

ANEMIA SCREENING RESULTS AMONG ELEMENTARY SCHOOL STUDENTS IN THE DISTRICT OF BEJI, DEPOK CITY, WEST JAVA, INDONESIA***Siti Nurbaya, Yusra, Suprilrianti Handayani, Luthfiyyah Mufidah and Kusmardi**

Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

Received 20th May 2023; Accepted 29th June 2023; Published online 30th July 2023

Abstract

Anemia is a blood disorder characterized by lower-than-normal concentrations of haemoglobin (Hb) and red blood cells (erythrocytes). Anemia is an important issue in the community, particularly among women and children, to the point where it has become a global health concern. This study aims to ensure that elementary school students in the Beji District live a healthy lifestyle and are aware of anemia. This research is a descriptive study with a cross-sectional study design in which data collection activities are conducted at the same time to paint a picture of anemia among students of 4 elementary school. We distributed questionnaires to determine students' understanding of anemia and haemoglobin analysis to determine the likelihood of anemia. Then, we process these results using the SPSS software and elaborate on the analysis' findings to gain a deeper understanding. From the results of the haemoglobin (Hb) screening examination, it was determined that 47 out of 168 students, or approximately 28%, still had anemia, particularly students at SDN 7 Beji (13 students or 29.5%) and SD IT Muqorrobin (21 students or 37%). In addition to screening for anemia, the questionnaires distributed to all students at the four research institutions, including those who had blood tests, yielded the following results, the majority of students who participate in this activity are knowledgeable about anemia (76.6%), and the majority also have a positive attitude towards anemia prevention (53.1%).

Keywords: Anemia, Children, Elementary school, Haemoglobin.

INTRODUCTION

Anemia is a blood disorder characterized by lower-than-normal concentrations of haemoglobin (Hb) and red blood cells (erythrocytes) [3]. Anemia is a severe problem in society, particularly among women and those of reproductive age, so that it has become a global health concern. Blood deficiency affects approximately two billion individuals worldwide, resulting in over 500 million cases of anemia. The prevalence of iron deficiency anemia in sub-Saharan Africa is estimated to be around 60%, with 40% to 50% of infants under the age of five in developing countries being iron deficient [5]. Iron deficiency anemia is the most prevalent nutritional problem in the globe, affecting over 600 million people. The global prevalence of anemia is estimated to be around 51 percent. Where the prevalence of infants is around 43%, the prevalence of school-age children is 37%, the prevalence of adult men is only 18%, and the prevalence of non-pregnant women is 33%, it is very concerning that in all developing countries, 44% of them are women (number range: 13.4%-87.5%). Beginning at 13.4% (Thailand) and culminating at 85.5% (India), the number continued to rise to 74% [4]. Anemia is prevalent throughout the globe, particularly in developing nations and socially disadvantaged groups [1]. Data from Indonesia indicates that approximately 3.5 million adolescents suffer from anemia. According to 2013 household health survey data, the prevalence of anemia among adolescents of school age reached 26.4% in 2013. In ten Jakarta elementary schools, the Kusuma Bangsa Foundation discovered that 34.1% of children suffer from anemia. In four of the ten examined primary schools, 50 to 70 percent of the students were anemic. This condition is more prevalent in females (55%) [2].

In addition to other nutritional concerns, such as protein deficiency, vitamin A deficiency, and endemic goiter, nutritional anemia is still a health issue in Indonesia [4]. Children with anemia appear more timid and disengage from social interaction, do not react to stimuli, and are more reclusive [7]. There are numerous causes of anemia. Anemia can be caused by iron deficiency, intestinal haemorrhage, bleeding, genetics, vitamin B12 deficiency, folic acid deficiency, and bone marrow disorders, from a physiological standpoint. Moreover, an improper lifestyle also contributes to the development of anemia. Beginning with the behaviour of ingesting iron-rich foods, vitamin deficiency, and engaging in activities that pose a risk of bleeding and culminating with the practice of staying up late [6]. Lack of leisure and sleep can be a cause of anemia, as determined by further investigation of the food and snacks consumed by malnourished primary school children. The purpose of this study is to ensure that elementary school students in the Beji District live a healthy lifestyle and though about anemia, so that they do not experience lethargy, weakness, fatigue, and amnesia when engaged in learning activities.

