



The Relationship of Breakfast and Hemoglobin Levels in Adolescent Girls at SMP Negeri 1 Tapa

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ABSTRACT

This study aims to determine the relationship between breakfast and hemoglobin levels in adolescent girls in the SMP Negeri 1 Tapa area. This study is a quantitative research with descriptive correlation analysis using a cross sectional approach. Based on the results of a study involving 68 respondents, it shows that most young women have breakfast habits in the adequate category, which is as many as 40 respondents (58.8%). The students who were in the breakfast category were good at 18 respondents (26.5%), while the breakfast category was less than 10 respondents (14.7%). In the examination of hemoglobin levels, it was found that the majority of female students experienced low hemoglobin levels, namely 46 respondents (67.6%). Meanwhile, female students with normal hemoglobin levels amounted to 22 respondents (32.4%). The results of the analysis using the Chi-square test obtained a value of $p = 0.047$, which shows a significant relationship between breakfast habits and hemoglobin levels in adolescent girls at SMP Negeri 1 Tapa.

INTRODUCTION

Adolescence is a phase of life that requires high energy due to the rapid growth and development process. Adolescents are a population aged 10-18 years, which in the age range requires adequate amounts of nutritional intake, both in terms of quality and quantity. Nutritional problems that often arise in adolescents can be caused by wrong consumption patterns or an imbalance between consumption and recommended nutrient needs. In young women, the problems that often occur are *Overweight* (more nutrition), *underweight* (malnutrition) and anemia. Among these three problems, anemia is one of the most commonly found conditions in adolescent girls, this can be seen from the incidence of anemia in adolescent girls (Saputra & Kartika, 2023)

According to *World Health Organization* (WHO) in (Ariana & Fajar, 2024), through the report *Global Anemia Estimates* 2021 edition which was delivered on *World Health Assembly* (WHA) 65, anemia is one of the important indicators of poor health and nutrition status. This condition can have an impact on the progress of a country's economic development, so anemia is considered a global health problem. In 2019, the prevalence of anemia worldwide reached 29.9%. In the Southeast Asian region, the prevalence is higher, at 41.9%. In Indonesia itself, the prevalence of anemia in women aged 15-49 years was recorded at 30.6%. Adolescent girls are a group that is prone to anemia due to increased nutritional needs during the growth period, blood loss due to menstruation, nutritional deficiencies, and insufficient iron intake.

Based on data Indonesian Health Survey (SKI) 2023, the prevalence of adolescent anemia in the age range of 15-24 years is 15.5%, where the prevalence of anemia in adolescent girls is 18%, while adolescent boys is 14.4%. Although it has decreased compared to five years ago, the figure of 15.5% is still considered high (Indonesia, 2023). According to data from the Gorontalo Provincial Health Office in 2024, the highest incidence of anemia in adolescent girls is found in Bone Bolango Regency with a prevalence of 72.27%. The most cases were found in Tapa District, precisely at SMP Negeri 1 Tapa, with The number of female students is 88 people. This information was obtained directly from the Youth Care Health Program (PKPR) officer at the Tapa Health Center.

Anemia in adolescent girls not only has an impact on physical conditions such as fatigue, frequent dizziness, and decreased immunity, but can also affect their thinking ability and psychological state. If left untreated from adolescence, anemia can continue into adulthood, even when they are pregnant and give birth later (Lailiyana & Hindratni, 2024). Anemia in adolescents can also cause various risk factors, ranging from delayed physical growth, behavioral and emotional disorders, to impaired brain cell development. This condition also makes the body's immunity decrease, and leads to low productivity. If left untreated, anemia experienced in adolescence can continue into adulthood and contribute to an increased risk of maternal and infant mortality, premature birth, and low birth weight (BBLR) infants (Lodia Tutuop *et al.*, 2023).

One of the causes of anemia in adolescents is lack of food intake that contain sufficient amounts of iron (Fe). In addition, anemia can also be caused by pathological inflammation due to diseases such as malaria or parasitic infections, such as worms. Other factors that contribute to the occurrence of anemia include low knowledge about anemia, less supportive attitudes towards healthy behaviors, education level, and family socioeconomic conditions. Diet also plays an important role in the onset of anemia. Adolescents who have irregular eating habits are at high risk of iron deficiency, which can eventually lead to nutritional disorders such as anemia (Merlisia *et al.*, 2024).

Anemia can occur Due to a decrease in hemoglobin levels, which is influenced by various factors, one of which is nutritional intake. In adolescent girls, the habit of eating breakfast is a form of nutrient consumption that plays a role in keeping hemoglobin levels normal. Breakfast has an important role in speeding up metabolic processes, especially in producing energy. When energy intake is reduced, the body will use protein as a substitute energy source. Protein deficiency can interfere with the process of transporting iron from the digestive tract to body tissues, including to the spinal cord which functions in the formation of hemoglobin, thus potentially lowering hemoglobin levels (Syifa *et al.*, 2025). One of the A common eating habit among teenagers is to often consume calorie-dense snacks and skip meals, especially breakfast. This breakfast habit is also one of the factors that cause low hemoglobin levels in adolescents (Sincovich *et al.*, 2022).

Breakfast is one of the important sources of nutritional intake that supports the body's needs. This activity should be carried out at 06.00-08.00 with a portion of about one-third of the total daily food needs. Through breakfast, the body obtains macronutrients such as carbohydrates, proteins, fats, minerals, and various other substances that are essential for body function. A regular and nutritious breakfast pattern not only helps meet energy needs, but also has a direct impact on increased concentration. By getting used to eating nutritious food in the morning, a person will be more focused and optimal in receiving and processing information throughout the day (Nurlita, Arfanda, 2024).

