

The Relationship Between Diet and the Incidence of Anemia in Boarding School Children

Alvita Devi¹, Niluh Arwati²

¹ Undergraduate Nutrition Study Program, Faculty of Science, Technology and Health Sciences, Bina Mandiri University Gorontalo and alvitadevi623@gmail.com

² Undergraduate Nutrition Study Program, Faculty of Science, Technology and Health Sciences, Bina Mandiri University Gorontalo and niluharwatiskm@gmail.com

ABSTRACT

This study aims to investigate the relationship between dietary patterns and the incidence of anemia among female students living in dormitories at Bina Mandiri University, Gorontalo. Anemia is a common health issue, particularly in developing countries, with a high prevalence among women of reproductive age. This research is motivated by the high prevalence of anemia among young women in Indonesia, including female students living in dormitories. Data were collected through questionnaires and hemoglobin tests among students of the Faculty of Science, Technology, and Health Sciences (FSTIK). Preliminary results indicate that out of 5 respondents, 3 were found to be anemic. Irregular eating habits and low iron intake through diet were identified as major risk factors for anemia. This study is expected to provide valuable information for improving nutritional knowledge, particularly in efforts to prevent anemia among female students. The findings of this research may also serve as a reference for future studies and the development of more effective nutrition education programs.

Keywords: *Anemia, Diet, Female Students, Iron Intake, Prevention*

1. INTRODUCTION

Anemia is a world health problem, especially in developing countries, where an estimated 30% of the world's population suffers from anemia. According to 2019 World Health Organization (WHO) data, the global prevalence of anemia in women of childbearing age is 29.9% or equivalent to the prevalence of more than 5 billion women aged 15-49 years. The prevalence of anemia in non-pregnant women of childbearing age is 29.6% and in pregnant women 36.5% (WHO, 2022). The prevalence of anemia in Indonesia is 48.9% in the age group 15-24 and 25-34 years (Risksdas 2018).

The incidence of anemia in developing countries is around 53.7% of adolescent girls. The rate of iron deficiency anemia in Indonesia is 72.3%. Iron deficiency in adolescents results in paleness, weakness, fatigue, dizziness, and decreased concentration in learning [1], [2].

Basic Health Research Data (2020) reveals that the prevalence of anemia in women of childbearing age (15 years and over) is 22.7%, while in pregnant women it is 37.1%. According to the Gorontalo Province Central Statistics Agency, there are 54,885 teenagers aged 10-14 years and 56,140 teenagers aged 15-19 years [1], [3].

The main cause of anemia in adolescent girls is a lack of nutritional intake through food. Most of the young women are more numerous consuming plant foods that contain little iron, compared to animal foods, so that iron needs are not met. Increased need for iron (Fe) for the formation of red blood cells which commonly occurs during growth and puberty when menstruation occurs every month. Above average iron loss can occur in adolescent girls with more frequent and longer menstrual patterns [4], [5].

Female students belong to the transitional age group from adolescence to adulthood. Diet patterns during this transition period are sometimes not paid attention to, so that quite a few people experience health problems, one of which is anemia. Anemia often occurs in female students or young women underestimated, meanwhile the female adolescent age group is at risk of suffering from anemia. This can be caused because during this period there is rapid growth and menstruation [4], [6].

Generally female students have habits not eating well. There are those who often consume food in quantities that are not balanced compared to their needs because they are afraid of getting fat. Apart from that, living alone or living in a boarding house makes students less accustomed to eating breakfast, consuming less vegetables and fruit, and more often eating instant food or fast food. The eating patterns of female students who live in boarding houses also tend to be irregular and far from healthy. This is caused by several factors, such as busy activities, economic difficulties, lack of awareness and knowledge of good eating patterns [7], [8].

Bina Mandiri University Gorontalo is a university whose majority consists of female students. The total number of students at the Faculty of Science, Technology and Health Sciences F-STIK is 739 students consisting of 4 study programs, namely the Health Analyst, Hospital Administration, Pharmacy and Nutrition study programs. As for the female students who live in boarding house for 332 female students.

