

Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among
High School Female Students in Banjarmasin City, Indonesia: A Mixed Method Study



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:วิธีการศึกษาแบบผสมวิธี



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Lafi Munira : Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School Female Students in Banjarmasin City, Indonesia: A Mixed Method Study. Advisor: Pramon Viwattanakulvanid, Ph.D.

Based on the Indonesia National Basic Health Survey in 2018, the prevalence of anemia in young women was 48.9%, along with the major proportions of anemia in the age group of 15-24 years. This study aimed to examine the influence of knowledge and attitude on iron deficiency anemia prevention practice and to find out the reasons for not practicing anemia prevention among female high school students in Banjarmasin, Indonesia. The mixed-method study with a quantitative study: cross-sectional survey study (April 2020) was conducted through an online survey among 359 female students (15-18 years old) and qualitative study: focus group discussion and in-depth interview (April-May 2020) were conducted through tele-interview via video call among teacher and health officers. Purposive sampling was used to select three high schools with a high prevalence of anemia in Banjarmasin, Indonesia. Data analysis for the quantitative study was used binary logistic regression and for qualitative study were used a combination of content analysis and thematic analysis. Results: A total of 359 female students participated in the study with the age range from 15 to 18 years old. The results showed 166 (46.2%) of female students had poor practice, along with 152 (42.3%) poor attitude level and 175 (48.7%) poor knowledge level towards iron deficiency anemia prevention. The study also indicated that age group (17-18 years old) OR (95%CI): 1.60 (1.03, 2.50) $p = 0.039$, types of school l OR (95%CI): 0.55 (0.34, 0.90) $p = 0.017$, knowledge OR (95%CI): 1.07 (1.01, 1.13) $p = 0.031$ were significant predictors of practicing iron deficiency anemia prevention. Top 3 reasons for not practicing anemia prevention among students were 1) Feeling nausea after taking iron tablets (32%); 2) Don't like the smell and color of iron tablets (21.4%); 3) Don't know the benefit of practice anemia prevention (18.9%). From focus group discussion findings found that lack of information given and lack of the duration of information given linked to lack of knowledge among female students. Main reasons for not practicing anemia prevention among female students were related to the dislike of iron tablets and lack of knowledge due to ineffective anemia education program. Therefore, anemia prevention programs should be improved for increasing the knowledge of students towards the benefit of anemia prevention practice and iron tablets compliance.

Field of Study: Public Health

Student's Signature

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TABLE OF CONTENTS

	Page
ABSTRACT (THAI)	iii
ABSTRACT (ENGLISH)	iv
ACKNOWLEDGEMENTS	v
TABLE OF CONTENTS	vi
CHAPTER I	10
INTRODUCTION	10
1.1 Background and Rationale	10
1.2 Research Questions	14
1.3. Research Goals and Objectives.....	14
1.4. Research Hypothesis.....	15
1.5. Conceptual Framework.....	16
1.6. Operational Definitions	17
CHAPTER II.....	19
LITERATURE REVIEW	19
2.1 Adolescence Development.....	19
2.2. Anemia and its causes, symptoms, and effects on health.....	20
2.3. Hemoglobin and its function.....	24
2.4 Iron (Fe) in the Human Body	25
2.5. Factors that are related to the incidence of anemia in adolescence girl.....	26
2.6 Behavior Theory and KAP.....	29
2.7. Banjarmasin city and its government policies regarding anemia.....	32

2.8 Related Studies.....	34
CHAPTER III.....	37
METHODOLOGY.....	37
3.1. Study Design.....	37
3.2. Study Area.....	38
3.4 Duration of the study.....	38
3.5 Measurement tools:.....	38
3.6 Sample Size.....	45
3.6.1 Sample Size for Quantitative Study.....	45
3.6.2 Sample Size for Qualitative Study.....	45
3.7 Inclusion and Exclusion Criteria.....	46
3.7.1 Inclusion and Exclusion Criteria for Quantitative Study.....	46
3.7.2 Inclusion and Exclusion Criteria for Qualitative Study.....	46
3.8. Sampling Techniques.....	47
3.9. Validity and reliability.....	48
3.9.1. Validity.....	48
3.9.2. Pretest and reliability.....	48
3.9.3 Validity for Qualitative Study.....	48
3.11 Data Entry and Analysis.....	50
3.12 Ethical Considerations.....	51
3.13 Expected Benefits and Application.....	52
CHAPTER IV.....	53
RESULTS.....	53
4.1 Quantitative Study Findings.....	54

4.1.1	Descriptive Findings	54
4.1.1.1	General Characteristics	54
4.1.1.2	Sources of Information Related with Iron Deficiency Anemia.....	56
4.1.1.3	Participant’s Practice on Anemia Prevention	56
4.1.1.4	Participant’s knowledge regarding iron deficiency anemia.....	59
4.1.1.5	Participant’s Attitude towards Anemia Prevention.....	62
4.1.1.6	Reasons for not practicing anemia prevention	64
4.1.2	Binary logistic regression findings	64
4.2	Qualitative Study Findings	66
4.2.1	Focus Group Discussion Findings.....	66
4.2.2	In-depth Interview Findings.....	71
4.3	Merge Between Quantitative and Qualitative Study Findings	78
CHAPTER V	84
DISCUSSION	84
5.1	Discussion.....	85
5.1.1	Practice of anemia prevention among female students.....	85
5.1.2	Age as a predicting factor towards practice of anemia prevention.....	87
5.1.3	Type of school as a predicting factor towards practice of anemia prevention.....	88
5.1.4	Knowledge as a predicting factor on practice of anemia prevention.....	89
5.1.5	Attitude towards iron deficiency anemia prevention.....	92
5.1.6	Reasons for not practicing iron deficiency anemia prevention.....	94
CHAPTER VI	96
CONCLUSION AND RECOMMENDATION	96

6.1 Conclusion	96
6.2 Recommendation	99
6.2.1 Recommendation for Program Implementation	100
6.2.2 Recommendation for Future Research.....	101
6.3 Limitations of the study	101
APPENDIX	1
Appendix 1: IOC Content Validity Results.....	1
Appendix 2: Information Sheet and Consent Form for Quantitative Study and Structured Questionnaires	8
Appendix 3: Consent Form for Qualitative Study and Focus Group Discussion Guidelines	15
Appendix 4: Information Sheet and Consent Form for Teachers and In-Depth Interview Guidelines	17
Appendix 5: Information Sheet and Consent Form for Health District Officer & In- depth interview guidelines	19
REFERENCES.....	2
VITA	4

CHAPTER I

INTRODUCTION

1.1 Background and Rationale

Anemia is a condition with the low levels of hemoglobin in the blood due to few red blood cells and / or a small amount of hemoglobin in each cell. There are many types of anemia but iron deficiency is the most common type. Iron deficiency anemia is one of the most common nutritional disorders in the world (Abakhail & Shawky, 2002). Anemia is a public health problem found throughout the world that affects up to 1.62 billion sufferers or about a quarter of the world's population in both developed and developing countries. More than 50% of global anemia cases are due to iron deficiency (Alzaheb & Al-Amer, 2017a).

The main factors causing iron deficiency anemia include inadequate food intake, and the presence of absorption and increased need for iron and excessive iron loss, genetic defects, diseases that affect blood cells and blood cell producing organs such as malaria, schistosomiasis, helminth infections mining and HIV infection (Margwe & Lupindu, 2018). Factors such as socioeconomic, biochemical, and anthropometric are known to be associated with low levels of hemoglobin in the blood. These factors can be decisive in relation to iron, including education level, income level, body mass index (BMI), parasitology, gender, and seasonality (Marques, Silva, Pessoa, Araújo, & Moreira-Araújo, 2015). Previous research has shown that other dietary components are also risk factors for anemia when intake of protein, vitamin A, folic acid, vitamin C, and vitamin B12 is inadequate (Marques et al., 2015).

Adolescent is defined by World Health Organization as a person between 10 and 19 years of age. The world is home to 1.2 billion individuals aged 10–19 years (A Angadi, 2016).

Adolescents (10-19 years old) are at high risk of developing iron deficiency anemia due to an increased need for accelerated but poor food intake, high infection rates, and worm attacks and the consequences of early marriage and pregnancy in adolescents. Anemia can have profound negative impact on psychological and physical development, healing capacity, work performance, and reproductive health of an individual (Bandyopadhyay, Maiti, Dasgupta, & Paul, 2017). The consequences of iron deficiency are reduced attention, memory and school performance in adolescents, reduced attendance of their schools, retention of physical growth, emergence of menarches, decreased immune status and morbidity from infection, decreased physical capacity and work performance, increased fetal morbidity and mortality , increasing perinatal risk for mothers and neonates, the incidence of LBW, increasing overall infant mortality (WHO, 2011).

The World Health Organization (WHO) aims to reduce the prevalence of anemia in reproductive age women by 50 percent by 2025 (WHO, 2014). Based on Indonesia National Basic Health Survey in 2013 prevalence of anemia in young women was 37.1% which actually increased to 48.9% in 2018, with the proportion of anemia in the age group of 15-24 years and 25-34 years. These things clearly reinforce that adolescent health is crucial for the success of health development, especially in the effort to print the quality of the nation's future generations (MOH, 2018).

In 2015 in the province of South Kalimantan, from 17,239 adolescent girls it was found that 5,021 suffered from anemia, in other words the prevalence of anemia in adolescent girls in South Kalimantan in 2015 was 29.13%. This shows that the prevalence of anemia adolescents in South Kalimantan is higher than the target set by the government in 2010, namely the target of decreasing the prevalence of anemia in adolescents to 20% (MOH, 2015). Anemia survey in 2014 in Banjarmasin prevalence nutritional anemia in adolescent girls reaches 42.42%. Banjarmasin is an urban area that has many schools. In 2018, there are 40 schools that have been targeted by

the government for anemia reduction programs. Several attempts have been made by the government through the health department to implement a program to check the levels of hemoglobin in the blood and iron tablets for students in junior high schools. According to data from the Department of Health in 2016 there were 603 female students who were anemia, in 2017 there were 1138 female students who were anemia, and in 2018 there were 884 female students who were anemia (MOH, 2019).

The problem of malnutrition in Indonesian young women is still very significant. Anemia can affect those women's physical health, hampering their study concentrations and decreasing their study performance at school. If a young woman chooses to become a mother, anemia can increase the likelihood of complications and fetal development problems. One of the efforts of the government and some private sectors was to implement the Weekly Iron Supplementation program. These Iron tablets contain iron and folic acid which are the initial components to pursue nutritional deficiencies. The goal, is to prepare young women so that when pregnant they are already well nourished. Thus, the cycle of malnutrition between generations can be decided. However, now the important major problem is compliance with Iron tablets consumption due to lack of information (Wibawa, 2019).

Nonprofit organizations and government help train staffs of related agencies and teachers; support planning, implementation and monitoring; and developing communication media. The hope, students, teachers and community members can obtain knowledge about good nutrition and anemia prevention. Other efforts undertaken are encouraging Indonesian government to provide a more complete nutritional multivitamin than Iron tablets for young women. The program that will be carried out is to give female students multivitamins, then hemoglobin levels will be measured before and after being given a multivitamin. However, what remains an obstacle is the price of expensive multivitamins (Wibawa, 2019).

The success of the prevention and response program approach on anemia is very dependent on active community participation based on careful analysis of behavioral changes in the form of assessment of knowledge, attitudes and practices that exist in the community. Behavior change is strongly influenced by knowledge which is an important domain for the formation of one's actions. Knowledge is the result of sensing from vision and hearing obtained from various sources, among others through health workers (Notoatmodjo, 2003).

Anemia can be overcome if female students obtain good education about nutrition and anemia prevention. Doctoral research studies at the University of Indonesia indicated that interventions in the form of providing education through several approaches could influence blood hemoglobin levels. There was an increase in hemoglobin levels after female students attained an intervention in the form of educational provision. From the results of this study, it can be concluded that knowledge has an important role in preventing anemia (Ciptaningtyas, 2019).

However there is a limitation from previous studies related to measure knowledge, attitude, and practice on anemia prevention among high school female students in Indonesia. According to the high prevalence of anemia in adolescent girls in Banjarmasin city, the current study aims is needed to explore the knowledge, attitudes, and practice of high school female students towards anemia prevention. By identifying the important influencing factors related to anemia prevention practice, we will understand more about knowledge, attitude and practice of female high school students towards anemia prevention practice then providing informations to create suitable programs to school and local health district to improve awareness and participation of female high school students towards anemia prevention.

1.2 Research Questions

1. What is the proportion of practice level on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia?
2. What are the general characteristics, knowledge and attitude toward practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia?
3. Is there any association between general characteristics, knowledge and attitude with practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia?
4. What are the reasons for not practicing of Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia?

1.3. Research Goals and Objectives

The main goal of this study is to assess knowledge, attitude, and practice toward Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia.

1.3.1 The objectives are as follows:

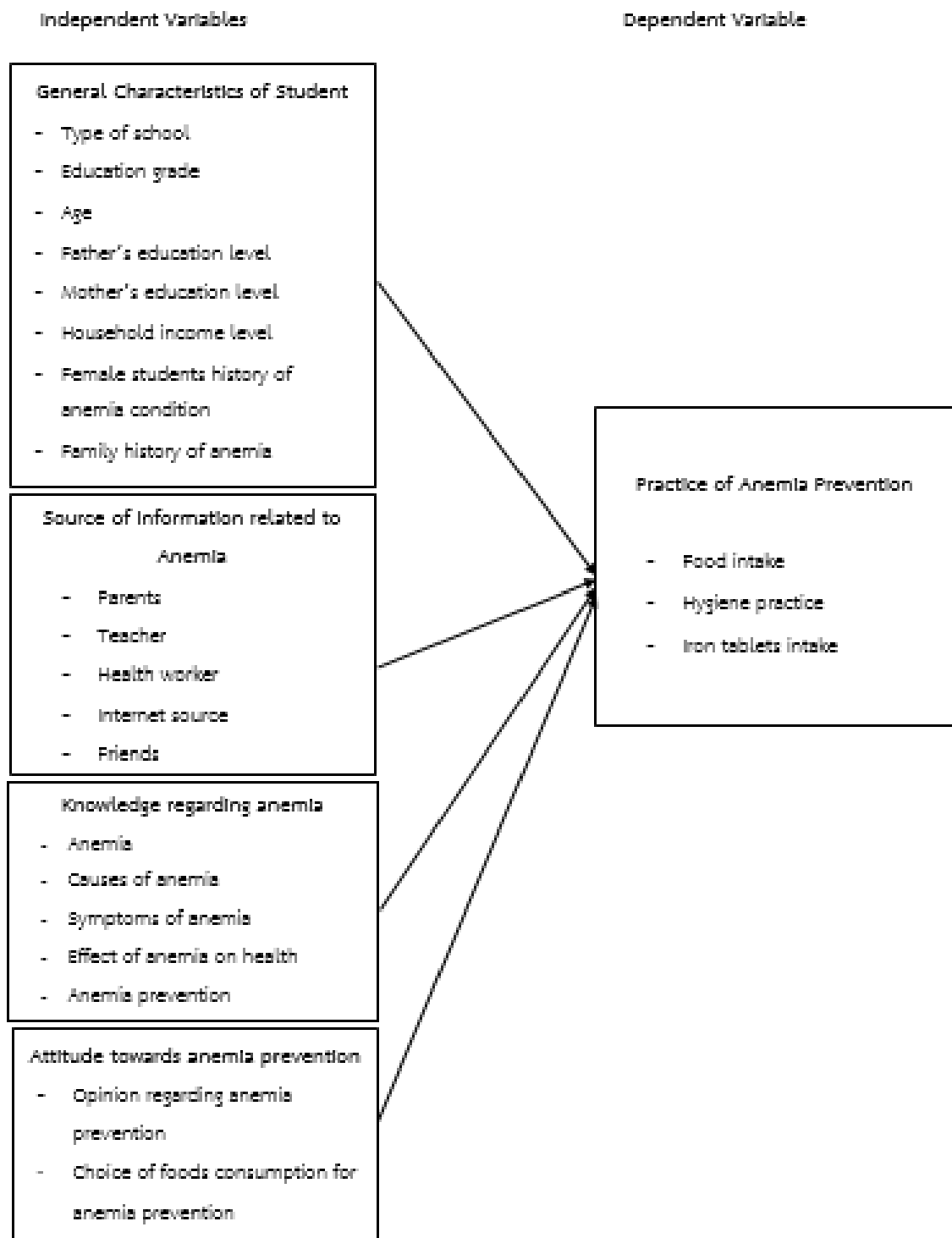
1. To determine the proportion of practice level on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia
2. To assess the general characteristics, knowledge level, and attitude level toward practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia
3. To identify association between general characteristics, knowledge scores, and attitude scores with practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia

4. To explore the reasons for not practicing of Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia

1.4. Research Hypothesis

1. There is difference in proportion between poor practice group and good practice group among high school female students in Banjarmasin city, Indonesia
2. There is an association between general characteristics and practice of Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia
3. There is an association between knowledge and practice of Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia
4. There is an association between attitude and practice of Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia

1.5. Conceptual Framework



1.6. Operational Definitions

Age	: The age of participants were 15-18 years of age.
Type of school	: in this study there were 2 types of school namely vocational school and non-vocational school
Vocational school	: A vocational school is a type of educational institution, designed to provide vocational education, or technical skills required to complete the tasks of a particular and specific job
Education grade	: in this study there were 3 types of grade namely grade 10, 11, and 12 in senior high school
Father's educational level	: in this study there were 2 levels of father's education namely < bachelor's degree and \geq bachelor's degree
Mother's educational level	: in this study there were 2 levels of mother's education namely < bachelor's degree and \geq bachelor's degree
Household income	: in this study there were 2 levels of parents income namely < 2,500,000 Indonesian Rupiah and \geq 2,500,000 Indonesian Rupiah
Female students' history of anemia condition	: anemia status of female students in past 1 year taken hemoglobin level checked. This status divided into three types namely students with anemia condition; students without anemia condition ; and students who don't know their anemia condition
Family history of anemia	: history of anemia condition in female student's family. Family refers to mother, sister and grand-mother of the students
High school female students	: Senior high school female students who were registered in grade 10, 11 and grade 12 academic year 2019/2020
Iron deficiency anemia	: the condition when the female student hemoglobin level in the blood less than normal standard for female adolescence due to Iron deficient. This anemia condition can overcome by taking iron tablets and foods enrich iron
Source of information	: the source provides information regarding anemia. Source of information in this study were divided into 5 sources such as parents,

	teacher, health worker, internet source, and friends
Knowledge regarding anemia	: knowledge level of female students towards anemia condition, cause of anemia, symptoms of anemia, effects of anemia on health, and anemia prevention.
Attitude towards anemia prevention	: the thoughts and believe of respondent towards opinion on anemia prevention and choice of foods consumption for anemia prevention.
Practice on anemia prevention	: practice on anemia prevention which are include iron tablets intake, hygiene practice, and food intake



CHAPTER II

LITERATURE REVIEW

This chapter will present literature review regarding; 1) Adolescence development, 2) Anemia and its causes, symptoms, and effects of anemia on health, 3) Hemoglobin and its functions, 4) Iron (Fe) and its functions; 5) Factors associated with the incidence of anemia in adolescent girls; 6) Behavior theory which contains knowledge, attitudes, and practices theory, 7) Banjarmasin and its government policies regarding anemia prevention; and 8) Related studies.

2.1 Adolescence Development

Adolescence is the connecting period or transition between childhoods with adulthood. The term adolescence comes from the Latin *adolescere* which means "to grow" or "grow to adulthood". The term adolescence that is used today has quite a broad meaning including mental, emotional, social, and physical maturity (Hurlock, 1999).

Adolescent age limits are expressed by several experts who divide the phases of adolescence into three stages, namely (Kartono, 1990):

1. Early adolescence (12-15 years)

In this age range adolescents experience very rapid physical growth and very intensive intellectual development, so that children's interest in the outside world is very large and at this time the teenager does not want to be considered a child anymore, but has not been able to abandon his childish patterns.