Breakfast plays an important role in meeting daily nutrient needs such as iron, protein, folic acid, vitamin B12, and energy needed by the body for the process of hemoglobin formation. The process of hemoglobin synthesis involves the formation of heme structures that contain porphyrin rings as the place where iron is attached, as well as globin which is composed of alpha and non-alpha protein chains. The adequacy of the intake of these nutrients allows the synthesis of hemoglobin to take place optimally, so that it can prevent anemia. On the other hand, the habit of not eating breakfast can inhibit the process of hemoglobin formation due to a lack of iron and protein intake, which has the potential to lead to a decrease in hemoglobin levels in the blood. This condition can have an impact on decreased concentration, as well as the onset of symptoms of weakness, fatigue, lethargy, and fatigue in adolescent girls. Adolescent girls who are not used to eating breakfast tend to experience a decrease in daily nutritional intake, including protein, vitamin C, and iron. Lack of intake of these nutrients in the long term can have an impact on decreasing hemoglobin levels in the blood. In addition, young women have a higher risk of developing anemia due to blood loss during menstruation (Nababan *et al.*, 2023).

Skipping breakfast is not able to replace energy or nutrients lost at other meals, so breakfast is an essential meal time for adolescents to meet their nutritional needs. Nutritional intake from breakfast plays an important role in various physiological processes of the body, including the formation of hemoglobin. A nutritious breakfast habit with iron, protein, and supporting vitamins plays an important role in maintaining normal hemoglobin levels, so that the regularity of breakfast can be used as one of the indicators in seeing a person's hemoglobin status (Anggraini *et al.*, 2024).

Hemoglobin is a complex protein in which there is a non-protein component in the form of heme. Hemoglobin is in red blood cells and plays a role in giving the blood a red color. Its function is to facilitate the exchange of oxygen and carbon dioxide in body tissues. The more optimal the supply and utilization of oxygen by organs and tissues, the cardiovascular resilience of a person will also increase. Cardiovascular resilience itself is the body's ability to use the heart, respiratory, and circulatory systems effectively and efficiently when carrying out activities continuously (Aswan *et al.*, 2022). If the level of hemoglobin in the blood decreases to below normal values according to age and sex, then individuals can experience anemia. In addition, anemia can also be caused by impaired iron absorption, chronic infections, or abnormalities in the digestive system (Rahmilah & Putri, 2024).

Previous research by Goddess. (2023), which found that there was a significant relationship between hemoglobin levels and breakfast. Where in this journal it is known that most of the respondents, namely 70% of students, have a habit of eating breakfast, while the other 30% do not eat breakfast before leaving for school. The results showed that students who regularly ate breakfast mostly had normal hemoglobin levels (91.6%), while those who did not eat breakfast tended to experience low hemoglobin levels (79.6%). This is because breakfast has the necessary levels of vitamins and minerals to form red blood cells. Thus macronutrient intake, especially protein, also plays an important role in the storage and transport of iron, which is a key component in the process of hemoglobin formation. In addition to iron, micronutrients such as Vitamin B12, Vitamin A, Folate, Riboflavin, and Copper also contribute to the production of hemoglobin. A deficiency of any of these nutrients can interfere with the formation of red blood cells and cause anemia. Therefore, an unbalanced diet, including the habit of skipping breakfast, is an important factor that triggers anemia. Research results Stuttgart (2021), also showed that there was a link between breakfast habits and the incidence of anemia. Where out of a total of 30 respondents, as many as 10% of students always eat breakfast, 23.33% often eat breakfast, 26.67% sometimes have breakfast, 30% rarely eat breakfast, and 10% never eat breakfast at all. The results of the examination showed that 40% of students had anemia, while 60% were not anemic. Breakfast acts as the main source of energy to start daily activities, especially for teenagers who have a fairly busy activity schedule. In addition to helping meet energy needs, breakfast can also prevent the habit of eating snacks that are generally low in nutritional content. With a good, sufficient and nutritious breakfast, adolescents can carry out daily activities optimally, both physically and concentrating on learning at school.

Based on the results of interviews with several students of SMP Negeri 1 Tapa, information was obtained that blood tests had been carried out at the school, especially hemoglobin, but all students at the time of the interview did not know the results of the hemoglobin levels obtained. From the clinical symptoms reported by the students at the time of the interview, 14 students often experienced complaints such as dizziness and fatigue, and 6 other students complained of physical weakness during activities, especially when not eating breakfast. The results of further interviews about breakfast stated that there were 17 female students who had the habit of eating breakfast regularly.

RESEARCH METHODS

This study is a quantitative research with descriptive correlation analysis using a cross sectional approach. The purpose of this study is to reveal the cause-effect relationship by observing all variables and measuring them at the time of the study. The data used in this study are primary data to determine the relationship between breakfast and hemoglobin levels in adolescent girls at SMP Negeri 1 Tapa. The location of the research was carried out at the State Junior High School 1 Tapa. The research time was held on November 06, 2025 at 09.20-11.10 WITA

In this study, the researcher used the *purposive sampling*. It is a sampling technique where the selection of subjects is deliberately based on certain criteria that are considered appropriate and relevant by the researcher. This technique allows the research to focus data collection on the individuals or groups most related to the research objectives, so that the data obtained tends to be more in-depth, specific, and in accordance with the needs of the study being conducted (Subhaktiyasa, 2024). The sample in this study amounted to 68 respondents who were obtained from the calculation using slovin in (Planlar *et al.*, 2025).

Data Analysis Techniques

Univariate Analysis

Univariate analysis is carried out when the variables analyzed consist of only one type. What is meant by one type here does not mean only one variable, but does not involve independent variables or related variables. Univariate analysis typically uses descriptive statistical methods to describe the parameters of each variable, which include the size of data concentration (*red*, *median*, *fashion*) as well as the size of the data dissemination (*variance*, *standard deviation*, and *Range*) (Sarwono & Handayani, 2021). Univariate analysis in this study was used to describe each variable separately. Independent variables are breakfast habits served in the form of frequency and percentage distributions. Dependent variables, namely hemoglobin levels that will be analyzed using descriptive statistics, include mean, median, standard deviation, minimum value, and maximum.

