The Effectiveness Of Android Based Applications An Adherence Monitoring System For Adolescent Female Consumption Fe Tablets

1*Yuni Handayani, 2Sugeng Winarso, 3Farida Wahyu Ningtyias

1Postgraduate Student Faculty of Public Health Science, University of Jember, Jember, East Java, Indonesia
2,3Faculty of Public Health Science, University of Jember, Jember, East Java, Indonesia
*Corespondence author : yunih579@gmail.com

ABSTRACT

Introduction: The level of adherence of adolescent female to the consumption of Fe tablets is an indicator of the success of the program of giving Fe tablets. **Objective:** To analyze the effectiveness of the use of android-based applications as a monitoring system for adherence with adolescent female consuming Fe tablets . **Methods:** This research approach is quantitative Quasi Experimental using Pre-Post Control Group Design. This study observes or measures the independent variable and the dependent variable at the same time or at one time. The population of this study was the female youth of SMAN 5 Jember grade 3 with a total of 123 respondents. The technique of taking simple random sampling consisted of 2 groups, 39 adolescent female became the experimental group by being given an android application and 39 adolescent female became the control group. The technique of collecting data is in the form of questionnaires and observations to determine the respondent's adherence with consuming Fe tablets . **Results:** Data analysis used a comparison test between the control and experimental groups with a P value of 0.000 less than 0.05. There is a significant difference between the adherence of adolescent female to take Fe tablets between the experimental group and the control group. **Conclusion:** It can be concluded that there is an effective use of android-based applications that can increase the adherence of adolescent female in consuming Fe tablets compared to the provision of activities that have been running previously. It is hoped that there will be development on an Android-based application to add blood to be used as a monitoring system.

ABSTRAK

Latar belakang : Tingkat kepatuhan remaja putri terhadap konsumsi tablet tambah darah merupakan indikator keberhasilan dari program pemberian tablet penambah darah. *Tujuan:* Menganalisis efektifitas pemanfaatan aplikasi berbasis android sebagai sistem monitoring kepatuhan remaja putri konsumsi tablet tambah darah. *Metode:* Pendekatan penelitian ini kuantitatif Quasi Experimental menggunakan Pre-Post Control Group Design. Penelitian ini melakukan pengamatan atau pengukuran variabel bebas dan variabel terikat pada saat yang bersamaan atau dalam satu waktu. Populasi Penelitian ini adalah remaja putri SMAN 5 Jember kelas 3 dengan jumlah sebanyak 123 responden. Teknik Pengambilan simple random sampling terdiri 2 kelompok yaitu 39 remaja putri menjadi kelompok eksperimen dengan diberikan aplikasi android dan 39 remaja putri menjadi kelompok kontrol. Teknik mengumpulan data menggunakan berupa kuesioner dan observasi untuk mengetahui kepatuhan responden konsumsi tablet tambah darah. *Hasil:* Analisis data menggunakan uji perbandingan antara kelompok kontrol dan eksperimen dengan nilai P value 0,000 kurang dari 0,05. Terdapat perbedaan yang signifikan antara kepatuhan remaja putri mengkonsumsi tablet tambah darah antara kelompok ekperimen dan kelompok kontrol. *Kesimpulan:* Dapat disimpulkan bahwa terdapat efektifitas pemanfaatan aplikasi berbasis android mampu meningkatkan kepatuhan remaja putri mengkonsumsi tablet tambah darah dibandingkan pemberian kegiatan yang sudah berjalan sebelumnya. Diharapkan adanya pengembangan pada aplikasi berbasis android tambah darah untuk digunakan sebagai sistem monitoring.

Introduction:

Adolescent female have a higher risk of developing anemia due to an increase in body requirements, which results from a low intake of nutrients and their absorption. (Tadege, Id, and Wassie 2018). Decreased hemoglobin (Hb) levels are influenced by increased iron requirements, decreased iron intake, rapid physical growth, during menstruation, and high iron requirements for the formation of hemoglobin (Hb) (Gedefaw, Tesfaye, and Yemane 2015). Adolescent female must take Fe tablets every month during menstruation to replace lost and unfulfilled iron from food (Fitriana and Dwi Pramardika 2019). Thus, it is necessary for adolescent female to comply with taking Fe tablets . The level of adherence of adolescent female to the consumption of Fe tablets is an indicator of the success of the program of giving Fe tablets (Kemenkes RI 2015).