METHODS**Research Design**

This research is a descriptive study with a cross-sectional study design in which data collection activities are conducted at the same time to paint a picture of anemia among students at elementary schools in the Beji District of Depok. The methodology adopted is quantitative.

Research Subjects

Four elementary schools in the Beji Depok District, namely SDN 4 Beji, SDN 5 Beji, SDN 7 Beji, and Muqorrobin IT

***Corresponding Author: Siti Nurbaya,**

Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia.

Elementary School, served as the focus of this study. While the sample of this research were sixth grade students from these schools. This study's sample consisted of 209 individuals with the following characteristics (Table 1).

Table 1. Sample distribution

School	Sample Size
SDN Beji 4	28
SDN Beji 7	59
SDN Beji 5	48
SD IT Muqorrobin	74

Programme Description

- Questionnaire:** Students in elementary school were asked to complete a questionnaire to assess their knowledge and attitudes regarding iron deficiency anemia. In addition to knowing the extent to which elementary school students engage in clean and healthful lifestyle behaviour's, particularly the consumption of nutrient-dense, well-balanced meals.
- Analysis of Haemoglobin:** The following is a list of the instruments and materials used in blood sampling.
 - Alcohol
 - Cotton
 - Lancet
 - Easy Touch GCHb
 - Paper Strips

While the workings of blood sampling include:

- ✓ Prepare all tools and materials,
- ✓ Take the cotton that has been given alcohol and then wipe it on the middle finger of the respondent so that it is sterile,
- ✓ Wait a few minutes for it to dry,
- ✓ Then the respondent's middle finger was pricked using a needle/lancet,
- ✓ Prepare a strip to drop the blood that has been taken,
- ✓ Then the strip containing blood is inserted into the Easy Touch GCHb tool to read the Hb results from the respondent,
- ✓ The tool will show the Hb level of the respondent.

3. **Extension:** This program includes counselling for iron-deficiency anemia. This counselling was administered after the Hb test, at which point elementary school pupils already knew whether or not they were anemic. This counselling is conducted so that secondary school students are aware of the signs and symptoms of anemia, the treatment options for anemic children, and how to avoid developing anemia.

4. **Data Processing:** The obtained primary data will then undergo data processing before being analysed with SPSS software. Several phases of data processing are performed during the data processing, such as editing, data coding, scoring, entry data, and cleaning data.

5. **Data Analysis:** The analysis of data was conducted in order to attain the specified objectives, namely a description of iron deficiency anemia in students from five elementary schools in Beji District, Depok City in 2018

based on haemoglobin testing. Using the SPSS software, a univariate analysis was performed on the analysed data. Based on haemoglobin examination, the frequency distribution for the dependent variable, iron deficiency anemia, was calculated during the univariate analysis phase. In addition, the frequency distribution for each independent variable, including elementary school students' age, gender, knowledge, was calculated.

- Research Ethics:** Students whose parents have given their consent are given a blood sample to determine their haemoglobin levels. The permit is written and signed by the parents when they consent to a blood draw on their child. Therefore, informed consent is obtained prior to conducting this research.

RESULTS AND DISCUSSION

In this subchapter, the frequency distributions for the independent variable, or respondent characteristics, and the dependent variable, or the incidence of anemia in elementary school children in Beji District, Depok, will be described.