Bivariate Analysis

Bivariate analysis is an analysis technique used in research with two variables. The goal is to test the hypothesis and find out the direction, meaning, and strength of the relationship between independent variables and dependent variables (Arifin *et al.*, 2022). Bivariate analysis in this study was used to determine the relationship between breakfast habits and hemoglobin levels in adolescent girls. Because the variable of breakfast habits consists of three categories (good, sufficient, and less) and the variable of hemoglobin levels is then categorized into two groups (normal and anemia) based on the cut-off value of hemoglobin, the statistical test used is the *Chi-Square* (χ^2). If there are conditions that are not met in the data processing results, for

example, there are cells with an expected frequency of <5 , then as an alternative test is used *Fisher's Exact Test* to obtain more accurate results. This test was chosen because it is suitable to find out the relationship between two variables that are categorically scaled.

RESULTS

Characteristics of Respondents by Age

Table 1. Frequency distribution of respondent characteristics by age

Yes	Age	Frequency (n)	Percentage (%)
1.	Years	31	45,6
2.	Years	26	38,2
3.	Years	10	14,7
4.	Years	1	1,5
Total		68	100

Source: Primary Data, 2025

Based on table 1, most of the respondents in this study consisted of 31 respondents aged 12 years (45.6), and a small number of respondents consisted of 15 years old with the number of respondents 1 (1.5).

Characteristics of Respondents by Class

Table 2 Frequency distribution of respondent characteristics by class

Yes	Classes	Frequency (n)	Percentage (%)
1.	7	34	50,0
2.	8	34	50,0
Total		68	100

Where the respondents in grade 7 and grade 8 are equivalent, namely, as many as 34 people (50%) each out of a total of 68 respondents. So that both groups have equal representation in data collection.

Univariate Analysis

Distribution of respondents based on breakfast habits

Table 3 The distribution of respondents is based on breakfast habits at SMP Negeri 1 Tapa

Yes	Breakfast	Frequency (n)	Percentage (%)
1.	Less	10	14,7
2.	Enough	40	58,8
3.	Good	18	26,5
Total		68	100

Source: Primary Data, 2025

In table 3, the results of breakfast for adolescent girls in junior high school as many as 10 people (14.7%) have a lack of breakfast habits. The majority of respondents, namely 40 people (58.8%) were in the category of adequate breakfast. Meanwhile, 18 people (26.5%) of these respondents had good breakfast habits. These results show that most of the respondents have already had breakfast, but the quality of their breakfast must be improved.

Distribution of respondents by hemoglobin levels in adolescent girls

Table 4. Distribution of respondents based on hemoglobin levels in adolescent girls at SMP Negeri 1 Tapa

Yes	Hemoglobin Levels	Frequency (n)	Percentage (%)
1.	Low	46	67,6
2.	Normal	22	32,4
Total		68	100

Source: Primary Data, 2025

Based on table 4, it shows that most of the respondents have low hemoglobin levels, namely 46 people (67.6%), while 22 people (32.4%) are in the normal category. These results showed that the majority of respondents had low hemoglobin levels and were at risk of anemia.

Bivariate Analysis

The Relationship between Breakfast and Hemoglobin Levels in Adolescent Girls at SMP Negeri 1 Tapa

Table 4 Relationship of Breakfast to Hemoglobin Levels

Breakfast	Hemoglobin Levels				Total		P- Value
	Low		Normal		N	%	
	N	%	N	%			
Less	8	80,0	2	20,0	10	100	0,047
Enough	30	75,0	10	25,0	40	100	
Good	8	44,4	10	55,6	18	100	
Total	46	67,6	22	32,4	68	100	

Source: Primary Data, 2025.

Based on table 5 above, it shows that most young women have low hemoglobin levels (67.6%). In the breakfast less group, (80%) of the respondents experienced low hemoglobin, while in the moderate breakfast as much (75%) were also in the low category. While the breakfast group was dominated by adolescents with normal hemoglobin (55.6%). The results of the *chi-square* test showed a value of $p = 0.047$ ($p < 0.05$), so it can be concluded that there is a significant relationship between breakfast habits and hemoglobin levels in adolescent girls at SMP Negeri 1 Tapa.

DISCUSSION

Breakfast Habits in Young Women at SMP Negeri 1 Tapa

Based on the results of the study on 68 adolescent female respondents at SMP Negeri 1 Tapa, their breakfast habits showed quite clear variations. Most of the students were in the category of adequate breakfast, which was as many as 40 respondents (58.8%). The breakfast category is quite the most dominant category in this study. In grade 7, the number of respondents with breakfast was enough as many as 17 respondents, while in grade 8 the number was higher, namely 23 respondents. Based on age, the breakfast category was most commonly found at the age of 12 years, which was 17 respondents, followed by 13-year-old 15 respondents, 14-year-old 7 respondents, and 15-year-old 1 respondent. Where in the sufficient category, the respondents have a fairly good consumption pattern but sometimes they still skip breakfast. They still eat carbohydrates and protein at breakfast, but do not always add vegetables or fruits, so the nutritional value is not optimal. Their breakfast frequency was lower than that of the good breakfast group, and occasionally still skipped breakfast due to rushing, restlessness, or lack of appetite. They understand the importance of breakfast, but its implementation is not routine and the menu chosen is still simple. This condition is in line with the findings (Damara & Muniroh, 2021) which explains that most adolescents have not met the criteria for a good breakfast because their energy intake is less than 15% of the CRA, breakfast times are often late, and the menu chosen tends to be simple and less varied. The study also noted that common reasons for skipping breakfast were not having time, not having an appetite, or being afraid of being late for school.