Based on the 2015 Ministry of Health, it has a target of reducing anemia in adolescent female to 8%. Based on data (Jember District Health Office 2018) the prevalence of anemia risk in adolescent female at the SMA/SMK, MA, SMALB levels in Jember Regency is 10.7%. Based on the results of the November 2019 IBI Organization study with a sample of 3 high schools / vocational schools in the working area of the Patrang Health Center, it was found that adolescent female who were at the most risk of anemia were at SMAN 5 Jember as many as 9.1% of adolescent female .

Adolescent female have a higher risk than men who experience anemia, because adolescent female experience menstruation which for or more than five days is feared to lose iron. Several factors related to the occurrence of anemia in adolescents include parental education, family income, knowledge and attitudes of adolescents towards anemia, nutrition, menstruation and infection (Harahap 2018). This has an impact on work productivity such as academic decline in schools, namely learning concentration and decreased body resistance so that they are susceptible to disease. In addition, adolescent female who experience anemia will be at risk of becoming mothers who produce offspring with low birth weight (LBW) and congenital abnormalities and increase the risk of maternal and child mortality (Hamranani, Permatasari, and Subiakni 2018).

The recommendation of the World Health Organization (WHO) was responded to well and quickly by the Indonesian government by making intensive prevention and control efforts of anemia in adolescent girls. Giving Blood Add Tablets distributed through school institutions is one of the efforts made by the Government. The Jember District Health Office has carried out efforts to prevent and overcome anemia in adolescent female with various activities at the beginning, namely socialization about giving Fe tablets and followed by giving Fe tablets . Based on information, Fe tablets have been distributed to schools through the School Health Unit program. The activity of distributing Fe tablets is given to adolescent female every Friday and consumed at school (Jember District Health Office 2018).

Adherence is a person's attitude that is influenced by knowledge. Knowledge is related to adherence because adherence is an important domain for the formation of attitudes. Attitudes obtained from adolescents' sensing of health information will affect adolescents' attitudes to maintain health, especially to avoid anemia, so adolescents will obey to take Fe tablets (Hamranani, Permatasari, and Subiakni 2018). Evaluation of the program for giving Fe tablets to adolescent female must be carried out with collaboration between teachers, families and health workers to provide motivation and socialization related to Fe tablets (Fitriana and Dwi Pramardika 2019). One of the obstacles to using a monitoring card is that if the card is lost or the young woman does not attend school, she will lose control or supervision of the adherence of the young woman in consuming Fe tablets . The monitoring system that is manually applied requires the use of technology to facilitate direct reporting and monitoring of adolescent female , namely by developing a monitoring system such as an android smartphone

monitoring application. The purpose of this study was to analyze the effectiveness of the use of android-based applications as a monitoring system for female adolescent adherence with Fe tablets.

Methods:

The approach in this study is a quantitative approach with a Quasi Experimental type of research using Pre-Post Control Group Design. This study observes or measures the independent variable and the dependent variable at the same time or at one time. The population of this study was the female youth of SMAN 5 Jember grade 3 with a total of 123 respondents. Sampling technique simple random sampling technique consisted of 2 groups, namely 39 adolescent female who became the experimental group by being given an android application and 39 adolescent female became the control group. The technique of collecting data used instruments in the form of questionnaires and observations to determine the respondent's adherence with the consumption of Fe tablets . Data analysis used a comparison test between the control and experimental groups with a P value of 0.000 less than 0.05.

Results:

1. Characteristics of Adolescent Female of SMAN 5 Jember

In the experimental group most of the respondents were 19 years old as much as 64.1% while in the control group most of the respondents were 18 years old as much as 51.3%. According to the place of residence in the experimental group, most of the respondents lived at home as much as 74.4% while in the control group most of the respondents lived at home as much as 61.5%. According to the weight of the respondents in the experimental group, most of the respondents weighed 35-45 kg as much as 28.2%. While in the control group, most of the respondents weigh 46-55 kg as much as 46.2%. Furthermore, according to the height of the experimental group, most of the respondents had a height of 150-159 cm as much as 82.1%. While in

the control group most of the respondents have a height of 150-159 cm as much as 53.8% Then the Body Mass Index (BMI) in the experimental group is mostly normal as much as 87.2% while the Body Mass Index (BMI) in the control group is 100% normal . Furthermore, the experimental group mostly experienced menarche at the age of 12 years as much as 33.3% while in the control group most of the respondents experienced menarche at the age of 12 years as much as 25.6%. According to the length of menstruation in both the experimental group and the control group, most of the respondents experienced menstruation for 5-7 days as much as 74.4%.

