higher knowledge. Practice regarding anemia varies significantly by education level, showing that the participants with higher education adopt good management practices regarding anemia.

The Kruskal test reveals that in the study population, the physical functioning QoL domain has a significant difference in the distribution of health scores between various age groups. The highest rank is of the age group (26–35), while the oldest age group (45 & above) has the lowest mean rank.

Discussion

The recent study revealed that 38.7% exhibit good knowledge about anemia. While the majority of females had poor knowledge about anemia. These findings resemble the study conducted in 2019, which found that most of the study participants have insufficient knowledge about anemia (22-24). This shows that patients are unaware of the disease, its causes, and management, increasing their susceptibility to anemia-related problems. The lack of suitable academic health care programs and seminars in this region may be the reason for the absence of information.

The study also found that only 12.1% of the participants had acceptable good practices, and the remaining had unsatisfactory practices for disease management. These findings appeared to match the study, which shows that approximately 12% of the participants adopt good practices (25, 26). The reason behind unsatisfactory practices towards anemia management was that patients often lack awareness about anemia symptoms, leading to incorrect and delayed diagnosis or poor compliance with treatment (27).

The study revealed that the Physical functioning health domain is the least affected. These findings revealed that most of the respondents belong to the age group of 16-25, due to which their ability to compensate for the consequences of this disease was much higher than older individuals. Due to this, this age group enjoyed good physical health, but the physical functioning domain in the elderly was more affected (20).

In comparison to others, health domains such as pain perception and mental health were notably affected. Pain and discomfort may be considered neglected indicators of anemia. The observed impact of anemia on mental health among female anemic patients in the recent study is consistent with previous literature indicating a significant association of anemia and psychological illness (28). Studies have revealed that impaired Hb levels affected cerebral oxygenation, negatively affecting cognitive ability, emotional well-being, and mood regulation (29).

Cross-tabulation results revealed that knowledge scores were significantly influenced by age, educational level, marital status, and pregnancy status ($p < 0.05$). This research is consistent with the previous literature conducted on secondary school girls, which described the relationship between knowledge and educational level (25). It highlights the role of education in enhancing health literacy and self-disease management (30). The previous study in China also came to the same conclusion (14). The analysis showed that there exists a significant distribution of scores between different educational groups, with the graduate or above having the highest mean rank for using their education and practically implementing it in their lives. It concluded that older individuals have a low score. This conclusion aligns with the results of the meta-analysis (31). The marital status of the females had found to have no association with practice. This finding established the concept that disease management in term of practice had no link with marital status which aligned with the study conducted in India

in 2019 (32).

The recent research shows that participants with good knowledge about anemia are observed to demonstrate satisfactory practices related to anemia management. These findings coincide with different previous studies that describe the same correlation (14, 33). In case of management practices and HRQoL, greater involvement in physical activities is linked with better perceived physical health. This supports previous literature correlating physical activity to improved functional capacity in chronic conditions, including anemia (34). Similarly, mental health showed a significant correlation with psychological counselling highlighting the role of emotional support in improving mental well-being, consistent with the previous literature (35).

The study was limited to the specific population so the it does not reflect the generalizability of the results. A very large sample size from a broad range of demographic and geographical groups will provide more information about the beliefs and perceptions of the patients. It also limits the ability to develop causal relationship between knowledge and management practices of females. For future perspectives, targeted educational interventions should be developed at state level and assessed to determine the effect of intervention in improving knowledge and practices.

Conclusion

The study reveals that majority of the study subjects has poor knowledge and bad practices towards disease management. In the context of HRQoL, the least affected domain is Physical Functioning, while the affected domains are Pain Perception and Mental Health. There exists a positive correlation between knowledge and practice score, revealing that a better understanding of the disease encourages patients to adopt good practices for disease management. Among the various practices evaluated, engagement in physical activity and access to psychological support showed significant associations with better physical and mental health domains of HRQoL. These findings suggest that lifestyle interventions, targeted health education programs and community-based interventions focusing on various domains of HRQoL could be effective strategies in addressing the burden of anemia and its broader impact on women's health.