2. Middle adolescence (15-18 years)

Teenage personality is still childish, but new elements have emerged, namely awareness of personality and physical life itself. At this age range, stability arises in oneself that is weightier. At this time adolescents begin to find themselves or their identity.

3. Late adolescence (18-21 years)

In this age range, teenagers already feel steady and stable. Teenagers already know themselves and want to live with a lifestyle outlined by themselves, in good faith and courage. Teenagers already have a certain stance based on a clear pattern that has just been determined.

In relation to the development process, adolescence is a period of transition from external control (most often parents) to internal control. This period is a very important period and influences the development of behavior patterns, which includes diet and self-care. Sources of information outside the family, such as the media (TV and radio) can be more meaningful. Therefore, adolescence is the right time for basic education interventions (Koblinsky, 1996).

An adolescent can experience an increased risk of iron deficiency, because of the increased needs associated with growth. Young women need foods with high iron content especially those who have menstruation every month. Adolescents who come from low socioeconomic, adequate food sources are not met, have a risk of iron deficiency before pregnancy.

2.2. Anemia and its causes, symptoms, and effects on health

Anemia is caused by decreased or reduced production of red blood cells and hemoglobin, increased damage to red blood cells (hemolysis) or blood loss when experiencing

heavy bleeding. Anemia is defined as a situation in which hemoglobin levels in the blood are lower than normal condition (WHO, 2001), see Table 2.1.

Table 2.1. Normal Limits of Hemoglobin Levels according to Age and Gender

Group	Age	Hb Level (gr/dl)
Children	6 months – 59 months	11
	5-11 years of age	11.5
	12-14 years of age	12
Adolescence	Women > 14 years of age	12
	Pregnant women	11
	Men > 14 years of age	13

Source: (WHO, 2001)

Based on the etiology anemia can be divided into two. The main causes are increased red blood cell loss and disruption or decreased cell formation. Increased loss of red blood cells can be caused by bleeding and cell destruction. Bleeding can be caused by trauma or injury, chronic bleeding due to colon polyps, malignancy, hemorrhoids, and abnormal menstruation. The second etiology is conjunctions of disturbed red blood cells. Every circumstance that is affect bone marrow included in this group, such as: (1) scattered malignancies such as cancer, drugs and toxic substances, as well as radiation; (2) chronic disease involving the kidneys and liver, infection and endocrine deficiency. Lack of important vitamins such as vitamin B12, vitamin C and iron can also cause the formation of red blood cells is ineffective, causing anemia (Baldy, 1992). Figure 2.1 shows conceptual framework of immediate, underlying, and basic causes of anemia (WHO, 2016).

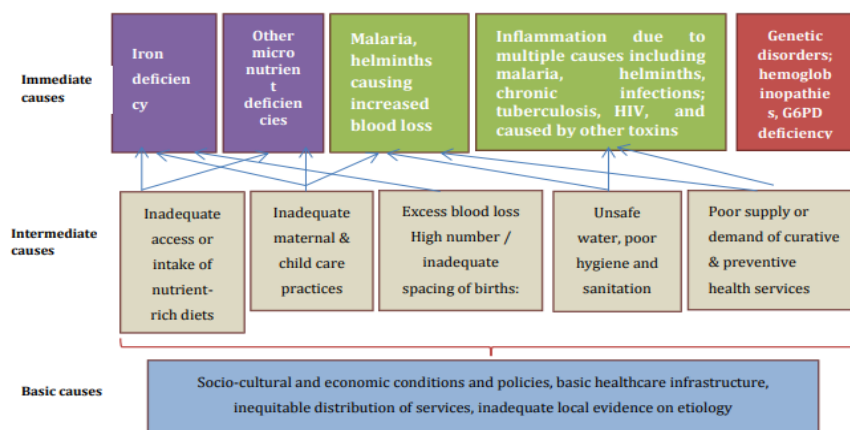


Figure 2.1. Adapted from USAID. Conceptual Frameworks: Multi-sectoral Anemia Partners Meeting, hosted by the USAID Anemia Task Force held on 18 October 2013. Washington DC, USA

Causes of anemia in adolescent girls and women are (MOH, 2003):

1. In general, consumption of plant foods in adolescent girls and women is high, compared to animal foods so that Fe's needs are not met.
2. Frequent diet (eating reduction) because the adolescent girls want to have the ideal body weight.
3. Young women and women menstruate every month who need iron three times more than men.

World Health Organization sets limits on the prevalence of anemia which is a public health problem that can be seen in Table 2.2. (WHO, 2001)

Table 2.2. Provisions for Public Health Problems Based on the Prevalence of Anemia

Problem Category Public Health	Anemia Prevalence
No problem	<4.9
Mild	5.0 - 19.9
Medium	20.0 - 39.9
High	>40,0

Source: (WHO, 2001)

Based on hemoglobin limits, (WHO, 2001) also classifies anemia, which is normal or not anemia, mild anemia, moderate anemia, severe anemia, and very severe anemia. Hemoglobin limits for each classification, as shown in Table 2.3.

Table 2.3. Anemia Classification Based on Hemoglobin Limits

Limitation Anemia	Classification of Hemoglobin
Normal	12-14 gr/dl
Mild	11-11.9 gr/dl
Medium	9-10.9 gr/dl
Weight	5-7.9 gr/dl
Very heavy	<5 gr/dl

Source: (WHO, 2001)

That Hemoglobin levels less than the standard can be used as an indicator of nutritional anemia as long as the prevalence of anemia in the community is still high. Iron deficiency and iron deficiency anemia are different conditions. Iron deficiency is a condition of lack of iron reserves in the body characterized by lack of red blood cell formation. While iron deficiency anemia is anemia caused due to extreme iron deficiency with reduced red blood cell characteristics and low Hemoglobin levels with symptoms of fatigue, lethargy, headaches, pale, not cold resistant, and decreased concentration power (Hallberg, 1988).

Symptoms of Anemia

Symptoms of anemia according to it are usually not typical and often unclear such as pale, easily tired, palpitating, and shortness of breath. while according to and symptoms / signs of anemia include fatigue, lethargy, weakness, fatigue, neglect, pale lips, shortness of breath,

slippery tongue, increased heart rate, difficulty defecating, decreased appetite, sometimes dizziness, and sleepy (Arisman, 2004; MOH, 1998; Supariasa, 2002).

Effects of Anemia on Health

The impact caused by anemia occurs in impaired physical and psychological development, decreased physical work and income, decreased resistance to fatigue, increased morbidity and mortality. Anemia suffered by adolescent girls can cause decreased learning achievement, decreased endurance so it is susceptible to infectious diseases. In addition, in anemic adolescent girls, their level of fitness will go down which impacts on low productivity and sports performance and not achieving maximum height because at this time there is a peak in height growth (MOH, 2003; WHO, 1996).

2.3. Hemoglobin and its function

Definition of Hemoglobin

Hemoglobin is a complex protein, containing globin protein and a non-protein compound called heme. Hemoglobin levels in the blood are parameters that are usually used to determine the prevalence of anemia. Hemoglobin is an oxygen-carrying compound found in red blood cells. Hemoglobin can be measured chemically and the amount of Hemoglobin / 100 ml of blood can be used as an index of the carrying capacity of oxygen in the blood. Low hemoglobin level is an indication of anemia (Nyoman, 2001; Sadikin, 2001)

Functions of Hemoglobin

In red blood cells, hemoglobin has the function of binding oxygen (O₂). We can define the function of Hemoglobin as the amount of oxygen that can be bound and carried by the blood. Hemoglobin provides sufficient oxygen to various places throughout the body, even to the most remote and isolated parts oxygen adequacy will be achieved (Sadikin, 2001).

2.4 Iron (Fe) in the Human Body

Definition of Iron (Fe)

Iron is a small element that is very important for the human body. Iron has a major role that is needed in the formation of blood, namely in the compound hemoglobin (Hb). The total amount of iron in the human body is an average of 4-5 grams, and about 65 percent of the iron in the human body is found in the form of hemoglobin. About 4 percent is found in the form of myoglobin, 1 percent is found in the form of various heme compounds which increase intracellular oxidation, 0.1 percent join transferrin protein in blood plasma and 15-30 percent iron is mainly stored in the reticuloendothelial system and liver parenchyma cells, especially in the form of ferritin (Djaeni, 2000; Hall, 2007). The human body has a very efficient mechanism for the use of iron. Some iron in the form of ferric is reduced to ferrous. This mechanism occurs in an acidic atmosphere in the stomach in the presence of HCl and vitamin C found in food consumed by humans (Almatsier, 2001).

Iron in the Human Body

If the human body has sufficient iron in the form of deposits, the need for the formation of red blood cells in the bone marrow will always be fulfilled. Under normal circumstances, the amount of iron in the form of these reserves in the human body is around one quarter of the

total iron in the body. Iron stored as a reserve, in the form of ferritin and hemosiderin, is found in the liver, spleen, and bone marrow. In some conditions the human body needs iron in large quantities, for example in children who are growing (under five years), women who are menstruating and also in pregnant women. In some of these conditions usually the amount of iron reserves in the body is low. (Hall, 2007).

2.5. Factors that are related to the incidence of anemia in adolescence girl

Level of family income

Despite its multifactorial etiology and distribution amongst all social strata, anemia is more frequent in contexts characterized by poor socioeconomic conditions, and where there is a low consumption of iron alongside the intake of substances that inhibit iron absorption. Thus, although there are several other factors that affect the availability of iron to meet the metabolic requirements of the organism, the risk factors for anemia most frequently cited in the literature are low family income, low maternal level of education, and inadequate iron intake. The determinate effect of household income in anemia seems to derive from the broad effect it has on the qualitative and quantitative availability of food (da Silva Ferreira, de Assunção Bezerra, Lopes de Assunção, & Egito de Menezes, 2016).

Previous studies found that the higher prevalence of anemia observed amongst the public school children, it was also found that the prevalence amongst the children who went to less expensive private schools was almost twice as high as the prevalence amongst those who attended more expensive private schools. In view of this association, it would be plausible to assume that having a working mother would help reduce the chance of anemia. However, our study found a higher prevalence of anemia amongst the private school children whose mothers had jobs. It is possible that in these circumstances the mothers have less time to devote to their

children. One study on nutrition and socioeconomic conditions found that working mothers were less likely to offer their children an adequate diet (da Silva Ferreira et al., 2016).

Losing Iron (Fe)

Menstruation

Menstruation is a condition in which all endometrial epithelial tissue in women is affected by cyclic changes in the balance of female reproductive hormones. The following are characteristics of normal menstrual conditions (Djaeni, 2000):

1. Long cycle between 21-35 days (28 + 7 days)
2. Bleeding time is 2-7 days
3. Bleeding from 20 to 80 cc per cycle (50 + 30 cc)
4. Not accompanied by pain
5. Fresh red blood and not clotted

Food Intake

Previous studies has found that most of the female students in the study sample who were anemic reported inadequate intakes of iron, along with a lower level of consumption (≤ 2 times per week) of red meat. These 2 factors were found to be associated with a statistically significant increased risk of Iron Deficiency Anemia. In the human diet, iron exists either in the form of heme or non-heme iron; the former is mostly consumed via meat, with a rate of absorption of up to 50%, whereas the latter is mainly found in dairy products, fruit, and vegetables, and its variable level of absorption depends on the enhancers and inhibitors present. Red meat is a key source of bioavailable heme iron in human diets, and various prior studies have identified a negative association between low levels of red meat consumption and a

heightened risk of Iron Deficiency Anemia. The relatively high cost of meat can prevent poor families living in developing countries from regularly buying and consuming it. For instance, a study in the context of Turkey reported that participants from poorer households had lower consumption rates of red meat and fish and therefore also lower intakes of easily bioavailable sources of iron. (Alzaheb & Al-Amer, 2017b)

Drinking Tea / Coffee Behavior

Tea drinking habits have become a culture for the world's population (Besral, 2007). Besides water, tea is the most widely consumed beverage by humans. The average world tea consumption is 120 mL / day per capita. The tannin content is a polyphenol found in tea, coffee and some types of vegetables and fruits that inhibit iron absorption by binding to iron. If the body's iron is not too high, you should not drink tea or coffee during meals (Almatsier, 2001). Drinking tea within one hour before or after meals will reduce the absorption of red blood cells and iron by 64 percent. The reduction in absorption caused by consumption of this tea is higher than the same effect caused by consumption of a glass of coffee after a meal. Coffee will reduce iron absorption by 39 percent. In tea there is tannin which causes a reduction in iron absorption. Besides containing tannin, tea also contains several substances, including caffeine, polyphenols, albumin, and vitamins. Tannins can affect the absorption of iron from food, especially those included in the category of non-iron *heme*, such as grains, vegetables, and nuts. (Morck, 1983).

Parents Education

Higher maternal education found increase the quality diets of children and knowledge of health and nutrition and educated mother may involve on decision making of child nutrition requirements. In Bangladesh a study found that among the poor household anemia is general,

due to lack of knowledge on dietary practices of mothers and household members and different types of food related to child growth and development. Various types of food related to mother education and child anemia. Previous studies found association with the mother's education and anemia of children in Bangladesh. This factor was found associated with anemia of children in others studies conducted in Uganda, China, South Korea and Myanmar. A study from Uganda reported that mother's education level has significant association with the anemia of children where they showed relationship with lower level of mother education (Hossain, 2018).

Breakfast Habit

Breakfast is consuming food eaten in the morning before leaving or doing school activities. The habit of not eating breakfast can be caused by lack of appetite, accustomed to not eating breakfast and not having enough time to do it. In addition, it can also be caused by dishes that are less interesting so cannot arouse appetite. The breakfast habit is very important for adolescents because it can help increase the concentration of student learning at school, where by eating breakfast the blood sugar levels will increase because the stomach refills after eight to ten empty hours (MOH, 2001; Saidin, 1991)

2.6 Behavior Theory and KAP

The success of the prevention and response program approach on anemia is very dependent on active community participation based on careful analysis of behavioral changes in the form of assessment of knowledge, attitudes and practices that exist in the community. Behavior change is strongly influenced by knowledge which is an important domain for the formation of one's actions. Knowledge is the result of sensing from vision and hearing obtained from various sources, among others through health workers (Notoatmodjo, 2003). Anemia can be

overcome if female students obtain good education about nutrition and anemia prevention. Doctoral research studies at the University of Indonesia indicated that interventions in the form of providing education through several approaches could influence blood hemoglobin levels. There was an increase in hemoglobin levels after female students attained an intervention in the form of educational provision. From the results of this study, it can be concluded that knowledge has an important role in preventing anemia (Ciptaningtyas, 2019).

A person's behavior consists of three important part, namely cognitive, affective and psychomotor. Cognitive can be measured from knowledge, affective from attitude or response and psychomotor measured through the actions (practices) carried out. In the process of forming and behavior change is influenced by several factors that originate from within and from outside the individual. Internal factors include knowledge, intelligence, perceptions, attitudes, emotions and motivations that function for cultivate excitatory from the outside. Factors from outside the individual include the environment around, both physical and non-physical such as climate, humans. Social, economic, culture and so on. Meanwhile, human behavior can be seen from three aspects, namely the physical, psychological and social aspects which are in detail reflection of various psychiatric turmoil, such as knowledge, motivation, perception and so on are determined and influenced by factors experience, beliefs, physical and social cultural facilities of the community. The description of behavior can be explained as follows (Notoatmodjo, 2003):

Knowledge

Knowledge is the resultant result of the sensing process towards an object. Sensing is mostly derived from vision and hearing, that knowledge can be explained obtained from various sources, for example through mass media, media electronics, manuals, poster media, health workers, relatives close and so on. Knowledge is the result of behavior and this happens after

sensing a certain object. Knowledge is a very important domain for action someone. If the acceptance of new behavior is based on knowledge, awareness and a positive attitude, then the behavior will be lasting. Conversely, if not based on knowledge and then awareness won't be immediate for long. Measurement or assessment knowledge is generally done through tests or interviews with the help of a questionnaire containing the material to be measured from respondent.

Attitude

Attitude is a reaction that is still closed cannot be seen directly so that attitude can only be interpreted from visible behavior. Another understanding of attitude is readiness to react to an object in a certain way as well as is an evaluative response to the experience of cognition, reaction, affection, the next will and behavior. So attitude is a response evaluative is based on self-evaluation, which is concluded in the form positive and negative assessments which then crystallize as potential reaction to an object. Attitude is the mental and nervous state of readiness, which is arranged through experience that gives a dynamic influence and directed towards individual responses to all objects and situations that are related to it. According to the level of attitude consists of:

a. Receive

Receiving means that people (subjects) want and pay attention given stimulus (object).

b. Respond

Give answers when asked, work on and completing the given task, it shows attitude towards ideas received. Because with an attempt to answer question or work on a given task, free from right or wrong, it means that people accept the idea.

c. Study

Invite others to work on or discuss a problem.

d. To be responsible

Want to be responsible for something that has been chosen with everything the risk. This is the highest attitude. Measuring attitude directly can be asked how or what opinions statement of the respondent to a problem.

Practice (action)

Practice has several levels: a) Perception: Knowing and choosing various objects influencing the action to be taken is a first level practice; b) Guided response: Can do things in the right order and according to the example is an indicator of second-level practice; c) Mechanism: If someone has done something right or has become a habit, then that person has been in the third level of practice; d) Adoption: Adaptation is a practice or action that has developed well. This means that the action has been modified without reducing the truth of the action (Notoadmojo, 2003).



2.7. Banjarmasin city and its government policies regarding anemia

In 2015 in the province of South Kalimantan, from 17,239 adolescent girls it was found that 5,021 suffered from anemia, in other words the prevalence of anemia in adolescent girls in South Kalimantan in 2015 was 29.13%. This shows that the prevalence of anemia adolescents in South Kalimantan is higher than the target set by the government in 2010, namely the target of decreasing the prevalence of anemia in adolescents to 20% (MOH, 2015). Banjarmasin is one of district in South Kalimantan province. Anemia survey in 2014 in Banjarmasin prevalence nutritional anemia in adolescent girls reaches 42.42%. Banjarmasin is an urban area that has many

schools. In 2018, there are 40 schools that have been targeted by the government for anemia reduction programs. Several attempts have been made by the government through the health department to implement a program to check the levels of hemoglobin in the blood and iron tablets for students in junior high schools. According to data from the Department of Health in 2016 there were 603 female students who were anemia, in 2017 there were 1138 female students who were anemia, and in 2018 there were 884 female students who were anemia (MOH, 2019).

Regulation of the Minister of Health of the Republic of Indonesia Number 88 Year 2014 regulates the Standard for Increasing Blood Tablets for women of childbearing age and pregnant women. Food sources rich in iron and folic acid are generally found in animal protein sources such as liver, fish and meat whose prices are relatively expensive and are not yet fully affordable by most people in Indonesia. Giving blood added tablets as one of the important efforts in the prevention and control of anemia which is an effective way because it can prevent and overcome anemia due to iron deficiency and/or folic acid. Blood supplement tablets are tablets given to women of childbearing age and pregnant women. For women of childbearing age, it is given 1 (one) time a week and 1 (one) time a day during menstruation and for pregnant women given every day during pregnancy or at least 90 (ninety) tablets. Each tablet adds blood for women of childbearing age and pregnant women at least containing: Iron equivalent to 60 mg of elemental iron (in dosage form Ferro Sulfate, Ferro Fumarat or Ferro Gluconate); and Folic Acid 0,400 mg. (MOH, 2014)

The target of the Blood Supplement Tablets program is teenage girls aged 12-18 years at school. Giving Blood Supplement Tablet 1 tablet every week throughout the year. The school determines the day to drink Blood Supplement Tablet every week. When the school holiday Blood Supplement Tablet is given before the school holidays. Blood Supplement Tablets are not

given to female students (remedies) who suffer from diseases, such as thalassemia, hemosiderosis, or on the indication of other doctors.

