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Anaemia: female youth's knowledge and supplementation program management

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ABSTRACT

The prevalence of anaemia among adolescent girls in Indonesia is 18.4%. One of the main indicator targets is reducing the prevalence of anaemia is in the form of iron-folic acid (IFA) supplementation for adolescent girls. The research aims to analyze knowledge of female youth on anaemia and management of iron-folic acid supplementation. This study used a cross-sectional design, and it was conducted in 24 senior high schools in Cianjur Regency (high stunting area) and Depok City (low stunting area). The total sample of this study was 243 female youth. The study began from September 2019 to February 2020 for the 1st term and continued from October 2022 to March 2023 for the 2nd term. The quantitative result showed that there was a significant difference in knowledge about the frequency of providing the iron-folic acid supplement (IFAS) at school and the duration in a year that students must consume the IFAS between high stunting and low stunting (p=0.000). A significant proportion of female youth, 67.5% in high stunting areas and 71.7% in low stunting areas, exhibit insufficient nutrition knowledge, underscoring the necessity for a nutrition education initiative targeting high school students. The qualitative results showed the input-process-output of the IFA program have been administered for the last few years, providing several constraints in order to improve the IFA program management. Based on those findings, the IFA supplementation program provides a potential chance for addressing anaemia in female youth.

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1. INTRODUCTION

The nutritional problem currently in the spotlight is stunting. Stunting is a condition in which children under five have low length-for-age or height-for-age. The stunted under-five child is included in chronic malnutrition caused by many factors such as socioeconomic conditions, maternal nutrition during pregnancy, infant morbidity, and insufficient infant intake [1]. Maternal anaemia significantly affected the nutritional status of young children, leading to stunting and underweight [2].

Malnutrition is still one of the fundamental problems for governments despite the economic and social progress and changes in lifestyle [3]. According to the 2018 Basic Health Survey by the Ministry of Health of the Republic of Indonesia, 30.8% of children under the age of five suffer from stunted growth. Although the prevalence of stunting in 2018 decreased compared to 2013 (from 37.2% to 30.8%), it was still considered high. However, in 2022, the stunting prevalence in Indonesia became 21.6% [4].

Stunting occurs from the preconception period when an adolescent is malnourished or anemic [5]. The condition worsens when the woman becomes pregnant, her nutrient intake is insufficient, and she also lives in an environment with poor sanitation. The provision of iron or iron-folic acid supplements in schools, either alone or alongside other micronutrient supplements, was linked to enhanced serum hemoglobin levels [6]. The Iron-folic acid (IFA) supplementation initiative is projected to reduce anaemia by approximately 27% among non-pregnant women on average. This program is considered a key primary intervention in anaemia prevention, supported by robust evidence of effectiveness and the capacity for widespread implementation to benefit all women [7].

The prevalence of anaemia among adolescent girls and women of reproductive age (15 to 24 years) in Indonesia is 18.4%. Female youth (10-19 years), the nation's future generations, are among the groups prone to developing anaemia [8]. One of the movement's efforts that have been done by the government, especially in overcoming the problem of anaemia in adolescents, is through supplementation of IFA in the form of iron (60 mg FeSO4) and folic acid (0.4 mg). The risk factors that associated with anaemia are income, occupation, and other risk factors like breastfeeding, contraceptive use, and iron supplementation [9].

A study conducted among adolescent girls in Bogor City revealed a decrease in anaemia prevalence following intervention with iron-folic acid supplementation (containing 60 mg elemental iron and 0.4 mg folic acid) administered over 16 weeks [10]. The primary factor influencing increased hemoglobin levels was the initial hemoglobin status; subjects with anaemia prior to supplementation had a 3.52 times greater likelihood of Hb level improvement compared to non-anemic subjects. Nevertheless, the iron-deficiency anaemia prevention and control program (IDAPCP) is perceived as ineffective due to low compliance with IFA supplement consumption, despite a decrease in prevalence [11].