Furthermore, there were 18 respondents (26.5%) who were included in the category of good breakfast. Based on the results of the study, respondents with the category of good breakfast were more found in grade 7 than in grade 8. In grade 7, there were 12 respondents who were included in the category of good breakfast, while in grade 8 there were only 6 respondents. In terms of age, breakfast in the good category was found at the age of 12 years as many as 9 respondents, followed by 13 years old as 7 respondents, and 14 years old as 2 respondents. From the results of the researcher's analysis, respondents who are included in the category of breakfast are generally good. Consume a complete breakfast menu, which includes sources of carbohydrates (such as rice, bread, or noodles), animal and vegetable proteins (chicken, eggs, tempeh, tofu), and vegetables or fruits as sources of vitamins and minerals. They also eat breakfast almost every day, finish the breakfast menu, and eat breakfast at the right time, namely 07.00-09.00. After that, they have a strong perception that breakfast is important for energy, concentration, and endurance. This is in line with research Levi *et al.*, (2021) Where the study says that a good breakfast is a morning meal activity that is carried out to meet the body's energy needs which should include carbohydrates, side dishes, vegetables, fruits, and drinks. On the other hand, skipping breakfast can cause weakness, drowsiness, decreased concentration, and disruption of learning activities.

Meanwhile, respondents with the breakfast category were less of the group with the least number compared to other categories. Students with breakfast who were in the category of breakfast were less than 10 respondents (14.7%). Where in grade 7, there were 5 respondents with the category of breakfast less, and in grade 8 there were also 5 respondents. When viewed from age, the breakfast less category was most found at

the age of 12 years with 5 respondents, followed by the age of 13 years with 4 respondents, and the age of 14 years with 1 respondent. Where respondents with the breakfast category are less likely to rarely eat breakfast or only eat snacks without a balanced nutritional composition. Many of them don't eat protein, vegetables, or fruit in the morning, and some don't even eat breakfast at all. The habit of skipping breakfast is influenced by the factor of the afternoon, no food preparation, or lack of appetite in the morning. As a result, their morning nutritional intake is low and does not meet their energy needs before activities. This research is in line with Bank (2021) It was found that most students had a low level of breakfast energy adequacy, as many of them skipped breakfast or only ate foods that did not meet 15-30% of their daily energy needs. The journal also explains that an inadequate breakfast leads to low daily nutritional intake and is often influenced by reasons for not having time, not being hungry, or not having food available at home.

The breakfast variables in this study were not only reviewed from the categories of good, adequate, and poor, but also considered the frequency, time of meals, and types of food consumed. Respondents with a good breakfast category usually have breakfast every day between 07.00-09.00 with a complete menu consisting of sources of carbohydrates, protein, and additional vegetables or fruits. In the moderate-breakfast group, the frequency of breakfast was less frequent and the completeness of the menu was not consistent, because some respondents only consumed carbohydrates and proteins without other complementary foods. Meanwhile, respondents with less breakfast were less likely to eat breakfast infrequently or only eat snacks, so their energy needs in the morning were not met.

Breakfast is an important part of a healthy lifestyle to achieve balanced, active, and intelligent nutrition, and should ideally be consumed between 6:00 a.m. and 9:00 a.m. Physiologically, breakfast provides essential nutrients for the body, so it is indispensable for school-age children to meet nutritional needs before starting intensive learning activities (Ekawaty, Fadliyana Ekawaty, 2025). Breakfast helps students meet their daily energy needs so that their nutritional status is maintained. In addition, the type of food consumed should include carbohydrate sources, animal or vegetable side dishes, vegetables, fruits, and drinks. Good breakfast habits also contribute to improved memory and concentration, reduce the risk of getting sick easily, and help maintain stamina throughout the day (Hibban *et al.*, 2025). Skipping breakfast is common in teens because they think eating breakfast can gain weight. Another factor that affects is the unavailability of food or menus that are less attractive at home. In urban teenagers, this habit is also triggered by parents who are busy at work and very early school leave, so they don't have time to eat breakfast (N. P. Sari & Khatimah, 2024).

In this study, it shows that the majority of respondents already have an adequate breakfast pattern before starting activities. In general, these results illustrate that the breakfast pattern of SMP Negeri 1 Tapa students tends to be at a fairly good level, although there are still a small number who have not made breakfast a daily routine. This is supported by research Saputra & Kartika, (2023) which explains the same thing where breakfast is a eating activity that is done after waking up to meet 15-30% of daily nutritional needs to support better health. However, the study also confirms that until now there are still many Indonesians who have not made breakfast a part of their habit.

Hemoglobin Levels in Adolescent Girls at SMP Negeri 1 Tapa

Based on the results of the study in table 4, there were 46 adolescents (67.6%) who had low hemoglobin levels. This figure shows that most of the young women at SMP Negeri 1 Tapa experience lower than normal hemoglobin levels, which indicates that there are significant anemia symptoms in this group. The group of adolescents with the lowest hemoglobin levels was in the 12-year-old age group, which was 21 respondents. Low hemoglobin levels in early adolescence occur because iron levels increase rapidly during puberty, while their diet is often unable to meet these needs. According to the theory P. Sari *et al.*, (2022) It shows that many young women have inadequate nutrient intake, including low iron consumption, so they are prone to anemia. Students with low iron intake tend to have lower than normal hemoglobin levels because iron is required in the formation of heme, which is the part of hemoglobin that attracts oxygen. When iron intake is insufficient, the body cannot produce enough hemoglobin so the oxygen supply to the tissues is reduced and leads to anemia (Widyaningrum *et al.*, 2023).

Meanwhile, female students with normal hemoglobin were most found in 12-year-old female students, namely 10 people. However, when viewed in percentage, the highest proportion of normal hemoglobin is found at the age of 13 years at 34.6%. Adolescence is a period of growth and development characterized by various changes, both physical, physiological, psychological, behavioral, and social. This growth and development process leads to an increased need for nutrients and other essential nutrients, so that adolescents become more at risk of malnutrition. The state of malnutrition in adolescents can cause various health problems that have an impact on the quality of health in the long term. One of the health problems that is often encountered in adolescents is anemia (P. R. Putri, 2024). In this phase, blood loss due to menstruation has not taken place regularly, so hemoglobin reserves are still relatively maintained. This shows that age factors and physiological developmental factors play an important role in maintaining normal hemoglobin levels in this age group (Octarian *et al.*, 2021).