Unfortunately, now the biggest problem is compliance with Blood Supplement Tablets consumption due to lack of information. For this reason, government provides the information materials needed by midwives, health workers, and school to convey the importance of this pill. However, what remains an obstacle is the price of expensive multivitamins. Therefore, government is working on an affordable multivitamin. In addition to the multivitamin the most urgent thing is to encourage the Ministry of Industry to allow iron fortification into wheat. Even though the wheat company was had been prepared to carry out iron fortification, the Ministry of Industry was still hesitant to issue the permit because the fortification or mixing had to be imported from abroad. In fact, fortification of iron into wheat is considered to be able to reduce anemia.

Previous research in 2015 found that counseling anemia to parents who have young women has not been successful due to several factors, namely the level of parental education, then the language of instruction used when counseling, parents do not understand some medical terms and types of human organs. The instructor uses a mixture of Banjar Language and Indonesian Language, so parents feel they do not understand some of the terms used. In addition, technological factors such as the media and the internet that provide information related to anemia are also factors that are not understood by parents.

2.8 Related Studies

Previous study in Saudi Arabia among female students in University. A cross-sectional study of 200 apparently healthy female students aged between 19 and 25 years was performed

between February and June 2016. Data on the participants' sociodemographic, diet, health, anthropometry, and hematological and biochemical iron status indices were gathered. A logistic regression analysis then revealed the Iron Deficiency Anemia risk factors. Found that The Iron Deficiency Anemia prevalence was 12.5%. The factors associated via logistic regression with an elevated anemia risk were inadequate iron and vitamin C intakes, infrequent (≤ 2 times per week) consumption of red meat, frequent (≥ 2 times per week) tea consumption, and a past personal history of IDA (Alzaheb & Al-Amer, 2017b).

Previous study in Brazil found that there is association between food intake and anemia among adolescent. A cross-sectional study was developed with 529 Brazilian students. Anemia was defined in terms of Hb concentration. Nutrient intake was assessed by a 3-day food record. The association between the prevalence of inadequate nutrient intake and anemia was estimated by the χ^2 test, and that between nutrient intake and Hb by linear regression. This study found that Heme iron and vitamin C are possible protective factors against anemia in boys. However, the lack of association between inadequate iron intake and anemia, especially in girls, suggests that other factors beyond diet could explain anemia in this age range (Bagni, Yokoo, & da Veiga, 2013).

Previous study in Palestine related to improvement in knowledge, attitude and practice of iron deficiency anemia among iron-deficient female adolescents after nutritional educational intervention. The study aims to evaluate the effectiveness of a nutrition education intervention in iron deficiency anemia on the knowledge, attitude, and practice (KAP) among iron-deficient

Female adolescents in the Gaza Strip. In this intervention study, 89 female adolescents aged 15–19 were recruited and randomly divided into intervention and control groups. Both of the groups received iron supplementation (ferrous fumarate 200 mg) weekly for three months.

The female adolescents' knowledge improved significantly after a nutrition education intervention, as the percentage of good knowledge ($\geq 50\%$) was 22.7% pre-nutrition educational intervention, and increased to 90.9% post intervention ($p < 0.001$) in the intervention group. Attitude and practice also improved from 36.4% and 54.5% at pre-test to 75.5% and 75.5% ($p < 0.001$ and $p < 0.002$) at post-test, respectively. Nutrition education intervention has an impact on improving knowledge, attitude and practices of iron-deficient female adolescents compared with control. The nutrition program should be adopted and integrated into comprehensive intervention programs to target IDA among adolescents at various levels in Palestine (Jalambo, Sharif, N, & Norimah, 2017).

Previous study in Iran found related to knowledge, attitude and practice of secondary school girls in Qazvin on iron deficiency anemia. The study population consists of 218 students who were randomly selected from ten secondary schools in a selected area. A questionnaire was prepared to collect the data and statistical tests of χ^2 and regression were employed to analyze the data. The results of the study indicated that 57.3 percent of students had poor knowledge, 54.1 percent unfavorable attitude and 44.5 percent weak practice on iron deficiency anemia. The results also showed that the field of education, the level of education, age, fathers' job and mothers, job had significant relation with knowledge. There is significant relationship between knowledge and attitudes. It was found that knowledge had significant relationship with practice (Shojaeizadeh, 2001).

CHAPTER III
METHODOLOGY

3.1. Study Design

Design of this study is a mixed-method. Mixed method is a study design in which the researcher collects and analyzes data, integrates the findings, and draw inferences using both quantitative and qualitative methods in a single study or a program of inquiry (Tashakkori & Creswell, 2007). Qualitative and quantitative approaches to research are complementary, and where appropriate should be combined in such a way as to maximize the strengths and minimize the limitation of each (WHO, 1996).

Sequential explanatory mixed method were used for this study. In this design, the qualitative arm assists the interpretation of quantitative findings. The aim is to explain a phenomenon, to interpret unexpected results, or to explore certain results in greater detail. (Creswell & Plano Clark, 2007). Quantitative phase will used cross sectional study, and Qualitative phase will used focus group discussion. Quantitative phase conducted first followed by Qualitative phase.



Figure 3.1 Flow of Mixed Method Sequential Explanatory Design (Source: Creswell & Plano, 2007)

3.2. Study Area

Study area in this study were three senior high schools namely non-vocational school No. 2, non-vocational school No. 3, and vocational school No. 4 in Banjarmasin City, South Kalimantan, Indonesia.

3.3 Study Population

Population of this study were female students in senior high school in Banjarmasin City, Indonesia age 15 - 18 years old.

3.4 Duration of the study

The study was conducted from April 2020 to May 2020

3.5 Measurement tools:

The questionnaires were prepared, adopted and modified from WHO guidelines on Anemia, Indonesian National Guideline on Anemia, various institutional sources and literature reviews (WHO, 1996); (WHO, 2001); (WHO, 2011); (Soleimani & abbaszadeh, 2011); (Rangan, Aitkin, Blight, & Binns, 1997); (Sirdah, Yassin, El Shekhi, & Lubbad, 2014); (MOH, 2003); (MOH, 1998); (Marques et al., 2015);(Lopez, Cacoub, Macdougall, & Peyrin-Biroulet, 2016); (Li et al., 2018). Structured questionnaires and focus group discussion guidelines will used for data collection.

For structured questionnaires it's contains 6 parts:

1. General characteristics
2. Source of information regarding anemia
3. Knowledge related to anemia

4. Attitude towards anemia prevention
5. Practice on anemia prevention

General characteristics

There were 7 questions contains general information of the respondents namely type of school, education grade, age, parents educational level, household income level, female student's history of anemia condition, and family history of anemia.

Type of School

For this characteristic we have 2 types of school. Respondent may choose 1 type of school. The answer classified into:

1. Non-Vocational School
2. Vocational School

Education grade

For this characteristic we have 3 kind of education grades. Respondent may choose 1 grade as their current grade. The answer will be classify to:

1. 10th grade
2. 11th grade
3. 12th grade

Age

For this characteristic we have range age of female students from 15 to 18 years old. Data were coded into 2 groups:

1. 15-16 years old
2. 17-18 years old

Household Income

For this characteristic respondent were choose 2 answers of their household income namely:

1. < 2,500,000 Indonesian Rupiah
2. \geq 2,500,000 Indonesian Rupiah

Father's Education Level

For this characteristic respondent were choose 2 answers of their fathers' education namely:

1. < bachelor's degree
2. \geq bachelor's degree

Mother's Education Level

For this characteristic respondent were choose 2 answers of their mothers' education namely:

1. < bachelor's degree
2. \geq bachelor's degree

History of anemia condition

For this characteristics there were 3 answers (Yes/No/Don't Know) with score "Yes" equal to 2 and "No" equal to 1, and "Don't Know" equal to 0.

"Yes" was represent as hemoglobin level checked in past 1 year and have status of anemia.

"No" was represent as there is no history of hemoglobin level checked in past 1 year "or" there was hemoglobin level checked in past 1 year and female student's hemoglobin level was normal at that time.

"Don't know" was represent as the student did not know their anemia status

Family history of anemia

For this characteristics there were 3 answers (Yes/No/Don't Know) with score "Yes" equal to 2 and "No" equal to 1, and "Don't Know" equal to 0.

"Yes" was represent as there were family member (mother/sister/grand-mother) of the student that ever had anemia condition.

"No" was represent as there were no family member (mother/sister/grand-mother) of the student that ever had anemia condition.

"Don't know" was represent as that student didn't know about their family anemia condition status

Source of information regarding anemia

This section contained 5 questions that related to source of information related to anemia, and content of information given. There were 5 kind of answers regarding source of information namely:

1. Parents
2. Teacher
3. Health Worker
4. Internet source
5. Friends

Knowledge related to anemia

This section aimed to find out the respondents' knowledge towards anemia prevention which covers:

- Anemia condition (Q.11-Q.16)
- Cause of anemia (Q.17-Q.18)
- Symptoms of anemia (Q.19-Q.24)
- Effects of anemia (Q.25-Q.28)
- Anemia prevention (Q.29-Q.39)

There were 29 questions with 3 responses (Yes/No/Not sure). The score was categorized as "1" for "Yes"/correct answer and "0" for "No"/incorrect and also "Not sure" answer. Score of each questions were summed up for total score and vary from 0 to 21. Median cutoff point were used when data is not normal distributed. Median cutoff point (median = 13) were used for classification of knowledge score into 2 levels as follow.

Poor Knowledge (< median): Score 1-12	Good Knowledge (\geq median): Score 13-21
---------------------------------------	--

Attitude towards anemia prevention

This section aimed to find out the respondents' attitude towards anemia prevention which covers:

- opinion on anemia prevention (Q.40-Q.46)
- choice of foods consumption for anemia prevention (Q.47-52)

This was measured by 13 questions and scale used for statements is Likert's scale. Q. 40, 41, 42, 43, 47, 49, 50, and 52 were positive statements. Q. 44, 45, 46, 48, and 51 were negative statements. The response to statements were ranged from "Strongly Agree" to Strongly Disagree" and scored with 5 points Likert's scale as mentioned below.

Table 3.1 Likert's Scale Scores for Positive statements and Negative statements

Positive statements		Negative statements	
Choice	Scores	Choice	Scores
Strongly agree	5	Strongly agree	1
Agree	4	Agree	2
Not sure	3	Not sure	3
Disagree	2	Disagree	4
Strongly disagree	1	Strongly disagree	5

For calculating scores attitude towards anemia prevention, Median cutoff point was used when data is not normal distributed. The cutoff point was used median cutoff point (median = 31). All respondents' score of 13 questions were summed up and code into 2 groups. The score range from 19-44. The attitude score classified as follow;

Poor attitude (< median) = score 19-31	Good attitude (\geq median) = score 31-44
--	--

Practice of anemia prevention

In this section there are 12 questions with 3 responses (Never/Sometimes/Often). The score was categorized as “0” = never, “1” = sometimes, and “2” = often. Score of each questions will be summed up for total score and vary from 0 to 22. Median cutoff point was used when data is not normal distributed. Total practice scores are categorized into good and poor practice by median cutoff point (median = 13). The practice score were classified as follow;

Poor Practice (< median) = 0-12	Good Practice (≥ median) = 13-22
---------------------------------	----------------------------------

Reasons for not practicing anemia prevention

In this section respondents were instructed to answer related their opinion about influencing factors for not practicing anemia prevention with various types of responses in "Part F: Reasons for not practicing anemia prevention". This section contains 1 question with 5 lists of possible reasons for not practicing anemia prevention as follows.

1. Lack of parents support
2. Don't know the benefit of practice anemia prevention
3. Don't like the smell and color of iron tablets
4. Anemia prevention is not important
5. Feeling nausea after taking iron tablet

Respondents only can choose three reasons that they think influence them for not practicing anemia prevention.

For focus group discussion guidelines it's contains:

- Source of information regarding anemia
- Knowledge related to anemia
- Attitude towards anemia prevention

- Reasons for not practicing anemia prevention
- Expectation of social support (family, friends, school, health workers) roles related to practice on anemia prevention

3.6 Sample Size

3.6.1 Sample Size for Quantitative Study

Prevalence of anemia prevention in Indonesia is 27% (WHO, 2018). Sample size estimation for **Dichotomous outcome** to ensure precise estimate of overall risk of unknown

population :

$$n_0 = \frac{z^2 \times p(1-p)}{e^2} \quad (\text{Lemeshow, 1991})$$

$$n = \left(\frac{1.96}{0.05} \right)^2 \times 0.27(1 - 0.27) = 302.87 \sim 303 + 10\% = 333 \text{ subjects}$$

n = sample size, z^2 = significant level at 95% (1.96), p=prevalence of anemia prevention (0.27),

e= margin of error (0.05), Power 90% ~ reduce 10% possibility of false result

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3.6.2 Sample Size for Qualitative Study

Sample size estimation for Qualitative study were used maximum variation techniques.

There were 2 schools that fulfill inclusion criteria of this study with total informants = 9 female students as participant in Focus Group Discussion. For In-depth interview there were 2 teachers from 2 schools that fulfill inclusion criteria, and 2 public health officer that comes from different level, 1 public health officer from provincial health office, and 1 public health officer from primary health care that fulfill inclusion criteria.

3.7 Inclusion and Exclusion Criteria

3.7.1 Inclusion and Exclusion Criteria for Quantitative Study

Table 3.2 Inclusion and exclusion criteria for Quantitative study

Inclusion criteria:	Exclusion criteria:
1. Female students 15-18 years of age 2. Female students who are study in grade 10th , 11th , and 12th 3. Study at school at least > 1 years 4. Stay in Banjarmasin City at least > 1 years 5. Female student who were have smart phone and internet connection to fill the online questionnaires 6. Understand and complete the questionnaires 7. Agreed to fill and sign inform consent	1. Registered student who have total study period in the school not less than 6 months 2. Foreign students

3.7.2 Inclusion and Exclusion Criteria for Qualitative Study

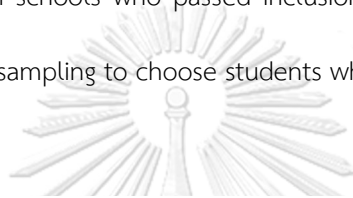
Table 3.3 Inclusion and exclusion criteria for Qualitative study

Inclusion criteria	Exclusion criteria
1. Female students 15-18 years of age 2. Female students who were study in grade 10th, 11th, and 12th 3. Study at school at least > 1 years 4. Stay in Banjarmasin City at least > 1 years 5. Female student who were have smart phone and internet connection to join video call	1. Registered student who have total study period in the school not less than 6 months 2. Foreign students

3.8. Sampling Techniques

3.8.1 Sampling Techniques for Quantitative Study

Sampling techniques that were used in this study was non probability sampling method. First was using purposive sampling to select district in who has high prevalence of anemia in female students. Second step was using purposive sampling to choose 3 high schools who have high prevalence of anemia. Third step was using inclusion and exclusion criteria in sampling frame, students from 3 high schools who passed inclusion criteria included as subject. Fourth step was used convenience sampling to choose students who agreed participate in this study.



Flow Chart of Sampling Technique for Quantitative Study

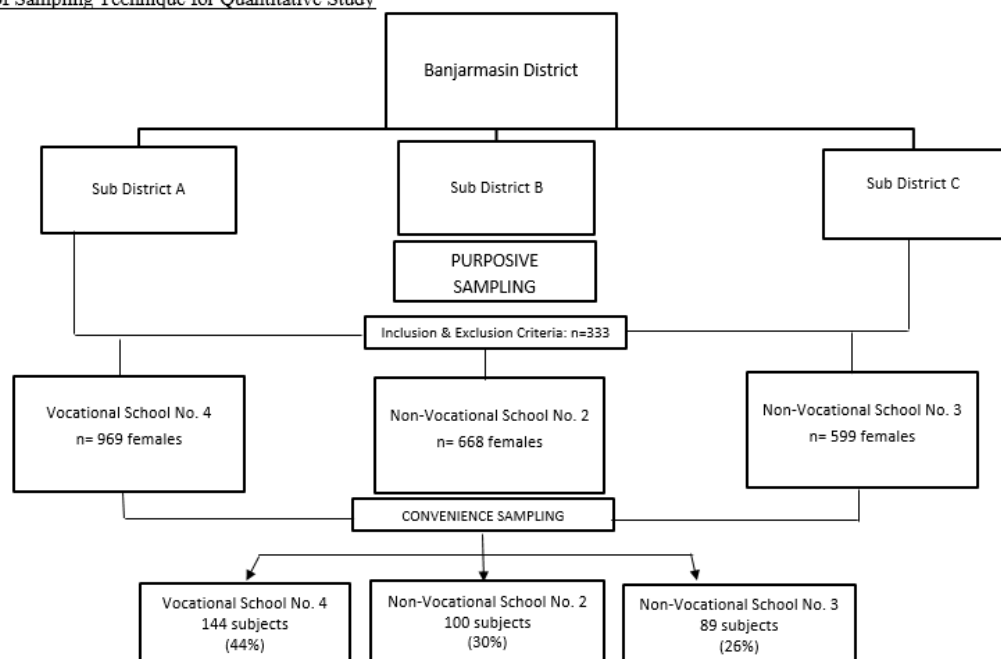


Figure 3.2 Flow chart of sampling technique for Quantitative study

3.9. Validity and reliability

3.9.1. Validity

The structured questionnaires in English was produced and reviewed for content validity by three experts from College of Public Health Sciences, Chulalongkorn University and scored for each question (+1/0/-1). The Index of Item-Objective Congruence (IOC) was conducted before pilot test. The questions with score equal or less than 0.5 were revised or deleted accordingly. After the revision, the questions were requested to review by experts again for confirmation. The validated questionnaires were translated into Bahasa Indonesia language.

3.9.2. Pretest and reliability

Prior to actual data collection, a pilot test was conducted in 35 samples in another high school in Banjarmasin with similar characteristics (10% of total sample size). By using SPSS ver.22, reliability were tested by Cronbach's Alpha and Kuder-Richardson formula 20. Reliability score for attitude was 0.752, and reliability score for knowledge was 0.717.

3.9.3 Validity for Qualitative Study

In this study we were used several kind of validation namely, 1) triangulating of statements – match respondents info with other sources (another FGD group, teachers, health officer) – match one respondent info with other group members about same info; 2) independent analysis – discuss regarding findings within researcher; 3) researcher self-asked questions – how credible was the informant? – Response statements prompted or spontaneous? – Researcher tried to set safe and free environment for respondents to give information in order to reduce non-socially desirable information.

3.10 Data Collection

Quantitative phase conduct first followed by Qualitative phase. Quantitative phase was conducted by online survey used google forms. Total participants in quantitative study was 359 participants from 3 senior high schools. Researcher was contact all leader of the students of each class in each schools, coordinate with them, and follow responses for this online survey. Estimated duration for data collection in 1 school were 3 weeks include the time to get permission for data collection and collect all responses.