In East Java and East Nusa Tenggara, the coverage of IFA supplementation among female youth, adherence levels to recommended IFA tablet consumption, and the proportion of girls consuming ≥52 tablets annually remain low. According to the 2018 Basic Health Survey, although 80.9% of adolescent girls received IFA supplements in schools, only 1.4% consumed ≥52 tablets per year. This study aimed to evaluate the knowledge of female youth regarding anaemia and the management of iron-folic acid supplementation.

2. METHOD

The research employed a cross-sectional design and was conducted across 24 senior high schools, comprising 12 schools in Cianjur Regency (with a high stunting prevalence of 33.7%) and 12 schools in Depok City (with a low stunting prevalence of 12.3%) [12]. In high stunting areas, the IFA supplementation program should be more intensive to prevent stunting than in low stunting areas. This two-site study was conducted to determine whether the performance of the IFA supplementation program is better in high stunting areas than in low stunting areas. The study began from September 2019 to February 2020 for the 1st term. It continued from October 2022 to March 2023 for the 2nd term, which included a location survey, permit arrangement, data collection, data processing, and data analysis.

The minimum sample size was determined using the formula for sample size calculation in cross-sectional studies [13]. In this equation, P denotes the estimated prevalence of anaemia among female youth nationwide, which stands at around 18% [14]. The Precision (d) was set at 0.05 to reflect the desired effect size, with Zα/2 established as 1.96, representing the normal deviate for a two-tailed alternative hypothesis at a 5% significance level. The subsequent section delineates the computation of the sample size.:

$$n = \frac{Z^2 \times p(1-p)}{d^2}$$

$$n = \frac{1.96^2 \times 0.18(1-0.18)}{(0.05)^2}$$

$$n = 226.8 (\sim n = 227)$$

Data collection was conducted by researchers, health analysts, and enumerators. The data collected in this study were quantitative and qualitative data. The quantitative data was collected through interviews using a set of questionnaires, and enumerators did anthropometric measurements while health analysts collected status anaemia measurements. Quantitative data encompassed the characteristics of female youth and their knowledge regarding anaemia and IFA.

Our questionnaire, designed to measure knowledge about anaemia and IFA supplementation, comprises 53 items. Initially, 39.6% of these items were validated upon first analysis, increasing to 85.7% upon a second analysis, and reaching 100% validation after a third analysis (n=62). Furthermore, reliability testing indicated that all items were deemed reliable, with a Cronbach's alpha of 0.767.

The validity of qualitative research instruments is ensured through a process of data triangulation. This involves cross-referencing and verifying data from multiple sources, leading to conclusions once data saturation is achieved, wherein adding more data would result in redundancy or overlap. The qualitative data was collected by using an in-depth interview data collection technique with teachers in both areas. Aside from teachers, data had also been collected by conducting in-depth interviews with the health workers from the four public health centers in Depok and Cianjur. The research informants are presented in Table 1.

Table 1. Research informants

Informan indepth interview	Low stunting area	High stunting area	Total
Teachers in senior high school			
Privat senior high school	-	1	1
Public senior high school	-	4	4
Privat vocational school	7	1	8
Public vocational school	1	1	2
Islami's senior high school	2	-	2
Health staff at public health center	4	4	8

This study received ethical clearance from the Bioethics Committee of Medical/Health Research at the Faculty of Medicine, Sultan Agung Islamic Semarang University, under reference No.004/1/2020/Bioethics Committee. Data was analyzed by calculating frequency distribution, estimating elementary statistics (mean, standard deviation) for the quantitative variables, and t-test analysis to compare variables in the two regencies. Microsoft Excel software for Windows and SPSS were used to manage the data analysis.