Distribution of Respondents Based on Anemia Incidence

This study's profile of the incidence of anemia is based on Hb results from blood tests conducted on students in elementary schools whose parents have given their consent. Consequently, only 168 of the total respondents took the test. There will be two categories for the incidence of anemia: non-anemia and anemia. The factor that prevents respondents from experiencing anemia if their Hb levels are 12 or higher. Those included in the anemia category, meanwhile, are respondents with Hb levels below 12. In accordance with the frequency distribution analysis presented in Figure 1, the distribution of respondents based on the incidence of anemia is depicted.

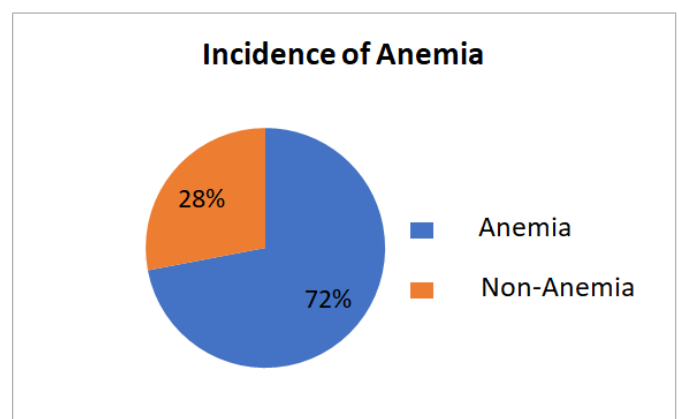


Figure 1. Distribution of Respondents according to the Incidence of Anemia

According to the above data, the majority of pupils are not affected by anemia. There are 121 students who do not have anemia, representing a 72.0% prevalence rate. The number of pupils with anemia was 47, representing a percentage of 28.0%. This indicates that the prevalence of anemia was 28.0% in this study. The obtained prevalence exceeds the national prevalence of anemia in school-aged adolescents, which is 26.4%. In addition, below is a summary of the prevalence of anemia in institutions where the research was conducted (Table 2).

Table 2. Per-School Distribution of Respondents Based on Anemia

School	Hb Results		Total
	Non-Anemia	Anemia	
SDN Beji 4	22 (78,6%)	6 (21,4%)	28
SDN Beji 7	31 (70,5%)	13 (29,5%)	44
SDN Beji 5	32 (82%)	7 (18%)	39
SD IT Muqorrobin	36 (63%)	21 (37%)	57

According to the data presented above, SD Negeri Beji 7 and SD IT Muqorrobin are the only schools where the incidence of anemia among students exceeds the prevalence of anemia in this activity (28.0%). The number of children diagnosed with anemia was found to be higher among students at SD IT Muqorrobin (37%) followed by SDN Beji 7 (29.5%). At the time of the interview, it was determined that they did not consume enough vegetables, such as spinach, cabbage, cesin, carrots, etc., and consumed an excessive amount of fast food, such as chicken nuggets, resulting in iron deficiency.

Age Distribution of the Respondents

The following figure provides a breakdown of the characteristics of respondents based on age, as determined by the frequency distribution analysis (Figure 2). According to the data presented, 71.3% of the students who participated in this activity were 11 years old. Students in sixth grade with the youngest age of 10 years are seven in number, or 3.3% of the total. While the sixth-grade students with the oldest average age, 14, are comprised of two individuals with a percentage of 1.0%.

