

# Knowledge Profile About Anemia and Disparity Among Adolescent 15-24 years in Indonesia - 2012 and 2017

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**Abstract**—Anemia in Indonesia is high. One of two pregnant women suffers from anemia as highest prevalence (85%) was among pregnant women aged 15-24. Maternal anemia are at risk of maternal death and giving birth to premature infant with low birth weight. Among age group 15-24 years, 32% is anemic (both men-women). The prevalence of anemia among women higher than men. The Ministry of Health has determined the consumption of iron tablet as nutrition program among adolescents, but only 8% of female teenagers who received iron tablet. Among adolescents who didn't consume iron tablets, 26% thought that it is unnecessary. The study aims to provide information about the knowledge profile of female adolescents on anemia, and disparity among them in Indonesia. We used the 2012 and 2017 IDHS which was held in all provinces. We analyzed unmarried women aged 15-24 (weighted) descriptively to identify knowledge about anemia from knowledge adolescent reproductive health section. Disparity analysis based on the results of difference percentage of knowledge of anemia according to age group, residence, education level and region. Most female adolescents (77% and 82%) have had heard of anemia. Adolescents who lived in urban areas and aged group 20-24 had higher percentage of having knowledge, and its percentage increased along with the increasing of education. High disparity of knowledge was found by educational background. Highest knowledge of terminology of anemia is blood deficit (69% and 73%). Knowledge of how someone become anemic ranged between 1% and 39%, while more 20% didn't know. Among female adolescent, 94% knew how to treat anemia, as 18% to 63% treated anemia by consuming iron and pills to increase blood. This study indicates that knowledge of female adolescent about anemia still a challenge to reduce prevalence of anemia in Indonesia. Low education as the sub group who need intervention.

**Keywords:** *adolescent health, adolescent nutritional status, anemia, knowledge of anemia, iron tablet consumption*

## I. INTRODUCTION

Anemia is one of nutritional problems in the world, including Indonesia. Anemia is an indicator of health and nutrition. In general, anemia decreases individual well-being.

Basic Health Research (Riskesdas) 2018 reported that the prevalence of anemia in pregnant women Indonesia is 48.9%, meaning that every two pregnant woman has

anemia, and among them, the highest prevalence was the age group of 15-24 years (85%)[1].

The general prevalence of anemia in Indonesia is 24 percent, the highest in the population of under-five (39%) and the age group of 15-24 years, accounting for 32% (both men and women), the prevalence of anemia among women was higher than men [1][2]. During puberty, female adolescents have a high risk of anemia due to the amount of iron deficiency during menstruation. This condition is aggravated if iron intake from food decreases. Young women need iron for growth and development. As they become pregnant women, adolescents who are anemic are at risk of giving birth to low-birth babies which may grow into stunted children.

World Health Organization (WHO) at the 65th World Health Assembly (WHA) brings about an agreement on an action plan and global targets for maternal, infant and child nutrition to reduce 50% the prevalence of anemia at women of reproductive age in 2025. One of recommendation interventions for prevention and control of anemia is early interventions targeting adolescent girls for prevention of iron deficiency anemia[3].

Anemia can be prevented by consumption of meat, fish and liver, also vegetables and fruits. However, the body's ability is limited to absorbing iron, hence it is necessary to consume oral supplementation. Efforts to accelerate the improvement of nutritional status regarding anemia are carried out by giving iron tablets. According to the 2015-2019 Strategic Plan, the Ministry of Health agreed that the provision of oral iron tablets for young women was 10% in 2015 and subsequently reached 30% in 2019[4]. In 2016, The Ministry of Health launch a program to provide the iron supplementation program 1 tablet iron supplement every week in educational institutions for female 12-18 aged and women reproductive age (15-49 years) at work. It calls "TTD Remaja Putri dan WUS"[5].

The 2016 National Health Indicator Survey (Sirkesnas) and the 2018 Riskesdas, collected information about iron supplementation in female adolescents. Among the 7.6% of young women who received supplementation, only 6% of girls who consumed iron tablets and 1.4% of them consumed >+ 52 tablets last year. Young women who

consume iron tablets <52 answered that 52% did not like the taste of the tablets, and 22% felt unnecessary. While Riskesdas 2018 reports reasons why teenagers did not consume the iron tablet, there were 20-40% of young women who answer that they do not feel necessary to consume the iron tablet[6][1]. This indicates that knowledge of adolescents about the iron tablets was still low. The awareness of consuming iron tablets among young women is related with the information and knowledge, because knowledge is a main domain for one's actions.

