



## Online nutrition education on anemia and breakfast habits in adolescent girls

### *Pendidikan gizi tentang anemia secara daring dan kebiasaan sarapan pagi pada remaja putri*

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## Abstract

The body's iron levels may become insufficient when one is not in the habit of having breakfast, potentially resulting in anemia among adolescents. Online nutrition education on anemia serves as a means to enhance knowledge and breakfast habits among adolescent girls. This study aimed to determine the effect of online nutrition education on anemia on adolescent girls' breakfast habits. The study design was a cluster randomized trial (CRTs). The subjects were randomly assigned to the treatment group (n = 99) or the control group (n = 101). Research data were collected at SMP Negeri 5 Sukoharjo and SMP Negeri 2 Sukoharjo, which were selected through simple random sampling from March to December 2022. Online nutrition education was directed for six sessions over two weeks with a 1-month reflection. Data on breakfast habits were collected using the Food Record form and analyzed using the Mann-Whitney test. No improvement in breakfast habits was observed in either group. There was no difference in breakfast habits among adolescent girls in the treatment group, who received nutritional education about anemia, and in the control group, who did not (p=0,174). In conclusion, online nutrition education has not been sufficient to improve breakfast habits among adolescent girls.

**Keywords:** Adolescent girls, anemia, breakfast habits, nutrition education

## Abstrak

Zat besi dalam tubuh tidak akan tercukupi jika tidak terbiasa sarapan pagi dan dapat menyebabkan remaja mengalami anemia. Pendidikan gizi tentang anemia secara daring merupakan 211paya untuk menambah pengetahuan serta memperbaiki perilaku kebiasaan sarapan pagi pada remaja putri. Tujuan penelitian untuk mengukur pengaruh pemberian pendidikan gizi tentang anemia secara daring terhadap kebiasaan sarapan pagi pada remaja putri. Desain penelitian menggunakan Cluster Randomized Trials (CRTs). Subjek kelompok perlakuan dan kelompok kontrol ditentukan dengan cara randomisasi sejumlah 99 subjek pada kelompok perlakuan dan 101 subjek pada kelompok kontrol. Data diambil di SMP Negeri 5 Sukoharjo dan SMP Negeri 2 Sukoharjo yang terpilih secara *simple random sampling* pada Maret-Desember 2022. Intervensi pendidikan gizi diberikan secara daring dengan 6 sesi selama 2 minggu dengan masa refleksi selama 1 bulan. Data kebiasaan sarapan pagi diperoleh dari formulir Food Record. Analisis data menggunakan uji *Mann Whitney*. Tidak terdapat peningkatan kebiasaan sarapan pagi pada kelompok perlakuan maupun kelompok kontrol. Tidak terdapat perbedaan kebiasaan

sarapan pagi pada remaja putri kelompok perlakuan setelah diberikan pendidikan gizi tentang anemia dan pada kelompok kontrol yang tidak diberikan pendidikan gizi tentang anemia ( $p=0,174$ ). Kesimpulan, pendidikan gizi secara daring belum cukup meningkatkan kebiasaan sarapan pada remaja putri.

**Kata Kunci:** Anemia, kebiasaan sarapan pagi, pendidikan gizi, remaja putri.

## Introduction

According to the World Health Organization (WHO) statistical data from 2019, the global prevalence of anemia in women of childbearing age women (15-49 years) is 29,9% (WHO, 2021), while the national prevalence is 26,8% in the age group of 5-14 years and 32% in the age group of 15-24 years (Kemenkes, 2018). In Central Java, the prevalence of anemia is 30,4% (Kemenkes, 2013). Other effects of anemia that adolescent girls may face are an increase in low birth weight, premature births, and neonatal mortality (Chandrakumari et al., 2019; Shaka & Wondimagegne, 2018).

Adolescents who skip breakfast suffer a reduction in energy intake; the body loses one-third of the energy intake required for optimal functioning, which may later result in anemia (Afrityeni et al., 2019). To fulfill 15-30% of daily nutritional needs, breakfast should be consumed at 6:00 or before 7:00 until 9:00 (Kemenkes, 2014); therefore, skipping breakfast may lead to inadequate nutritional intake (Nasriyah & Putri, 2021). The inadequate nutritional intake can provoke a deficiency in minerals, particularly a lack of both macro and micronutrient intake. As a result, they will suffer from anemia (Poda et al., 2019). Moreover, the benefits of having breakfast include prevention of overweight or obesity (Arenaza et al., 2018; Gibney et al., 2018), being more energized (Lakmali et al., 2022), and better academic achievement (Hartline-Grafton & Levin, 2022; Lundqvist & Vogel, 2019).

