TROPICAL PUBLIC HEALTH JOURNAL
Journal homepage: https://talenta.usu.ac.id/trophico

The relationship of breakfast habits and nutrient intake with the incidence of anemia in female students at Dharmawangsa High School in Medan City

Luthfiyah Shidqi Widhyatri*[1], Ernawati Nasution[2], Arfah Mardiana Lubis[3], Zulhaida Lubis[3]
[1,2,3,4]*Faculty of Public Health, Universitas Sumatera Utara, Medan, Indonesia*

Correspondence Writer: luthfiyahshidqii01@students.usu.ac.id

ARTICLE INFO

Article history:
Received October 14, 2025
Revised January 26, 2026
Accepted July 13, 2026
Available online
https://talenta.usu.ac.id/trophico

E-ISSN: 2797-751X
P-ISSN: 2774-7662

How to cite:
Widhyatri, S. L & Nasution, E. (2026). The Relationship of Breakfast Habits and Nutrient Intake with the Incidence of Anemia in Female Students at Dharmawangsa High School in Medan City. *Tropical Public Health Journal*, *6*(1), 30-38.

http://doi.org/10.32734/trophico.v6i1.23140

ABSTRACT

Anemia is among the most common health issues experienced by adolescent girls, characterized by a hemoglobin (Hb) level below the established threshold (<12 g/dL). This condition can impact learning concentration, physical stamina, and productivity. Field observations indicate that several students appear weak, have pale complexions, and frequently miss school due to dizziness or fatigue. This is supported by teachers' reports stating that a considerable number of students have reduced concentration, especially in the morning after the flag ceremony or physical education sessions, and many of them do not have time to eat breakfast at home. This reflects poor breakfast habits and the possibility of insufficient nutritional intake. The objective of this study was to examine the relationship between breakfast habits and nutrient intake with the incidence of anemia among female students at Dharmawangsa High School in Medan. This research is a quantitative study with a cross-sectional design. The study was carried out at Dharmawangsa High School in Medan City with a sample of 80 female students determined using the Slovin formula. Data were collected through interviews using a breakfast habits questionnaire, assessment of nutrient intake using the 2x24-hour food recall method, and measurement of hemoglobin levels using the EasyTouch GCHB digital device. Data analysis was conducted using univariate and bivariate methods with the Chi-Square test (α=0.05). The findings showed that 53.8% of female students had poor breakfast habits. There was a significant association between breakfast habits, energy intake, protein, iron, and zinc intake with the incidence of anemia. It is expected that female students will pay greater attention to their nutritional intake, particularly at breakfast, to help prevent anemia.

Keywords: *Incidence of Anemia, Breakfast Habits, Nutrient Intake*

1. Introduction

Adolescence is a phase in which an individual transitions from childhood to adulthood, marked by physical, behavioral, cognitive, biological, and emotional changes. Adolescent girls are ten times more susceptible to iron deficiency, commonly referred to as anemia, compared to adolescent boys. This occurs because teenage girls experience monthly menstruation and are undergoing a growth phase, which increases their need for iron intake (Nurbaya et al., 2019). The global prevalence of anemia in 2019 reached 29.9%. In Southeast Asia, the prevalence of anemia was reported at 41.9%. Data from Indonesia indicates that the prevalence of anemia among women (aged 15–49 years) was 30.6%. Based on data from the basic health survey in Indonesia, there has been a rise in the prevalence of anemia among Indonesian adolescent girls, from 22.7% by Riskesdas 2013 to 32% by Riskesdas 2018 (Ariana & Nur, 2024).