3. RESULTS AND DISCUSSION

Anaemia is a global problem of micronutrients, especially in developing countries, where it is estimated to occur in 30% of the world's population. As many as 29% and 38% of non-pregnant and pregnant women suffered from anaemia [15]. Anaemia is a worldwide public health problem, in which one-third of reproductive women, 38% of pregnant adult females, and children under five years old are anemic, being worst in low- and middle-income countries [16]. The prevalence of anaemia among adolescent girls and women of reproductive age (15 to 24 years) at the national level in Indonesia was 18.4% [4]. Anaemia decreases physical capacity and adversely affects performance in women, such as female youth [17]. Female youth (10-19 years), the nation's future generations, are among the groups prone to developing anaemia. One of the movement's efforts that have been done by the government, especially in overcoming the problem of anaemia in adolescents, is through supplementation of IFA in the form of iron (60 mg FeSO4) and folic acid (0.4 mg). The risk factors that associated with anaemia such as income, occupation, and other risk factors like breastfeeding, contraceptive use, and iron supplementation [9]. This study involved high school students from various educational backgrounds (general, vocational, and Islamic senior high schools). Characteristics observed included the students' ages and pocket money, with the distribution outlined in Table 2.

Table 2. Characteristics of female youth

Variable	High stunting n=123	Low stunting n=120	p
Children's age (year)	16.9±0.6	16.7±0.5	0.131
Pocket money (for snacking)/day (IDR)	16,983±7,562	20,668±14,948	0.039
Pocket money (for transportation)/day (IDR)	4,114±4,082	4,759±8,867	0.000
Pocket money (for top-up phone credits)/week (IDR)	13,916±10,082	13,120±18,738	0.000

Table 2 shows the characteristics of the female youth, which showed age, daily pocket money, daily transportation money, and weekly phone credits. According to the findings, the median pocket money reported was significantly higher in low-stunting areas compared to high-stunting areas. And there was also a significant difference between the pocket money for snacking (p=0.039), pocket money for transportation (p=0.000), and pocket money for top-up phone credits (p=0.000). Pocket money is the amount received by adolescents every day, and it is given by their parents or guardians to be used for transportation or snack expenses. The amount of pocket money may vary depending on their parent's income and the location where the students live (Cianjur or Depok). When the pocket money, transportation money, and phone credit (top-up) money are added together, the pocket money received by Depok female youth (low stunting area) is higher than the Cianjur female youth (high stunting area). Knowledge about anaemia can influence the attitudes and dietary behaviors of female youth, thereby affecting their nutritional status, including anaemia prevalence. Female youth' comprehension of anaemia and iron supplementation was divided into three tiers: low, moderate, and high, with their distribution illustrated in Table 3.

Table 3. Distribution of female youth according to their anaemia knowledge levels [n (%)]

Level of knowledge	High stunting n=123	Low stunting n=120	p
Low (score<60)	83 (67.5)	86 (71.7)	
Middle (score 60-80)	39 (31.7)	34 (28.3)	0.410
High (score >80)	1 (0.8)	0 (0)	
Mean ± SD	54.8±9.5	54.1±9.2	

Table 3 shows that most of the female youth in both locations had a low level of knowledge about anaemia (67.5% for Cianjur and 71.7% for Depok). The proportion of female youth with poor and moderate knowledge of anaemia was almost the same for both locations. Similar to the average score of nutrition knowledge in Cianjur and Depok, it was found to be relatively the same (54.8±9.5 for Cianjur and 54.1±9.2 for Depok). There was no significant difference (p=0.410) in the level of anaemia knowledge between respondents in Cianjur and Depok.

Without follow-up, an iron supplementation program aimed at female youth may fail to effectively improve anaemia status due to insufficient knowledge and motivation. Nutrition education programs for school children have been shown to positively impact health outcomes by instilling healthy lifestyle habits [18]. The significant proportion of female youth demonstrating a low level of nutritional knowledge underscores the necessity of nutrition education programs for high school students [19]. These programs aim to alter attitudes and behaviors, educating individuals about the importance of nutrition in enhancing concentration and academic achievement [20]. Table 4 displays how female youth are distributed based on their understanding of methods to prevent anaemia. The most common response regarding preventive measures was the consumption of iron supplementation tablets, followed by the intake of green leafy vegetables and fruits rich in vitamin C.