In theory, knowledge will determine a person's behavior[7]. Marwan O. Jalambo et al, states that the lack of knowledge concerning nutrition is one of the most significant reasons for nutritional problems and consequently, inappropriate practices can lead to numerous complications[8]. The problem of anemia in pregnant women and young women as prospective mothers is closely related to the health status of mothers and newborns. For this reason, relevant data is needed to support program to accelerate the reduction of nutrition problems for mothers, children and adolescents. In addition, the 2012 and 2017 Indonesia Demographic and Health Survey (IDHS) not only collects data for women of childbearing age, but also for unmarried adolescents.

The study aims is to provide information about the knowledge profile of female adolescents about anemia and disparity among them in Indonesia. The information gained in this study is expected to be a database of problem magnitude and identification of the target group as material for planning interventions according to needs.

## II. MATERIALS & METHODS

### A. *Design, sample and setting*

This study used the 2017 and 2012 IDHS which are nationally household survey with a cross sectional design carried out in 34 provinces in Indonesia. Samples of the 2017 and 2012 IDHS covered 49,261 household from 1,970 census blocks (CBs) of urban and rural of 34 provinces. The households were selected using two-stage stratified sampling. At the first stage, numbers of CBs were selected using probability proportional to size (PPS) from the Population Census 2010 based on the wealth index categories. Later, 25 households were selected using systematic sampling method.

All women of reproductive age who lived in selected households are individual samples of IDHS with a range of questions about birth history, family planning knowledge and participation, pregnancy and health checks to postpartum period, child immunization, child health and nutrition, fertility preference and other health issues. Unmarried women aged 15-24 years are individual samples for the adolescents' section (KRR). The adolescent sample of IDHS was asked about knowledge and experience of the reproductive system such as birth control and signs of puberty. The IDHS also collects information for young women's knowledge about anemia [9][10].

### B. *Study population*

The population in this study were all adolescents 15-24 years. This study conducted a secondary data analysis of

IDHS specifically for adolescent health with subset of young women 15-24 obtained from the website <http://sdki.bkkbn.go.id>

### C. *Measure*

This study measured adolescent knowledge about anemia which include having heard of anemia, knowledge of the terminology of anemia, knowledge of how someone becomes anemic and how to treat anemia. Knowledge about anemia is expressed as a percentage and breakdown according to demographic characteristics such as education, place of residence, region, age group. This study used two datasets of the 2012 and 2017 IDHS. Each dataset comprises of 8,902 adolescents (2012 IDHS data) and 10,690 (2017 IDHS data). The study also conducted a special gap analysis of adolescent knowledge about anemia as measured by comparing the percentage between two subgroups. Inequality analysis used simple measure difference.

### D. *Data analysis*

Descriptive statistics were used to summarize the characteristics of the study samples. Categorical variables were summarized using their associated percentages. The data were analyzed using STATA SE version 15.1

## III. RESULT

The 2012 and 2017 IDHS data were used to compare knowledge between the two periods of the 2017 and 2012 IDHS. This was to reflect the teenagers' knowledge of anemia before and according to the program of iron supplementation among teenagers. In this study, we also carried out an analysis of disparities to get a glimpse of disadvantaged target groups or a group of adolescents who lack knowledge thus program interventions can be more targeted. Table 1 presents the knowledge of adolescents about anemia and understanding anemia according to those who have heard of it. In general, the percentage of teenagers who have heard about anemia was more than 75% and showed an increase in 2017 (82%) compared to data in 2012 (77%). The differences between the two data has a consistent pattern with all characteristics except the Kalimantan region which shows no difference. The pattern according to the characteristics in general is also the same that age and education affect teenagers' knowledge. The increasing age and level of education, the percentage of people who have heard about anemia is greater, and adolescents in urban areas are higher than in rural areas. Differences vary according to region as the largest percentage is Java-Bali.

Table 1 also shows that the percentage of adolescents who knew the meaning of anemia according to the perceptions of respondents who are asked to those who know about anemia. Among the six notions of anemia, the most term mentioned by young women is a blood deficit. About 5 percent of young women say that anemia is low hemoglobin. Information about the causes of anemia can be the background for the preparation of promotional materials for teenagers.