Young women have possibilities about ten times more likely to develop anemia than adolescent boys. This condition occurs because young women experience menstruation every month which causes blood loss, and are in a growth phase that increases iron needs, so their intake must be higher (Medical & Journal, 2025). Young women are more at risk of anemia because of regular blood loss during menstruation that occurs every month. The incidence of anemia in this group is related to menstrual patterns, such as age at menarche, the regularity of the cycle, the length of menstruation, the amount of blood that comes out, and the presence of menstrual disorders. Differences in menstrual patterns in each adolescent girl will affect the volume of bleeding that occurs, thus having an impact on hemoglobin levels in the blood (Karimah *et al.*, 2024).

Hemoglobin is a metalloprotein, which is a protein that contains the element iron in red blood cells. Its function is to transport oxygen from the lungs to the rest of the body, and the level can increase or decrease according to the condition of the body (Sukasari, 2022). Hemoglobin is a protein that contains iron. The globin component of hemoglobin will be broken down into amino acids which are then used as proteins for body tissues. Meanwhile, the iron contained in heme will be released and reused in the process of further formation of red blood cells. Proteins also play a role in the process of transporting iron through transferrin. If protein intake is insufficient, the process of iron transport and the formation of hemoglobin and red blood cells can be disrupted, which can eventually lead to anemia (A. N. Sari *et al.*, 2024).

This is in line with the research that has been carried out where at the time of the examination it was found that most of the students experienced anemia, as seen Of the many hemoglobin values that are in the range of 10 – 11 g/dl and even some below 10 g/dl. This condition can physiologically occur because adolescent girls have a higher iron requirement due to menstruation, so inadequate food intake will have a direct impact on lowering hemoglobin levels. This finding is in line with research Wiafe *et al.* (2023) Which explains that adolescent girls have a higher iron requirement due to puberty and menstruation, but are often not balanced with an adequate diet, especially low intake of iron, protein, and vitamins that play a role in the formation of hemoglobin.

The Relationship of Breakfast and Hemoglobin Levels in Adolescent Girls at SMP Negeri 1 Tapa

Based on the results of bivariate analysis from 64 respondents, there were 10 respondents with a lack of breakfast category, where most of the respondents in this category had low hemoglobin levels, namely 8 respondents (80.0%), while those with normal hemoglobin levels were only 2 respondents (20.0%). These findings suggest that poor breakfast habits are related to a high proportion of low hemoglobin levels in female students. Condition tThis can be caused by irregular breakfast patterns, where in this category respondents rarely or never eat breakfast in one week, and do not consume breakfast menus regularly complete such as adequacy of protein, vegetables, and fruits. Respondents tended to eat only one type of food or even skip breakfast altogether. In addition, many respondents in this category stated that they missed breakfast because they were in a hurry to leave for school, had no appetite, or the breakfast menu was not available. As a result, nutrients in the morning become low, contributing to low hemoglobin levels in female students with a lack of breakfast category. This is in line with research Fadila *et al.*, (2024) Where nutrient intake is greatly influenced by breakfast habits. Low hemoglobin levels can occur due to insufficient food intake for the body, so that iron reserves in the body are reduced.

Furthermore, in the group with enough breakfast, there were 40 respondents, where most of the respondents still had low hemoglobin levels, namely 30 respondents (75.0%), while 10 respondents (25.0%) had normal hemoglobin levels. Although it is included in the category of adequate breakfast, the high proportion of low hemoglobin levels in this group indicates that the breakfast done is not completely optimal. In this category, some respondents have done breakfast in one week, but it has not been done regularly every day. In this group, they generally often or occasionally consume a source of carbohydrates and protein at breakfast, but it is not always accompanied by vegetables and fruits as a source of vitamins and minerals. The frequency of breakfast in this category is better than less breakfast, but some respondents still occasionally skip breakfast for reasons of being in a hurry, waking up late, or lack of appetite. These findings show that the breakfast carried out is not fully optimal, both in terms of consistency and completeness of the menu, so it has not had a maximum impact on the maintenance of normal hemoglobin levels.

This is in line with research Nabila & Widiyaningsih, (2025), which states that the habit of skipping breakfast can cause one-third of daily nutrient needs, such as carbohydrates, proteins, and micronutrients including iron and vitamins, to be unmet. Insufficient intake of these nutrients has the potential to cause health problems in adolescents, especially increasing the risk of anemia. Irregular food consumption patterns are the dominant factor that makes adolescent girls susceptible to anemia, because the habit of skipping breakfast repeatedly can hinder the fulfillment of the diversity of nutrients needed in the process of hemoglobin synthesis.

Meanwhile, in the good breakfast category, There were 18 respondents where most of the respondents had normal hemoglobin levels, namely 10 respondents (55.6%), while 8 respondents (44.4%) still had low hemoglobin levels. These findings show a tendency that the better the breakfast habits, the higher the proportion of adolescents with normal hemoglobin levels. Respondents in this category always eat breakfast

every morning, done consistently in the past week, and at the appropriate time. In addition, respondents often consume a complete breakfast menu, consisting of carbohydrate sources, animal and vegetable proteins, vegetables, and fruits, and spend the breakfast served. This is related to the role of breakfast as a source of energy and essential substances, including iron, which are needed in the process of hemoglobin formation. When breakfast is missed or the quality is lacking, the body will lack iron intake so that it increases the risk of low hemoglobin levels or anemia. This research is in line with Thompson's theory in Atik *et al.*, (2022) Where it is stated that nutritional statistics are positively related to hemoglobin levels, which means that the better a person's nutritional status, the higher the hemoglobin level.

