Awareness about Anaemia and Weekly Iron-Folic Acid Supplementation (WIFAS) among School-Going Adolescent Girls and Parents in East Java and East Nusa Tenggara, Indonesia

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Summary Since 2016, Indonesia has been implementing a weekly iron-folic acid supplementation (WIFAS) program in two provinces for school going adolescent girls to reduce anaemia. This study aimed to explore the awareness and understanding of school-going adolescent girls and parents regarding anaemia and WIFAS. The study was conducted in 10 districts, each from East Java province and East Nusa Tenggara province. Twenty focused group discussions (FGDs) were conducted with school-going adolescent girls (n=174) and ten FGDs with parents (n=66). Also, in-depth interviews (IDIs) were conducted with school-going adolescent girls (n=20) and their parents (n=10) from 20 schools. All FGDs and IDIs were audio-recorded, transcribed verbatim, and analyzed for themes using NVivo Pro 12 software. School going adolescent girls and parents had high levels of misinformation about anaemia and healthy nutritional practices, which were influenced by socio-cultural milieu and local dietary habits. Both parents and girls perceived low risk of anaemia for school-going adolescent girls. Girls stated that their parents' opinion about anaemia influenced their desire to consume iron supplements. In conclusion, girls and parents would benefit from increased access to information about anaemia risks and prevention, and the benefits of WIFAS for adolescent girls. Prevention of anemia should include relevant dietary guidance that considers their socio-cultural milieu and local dietary habits.

Key Words adolescent girls, iron-folic acid, local dietary habits, WIFA programs, socio-cultural milieu

Since 1996, Indonesia has been promoting Weekly Iron and Folic Acid supplementation (WIFAS) among adolescent girls, women of childbearing age, and pregnant women for improving maternal health and nutrition status as well as pregnancy outcomes (*1*). However, there has been an increase in anaemia prevalence among adolescent girls (age 15–24 y) from 37.1% in 2013 to 48.9% in 2018 (*2*).

Studies showed a variety of results about the effectiveness of WIFAS in Indonesia. Several studies also showed that consuming WIFAS only is not enough to decrease anaemia prevalence, as other factors should also be in place, such as clean and healthy lifestyle, consuming iron foods or foods/drinks that enhance iron absorption (*3*, *4*), not consuming foods/drinks that inhibit iron absorption after taking WIFAS or after iron foods consumption (5), high level of compliance towards WIFAS, and knowledge to overcome WIFAS side effects (*6*).

WIFAS program also includes a component of awareness raising about anaemia and WIFAS. However, some studies revealed that Indonesia's adolescent girls have a low level of knowledge, attitude, and practices related to anaemia and WIFAS (*7*, *8*). Studies from other countries showed that appropriate counseling and supervision (*9–11*), awareness-raising for school going adolescent girls by peer educators (*10*, *12*, *13*), and training for service providers, such as teachers and health staffs (*14*) were effective to increase awareness about anaemia and WIFAS. It should be noted that the most critical factors of misconceptions about anaemia and WIFAS was influenced by local context (*11*, *15–17*).

To address the local context, an intervention needs to understand the perspective of local people. A study stated that "... supplementation program has been driven primarily by the supply side of the supply-demand continuum" (*18*), where beneficiaries' perspec-

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tive or local people is often neglected. It is essential to consider local knowledge or experience related to anaemia since "... local communities have the maximum knowledge of their culture and traditions based on their experiences" (*19*). This statement explained that the message or method in communicating anaemia and WIFAS have to be relatable to the local perspective and practical for local people.

There have been limited reports that explore local perspectives in delivering information about anaemia and WIFAS, especially in Indonesia. There are also no documented reports about the involvement of parents as significant beneficiaries of the program. Support from knowledgeable parents about anaemia and WIFAS might lead to behavior change of girls in consuming WIFAS. Lesson learned from studies of the WIFAS program to pregnant women showed that family members play a crucial role in supporting women to consume WIFAS (*20*). Therefore, this article aimed to explore local perspectives related to anaemia and WIFAS program and socio-culture milieu among school-going adolescent girls and parents (as the legal guardian).

MATERIALS AND METHODS

Study area. The study locations were Nutrition International's (NI) supported provinces for WIFAS Supplementation Program intervention. The supported area selected for this study were East Java and East Nusa Tenggara, where ten districts were selected from each province. The selected districts were Pacitan, Ponorogo, Lumajang, Jember, Banyuwangi, Bondowoso, Situbondo, Ngawi, Bangkalan, and Sampang for East Java and Malaka, Alor, Ende, Ngada, Manggarai Barat, Centre Sumba, South West Sumba, Nagekeo, Sabu Raijua and Kupang City for East Nusa Tenggara.

Evaluation design. This study was part of a baseline survey for an improved WIFAS program for 15–19 y of age school going adolescent girls in East Java and East Nusa Tenggara, Indonesia. The baseline was conducted using mixed methods. This article covers the qualitative data in order to present a detailed explanation of the understandings of the WIFAS program among school-going adolescent girls and parents.