2. Adolescent Female Adherence Consumption Fe Tablets Before Using Android based Applications

Table 1 Adherence of Adolescent Female Consumption Fe Tablets Before Using Android based

Adherence	Eksperiment		Control	
	Amount	Percentage	Amount	Percentage
Low	32	82,1%	27	69,2%
Mild	7	17,9%	12	30,8%
High	0	0,0%	0	0,0%
Totals	39	100%	39	100%
Uji Mann Whitney	***T Statistics***		***Sig. (2 tailed)***	
	-0,735		0,462	

It can be seen that in the experimental group based on the category of adherence, most of the respondents did not comply with 82.1% and in the control group most of the respondents did not comply with 69.2%. The results of the comparison test between the control and experimental groups with a P value of 0.000 more than 0.05. Thus, there is no comparison or the same between the control group and the experimental group in the level of adherence of adolescent female to consuming Fe tablets .

3. Adolescent Female Adherence Consumption Fe TabletsAfter Using Android based Applications

Table 2 Adherence of Adolescent Female Consumption Fe Tablets After Using Android based Applications

Adherence	Eksperiment		Control	
	Amount	Percentage	Amount	Percentage
Low	12	30,8%	27	69,2%
Mild	17	43,6%	11	28,2%
High	10	25,6%	1	2,6%
Totals	39	100%	39	100%
Uji Mann Whitney	T Statistics		Sig. (2 tailed)	
	3,630		0,000	

4. Analysis of the Effectiveness of Android Based Applications as a Monitoring System on the Adolescent Female Adherence Consumption Fe Tablets

Table 3 Results of Different Tests of Adolescent Female Adherence Levels Consumption Fe Tablets with the Wilcoxon Test in the experimental group

Adherence	Ekperimen			
	Pretest		Pottest	
	Amount	Percentage	Amount	Percentage
Low	32	82,1%	12	30,8%
Mild	7	17,9%	17	43,6%
High	0	0,0%	10	25,6%
Totals	39	100%	39	100%
Uji Wilcoxon	Z Statistics		Sig. (2 tailed)	
	-4,250		0,000*	

The results of the Wilcoxon test to determine the difference between pretest and posttest adherence in the experimental group had a P value of 0.000 less than 0.05. Thus, it can be stated that there is a significant difference between the adherence of the experimental group of adolescent female consuming Fe tablets after being given blood-added tablet-based applications.

Table 4 Results of Different Tests of Adolescent Female Adherence Levels Consumption Fe Tablets with the Wilcoxon Test in the experimental group

Adherence	Control			
	Pretest		Pottest	
	Amount	Percentage	Amount	Percentage
Low	27	69,2%	27	69,2%
Mild	12	30,8%	11	28,2%
High	0	0,0%	1	2,6%
Totals	39	100%	39	100%
Uji Wilcoxon	Z Statistics		Sig. (2 tailed)	
	-0,236		0,813	

The results of the Wilcoxon test to determine the difference between the pretest and posttest adherence of the control group had a P value of 0.000 more than 0.05. Thus, it can be stated that there is no significant difference between the adherence of the experimental group of adolescent female consuming Fe tablets after being given blood-added tablet-based applications.

Table 5 show that the results of the comparison test between the control and experimental groups with a P value of 0.000 less than 0.05. Thus there is a comparison between the control group and the experimental group on the adherence of adolescent female consuming Fe tablets . Thus it can be concluded that in the experimental group there is the use of an android-based application that is proven to be effective in increasing the adherence of adolescent female consuming Fe tablets .