This study shows that the respondents with low hemoglobin levels most come from the category of adequate breakfast, because basically most of the students eat breakfast but the quality and consistency are not optimal, for example, they only consume carbohydrates and proteins without vegetables and fruits, so that the intake of important micronutrients such as non-heme iron, folate, and vitamins that support iron absorption is lacking.

These findings indicate that although this group has relatively better breakfast habits than the breakfast category, the quality and consistency of their breakfast menu is not optimal in meeting the nutritional needs, especially iron which plays an important role in the formation of hemoglobin. This is in line with the results of the research Princess *et al.*, (2025) Where the study showed that adolescent girls with low hemoglobin levels were more likely to have poor breakfast quality, which was 46.3%, compared to those with good breakfast quality, which was 17.1%. Meanwhile, adolescent girls with normal hemoglobin levels were more found in the group with good breakfast quality at 26.8%, compared to the group with poor breakfast quality which was only 9.8%.

From the results of the research that has been conducted, respondents with normal hemoglobin levels are most in the category of good breakfast. This can happen because respondents with a good breakfast category tend to eat breakfast more regularly every day, choose a more complete breakfast menu, namely consuming carbohydrates, animal protein, vegetable protein, vegetables and fruits, eating at the right time, and having a good understanding of the importance of morning nutritional intake. This habit makes their intake of nutrients, especially iron, protein, and vitamin C more fulfilled so that this condition supports the formation of hemoglobin and keeps hemoglobin levels normal. Meanwhile, some of the respondents who are in the breakfast category also have normal hemoglobin, but the number is not as much in the breakfast category as well because the quality and consistency of their menus still vary.

CONCLUSION

Based on the results of a study involving 68 respondents, it shows that most young women have breakfast habits in the adequate category, which is as many as 40 respondents (58.8%). The students who were in the breakfast category were good at 18 respondents (26.5%), while the breakfast category was less than 10 respondents (14.7%). In the examination of hemoglobin levels, it was found that the majority of female students experienced low hemoglobin levels, namely 46 respondents (67.6%). Meanwhile, female students with normal hemoglobin levels amounted to 22 respondents (32.4%). The results of the analysis using *the Chi-square* test obtained a value of $p = 0.047$, which shows a significant relationship between breakfast habits and hemoglobin levels in adolescent girls at SMP Negeri 1 Tapa.

SUGGESTIONS

Health workers are advised to conduct periodic monitoring of the hemoglobin status of female students and provide education on the prevention of anemia, including the importance of iron intake, consumption of blood-boosting tablets (TTD), and a healthy lifestyle.

For young women, it is recommended to make breakfast a habit every morning by choosing foods that are nutritious, balanced, and rich in iron, such as meat, green vegetables, eggs, and other animal foods. Because consistency in breakfast and the selection of nutritious menus can help increase hemoglobin levels and prevent anemia.

REFERENCES

- Agama, P., Di, I., & Medan, M. A. N. (2022). Journal of Research, Education and Implementation of Outdoor Learning Methods in. 3(2), 147–153.
- Anggraini, V. R., Maulida, N. R., & Aini, R. N. (2024). The Relationship Between Protein, Iron, Folic Acid, Vitamin C Intake and Breakfast Habits With The Incidence of Anemia in Female Students of SMPN 152 Jakarta. Journal of Global Nutrition, 4(2), 351–357. <https://doi.org/10.53823/jgn.v4i2.93>
- Arifin, R., Fahdhienie, F., & Ariscasari, P. (2022). Analysis of Learning Interests and Learning Activities During the Covid-19 Pandemic on the Quality of Online Learning of SMP N 2 Trumon Timur Students of South Aceh Regency in 2021. Journal of the Center for the Study of People's Education, 2(3), 75–84.