**TABLE I. PERCENTAGE OF FEMALE ADOLESCENT WHO EVER HEARD ANEMIA AND KNOWLEDGE OF TERMINATION OF ANEMIA, 2012 AND 2017**

Characteristics	Ever heard anemia		Among ever heard anemia; What is anemia?											
			Low Hemo-globine (Hb)		Iron Deficiency		Deficit in red blood		Blood deficit		Vitamin deficiency		Low blood pressure	
	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS
AGE GROUP														
• 15-19	73.1	79.3	3.5	4.0	4.6	7.3	13.7	13.9	65.3	71.5	2.2	4.5	2.4	3.5
• 20-24	86.4	86.6	5.8	7.7	9.5	10.5	16.0	17.4	75.4	75.8	1.8	3.4	3.0	5.5
<i>Disparity</i>	<i>13.2</i>	<i>7.4</i>	<i>2.3</i>	<i>3.7</i>	<i>4.9</i>	<i>3.2</i>	<i>2.3</i>	<i>3.5</i>	<i>10.1</i>	<i>4.3</i>	<i>-0.4</i>	<i>-1.1</i>	<i>0.6</i>	<i>1.9</i>
EDUCATION														
• No education	12.1	19.5	0.0	0.0	0.0	0.0	0.0	14.7	27.8	100.0	0.0	0.0	27.8	0.0
• Some primary	21.2	17.8	0.0	0.6	14.3	5.2	2.2	0.0	47.7	58.3	0.0	0.0	47.7	6.8
• Complete primary	33.5	39.5	0.3	0.0	2.1	6.0	5.4	5.9	58.6	61.4	0.6	3.4	58.6	0.0
• Some secondary	71.8	77.6	3.1	3.4	3.8	6.7	23.6	13.5	63.1	71.0	2.1	4.1	63.1	3.6
• Secondary+	91.3	94.4	5.4	7.1	8.5	10.0	16.7	16.8	74.2	75.0	2.2	4.1	74.2	4.8
<i>Disparity</i>	<i>79.1</i>	<i>75.0</i>	<i>5.4</i>	<i>7.1</i>	<i>8.5</i>	<i>10.0</i>	<i>16.7</i>	<i>2.0</i>	<i>46.3</i>	<i>-25.0</i>	<i>2.2</i>	<i>4.1</i>	<i>46.3</i>	<i>4.8</i>
PLACE OF RESIDENT														
• Urban	84.3	86.6	4.9	5.9	7.0	9.1	15.3	17.0	73.1	74.3	2.3	3.8	2.8	4.6
• Rural	65.5	74.5	2.9	4.2	4.6	7.1	12.8	12.0	59.5	70.7	1.7	4.6	2.1	3.5
<i>Disparity</i>	<i>18.8</i>	<i>12.1</i>	<i>2.0</i>	<i>1.7</i>	<i>2.4</i>	<i>2.0</i>	<i>2.6</i>	<i>5.0</i>	<i>13.6</i>	<i>3.6</i>	<i>0.6</i>	<i>-0.8</i>	<i>0.8</i>	<i>1.1</i>
REGION														
• Sumatera	71.9	75.8	3.1	3.3	4.0	4.3	11.5	13.0	64.2	68.2	1.5	3.9	1.1	2.4
• Java-Bali	83.1	88.6	4.4	5.9	7.1	10.2	16.8	16.7	70.1	75.3	2.1	4.2	3.0	5.2
• Kalimantan	71.8	71.4	2.7	7.8	3.3	7.8	8.4	14.8	76.6	71.2	1.5	3.6	3.2	2.9
• Sulawesi	66.8	71.5	5.7	2.6	5.5	3.4	9.1	8.0	61.4	68.7	2.4	2.5	2.3	2.1
• Eastern Indonesia	56.9	60.3	7.1	6.6	7.3	8.9	10.9	12.7	69.2	70.8	4.3	6.2	4.0	2.4
<i>Disparity</i>	<i>26.2</i>	<i>28.2</i>	<i>-2.8</i>	<i>-0.7</i>	<i>-0.2</i>	<i>1.3</i>	<i>5.9</i>	<i>4.0</i>	<i>1.0</i>	<i>4.5</i>	<i>-2.2</i>	<i>-2.0</i>	<i>-1.0</i>	<i>2.8</i>
Total	76.9	81.6	4.2	5.3	6.2	8.4	14.5	15.1	68.5	73.0	2.1	4.1	68.5	4.3