There is a close relationship between breakfast habits and anemia among adolescent girls (Arisnawati & Zakiudin, 2018). 86,2% of adolescent girls with irregular breakfast habits suffer from anemia (Ikhtiyaruddin et al., 2020). This high percentage shows that nutrition education is an appropriate strategy to enhance both knowledge and eating behavior in adolescents (Abu-Baker et al., 2021). Such education aims to encourage adolescents to consume nutritious foods needed by their bodies (Warjito et al., 2015).

One common nutrition education method is lectures, as they ease the way knowledge is transferred to adolescents (Rohim et al., 2016). During the pandemic era, lectures are conducted online, and despite these challenges, this method remains beneficial, leveraging its inherent strengths. Online lectures are more convenient to prepare and use, affordable, and flexible. Nonetheless, the drawback of this method is that it tends to make the audience passive, as it is unidirectional, leading to boredom if the material is not that interactive (Wirabumi, 2020). Regardless of these challenges, e-learning for nutrition education is effective in the learning process (Alenezi, 2020).

It has been proven that knowledge of anemia in adolescents who receive nutrition education has improved (Putra et al., 2019). The improvement fosters their mindset to bring about a positive attitude change towards anemia. Empowering adolescents' knowledge of nutrition means preventing them from deviant eating habits and raising awareness of the intake of iron-rich foods (Johnson et al., 2016).

A study conducted by Murimi et al. (2018) showed that nutrition education is effective in enhancing the selection of healthy foods. It is also believed that nutrition education precedes changes in adolescents' habits in preventing and treating anemia, as well as having a better lifestyle (Roche et al., 2018).

This research, conducted in the post-COVID-19 pandemic New Normal conditions, aimed to determine the effects of an online nutrition education intervention on anemia among adolescent girls regarding breakfast habits.

## Methods

The research design employed was a Cluster Randomized Trial (CRT) with two randomly assigned groups of research subjects: the treatment group receiving nutritional education intervention and the control group receiving no intervention. There were 16 classes included in

the treatment group and 17 classes included in the control group, with 101 randomly assigned adolescent girls involved in both groups. However, two in the control group withdrew from the study. The study was conducted at SMP Negeri 2 Sukoharjo and SMP Negeri 5 Sukoharjo in Central Java. Research permission was obtained from the Health Research Ethics Commission (KEPK) of RSUD, Dr. Moewwith (number: 260/II/HREC/2023).

Data collection was conducted from March to 2022. All adolescent girls aged 13-15 years in the Sukoharjo Regency were included in the study. In addition to age, other criteria are that the adolescents have handphones and Internet access, agree to be a respondent by filling informed consent, experience no allergies to specific foods, not in a sick condition, and not currently on a diet. Exclusion criteria were established if the participants withdrew from the study.

The initial data collection for this study included characteristic information about the participants, such as age, mother's and father's education, mother's and father's occupation, and family income. Adolescents' breakfast habits were collected through food record form in 7 days before the intervention. The treatment group received an intervention in the form of an online nutrition lecture about anemia delivered with the help of a narrated video and PowerPoint (PPT) presentations. The topics covered were anemia in adolescents, consumption of iron supplements, protein-rich foods, heme and non-heme iron sources, and vegetables and fruits to prevent anemia. The final topic addressed the dangers associated with fast-food consumption. The materials were provided in the form of YouTube links that were later shared through WhatsApp Gorup (WAG). Online nutrition education was directed for six sessions over two weeks with a 1-month reflection. The post-assessment of breakfast habits in adolescents was conducted after providing nutrition education and upon completion of the reflection session. The completion of the food record form included the food and beverages consumed by adolescents over a period of 7 days.