- Foster care, P., People, D., Against, T., Adolescent, A., Use, D., Village, D., & District, P. (2022). JPDK: Volume 4 Number 1 of 2022 Research & Learning in Primary Education Dialogical Parenting Patterns of Parents to Adolescents in the Use of Gadgets in Patalan Village, Probolinggo Regency. 4, 368–375.
- Aswan, P., Razali, Amiruddin, Syamsulrizal, Putra, S., & Nauval, I. (2022). Analysis of Hemoglobin Levels on Cardiovascular Endurance Ability in First Education Students of the Indonesian Army Military Command Iskandar Muda. *Kuala Journal of Shia Medicine*, 22(2), 66–71. <https://doi.org/10.24815/jks.v22i2.25426>
- Atik, N. S., Susilowati, E., & Kristinawati. (2022). Overview of Hemoglobin Levels in Adolescent Girls at Vocational Schools in the Highland Region. *Indonesian Journal of Midwifery*, 6(2), 61–68. <http://ejr.stikesmuhkudus.ac.id/index.php/ijb/article/view/1731/1033>
- Atiqah, N., Sulhan, A., Ardaniah, N. H., & Rahmadi, M. S. (2024). Behavior : Journal of Educational Guidance Counseling and Psychology Volume 1 No 1 May 2024 Periodization of Child Development in Adolescence : A Psychological Review. 1(1), 9–36.
- Attend. (2021). The Relationship between Breakfast Habits and the Incidence of Anemia in Students of Al Washliyah Vocational School 13 Kota Tebing Tinggi. *Journal of Research Science* |, 11 (November), 752. <http://journal.unigha.ac.id/index.php/JSR>
- Bank, W. (2021). Breakfast characteristics, perception, and reasons of skipping among 8th and 9th- grade students at governmental schools,. 1–10.
- Collins, S. P., Storrow, A., Liu, D., Jenkins, C. A., Miller, K. F., Kampe, C., & Butler, J. (2021). Nutrition Education and Making Healthy Breakfasts for Students to Reduce Nutritional Problems Over at SMA Negeri 4 Semarang City. 7(2), 167–186.
- Haeriyah, S., Ayuningtyas, N., Marsepa, E., & Faidatusyarifah, F. (2022). Education on the importance of breakfast in teenagers. *JMM (Journal of Independent Society)*, 6(6), 5023. <https://doi.org/10.31764/jmm.v6i6.11643>
- Hamzah. (2023). The Relationship of Breakfast Habits to Physical Activity Fulfillment and Learning Concentration of Elementary School Students at SDN Mangun Jaya 04 South Tambun. *Scientific Journal of Educational Vehicles*, 9(2), 70–75. <https://doi.org/https://doi.org/10.5281/zenodo.7584595>
- Hartanti, A., Harwati, R., & Arswinda, A. (2024). The Relationship of Knowledge About Nutrition with Nutritional Status in Grade VII Adolescent Girls at SMP N 3 Boyolali. *Journal of Nursing Horizons*, 01(02), 134–145.
- Hartati, B., Savitri Effendy, D., Lestari, H., & Tosepu, R. (2023). Education of the PESPA program (The Importance of Breakfast) for Health for Students of SMPN 15 Kendari City, Southeast Sulawesi. *Dedicative Journal of Public Health*, 3(2), 23–28. <https://doi.org/10.22487/dedikatifkesmas.v3i2.607>
- Hartini, S., Prihandono, D. S., & Gustiani, D. (2024). Analysis of student hemoglobin levels with breakfast habits. *Journal Health & Science: Gorontalo Journal Health and Science Community*, 8(1), 43–51. <https://doi.org/10.35971/gojhes.v8i1.21929>
- Helmyati, S., Hasanah, F. C., Putri, F., Sundjaya, T., & Dilantika, C. (2023). Biochemistry Indicators for the Identification of Iron Deficiency Anemia in Indonesia: A Literature Review. *Amerta Nutrition*, 7(3), 62–70. <https://doi.org/10.20473/amnt.v7i3SP.2023.62-70>
- Hibban, A., Huwaidy, A., Zuraida, R., & Febriani, W. (2025). The Relationship between Breakfast Habits and Students Nutritional Status: Literature Review. see also Doctrine and Covenants, 1953–1958.
- Imas Saraswati, P. M. I. (2021). The relationship between hemoglobin (HB) levels and achievement in high school students (SMA) or equivalent. *Journal of Medicine Hutama*, 02(04), 1187–1191. <http://www.jurnalmedikahutama.com/index.php/JMH/article/view/246>
- Lewi, S., Yemina, L., & Siringo-ringo, L. (2021). Overview of Breakfast Habits with Student Concentration Level in the Dormitory of the Care Academy of PGI Cikini Hospital, Central Jakarta. 2(2), 19–25.
- Lodia Tuturop, K., Martina Pariaribo, K., Asriati, A., Adimuntja, N. P., & Nurdin, M. A. (2023). Prevention of Anemia in Adolescent Women, FKM Students of Cendrawasih University. *Panrita Inovasi: Journal of Community Service*, 2(1), 19. <https://doi.org/10.56680/pijpm.v2i1.46797>
- Lorenza, T. (2021). The Effect of the Use of the Inside Outside Circle (Ioc) Model on the Improvement of Integrated Thematic Learning Outcomes for Class IV Sdn Cluster V, Sutera District. *Didactic : PGSD Scientific Journal STKIP Subang*, 7(02), 415–426. <https://doi.org/10.36989/didaktik.v7i02.235>
- Lubis, R., Nabila, P., Nasution, N., Azzahra Lathifah, Hasraful, & Andina Fadillah. (2024). The Evolution of Adolescents Aged 17-19 Years: An Analysis of Their Growth and Development. *Journal of Education and Teaching Review*, 7(3), 7899–7907.
- Medical, B., & Journal, H. S. (2025). Overview of Hemoglobin Levels in Adolescent Girls at UPTD Kereng Bangkirai Health Center 1. pp. 1(01), 1–11.