Ethical Approval:

This study was approved by the Bioethics Committee of University of Sargodha, Sargodha, Pakistan.
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Data Availability: Data supporting the findings are available upon reasonable request.

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Authors' Contribution:

TK: Conceptualization, Investigation, Data Acquisition, Formal Analysis, Software, Writing original draft, interpretation of data

SRN: Conceptualization, Supervision, Methodology, Validation

KA: Data Acquisition, Analysis

SA: Data Acquisition, Drafting of article

RN: Data Acquisition, Resources

TK: Data Acquisition, Analysis

References

- World Health Organization. Guideline on haemoglobin cutoffs to define anaemia in individuals and populations. Geneva: World Health Organization; 2024.
- Bhadra P, Deb A. A review on nutritional anemia. *Indian J Nat Sci*. 2020;10(59):18466–74.
- Awe OO, Dogbey DM, Sewpaul R, Sekgala D, Dukhi N. Anaemia in children and adolescents: a bibliometric analysis of BRICS countries (1990–2020). *Int J Environ Res Public Health*. 2021;18(11):5756–69.
- Petry N, Olofin I, Hurrell RF, Boy E, Wirth JP, Moursi M, et al. The proportion of anemia associated with iron deficiency in low, medium, and high human development index countries: a systematic analysis of national surveys. *Nutrients*. 2016;8(11):693–710.
- Özbilen M, Kaya Y. Beyond anemia: a comprehensive analysis of iron deficiency symptoms in women and their correlation with biomarkers. *BMC Womens Health*. 2025;25(1):376.
- Shah SA, Soomro U, Ali O, Tariq Y, Waleed MS, Guntipalli P, et al. The prevalence of anemia in working women. *Cureus*. 2023;15(8):100–10.
- Sunuwar DR, Singh DR, Chaudhary NK, Pradhan PMS, Rai P, Tiwari K. Prevalence and factors associated with anemia among women of reproductive age in seven South and Southeast Asian countries: evidence from nationally representative surveys. *PLoS One*. 2020;15(8):e0236449.
- Chaparro CM, Suchdev PS. Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. *Ann N Y Acad Sci*. 2019;1450(1):15–31.
- Goodarzi E, Beiranvand R, Naemi H, Darvishi I, Khazaei Z. Prevalence of iron deficiency anemia in Asian female population and human development index (HDI): an ecological study. *Obstet Gynecol Sci*. 2020;63(4):497–505.
- Mazhar S. Prevalence of anemia and dietary iron intake among female adolescents (grade 8–12) in Lahore. *J Dow Univ Health Sci*. 2015;9(3):99–105.
- Goodnough LT, Comin-Colet J, Leal-Noval S, Ozawa S, Takere J, Henry D, et al. Management of anemia in patients with congestive heart failure. *Am J Hematol*. 2017;92(1):88–93.
- Mildon A, Lopez de Romaña D, Jefferds MED, Rogers LM, Golan JM, Arabi M. Integrating and coordinating programs for the management of anemia across the life course. *Ann N Y Acad Sci*. 2023;1525(1):160–72.
- Nanjundeswaraswamy T, Divakar S. Determination of sample size and sampling methods in applied research. *Proc Eng Sci*. 2021;3(1):25–32.
- Yao B, Xu M, Cheng F, Peng M, Mao X. Knowledge, attitudes, and practices among patients with anemia towards disease management. *Front Public Health*. 2024;12(1):1380710.
- Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus disease-2019: knowledge, attitude, and practices of health care workers at Makerere University Teaching Hospitals, Uganda. *Front Public Health*. 2020;8(1):181–90.
- Stewart AL, Hays RD, Ware JE Jr. The MOS short-form general health survey: reliability and validity in a patient population. *Med Care*. 1988;26(7):724–35.