The descriptive analysis of the results of the food records regarding breakfast habits was classified into several categories. The subjects

were categorized as accustomed if breakfast was consumed  $\geq 4$  times within 7 days and as not accustomed if breakfast was consumed  $< 4$  times within 7 days (Puspitasari & Nissa, 2018). Adolescent girls need 15-30% nutrition during breakfast. This contributes to the daily nutritional needs (Kemenkes, 2014); therefore, to meet the calorie needs of adolescent girls, it is required the 307,5 calories needs of 615 calories.

The normality of the data tested using the Kolmogorov-Smirnov test showed that the data on breakfast habits were not normally distributed. Thus, the Mann-Whitney U test was used for statistical analysis. The conclusions drawn from the analysis were based on a significance level of 5%.

## Result and Discussion

Based on socio-demographic characteristics, in the treatment group, most adolescent girls were 14 years old (49,5%), while in the control group, the majority were 13 years old (55,4%). The majority of adolescent girls in the treatment group had parents with an advanced education (65,7% for mothers and 75,8% for fathers). Meanwhile, a larger percentage of parents had a basic education (58,4% for mothers and 65,3% for fathers) in the control group (Table 1).

In the treatment group, over half of the mothers were not working or were homemakers (51,5%), whereas in the control group, most were employed (65,3%). In the treatment group, a significant proportion of fathers were engaged in entrepreneurial activities (36,4%), whereas in the control group, the predominant occupation for fathers was working as laborers (58,4%). As for family income, both groups demonstrated comparable results, with the majority of families having an income greater than the minimum wage (81,8%; 62,4%) (Table 1).

On average, adolescent girls in both groups were 13 years old. This signifies an increased need for nutrients. To meet increased nutritional needs, they are required to maintain a balanced diet along with sufficient physical activity. Adolescent girls often feature unhealthy eating habits affected by social interactions and a desire for a slim body through strict dieting (Suryani et al., 2015).

**Table 1.** Sociodemographic characteristics of study subjects.

Characteristics	Group	
	Treatment	Control
Age (Years) (mean±SD)		
12	2 (2%)	0 (0%)
13	40 (40,4%)	56(55,4%)
14	49 (49,5%)	41(40,6%)
15	8 (8,1%)	4(4%)
Mother's Education		
Basic	34(34,3%)	56(55,4%)
Advanced	65(65,7%)	45(45,6%)
Father's Education		
Basic	24(24,2%)	59(58,4%)
Advanced	75(75,8%)	42(41,6%)
Mother's Employment Status		
Employed	48(48,5%)	66(65,3%)
Unemployed	51(51,5%)	35(34,7%)
Father's Occupation		
Laborer	22(22,2%)	59(58,4%)
Farm Worker	3(3%)	5(5%)
Farmer	2(2%)	4(4%)
Private Employee	23(23,2%)	16(15,8%)
Entrepreneur	36(36,3%)	12(11,9%)
Civil Servant	8(8,1%)	2(2%)
Unemployed	5(5,1%)	3(3%)
Family Income		
Below the Minimum Wage	18(18,2%)	38(37,6%)
Above the Minimum Wage	81(81,8%)	63(62,4%)
Breakfast Frequency		
Never	4(4%)	1(1%)
Rarely(1 – 3 times)	8(8,1%)	14(14%)
Often (4 – 6 times)	36(36,4%)	33(32,8%)
Always (7 times)	51(51,55%)	53(52,5%)

Most jobs performed by parents with salaries below the minimum wage do not

sufficiently cover the needs of the family or household (Basith et al., 2017). Regrettably, this indirectly influences anemia in adolescent girls, as the amount of income affects how parents can afford nutritious food sources (Farinendya et al., 2019). According to Hasyim (2018), families with low income have twice the risk of adolescents suffering anemia compared to those with high income (OR=2,439; 95% CI: 1,078-5,519). The majority of adolescents in both groups had regular breakfast (seven times a week). Antono et al., (2020) affirms that the family and school environment can influence the adolescents' eating habits.

The average energy of breakfast in the treatment and control group in table 2

**Table 2.** The Average Energy of Breakfast in the Treatment and Control Group

Group	The Average Energy mean±SD
Treatment Group	
Before	206,85±100,23
After	188,26±110,26
Control Group	
Before	214,52±111,89
After	173,13±88,732

The highest average energy of breakfast (214,52±111,89 calories) was found in the control group before data collection, and the lowest average energy of breakfast (173,13±88,732 calories) was found in the control group (Table 2).