- Meimi Lailla, Zainiar, A. F. (2021). Comparison of Digital Hemoglobin Test Results with Cyanmethemoglobin Hemoglobin Test Results | Lailla | Journal of Educational Laboratory Management. *Journal of Educational Laboratory Management*, 3 (September 2020), 1–6. <https://ejournal2.undip.ac.id/index.php/jplp/article/view/11555/5955>
- Merlisia, M., Setyarsih, L., Novianti, T. A., Arnisaputri, D., City, J., Merlisia, M., Setyarsih, L., Novianti, T. A., & Arnisaputri, D. (2024). The Relationship between Breakfast Habits and the Incidence of Anemia in Adolescent Women in the Working Area of the Rawasari Health Center, Jambi City. *Nightingale Journal of Nursing*, 12, 9–12.
- Muhada, D., Pranata, R., Tanjungpura, U., West Jl Jl Professor Doctor H Hadari Nawawi, K. H., Laut, B., Pontianak Tenggara, K., Pontianak, K., & Barat, K. (2024). Overview of Breakfast Habits for Elementary School Children. *Journal of the World of Education*, 4(4), 1452–1461.
- Musrifah Mardiani Sanaky, La Moh. Saleh, H. D. T. (2021). Analysis of the Factors Causing Delays in the Construction Project of the Man 1 Tulehu Dormitory Building, Central Maluku. Semarang: Diponegoro University Publishing Board, 11(1), 432–439.
- Nababan, A. S. V., Wanda Lestari, Eka Nenni Jairani, Yulita, Y., & Salsabila, W. I. (2023). The Effect of Breakfast Counseling on Hemoglobin Levels and Knowledge in MAN 2 Aceh Tamiang Students. *Indonesian Scientific Nutrition Media*, 1(2), 53–62. <https://doi.org/10.62358/mgii.v1i2.11>
- Nabila, S. Y., & Widiyaningsih, E. N. (2025). The Relationship between Breakfast Habits and Anemia Status in Adolescent Girls of SMAN 1 Kartasura. 9, 4859–4864.
- Nareswari, N. A., Muwakhidah, M., Studie, P., Nutrition, I., Health, F. I., & Surakarta, U. M. (2025). The Relationship between Breakfast Habits and Nutritional Status and Incidence of Anemia in Adolescent Women at the Faculty of Health Sciences, University of Muhammadiyah Surakarta. 4(4), 983–996. <https://doi.org/10.55123/insologi.v4i4.6179>
- Nurlita, Arfanda, and R. (2024). Journal of the world of education. *Journal of the World of Education*, 3 (November), 1658–1668. <http://jurnal.stokbinaguna.ac.id/index.php/JURDIP/article/view/2083>
- Oktariana, D., Lusiana, E., Tamzil, N. S., & Prasasty, G. D. (2021). Level of haemoglobin and knowledge regarding anemia and its prevention among adolescents. 117–122. <https://doi.org/10.32539/SJM.v4i2.108>
- Pebriani, Fadliyana Ekawaty, A. (2025). *Journal of tropical nursing of Papua*. pp. 8(2023), 4–11.
- Peña-jorquera, H., Campos-n, V., Sadarangani, K. P., Ferrari, G., Jorquera-aguilera, C., & Cristi-montero, C. (2021). Breakfast: A Crucial Meal for Adolescents' Cognitive Cogni-Action Project. *Nutrients*, 13, 1320.
- Putri, P. R. (2024). ANAEMIA EDUCATION AND HEMOGLOBIN LEVEL CHECKS IN ADOLESCENT GIRLS. 6(November), 10–17.
- Putri, R., Smpn, D. I., & Raya, S. (2025). The Relationship Between Breakfast Quality And Hemoglobin Levels Among Female Adolescents At Smpn 5 Sungai Raya Abstract. That is why we need to be vigilant.
- Rahmatullah, W., Abdullah, S., & Mardiyansih, A. (2023). Differences in Hemoglobin Levels Using Saputra, A., & Kartika, W. (2023). The Effect of Breakfast on the Nutritional Status of Adolescents at SMA Negeri 1 Ciomas. *Health Scientific Journal*, 2(1), 50–54.
- SEPTIANI, W. N. V. (2024). Breakfast habits with a concentration on learning in class XI students. 1–23.
- Sincovich, A., Moller, H., Smithers, L., Brushe, M., Lassi, Z. S., Brinkman, S. A., & Gregory, T. (2022). Prevalence of breakfast skipping among children and adolescents: a cross-sectional population level study. *BMC Pediatrics*, 22(1), 1–10. <https://doi.org/10.1186/s12887-022-03284-4>
- Subhaktiyasa, P. G. (2024). Determining Population and Sample: Quantitative and Qualitative Research Methodology Approach. 9, 2721–2731.
- Sukasari, D. (2022). *Journal of Indonesian Medical Laboratory and Science*. 3(2), 184–191.
- Sumariyatun (Palembang Health Polytechnic). (2020). Overview of Hemoglobin Levels of Cupri Sulfate Method in Prospective Donors at Utd Depati Bahrin Hospital, Bangka Regency in 2020. *Journal of Health Analysts*, 30.
- Supriyatin, S., Solikhah, S., & Prambudi, H. (2024). Blood Bank Screening for Hemoglobin Examination in Pasalakan Village, Sumber District. *Journal of Community Service Creativity (PKM)*, 7(1), 34–43. <https://doi.org/10.33024/jkpm.v7i1.12185>
- Suryana et al. (2022). Master of Islamic Religious Education, Tarbiyah and Teacher Training, State Islamic University (UIN). Early and Secondary Adolescent Development and Its Implications for Education, 8(3), 1917–1928.
- Syafrida. (2022). This book was written by a lecturer at the University of Medan Copyright Area Protected by Law Has been deposited into the UMA Repository on January 27, 2022.

- Syifa, N., Ilhami, T., & Akbar, S. (2025). The Relationship of Breakfast Habits to Hemoglobin Levels of Students of the Faculty of Medicine, Malikussaleh University Class of 2019-2021 ". *Journal of Implementing Husada*, 6(1), 1–11.
- Tambunan, H., & Maritalia, D. (2023). Comparison of Hemoglobin Level Examination Results with Sahli Method and Digital Method. *Forikes Journal of Voice Health Research*, Vol 14 (April), 41–43. <http://forikes-ejournal.com/index.php/SF>
- Utami, J. R., Shifa, N. A., & Rukiah, N. (2024). The Relationship between Eating Habits and Physical Activity and Nutritional Status in Adolescents in 2024. *Journal of Health and Medicine*, 1(2), 46–56. <https://doi.org/10.62383/vimed.v1i2.112>
- W.Sarwono, 2023. (2023). Implementation of the Social Environment on the Formation of Adolescent Empathy Behavior. *Journal of Counseling Guidance*, 9(1), 74–85.
- Wiafe, M. A., Ayenu, J., & Eli-cophie, D. (2023). A Review of the Risk Factors for Iron Deficiency Anaemia among Adolescents in Developing Countries. 2023.
- Widyaningrum, M., Mar, K., Dhiemitra, A., & Dewi, A. (2023). The Relationship of Fe Intake to Hemoglobin Levels in Adolescent Women. 1, 224–230.
- Wiesenthal, D. L., Hennessy, D. A., Totten, B., Vazquez, J., Acquisitions, L. E. AND D. E., Vigente, T., Frampton, P., Azar, S., Jacobson, S., Perrelli, T. J., Washington, B. L. L. P., No, Ars, P. R. D. a T. a W., Kibbe, L., Golbère, B., Nystrom, J., Tobey, R., Conner, P., King, C., ... Chraif, M. (2023). The relationship between knowledge, attitudes, and habits of balanced nutritional breakfast with anemia in adolescent girls at SMP Negeri 3 Kaliwungu. *Accident Analysis and Prevention*, 183(2), 153–164.
- Zaki, M., & Saiman, S. (2021). Study on the Formulation of Statistical Hypotheses in Testing Research Hypotheses. *JiIP - Scientific Journal of Education*, 4(2), 115–118. <https://doi.org/10.54371/jiip.v4i2.216>
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