Breakfast is the activity of eating and drinking from the moment you wake up until 9 a.m. to fulfill approximately 15-30% of your daily nutritional needs (Syahnur, 2017). The prevalence of children and

adolescents who do not eat breakfast is 16.9% to 59%, and 31.2% of adults on average do not eat breakfast (Pratama et al., 2025). Breakfast is beneficial for maintaining physical endurance, enabling students to learn well, helping them focus their minds on learning, and providing sufficient nutrients. Breakfast is the main source of nutrition for meeting energy needs (Lentini & Margawati, 2014). Inadequate nutritional intake is one of the causes of anemia. Anemia can be caused by an improper, irregular, and unbalanced diet that does not provide the nutrients needed by the body (Tiaki, 2017). This contributes to low intake of essential nutrients, such as iron, zinc, carbohydrates, protein, fat, folic acid, vitamin A, and vitamin C, which play a role in red blood cell formation and iron absorption. As a result, adolescents often feel tired, weak, lethargic, and lacking in energy, but in such conditions it could be caused by anemia or, in everyday language, referred to as low blood (Anisa et al., 2024)

A preliminary survey of 31 female students at Dharmawangsa High School in Medan showed that 54.8% of students had poor breakfast habits. The students also had insufficient intake of iron, zinc, carbohydrates, protein, fat, folic acid, vitamin A, and vitamin C. Observations also showed that some female students appeared weak, sleepy in class, easily tired, and had pale faces, which are common physical symptoms of anemia. This indicates the need for further research on the relationship between breakfast habits and nutritional intake with the incidence of anemia among female students. Based on the above background, the researcher is interested in conducting research on the relationship of breakfast habits and nutrient intake with the incidence of anemia in female students at Dharmawangsa High School in Medan City.

2. Methods

This study is a quantitative research using a cross-sectional design conducted at Dharmawangsa High School in Medan from January to September 2025. The population in this study included all female students in grades X and XI at Dharmawangsa High School in Medan, totaling 332 students, with sampling carried out using proportional random sampling based on the following inclusion criteria: female students in grades X and XI, female students who were willing to undergo blood collection for Hb testing, and female students who were not ill or menstruating. Data on breakfast habits were collected through interviews using questionnaires, while nutrient intake data were obtained using a 2 × 24-hour food recall method, which was then analyzed using Nutri Survey software to determine the levels of iron, zinc, carbohydrates, protein, fat, folic acid, vitamin A, and vitamin C. Anemia was assessed by measuring Hb (hemoglobin) levels using the EasyTouch GCHB digital device, which were then compared with the predetermined cutoff value (<12 g/dL). Data analysis was conducted univariately to determine the frequency distribution of each variable and bivariately using the Chi-Square statistical test to assess the relationship between variables, with the significance level set at $p < 0.05$.

3. Results

The frequency distribution based on the incidence of anemia can be seen in the following diagram.

Table 1. Frequency distribution based on the incidence of anemia among female students

Incidence of Anemia	n	%
Not Anemia	41	51,20
Anemia	39	48,80
Total	80	100,00

Based on Table 1, the frequency distribution of respondents at Dharmawangsa High School in Medan, it is known that 39 (48.80%) female students at Dharmawangsa High School suffer from anemia, with hemoglobin (Hb) levels below 12g/dl.

Table 2. Frequency distribution based on the type of breakfast eaten by female students

Breakfast Types	n	%
Staple foods, side dishes, vegetables, and fruits	30	37,50
Bread/Cereal/Noodles	29	36,25
Milk/Tea	21	26,25
Total	80	100,00

Based on Table 2, it was found that 21 (26.25%) female students only consumed milk/tea for breakfast and 29 (36.25%) female students only consumed bread/cereal/noodles.

TROPHICO: Tropical Public Health Journal Vol.06, No.01 (2026) 30–38

Table 3. Frequency distribution based on female students' breakfast frequency

Frequency of Breakfast	n	%
7 times/week	24	30,00
4-5 times/week	30	37,50
1-3 times/week	26	32,50
Total	80	100,00

Based on Table 3, it was found that 26 (32.50%) students only ate breakfast 1-3 times a week, and 30 (37.50%) students only ate breakfast 4-5 times a week.

Table 4. Frequency distribution based on female students' breakfast frequency

Adequate Energy Intake	n	%
Severe Energy Deficit Intake	33	41,25
Moderate Energy Deficit Intake	5	6,25
Mild Energy Deficit Intake	0	0
Good Energy Intake	41	51,25
Excess Energy Intake	1	1,25
Total	80	100,00

Based on Table 4, it was found that 33 (41.25%) female students had a severe energy deficit intake. It was also found that 41 (51.25%) female students had a good energy intake.