### The Distribution of Research Subjects Based on Breakfast Habits

In Table 3, participants are categorized based on breakfast habits: habitual (≥4 days in 7 days) and infrequent (<4 days in 7 days)

**Table 3.** The Distribution of Research Subjects Based on Breakfast Habits

Morning Breakfast Habit	Treatment		Control		p-value
	Before	After	Before	After	
Habitual (≥4 days in 7 days)	14(14%)	8(8%)	13(13%)	6(6%)	
Infrequent (<4 days in 7 days)	85(85%)	91(91%)	88(88%)	95(95%)	
Average breakfast habit (in 7 days) (mean±SD)	1,46±1,64	1,13±1,38	1,47±1,66	1,12±1,38	
Δ initial-final (mean±SD)	-0,29±1,96		-0,36±2,03		0,786

The highest average of breakfast habits (1,47±1,66) was found in the data before for the control group, and the lowest average of breakfast habits (1,12±1,38) was found in the data for the control group (Table 3). This indicates that in both groups that received nutritional education intervention and the group that did not, adolescent girls only had breakfast twice in seven days even though 15-30% of nutritional intake during breakfast is essential for adolescent girls to fulfill their daily nutritional needs (Kemenkes, 2014). Neither group showed an improvement in breakfast habits; the breakfast habits in the control group, without nutritional education, closely resembled those in the treatment group that received nutritional education.

The improvement in adolescent girls' breakfast habits is crucial, as both groups experienced a decline in breakfast habits before and after nutritional education. In the treatment group, it decreased from 15,2% to 8,1%, while in the control group, it decreased from 13,9% to 5,9%. Initially, 15 adolescent girls in the treatment group engaged in regular breakfast habits. However, only eight of them had regular breakfast habits after treatment. After receiving education on anemia, the number of adolescent girls who had infrequent breakfast habits increased from 84 to 91. This underscores the importance of nurturing a morning meal routine given its pivotal role in shielding the body from adverse effects during extended fasting periods (Larega, 2015). This decrease occurred because of a change in breakfast time. Moreover, there is a change in the amount of nutritional intake that does not meet the ideal intake. Adolescent girls prefer to buy snacks in the cafeteria, as they feel lazy or have no time to have breakfast at home. Correspondingly, based on the study conducted by Aswanto et al. (2023), adolescents admitted that their parents have no time to cook breakfast, so having breakfast in the cafeteria becomes the solution.

Masfiah et al. (2021) also believe that breakfast habits affect the anemia the adolescents suffer. Breakfast plays a vital role in controlling the body and helps to enhance concentration in learning. Furthermore, breakfast serves as a source of energy for carrying out activities. Thus, it is highly advisable to have breakfast before adolescents engage in school learning activities. Moreover, this can reduce the consumption of foods with low nutritional contents (Purba et al., 2019).

Skipping breakfast affects adolescents' nutritional status (Arza et al. 2022; Jawed et al. 2017; Olatona et al. 2022).

Types of food that Adolescent girls with regular breakfast typically include fried rice with egg, white or sweet bread, rissoles, rice with vegetables (spinach or vegetable soup), animal protein (fried chicken, fried egg, or milkfish), and plant-based proteins (fried tofu or fried tempeh). Adolescents who rarely have breakfast usually consume various types of food such as white or sweet bread, condensed milk, boxed milk, instant noodles, white rice with fried chicken or fried egg, fried rice, fried tempeh, spinach, and water spinach. Sary (2021) expounds that although they have breakfast, it does not guarantee if they have balanced nutrition such as having both rice and side dishes. A total of 2050 calories is the standard Recommended Dietary Allowance (RDA) for females aged 13-15 years (Kemenkes RI, 2019). Without balanced nutrition for breakfast, there will be insufficient micronutrients (iron), resulting in hemoglobin levels below the normal range (Mulianingsih et al., 2022). The good-eating habits are affected by parents' roles and practices (Mahmood et al., 2021). Click or tap here to enter text. Nutrition education is considered a fundamental strategy to influence eating habits as well as a balanced diet (Saha et al., 2017).

Online nutrition education conducted in this study, however, did not been able to show positive effects on breakfast habits, as the statistical analysis showed that there was no significant difference between the treatment and control groups ( $p=0.786$ ).