Table 4. Distribution of female youth according to their past awareness of methods to prevent anaemia [n (%)]

The ways to prevent anaemia	High stunting n=123	Low stunting n = 120	p
Take an IFA supplement	112 (91.1)	112 (93.3)	0.509
Consume green leavy vegetables	89 (72.4)	62 (51.7)	0.001
Consume fruits and vitamin C rich vegetables	74 (60.2)	71 (59.2)	0.874
Consume meat or liver	61 (49.6)	45 (37.5)	0.057
Consume deworm medication in every six months	11 (8.9)	11 (9.2)	0.952

Table 4 shows that knowledge of the ways how to prevent anaemia between female youth in Cianjur and Depok was significantly different (consume green leafy vegetables p=0.001). Understanding anaemia and cultivating positive attitudes toward its prevention are crucial for female youth [21]. Acquiring knowledge about anaemia empowers them to take preventive measures, enabling informed decisions and behaviors [22]. Knowledge of IFAS was also another predictor; those women who had good knowledge of IFAS were 2.1 times more likely to be adhered ti compared to those who had poor knowledge of IFAS. The likely justification may be that those who had good knowledge had better opportunities about tablets benefits, side effects, when it has to be taken, and complications if missed [23]. Table 5 demonstrates the distribution of female youth' knowledge regarding the frequency and duration of IFA supplementation.

Table 5. Distribution of female youth based on n their comprehension of the frequency and duration of IFA supplementation [n (%)]

Dose and duration of IFA supplement	High stunting n=123	Low stunting n=120	p
Frequency of providing the IFA supplement at school:			
- Once a week	108 (87.8)	61 (50.8)	0.000
- Once a month	15 (12.2)	41 (34.2)	
- During menstruation	0 (0)	18 (15)	
Duration in a year that students must consume IFA supplement:			
- 4 weeks	15 (12.2)	42 (35)	
- 12 weeks	51 (41.5)	63 (52.5)	0.000
- 52 weeks	57 (46.3)	15 (12.5)	

In Cianjur (a high stunting area), 87.8% of female youth recognize that IFA (iron and folic acid) should be administered once a week, compared to 50.8% in Depok. The female youth from Cianjur (46.3%) have better knowledge when compared to the female youth from Depok (12.5%) in understanding that within a year, they should consume 52 IFA tablets. There were significant differences (p=0.000) in knowledge of the frequency and duration of taking IFA supplementation between female youth in Cianjur and Depok.

As of global recommendation, in the regions with highly prevalent of anaemia ≥ 40%, adolescent girls and women of reproductive ages should be provided 30-60 mg of elemental iron. It should be given daily for 3 consecutive months in a year [24]. Meanwhile, for the regions with a prevalence of anaemia ≥20%, supplementation is composed of 60 mg of elemental iron and 2,800 mcg of folic acid, and it is given weekly for three months on (given) and three months off (not given) [25]. Moreover, the Directorate General of Public Health, Ministry of Health of the Republic of Indonesia issued an official circular letter (No: HK.03.03/V/0595/2016) to all Health Offices at the provincial and regency/city levels regarding the Implementation of Iron Folic Acid Supplementation for Female youth and Women of Reproductive Age. This circular letter delineated the guidelines (including frequency, duration, dosage, and procedural aspects) of the IFA supplementation program. It stipulates that IFA should be administered once weekly (1 tablet) throughout the entire year (52 weeks) for female youth in educational settings and women of reproductive age in workplace settings. Furthermore, it was noted that multivitamins and mineral supplements can enhance immune function and immunity status, particularly in individuals with mineral and vitamin deficiencies. To mitigate any adverse effects, it is imperative to ensure that supplementation adheres to the recommended tolerable upper intake levels [26]. Table 6 delineates the distribution of female youth based on their understanding of strategies to manage the side effects of IFA consumption.