Table 5. Frequency distribution based on macro nutrient intake among female students

Level of Intake of Macro Nutrients	n (80)	%
Carbohydrate:		
Severe Deficit	37	46,25
Moderate Deficit	1	1,25
Mild Deficit	4	5,00
Good	38	47,50
Better	0	0,00
Protein:		
Severe Deficit	18	22,50
Moderate Deficit	17	21,25
Mild Deficit	4	5,00
Good	31	38,75
Better	10	12,50
Fat:		
Severe Deficit	18	22,50
Moderate Deficit	16	20,00
Mild Deficit	15	18,80
Good	22	27,50
Better	9	11,20

Based on Table 5, it was found that there were students in the deficit category, namely 42 (52.50%) female students with carbohydrate intake, 39 (48.75%) female students with protein intake, and 49 (61.25%) female students with fat intake. Some even experienced a severe deficit, namely carbohydrates in 37 (46.25%) female students, protein and fat in 18 (22.50%) female students. Then there were those who experienced excess intake, namely protein in 10 (12.05%) female students and fat in 9 (11.25%) female students.

Table 6. Frequency distribution based on macro nutrient intake among female students

Micro Nutrient Intake	n (80)	%
Iron:		
Sufficient	38	47,50
Deficient	42	52,50

(to be continued)

Table 6. Frequency distribution based on macro nutrient intake among female students *(continued)*

Micro Nutrient Intake	n (80)	%
Zinc:		
Sufficient	40	50,00
Deficient	40	50,00
Vitamin C:		
Sufficient	24	30,00
Deficient	56	70,00
Vitamin A:		
Sufficient	17	21,25
Deficient	63	78,75
Asam Folat:		
Sufficient	13	16,25
Deficient	67	83,75

Based on Table 6, it was found that 42 (52.50%) female students had insufficient iron intake, and 40 (50.00%) female students were deficient in zinc. The highest deficiency was found in folic acid, with 67 (83.75%) female students, followed by vitamin A with 63 (78.75%) female students, and vitamin C with 56 (70.00%) female students.

Table 7. Relationship between breakfast habits and anemia

Breakfast Habits	Incidence of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Not Good	15	34,09	29	65,91	44	100,0	0,001
Good	26	72,22	10	27,78	36	100,0	

Based on Table 7, it was identified that there was an association between breakfast habits and the incidence of anemia among female students at Dharmawangsa High School in Medan City, with the highest proportion found among female students who experienced anemia and had poor breakfast habits, totaling 29 (65.91%) students.

Table 8. Relationship between energy intake and incidence of anemia

Energy Intake	Incidence of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	N	%	
Enough	17	40,47	25	59,52	42	100,0	0,043
Not Enough	24	63,15	14	36,84	38	100,0	

Based on Table 8, it was found that there was an association between energy intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with the lowest proportion observed among female students who experienced anemia and had insufficient energy intake, totaling 14 (36.84%) students, while the highest proportion was found among female students who experienced anemia despite having sufficient energy intake, totaling 25 (59.52%) students.

Table 9. Relationship between carbohydrates and the incidence of anemia

Carbohydrate	Incidence of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	19	50,00	19	50,00	38	100,0	0,832
Not Enough	22	52,38	20	47,62	42	100,0	

Based on Table 9, it was found that there was no significant association between carbohydrate intake and

the incidence of anemia among female students at Dharmawangsa High School in Medan. Female students who experienced anemia tended to have low carbohydrate intake, with a considerable number, namely 20 (47.62%) students.

Table 10. Relationship between protein and the incidence of anemia

Protein	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	13	31,71	28	68,29	41	100,0	0,001
Not Enough	28	71,79	11	28,21	39	100,0	

Based on Table 10, it was found that there was a significant association between protein intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with the lowest proportion observed among female students who experienced anemia and had insufficient protein intake, totaling 11 (28.21%) students, while the highest proportion was found among female students who experienced anemia despite having adequate protein intake, totaling 28 (71.79%) students.

Table 11. Relationship between fat and the incidence of anemia

Fat	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	16	51,61	15	48,38	31	100,0	0,959
Not Enough	25	51,02	24	48,98	49	100,0	

Based on Table 11, it was found that there was no significant association between fat intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with a relatively high proportion of female students who experienced anemia having low fat intake, totaling 24 (48.98%) students.