Similarly, a study conducted by Azhari & Fayasari (2020) showed comparable result that there is no notable difference after the intervention. This is because the majority of adolescents are already accustomed to having breakfast. Widhi & Alamsyah (2022) state that there is an improvement in knowledge and attitudes towards breakfast, but there is no improvement on breakfast habit. This may be due to the brief duration and frequency of nutrition education interventions. Therefore, providing nutrition education for a longer duration and frequency is highly recommended.

The limitations of this study are rooted in the online delivery mode, raising concerns about the effectiveness of the interventions, as the potential lack of completion might impact the comprehensiveness and impact of the

educational materials presented. Therefore, addressing the challenges in online delivery is crucial for more effective interventions in future studies.

## Conclusion

The delivery of online nutrition education failed to improve adolescent girls' breakfast habits. Consequently, a more intensive approach, encompassing balanced nutrition education and the distribution of iron supplementation tablets, could be implemented as a preventive and corrective measure for anemia in this population.

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## References

- Abu-Baker, N. N., Eyadat, A. M., & Khamaiseh, A. M. (2021). The impact of nutrition education on knowledge, attitude, and practice regarding iron deficiency anemia among female adolescent students in Jordan. *Heliyon*, 7(2). <https://doi.org/10.1016/j.heliyon.2021.e06348>
- Afritayeni, Ritawani, E., & Liwanti, L. (2019). Hubungan kebiasaan sarapan pagi dengan kejadian anemia pada remaja putri di SMP Negeri 20 Pekanbaru. *Al-Insyirah Midwifery Jurnal Ilmu Kebidanan*, 8. <https://www.neliti.com/id/publications/329383/hubungan-kebiasaan-sarapan-pagi-dengan-kejadian-anemia-pada-remaja-putri-di-smp>
- Alenezi, A. (2020). The role of e-learning materials in enhancing teaching and learning behaviors. *International Journal of Information and Education Technology*, 10(1), 48–56. <https://doi.org/10.18178/ijiet.2020.10.1.1338>
- Antono, S. D., Setyarini, A. I., Studi, P., Kediri, K., Malang, P. K., Lor, B., Kediri, K., & Timur, J. (2020). Pola makan pada remaja berhubungan dengan kejadian anemia pada siswi kelas VII. *Jurnal Ilmiah Permas: Jurnal Ilmiah STIKES Kendal*, 10(2), 223–232. <https://journal.stikeskendal.ac.id/index.php/PSKM/article/view/721/438>
- Arenaza, L., Muñoz-Hernández, V., Medrano, M., Osés, M., Amasene, M., Merchán-Ramírez, E., Cadenas-Sanchez, C., Ortega, F. B., Ruiz, J. R., & Labayen, I. (2018). Association of breakfast quality and energy density with cardiometabolic risk factors in overweight/obese children: Role of physical activity. *Nutrients*, 10(8), 1–13. <https://doi.org/10.3390/nu10081066>
- Arisnawati, & Zakiudin, A. (2018). Hubungan Kebiasaan Makan Pagi Dengan Kejadian Anemia Pada Remaja Putri di SMA Al Hikmah 2 Benda Sirampog Brebes. *Jurnal Para Pemikir*, 7(1), 53–58.
- Arza, P. A., Nur, N. C., & Sabri, R. (2022). Breakfast Eating Habit and Dairy Consumption in Relation to Nutritional Status among Junior High School Student in Painan, West Sumatra Province. *ICSDH 2021-International Conferemce on Social Determinants of Health, Icsdh 2021*, 39–42. <https://doi.org/10.5220/0010757700003235>
- Aswanto, A. R. A., Poncorini, E., & Suminah. (2023). Pengaruh Edukasi Gizi Menggunakan E-Booklet terhadap Pengetahuan Gizi, Sikap dan Perilaku Sarapan Remaja. *Simposium Kesehatan Nasional*, 2.
- Azhari, M. A., & Fayasari, A. (2020). Pengaruh Edukasi Gizi Dengan Media Ceramah Dan Video Sarapan Serta Konsumsi Sayur Buah. *Jurnal AcTion: Aceh Nutrition Journal*, 1(5), 55–61.
- Basith, A., Agustina, R., & Diani, N. (2017). Faktor-Faktor Yang Berhubungan Dengan Kejadian Anemia Pada Remaja Putri. *Dunia Keperawatan*, 5(1), 1. <https://doi.org/10.20527/dk.v5i1.3634>
- Chandrakumari, A. S., Sinha, P., Singaravelu, S., & S, J. (2019). Prevalence of Anemia among