Table 2 presents the percentage of adolescent knowledge about the causes of anemia. In general, the knowledge of adolescents about the causes of anemia in the 2017 IDHS increases compared to the 2012 IDHS, including those who reported not to know 27 percent compared to 21 percent in 2012. Adolescents reported that the most common cause of anemia was a lack of consumption of vegetables and fruits (37% in 2017 IDHS) which was higher compared to the 2012 IDHS (29%). Furthermore, 26 percent is the lack of meat, fish and liver consumption in 2017 which has been increased compared to that in 2012. Some 17 percent said that it was due to malnutrition from 2017 IDHS and only 12 percent said it was due to menstruation (5% in from 2017 IDHS) and 7 percent states that it was due to bleeding. This knowledge is related to educational background, the higher the education of adolescent, the higher the knowledge about the causes of anemia. This knowledge is important to

encourage someone to seek treatment. Table 3, shows information about whether anemia can be treated. In general almost all (94%) adolescents said that anemia can be treated. Furthermore, among those who answered anemia can be treated were asked about how to treat anemia. Generally speaking based on the 2012 and 2017 IDHS, anemia can be treated by taking pills for blood boosting (58% and 63%), taking iron tablets (18% both in 2012 and 2017), consuming meat, fish and liver (19% and 24%) and consuming iron-rich vegetables (21% and 27%). This shows that the percentage of teenagers who knew about anemia treatment related to the iron tablet program is more than a half. However, teenagers should also be promoted and well-educated to have healthy behavior. Specifically, the percentage among teenagers in the Java-Bali and Kalimantan regions are higher than other regions. Teenagers in urban areas have a higher percentage as better educated teenagers has better knowledge.

**TABLE II PERCENTAGE OF FEMALE ADOLESCENT ABOUT KNOWLEDGE OF THE CAUSES OF ANEMIA, 2012 AND 2017**

Characteristics	Lack of consumption of meat, fish and liver		Lack of consumption of vegetables and fruits		Bleeding		Menstruation		Malnutrition		Infectious disease		Don't know	
	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2017 IDHS	2012 IDHS
<b>AGE GROUP</b>														
•15-19	15.0	23.9	27.5	35.2	3.8	6.6	4.6	11.5	10.8	17.3	0.4	0.5	23.9	31.5
•20-24	22.7	31.0	32.5	39.8	4.2	8.0	7.0	12.9	16.3	19.3	0.4	0.6	14.9	15.9
<i>Disparity</i>	7.7	7.1	5.0	4.7	0.4	1.4	2.4	1.4	5.5	2.1	0.0	0.1	-9.0	-15.6
<b>EDUCATION</b>														
•No education	0.0	14.7	5.2	61.6	0.0	2.2	0.0	0.0	0.0	17.0	0.0	0.0	0.0	24.1
•Some primary	4.9	5.1	10.0	11.4	4.2	2.1	11.2	6.5	0.7	22.3	0.0	0.0	50.0	65.4
•Complete primary	7.5	19.4	16.3	28.1	3.6	4.0	2.8	3.0	12.2	8.1	0.0	0.0	45.2	43.9
•Some secondary	13.1	22.6	25.6	34.0	3.1	7.3	5.3	11.5	10.5	17.9	0.2	0.6	25.0	35.6
•Secondary+	22.0	29.3	33.1	39.5	4.6	7.0	5.5	12.6	14.5	18.2	0.6	0.5	16.4	17.2
<i>Disparity</i>	22.0	14.6	27.9	-22.0	4.6	4.8	5.5	12.6	14.5	1.3	0.6	0.5	16.4	-6.9
<b>PLACE OF RESIDENCE</b>														
•Urban	20.2	27.9	32.9	37.7	4.2	7.4	5.8	11.9	14.0	18.6	0.5	0.6	17.8	20.8
•Rural	11.9	22.7	21.5	35.2	3.2	6.6	4.5	12.0	9.5	16.9	0.2	0.4	25.9	38.0
<i>Disparity</i>	8.3	5.2	11.4	2.5	1.0	0.8	1.3	-0.1	4.5	1.7	0.3	0.1	-8.2	-17.3
<b>REGIONAL</b>														
•Sumatera	14.0	19.0	27.2	31.1	2.9	4.4	1.8	5.2	9.5	16.9	0.5	0.6	30.3	34.7
•Java-Bali	19.7	30.3	31.4	41.6	3.7	8.3	6.1	14.1	13.6	18.6	0.3	0.5	17.0	22.5
•Kalimantan	15.1	22.4	24.5	31.9	3.6	5.6	6.4	14.3	11.2	16.7	0.6	0.0	22.5	30.8
•Sulawesi	10.7	11.2	16.6	19.6	4.0	4.7	3.4	7.9	10.8	11.8	0.1	0.3	29.2	35.6
•Eastern Indonesia	15.7	22.4	28.7	25.3	10.2	8.4	12.9	16.9	16.0	23.8	0.4	1.2	17.7	35.4
<i>Disparity</i>	4.0	8.0	2.7	16.3	-6.5	-0.1	-6.7	-2.8	-2.4	-5.2	-0.1	-0.7	-0.8	-12.9
Total	17.5	26.0	29.1	36.8	3.9	7.1	5.4	12.0	12.5	18.0	0.4	0.5	20.8	26.5