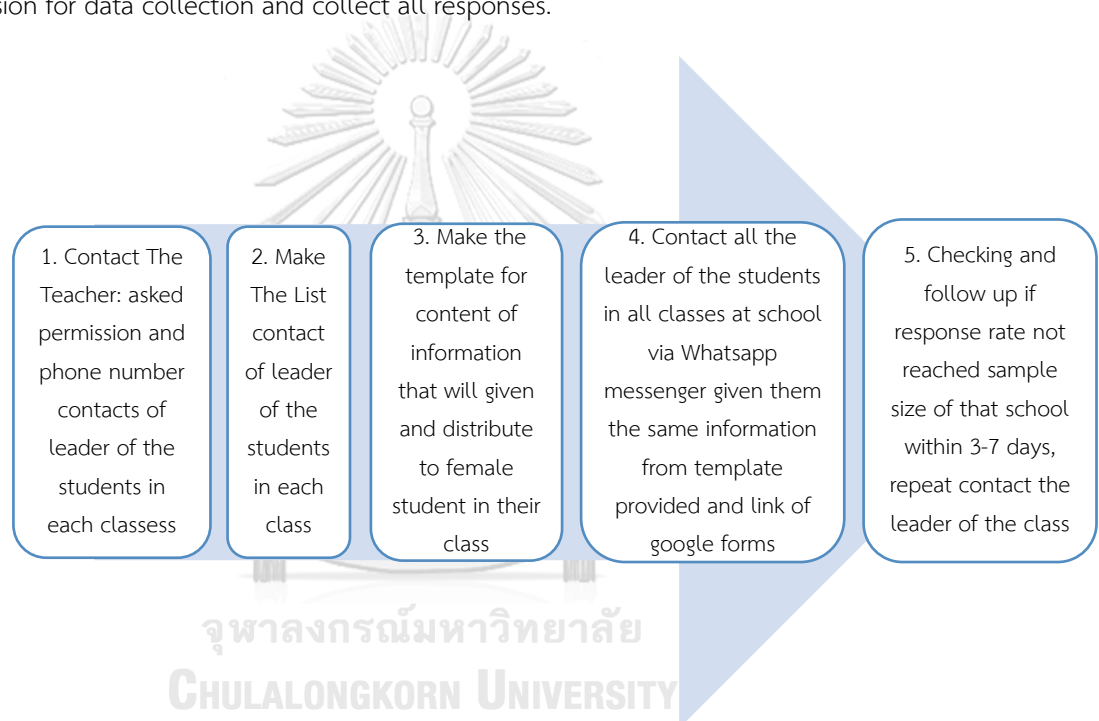


Figure 3.3 Flow chart of data collection process in Quantitative study

For Qualitative phase will divided into two part, 1st part is focus group discussion for female students and 2nd part is in-depth interview for key informants such as teachers of each school, and health officers. For focus group discussion it takes 9 participant from two non-vocational schools. This focus group discussion conducted by tele-interview by WhatsApp video call. For in-depth interview there were 2 teachers from 2 schools, and 2 health officer from

nutrition program in provincial health office and primary health care. For in-depth interview conducted by tele-interview by WhatsApp voice call. The instruments for this study such as focus group discussion and in-depth interview guidelines, mobile phone, internet connection, WhatsApp application, recorder, and notes. For focus group discussion total duration of all interview was 40 minutes. And for in-depth interview total duration of all interview was 70 minutes.

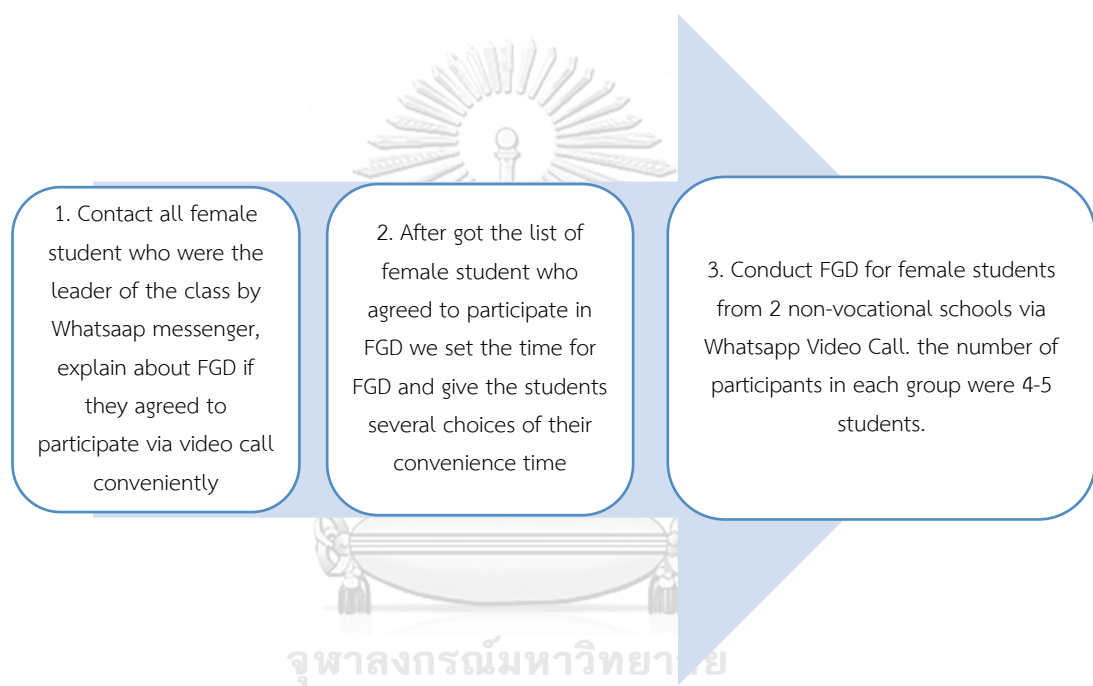


Figure 3.4 Flow chart of data collection process in Qualitative study

3.11 Data Entry and Analysis

Principle researcher check the data and the questionnaires were coded before entering data to the computer. After that, data entry was done by double entry process and data cleaning was performed before the analysis. Data analysis was processed by using SPSS software version 22 (licensed from Chulalongkorn University) for windows.

Descriptive statistics	Binary Logistic Regression
Categorical data -frequency and percentage Continuous data - Mean, standard deviation, range, frequency and percentage	to find the final predictors of dependent variable which included all independent variables

For Qualitative phase, researcher made the transcript from audio that recorded before. After combined all transcript, we coded for each topics/themes and made a matrix summary of Qualitative findings. In this qualitative study, researcher used a combination between content analysis and thematic analysis. Content analysis was the first step to check the frequencies of similar findings until met saturated findings and then we interpret the results. After that we conducted thematic analysis to group the similarity or difference patterns of results, in thematic analysis after we found the patterns/themes of the results, we continue to make the interpretation.

Integrating data between quantitative results and qualitative results by compare the similarities and differences between these quantitative and qualitative findings and complement quantitative findings with qualitative findings and make the interpretation of this combination between two findings.

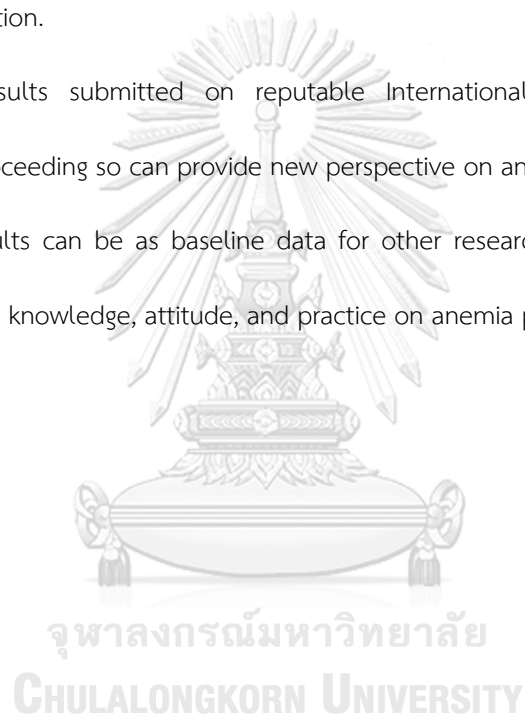
3.12 Ethical Considerations

- Written request: The study was approved by a written permission from Ethical Review Board, Faculty of Public Health - University of Muhammadiyah Jakarta: No. 10.005.B/KEPK-FKMUMJ/IV/2020
- Informed consent: The respondent voluntary sign informed consent as agreement to be respondent in this study.

- Confidentiality: Anonymity and confidentiality of respondent were maintained. The respondent was informed that they can refuse to participate in the study at any time.

3.13 Expected Benefits and Application

1. This study results should be important information for local government and schools to conduct suitable programs to increase female student knowledge, attitude, and practice on anemia prevention.
2. This study results submitted on reputable International Journals and International Conference proceeding so can provide new perspective on anemia prevention issue.
3. This study results can be as baseline data for other researchers to conduct intervention study based on knowledge, attitude, and practice on anemia prevention.



CHAPTER IV

RESULTS

The objectives of this study was to determine the proportion of practice on Iron deficiency anemia prevention among high school female students, to assess the general characteristics, knowledge level, and attitude level toward practice on Iron deficiency anemia prevention among high school female students, to identify association between general characteristics, knowledge level, and attitude level with practice on Iron deficiency anemia prevention among high school female students, and to explore the reasons for practice and non-practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia. The study population was senior high school female students from 3 senior high schools in Banjarmasin, Indonesia.

The results are divided into 3 parts; quantitative study findings, qualitative study findings, and integrated between quantitative study findings and qualitative study findings. The first part is quantitative study findings divided into two sections; descriptive and inferential findings. The first part contains descriptive findings of general characteristics, knowledge regarding anemia, attitude towards anemia prevention and practice of anemia prevention. In this descriptive findings section, other descriptive findings such as source of information related to anemia and reasons for not practicing anemia prevention are included. The second section of quantitative study findings contains the binary logistic regression find the association between dependent and independent variables. The dependent .variable is practice of anemia prevention (categorical: Good/Poor) and independent variables include age, grade, type of school, household income, father education, mother education, history of anemia, family history of anemia, source of information related to

anemia, level of knowledge regarding anemia and level of attitude towards practice of anemia prevention.

4.1 Quantitative Study Findings

4.1.1 Descriptive Findings

4.1.1.1 General Characteristics

Table 4.1 shows the general characteristics of the participants. More than half of the participants, 51.3% were age between 15-16 years old. More than one third of the participants, 38.4% were in grade 11. More than half of the participants, 56.8% were have parent's income higher than district minimum wage \geq 2,500,000 Indonesian Rupiah (IDR) approx. 174.5 USD. More than half of participants, 68.2% were public school's students. More than half of participants' father's education, 73.8 were less than bachelor degree. More than half of participants' mother's education, 80.2%. World Health Organization sets limits on the prevalence of anemia which is a public health problem. From table 4.1 out of 359 participants, 20% had anemia history. Refers to WHO sets limit on the prevalence of anemia, finding of this study can categorize as medium level of anemia problem in public health.

Table 4.1 General Characteristics of Participants (N=359)

Characteristics	Frequency	Percentage (%)
Age		
15-16 years old	184	51.3
17-18 years old	175	48.7
Grade		
Grade 10	131	36.5
Grade 11	138	38.4

Grade 12	90	25.1
Household Income		
< 2,500,000 IDR per month	155	43.2
≥ 2,500,000 IDR per month	204	56.8
Type of School		
Non-vocational school	245	68.2
Vocational School	114	31.8
Father Education		
< Bachelor's Degree	265	73.8
≥ Bachelor's Degree	94	26.2
Mother Education		
< Bachelor's Degree	288	80.2
≥ Bachelor's Degree	71	19.8
Anemia History		
Yes	75	20.9
No;	148	41.2
Don't know	136	37.9
Family History of Anemia		
Yes	72	20.1
No;	128	35.7
Don't know	159	44.3

Currency rate: 1 USD = 16,000 Indonesia Rupiah (IDR), June 2020

4.1.1.2 Sources of Information Related with Iron Deficiency Anemia

Figure 4.1 shows response of the participants showed top five source of information obtained were from health officer (37.0%), internet source (35.9%), parents (14.5%), teacher (7.0%), and friends (5.6%).

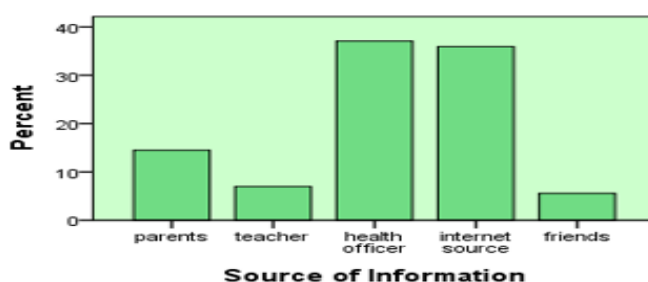


Figure 4.1 Sources of Information Related to Iron Deficiency Anemia

4.1.1.3 Participant's Practice on Anemia Prevention

Table 4.2 shows participant's practice on anemia prevention. Out of 359 participants, 193 (53.8%) had good practice on anemia prevention and 166 (46.2%) had poor practice on anemia prevention. More than half of respondents 239 (66.6%) never consume iron tablets in past 1 week. More than half of respondents 206 (57.4%) also never consume anthelmintic tablets in past 6 months. More than two third of respondents 266 (74.1%) often kept nails clean in past 1 month. Almost all respondents 337 (93.9%) often used soap after defecation. More than half of respondents 263 (73.3%) often used sleeper when they are going outside. From this finding we can conclude that female students had good practice on hygiene practice but they had poor practice on iron tablets and anthelmintic tablets consumption.

Table 4.2. Frequencies and distribution of practice of anemia prevention (N=359)

Statement	Frequencies (N=359)	Percentage (100%)
Eat 3 times per day in past 2 weeks		
Never	23	6.4
Sometimes	197	54.9
Often	139	38.7
In past 1 month eat foods enrich iron such as red meat, liver at least 1-2 times per week		
Never	75	20.9
Sometimes	233	64.9
Often	51	14.2
In past 1 month eat chicken liver at least 1-2 times per week		
Never	153	42.6
Sometimes	165	46.0
Often	41	11.4
In past 1 month eat egg yolks at least 1-2 times per week		
Never	40	11.1
Sometimes	141	39.3
Often	178	49.6
In past 1 month eat green vegetables such as spinach at least 1-2 times per week		
Never	39	10.9
Sometimes	166	46.2
Often	154	42.9
Consume iron tablets in past 1 week		
Never	239	66.6

Sometimes	101	28.1
Often	19	5.3
In past 1 month always kept nails clean		
Never	3	0.8
Sometimes	90	25.1
Often	266	74.1
In past 1 month always used soap to wash after defecation		
Never	2	0.6
Sometimes	20	5.6
Often	337	93.9
Not practicing open defecation		
Never	89	24.8
Sometimes	7	1.9
Often	263	73.3
Not walking barefoot outside		
Never	97	27.0
Sometimes	75	20.9
Often	187	52.1
Consume anthelmintic tablets in past 6 months		
Never	206	57.4
Sometimes	114	31.8
Often	39	10.9

Proportion of practice level on anemia prevention

Total practice scores are categorized into good and poor practice by median cutoff point (median = 13). Among 359 respondents about 193 (53.8%) had good practice on anemia prevention followed by poor practice 166 (46.2%).

Table 4.3. Score and Proportion of practice level on anemia prevention (N=359)

Practice Level (N=359)	Frequencies (%)
Poor practice (Score 0-12)	166 (46.2)
Good practice (Score 13-22)	193 (53.8)

4.1.1.4 Participant's knowledge regarding iron deficiency anemia

Regarding "Iron Deficiency Anemia Condition" topic, most of the respondents know the definition of iron deficiency anemia (82.7%), they also know that female adolescent need more iron (83.6%). Regarding "Iron Deficiency Anemia Causes" topic, more than half of respondents know that anemia causes by lose iron when they got period (76.9%), however most of them (71.0%) doesn't know that hookworm infestation is one of the cause of iron deficiency. Regarding "Iron Deficiency Anemia Symptoms" topic shows that female students score is considered as low scores, about (57.1%) of respondents doesn't know that shortness breath and heart palpitation is a symptom of anemia, followed by (79.7%) of respondents doesn't know that flat nail or bend like a spoon is a symptom of iron deficiency anemia, and more than half of respondents (58.2%) doesn't know that cold hands and feet is a symptom of iron deficiency anemia.

Regarding "Iron Deficiency Anemia Effects on Health" topic, most of the respondents (88.3%) knows that iron deficiency anemia will cause loss concentration in study, followed by (80.5%) of the respondents knows that iron deficiency anemia will cause low immunity. Most of the respondents (80.2%) also knows that iron deficiency anemia will cause slow process of thinking. Regarding "Iron Deficiency Anemia Prevention" topic, most of the respondents shows

low score in each statement. Almost all the respondents (92.8%) had no knowledge about vegetarian food only could not help support iron production. More than half of respondents (59.9%) doesn't know that red meat contains high iron and (73.3%) of the respondents had no knowledge about fruit consumption will increase absorption of iron from food. More than half of respondents (64.3%) doesn't know that drinking tea/coffee after meal immediately it will reduce absorption of iron and (60.4%) of respondents doesn't know about the benefit of anthelmintic tablets on iron deficiency anemia prevention. However, most of the respondents (82.7%) knows that practice hand washing with soap properly can prevent infection from contamination.

Table 4.4 Frequencies and Distribution of Knowledge scores (correct answer and incorrect answers) regarding iron deficiency anemia (N=359)

Statement	Frequencies (%)	
	N=359	
	Incorrect Answers	Correct Answers
<u>Iron Deficiency Anemia Condition</u>		
Iron deficiency anemia is the condition of the body have the red blood concentration lower than normal	62 (17.3)	297 (82.7)
Iron is needed for human body growth especially for fetus and small children	62 (17.3)	297 (82.7)
Iron is important for red blood cells	41 (11.4)	318 (88.6)
Female adolescent need more iron than general people	59 (16.4)	300 (83.6)
<u>Iron Deficiency Anemia Causes</u>		
Female lose iron when period	83 (23.1)	276 (76.9)
Hookworm infestation is one of the cause of iron deficiency	255 (71.0)	104 (29.0)
<u>Iron Deficiency Anemia Symptoms</u>		
Shortness breath and heart palpitation is a symptom of anemia	205 (57.1)	154 (42.9)

Flat nail or bend like a spoon is a symptom of iron deficiency anemia	286 (79.7)	73 (20.3)
Cold hands and feet is a symptom of iron deficiency anemia	209 (58.2)	150 (41.8)
<u>Iron Deficiency Anemia Effects on Health</u>		
When the body have Iron deficiency anemia it will cause loss concentration in study	42 (11.7)	317 (88.3)
When the body have Iron deficiency anemia it will cause low immunity	70 (19.5)	289 (80.5)
When the body have Iron deficiency anemia it will cause slow process of thinking	71 (19.8)	288 (80.2)
When the body have Iron deficiency anemia it will cause poor growth and development in childhood	147 (40.9)	212 (59.1)
<u>Iron Deficiency Anemia Prevention</u>		
Vegetarian food help support iron production	333 (92.8)	26 (7.2)
Red meat contains low iron	215 (59.9)	144 (40.1)
If you eat Vitamin C and Vitamin A-enriched fruit such as orange, papaya, guava and strawberries after meal immediately it will reduce absorption of iron from food	263 (73.3)	96 (26.7)
If you drinking tea/coffee after meal immediately it will Reduce absorption of iron from gut	231 (64.3)	128 (35.7)
If you always do hand washing with soap properly it can prevent infection from contamination	62 (17.3)	297 (82.7)
If you always no bare feet it can prevent iron deficiency anemia due to hookworm	244 (68.0)	115 (32.0)
If you take stool exam and Anti-helminthic	217 (60.4)	142 (39.6)

tablet annually it can prevent iron deficiency anemia		
Source of proteins such as fish and eggs are foods that contains high iron	86 (24.0)	273 (76.0)
Green leaves vegetables contains low iron	198 (55.2)	161 (44.8)

Level of knowledge regarding iron deficiency anemia

Knowledge scores are categorized into good and poor levels by median cutoff point. As shows in Table 4.5 among total 359 respondents, half scored good knowledge level (51.3%) followed by poor knowledge (48.7%).

Table 4.5. Score and level of knowledge regarding iron deficiency anemia (N=359)

Level of knowledge (N=359)	Frequencies (%)
Poor knowledge (Score 1-12)	175 (48.7)
Good knowledge (Score 13-21)	184 (51.3)

4.1.1.5 Participant's Attitude towards Anemia Prevention

There are 8 statements in attitude section (6 positive statements and 2 negative statements). Table 4.6 shows the frequency of the respondent's response for these statements. The score of each statement is given by 5 points Likert scale, and responses are grouped into 3; strongly agree/agree, not sure, and disagree/strongly disagree for clear understanding in descriptive findings. Majority of the respondents agreed that iron deficiency anemia is preventable disease (81.6%) and can be treated with food (67.7%). More than half of respondents agreed that iron deficiency anemia effect to all of the system in our body (65.2%). More than half of respondents disagreed that male have more chance to have iron deficiency anemia (73.8). And about half of respondents not sure that drinking juice will help the absorption iron from food (43.5%) and not sure that drinking coffee or tea will help increase the

absorption of iron from food (47.9%). And more than half of respondents agreed that taking iron tablets can prevent iron deficiency anemia (75.8%).