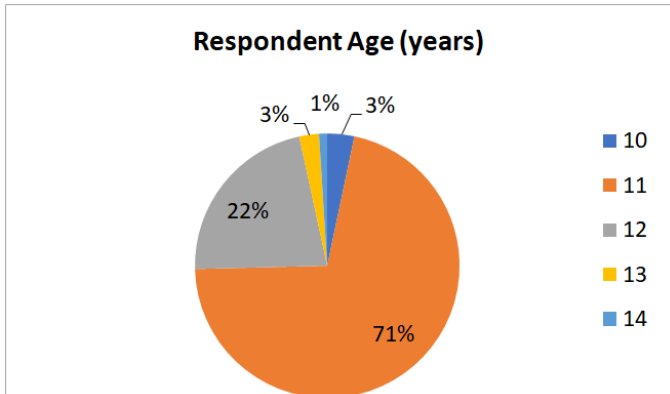


Figure 2. Age Distribution of Respondents

Gender Distribution of Respondents

In accordance with the frequency distribution analysis presented in the accompanying figure 3, the characteristics of respondents based on gender are described. According to the data presented, the majority of pupils who participated in this activity were male. There are 114 male pupils, or 54.5% of the student body. While female pupils make up 45.5% of the student body, or 95 individuals. The frequency distribution of respondents by gender is depicted in the following diagram.

Distribution of Responses by School

In accordance with the analysis of the frequency distribution presented in the figure 4, a breakdown of respondents by institution is provided. According to the data presented, the students from each institution who participated in this activity

were not distributed evenly. The majority of respondents, or 35.4%, were from SD IT Muqorrobin, with a total of 74 individuals. While SD Negeri Beji 4 had the fewest respondents with a total of 28 individuals, or 13.4% of the total. This is possible because the number of students at each institution varies.

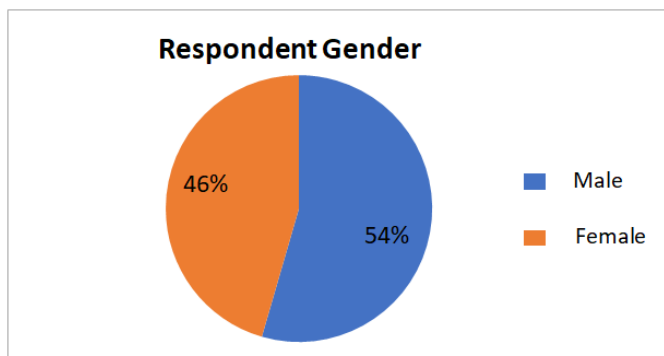


Figure 3. Gender Distribution of Respondents

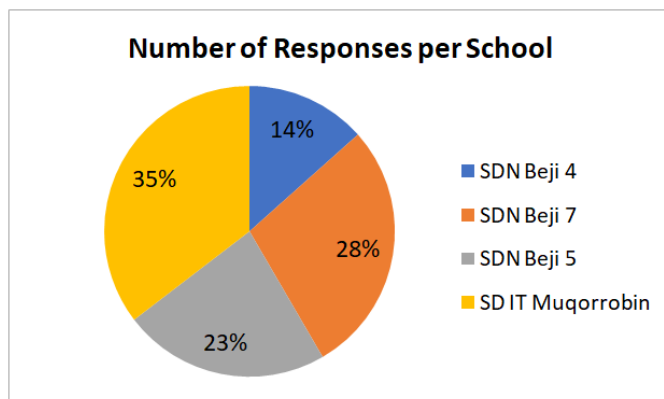


Figure 4. Distribution of Responses by School

Distribution of Respondents According to Their Understanding of Anemia

After conducting the normality test, it was determined that the respondents' knowledge data was not normally distributed (p value = 0.000), so the cut-off point used the median value as the limit for categorizing knowledge, i.e. 6 out of 7 questions were answered correctly. In accordance with the frequency distribution analysis shown in the Figure 5, the characteristics of respondents based on their level of knowledge are described. According to the data presented, the majority of students who participated in this activity had a solid understanding of anemia. There are 160 students with adequate knowledge, constituting 76.6% of the student body. The number of pupils with inadequate knowledge was 49, representing a percentage of 23.4%.

Distribution of Respondents Based on Anemia Thoughts

Following the normality test, it was determined that the respondents' knowledge data was not normally distributed (p value = 0.000), so the median value was used as the cut-off point for grouping attitudes, i.e. the total value of the 10 attitude statements was 32 out of a total of 40. In accordance with the accompanying Figure 6, the frequency distribution analysis provides a description of the characteristics of respondents based on their attitudes.