The initial survey that researchers conducted at Bina Mandiri University, Gorontalo, was through interviews using sheets questionnaire (frequency, amount and type of eating) to the 5 FSTIK female students, then a hemoglobin examination was carried out, the results showed that of the 5 female students who were divided into 4 study programs, namely the Hospital Administration, Pharmacy, Nutrition and Health Analysis study programs, they were found to be female students. 3 people experienced anemia, and 2 people did not experience anemia. Based on this background description, considering that there is still a large prevalence of anemia, especially among female students who live in boarding houses, it is therefore necessary to conduct research on "the relationship between diet and the incidence of anemia in boarding students at FSTIK Bina Mandiri University, Gorontalo."

2. METHODS

2.1 Types of Research

This research is a quantitative study with a cross-sectional design. This design was chosen to identify the relationship between diet and the incidence of anemia in female students living in boarding houses at Bina Mandiri University, Gorontalo at a certain time.

2.2 Research Variables

Independent variables: Diet, including frequency of food consumption and iron intake.
Dependent variable: Incidence of anemia as measured by hemoglobin levels.

2.3 Place and Time of Research

The research was carried out at Bina Mandiri University Gorontalo, specifically on students from the Faculty of Science, Technology and Health Sciences (FSTIK) who lived in boarding houses, in the period January to March 2024.

2.4 Population and Sample

The population of this study were all female students from the Faculty of Science, Technology and Health Sciences (FSTIK) who lived in boarding houses. The research sample was determined using a purposive sampling technique, with a total of 50 respondents who met the inclusion criteria (students who lived in boarding houses for more than 6 months and were willing to participate).

2.5 Data Collection

Data was collected through a questionnaire. This instrument was used to collect data about eating patterns, frequency of food consumption, and iron intake. The questionnaire used has been validated in previous research. Hemoglobin examination: Hemoglobin levels are measured using the Hemocue tool to determine the respondent's anemia status. Hemoglobin Measuring Device (Hemocue): Used to measure hemoglobin levels in capillary blood.

2.6 Data Analysis

Data were analyzed using the chi-square statistical test to test the relationship between diet and the incidence of anemia. The significance level was set at p-value <0.05. Analysis was carried out using statistical software (e.g. SPSS latest version) to ensure the accuracy of the results.

2.7 Research Ethics

This research was carried out in accordance with research ethics rules. Each participant was given an explanation of the aims and procedures of the research, and asked to sign informed consent before participating. The data collected will be kept confidential and only used for research purposes.

3. RESULTS AND DISCUSSION

This research was carried out at the Bina Mandiri University Gorontalo Campus which is located on Jalan Prof. Dr. Aloei Saboe No. 173 Bone Bolango District, Wongkaditi Village, Gorontalo City, Gorontalo Province, the location of this research is 0.7 KM from Prof. General Hospital. Dr. Aloei Saboe. Legally, this campus is under the auspices of the Bina Mandiri Gorontalo Foundation.

The Bina Mandiri Gorontalo Foundation is a legal entity established based on Notarial Deed Number 14 dated 30 June 2010 and Ratification of the Foundation by the Minister of Law and Human Rights of the Republic of Indonesia Number: AHU.4982.AH.01.04 Year 2010. The Gorontalo Mandiri Foundation office is headquartered on Jalan Jalaludin Tantu Number 95, Gorontalo City.

Since its founding, the Bina Mandiri Gorontalo Foundation has been a legal entity that operates in the field of social education which organizes higher education institutions in the Gorontalo Province region under the Supervision, Control and Development of Higher Education Service Institutions (LLDIKTI) in the Sulawesi and Gorontalo Regions in Makassar as an extension of the Directorate General of Institutions, Research and Higher Education.

3.1 Univariate Analysis

Frequency of Respondent Characteristics Based on Age

Table 1. Characteristics of Respondents Based on Age

No	Age (Year)	Frequency (n)	Percentage (%)
1	17 years	1	2.6
2	18 years	9	23.1
3	19 years old	11	28.2
4	20 years	8	20.5
5	21 years	5	12.8
6	22 years	5	12.8

Total	39	100
-------	----	-----

Source: Primary Data 2024

Based on the table above, the characteristics of respondents based on age in this study were at most 19 years old, namely 11 respondents (28.2%), while at least 1 respondent was 17 years old (2.6%). At this age range, respondents fall into the criteria of late adolescence.