### III. DISCUSSION

Anemia which is a problem of nutrition and health in Indonesia requires the attention and support of various parties. The results of the 2018 Riskesdas show that 49% of pregnant women suffer from anemia, meaning that 1 in 2 pregnant women suffer from anemia [1]. This can have an impact on pregnancy outcomes in the form of maternal and infant complications. So far anemia in pregnant women is one of the causes of maternal mortality in Indonesia[11]. Anemia in pregnant women is also at risk of giving birth to children who grow into stunting[3].

The government of Indonesian through the Nutrition Directorate of the Ministry of Health has a policy of giving blood tablets for school children aged 12-18 years. Ideally the program for administering blood tablets in young women is mainly given during menstruation. The policy of administering iron supplementation was given to all young women. The Director General of Public Health issued a Circular Number HK.03.03/V/0595/2016 concerning Provision of Iron Tablets for Young Women and Women Reproductive Age[5]. This policy is an effort to improve the health and nutrition status of children as the main target of the 2015-2019 National Medium-Term Development Plan

(RPJMN) and in the implementation of the Ministry of Health's 2015-2019 Strategic Plan to target the Mother-Child Health and Nutrition Program namely increasing availability and affordability quality health for the community[4]. This policy indicator is the coverage provision of blood tablets for girls with a target of 30% by 2019. Based on the results of the 2018 Riskesdas, the target has not been reached. For this reason, supporting information about the knowledge of adolescents regarding anemia can be a program planning input for the health and education departments. Knowledge is the basis that influences behavior and implementation or practice. Knowledge of anemia is a long-term investment in the younger generation. Results from the 2017 IDHS show that 'anemia' is already popular among Indonesian adolescents because 82% have heard about it (Table 1), this condition is better than the study in Palestine, who reported that 91.6% had no knowledge on the causes of Iron Deficiency Anemia (IDA). Teenagers' knowledge varied when they were asked further about anemia[5]. Most teenagers knew that anemia is 73% of "blood deficit" and about 15% of "deficit in red blood". This indicates that the term "blood deficit" is popular among female adolescents and can be a gateway to promotion of anemia to adolescents while introducing other

terms and understanding of anemia. Table 1 also shows that less than 10 percent stated iron deficiency. Even though iron deficiency is the main contributor to anemia, it is defined as insufficient mass cells circulating in the blood or hemoglobin below established thresholds [3].

The striking thing is that in the 'low blood pressure' there was a drastic decline in the 2012 IDHS by 69% to 4%. In Indonesia, the consumption of iron supplements is understood to “increase the blood”, therefore is sometimes anemia associated with hypertensive disorders[12]. The

characteristics of a low blood pressure and anemic condition are almost similar.

The results of tables 2 and 3 also indicate that adolescents' knowledge about the causes of anemia is still low and only few knew that menstruation that is routinely experienced every month is one of the causes of anemia in adolescent girls (12%). These are the conditions of growth and sexual maturation and the onset of menses. Regarding the knowledge on how anemia is treated, some have already mentioned that drinking pills is one way to treat anemia.