Table 4.6. Frequencies and distribution of attitude towards anemia prevention (N=359)

Statement	Frequencies (%)		
	Strongly agree/Agree	Not Sure	Disagree/Strongly disagree
I believe that Iron deficiency anemia is the preventable disease	293 (81.6)	62 (17.3)	4 (1.1)
I believe that Iron deficiency anemia can be treated with food	243 (67.7)	103 (28.7)	13 (3.6)
I think that Iron deficiency anemia effect all of the system in our body	234 (65.2)	99 (27.6)	26 (7.2)
In my opinion Male have more chance to have Iron deficiency anemia than female*	23 (6.4)	71 (19.8)	265 (73.8)
I believe that eating chicken liver can prevent from getting Iron deficiency anemia	238 (66.3)	97 (27.0)	24 (6.6)
I think that drinking juice such as orange juice after meal will help the absorption of iron from food	179 (49.9)	156 (43.5)	24 (6.6)
I think that drinking coffee or tea will help increase the absorption of iron from food*	93 (25.9)	172 (47.9)	94 (26.2)
I believe that taking iron tablets can prevent Iron deficiency anemia	272 (75.8)	78 (21.7)	9 (2.5)

*negative statement

Level of attitude towards anemia prevention

Attitude scores are categorized into poor attitude (< median) and good attitude (> median) by median cutoff point. The median score of attitude section is 31. Poor attitude score

range from 19 to 30, and good attitude score range from 31 to 44. From table 4.7 shows that half of respondents had good attitude (57.7%) followed by poor attitude (42.3%).

Table 4.7. Scores and level of attitude towards anemia prevention (N=359)

Level of Attitude (N=359)	Frequencies (%)
Poor attitude (Score 19-30)	152 (42.3)
Good attitude (Score 31-44)	207 (57.7)

4.1.1.6 Reasons for not practicing anemia prevention

Table 4.8 shows that top three the reasons of respondents not practicing anemia prevention were feeling nausea after taking iron tablet (32.3%), don't like the smell and color of iron tablets (21.6%), and don't know the benefit of practice anemia prevention (19.1%). Followed by anemia prevention is not important (16.0%), and lack of parent's support (11.0%).

Table 4.8. Frequencies and distribution of reasons for not practicing anemia prevention (N=359)

Reasons for not practicing anemia prevention	Frequencies (%)
Feeling nausea after taking iron tablet	115 (32.3)
Don't like the smell and color of iron tablets	77 (21.6)
Don't know the benefit of practice anemia prevention	68 (19.1)
Anemia prevention is not important	57 (16.0)
Lack of parents support	39 (11.0)

4.1.2 Binary logistic regression findings

Binary logistic regression with enter method was used to analyze the associations between the multiple independent variables and dependent variable which is practice of iron deficiency anemia prevention. All independent variables which are age, household income, type of school, father education, mother education, knowledge scores, and attitude scores were put together at the same time to run with enter method in binary logistic regression in SPSS.

Among the 9 predictors, the findings of the study indicated that three predictors showed statistically significant on practice of anemia prevention after holding other variables constant. Older age group of female students (17-18 years old) was 1.602 times more likely to practice anemia prevention than younger age group of female students (15-16 years old) (OR (95%CI): 1.60 (1.025, 2.504) $p= 0.039$). Female students at non-vocational school were 42% less likely to practice anemia prevention than female students at vocational school (OR (95%CI): 0.579 (0.340, 0.901) $p= 0.017$). As knowledge increases one unit among female students, the odd of having anemia prevention practice increase 7% (OR (95%CI): 1.068 (1.006, 1.134) $p= 0.031$).

Table 4.9 Factors predicting practice of anemia prevention among respondents (N=359)

Variables	Practice of anemia prevention					
	B	SE	p value ^b	OR ^b	95% CI	
					Lower	Upper
Age (15-16 years old ^{Ref})	0.471	0.228	0.039	1.602	1.025	2.504
Household income (\leq 2,500,000 IDR ^{Ref})	0.375	0.242	0.121	1.456	0.906	2.340
Type of school (Vocational school ^{Ref})	-0.591	0.248	0.017	0.554	0.340	0.901
Father education (Lower than bachelor degree ^{Ref})	0.160	0.288	0.579	1.173	0.667	2.062
Mother education (Lower than bachelor degree ^{Ref})	-0.145	0.308	0.638	0.865	0.474	1.581
Knowledge	0.066	0.031	0.031	1.068	1.006	1.134
Attitude	0.003	0.032	0.927	1.003	0.941	1.069
Female student without Anemia History						
Yes	-0.010	0.336	0.976	0.990	0.512	1.913
Don't know (No ^{Ref})	-0.225	0.278	0.417	0.798	0.463	1.376

Family without Anemia History						
Yes	-0.065	0.346	0.851	0.937	0.475	1.847
Don't know (No ^{Ref})	0.103	0.278	0.712	1.108	0.642	1.911

^bp value from multivariable logistic regression.

* Significant at p value <0.05

4.2 Qualitative Study Findings

4.2.1 Focus Group Discussion Findings

Total participants in focus group discussion were 9 female students from 2 non-vocational schools age 15-18 years old. From 9 participants there were 3 female students that had anemia history, 1 female student do not have anemia history, and 5 female students don't know if they ever had anemia history. From 9 participants there were 1 female student who had family with anemia history, followed by 8 female students don't know if they have family with anemia history.

The focus group discussion were used a WhatsApp video call to 2 groups of students from 2 different schools with a total of 9 informants. The pilot test was conducted with in-depth interviews with one of the students to find out how far the questions could be accepted and understood by the students. After conducting a pilot test the researchers replaced some questions and deleted some questions that were considered difficult. The data on the qualitative findings of this study were sorted, classified and interpreted using a thematic combination of analysis and content analysis. Content analysis was done first by looking at the frequency of answers and similar patterns until the researcher reached meaningful and saturated findings. Thematic analysis was carried out after the researcher found several findings that can be

classified in the same theme or topic. The findings in this focus group discussion are divided into 4 themes / topics namely: 1) education programs regarding iron deficiency anemia, 2) female students knowledge regarding iron deficiency anemia, 3) iron tablets consumption: perceived of risk, side effects, and the role of family, and 4) female students expectation towards anemia prevention program at school. Table 4.10 shows summary of focus group discussion among female students' finding.

Table 4.10 Matrix summary of focus group discussion among female student's finding

Themes	Data/Quotations	Interpretation
Education program regarding iron deficiency anemia	<p>“Lately no, it's been a long time, last year, I guess”</p> <p>“It's like there is counseling at school, yeah, people come to school, health workers maybe? I'm not sure...”</p> <p>“Just a little socialization, if you feel less blood then take a tablet. So, they give information that is not too specific about the disease, what are the symptoms, sometimes at school they rarely convey it, sis”</p> <p>“It seems if socialization is less frequent, blood checks and then given medicine, if socialization is rare”</p> <p>“They told me about how to</p>	<p>Education related to iron deficiency anemia and how to prevent it have been done one time at the same time when the hemoglobin test was held at school. The person in charge of conducting information about iron deficiency anemia was health workers.</p> <p>Because the previous socialization time was long enough, more than 6 months ago, and there was no additional socialization or education related to iron deficiency anemia and the importance of preventing iron deficiency anemia so the majority of students were unsure about their understanding of iron deficiency anemia.</p>

Themes	Data/Quotations	Interpretation
	prevent it, how to take the medicine. Yeah, I guess I never took the tablets either.”	
Female students knowledge regarding iron deficiency anemia	<p>“I know if anemia is lacking blood, that's all. Maybe like feeling dizzy like that, I've never felt sis”</p> <p>“I don't know what causes blood loss”</p> <p>“Lack of blood due to lack of hemoglobin throughout the body”</p> <p>“Dizzy, weak, I know that because my friends are like that, have anemia”</p> <p>“I never take medicine Sis, I don't feel that I'm anemic Sis”</p> <p>“Just know the symptoms sis ... people are sometimes confused because they do not know they are anemic or not, whether people who have symptoms of dizziness she is definitely anemic, so people can be difficult to distinguish sis”</p> <p>“Sis, I have heard that anemia can cause death, so I know that anemia is dangerous”</p>	<p>Blood deficiency is a term for anemia that is understood by students. Schoolgirls do not have an understanding of why anemia can occur. Symptoms of anemia understood by schoolgirls are dizziness. But this understanding of dizziness became biased, students stated that dizziness symptoms were not necessarily assumed to be anemia symptoms so that they were overcome by taking headache relief medications. Students feel unsure whether preventing anemia is important because they have not received education about preventing anemia and why they should prevent anemia.</p> <p>The program that was carried out by the health department in schools in mid-2019 was in the form of socialization about anemia and checking blood samples of 350 students. After checking the blood sample, the students stated that they were asked to take iron tablets every week. Schoolgirls said that they did not know the results of checking blood samples whether they were anemic or not.</p>

Themes	Data/Quotations	Interpretation
<p>Iron tablets consumption: perceived of risk, side effect, and the role of family</p>	<p>“I have done the test. But, we were not told what the anemia test results were sis”</p> <p>“It's just that every week our teacher is given medicine for anemia, sis”</p> <p>“I rarely take medicine. I can't take medicine. Indeed, I had never been given medicine when I was sick, until now I have never been used to medicine</p> <p>So I gave the anemia medicine to my classmate, usually my friend has less blood so I gave it to her.”</p> <p>“The medicine is given one by one for each student and then told to took it”</p> <p>“I once checked for hemoglobin and the results were 15 so I felt I didn't need the medicine. I don't usually take drugs, sis. I never take medicine, I also feel that I'm not anemic too sis.”</p> <p>“Back when I was menstruating I took the medicine because I felt dizzy. I took about 3-4 tablets sis it has an effect and I don't feel dizzy anymore, but then my</p>	<p>Consumption of iron tablets among students is influenced by several factors: that they do not know the results of anemia tests and the lack of education carried out in schools. Giving iron tablets weekly without being followed by routine information giving made students not understand why teachers always give iron tablets while they don't understand.</p> <p>Lack of understanding of students led to the formation of the perception that iron tablets are only consumed if they have been exposed to anemia. As long as they do not feel anemia symptoms such as dizziness they feel they are not affected by anemia so consumption of iron tablets is not necessary.</p> <p>Different when there are some students who have the will to drink the iron tablets. Because of the lack of understanding about side effects and how to consume drugs, the student felt scared and didn't want to consume the iron tablets anymore. After consuming the iron tablets at weekly doses for 3-4 days in a row resulting in black stool. Also there are some students who complain about feeling nauseous and feel like vomiting after taking an iron tablet. Some of the experiences experienced by these students resulted in them being reluctant to consume iron tablets again.</p> <p>The habit of handling the condition of illness</p>

Themes	Data/Quotations	Interpretation
	<p>stool is black, I told my parents, my parents said that the iron is excess, so I stopped taking it sis .. Now I am afraid that want to take that medicine again, I'm afraid my stool is black again sis.”</p> <p>“I used to drink <i>sangobion</i> (refers to: one of the brand of Iron tablets in the market) sis, if the medicine from the school I was lazy to take, because if at school I did not know sis why we were told to drink it, and also there were no friends in the class who took the drug, there were discarded. Yes, usually when I'm dizzy during menstruation I was told to drink <i>sangobion</i> (refers to: one of the brand of Iron tablets in the market) with my parents, after taking it I don't feel dizzy anymore. Yes I took <i>sangobion</i> (refers to: one of the brand of Iron tablets in the market), mom and sister took <i>sangobion</i> too (refers to: one of the brand of Iron tablets in the market), my mom took <i>sangobion</i> (refers to: one of the brand of Iron tablets in the market), my mom is anemic so it's usually mom who buys</p>	<p>in the family at home also affects the willingness of students to take any kind of medicine. Two students said that they were not accustomed to taking medicines while at home. So they objected when they were asked to take iron tablets. The reason is not usual taking any medication coupled with the perception that she was fine because she did not experience any symptoms.</p> <p>Habits at home also contribute to the consumption of female iron tablets. There is a student who states that she consumes <i>sangobion</i> (refers to: one of the brand of Iron tablets in the market) routinely during menstruation because at home she is accustomed to consuming <i>sangobion</i>. <i>Sangobion</i> (refers to: one of the brand of Iron tablets in the market) is always provided by her mother at home, with mothers who often suffer from anemia so her mother asks her and her sister to take <i>Sangobion</i> (refers to: one of the brand of Iron tablets in the market) during menstruation. The habit of taking the iron tablet with the <i>Sangobion</i> brand is always done in her family. But when asked if she took iron tablets given by the teacher at school, she said that she was lazy, did not feel convinced because she did not understand why they were suddenly asked to take iron tablets at school.</p>

Themes	Data/Quotations	Interpretation
	<p><i>sangobion</i> (refers to: one of the brand of Iron tablets in the market) for us.”</p> <p>“I don't like it anymore, after taking the medicine I feel nauseous and dizzy so I don't like it.”</p> <p>“The last time I took it was immediately vomited nausea sis... My friend in class also nobody took it...”</p>	
Female students expectation towards anemia prevention program at school	<p>“Yes, we want to know what the medicine is for sis, many people don't want to take it because they were not given an explanation Sis, we were taken our blood but we were not told the results Sis whether we are anemic or not, so we were only told to take medication only ..”</p>	<p>The implementation of the iron tablet program in schools still needs to be evaluated. Giving tablets without accompanied by massive information about anemia makes students feel unconvinced. They hope that they know more about the tablets that are given, as well as what benefits will be obtained when they consume these tablets.</p>

4.2.2 In-depth Interview Findings

Table 4.11 shows matrix of summary of in-depth interview among teachers. These findings summary as one theme namely “Barrier of anemia reduction program implementation at schools: Knowledge gap, Communication gap, Lack of monitoring and evaluation, and side effects of iron tablet”. This table represent themes, data/quotations, and interpretation of in-depth interview among teacher findings. The informant of this in-depth interview were public school teachers.

Table 4.11. Matrix summary of in-depth interview among teachers finding

Themes	Data/Quotations	Interpretation
<p>Barrier of anemia reduction program implementation at schools:</p> <p>Knowledge gap, Communication gap, Lack of monitoring and evaluation, and side effects of iron tablet</p>	<p>“The distribution of iron tablets was the first time carried out by the provincial health office at that time they also carried out a socialization program to reduce anemia in schools. So the students take iron tablets on the spot after hemoglobin testing, immediately take medicine together.”</p> <p>“After the activity, I share it every week. I share it with classes, but only once I explain it, take it, dear. It's just that many students feel nauseous. Nausea is a side effect, said the health center staff, so I gave her iron tablets after the first break. Around 11 a.m. Around 10 o'clock in the morning in order to reduce the nausea with the thought of the first break the students eat and have filled their stomachs, so by eating it can reduce the feeling of nausea in my opinion like that.”</p> <p>“I explained the first week and then I didn't explain it the next week because I explained it in the first week. But indeed when I shared there were students who said 'yes ma'am, my drinking water</p>	<p>Health district officer only 1 time giving anemia education at school at mid-2019. After that they give responsibility to teacher to distribute iron tablets to the female students 1 tablet each week.</p> <p>The teacher admit that she only explain about how to consume iron tablets once at first week program implementation. After that she didn't explain again to the students, because she think that she already explain before.</p> <p>The students express their feeling regarding iron tablets, they didn't like it because they felt nauseous after taking those tablet. So the teacher has her own idea to distribute the tablets after the students fill the stomach with foods, she thinks that by eating it can reduce the feeling of nausea.</p> <p>She also admit that she didn't tell all female students about the results of hemoglobin level check. She just put the results on the wall of her office, it depends on students if they have intention to see the results or not. There's some students that take a look the results on her office, but there's some that not take a look the results</p>

Themes	Data/Quotations	Interpretation
	<p>will run out'."</p> <p>"They were taken blood 2 times initially in September and then in December they were taken again. At the first time, many students were anemia, around 58%. Then the second seems to be reduced to 60% without anemia."</p> <p>"If I go around, I bring the book with the results of the examination, if you want to see the results, it is in the school health unit. But many students do not see the results, but there are also those who see the results, but many students say that they do not like it because they feel nauseous after taking the iron tablet, and also feel dizzy after taking it."</p> <p>"Understanding of students is still lacking, self-awareness is indeed lacking, I think why students can feel nauseous, I do not understand too. Because there are some students who don't feel nauseous."</p>	<p>as well.</p> <p>She think that the understanding of students regarding anemia is still lacking, self-awareness is indeed lacking.</p>

Table 4.12 shows matrix summary of in-depth interview among public health officers. These findings summary as one theme namely “Barrier of anemia reduction program implementation at schools: the expectation doesn’t meet the reality”. This table represent themes, data/quotations, and interpretation of in-depth interview among public health officer findings. The informants of this in-depth interview were public health officer from provincial health office and primary health care.

Table 4.12. Matrix summary of in-depth interview among public health officers finding

Themes	Data/Quotations	Interpretation
Barrier of anemia reduction program implementation at schools: the expectation doesn’t meet the reality	<p>“Lack of response from schools. If we go there like we are not accompanied by teachers or school principals, so like this only our program is not a joint program between the provincial health office and schools.”</p> <p>“We have also submitted it to the school, the names of those who are anemic and those who are not.”</p> <p>“We expect cooperation from the school because we cannot monitor every month or every week. Because the work of primary health care nutrition workers cannot focus on just one program, there are still other programs that we have to deal with. But from the school stated that they could not monitor, primary health care officers must come directly to</p>	<p>Duration of education that given by schools mentioned several times as the barrier of anemia reduction program implementation at school.</p> <p>Gap between health sector and non-health sector is also still wide. Health officer as health sector personnel claim that they were working alone and rarely got enthusiastic response from schools as non-health sector.</p> <p>These gap became wide when health sector personnel perceived that non-health sector personnel didn’t have motivation to get along together, and non-sector personnel perceived that “health program” is health sector personnel responsibility.</p>

Themes	Data/Quotations	Interpretation
	<p>see.”</p> <p>“Actually, this iron tablet is not to be taken home, but taken immediately at school together. Information from us each student gets 52 tablets for 1 year, 1 week only 1 tablet is not to be given every day.”</p> <p>“So indeed the private schools, they have a superior program for health, rather than public schools. The teachers send photos together drinking tablets with students, we conclude that school supports our program.”</p> <p>“For this program we have a dilemma too. Actually we want everything to be independent after the program. For example after this year we give, but next year we want to see independence. We cannot walk alone from the health sector who always takes the initiative to remind.”</p> <p>“We educate students and give leaflets. When we educate students to understand, but we are confused whether students really understand or not, we think that senior high school students can already understand the context if given</p>	

Themes	Data/Quotations	Interpretation
	<p>education. But it also seems difficult to ascertain whether students really understand what we always convey related to anemia.”</p> <p>“We gave the test results to the teacher, but we did not know whether it was passed on to the students or not, we felt bad when we told the teacher that please tell the results to the students. So we don't ask teachers to do this.”</p> <p>“We also see that coordination within schools is still lacking, many principals don't know about this program, but we don't want them to blame each other internally.”</p> <p>“This is a condition that we always face when in contact with other sectors. This activity is carried out continuously almost every year. But not only students, just many teachers do not understand.”</p> <p>“When we carry out counseling about anemia, maybe all are present, but not all students want to understand what we are saying. They are there, but almost all students just listen, without wanting to understand, or change habits like drinking iron tablets and changing</p>	

Themes	Data/Quotations	Interpretation
	<p>eating patterns.”</p> <p>“We were only given a short amount of time to deliver because the teachers also had their own learning targets in the school so the allocation of time for health education in schools was very limited. Imagine, within 45-60 minutes given to us for one session, expecting them to understand, want and be able to change behavior seems very unlikely.”</p> <p>“That's why we always work closely with school health unit teachers. For teachers who are responsible for the school health unit, they also feel much burdened with this activity. They partly assume that the realm of health is not education so they do not feel the need to contribute.”</p> <p>“If we want to follow our ego, this problem should be dealt with from the top level, not always from below, namely at the primary health care level.”</p> <p>“So what we said for 45 minutes turned out to be very lacking, and this was not every month. The school said from the beginning that this activity took up teaching and</p>	

Themes	Data/Quotations	Interpretation
	<p>learning time at school. If we often ask for time for counseling at the school the teacher will feel disturbed because they have the target of teaching and learning.”</p> <p>“Maybe health education should have special times such as its own subjects so that each student can be knowledgeable, not 1 hour of health education for several months. And this program I think is difficult and hard for us as health workers. Actually we only deliver material about anemia, distributing iron tablets, and then the school that distributes it to students and supervises and takes notes. But in fact, some schools feel this is not their responsibility.”</p>	

4.3 Merge Between Quantitative and Qualitative Study Findings

Table 4.13 shows the merge between quantitative and qualitative findings. This table represent merge and complement each other in some topics: type of school, knowledge, and attitude. This table represent quantitative results, qualitative quotations, and interpretation between these two results.