Frequency of Eating Patterns in FSTIK Boarding School Students at Bina Mandiri University, Gorontalo

Table 2. Frequency of Boarding School Children's Eating Patterns

No	Dietary habit	Total	Presentation (%)
1	Poor Diet	18	46.2
2	Adequate Diet	14	35.9
3	Good Diet	7	17.9
Total		39	100

Source: Primary Data 2024

Based on the table above, it shows that the most common eating pattern is in the poor category, 18 respondents (46.2%) and the least is in the good eating pattern category, 7 respondents (17.9%).

Frequency of Anemia in FSTIK Boarding School Students at Bina Mandiri University, Gorontalo.

Table 3. Frequency of Anemia in Boarding School Children

No	Anemia Occurrence	Total	Presentation (%)
1	Anemia	11	28.2
2	Normal	28	71.8
Total		39	100

Source: Primary Data 2024

Based on the table above, the highest frequency of anemia is 28 respondents (71.8%) who do not experience anemia and 11 respondents (28.2%) who experience the least anemia. Distribution of Dietary Patterns and the Incidence of Anemia:

Table 4. Distribution of Dietary Patterns with Incidence of Anemia

No	Dietary habit	Hemoglobin (Hb)				Total	%
		Normal	%	Anemia	%		
1	Poor Diet	14	50	4	36.3	18	46
2	Adequate Diet	9	32	5	45.5	14	36
3	Good Diet	5	18	2	18.2	7	18
Total		28	100	11	100	39	100

Source: Primary Data 2024

Based on the table above, it can be concluded that female students who live in the highest boarding houses have poor eating patterns for 18 respondents (46%) but hemoglobin levels are still normal for 14 respondents (50%).

3.2 Bivariate Analysis

Table 5. Relationship Between Eating Patterns and The Incidence of Anemia in Boarding School Children

Average Diet	Average Hemoglobin (Hb)	Sig. Pearson Chi Square	Note
Adequate Diet	Normal	0.702	No connection

Source: Primary Data 2024

Based on table above, it can be concluded that the average diet of 39 female students living in boarding houses falls into the adequate diet category with an average normal hemoglobin level. The results of the analysis of the relationship between diet and the incidence of anemia show that there is no relationship between diet and the incidence of anemia in students living in boarding houses. This result is shown based on the significant Pearson Chi-Square value > 0.05 ($0.702 > 0.05$).

Based on this research, of the 39 respondents, the majority of respondents were 19 years old, namely 11 respondents (28.2%) and the fewest respondents in this study were 17 years old, namely 1 respondent (2.6%). At this age range, respondents fall into the criteria of late adolescence. Data Subject characteristics including age are one factor that can influence. Age is often related to experience, experience is correlated with knowledge, understanding and views on an illness or event so that it can shape perceptions and attitudes. Maturity of thought processes in adult individuals is more likely to use better coping mechanisms compared to adolescent groups [2], [9], [10].

This study used samples from FSTIK students at Bina Mandiri University, Gorontalo, with ages ranging from 17-22 years. With a small age range and variation, the entire sample is in the late teenage group. Based on this research, it shows that the eating patterns of female students who live in boarding houses mostly have poor eating patterns, namely 18 respondents (46.2%) and most the few that have a good diet are 7 respondents (17.9%). Female students are a group of teenagers who need a healthy and balanced diet for teenage growth.

Unfortunately, many teenagers have an unbalanced diet. Students' activities are so busy that sometimes they no longer pay attention to the food they consume. In fact, carrying out daily activities requires a balanced diet, so that energy supply matches energy output [4], [11], [12]. This research is in line with research [4] which states that 91.0% of students have eating patterns in the poor category.