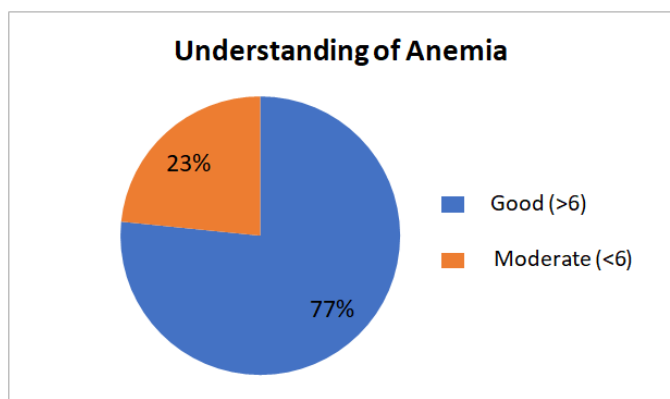


Figure 5. Distribution of Respondents According to Their Understanding of Anemia

According to the data presented, the majority of students who participated in this activity held a favourable view of anemia prevention. With a percentage of 53.1%, 111 students have a positive attitude toward anemia prevention. In contrast, 46.9% of the 98 students surveyed held a negative view of anemia prevention.

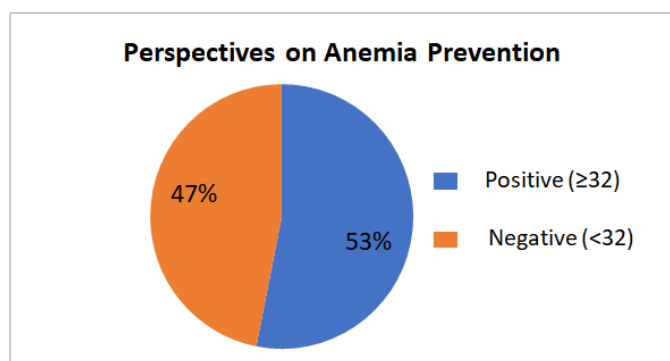


Figure 6. Distribution of Respondents Based on Anemia Thoughts

Conclusion

Anemia can affect children of all ages, including infants and school-aged children. Although not all students are willing to undergo blood tests, the anemia screening program that has been implemented in four elementary schools, namely SDN 4 Beji, SDN 7 Beji, SDN 5 Beji, and Muqorobin IT Elementary School, has been implemented effectively. From the results of the haemoglobin (Hb) screening examination, it was determined that 47 out of 168 students, or approximately 28%, still had anemia, particularly students at SDN 7 Beji (13 students or 29.5%) and SD IT Muqorobin (21 students or 37%). In addition to screening for anemia, the questionnaires distributed to all students at the four research institutions, including those who had blood tests, yielded the following results, the majority of students who participate in this activity are knowledgeable about anemia (76.6%), and the majority also have a positive attitude towards anemia prevention (53.1%).