Table 4.13. Merge between quantitative and qualitative findings

Merge between findings		
Quantitative	Qualitative	Interpretation
<p><u>Type of school:</u></p> <p>Female students at non-vocational school were 44% less likely to practice anemia prevention than female students at vocational school (OR (95%CI): 0.579 (0.340, 0.901) p= 0.017).</p>	<p>“So indeed the vocational schools, they have a superior program for health, rather than non-vocational schools. The teachers send photos together drinking tablets with students, we conclude that as a school that supports our program.” (HW-1, HW-2)</p> <p>“This is a condition that we always face when in contact with other sectors. This activity is carried out continuously almost every year. But not only students, just many teachers do not understand.” (HW-2)</p> <p>“We were only given a short amount of time to deliver because the teachers also had their own learning targets in the school so the allocation of time for health education in schools was very limited. Imagine, within 45-60 minutes given to us for one session, expecting them to understand, want and be able to change behavior seems very unlikely.” (HW-2)</p>	<p>Female students at non-vocational school were 44% less likely to practice anemia prevention than female students at vocational school (OR (95%CI): 0.579 (0.340, 0.901) p= 0.017).</p> <p>From information provided by health provincial officer, teacher and head of school from vocational schools are very opened to anemia reduction program. The way they build a trust, communication, and also relationship with health officer are always good. So health officer perceived that vocational schools and private schools are more likely aware and easy to cooperate. In fact health officer always find difficulties to communicate and build relationship with teachers and head of schools from non-vocational schools school in district.</p>

	<p>“I explained the first week and then I didn't explain it the next week because I explained it in the first week.” (T-1)</p> <p>“Understanding of students is still lacking, self-awareness is indeed lacking.” (T-1)</p> <p>“I rarely take medicine. I can't take medicine. Indeed, I had never been given medicine when I was sick, until now I have never been used to medicine. So I gave the anemia medicine to my classmate, usually my friend has less blood so I gave it to her.” (S-7, S-8)</p> <p>“Yes, we want to know what the medicine is for sis, many people don't want to take it because they were not given an explanation Sis, we were taken our blood but we were not told the results Sis whether we are anemic or not, so we were only told to take medication only ..” (S-5, S-6)</p>	
<p>Knowledge:</p> <p>For 1 unit increase</p>	<p>“I know if anemia is lacking</p>	<p>For 1 unit increase of knowledge</p>

<p>of knowledge among female students, the odd of having anemia prevention practice increase 7% (OR (95%CI): 1.068 (1.006, 1.134) p= 0.031).</p>	<p>blood, that's all. Maybe like feeling dizzy like that, I've never felt sis" (S-1, S-2, S-3)</p> <p>"Just know the symptoms sis ... people are sometimes confused because they do not know they are anemic or not, whether people who have symptoms of dizziness she is definitely anemic, so people can be difficult to distinguish sis" (S-5, S-6)</p> <p>"I explained the first week and then I didn't explain it the next week because I explained it in the first week." (T-1)</p> <p>"Understanding of students is still lacking, self-awareness is indeed lacking." (T-1)</p> <p>"We educate students and give leaflets. When we educate students to understand, but we are confused whether students really understand or not, we think that senior high school students can already understand the context if given education. But it also seems difficult to ascertain whether students really understand what we always convey related to anemia." (HW-1)</p>	<p>among female students, the odd of having anemia prevention practice increase 7% (OR (95%CI): 1.068 (1.006, 1.134) p= 0.031).</p> <p>Because the previous socialization time was quite long, more than 6 months ago, and there was no additional socialization or education related to anemia and the importance of preventing anemia so the majority of students were not sure about their understanding of anemia. Blood deficiency is a term for anemia that is understood by students. Students do not have an understanding of why anemia can occur. Symptoms of anemia understood by students are dizziness.</p>
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	<p>“But not only students, just many teachers do not understand. When we carry out counseling about anemia, maybe all are present, but not all students want to understand what we are saying. They are there, but almost all students just listen, without wanting to understand, or change habits like drinking iron tablets and changing eating patterns.” (HW-2)</p> <p>“We were only given a short amount of time to deliver because the teachers also had their own learning targets in the school so the allocation of time for health education in schools was very limited. Imagine, within 45-60 minutes given to us for one session, expecting them to understand, want and be able to change behavior seems very unlikely.” (HW-2)</p>	
<p><u>Attitude</u></p> <p>Female students who had good attitude (57.7%) followed by poor attitude (42.3%).</p>	<p>“They told me about how to prevent it, how to take the medicine. Yeah, I guess I never drink either.” (S-7)</p> <p>“I never take medicine Sis, I don't feel that I'm anemic Sis”</p>	<p>Female students who had poor attitude was 42.3%. Qualitative findings also found that students had lack of awareness regarding anemia. The students also admitted that they didn't enthusiast and lack of initiative to find out what is anemia even from internet.</p>

	<p>(S-7)</p> <p>“I rarely take medicine. I can't take medicine. Indeed, I had never been given medicine when I was sick, until now I have never been used to medicine So I gave the anemia medicine to my classmate, usually my friend has less blood so I gave it to her.” (S-3)</p> <p>“I once checked for hemoglobin and the results were 15 so I felt I didn't need the medicine. I don't usually take drugs, sis. I never take medicine, I also feel that I'm not anemic too sis.” (S-8)</p> <p>“Back when I was menstruating I took the medicine because I felt dizzy. I took about 3-4 tablets sis it has an effect and I don't feel dizzy anymore, but then my stool is black, I told my parents, my parents said that the iron is excess, so I stopped taking it sis .. Now I am afraid that want to take that medicine again, I'm afraid my stool is black again sis.” (S-2)</p>	<p>For some students because they feel that they didn't have any symptoms of anemia so they perceived that they were not anemia and they don't need to take iron tablets.</p>
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CHAPTER V

DISCUSSION

The objectives of this study was to determine the proportion of practice on Iron deficiency anemia prevention among high school female students, to assess the general characteristics, knowledge level, and attitude level toward practice on Iron deficiency anemia prevention among high school female students, to identify association between general characteristics, knowledge level, and attitude level with practice on Iron deficiency anemia prevention among high school female students, and to explore the reasons for practice and non-practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia. The study population was senior high school female students from 3 senior high schools in Banjarmasin, Indonesia.

Total 359 female students participated in the study with age 15-18 years old. More than half of the participants, 56.8% were have parent's income higher than district minimum wage \geq 2,500,000 Indonesian Rupiah (IDR) approx. 174.5 USD. More than half of participants, 68.2% were public school's students. More than half of participants, 79.1% didn't have anemia history. More than half of participants, 79.9% didn't have family member experience anemia. Top five sources of information obtained were from health officer (37.0%), internet source (35.9%), parents (14.5%), teacher (7.0%), and friends (5.6%).

Out of 359 participants, 193 (53.8%) had good practice on anemia prevention and 166 (46.2%) had poor practice on anemia prevention. More than half of respondents 239 (66.6%) never consume iron tablets in past 1 week. More than half of respondents 206 (57.4%) also never consume anthelmintic tablets in past 6 months.

Out of 359 participants, 184 (51.3%) had good knowledge related on anemia and 175 (48.7%) had poor knowledge related on anemia. Almost all the respondents (92.8%) had no knowledge about vegetarian food only could not help support iron production. More than half of respondents (59.9%) doesn't know that red meat contains high iron and (73.3%) of the respondents had no knowledge about fruit consumption will increase absorption of iron from food. More than half of respondents (64.3%) doesn't know that drinking tea/coffee after meal immediately it will reduce absorption of iron and (60.4%) of respondents doesn't know about the benefit of anthelmintic tablets on iron deficiency anemia prevention.

Female students who had good attitude (57.7%) followed by poor attitude (42.3%). Majority of the respondents agreed that iron deficiency anemia is preventable disease (81.6%) and can be treated with food (67.7%). And about half of respondents not sure that drinking juice will help the absorption iron from food (43.5%) and not sure that drinking coffee or tea will help increase the absorption of iron from food (47.9%). And more than half of respondents agreed that taking iron tablets can prevent iron deficiency anemia (75.8%).

Top three the reasons of respondents not practicing anemia prevention were feeling nausea after taking iron tablet (32.3%), don't like the smell and color of iron tablets (21.6%), and don't know the benefit of practice anemia prevention (19.1%). Followed by anemia prevention is not important (16.0%), and lack of parent's support (11.0%).

5.1 Discussion

5.1.1 Practice of anemia prevention among female students

Out of 359 participants, 193 (53.8%) had good practice on anemia prevention and 166 (46.2%) had poor practice on anemia prevention. Even though percentage of the good practice is higher than 50% but the percentage of poor practice is nearly 50%. As we can see from the

results more than half of respondents 239 (66.6%) never consume iron tablets in past 1 week. More than half of respondents 206 (57.4%) also never consume anthelmintic tablets in past 6 months. The poor practice of taken iron tablets by the female students (66.6%) was caused due to lack of knowledge related on anemia prevention. From focus group discussion female students admit that given the iron tablets every week by the teacher caused confusion, because they did not know why they should always consume iron tablets every week, nor did they know what benefits could be obtained by consuming iron tablets. A half-understanding makes students hesitate to drink iron tablets given by the teacher every week.

“Just a little socialization, if you feel less blood then take a tablet. So, they give information that is not too specific about the disease, what are the symptoms, sometimes at school they rarely convey it, sis” (S-1)

“Just know the symptoms sis ... people are sometimes confused because they do not know they are anemic or not, whether people who have symptoms of dizziness she is definitely anemic, so people can be difficult to distinguish sis” (S-3)

“Yes, we want to know what the medicine is for sis, many people don't want to take it because they were not given an explanation Sis, we were taken our blood but we were not told the results Sis whether we are anemic or not, so we were only told to take medication only ..” (S-2, S-3, S-5, S-6, S-7, S-8, S-9)

“I explained the first week and then I didn't explain it the next week because I explained it in the first week. Understanding of students is still lacking, self-awareness is indeed lacking..” (T-1)

“We were only given a short amount of time to deliver because the teachers also had their own learning targets in the school so the allocation of time for health education in schools was very limited. Imagine, within 45-60 minutes given to us for one session, expecting them to understand, want and be able to change behavior seems very unlikely.” (HW-1, HW-2)

From qualitative findings female students claimed that in the end they never took the iron tablets given, some of them discarded the iron tablets because they felt the side effects of nausea and the desire to vomit after consuming the iron tablets, while others claimed that they brought the iron tablets home but were not taken after arriving at home.

With an understanding that is still lacking in relation to anemia, the female student admitted that they did not really know whether preventing anemia was an important thing to do. From this study lack of knowledge is contributing factor that lead female students had poor practice of anemia prevention. From previous study found that individuals who had better nutrition knowledge had a more positive attitude towards eating healthier foods (Garcia-Lascurain, Kicklighter, Jonnalagadda, Boudolf, & Duchon, 2006; Heaney, O'Connor, Michael, Gifford, & Naughton, 2011). Conversely, poor knowledge is one of the risk factors to develop malnutrition (Ryoo, 2011).

5.1.2 Age as a predicting factor towards practice of anemia prevention

Older age group of female students (17-18 years old) was 1.602 times more likely to practice anemia prevention than younger age group of female students (15-16 years old) (OR (95%CI): 1.602 (1.025, 2.504) $p= 0.039$). From the observation during the focus group discussion, female students who are in 11th and 12th grade more likely have clear reasons if they take iron

tablets or not and they can give explanation clearly why they practice or not practice anemia prevention compare than students who are in grade 10th. If we return to adolescent development stages theory, the middle stage of adolescent (14-17 years old) the brain continues to change and mature in this stage, but there are still many differences in how a normal middle adolescent thinks compared to an adult. Much of this is because the frontal lobes are the last areas of the brain to mature—development is not complete until a person is well into their 20s. The frontal lobes play a big role in coordinating complex decision making, impulse control, and being able to consider multiple options and consequences. Middle adolescents are more able to think abstractly and consider "the big picture," but they still may lack the ability to apply it in the moment. And late adolescents (18-21 years old) generally have completed physical development and grown to their full adult height. They usually have more impulse control by now and may be better able to gauge risks and rewards accurately (Allen, B, 2019).

5.1.3 Type of school as a predicting factor towards practice of anemia prevention

Female students at non-vocational school were 44% less likely to practice anemia prevention than female students at vocational school (OR (95%CI): 0.579 (0.340, 0.901) $p= 0.017$). From in-depth-interview findings with health provincial officer, teacher and head of school from vocational schools are very opened to anemia reduction program. The way they build a trust, communication, and also relationship with health officer are always good. So health officer perceived that vocational schools and also private schools are more likely aware and easy to cooperate. In fact health officer always find difficulties to communicate and build relationship with teachers and head of schools from public schools school in district.

“Lack of response from schools. If we go there like we are not accompanied by teachers or school principals, so like this only our program is not a joint program between the provincial health office and schools. We expect cooperation from the school because we cannot monitor every month or every week. Because the work of primary health care nutrition workers cannot focus on just one program, there are still other programs that we have to deal with. But from the school stated that they could not monitor, primary health care officers must come directly to see. So indeed the private schools, they have a superior program for health, rather than public schools. The teachers send photos together drinking tablets with students, we conclude that school supports our program.”

(HW-1)

“The last time I drank it was immediately vomited nausea sis... My friend in class also nobody drink it...” (S-8, S-9)

“I rarely take medicine. I can't take medicine. Indeed, I had never been given medicine when I was sick, until now I have never been used to medicine. So I gave the anemia medicine to my classmate, usually my friend has less blood so I gave it to her.” (S-1)

From observation in focus group discussion, female students who were public schools students tend to have poor practice of anemia prevention as well, they admit that they didn't took iron tablets regularly, some of them discarded the iron tablets instead of taken it.

5.1.4 Knowledge as a predicting factor on practice of anemia prevention

For 1 unit increase of knowledge among female students, the odd of having anemia prevention practice increase 7% (OR (95%CI): 1.068 (1.006, 1.134) p= 0.031). From focus group

discussion findings found that lack of information given and the duration of information given that not continuously given caused lack of knowledge among female students. Because the previous socialization time was quite long, more than 6 months ago, and there was no additional socialization or education related to anemia and the importance of preventing anemia so the majority of students were not sure about their understanding of anemia. Blood deficiency is a term for anemia that is understood by students. Students do not have an understanding of why anemia can occur. Symptoms of anemia understood by students are dizziness. From previous studies dietary intake recommendations along with nutrition education programs, is essential to reduce anemia among adolescent girls (Ghajari H, Ghaderi N, Valizadeh R., 2016). Regarding the important role of schools in the education area, the implementation of nutrition education programs in schools is the way to intervene in order to enhance nutritional knowledge among students (Glanz K, Rimer Bk, Viswanath k, 2008).

“I explained the first week and then I didn't explain it the next week because I explained it in the first week.” (T-1)

“We educate students and give leaflets. When we educate students to understand, but we are confused whether students really understand or not, we think that senior high school students can already understand the context if given education. But it also seems difficult to ascertain whether students really understand what we always convey related to anemia.” (HW-1)

“When we carry out counseling about anemia, maybe all are present, but not all students want to understand what we are saying. They are there, but almost all students just listen, without wanting to understand, or change habits like drinking iron tablets and changing eating patterns.” We were only given a short amount of time to deliver because the teachers also had their own learning targets in the school so the allocation

of time for health education in schools was very limited. Imagine, within 45-60 minutes given to us for one session, expecting them to understand, want and be able to change behavior seems very unlikely.” (HW-2)

The duration of education program is one of important factor contribute with knowledge of the students related to anemia. From the findings health district officer only 1 time giving anemia education at school at mid-2019. After that they give responsibility to teacher to distribute iron tablets to the female students 1 tablet each week. The teacher admit that she only explain about how to consume iron tablets once at first week program implementation. After that she didn't explain again to the students, because she think that she already explain before. Blood deficiency is a term for anemia that is understood by students. Schoolgirls do not have an understanding of why anemia can occur. Symptoms of anemia understood by schoolgirls are dizziness. But this understanding of dizziness became biased, students stated that dizziness symptoms were not necessarily assumed to be anemia symptoms so that they were overcome by taking headache relief medications. Students feel unsure whether preventing anemia is important because they have not received education about preventing anemia. Students perceived that they might be not at risk because they didn't know exactly the symptoms of anemia, the cause of anemia, and effect of anemia on their health. From this situation we can assure that due to lack of knowledge and duration of information given to the students that makes students didn't take the iron tablets properly. This study findings consistent with previous study findings that shows that the nutrition education intervention for nine sessions (1½ hours weekly) was found to be effective in significantly improving KAP. This finding is consistent with a previous study conducted among adolescents students in India which concluded that ten weeks of nutrition education programme (one hour weekly) led to significant improvements in nutrition

KAP, as well as a decrease in consumption of junk foods (Rani et al., 2013). Moreover, the nutrition education material such as lectures, brochures, and videos in the current study may have contributed to the improvement in knowledge scores among the intervention group. Similar findings were reported among female adolescents and young students (Ruzita, Wan Azdie, & Ismail, 2007; Yusoff, Wan Daud, & Ahmad, 2012).

5.1.5 Attitude towards iron deficiency anemia prevention

Based on quantitative findings even though attitude is not significant but it also linked to the knowledge, and female students who had good attitude tend to practice anemia prevention rather than female students who had poor attitude. However we need to enhance because from the findings female students who had poor attitude was 42.3% nearly 50%. Qualitative findings also found that students had lack of awareness regarding anemia. The students also admit that they didn't enthusiast and lack of initiative to find out what is anemia even from internet. For some students because they feel that they didn't have any symptoms of anemia so they perceived that they were not anemia and they don't need to take iron tablets. As long as they do not feel anemia symptoms such as dizziness they feel they are not affected by anemia so consumption of iron tablets is not necessary.

“Just know the symptoms sis ... people are sometimes confused because they do not know they are anemic or not, whether people who have symptoms of dizziness she is definitely anemic, so people can be difficult to distinguish sis” (S-2)

“I never take medicine Sis, I don't feel that I'm anemic Sis” (S-7)

“Back when I was menstruating I took the medicine because I felt dizzy. I drink about 3-4 tablets sis it has an effect and I don't feel dizzy anymore, but then my stool is black, I told my parents, my parents said that the iron is excess, so I stopped taking it sis .. Now I

am afraid that want to take that medicine again, I'm afraid my stool is black again sis.” (S-3)

Different when there are some students who have the will to drink the iron tablets. Because of the lack of understanding about side effects and how to consume the tablets, the student felt scared and didn't want to consume the iron tablets anymore. After consuming the iron tablets at weekly doses for 3-4 days in a row resulting in black stool. Also there are some students who complain about feeling nauseous and feel like vomiting after taking an iron tablet. Some of the experiences happened with these students resulted in them being reluctant to consume iron tablets again.