This happens because the type of breakfast, breakfast time, and the level of energy and substance adequacy of students' breakfast are less than the required requirements. Based on the results of this research, regarding the incidence of anemia in female students who live in boarding houses, it shows that the majority do not experience anemia, namely 28 respondents (71.8%) and those who experience anemia are 11 respondents (28.2%). In accordance with the results of research conducted by [4], [13] entitled Eating Patterns and the Incidence of Anemia in Female Students Living in Boarding Houses. Boarding house where the results of the research showed that out of 100 student respondents living in boarding houses whose hemoglobin levels had been researched and checked, data was obtained that only 39 people had anemia and 61 people did not have anemia.

Based on the results of this research, it shows that there is no relationship between diet and the incidence of anemia in students living in boarding houses. This result is shown based on the significant Pearson Chi-Square value > 0.05 ($0.702 > 0.05$). This research showed that the majority had poor eating patterns, namely 18 respondents (46.2%) with anemia as many as 4 respondents (36.3%). According to researchers, respondents who have poor eating patterns can see from the questionnaire used that the food consumed is not sufficient for the body's needs, so anemia occurs. Poor diet is a factor in anemia. Good food quality and the amount of food that should be eaten will influence optimal body health.

Energy is a source erythrocyte formation. Hemoglobin is part of erythrocytes so that if energy intake is lacking it will cause a decrease in erythrocyte formation and result in decreased Hb levels. Factors related to the incidence of anemia in young women are breakfast habits, nutritional status, protein intake, consumption patterns of foods that inhibit iron absorption and menstrual length. Lack of consumption of animal foods, diet habits to reduce body weight, and poverty result in inadequate consumption of nutritional foods, which can cause anemia [10], [14].

The incidence of anemia in teenagers is not only caused by poor eating patterns, this is proven by the results of research that there are 7 respondents (18%) who have good patterns and 2 people (18.2%) who have anemia and have adequate eating patterns. 14 people (36%) and 5 people (45.5%) experienced anemia. This shows that it is not only diet that influences the occurrence of anemia but other factors such as the lack of Vitamin B12, Protein and Folic Acid in the food consumed [9], [15].

It is also known that female students have the habit of drinking tea after eating, which is also possible at risk of developing anemia. Iron absorption is greatly influenced by the combination of foods absorbed when eating certain foods, especially strong tea which will cause a real inhibition of iron absorption. Excessive tannin compounds from tea in the blood will interfere with iron absorption. The body lacks iron so the formation of red blood cells (hemoglobin) is reduced, resulting in anemia. The results of this study are supported by previous research obtained [10] entitled The Relationship between Diet and the Incidence of Anemia, the results of which found that there was no relationship between diet and the incidence of anemia in young women in Banjarmasin.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that there is no relationship between diet and the incidence of anemia in FSTIK Boarding School Students at Bina Mandiri University, Gorontalo. These results are shown based on significant values Pearson Chi-Square > 0.05 ($0.702 > 0.05$). Based on the conclusions of this study, researchers suggest that students at Bina Mandiri University, Gorontalo, pay more attention to their diet by paying attention to the food they consume so that cases of anemia do not increase compared to what was found in this study. Apart from that, researchers also suggest that further research be carried out with different groups of respondents and characteristics to get more varied results. Finally, it is hoped that future researchers will be able to create a more detailed questionnaire regarding nutritional intake, especially those related to iron and protein.