Table 12. Relationship between iron and the incidence of anemia

Iron	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	14	36,84	24	63,15	38	100,0	0,014
Not Enough	27	64,28	15	35,71	42	100,0	

Based on Table 12, it was found that there was a significant association between iron intake and the incidence of anemia among female students at Dharmawangsa High School in Medan. Female students who experienced anemia and had insufficient iron intake were relatively few, totaling 15 (35.71%) students, while there were also a considerable number of female students who experienced anemia despite having adequate iron intake, totaling 24 (63.15%) students.

Table 13. Relationship between zinc and the incidence of anemia

Zinc	Incodence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	N	%	
Enough	16	40,00	24	60,00	40	100,0	0,044
Not Enough	25	62,50	15	37,50	40	100,0	

Based on Table 13, it was found that there was a significant association between zinc intake and the incidence of anemia among female students at Dharmawangsa High School in Medan. Female students who experienced anemia and had low zinc intake were the smallest group, totaling 15 (37.50%) students, while the largest group consisted of female students who experienced anemia despite having adequate zinc intake, totaling 25 (62.50%) students.

Table 14. Relationship between vitamin C and the incidence of anemia

Vitamin C	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	10	41,66	14	58,33	24	100,0	0,262
Not Enough	31	55,35	25	44,64	56	100,0	

Based on Table 14, it was found that there was no significant association between vitamin C intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with a number of female students who experienced anemia having insufficient vitamin C intake, totaling 25 (44.64%) students.

Table 15. Relationship between vitamin A and the incidence of anemia

Vitamin A	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	8	47,05	9	52,94	17	100,0	0,697
Not Enough	33	52,38	30	47,61	63	100,0	

Based on Table 15, it was found that there was no significant association between vitamin A intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with a number of female students who experienced anemia having insufficient vitamin A intake, totaling 30 (47.61%) students.

Table 16. Relationship between folic acid and the incidence of anemia

Folic Acid	Incidence Of Anemia				Amount		*p-value*
	Not Anemia		Anemia				
	n	%	n	%	n	%	
Enough	5	38,46	8	61,53	13	100,0	0,313
Not Enough	36	53,73	31	46,26	67	100,0	

Based on Table 16, it was found that there was no significant association between folic acid intake and the incidence of anemia among female students at Dharmawangsa High School in Medan, with a number of female students who experienced anemia having insufficient folic acid intake, totaling 31 (46.46%) students.

4. Discussion

4.1 Incidence Of Anemia

The results indicated that 48.75 percent of female students were anemic, while 51.25 percent were not. This condition suggests that anemia remains a significant health issue among adolescent girls. This may be due to the fact that many female students have poor breakfast habits and inadequate intake of energy, protein, iron, and zinc. The findings of the study also demonstrate a significant association between anemia and breakfast habits, as well as energy, protein, iron, and zinc intake.

4.2 Breakfast Habits

A study conducted among female students at Dharmawangsa High School in Medan showed that those with poor breakfast habits had the highest prevalence of anemia, reaching 74.36 percent. Meanwhile, among female students who were not anemic, the majority had good breakfast habits, accounting for 63.41 percent. Breakfast habits are considered one of the contributing factors to anemia. Female students at Dharmawangsa have poor breakfast habits because they skip breakfast for fear of being late or waking up late. Therefore, inadequate macronutrient and micronutrient intake due to skipping breakfast can lead to decreased hemoglobin levels. Low hemoglobin levels occur due to insufficient food intake and not meeting nutritional needs, resulting in decreased iron reserves in the body (Fadila et al., 2024). Based on the results of the Chi-Square test, it was found that there is an association between breakfast habits and the incidence of anemia ($p = 0.001$). Adolescents who skip breakfast are unable to compensate for the loss of energy and nutrients at other mealtimes, making breakfast an essential meal for meeting their daily nutritional needs (Dewi & Mulyati, 2014).