- Adolescent Girls in a Rural Area of Tamil Nadu, India. *Journal of Family Medicine and Primary Care*.  
<https://doi.org/10.4103/jfmmpc.jfmmpc>
- Farinendya, A., Muniroh, L., & Buanasita, A. (2019). *Hubungan Tingkat Kecukupan Zat Gizi Dan Siklus Menstruasi Dengan Anemia Pada Remaja Putri The Correlation of Nutrition Adequacy Level and Menstrual Cycle with Anemia Among Adolescent Girls*. 298–304.  
<https://doi.org/10.2473/amnt.v3i4.2019>
- Gibney, M. J., Barr, S. I., Bellisle, F., Drewnowski, A., Fagt, S., Livingstone, B., Masset, G., Moreiras, G. V., Moreno, L. A., Smith, J., Vieux, F., Thielecke, F., & Hopkins, S. (2018). Breakfast in human nutrition: The international breakfast research initiative. *Nutrients*, 10(5), 1–12.  
<https://doi.org/10.3390/nu10050559>
- Handayani, I. F., & Sugiarsih, U. (2022). Kejadian Anemia Pada Remaja Putri di SMP Budi Mulia Kabupaten Karawang Tahun 2018. *Muhammadiyah Journal of Midwifery*, 2(2), 76.  
<https://doi.org/10.24853/myjm.2.2.76-89>
- Hartline-Grafton, H., & Levin, M. (2022). Breakfast and School-Related Outcomes in Children and Adolescents in the US: A Literature Review and its Implications for School Nutrition Policy. *Current Nutrition Reports*, 11(4), 653–664.  
<https://doi.org/10.1007/s13668-022-00434-z>
- Hasyim, D. I. (2018). Pengetahuan, sosial ekonomi, pola makan, pola haid, status gizi dan aktivitas fisik dengan kejadian anemia pada remaja putri. *Jurnal Kebidanan Dan Keperawatan Aisyiyah*, 14(1), 06–14.  
<https://doi.org/10.31101/jkk.544>
- Ikhtiyaruddin, I., Alamsyah, A., Mitra, M., & Setyaningsih, A. (2020). Determinan Kejadian Anemia pada siswi Di SMAN 1 Teluk Belengkong Kabupaten Indragiri Hilir pada tahun 2019. *Jurnal Kesehatan Komunitas*, 6(1), 56–62.  
<https://doi.org/10.25311/keskom.vol6.iss1.527>
- Jawed, S., Tariq, S., Tariq, S., & Kamal, A. (2017). Frequency of nutritional anemia among female medical students of Faisalabad. *Pakistan Journal of Medical Sciences*, 33(2), 398–403.  
<https://doi.org/10.12669/pjms.332.11854>
- Johnson, N., Noufeena, Parvathi, Joseph, P., Aranha, P. R., & Shetty, A. P. (2016). a Study on Knowledge Regarding Prevention of Iron Deficiency Anemia Among Adolescent Girls in Selected Pre-University Colleges of Mangaluru. *International Journal of Current Research and Review*, 8(18), 05–07.
- Kemenkes, R. (2013). Laporan Nasional Riset Kesehatan Dasar Tahun 2013. *Kementerian Kesehatan Republik Indonesia*.  
<https://doi.org/10.1517/13543784.7.5.803>
- Kemenkes, R. (2014). Peraturan Menteri Kesehatan Republik Indonesia Nomor 25 Tahun 2014. *Kemeterian Kesehatan Republik Indonesia*.  
<https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/diger-kitaplar/TBSA-Beslenme-Yayini.pdf>
- Kemenkes, R. (2018). Pedoman Pencegahan dan Penanggulangan Anemia Pada Remaja Putri dan Wanita Usia Subur (WUS). *Kementerian Kesehatan Republik Indonesia*.
- Kemenkes RI. (2019). Angka kecukupan gizi yang dianjurkan untuk masyarakat Indonesia. *Permenkes Nomor 28 Tahun 2019, Nomor 65(879)*, 2004–2006.
- Lakmali, S. S., Moirangthem, R., Mahant, Y., Devi, N. P., Sharma, T. R., & Kumar, T. P. (2022). Importance of breakfast in teenagers. *International Journal of Health Sciences*, 6(May), 4709–4726.  
<https://doi.org/10.53730/ijhs.v6ns3.6938>
- Larega, T. S. P. (2015). Effect Of Breakfast on the Level of Concentration in Adolescents. *J Majority*, 4(2), 115–121.
- Lundqvist, M., & Vogel, N. E. (2019). Effect of eating breakfast on children and adolescents: a systematic review of potentially relevant outcomes in economic evaluations. *Food & Nutrition Research*, 1, 1–15.
- Mahmood, L., Flores-Barrantes, P., Moreno, L. A., Manios, Y., & Gonzalez-Gil, E. M. (2021). The influence of parental dietary behaviors and practices on children's eating habits. *Nutrients*, 13(4), 1–13.
- Masfiah, S., Ayu Maqfiroch, A. F., Rubai, W. L., Mars WIjayanti, S. P., Anandari, D.,