Table 5 Results of Testing the Effectiveness of Android Based Applications as a Monitoring System on the Adherence Level of Adolescent female Consumption Fe Tablets with Mann Whitney

| Adherence | Ekperimen | | | | | | Kontrol | | | | | |
| | Pretest | | Pottest | | Difference | | Pretest | | Pottest | | Difference | |
	A	P	A	P	A	P	A	P	A	P	A	P
Low	32	82,1%	12	30,8%	20	51,3%	27	69,2%	27	69,2%	27	69,2%
Mild	7	17,9%	17	43,6%	9	23,1%	12	30,8%	11	28,2%	11	28,2%
High	0	0,0%	10	25,6%	10	25,6%	0	0,0%	1	2,6%	1	2,6%
Totals	39	100%	39	100%	39	100%	39	100%	39	100%	39	100%

Uji Mann Whitney	Z Statistics	Sig. (2 tailed)
	3,630	0,000*

Discussion:

1. Characteristics adolescent female at SMAN 5 Jember

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember showed that most of the data were 19 years old. The results of the study stated that the main determinants for identifying the occurrence of anemia in adolescent female were age, place of residence and menarche status (Regasa and Haidar 2019). Thus, age greatly affects individual development, especially adolescent girls, the older they are, the more they are able to control themselves in sorting and choosing the best to meet their needs and comply with the advice to consume Fe tablets in preventing anemia.

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember obtained weight data from 46-55 Kg. The respondent's body weight is said to be normal, this is reinforced by Broca's theory which states that the normal weight for adolescent female is 40-68 kg using the calculation formula (height - 100) - (15% x (height - 100). Body weight in young men is very much determined by the pattern of eating and food intake consumed in daily life. Irregular eating patterns or diets can result in an imbalance of body needs. Restrictions on eating by adolescent female if they are not appropriate will have weight underweight or underweight which can lead to anemia.This is why it is necessary to educate adolescent female about eating patterns to become more regular and to fulfill iron in the body, and to take Fe tablets , especially those who are menstruating so as to prevent anemia.

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember obtained data on the height of the respondents in the experimental group of 150-159 cm. Based on the data from Riskesdas, the normal height of the female adolescent is 150.7-154 cm, thus the height of the respondent is included in the normal category.

Height and weight are the period of measurement of growth and development of adolescent girls, with weight and height of adolescent girls, it can be known Body Mass Index (BMI) in determining nutritional status. Nutritional status is strongly influenced by the food intake of adolescent girls, especially the nutritional content of the food consumed on a daily basis. Adolescent female who have a height that exceeds must be balanced with food intake to achieve a body mass index (BMI). Based on the results of the study, it was stated that nutritional status had a positive correlation with hemoglobin concentration,

meaning that the worse a person's nutritional status, the lower the hemoglobin level (Sukarno, Marunduh, and Pangemanan 2016). If the weight and height are appropriate, it can be categorized as underweight nutritional status and allows the occurrence of anemia in adolescent female. And vice versa with more weight if it is not appropriate it also allows the occurrence of anemia in adolescents.

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember based on where most of the respondents live at home. The place of residence is very influential on the development of adolescent female , namely with the support of the family towards the adherence of adolescent female . Family support greatly affects individual adherence in taking drugs (Handayani and Novayelinda 2016). Adolescent female who live at home get more attention and support from their families, so adolescent female will increase their motivation to comply with what is recommended and recommended, and vice versa if there is no cooperation in the form of support from the family, obedience will not be formed.

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember based on menarche, most of the respondents experienced menarche at the age of 12 years. Menarche or first menstruation is a sign of a girl entering puberty/adolescence. The initial age of menstruation (menarche) occurs at the age of 11-14 years, accompanied by the appearance of secondary sex signs such as breast enlargement, hair growth in the armpits and pubic area. The early age of menarche makes it possible that at the age of 13, the young woman already has a normal menstrual pattern because it is possible that the menstrual hormones are fully formed (Yunarsih and Antono 2017). With the arrival of menarche in adolescent female , there must be mental readiness in experiencing menstruation because it is related to how to maintain cleanliness and main nutritional intake to prevent anemia.

The results of the analysis of the characteristics of adolescent female at SMAN 5 Jember based on the length of menstruation, most of the respondents experienced menstruation for 4-7 days. Menstrual pattern is a series of menstrual processes that occur from the menstrual cycle and the duration of menstrual bleeding that can cause anemia. The length of time and bleeding that occurs during menstruation does vary from one woman to another. Normally, bleeding that occurs during menstruation is 3-7 days (Memorisa and Aminah 2020). It is expected that adolescent female eat nutritious foods, and suggest adolescent female to exercise that is not too heavy so that they can maintain the length of menstruation well, and can prevent anemia in adolescents.