4.3 The Relationship Between Energy Intake and the Incidence of Anemia

The analysis revealed an association between energy intake and anemia (p = 0.043) among female students at Dharmawangsa High School in Medan. The findings indicate that female students with anemia had adequate energy intake at 59.52% compared to those with insufficient energy intake at 36.84%. This may be explained by the fact that although the total energy intake is adequate, the energy sources are not supported by sufficient macro- and micronutrients that play a crucial role in hemoglobin formation. This is consistent with the study conducted by (Anggraini et al., 2024), which found that adolescent girls had adequate energy intake but still experienced anemia. These results emphasize the importance of breakfast habits in preventing the risk of anemia, as breakfast patterns can influence inadequate energy nutrient intake among adolescent girls.

4.4 Macronutrient Intake

4.4.1 The Relationship Between Carbohydrate Intake and the Incidence of Anemia

Based on the results of the study, it was found that there was no relationship between carbohydrates and the incidence of anemia (p = 0.832) among female students at Dharmawangsa High School in Medan. Although most female students with anemia had a carbohydrate intake of less than 47.62 percent, it turned out that the group without anemia also had a higher carbohydrate intake of less than 50.00 percent. This is because carbohydrates do not play a direct role in hemoglobin formation, so their adequacy or deficiency does not directly cause anemia. These research results are in line with the research by (Restuti & Susindra, 2016), which found no relationship between carbohydrate intake and the incidence of anemia.

4.4.2 The Relationship Between Protein Intake and the Incidence of Anemia

In this study, an association was identified between protein intake and the incidence of anemia (p = 0.001) among female students at Dharmawangsa High School in Medan. Interestingly, the findings indicate that female students with anemia had adequate protein intake at 68.29 percent compared to those with insufficient protein intake at 28.21 percent. This condition suggests that although many female students had sufficient protein intake in terms of quantity, the quality of protein sources was predominantly derived from plant-based proteins, which have lower iron bioavailability. This explains why the relationship between protein intake and anemia remained statistically significant. The findings of this analysis are consistent with the study conducted by (Firmansyah et al., 2024), which also reported a significant association between protein intake and the incidence of anemia.

4.4.3 The Relationship Between Fat Intake and the Incidence of Anemia

The results indicated that there was no association between fat intake and the incidence of anemia (p = 0.959) among female students at Dharmawangsa High School in Medan. Although the majority of female students with anemia had fat intake below 48.98 percent, it was observed that the non-anemic group also had a relatively higher proportion with low fat intake, at 51.02 percent. These findings suggest that fat deficiency is not a primary factor contributing to anemia. This is consistent with the theory that fat mainly functions in supporting overall metabolism, rather than acting as a factor that causes or prevents anemia. The results demonstrate that there is no relationship between fat intake and the incidence of anemia because there is no significant difference between female students with anemia and those without anemia, thus statistically indicating no significant association.

4.5 Micronutrient Intake

4.5.1 The Relationship Between Iron Intake and the Incidence of Anemia

Based on the study findings, it was identified that there is an association between iron intake and the incidence of anemia (p = 0.014) among female students at Dharmawangsa High School in Medan. The data indicate that female students with anemia were more likely to have adequate iron intake (63.15 percent) compared to those with insufficient intake (35.71 percent). This may be explained by the fact that most of the iron consumed by adolescent girls is derived from plant-based sources (such as tempeh, green vegetables, and legumes) containing non-heme iron, which has relatively low bioavailability (approximately 2–20%). The results of this study are consistent with research conducted by (Marisa & Hendarini, 2021), which also found an association between iron intake and the incidence of anemia.

4.5.2 The Relationship Between Zinc Intake and the Incidence of Anemia

Statistical analysis indicates that there is an association between zinc intake and the incidence of anemia (p = 0.044) among female students at Dharmawangsa High School in Medan. The data reveal that most female students with anemia actually had adequate zinc intake at 60.00 percent compared to those with insufficient

intake at 37.50 percent. Most female students tend to consume plant-based sources of zinc, therefore even though their zinc intake is adequate, the bioavailability (absorption rate) of zinc in the body remains low. As a result, the functional zinc levels in the bloodstream are not proportional to the amount of intake, which may indirectly contribute to the occurrence of anemia. This study is consistent with the research conducted by (Marisa & Hendarini, 2021), which also identified an association between zinc intake and the incidence of anemia.