The habit of handling the condition of illness in the family at home also affects the willingness of students to take any kind of medicine. Two students said that they were not accustomed to taking medicines while at home. So they objected when they were asked to take iron tablets. The reason is not usual taking any medication coupled with the perception that she was fine because she did not experience any symptoms.

“I rarely take medicine. I can't take medicine. Indeed, I had never been given medicine when I was sick, until now I have never been used to medicine so I gave the anemia medicine to my classmate, usually my friend has less blood so I gave it to her.” (S-1)

“I once checked for hemoglobin and the results were 15 so I felt I didn't need the medicine. I don't usually take drugs, sis. I never take medicine, I also feel that I'm not anemic too sis.” (S-6)

“I used to drink sangobion (one of Iron tablet brand name in Indonesia) sis, if the medicine from the school I was lazy to take, because if at school I did not know sis why we were told to drink it, and also there were no friends in the class who took the drug,

there were discarded. Yes, usually when I'm dizzy during menstruation I was told to drink sangobion (one of Iron tablet brand name in Indonesia) with my parents, after drinking it I don't feel dizzy anymore. Yes I drink sangobion (one of Iron tablet brand name in Indonesia), mom and brother drink sangobion (one of Iron tablet brand name in Indonesia), my mom drinks sangobion (one of Iron tablet brand name in Indonesia), my mom is anemic so it's usually mom who bought sangobion (one of Iron tablet brand name in Indonesia) for us.” (S-5)

Habits at home also contribute to the consumption of female iron tablets. There is a student who states that she consumes sangobion (one of Iron tablet brand name in Indonesia) routinely during menstruation because at home she is accustomed to consuming sangobion (one of Iron tablet brand name in Indonesia). Sangobion (one of Iron tablet brand name in Indonesia) is always provided by her mother at home, with mothers who often suffer from anemia so her mother asks her and her sister to take Sangobion (one of Iron tablet brand name in Indonesia) during menstruation. The habit of taking the iron tablet with the Sangobion (one of Iron tablet brand name in Indonesia) is always done in her family. But when asked if she took iron tablets given by the teacher at school, she said that she was lazy, did not feel convinced because she did not understand why they were suddenly asked to take iron tablets at school.

5.1.6 Reasons for not practicing iron deficiency anemia prevention

Top three the reasons of respondents not practicing anemia prevention were feeling nausea after taking iron tablet (32.3%), don't like the smell and color of iron tablets (21.6%), and don't know the benefit of practice anemia prevention (19.1%). Followed by anemia prevention is not important (16.0%), and lack of parent's support (11.0%). These quantitative linked with

qualitative findings found that three influencing factors that contributed female students not practicing anemia prevention such as feeling nausea after taking iron tablet, don't know the benefit of practice anemia prevention, and perceived that anemia prevention is not important.

Indicators of the success of the anemia program in schools so far have only relied on the results of blood samples before and after the iron tablet intervention. The program is said to be successful if the proportion of anemic students after getting an iron tablet intervention decreases compared to before getting an iron tablet intervention. But it seems there are things that still need to be considered from the implementation of this anemia reduction program. The provision of iron tablets on a regular basis without being balanced with the provision of education about anemia routinely and comprehensively is something that needs to be improved from the iron tablet delivery program at schools.

Side effect and not understand about the benefit was mentioned by female students several times. The implementation of the iron tablet program in schools still needs to be evaluated. Giving tablets without accompanied by massive information about anemia makes students feel unconvinced. They hope that they know more about the tablets that are given, as well as what benefits will be obtained when they consume these tablets.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study objectives was to determine the proportion of practice on Iron deficiency anemia prevention among high school female students, to assess the general characteristics, knowledge level, and attitude level toward practice on Iron deficiency anemia prevention among high school female students, to identify association between general characteristics, knowledge level, and attitude level with practice on Iron deficiency anemia prevention among high school female students, and to explore the reasons for practice and non-practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia. The study population was 359 senior high school female students age range 15-18 years old from 3 senior high schools in Banjarmasin, Indonesia.

Out of 359 participants, 193 (53.8%) had good practice on anemia prevention and 166 (46.2%) had poor practice on anemia prevention. Even though percentage of the good practice is higher than 50% but the percentage of poor practice is nearly 50%. As we can see from the results more than half of respondents 239 (66.6%) never consume iron tablets in past 1 week. More than half of respondents 206 (57.4%) also never consume anthelmintic tablets in past 6 months. The poor practice of taken iron tablets by the female students (66.6%) was caused due to lack of knowledge related on anemia prevention. From focus group discussion female students admit that given the iron tablets every week by the teacher caused confusion, because they did not know why they should always consume iron tablets every week, nor did they know what benefits could be obtained by consuming iron tablets. A half-understanding makes students hesitate to drink iron tablets given by the teacher every week.

Among the 9 predictors, the findings of the study indicated that three predictors showed statistically significant on practice of anemia prevention after holding other variables constant. Older age group of female students (17-18 years old) was 1.605 times more likely to practice anemia prevention than younger age group of female students (15-16 years old). Female students at public school were 45% less likely to practice anemia prevention than female students at vocational school. As the knowledge increased, the practice of anemia prevention will increase 6%.

As the increase of knowledge among female students affected the more practice of anemia prevention in quantitative study, it was consistent with qualitative study. From focus group discussion findings found that lack of information given and the duration of information given that not continuously given caused lack of knowledge among female students. Because the previous socialization time was quite long, more than 6 months ago, and there was no additional socialization or education related to anemia and the importance of preventing anemia so the majority of students were not sure about their understanding of anemia. Blood deficiency is a term for anemia that is understood by students. Students do not have an understanding of why anemia can occur. Symptoms of anemia understood by students are dizziness. But this understanding of dizziness became biased, students stated that dizziness symptoms were not necessarily assumed to be anemia symptoms so that they were overcome by taking headache relief medications. Students feel unsure whether preventing anemia is important because they have not received education about preventing anemia. Students perceived that they might be not at risk because they didn't know exactly the symptoms of anemia, the cause of anemia, and effect of anemia on their health. From this situation we can assure that due to lack of knowledge and duration of information given to the students that makes students didn't take the iron tablets properly.

Based on quantitative findings even though attitude is not significant but it also linked to the knowledge, and female students who had good attitude tend to practice anemia prevention rather than female students who had poor attitude. However we need to enhance because from the findings female students who had poor attitude was 42.3% nearly 50%. Qualitative findings also found that students had lack of awareness regarding anemia. The students also admit that they didn't enthusiast and lack of initiative to find out what is anemia even from internet. For some students because they feel that they didn't have any symptoms of anemia so they perceived that they were not anemia and they don't need to take iron tablets. As long as they do not feel anemia symptoms such as dizziness they feel they are not affected by anemia so consumption of iron tablets is not necessary.

Top three the reasons of respondents not practicing anemia prevention were feeling nausea after taking iron tablet (32.3%), don't like the smell and color of iron tablets (21.6%), and don't know the benefit of practice anemia prevention (19.1%). Followed by anemia prevention is not important (16.0%), and lack of parent's support (11.0%). These quantitative linked with qualitative findings found that three influencing factors that contributed female students not practicing anemia prevention such as feeling nausea after taking iron tablet, don't know the benefit of practice anemia prevention, and perceived that anemia prevention is not important.

Indicators of the success of the anemia program in schools so far have only relied on the results of blood samples before and after the iron tablet intervention. The program is said to be successful if the proportion of anemic students after getting an iron tablet intervention decreases compared to before getting an iron tablet intervention. But it seems there are things that still need to be considered from the implementation of this anemia reduction program. The provision of iron tablets on a regular basis without being balanced with the provision of education about

anemia routinely and comprehensively is something that needs to be improved from the iron tablet delivery program at schools.

From this study mixed-method findings found that knowledge is the important factor to increase practice of anemia prevention among female students. Side effect of iron tablets such as nausea and not understand about the benefit taking iron tablets were mentioned by female students several times. The implementation of the iron tablet program in schools still needs to be evaluated. Giving tablets without accompanied by continuously information about anemia makes students feel unconvinced. They hope that they know more about the tablets that are given, as well as what benefits will be obtained when they consume these tablets.

6.2 Recommendation

This study objectives was to determine the proportion of practice on Iron deficiency anemia prevention among high school female students, to assess the general characteristics, knowledge level, and attitude level toward practice on Iron deficiency anemia prevention among high school female students, to identify association between general characteristics, knowledge level, and attitude level with practice on Iron deficiency anemia prevention among high school female students, and to explore the reasons for practice and non-practice on Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia.

This study results should be important information for local government and schools to conduct suitable programs to increase female student knowledge, attitude, and practice on anemia prevention.

6.2.1 Recommendation for Program Implementation

<u>Recommendation points</u>	<u>Plan of actions</u>
<p>Emphasize female student's knowledge and awareness through continuous education program</p>	<ol style="list-style-type: none"> 1. The students expect to get information related to anemia. Increase the frequencies of education program by health officer from 1 time per year to at least 3 times per semester. 2. The information related: 1) what is anemia cause, anemia symptom, anemia prevention; 2) what is the benefit of taking iron tablets; 3) what is the side effect of iron tablet and how to reduce the side effect; 4) what kind of food and fruits that contains high iron and good to consume; 5) side effect of consuming tea/coffee on iron absorption; 6) the important to hygiene practice to prevent anemia; 6) anthelmintic tablet consumption regularly are important to deliver to the students should be given to the female students continuously 3. To increase students enthusiasm during anemia education program. Health officer could make attractive video related anemia. Make some rewards or quizzes that can develop student's enthusiasm on education program.
<p>Narrow the gap between health officer and teachers/head of school</p>	<ol style="list-style-type: none"> 1. Having routine coordination regarding anemia reduction program at least 2 times per semester. 2. To reduce teacher burden on monitoring and evaluation. Health officer can make weekly online form. Student can access and fill the form to make sure they consume iron tablet 3. From the results found that 45-60 minutes per session for several months is not enough to educate the students. Provincial health office can collaborate to make the events or education program every two months at schools. The duration of events range 60-90 minutes.

Iron tablet quality	<ol style="list-style-type: none"> 1. Ministry of health should be consider about iron tablet quality. And solve the problem that iron tablets taking make students feel nausea. 2. If the iron tablets could not switch to the better one, Ministry of health should find the way to solve the side effect so it can convince the students to taking it properly without feeling scared of the side effect
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6.2.2 Recommendation for Future Research

1. Future research should study about what kind of interactive activities that can involve in Iron deficiency anemia education program.
2. Future research should study about the kind of Iron deficiency anemia education program in new normal situation.
3. Tele-interview via video call can be as solution to build rapport between researcher and participants during new normal condition when researcher difficult to conduct face to face interview.

6.3 Limitations of the study

In covid-19 situation we face many challenges, include the way to run data collection for research. Normally we conduct face to face interview for data collection and permission process. However, this study can switch data collection methods from face to face interview into online survey and tele-interview. The difficulties when we conduct the online survey is we should wait for the responses that couldn't complete faster than face to face interview. However, good management and good coordination to the teacher and leader of each class is really important. The point is we should follow up the response, and contact the key person regularly 1 time per week.

The same with qualitative study, normally we conduct face to face interview and build a good rapport with informants. However tele-interview by video call is also good in this new normal situation. By video call researcher can see participants face expression and build a rapport whether the feelings between real face to face and virtual face to face is quite different. We also face challenge because female students feel shy and not confident to join tele-interview. However 4 informants in 1 focus group discussion is enough to make the interview process run well. In new normal situation, we also need to learn tele-interview techniques, to find the way how to make participants feel comfortable and convenient in discussion.



APPENDIX

Appendix 1: IOC Content Validity Results

SECTION 1: RESPONDENT CHARACTERISTICS				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
1. What is your age in completed year?	1	1	1	1
2. What is your current class/grade?	1	1	1	1 We will add one more question (3) Grade 12
3. Household income every month	1	0	1	0.6
4. What is your type of school?	1	1	1	1
5. What is your father education?	1	0	1	0.6 We will change into two answers: > Bachelor degree < Bachelor degree
6. What is your mother education?	1	0	1	0.6 We will change into two answers: > Bachelor degree < Bachelor degree
7. Do you have history of anemia problem	1	1	1	1
8. Do your family (mother, grandmother, sister) ever have history of anemia	1	1	0	0.6

SECTION 2: SOURCE OF INFORMATION REGARDING ANEMIA				
choose the answer by filling yes or no in the box provided				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
9. Please rank and choose only 3 the source of information that provides you information regarding anemia in the past 1 year? (You should rank your choice from 1 to 3, please put the number 1-3 at the left side of box you choose)	1	1	1	1
10. What kind of information you get about (applies to questions number 10.1-): understanding about anemia				
10.1 Causes of iron deficiency anemia				
10.2 Symptoms of iron deficiency anemia	1	1	1	1
10.3 The effects of iron deficiency anemia on health	1	1	1	1
10.4 How to prevent iron deficiency anemia	1	1	1	1

SECTION 3: KNOWLEDGE REGARDING ANEMIA				
Questions	Score			Total score
	1 st expert	2 nd expert	3 rd expert	
11. Iron deficiency anemia is the condition of the body have the red blood concentration lower than normal	1	1	1	1
12. Iron is needed for human body growth especially for fetus and small children	1	1	1	1
13. Iron is important for red blood cells	1	1	1	1
14. Anemia condition will make the body absorb less for iron	1	1	1	1
15. Anemia mostly in male	1	1	1	1
16. Female adolescent need more iron than general people	1	1	1	1
17. Hookworm infestation is one of the cause of iron deficiency	1	1	1	1

SECTION 3: KNOWLEDGE REGARDING ANEMIA				
Questions	Score			Total score
	1 st expert	2 nd expert	3 rd expert	
18. Female lose iron when period	1	1	1	1
19. Body will get tired easily is a symptom of iron deficiency	1	1	1	1
20. Dizzy is a symptom of iron deficiency anemia	1	1	1	1
21. Fatigue is a symptom of iron deficiency anemia	1	1	1	1
22. Shortness breath and heart palpitation is a symptom of anemia	1	1	1	1
23. Flat nail or bend like a spoon is a symptom of iron deficiency anemia	1	1	1	1
24. Cold hands and feet is a symptom of iron deficiency anemia	1	1	0	0.6
25. When the body have Iron deficiency anemia it will cause loss concentration in study	1	1	1	1
26. When the body have Iron deficiency anemia it will cause low immunity	1	1	1	1
27. When the body have Iron deficiency anemia it will cause slow process of thinking	1	1	1	1
28. When the body have Iron deficiency anemia it will cause poor growth and development in childhood	1	1	1	1
29. Vegetarian food help support iron production	1	1	1	1
30. Red meat contains low iron	1	1	1	1
31. Liver is food enrich of iron	1	1	1	1
32. If you eat Vitamin C and Vitamin A-enriched fruit such as orange, papaya, guava and strawberries after meal immediately it will reduce absorption of iron from food	0	1	1	0.6 We add example type of fruit orange, papaya, guava and strawberries

SECTION 3: KNOWLEDGE REGARDING ANEMIA				
Questions	Score			Total score
	1 st expert	2 nd expert	3 rd expert	
33. If you drinking tea/coffee after meal immediately it will Reduce absorption of iron from gut	1	1	1	1
34. If you always do hand washing with soap properly it can prevent infection from contamination	1	1	1	1
35. If you always no bare feet it can prevent iron deficiency anemia due to hookworm	1	1	1	1
36. If you take stool exam and Anti-helminth tablet annually it can prevent iron deficiency anemia	1	1	1	1
37. If you take Iron tablets properly it can overcome iron deficiency anemia	1	1	1	1
38. Source of proteins such as fish and eggs are foods that contains high iron	1	1	1	1
39. Green leaves vegetables contains low iron	1	1	1	1

SECTION 4: ATTITUDE TOWARDS PRACTICE OF ANEMIA PREVENTION				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
40. I believe that Iron deficiency anemia is the preventable disease	1	1	1	1
41. I believe that Iron deficiency anemia can kill	1	0	1	0 We cut this question
42. I believe that Iron deficiency anemia can be treated with food	1	1	1	1
43. I think that Iron deficiency anemia effect all of the system in our body	1	1	1	1
44. In my opinion Male have more chance to have Iron deficiency anemia than female	1	1	1	1
45. In my opinion Iron deficiency anemia will happen	1	0	1	0.6

SECTION 4: ATTITUDE TOWARDS PRACTICE OF ANEMIA PREVENTION				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
to weak body only				
46. I don't think that Iron deficiency anemia will make us get tired easily	1	1	1	1
47. I don't think that Iron deficiency anemia will make immunity lower and have a chance to get infected easily	1	1	1	1
48. I believe that eating chicken liver can prevent from getting Iron deficiency anemia	1	1	1	1
49. I believe that eating red meat a lot can prevent Iron deficiency anemia	1	1	1	1
50. I think that drinking juice such as orange juice after meal will help the absorption of iron from food	1	1	1	1
51. I don't think that drinking coffee or tea will help increase the absorption of iron from food	1	1	1	1
52. In my opinion eating sweet dessert after meal will help increase the absorption of iron from food	1	1	1	1
53. I believe that taking iron tablets can prevent Iron deficiency anemia	1	1	1	1

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SECTION 5: PRACTICE OF ANEMIA PREVENTION				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
For this part you can choose one answer (never/sometimes/often). You can choose "often" if you (do 3-4 day a week) You can choose "sometimes" if you (do 1-2 day a week) and You can choose "never" if you (not doing anything = 0 day)				
54. For the past 2 weeks I eat food three times everyday	1	1	0	0.6

SECTION 5: PRACTICE OF ANEMIA PREVENTION				
Questions	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
<p>For this part you can choose one answer (never/sometimes/often).</p> <p>You can choose “often” if you (do 3-4 day a week)</p> <p>You can choose “sometimes” if you (do 1-2 day a week) and</p> <p>You can choose “never” if you (not doing anything = 0 day)</p>				
55. For the past 2 weeks I skipped breakfast more than 6 times	±	0	0	0.3 We cut this question
56. For the past 1 month, I eat iron rich food, for example, red meat , liver , organs at least 1-2 times per week	1	0	1	0.6
57. For the past 1 month I eat chicken liver at least 1-2 times per week	1	0	1	0.6
58. For the past 1 month I eat Egg yolk at least 1-2 times per week	1	0	1	0.6
59. For the past 1 month I eat green vegetables such as spinach at least 1-2 times per week	1	0	1	0.6
60. For the past 2 weeks I drink coffee/tea after meal at least 3-4 times per week	1	0	1	0.6
61. I take iron tablets past 1 week	1	1	1	1
62. For the past 1 month I always keep nails clean	1	1	1	1
63. For the past 1 month I always use soap to wash my hands after defecation	1	1	1	1
64. I don't do open defecation	1	1	1	1
65. I don't walk bare feet outside.	1	1	1	1
66. I take anthelmintic tablets past 6 months	1	1	1	1

SECTION 6: REASONS FOR PRACTICING ANEMIA PREVENTION	Score			Total Score
	1 st expert	2 nd expert	3 rd expert	
<p>67. Do you think what are the reasons that most influences you for not practicing anemia prevention? Please choose and rank (1 to 3) of reasons below:</p> <p>1= the 1st most influential reason 2= the 2nd most influential reason 3= the 3rd most influential reason</p> <p>For not practicing anemia</p> <p>Rank:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lack of parents support <input type="checkbox"/> I don't know about the benefits of preventing anemia <input type="checkbox"/> I think preventing anemia doesn't really matter <input checked="" type="checkbox"/> I did not get information related to anemia <input type="checkbox"/> I don't like the smell or color of iron tablets <input type="checkbox"/> I feel nausea every time I take iron tablets <input checked="" type="checkbox"/> I can't buy an iron tablet with my own money 	1	1	1	<p>1</p> <p>Cut this statement</p> <p>Cut this statement</p>

Appendix 2: Information Sheet and Consent Form for Quantitative Study and Structured Questionnaires

Title of research project: “Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School Female Student in Banjarmasin City, Indonesia state: A Mixed Method Study”

Principal researcher’s name: Ms. Lafi Munira **Position:** Master’s Degree Student

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This study aimed to assess knowledge, attitude, and practice toward Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia state. The study requires 333 participants who are female students in grade 10, grade 11, and grade 12 in Senior High School in Banjarmasin City and age \geq 15-18 years old. Participants who have total study period in the school less than 6 months will excluded from the study. The data would be collected from Monday to Sunday from 09.00 am until 07.00 pm. The researcher targeted 45-50 participants per day, who fulfilled the inclusion criteria to be answered the questions in online form about 15-20 minutes.