Table 6. Female youth categorized by understanding of strategies to alleviate the side effects of IFA intake [n (%)]

Methods to overcome side effects of IFA consumption	High stunting n=123	Low stunting n=120	p
Take it after meal	71 (57.7)	85 (70.8)	0.033
Consume it with eating banana	36 (29.3)	35 (29.2)	0.986

Table 6 illustrates that a large proportion of female youth are familiar with strategies to alleviate the side effects of IFA intake, such as consuming the pill after meals. A comparative analysis between Cianjur and Depok demonstrates that female youth in Depok possess a higher level of awareness (70.8% in Depok compared to 57.7% in Cianjur). Notably, a significant divergence in knowledge regarding methods to address side effects of IFA consumption, such as post-meal ingestion (p=0.033), is evident between respondents in Cianjur and Depok. The distribution of female youth based on their comprehension of the benefits and rationale behind IFA supplement usage is outlined in Table 7.

Table 7. Distribution of female youth according to comprehension of the advantages or motivations for consuming IFA supplements [n (%)]

Benefits or reasons for consumption of IFA supplements	High stunting n=123	Low stunting n=120	p
Increase concentration	71 (57.7)	75 (62.5)	0.447
Not easily to feel fatigue	75 (61)	82 (68.3)	0.232
Increase work productivity	25 (20.3)	40 (33.3)	0.022
Increase learning capacity	23 (18.7)	39 (32.5)	0.014
Prevent anaemia	113 (91.9)	100 (83.3)	0.043

Note: respondents may choose more than one option.

Table 7 illustrates that a large proportion of female youth are aware that IFA supplementation may aid in i) preventing anaemia (91.9% in Cianjur and 83.3% in Depok), ii) enhancing concentration (57.7% in Cianjur and 62.5% in Depok), and iii) reducing fatigue (61% in Cianjur and 68.3% in Depok). Knowledge of benefits or reasons for IFA supplement consumption between female youth in Cianjur and Depok was significantly different (increased work productivity p=0.022, increased learning capacity p=0.014, and prevented anaemia p=0.043). There is a rationale for a weekly supplementation schedule. Intermittent iron supplementation was proposed as an alternative to the usual daily dose because of the limited absorptive capacity of the intestinal cells, which leads to an accumulation of non-absorbed iron in the intestinal mucosa and subsequent side effects. Since intestinal cells turn over every 5-6 d, an intermittent supplementation regime would expose only new cells to the iron compound, increasing absorption, reducing iron exposure, and decreasing subsequent oxidative stress [27]. The lack of knowledge and awareness among female youth regarding anaemia and iron supplementation contributes to nutritional challenges [28]. School-based supplementation with IFA has been effective in reducing anaemia among adolescent females, and World Health Organization guidelines recommend intermittent IFA supplementation for adolescents in regions where the prevalence is high [29]. Anaemia status of female youth is presented in Table 8. Table 8 shows that the anaemia prevalence in female youth in the Depok area is almost three times higher than that of female youth in the Cianjur area with a significant difference in their mean hemoglobin levels (p=0.000).

Table 8. Anaemia status among female youth [n (%)]

Anaemia status	High stunting n=123	Low stunting n=120	p
Anaemia (Hb<12 mg/dL)	15 (12.2)	41 (34.2)	
Normal (Hb≥12 mg/dL)	108 (87.8)	79 (65.8)	0.000
Mean ± SD Hb (mg/dL)	13.4±1.4	12.4±1.3	

The implementation of programs providing IFA supplementation tablets to female youth is among various initiatives aimed at enhancing the health status of students in Indonesia [30]. The implementer of the IFA program was the Nutrition Administrator at the public health center. In contrast, the people in charge of the IFA program in school were more varied: the teacher of student affairs, the school principal or vice principal, administration staff, the school's public relations, the nursing teacher, and the School Health Unit teacher who coordinate the student cadres or Youth Red Cross members to distribute IFA tablets. Figure 1 demonstrates how the iron supplements were distributed from the public health center to the related schools. The public health center distributes the IFA tablets directly to the target schools. Some public health centers, such as the public health center in Cianjur, have a schedule for delivering iron tablets to schools, with a monthly distribution schedule. In contrast, the public health center in Depok has a distribution schedule for every three months, six months, or once a year. Furthermore, several health workers said a quite strategic IFA distribution was chosen at the time of academic report distribution at the schools (every six months).