4.5.3 The Relationship Between Vitamin C Intake and the Incidence of Anemia

This study found that there was no association between vitamin C intake and the incidence of anemia (p = 0.262) among female students at Dharmawangsa High School in Medan. Although the majority of female students with anemia had vitamin C intake that was 44.64 percent below the recommended level, it was observed that the non-anemic group also had vitamin C intake that was 55.35 percent below the recommended level. However, in this study, the relationship was not statistically significant. This may be explained by the fact that vitamin C plays a role in enhancing the absorption of non-heme iron (from plant sources), but based on the 2×24-hour food recall data, the consumption of animal-based iron sources was low, making the effect of vitamin C less evident. The results of this analysis are consistent with the study conducted by (Habibie et al., 2018), which reported that vitamin C intake was not associated with hemoglobin levels.

4.5.4 The Relationship Between Vitamin A Intake and the Incidence of Anemia

Based on the study results, it was found that there is no association between vitamin A intake and the incidence of anemia (p = 0.697) among female students at Dharmawangsa High School in Medan. It is known that the majority of female students at Dharmawangsa High School in Medan, both those with anemia and those without, have inadequate vitamin A intake. In the non-anemic group, 52.38 percent of students had insufficient vitamin A intake, while in the anemic group, the proportion was nearly similar, at 47.61 percent of students. However, the findings of this study indicate that vitamin A intake is not significantly associated with the incidence of anemia. This may be due to the minimal difference between the "adequate" and "deficient" vitamin A groups, so that small variations in intake result in no statistically significant relationship. This is further supported by low fat and zinc intake (as identified in this study), which leads to suboptimal absorption and activation of vitamin A, thereby reducing its role in hemoglobin formation. In other words, vitamin A works synergistically, but its effect may not be evident when iron and protein intake are insufficient. The results of this study are consistent with research conducted by (Wiranti, 2016), which also reported that vitamin A intake is not associated with the incidence of anemia.

4.5.5 The Relationship Between Folic Acid Intake and the Incidence of Anemia

The results of the analysis indicate that there is no association between folic acid intake and the incidence of anemia (p = 0.313) among female students at Dharmawangsa High School in Medan. In the non-anemic group, 53.73 percent of female students had inadequate folic acid intake, while in the anemic group, the proportion was nearly similar, at 46.26 percent of female students. Theoretically, folic acid deficiency leads to megaloblastic anemia, which occurs due to impaired DNA synthesis resulting in the production of large and immature erythrocytes. However, among adolescent girls, the most common type of anemia is iron deficiency anemia rather than megaloblastic anemia. This suggests that although folic acid intake is insufficient, its impact on hemoglobin levels is not very pronounced because the primary cause of anemia in this population is iron deficiency rather than folate deficiency. Folate does contribute to hemoglobin formation, but it is not the main determining factor in adolescents. The findings of this study are consistent with the study conducted by (Marisa & Hendarini, 2021), which also reported no association between folic acid intake and the incidence of anemia.

5. Conclusion

The conclusion of this study indicates that students at Dharmawangsa High School tend to consume breakfast consisting of non-staple foods (62.5%), and they also have breakfast less frequently at the recommended time. There is a significant association between breakfast habits (p = 0.001), energy intake (p = 0.043), protein (p = 0.000), iron (p = 0.014), and zinc (p = 0.044) intake and the incidence of anemia. It is recommended that female students or adolescent girls pay greater attention to their daily dietary patterns, particularly breakfast habits, consume a balanced breakfast, increase the intake of animal-based foods such as chicken liver, beef, fish, and eggs for better absorption, and reduce the habit of drinking tea or coffee after meals as it may inhibit iron absorption. Schools are encouraged to provide both direct and indirect education on the importance of fulfilling macro- and micronutrient requirements to prevent anemia. This can be

implemented through adolescent health seminars or by displaying posters related to anemia on school bulletin boards.