- Kurniawan, A., Saryono, S., & Aji, B. (2021). Prevalence and Determinants of Anemia among Adolescent Girls: A School-Based Survey in Central Java, Indonesia. *Global Journal of Health Science*, 13(3), 37. <https://doi.org/10.5539/gjhs.v13n3p37>
- Melwani, V., Dubey, M., Khan, A., Toppo, M., Choudhary, Y., & Priya, A. (2018). A study to assess the prevalence of anaemia amongst adolescent girls residing in selected slum of Bhopal city. *International Journal Of Community Medicine And Public Health*, 5(3), 1096. <https://doi.org/10.18203/2394-6040.ijcmph20180767>
- Mulianingsih, M., Halid, S., & Hadi, I. (2022). Relationship of Lifestyle and Health Status With Event of Anemia in Adolescent. *Jurnal Ilmu Keperawatan Jiwa*, 5(1), 127-136.
- Murimi, M. W., Moyeda-Carabaza, A. F., Nguyen, B., Saha, S., Amin, R., & Njike, V. (2018). Factors that contribute to effective nutrition education interventions in children: A systematic review. *Nutrition Reviews*, 76(8), 553-580. <https://doi.org/10.1093/nutrit/nuy020>
- Narsih, U., & Hikmawati, N. (2020). Pengaruh persepsi kerentanan dan persepsi manfaat terhadap perilaku remaja putri dalam pencegahan anemia. *Indonesian Journal for Health Sciences*, 4(1), 25-30.
- Nasriyah, & Putri, T. (2021). Relationship Breakfast Habits with Anemia Based on Hemoglobin Test Using Sianmethemoglobin Method on Adolescent Girls. *Proceedings of the 1st Paris Van Java International Seminar on Health, Economics, Social Science and Humanities (PVJ-ISHESSH 2020)*, 535, 451-453. <https://doi.org/10.2991/assehr.k.210304.100>
- Olatona, F. A., Oloruntola, O., Adeniyi, O., & Amu, E. (2022). Association Between Breakfast Consumption and Anthropometrically Determined Nutritional Status of Secondary-School Adolescents in Lagos, Southwest Nigeria. *International Journal of Maternal and Child Health and AIDS (IJMA)*, 11(1). <https://doi.org/10.21106/ijma.503>
- Poda, G. G., Hsu, C. Y., Rau, H. H., & Chao, J. C. J. (2019). Impact of socio-demographic factors, lifestyle and health status on nutritional status among the elderly in Taiwan. *Nutrition Research and Practice*, 13(3), 222-229. <https://doi.org/10.4162/nrp.2019.13.3.222>
- Purba, R. B., Djendra, I. M., Kindangen, R. Z., Ranti, I. N., Paruntu, O., Langi, G. K., & Laoh, J. M. (2019). Eating Behavior and Protein Intake in Adolescent Girls with Anemia in Junior High School Krispa Silian the Regency of Southeast Minahasa North Sulawesi Indonesia. *International Journal of Pharma Medicine and Biological Sciences*, 8(2), 53-57. <https://doi.org/10.18178/ijpmbs.8.2.53-57>
- Puspitasari, H. K. E., & Nissa, C. (2018). Hubungan Kebiasaan Sarapan, Kadar Hemoglobin dengan Prestasi Belajar Remaja Putri Status Gizi Lebih. *Journal of Nutrition College*, 7(2337-6236), 100-106.
- Putra, R. W. H., Supadi, J., & Wijaningsih, W. (2019). the Effect of Nutrition Education on Knowledge and Attitude About Anemia in Adolescents. *Jurnal Riset Gizi*, 7(2), 75-78.
- Roche, M. L., Bury, L., Yusadiredjai, I. N., Asri, E. K., Purwanti, T. S., Kusyuniati, S., Bhardwaj, A., & Izwardy, D. (2018). Adolescent girls' nutrition and prevention of anaemia: A school based multisectoral collaboration in Indonesia. *BMJ (Online)*, 363, 1-6. <https://doi.org/10.1136/bmj.k4541>
- Rohim, A. N., Zulaekah, S., & Kusumawati, Y. (2016). Perbedaan Pengetahuan Anemia pada Remaja Putri Setelah Diberi Pendidikan dengan Metode Ceramah Tanpa Media dan Ceramah dengan Media Buku Cerita. *Jurnal Kesehatan*, 1(1979-7621).
- Saha, J., Mazumder Sen, S., & Samanta, A. (2017). Impact study of nutritional education as a controlling measure of iron deficiency anemia. *International Journal Of Community Medicine And Public Health*, 4(11), 4057. <https://doi.org/10.18203/2394-6040.ijcmph20174482>
- Sary, Y. N. E. (2021). Pendidikan kesehatan tentang sarapan pagi seimbang berpengaruh terhadap status gizi remaja putri. *Artikel Penelitian Syifa' MEDIKA*,