The relationship between Body Mass Index (BMI) and the length of menstruation in the experimental and control groups of respondents illustrates a strong relationship. A person who has more or less is at risk of having long periods. Body Mass Index (BMI) can affect a woman's menstrual cycle is known through the role of the hormone estrogen. Estrogen is produced in the ovaries, placenta, adrenal glands and fat tissue. The results of the study stated that the cause of the longer menstrual cycle was due to the increased amount of estrogen in the blood due to the increased amount of body fat. Excess body weight can affect the menstrual cycle (Harahap and Irmayanti 2016). Adolescent female are expected to be able to meet the needs of the body, especially fat according to their needs in order to have a normal Body Mass Index (BMI) so that they experience a normal menstrual cycle. As for how to choose and sort out foods that contain fat and are not excessive and can be balanced with a pattern of rest and light exercise that is done regularly.

The relationship between the age of early menstruation (menarche) and the length of menstruation in the experimental group and the control group describes a less strong relationship. There are several

factors that affect the age at the start of menstruation (menarche) in adolescents, including nutritional status. Based on the results of the study, it was stated that respondents who had normal nutritional status and were overweight experienced more menarche age under the age of 13 years, while those who experienced the early age of menstruation (menarche) above the age of 13 years were more respondents with underweight nutritional status. The nutritional status of adolescent female greatly affects the age at which menstruation begins (menarche) and the presence of complaints during menstruation, as well as the length of menstrual days (Mutasya, Edison, and Hasyim 2016). Thus, to get the age at the beginning of menstruation (menarche) in the normal category of adolescent female and to avoid problems that accompany menstrual disorders by fulfilling the nutritional status in the body according to their needs. Menstrual disorders such as the length of menstruation will not occur if it is anticipated with improvements in the nutritional status of adolescent girls. Adolescent female who experience menstrual disorders, such as the length of menstruation outside the normal limits, allow the occurrence of anemia.

2. Adolescent Female Adherence Consumption Fe Tablets Before Using Android-based Applications

Based on the results of the data analysis of the experimental and control groups, the data showed that the category of adherence scores at the pretest was mostly non-compliant. The disobedience of these adolescent female is due to several things, including the lack of information obtained from health workers, teachers at school, or social media. The lack of knowledge of adolescent female about anemia can result in the unwillingness of adolescent female to consume Fe tablets in accordance with government programs so that the program does not run and the incidence of anemia in adolescent female is still high.

The approach used as a strategy to improve adolescent girls' adherence to consuming Fe tablets is through health education about anemia, prevention and Fe tablets . Based on a review of research results, it explains the basic control approach including education and methods related to increasing iron intake, modifying diet to increase iron absorption and choosing food ingredients (Sun and Zhang 2018). Knowledge is related to adherence because adherence is an important domain for the formation of behavior. A person's behavior will be based on extensive knowledge to understand something. Behavior obtained from adolescent sensing of health information will affect the behavior of adolescent femalw to maintain health, especially to avoid anemia, so adolescents will obey to take Fe tablets. The better knowledge, strong motivation and good family support, the more obedient adolescent female will be (Hamranani, Permatasari, and Subiakni 2018).

Adolescent female have extensive knowledge related to how to prevent anemia by being obedient in consuming Fe tablets . Success in increasing the adherence of adolescent female will be achieved if all parties, both health workers, teachers and families work together to continue to provide motivation and supervision in consuming Fe tablets . Education is needed directly or through print and electronic media which is provided continuously to increase the knowledge of adolescent female. With the hope of being able to change the behavior of adolescent female obediently consuming Fe tablets to prevent anemia.

3. Adolescent Female Adherence Consumption Fe Tablets After Using Android based Applications

Based on the results of data analysis in the experimental group, it was found that after using an android based application there was an increase in adherence. This

shows that there is a significant increase with the use of android based applications to increase the adherence of adolescent female in consuming Fe tablets . Knowledge of health is primarily about nutrition, because nutrition is an important factor and influences the behavior of individuals, families, and even communities (Saraswati, Kartini, and Agushybana 2020). This is a public health strategy that contributes to preventing and increasing the reduction in the incidence of anemia as an effort to change food intake, micronutrient supplementation, increase awareness of nutrition and public health (Jinghuan, Hu, and Li 2019). Good knowledge on iron deficiency and Fe tablets and the experience of adolescent female affect the formation of attitudes of adolescent female to obediently consume Fe tablets . In addition, support from outside parties is needed, namely teacher support is very important to make adolescent female obedient in consuming Fe tablets because adolescent female spend more time at school every day than at home.