**TABLE III. PERCENTAGE OF FEMALE ADOLESCENT ABOUT KNOWLEDGE OF THE TREATED OF ANEMIA, 2012 AND 2017**

Characteristic	Anemia can be treated?		Treated anemia							
			Take pill to increase blood		Take iron tablet		Increase consumption of meal, fish and liver		Increase consumption of iron-rich vegetables	
	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS	2012 IDHS	2017 IDHS
<b>AGE GROUP</b>										
• 15-19	92.0	93.4	55.0	61.1	13.8	15.0	16.4	21.2	25.1	38.5
• 20-24	96.7	96.4	62.1	66.1	24.5	22.6	22.1	28.2	30.4	35.6
<i>Disparity</i>	<i>4.6</i>	<i>2.9</i>	<i>7.1</i>	<i>5.1</i>	<i>10.7</i>	<i>7.6</i>	<i>5.7</i>	<i>7.0</i>	<i>5.3</i>	<i>-2.8</i>
<b>EDUCATION</b>										
• No education	NA	NA	5.2	41.9	5.2	17.6	0.0	0.0	0.0	58.7
• Some primary	59.6	88.2	56.8	38.7	11.3	6.6	26.3	11.2	8.2	41.3
• Complete primary	92.1	83.2	43.6	37.8	3.7	6.3	6.9	18.1	14.5	36.3
• Some secondary	91.0	93.5	52.4	60.6	22.8	14.2	14.2	20.9	23.3	33.3
• Secondary+	96.2	95.6	62.3	64.4	22.8	21.0	22.2	26.3	30.5	37.7
<i>Disparity</i>	<i>36.6</i>	<i>7.3</i>	<i>57.1</i>	<i>22.6</i>	<i>17.6</i>	<i>3.4</i>	<i>22.2</i>	<i>26.3</i>	<i>30.5</i>	<i>-21.0</i>
<b>PLACE OF RESIDENT</b>										
• Urban	94.7	94.8	63.3	63.9	19.0	19.4	19.7	24.8	27.9	35.9
• Rural	91.2	93.8	45.0	61.1	13.9	14.8	15.3	21.7	24.7	35.2
<i>Disparity</i>	<i>3.5</i>	<i>1.1</i>	<i>18.4</i>	<i>63.9</i>	<i>5.2</i>	<i>19.4</i>	<i>4.4</i>	<i>24.8</i>	<i>3.2</i>	<i>35.9</i>
<b>REGION</b>										
• Sumatera	91.8	92.8	48.7	54.2	16.6	12.2	12.1	15.9	19.7	33.0
• Java-Bali	94.7	95.5	60.4	65.4	18.7	20.3	20.7	27.3	29.8	38.1
• Kalimantan	92.7	93.8	64.3	67.5	11.4	16.1	15.6	22.3	26.7	36.4
• Sulawesi	89.1	90.2	50.4	55.9	12.3	13.1	13.9	13.5	17.6	24.5
• Eastern Indonesia	92.7	93.3	59.0	69.5	15.3	12.8	22.4	22.4	30.8	28.0
<i>Disparity</i>	<i>2.0</i>	<i>2.2</i>	<i>1.4</i>	<i>-4.1</i>	<i>3.4</i>	<i>7.5</i>	<i>-1.7</i>	<i>4.8</i>	<i>-1.0</i>	<i>10.1</i>
Total	93.5	94.4	57.4	62.9	17.3	17.7	18.3	23.6	26.8	35.6

Knowledge of the causes and consequences of anemia in adolescence is critical, since it serves a window of opportunity for interventions to improve adolescent health. Involving adolescents in developing interventions is essential for sustainability. Promoting the benefit of healthy diet and lifestyles choices through education should be initiated as early as possible to prevent anemia during

adolescence and their later life. Several studies revealed that health/nutrition education intervention improved anemia related knowledge among adolescents[13][14][15].

The limitation of this study was not supplemented with the results of measuring anemia so that the relationship between knowledge with anemia status and iron tablet medication behavior cannot be developed. Young women are the main

population at risk of anemia, so if they were not prepared to become a mother properly, there will be implications for the risk of maternal death – giving birth to LBW children who are at risk of neonatal death and stunting. For this reason, the female youth iron tablet program is an early intervention policy in adolescence. This program is a long-term policy in preparing prospective healthy mothers to reproduce so that giving birth to healthy and babies born also have good nutritional status and good survival so that it can reduce neonatal mortality.

The biggest challenge is how to make young women like to drink iron tablets. The results of the two national surveys; Sirkesnas 2016 and 2018 Riskesdas show that the behavior of young women to take iron tablets has not been achieved[6][1]. Other research was conducted at class 9 of junior and senior high schools in Sleman Regency, Yogyakarta. The adolescents' awareness in efforts to prevent anemia through consumption of iron tablets during menstruation is also still low based on the anemia survey. The results of this study showed that only 2.7% of students consumed iron tablets during menstruation[16]. Another study in Bogor City, also reported adolescent adherence to consuming iron tablets during menstruation in the fourth month continued to decline[17].