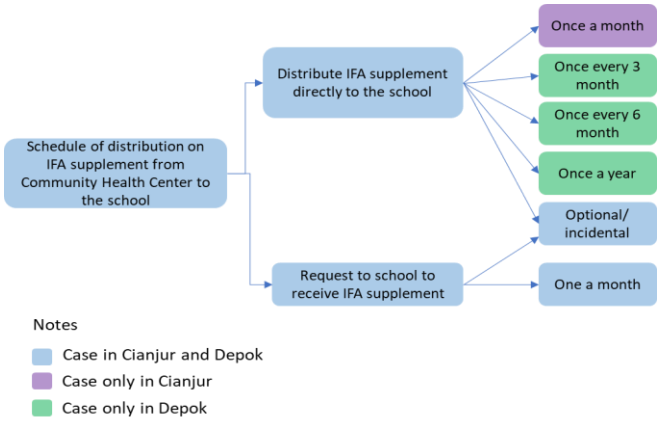

Figure 1. IFA distribution procedures from public health center to the school

After the request was accepted, then IFA tablets were distributed to schools. There were two ways of IFA distribution from the public health center to schools. Time differences in the IFA distribution schedule to target schools will affect the amount of iron supplements given to schools. public health center, which had a schedule of administering iron supplement tablets once a year, will provide 52 iron tablets directly to each student. The second way is that there was a policy from the public health center for any representatives of the targeted schools to come to the public health center to take iron supplements. This policy was implemented to overcome the inconsistent distribution schedule from the public health center to targeted schools due to the busy activities of the health workers of the public health center. Unfortunately, in reality, the distribution process of IFA tablets did not always follow the planned schedule. According to the health workers, the second method (the school took the iron tablets at the public health center) was ineffective and resulted in the school not receiving the iron supplements. Finally, the public health center itself must send the iron supplements to the targeted schools. The school also admitted that the public health center sometimes did not come according to the schedule, but this only happened incidentally.

Moreover, schools also have their way of giving IFA tablets to students. The first method was to distribute the iron tablets according to the amount provided by the public health center. For instance, as happened in one of the public health centers located in Depok, the health center distributed all IFA tablets only one time for one year, which means there was a school directly giving 52 IFA tablets (for one year supply) to each student. The second method was to distribute the iron supplements every week, although the public health center provided stock for more than one week. There was one school in Depok that received IFA stocks for one year but chose to distribute them every week to their female youth and keep the rest of the IFA at school.

The administration of IFA tablets to female youth also has several mechanisms. There were at least four scenarios of iron supplement administration mechanisms for female youth. The first scenario was the health workers directly gave IFA tablets to the female youth. This scenario is a common way for public health centers, which have a distribution schedule of six months or once a year. The second scenario was the health workers gave the IFA supplement firsthand to the appointed teacher (a teacher who is responsible for this program). Then, the appointed teacher gave it to the students. The third scenario was when the health workers gave the IFA tablet to the appointed teacher. Then, the teacher handed it over to the Youth Red Cross cadres or the class leaders, and they had the responsibility to give it to the female youth. The last scenario (4th scenario) was the appointed teacher giving it to the homeroom teacher, and the homeroom teacher finally giving it to the female youth. These four scenarios were well-dispersed both in Depok and in Cianjur.

After the female youth receive the IFA tablets, two actions may occur depending on their school policy: whether the IFA supplement is consumed together at school or brought the IFA tablets home by the female youth. Depok and Cianjur found some schools that have a policy to take the iron tablets together during the women's activity day or another predetermined day. Yet, the teachers admitted that taking the iron tablets together was only conducted at the beginning of the IFA distribution. For the next distribution time of IFA, they were no longer taking the tablets together. It complicates the monitoring of IFA compliance (obedience). Another finding of this study pertains to the provision of iron tablets to female youth who were absent during the IFA administration day. The school stated that the iron tablets were entrusted to the Youth Red Cross cadres or a friend. However, they did not know whether the IFA was given or received by the absentee or not.