This study has no risk/harm procedure which may cause ill effect to physical, mental, social, economic, and belief of participants. Also, all information related directly to participant will be kept confidential and all information will be deleted after completion of the study. The participants in this study is voluntary and has the right to deny and/or withdraw from the study at any time, no need to give any reason, and there will be no bad impact upon the participants. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. I am not expecting you to give a specific answer; I would like you to answer questions honestly, telling me about what you know, how you feel, the way you live your daily life. Feel free to answer questions at your own pace. If you have any question or would like to obtain more information, the researcher can be reached at all time.

After received the explanation regarding the research goals and objectives as well as understand it fully, thereupon I state to voluntarily participate as the subject of study. Thus, this statement was made with my full concern without any duress of any parties. I have read details in participant information sheet and consent form and I have been informed and explained about rationale/objective(s), research procedures, and risk and benefit of research project by researcher. I clearly understand with satisfaction and willing agree participate in this research project and give consent the researcher by signature.

Sign.....

(.....)

Principal investigator

Sign.....

(.....)

Research participant

Banjarmasin,2020

Statement Maker

Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High

School Female Student in Banjarmasin City, Indonesia: A Mixed Method Study

Structured Questionnaires

Interview Date:/2020

School ID:

Whatsapp/Line:

SECTION 1: RESPONDENT CHARACTERISTICS	
Questions	Answer
1. What is your age in completed year? Year of age
2. What is your current class/grade?	<input type="checkbox"/> (1) Grade 10 <input type="checkbox"/> (2) Grade 11 <input type="checkbox"/> (3) Grade 12
3. Household income every month	<input type="checkbox"/> (1) Rp. < 2,500,000,- <input type="checkbox"/> (2) Rp. ≥ 2.500,000
4. What is your type of school?	<input type="checkbox"/> (1) Non-Vocational School <input type="checkbox"/> (2) Vocational School
5. What is your father education?	<input type="checkbox"/> < Bachelor Degree <input type="checkbox"/> ≥ Bachelor Degree
6. What is your mother education?	<input type="checkbox"/> < Bachelor Degree <input type="checkbox"/> ≥ Bachelor Degree
7. Do you have history of anemia problem	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
8. Do your family (mother, grandmother, sister) ever have history of anemia	<input type="checkbox"/> Yes <input type="checkbox"/> No

	<input type="checkbox"/> Don't know
--	-------------------------------------

SECTION 2: SOURCE OF INFORMATION REGARDING ANEMIA	
choose the answer by filling yes or no in the box provided	
Questions	Answer
9. Please rank and choose only 3 the source of information that provides you information regarding anemia in the past 1 year? (You should rank your choice from 1 to 3, please put the number 1-3 at the left side of box you choose)	Rank (1 to 3) <input type="checkbox"/> (1) Parents <input type="checkbox"/> (2) Teacher <input type="checkbox"/> (3) Health worker <input type="checkbox"/> (4) Internet sources <input type="checkbox"/> (5) Peer
10. What kind of information you get about (applies to questions number 10.1-): understanding about anemia	
10.1 Causes of iron deficiency anemia	<input type="checkbox"/> (1) Yes <input type="checkbox"/> (2) No <input type="checkbox"/> (3) Not sure
10.2 Symptoms of iron deficiency anemia	<input type="checkbox"/> (1) Yes <input type="checkbox"/> (2) No <input type="checkbox"/> (3) Not sure
10.3 The effects of iron deficiency anemia on health	<input type="checkbox"/> (1) Yes <input type="checkbox"/> (2) No <input type="checkbox"/> (3) Not Sure
10.4 How to prevent iron deficiency anemia	<input type="checkbox"/> (1) Yes <input type="checkbox"/> (2) No <input type="checkbox"/> (3) Not Sure

SECTION 3: KNOWLEDGE REGARDING ANEMIA			
Questions	Answer		
	Yes	No	Not Sure
11. Iron deficiency anemia is the condition of the body have the red blood concentration lower than normal			
12. Iron is needed for human body growth especially for fetus and small children			
13. Iron is important for red blood cells			
14. Anemia condition will make the body absorb less for iron			
15. Anemia mostly in male			
16. Female adolescent need more iron than general people			
17. Hookworm infestation is one of the cause of iron deficiency			
18. Female lose iron when period			
19. Body will get tired easily is a symptom of iron deficiency			
20. Dizzy is a symptom of iron deficiency anemia			
21. Fatigue is a symptom of iron deficiency anemia			
22. Shortness breath and heart palpitation is a symptom of anemia			
23. Flat nail or bend like a spoon is a symptom of iron deficiency anemia			
24. Cold hands and feet is a symptom of iron deficiency anemia			
25. When the body have Iron deficiency anemia it will cause loss concentration in study			
26. When the body have Iron deficiency anemia it will cause low immunity			
27. When the body have Iron deficiency anemia it will cause slow process of thinking			
28. When the body have Iron deficiency anemia it will cause poor growth and development in childhood			
29. Vegetarian food help support iron production			
30. Red meat contains low iron			
31. Liver is food enrich of iron			
32. If you eat Vitamin C and Vitamin A-enriched fruit such as orange, papaya, guava and strawberries after meal immediately it will reduce absorption of iron from food			
33. If you drinking tea/coffee after meal immediately it will Reduce			

SECTION 3: KNOWLEDGE REGARDING ANEMIA			
Questions	Answer		
	Yes	No	Not Sure
absorption of iron from gut			
34. If you always do hand washing with soap properly it can prevent infection from contamination			
35. If you always no bare feet it can prevent iron deficiency anemia due to hookworm			
36. If you take stool exam and Anti-helminth tablet annually it can prevent iron deficiency anemia			
37. If you take Iron tablets properly it can overcome iron deficiency anemia			
38. Source of proteins such as fish and eggs are foods that contains high iron			
39. Green leaves vegetables contains low iron			

SECTION 4: ATTITUDE TOWARDS PRACTICE OF ANEMIA PREVENTION					
Questions	Answer				
	Strongly disagree	Not agree	Not sure	Agree	Strongly agree
40. I believe that Iron deficiency anemia is the preventable disease					
41. I believe that Iron deficiency anemia can be treated with food					
42. I think that Iron deficiency anemia effect all of the system in our body					
43. In my opinion Male have more chance to have Iron deficiency anemia than female					
44. In my opinion Iron deficiency anemia will happen to weak body only					
45. I don't think that Iron deficiency anemia will make us get tired easily					
46. I don't think that Iron deficiency anemia					

SECTION 4: ATTITUDE TOWARDS PRACTICE OF ANEMIA PREVENTION					
Questions	Answer				
	Strongly disagree	Not agree	Not sure	Agree	Strongly agree
will make immunity lower and have a chance to get infected easily					
47. I believe that eating chicken liver can prevent from getting Iron deficiency anemia					
48. I believe that eating red meat a lot can prevent Iron deficiency anemia					
49. I think that drinking juice such as orange juice after meal will help the absorption of iron from food					
50. I don't think that drinking coffee or tea will help increase the absorption of iron from food					
51. In my opinion eating sweet dessert after meal will help increase the absorption of iron from food					
52. I believe that taking iron tablets can prevent Iron deficiency anemia					

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SECTION 5: PRACTICE OF ANEMIA PREVENTION			
Questions	Answer		
	Never	Sometimes	Often
For this part you can choose one answer (never/sometimes/often). You can choose "often" if you (do 3-4 day a week) You can choose "sometimes" if you (do 1-2 day a week) and You can choose "never" if you (not doing anything = 0 day)			
53. For the past 2 weeks I eat food three times everyday			
54. For the past 1 month, I eat iron rich food, for example, red meat , liver , organs at least 1-2 times per week			
55. For the past 1 month I eat chicken liver at least 1-2 times per week			

SECTION 5: PRACTICE OF ANEMIA PREVENTION			
Questions	Answer		
	Never	Sometimes	Often
For this part you can choose one answer (never/sometimes/often). You can choose "often" if you (do 3-4 day a week) You can choose "sometimes" if you (do 1-2 day a week) and You can choose "never" if you (not doing anything = 0 day)			
56. For the past 1 month I eat Egg yolk at least 1-2 times per week			
57. For the past 1 month I eat green vegetables such as spinach at least 1-2 times per week			
58. For the past 2 weeks I drink coffee/tea after meal at least 3-4 times per week			
59. I take iron tablets past 1 week			
60. For the past 1 month I always keep nails clean			
61. For the past 1 month I always use soap to wash my hands after defecation			
62. I don't do open defecation			
63. I don't walk bare feet outside.			
64. I take anthelmintic tablets past 6 months			

SECTION 6: REASONS FOR PRACTICING ANEMIA PREVENTION
<p>65. Do you think what are the reasons that most influences you for not practicing anemia prevention? Please choose and rank (1 to 3) of reasons below:</p> <p>1= the 1st most influential reason 2= the 2nd most influential reason 3= the 3rd most influential reason</p> <p>For not practicing anemia</p> <p>Rank:</p> <p><input type="checkbox"/> Lack of parents support</p> <p><input type="checkbox"/> I don't know about the benefits of preventing anemia</p> <p><input type="checkbox"/> I think preventing anemia doesn't really matter</p> <p><input type="checkbox"/> I don't like the smell or color of iron tablets</p> <p><input type="checkbox"/> I feel nausea every time I take iron tablets</p>

Appendix 3: Consent Form for Qualitative Study and Focus Group Discussion Guidelines

Title of research project: “Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School Female Student in Banjarmasin City, Indonesia state: A Mixed Method Study”

Principal researcher’s name: Ms. Lafi Munira Position: Master’s Degree Student

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Telephone (office): +66-2218-8193/ +66-2255-6046 Email: ukhtilafi@gmail.com

This study aimed to assess knowledge, attitude, and practice toward Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia state. The study requires 12-24 participants who are female students in grade 10, grade 11, and grade 12 in Senior High School in Banjarmasin City and age \geq 15-18 years old. Participants who have total study period in the school less than 6 months will be excluded from the study. The data would be collected from Monday to Sunday around 10.00 am until 12.00 am. The researcher targeted 6 participants per day, who fulfilled the inclusion criteria to be interviewed in focus group discussion via Skype/Hangouts/Zoom application about 50-60 minutes.

This study has no risk/harm procedure which may cause ill effect to physical, mental, social, economic, and belief of participants. Also, all information related directly to participant will be kept confidential and all information will be deleted after completion of the study. The participants in this study is voluntary and has the right to deny and/or withdraw from the study at any time, no need to give any reason, and there will be no bad impact upon the participants. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. I am not expecting you to give a specific answer; I would like you to answer questions honestly, telling me about what you know, how you feel, the way you live your daily life. Feel free to answer questions at your own pace. If you have any question or would like to obtain more information, the researcher can be reached at all time.

After received the explanation regarding the research goals and objectives as well as understand it fully, thereupon I state to voluntarily participate as the subject of study. Thus, this statement was made with my full concern without any duress of any parties. I have read details in participant information sheet and consent form and I have been informed and explained about rationale/objective(s), research procedures, and risk and benefit of research project by researcher. I clearly understand with satisfaction and willing agree participate in this research project and give consent the researcher by signature.

Sign..... Sign.....

(.....)

Principal investigator

(.....)

Research participant

Banjarmasin, 2020

Statement Maker

Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School

Female Student in Banjarmasin City, Indonesia: A Mixed Method Study

Focus Group Discussion Guidelines

1. Did you get information about anemia in the past 6 months?, Where do you get anemia information?, Probing: What do think after get information, please explain?, Probing: Do you feel get some benefits from information you have got, please explain?
2. Have you ever heard about anemia?, What is it, could you explain?
3. What do you think of anemia causes, please explain?
4. What do you think of anemia symptoms, please explain?
5. What do you think of anemia effects on health, please explain?
6. Do you think is it important to prevent anemia?, How is your suggestions to prevent anemia, what to do, can you explain?,
7. Do you know about iron tablets, what is it, can you explain?
8. Have you ever take iron tablets?, if yes why, if no why?, Probing: How is it, is it good or not, how about the taste and your feeling after take it?
9. What do you think about iron tablets, is it important, can you explain?
10. Do your school have anemia prevention program? How is it, can you explain?
11. What is your expectation about the anemia prevention programs at your school?

Appendix 4: Information Sheet and Consent Form for Teachers and In-Depth Interview Guidelines

Title of research project: “Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School Female Student in Banjarmasin City, Indonesia: A Mixed Method Study”

Principal researcher’s name: Ms. Lafi Munira Position: Master’s Degree Student

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This study aimed to assess knowledge, attitude, and practice toward Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia state. The study requires 3-4 teachers who are have responsibilities related anemia prevention program at Senior High School in Banjarmasin City. The data would be collected from Monday to Friday around 10.00 am until 12.00 am. The researcher targeted 1-2 participant per day, who fulfilled the inclusion criteria to be in-depth interviewed via Skype/Hangouts/Zoom application about 20-30 minutes.

This study has no risk/harm procedure which may cause ill effect to physical, mental, social, economic, and belief of participants. Also, all information related directly to participant will be kept confidential and all information will be deleted after completion of the study. The participants in this study is voluntary and has the right to deny and/or withdraw from the study at any time, no need to give any reason, and there will be no bad impact upon the participants. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. I am not expecting you to give a specific answer; I would like you to answer questions honestly, telling me about what you know, how you feel, the way you live your daily life. Feel free to answer questions at your own pace. If you have any question or would like to obtain more information, the researcher can be reached at all time.

After received the explanation regarding the research goals and objectives as well as understand it fully, thereupon I state to voluntarily participate as the subject of study. Thus, this statement was made with my full concern without any duress of any parties. I have read details in participant information sheet and consent form and I have been informed and explained about rationale/objective(s), research procedures, and risk and benefit of research project by researcher. I clearly understand with satisfaction and willing agree participate in this research project and give consent the researcher by signature.

Sign..... Sign.....

(.....)

Principal investigator (.....)

Research participant

Banjarmasin, 2020

Statement Maker

Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School

Female Student in Banjarmasin City, Indonesia: A Mixed Method Study

In-depth Interview Guidelines

1. Did you give information to your students about anemia in the past 6 months, Probing: What do think about this information, please explain?, Probing: Do you think that students get some benefits from information you have given?, How do you think about it? please explain?
2. Do you think anemia is one of health problem among female students in your school, why?
3. Do you think your students ever severe anemia these several months, if yes why it's happened, if no why?
4. Do your school have anemia prevention program for the students? How is it run so far, can you explain? Do you have any barrier or obstacles during run the program? Could you explain about this?
5. Do you think that students can practice anemia prevention by them self?, why?
6. Did you expect health district helps you to run anemia prevention program at school?, Probing: what kind of help that you expect that the health district will provide? Why?
7. Did health district have monitoring and evaluation regarding anemia prevention program in your school?, how is it?. Probing: what is the weakness of health district program regarding anemia prevention program at school?, Do you have suggestion to enhance or solution to this weakness?
8. What do you think about quality of iron tablets provided by health district?, How is it?, Do you ever get complain from the students regarding side effect of iron tablets?

Appendix 5: Information Sheet and Consent Form for Health District Officer & In-depth interview guidelines

Title of research project: "Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School Female Student in Banjarmasin City, Indonesia: A Mixed Method Study"

Principal researcher's name: Ms. Lafi Munira Position: Master's Degree Student

Office address: College of Public Health Sciences, Chulalongkorn University, Institute building 3 (10th-11th floor), Chulalongkorn Soi 62, Phyathai road, Bangkok 10330, Thailand

Telephone (office): +66-2218-8193/ +66-2255-6046 Email: ukhtilafi@gmail.com

This study aimed to assess knowledge, attitude, and practice toward Iron deficiency anemia prevention among high school female students in Banjarmasin city, Indonesia state. The study requires 2 health district officer who have responsibilities in anemia prevention program among female students in Banjarmasin District. The data would be collected from Monday to Friday around 10.00 am until 12.00 am. The researcher targeted 2 participants per day, who fulfilled the inclusion criteria to be interviewed in focus group discussion via Skype/Hangouts/Zoom application about 50-60 minutes.

This study has no risk/harm procedure which may cause ill effect to physical, mental, social, economic, and belief of participants. Also, all information related directly to participant will be kept confidential and all information will be deleted after completion of the study. The participants in this study is voluntary and has the right to deny and/or withdraw from the study at any time, no need to give any reason, and there will be no bad impact upon the participants. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. I am not expecting you to give a specific answer; I would like you to answer questions honestly, telling me about what you know, how you feel, the way you live your daily life. Feel free to answer questions at your own pace. If you have any question or would like to obtain more information, the researcher can be reached at all time.

After received the explanation regarding the research goals and objectives as well as understand it fully, thereupon I state to voluntarily participate as the subject of study. Thus, this statement was made with my full concern without any duress of any parties. I have read details in participant information sheet and consent form and I have been informed and explained about rationale/objective(s), research procedures, and risk and benefit of research project by researcher. I clearly understand with satisfaction and willing agree participate in this research project and give consent the researcher by signature.

Sign..... Sign.....

(.....)

Principal investigator (.....)

Research participant

Banjarmasin, 2020

Statement Maker

Knowledge and Attitude on Practice of Iron Deficiency Anemia Prevention among High School

Female Student in Banjarmasin City, Indonesia: A Mixed Method Study

In-depth Interview Guidelines For Health Officer

1. Did you give information towards students in school A, B, and C about anemia in the past 6 months, Probing: What do think about this information, please explain?, Probing: Do you think that students get some benefits from information you have given, please explain?
2. Do your health district have anemia prevention program for the students? How is it run so far, can you explain? Do you have any barrier or obstacles during run the program? Could you explain about this?
3. Did you expect school helps you to run anemia prevention program at school?, Probing: what kind of help that you expect that the school will provide? Why?
4. What is your expectation about the anemia prevention programs at school?. What is your opinion this far regarding implementation of anemia prevention program at school?

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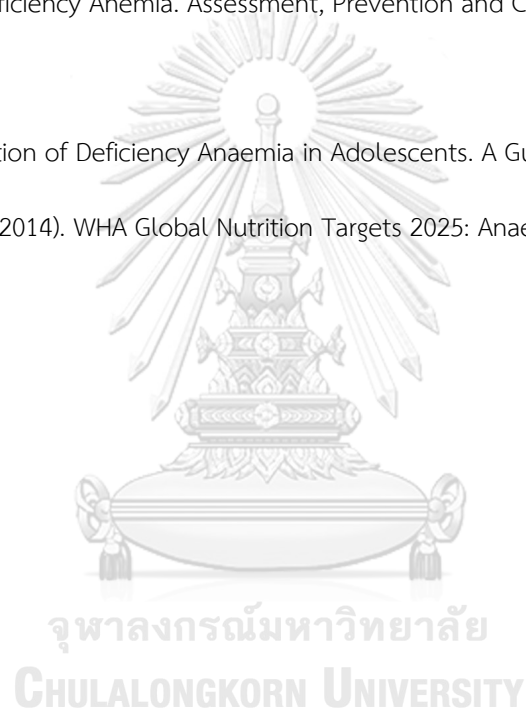
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