- 12(1), 11–20.
- Shaka, M. F., & Wondimagegne, Y. A. (2018). Anemia, a moderate public health concern among adolescents in South Ethiopia. *PLoS ONE*, 13(7), 1–14. <https://doi.org/10.1371/journal.pone.0191467>
- Siswanto, Y., & Widyawati, S. A. (2016). Kajian Anemia pada Siswi SMA di Kabupaten Semarang. *MUSWIL IPEMI Jateng, 2010*, 45–54.
- Sunarti, A. (2022). Penyuluhan tentang Dampak Anemia pada Remaja di SMKN 6 Palu. *Jurnal Pengabdian Masyarakat*, 1(2), 77–84.
- Suryani, D., Hafiani, R., Junita, R. (2015). Analisis Pola Makan dan Anemia Gizi Besi pada Remaja Putri Kota Bengkulu. *Jurnal Kesehatan Masyarakat Andalas*, 10, 11–18.
- Tesfaye, M., Yemane, T., Adisu, W., Ares, Y., & Gedefaw, L. (2015). Anemia and iron deficiency among school adolescents: burden, severity, and determinant factors in southwest Ethiopia. *Adolescent Health, Medicine and Therapeutics*, 6, 189–196. <https://doi.org/10.2147/ahmt.s94865>
- Warjito, Mustofa, A., & Suhartatik, N. (2015). the Role of Nutrition Education of Knowledge, Behavior & Attitude of Adolescent Consumption in Smk Bhinneka Karya Simo. *Artikel Pemakalah Paralel*, 382–390.
- WHO. (2021). World Health Statistic 2021 Monitoring Health for The SDGs. *WHO*.
- Widhi, A. S., & Alamsyah, P. N. (2022). Nutritional education on knowledge, attitudes, and practices breakfast in SMP IT Nurul Fajar Cikarang. *Nutrition Scientific Journal*, 1(1), 41–51. <https://doi.org/10.37058/nsj.v1i1.5962>
- Wirabumi, R. (2020). Metode Pembelajaran Ceramah. *Annual Conference on Islamic Education and Thought*, 1(1), 111.
- Yuliani, M., Asri, Oktafiani, H., & Hayati, N. (2020). Hemoglobin Levels of Female Students Based On Fe Consumption and Breakfast Habits. *Journal of Global Research in Public Health*, 5(2), 195–203.