Figure 2 shows that the constraints of the IFA program have five general problems: there are limitations on human resources, female youth' perception (it is not necessary to take IFA because of feeling healthy, the appearance of IFA makes them unwilling to consume), side effects of IFA (nausea, dizzy), monitoring and reporting (monitoring was not sustainable, no budget available, and distribution process (uncertain visiting schedule).

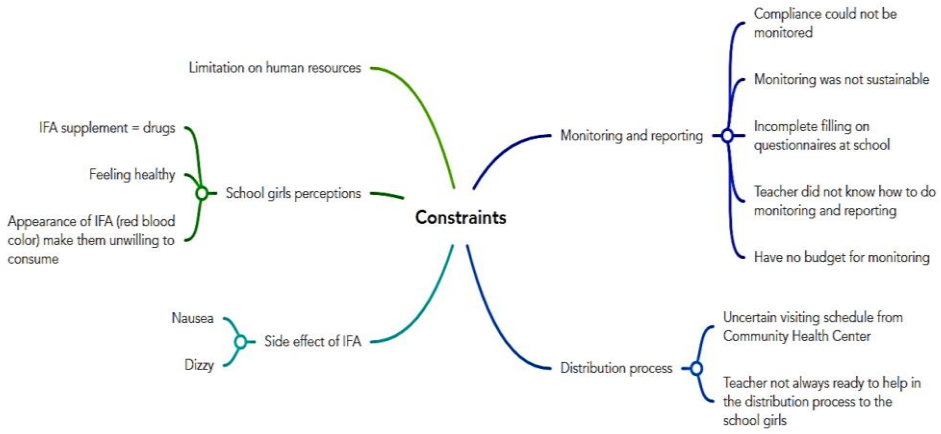

Figure 2. Constraints on implementing IFA supplementation program

The constraints of the IFA program have five general problems. The first problem is related to the limited (not enough) human resources. Both implementers (the public health center and schools) felt their work activities were too many, so they could not implement the IFA program consistently. The second problem is related to the monitoring and reporting of the IFA program. It said it is difficult to monitor the obedience/compliance in taking the iron supplement tablets as the monitoring cannot be done continuously. The schools, in an incomplete way, filled results, so the public health center needed help making reports since teachers needed to learn how to do monitoring and reporting, and the public health center felt there was a need for a special budget for monitoring. Additionally, challenges were identified in the distribution process of iron tablets to schools and female youth. According to the schools, the schedule for the visit by the public health center was often erratic (unscheduled) and sometimes needed to match the teaching and learning activities, for example, the time of exams or other studying activities that cannot suddenly be interrupted by the IFA distribution. Teachers also stated there were times when IFA was not distributed directly to their students since the amount was not according to the school's needs (too few/not enough iron supplement tablets) to avoid confusion among students, or the schools did not have a mechanism for distributing IFA to female youth. The fourth problem is related to the side effects of consuming iron tablets, such as feeling nauseous and dizzy after taking the iron tablets. The last problem relates to the student's perception of IFA, which is still troublesome

since the students perceive the IFA tablets as medicine. Hence, they felt it was unnecessary to consume it if they were in good health. In addition, students also do not understand the benefits of IFA tablets.

4. CONCLUSION

IFA supplementation program provides a chance to address malnutrition problems (anaemia) in female youth. Based on the quantitative results, we found that no group of female youth in both areas had good nutrition knowledge, and the score of knowledge was still below 60. The high percentage of female youth with limited nutrition knowledge underscores the necessity of nutrition education programs for high school students.

The qualitative results, including the input-process-output in the implementation of the IFA program, have been documented, providing several constraints in order to improve the IFA program management. The constraints of the IFA program involve i) the limitation of human resources; ii) the difficulties in monitoring and reporting the IFA program; iii) the distribution of the IFA supplement, which has specific technical problems such as uncertain visiting schedule by staffs of public health center; iv) low adherence due to side effect of IFA (nausea and dizziness); and v) the student's perception of IFA which is still troublesome since it was perceived as a drug.

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