REFERENCES

- Departemen Kesehatan RI. Program Penanggulangan Anemia pada Wanita Usia Subur Jakarta. Direktorat Gizi Masyarakat, Direktorat Jenderal Bina Kesehatan Masyarakat. 2008.
- Arifin, S. U., Mayulu, N., & Rottie, J. Hubungan Asupan Zat Gizi Dengan Kejadian Anemia pada Anak Sekolah Dasar di Kabupaten Bolaang Mongondow Utara. 2013. E-journal Keperawatan, 1.
- Soebroto, Ikhsan. Cara Mudah Mengatasi Problem Anemia. 2009. Yogyakarta.
- Arisman, MB. 2009. Gizi Dalam Daur Kehidupan. Jakarta: Penerbit Buku Kedokteran EGC.
- Aguilar, R. Moraleda, C. Quinto, L. Renom, M. Mussacate, L. Macete, E. Aguilar, L, J. Menendez, C. Challenges In The Diagnosis of Iron Deficiency In Children Exposed To High Prevalence of Infections. 2012. US National Library of Medicine national Institutes of Health. 7(11)
- World Health Organization. Guideline Daily Iron. Daily iron supplementation in infants and children. Geneva: WHO Press. 2016: 44
- Arifin, S. U., Mayulu, N., & Rottie, J. (2013). Hubungan Asupan Zat Gizi Dengan Kejadian Anemia pada Anak Sekolah Dasar di Kabupaten Bolaang Mongondow Utara. Ejournal Keperawatan, 1.
- Balarajan Y, Ramakrishman U. Ozaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. Lancet. 2011 Dec 17; 378(9809): 2123-35.
- Clark SF. Iron deficiency anemia. Nutr Clin Pract. 2008 April-May; 23(2): 128-41.
- Goodnough LT, Nemeth E. Iron Deficiency and Related Disorders. In: Jonathan W, Pine J, editors. Wintrobe's clinical hematology. 13th ed. Philadelphia: Lippincott Williams & Wilkins; 2009. p.617-43.
- World Health Organization. Assessing iron status of populations. Geneva: WHO Press. 2004; 58.
- World Health Organization. Prevention of deficiency anaemia in adolescent; role of weekly iron and folic acid supplementation. Geneva: WHO Press. 2011; 27.
- Bakta IM. Suega K, Dharmayuda TG. Anemiadefisiensi besi. In: Setiati S, Alwi A, Sudoyo AW, Simadibrata M, Setiyahadi B, Syam AF, editors. Buku ajar ilmu penyakit dalam. 6th ed. Jakarta: Interna publishing; 2014.p.1127-36.
- Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI. Riset Kesehatan Dasar (Riskesdas) 2013. Jakarta: Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI; 2013.
- Nursalam, Susilaningrum, Rekawati., and Utami, Sri. Asuhan Keperawatan Anak: untuk Perawat dan Bidan. Jakarta: Salemba Medika. 2013.
- Zoe, Mita. Anak Pun Terkena Anemia. <http://www.inspiredkidsmagazine.com>. 2008.
- Ali, Muhammad. Mewaspada Anemia Defisiensi Besi: Ketika Anak Kurang Konsentrasi Belajar. <http://www.suaramerdeka.com>. 2007
- Yanola J, Kongpan C, Pomprasert S. Prevalence of anemia, iron deficiency, thalassemia and glucose-6-phosphate dehydrogenase deficiency among Hill-tribe school children in Omkoi district, Chiang Mai province, Thailand. Southeast Asian J Trop Med Public Health. 2014; 45:920-5.
- Ganz T. Iron deficiency and overload. In: Kaushansky K, Lichtman MA, Prchal JT, Levi MM, Press OW, Burns LJ, Caligiuri MA, editors, William Hematology. 9th ed. New York: Mac Grow Hill Education; 2016.p.627-34.
- Raspati H, Reniarti L, Susanah S. Anemia defisiensi besi. Dalam: Permono B, Sutaryo, Ugrasena IDG, Windiastuti E,