Bibliography

Anggraini, V. ., Maulida, R. ., & Aini, R. N. (2024). *Intake and breakfast habits with the incidence of anemia in female students of SMPN 152 Jakarta*. *4*(2), 351–357. https://doi.org/10.53823/jgn.v4i2.93

Anisa, Y., Siti, A., & Sri, H. (2024). Faktor-Faktor yang berhubungan dengan anemia pada remaja putri. *Lentera Perawat*, *5*(1), 10–17. https://doi.org/10.52235/lp.v5i1.276

Ariana, R., & Nur, A. F. (2024). Analisis faktor risiko kejadian anemia pada remaja putri: Literatur review. *Jurnal Kesehatan Komunitas (Journal of Community Health)*, *10*(1), 133–140. https://doi.org/10.25311/keskom.Vol10.Iss1.1403

Dewi, A. N., & Mulyati, T. (2014). Hubungan kebiasaan sarapan dengan kadar hemoglobin pada remaja putri (studi penelitian di SMP Negeri 13 Semarang). *Journal of Nutrition College*, *3*(4), 824–830. https://doi.org/10.14710/jnc.v3i4.6886

Fadila, A., Nurbaiti, L., & Wiguna, P. A. (2024). Hubungan kebiasaan sarapan dan konsumsi tablet tambah darah dengan kejadian anemia pada remaja putri di SMPN 13 Mataram. *Jurnal Medika Hutama*, *6*(1), 4074–4083. https://jurnalmedikahutama.com/index.php/JMH/article/view/723

Firmansyah, H., Harahap, W. A., & Rosmiati, R. (2024). Protein intake is associated with the incidence of anemia among female students at SMAN 11 Medan. *Health Gema*, *16*(1), 45–53. https://doi.org/10.47539/gk.v16i1.444

Habibie, I. Y., Oktavia, F., & Ventiyaningsih, A. D. I. (2018). Asupan vitamin C tidak berhubungan dengan kadar hemoglobin pada remaja putri di SMA Negeri 5 Kota Malang. *Indonesian Journal of Human Nutrition*, *7*(2), 139–152. https://doi.org/10.21776/ub.ijhn.2018.005.02.5

Lentini, B., & Margawati, A. (2014). Hubungan Kebiasaan Sarapan Dan Status Hidrasi Dengan Konsentrasi Berfikir Pada Remaja. *Journal of Nutrition College*, *3*(4), 631–637. https://doi.org/10.14710/jnc.v3i4.6862

Marisa, M., & Hendarini, A. T. (2021). Hubungan Asupan Zat Besi, Zinc Dan Asam Folat Dengan Kejadian Anemia Pada Remaja Putri Di Sman 1 Kampar Utara Tahun 2021. *Universitas Pahlawan Tuanku Tambusai*, *2*, 7. https://doi.org/10.31004/jkt.v2i4.2688

Nurbaya, S., Yusra, & Handayani Irianti, S. (2019). *Cerita Anemia*. https://books.google.co.id/books/about/Cerita_Anemia.html?id=FI8EEAAAQBAJ&redir_esc=y

Pratama, W., Syuryadi, N., & Maya, S. (2025). Hubungan Sarapan dengan Konsentrasi Siswa Di Sman 1 Kelayang. *Seminar Nasional Integrasi Pertanian Dan Peternakan*, *3*(1), 203–210. https://semnasfpp.uin-suska.ac.id/index.php/snipp

Restuti, A. N., & Susindra, Y. (2016). Hubungan Antara Asupan Zat Gizi dan Status Gizi. *Ilmiah INOVASI ISSN*, *16*(3), 163–167. https://doi.org/10.25047/jii.v16i3.305

Syahnur. (2017). *Kebiasaan Sarapan Pagi*. Sinar Baru Algensindo.

Tiaki, N. K. A. (2017). Hubungan Pola Makan Dengan Kejadian Anemia pada Remaja Putri Kelas XI di SMK N 2 Yogyakarta. *Naskah Publikasi*, 10. http://digilib.unisayogya.ac.id/2469/1/Naskah Publikasi hatim.pdf

Wiranti, asih aprliriana. (2016). Hubungan antara Asupan Zat Gizi Mikro (Zat Besi, Vitamin B12, dan Vitamin A) dengan Kejadian Anemia pada Siswi SMK Negeri 1 Sukoharjo Jawa Tengah. *Publikasi Karya Ilmiah*, 8–13. http://eprints.ums.ac.id/id/eprint/42377