Adherence of adolescent female can be grown by seeking the latest information related to anemia and how to prevent it. adolescent female can access the latest information from social media, applications and websites and this information can be forwarded to other friends so as to prevent anemia. Based on a study of the theory of female adolescent adherence in consuming blood steadfast tablets is strongly influenced by environmental factors. Such as health workers, schools, friends and family. Health workers need to empower in implementing programs at the school level with and there must be an agreement on the implementation of drinking tables in schools (Widiastuti, Musdalifah, and Zuhriyatun 2020).

Adolescent female lack information related to understanding anemia and the importance of Fe tablets and lack of supervision in consuming Fe tablets so that these teenagers do not care about their health. The provision of education and information that is continuously given to Adolescent female is expected to be able to understand about anemia, how to prevent it and how to take Fe tablets so that Adolescent female are obedient in consuming Fe tablets . Without a change in the improvement of education and information provided, Adolescent female do not have the will of Adolescent female to obey in consuming Fe tablets so that anemia occurs in adolescents.

4. Analysis of the Effectiveness of Android Based Applications as a Monitoring System on the Adolescent Female Adherence Consumption Fe Tablets

The results of this study indicate that there is a significant difference between the adherence of adolescent female in consuming Fe tablets between the use of android-based applications and the provision of activities that have been running previously. It can be concluded that the use of android based applications is able to significantly increase the adherence of adolescent female in consuming Fe tablets compared to the provision of activities that have been running previously. Based on the results of previous studies, it was stated that the Aneminfo android application could be a fairly effective means of providing education about iron deficiency anemia as an effort to increase adolescent knowledge and remind adolescents to prevent anemia from an early age. Android applications can be an alternative media that can be used as a means of health education (Saraswati, Kartini and Agushybana 2020).

Adolescent female get a lot of health related information from the internet and other information media. In addition, the results of previous studies explained that the digital application of medication reminders installed on the mobile phones of patients with diabetes mellitus was effective in improving medication adherence (Alfian and Putra 2017). With

this android based application, adolescent female can use it to explore knowledge and remind them to consume Fe tablets on time as recommended. Because this application has provided features of information related to the definition of anemia, signs and symptoms, causes and ways to prevent anemia. This android-based application can also be used as a monitoring medium that can be done by anyone, both health workers, teachers and families to see the adherence of adolescent female to consume Fe tablets as recommended. Teenage girls will take Fe tablets according to the recommendation because there is a reminder when to take medicine. Thus, this android-based application can be used to improve the adherence of adolescent female with the aim of achieving government programs on tablets as a strategy to prevent anemia in adolescent female.

Conclusion:

1. The characteristics of adolescent female at SMAN 5 Jember describe normal conditions according to their growth and development.
2. There was no difference between the experimental group and the control group before using the android based application.
3. There is a difference between the experimental and control groups of female adolescents taking blood supplement tablets after using an android based application.
4. Based on the results of the test, the difference in adherence between the pretest and posttest in the control group resulted in a significance value > level of significance (α=5% or 0.05). Thus, it can be stated that there is a significant difference between the adherence of adolescent female in consuming Fe tablets both before and after being given Fe tablets .

The results of the difference test between the control and experimental groups resulted in a significance value < level of significance (α = 5% or 0.05). Thus, it can be stated that there is a significant difference between the two control groups and the experimental group in the adherence of adolescent female to consuming Fe tablets . Thus it can be concluded that the use of android based applications is proven to be effective in increasing the adherence of adolescent female consuming Fe tablets .

References:

Alfian, Riza, and Aditya Maulana Perdana Putra. 2017. "The Effect of Using a Digital Application Reminder to Take Drugs on Compliance with Taking Drugs and The Success of Diabetes Mellitus Patients." *Proceedings of the National Seminar APTFI II* (2013):63–71.

Jember District Health Office. 2018. *Jember District Health Profile*. Jember.