- Abdulsalam M, penyunting. Buku ajar hematologi-onkologi anak. Jakarta: Badan Penerbit IDAI; 2006. H. 30-42.
21. Manios Y, Moschonis G, Chrousos GP, Lionis C, Mougios V, Kantilafti M, et al. The double burden of obesity and iron deficiency on children and adolescents in Greece: the healthy growth study. *J Hum Nutr Diet*. 2013;26:470-8.
 22. Afrianti D, Garna H, Idjradinata P. Perbandingan status besi pada remaja perempuan obes dengan gizi normal. *Sari Pediatri*. 2012;14:97-103
 23. Iqbal K, Zafar T, Iqbal Z, Usman M, Bibi H, Afreen MS, et al. Effect of iron deficiency anemia on intellectual performance of primary school children in Islamabad, Pakistan. *Trop J Pharm Res*. 2015; 14:287-91.
 24. Ngui R, Lim YA, Kin LC, Chuen CS, Jaffar K. Association between anaemia, iron deficiency anaemia, neglected parasitic infections and socioeconomic factors in rural children of West Malaysia. *PlosNegl Trop Dis*. 2012;6:e1550.
 25. Hidajat B, Lestari ED. Defisiensi zat besi. Dalam: Sjarif DR, Lestari ED, Mexitalia M, Nasar SS, penyunting. *Nutrisi pediatrik dan penyakit metabolik*. Jilid I. Jakarta: Badan Penerbit IDAI; 2011. H. 190-8
 26. Low M, Farrell A, Biggs B, Pasricha S. Effects of daily iron supplementation in primary-school-aged children: systematic review and meta-analysis of randomized controlled trials. *CMAJ*. 2013; 185:791-801.
 27. Glader B. Iron deficiency anemia. in: Behrman RE, Kliegman RM, editor: *Jenson HB. Nelson textbook of pediatrics*. Edisi ke-20, Beaverton: Ringgold Inc; 2015. H. 1614-5.
 28. Tjitrasasi T, Gatot D, Abdulsalam M. Tata laksana anemia pada anak. In: Abdulsalam M, Trihono PP, Kaswandani N, Endyarni B. *Pendekatan praktis pucat: masalah kesehatan yang terabaikan pada bayi dan anak*. Jakarta: Departemen Ilmu Kesehatan Anak FKUI RSCM; 2008. H 117-29.
 29. Brune M, Rossander L, Hallberg L. Iron absorption and phenolic compounds: importance of different phenolic structure. *Eur J Clin Nutr*. 1989;43:547-57.
 30. Almasyhuri, Yuniati H, Slamet DS. Kandungan asam fitat dan tanin dalam kacang-kacangan yang dibuat tempe. *PGM*. 1990;13:65-72.
 31. Jumrakh M, Lubis IZ, Azis N. Nutritional status and hemoglobin level in elementary school children. *Paediatr Indonesia*. 2001;41:296-8.
 32. Hiltatuzzahroh. Korelasi kadar tanin pada produk the komersial dengan aktivitasnya sebagai senyawa antibakteri EPEC K1-1. Tesis. 2006.
 33. Kartono D, Hardinsyah, Jahari AB, Sulaeman A, Astuti M, Soekatri M, et al. Angka kecukupan gizi untuk orang Indonesia. Direktorat Bina Gizi dan Kesehatan Ibu dan Anak Kementerian Kesehatan Republik Indonesia; 2014.h 1-14
 34. Soekarti M, Kartono D. Kecukupan mineral: kalsium, fosfor, magnesium, tembaga, kromium, besi, iodium, seng, selenium, mangan, fluor, natrium dan kalium. Direktorat Bina Gizi dan Kesehatan Ibu dan Anak Kementerian Kesehatan Republik Indonesia; 2014.h. 121-46.
 35. Choi H, Lee H, Jang HB, Park JY, Kang J, Park K, dkk. Effects of maternal education on diet, anemia, and iron deficiency in Korean school-aged children. *BMC Public Health*. 2011;11:870.
 36. Thompson FE, Subar AF. Dietary assessment methodology. Dalam: Coulston AM, Boushey CJ, Ferruzzi MG, penyunting. *Nutrition in the prevention and treatment of disease*. Edisi ke-2. London: Elsevier, 2008.h.5-29.
 37. Ortego RM, Perez-Rodrigo C, Lopez-Sobaler AM. Dietary assessment methods: dietary records. *Nutr Hosp*. 2015;31:38-45
 38. Winita R, Mulyati, Astuty H. Upaya pemberantasan kecacingan di sekolah dasar. *Makara Kesehatan*. 2012;16:65-71.
 39. Satgas Anemia Difisiensi Besi IDAI. Rekomendasi suplementasi besi untuk anak. Jakarta: Ikatan Dokter Anak Indonesia; 2011.