Effort to be considered in the long-term program to fight anemia is the need to pay attention to social aspects. Changes in behavior from knowledge to habits and good and right practices are social problems that must be considered to achieve success. Jason M et al. conducted a meta-analysis of social and determinant of iron supplementation among women reproductive age in Nagata. The result of a systematic review from qualitative data states that there are seven domains emerging from the review, such as: cultural norms and societal values including explanatory models and medical pluralism; political and socio-economic circumstances; education and communication; social organization and social relationships; health care access and supplement supply; food and nutrition availability; and adherence. In cultural norms and societal values, it is necessary to pay attention to 1) individual beliefs from, perceptions, and knowledge of anemia and symptoms; 2) societal norms and practices; 3) medical pluralism, whereas the political and socio-economic circumstances include 1) government and politics; 2) economics and material resources[18]. The government must pay attention to aspects of: 1) health care providers, in this case the iron tablet program for school children, there is a need to work together between Puskesmas and the schools; 2) access to iron supplements; facilitate young women to access iron tablet, including young women outside the school environment and 3) supply of iron supplements which ensure that the distribution of iron tablet to young women can be available every week so that the target of young women consuming a minimum of 52 tablets in 12 months can be achieved.

The most important result of this study is that young women still need education about what anemia is, the causes of anemia, how to prevent anemia and treat anemia and why it is necessary to take blood tablets. During this time, the ranks

of the Ministry of Health and Education carried out by the Minister of Health and high leaders at the Ministry of Health conducted a socialization safari on the girls' iron tablet program. The Regional Government was asked to implement a routine teenagers' iron tablet program every week. For example, in the city of Cilegon, District Health Office has a SEGANI program "Selasa Cegah Anemia" or "Tuesday of Preventing Anemia" that is a program of giving iron tablet to young women every Tuesday drinking iron tablet together in school in order to prevent anemia[19]. However, there is still a demand to increase the knowledge of young women outside of school, especially teenagers who do not have access to formal education so that they also get the same services. The results of this analysis indicate that more teens knew about anemia but it still needs an improvement in the knowledge of adolescents about the causes, prevention and treatment so that adolescents understand the importance of consuming iron tablet in order to become healthy adolescents into productive human resources and while undergoing pregnancy to be healthy, not anemic pregnant women who eventually give birth to children with normal length and weight and not stunted.

Since 86% Indonesian adolescents are enrolled in secondary school, school-based interventions are seen as more cost-effective method to reach them compare to other setting[20]. Intervention to increase the knowledge about anemia can be delivered by giving nutrition education and/or counseling. However, knowledge alone is not sufficient to prevent anemia among adolescents. Nutrition education should be integrated with other strategy to obtain optimal results, such as iron tablet supplementation and iron rich foods consumption.

This result also shows that young women who are not educated or low education are the group with the lowest percentage of correct knowledge about anemia. The most prominent disparity in adolescent knowledge about anemia occurred in the group of uneducated or low educated girls. Educational background of adolescents is associated with knowledge regarding anemia [21]. The higher educational level of adolescents, the knowledge about anemia increased. This may be due to the greater exposure to information about anemia in the higher educational level group. They may be exposed with many information channels, such as social media, peer group, and television.

For this reason, it is necessary to develop promotional material about anemia and consume blood-added tablets for adolescents who are not in school. The results of this analysis can be input on terms that have been generally understood as a blood deficit as an entry point for promotion and that knowledge is still wrong, such as "malnutrition as the cause of anemia" as material for education. The limitation of this study was not supplemented with the results of measuring anemia so that it could not see the relationship between knowledge with anemia status and iron tablet medication behavior. This study also does not distinguish between teenagers who are still in school and those who are not in school. The results of this study concluded that most of the adolescents who had heard of

anemia could have been treated, but the causes of anemia remained low. We identified the disparity among education levels which still have misperception and with low knowledge about causes. We recommend making promotional material about anemia, the consequences and the need to consume blood-added tablets to prevent anemia. This youth knowledge profile can be material for the preparation of promotional materials. Blood deficit the most common term for adolescents can be the entrance door in the preparation of promotional materials about anemia and prevention of anemia.

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