Fitriana, Fitriana, and Dhito Dwi Pramardika. 2019. "Evaluation of the Blood Enhancement Tablet Program for Adolescent" *MPPKI (Indonesian Health Promotion Publication Media): The Indonesian Journal of Health Promotion* 2(3):200–207. doi: 10.31934/mppki.v2i3.807.

Gedefaw, Lealem, Melkam Tesfaye, and Yemane. 2015. "Anemia and Iron Deficiency among School Adolescents: Burden, Severity, and Determinant Factors in Southwest Ethiopia." *Adolescent Health, Medicine and Therapeutics* 189. doi: 10.2147/ahmt.s94865.

Hamranani, Sri Sat Titi, Devi Permatasari, and Subiakni. 2018. "The Relationship of Knowledge and Attitude with Compliance with Taking FE Tablets in Adolescent Female Class X Di SMK N 1 Klaten." *TRIAGE Journal of Nursing Science* 8(1):1–10.

Handayani, Novayelinda, Jumaini. 2016. "Relationship Of Nutritional Status With The Event Of Anemia In Adolescent Women " *Jurnal Online College student* 2(1).

Harahap, V, A. Irmayanti. 2016. "Relationship between Body Mass Index (BMI) and Menstrual Cycle in Adolescent Girls in SMPN 17 Jambi City Tahun 2012." *STIKes PRIMA JAMBI* 2:17–20.

Harahap, Novy Ramini. 2018. "Factors Associated with the Incidence of Anemia in Young Women." *Nursing Arts* 12(2):78–90. doi: 10.36741/jna.v12i2.78.

Jinghuan, J., Yichun Hu, and Li. 2019. "Prevalence of Anemia in Chinese Children and Adolescents and Its Associated Factors." *International Journal of Environmental Research and Public Health* 16(8):1–13. doi: 10.3390/ijerph16081416.

KemenKes RI. 2015. *Profil Health Indonesia*. Jakarta.

Memorisa, Gebby, and Siti Aminah. 2020. "The Relationship between Menstruation Length and Anemia in Adolescents." *Health Student Journal* 1(2):165–71.

Mutasya, Fitrah Umi, Edison Edison, and Hasnar Hasyim. 2016. "The Relation factors Dengan Age Menarche Adolescent SMP Adabiah." *Health Jurnal Andalas* 5(1):233–37. doi: 10.25077/jka.v5i1.475.

Regasa, Rediet Takele, and Jemal Ali Haidar. 2019. "Anemia and Its Determinant of In-School Adolescent Girls from Rural Ethiopia: A School Based Cross-Sectional Study." *BMC Women's Health* 19(1):1–7. doi: 10.1186/s12905-019-0791-5.

Saraswati, Rizki Septia, Apoina Kartini, and Farid Agushybana. 2020. "The Effect of the Aneminfo Android Application on the Knowledge and Attitudes of Adolescent Regarding Iron Deficiency Anemia." *Indonesian Journal of Health Promotion* 15(2):65–69. doi: 10.14710/jpki.15.2.65-69.

Sukarno, Janneta, R. Marunduh, and Pangemanan. 2016. "Relationship between Body Mass Index and Hemoglobin Levels in Adolescents in West Bolangitang District, North Bolaang Mongondow Regency." *JKK (Journal of Clinical Medicine)* 1(1):29–35.

Sun, Jian, and Zhang. 2018. "Effect of Dietary Intervention Treatment on Children with Iron Deficiency Anemia in China: A Meta-Analysis." *Lipids in Health and Disease* 17(1):1–6. doi: 10.1186/s12944-018-0749-x.

Tadege, Melaku, Engidaw Id, and Wassie. 2018. "Anemia and Associated Factors among Adolescent Girls Living in Aw-Barre Refugee Camp , Somali Regional State , Southeast." 1–12.

Widiastuti, Anita, Ulfah Musdalifah, and Fitria Zuhriyatun. 2020. "Implementation Model of Giving Blood Add Tablets in Middle Schools." *Link* 16(1):17–22. doi: 10.31983/link.v16i1.5655.

Yunarsih, Yunarsih, and Sumy Dwi Antono. 2017. "The Relationship between Menstrual Patterns and the Incidence of Anemia in Adolescent Girls Class VII SMPN 6 Kediri." *Journal of Health Sciences.* 3(1):25. doi: 10.32831/jik.v3i1.42.