- Carver DJ, Chapman CA, Thomas VS, Stadnyk KJ, Rockwood K. Validity and reliability of the Medical Outcomes Study Short Form-20 questionnaire as a measure of quality of life in elderly people living at home. *Age Ageing*. 1999;28(2):169–74.
- 20-Item Short Form Survey (SF-20). Available from: https://www.rand.org/health-care/surveys_tools/mos/20-item-short-form.html
- SF-20 - OrthoToolKit. Available from: <https://orthotoolkit.com/sf-20/>
- Wouters HJ, van der Klauw MM, de Witte T, Stauder R, Swinkels DW, Wolffenbuttel BH, et al. Association of anemia with health-related quality of life and survival: a large population-based cohort study. *Haematologica*. 2018;104(3):468–76.
- Van Loon I, Bots M, Boereboom FT, Grooteman MP, Blankestijn P, van den Dorpel MA, et al. Quality of life as indicator of poor outcome in hemodialysis: relation with mortality in different age groups. *BMC Nephrol*. 2017;18(1):217–25.
- Sharmila P, Kumar MA, Rajagopala S. Knowledge, attitude and practices (KAP) related to Pandu Roga (iron deficiency anaemia) among adolescent girls attending Ayurveda tertiary care hospital and nearby schools-a survey. *J Ayurveda Integr Med Sci*. 2019;4(4):154–9.
- Angadi N, Ranjitha A. Knowledge, attitude, and practice about anemia among adolescent girls in urban slums of Davangere City, Karnataka. *Int J Med Sci Public Health*. 2016;5(3):416–19.
- Aboud SAEH, El Sayed HAE, Ibrahim HA-F. Knowledge, attitude and practice regarding prevention of iron deficiency anemia among pregnant women in Tabuk Region. *Int J Pharm Res Allied Sci*. 2019;8(2).
- Tiyuri A, Torshizi M, Akbari T, Tiyuri A. Knowledge and practice of secondary girl students of Birjand in relation to iron deficiency anemia and iron supplementation in 2015. *Health Dev J*. 2017;6(2):161–70.
- Hamed LA. Knowledge, attitudes, and nutrition practices of anemic college females. *Evid Based Nurs Res*. 2020;2(4):11.
- Singh M, Honnakamble RA, Rajoura OP. Knowledge, attitude and practice change about anemia after intensive health education among adolescent school girls of Delhi: an intervention study. *Int J Med Public Health*. 2019;9(3):71–3.
- Karatepe BA, Yıldız S, Yıldırım TT. Iron, emotion, and awareness: exploring alexithymia and anxiety in anemic women. *Medicina*. 2025;61(8):1359.
- Moya E, Phiri N, Mwangi MN, Phiri K. Effect of postpartum anaemia on maternal health-related quality of life: a systematic review. 2021.
- Chaudhary A, Kumari M, Vyas S. The effect of nutritional education on knowledge, attitudes, and practices related to iron deficiency anaemia in lactating women. *Food Humanit*. 2026;6:101062.
- Amar Raj A, Dhopte SR, Hajare AL. Global evidence on knowledge, attitudes, and practices related to anemia among women of reproductive age: a systematic review and meta-analysis. *Int J Med Pharm Res*. 2026;7:1243–50.
- Jani KG, Chaudhry B, Patel K, Bhadiyadra K. Knowledge, attitude and practice of anemia: a cross-sectional study. *Towards Excell*. 2022;14(1).
- Huong C, Chua JL, Ng RY, Panse DK, Misra S, Sumera A. Knowledge, attitude and practices (KAP) towards anaemia among female university students in Malaysia: a cross-sectional survey. *Malays J Nutr*. 2022;28(2):203–15.
- Alzahrani H, Alotaibi N, Alshahrani A, Alkhatami KM, Alshehri YS, Alzhrani M, et al. Self-reported moderate-to-vigorous physical activity: its association with health-related quality of life in a large cohort of people with chronic diseases. *Healthcare*. 2023.
- Zhang W, Balloo K, Hosein A, Medland E. A scoping review of well-being measures: conceptualisation and scales for overall well-being. *BMC Psychol*. 2024;12(1):585.