REFERENCES

- [1] E. Yulianingsih, F. D. Yanti, and D. Hulawa, "Health Education Using Booklet to Increase Knowledge on Anemia among Adolescent Girls," *EMBRIO*, vol. 15, no. 1, pp. 57–62, 2023.
- [2] R. Fitriyani, G. C. Sipasulta, and Y. Palin, "Hubungan Perilaku Makan dengan Kejadian Anemia Pada remaja Putri di SMPN 4 Desa Tajur Wilayah Kerja Puskesmas Long Ikis Tahun 2022," *Humantech J. Ilm. Multidisiplin Indones.*, vol. 2, no. 4, pp. 690–697, 2023.
- [3] N. Liana, R. Wulandari, and S. Darmi, "HUBUNGAN POLA MAKAN, RIWAYAT KEHAMILAN DAN KEPATUHAN KONSUMSI TABLET FE TERHADAP KEJADIAN ANEMIA PADA IBU HAMIL TRIMESTER III DI RUMAH SAKIT MEDIKA KRAKATAU KOTA CILEGON TAHUN 2022," *SENTRI J. Ris. Ilm.*, vol. 2, no. 4, pp. 1029–1042, 2023.
- [4] A. D. P. Rusman, "Pola Makan Dan Kejadian Anemia Pada Mahasiswi Yang Tinggal Di Kos-Kosan," *J. Ilm. Mns. Dan Kesehat.*, vol. 1, no. 2, pp. 144–151, 2018.
- [5] N. C. Mamuaya, "ВІМ (2023). 'Бсп За България' Е Под Номер 1 В Бюлетината За Вота, Герб-С Номер 2, Пп-Дб-С Номер 12. Peran Kepuasan Nasabah Dalam Memediasi Pengaruh Customer Relationship Marketing Terhadap Loyalitas Nasabah, 2 (3), 310–324."
- [6] K. CHAIRUNNISA, "ASUHAN KEPERAWATAN PADA PASIEN PROLAPS UTERI DENGAN ANEMIA BERAT DI RUANG RAWAT INAP KELAS II-III DI RSUD KOTA BANDUNG: STUDI KASUS," 2021.
- [7] E. Ervina, "Cara Hidup Mahasiswi Kos di Masa Pandemi Covid-19: Apa yang Beda?," *Emik*, vol. 5, no. 1, pp. 101–118, 2022.
- [8] C. M. Chaparro and P. S. Suchdev, "Anemia epidemiology, pathophysiology, and etiology in low-and middle-income countries," *Ann. N. Y. Acad. Sci.*, vol. 1450, no. 1, pp. 15–31, 2019.
- [9] H. D. Manila, "Hubungan Pola Makan dengan Kejadian Anemia pada Remaja Putri Kelas X SMA Murni Padang," *J. Kesehat. Saintika Meditory*, vol. 4, no. 1, pp. 77–82, 2021.
- [10] K. S. K. Putera, M. S. Noor, and F. Heriyani, "Hubungan Pola Makan dengan Kejadian Anemia di SMP Negeri 18 Banjarmasin 2019/2020," *Homeostasis*, vol. 3, no. 2, pp. 217–222, 2020.
- [11] I. Suryani, A. Crhistinawati, and I. Diani, "HUBUNGAN PENGGUNAAN KONTRASEPSI HORMONAL KB PIL DENGAN KEJADIAN ANEMIA DI PMB BD W KABUPATEN SUMEDANG," *J. Sehat Masada*, vol. 17, no. 2, pp. 5–

- 11, 2023.
- [12] G. C. Tampatty, N. S. H. Malonda, and M. D. Amisi, "Gambaran Pola Makan Pada Tenaga Pendidik Dan Kependidikan Fakultas Kesehatan Masyarakat Universitas Sam Ratulangi Selama Masa Pandemi COVID-19," *KESMAS*, vol. 9, no. 6, 2020.
- [13] N. Tarigan, L. Sitompul, and S. Zahra, "Asupan energi, protein, zat besi, asam folat dan status anemia ibu hamil di wilayah kerja Puskesmas Petumbukan," *Wahana Inov. J. Penelit. dan Pengabd. Masy. UISU*, vol. 10, no. 1, pp. 117–127, 2021.
- [14] I. Widaningsih, "UPAYA MENINGKATKAN KADAR HB REMAJA PUTRI DENGAN PENGAPLIKASIAN JUS KURLAPA (KURMA DAN KELAPA) DI DESA KARANGRAHARJA," *PROFICIO*, vol. 5, no. 1, pp. 168–172, 2024.
- [15] M. Amaliyah, R. D. Soeyono, L. Nurlaela, and D. Kritiastuti, "Pola konsumsi makan remaja di masa pandemi covid-19," *J. Tata Boga*, vol. 10, no. 1, pp. 129–137, 2021.