In each province, all ten districts were grouped into five clusters. For East Java, the clusters were: (1) Pacitan and Ponorogo; (2) Lumajang and Ngawi; (3) Bangkalan and Sampang; (4) Bondowoso and Situbondo; and (5) Jember and Banyuwangi, while for East Nusa Tenggara were: (1) Kupang and Alor; (2) Malaka and Sabu Raijua; (3) Ngada and Manggarai Barat; (4) Centre Sumba and South West Sumba; and (5) Ende and Nagekeo. The clusters were grouped based on location, where the two districts are close to each other, to make the data collection process efficient.

The WIFAS program is a school-based intervention, thus visiting schools was considered sufficient to meet informants. The schools were chosen through systemic random sampling. The sample was taken from the most recent data of schools from the Ministry of Education and Ministry of Religious Affairs, Republic of Indonesia. Three schools per district were chosen as the sampling frame for the whole study. For the qualitative data collection, two schools from each cluster that have implemented the WIFAS program were chosen to get a whole story related to the program. Hence, the total number of schools included in this study was two schools $\times 5$ clusters $\times 2$ provinces $= 20$ schools.

Table 1. Number of informants.

Informants	East Java	East Nusa Tenggara	Total
FGDs			
Girls	$n=89$	$n=85$	$n=174$
Grade X	59	40	99
Grade XI	10	25	35
Grade XII	20	20	40
Parents	$n=32$	$n=34$	$n=66$
Mother	26	19	45
Father	6	15	21
IDIs			
Girls	$n=10$	$n=10$	$n=20$
Grade X	5	4	9
Grade XI	3	3	6
Grade XII	2	3	5
Parents	$n=5$	$n=5$	$n=10$
Mother	5	4	9
Father	—	1	1

The interview protocol contained open-ended questions about information regarding (1) girls and parents understanding and experience about anaemia; (2) girls and parents understanding and experience about WIFAS; (3) socio-cultural milieu that influences their decision making related to anaemia and WIFAS. Two types of interview protocols were provided: for girls and parents who have received WIFAS from school and for those who have not received. In East Java, almost all of the selected schools had received WIFAS, while in East Nusa Tenggara, only limited schools have received WIFAS. For example, in a district, there was only one school that has received WIFAS. To overcome this problem, we selected two schools from each cluster in East Nusa Tenggara but did not cover information regarding WIFAS.

Informants. For FGDs, ten girls from grade X, XI, and XII and five parents (mother or father) were recruited. Subsequently, one participant from FGDs was selected for IDIs. However, during the data collection period, some parents did not come even after prior invitation. As for girls, students of grade XI and XII were in exam period, so in some schools, only grade X could participate in the interviews. At the vocational schools, we also found that students of grade XI were not attending schools because of the internship period that lasted for three months. As shown in Table 1, there were twenty FGDs with girls ($n=174$), ten FGDs with parents ($n=66$), ten IDIs with girls ($n=20$), and ten IDIs with parents ($n=10$). In total, 240 respondents were inter-

viewed.

The FGDs and IDIs lasted for 1 to 2 h each, where all of FGDs and IDIs were audio-recorded using a smartphone voice recorder, transcribed in Bahasa, and analyzed using Nvivo Pro 12. Two strategies were used in the coding process. The first strategy was based on research questions, and the second one was based on the coding process, which includes descriptive, in vivo, process, evaluation, emotion, and values coding to support analysis (*21*). After the coding process was completed, mind maps were organized as a guide to explain the results of this study.

Ethical clearance for this study was obtained from FKUI-RSCM Research Ethical Committee No. 0057/UN2.F1/ETIK/2018. Written informed consent was also obtained from all participants involved in this study.

RESULTS

Girls and parents understanding about anaemia

Questions about causes, symptoms, consequences, preventions of anaemia, and foods/drinks that enhance and inhibit iron absorption were asked to grasp the girls' and parents' understanding of anaemia. The girls and parents believed that the causes of anaemia were: 'iron deficiency', 'lack of red blood cells', 'menstruation', 'low blood pressure', 'eating irregularly', 'lack of nutritious food', 'stress', 'hereditary disease', and 'lack of sleep/fatigue'. The girls and parents knew that the symptoms of anaemia were 'dizziness, fatigue, light-headedness, malaise, pale, or weakness'. The parents said that 'lack of blood', 'hard to concentrate while studying', 'death', and 'dizziness, fatigue, light-headedness, malaise, pale or weakness' were the consequences of anaemia. The girls shared the same answers as parents; however they also thought that 'causing the emergence of other diseases' and 'metabolism problem' was the consequence of anaemia. To prevent anaemia, the parents thought that the best methods were: 'eat nutritious food', 'do not overwork', and 'take vitamins'. The girls gave the same answers; however, they also thought that 'drink much water', 'have breakfast regularly', and 'take WIFAS' were the preventions of anaemia.

The parents believed that green vegetables, fruits, meat, chicken liver, nuts, eggs, and sugar were foods/drinks that enhance iron absorption. The girls shared the same knowledge; however they also thought that rice, fish, milk, vitamin C, and corn were foods that enhance iron absorption. As for foods/drinks that inhibit iron absorption, the parents answered tea, meat, and fatty food, while the girls answered carbonated drinks, coffee, milk, fruits, vegetables, instant noodles, alcohol, and tea. However, these findings were meaningful when presented based on location. Figure 1 shows the knowledge of foods/drink inhibit iron absorption, and Fig. 2 shows the knowledge of foods/drink that prevent iron absorption.

There were similar responses from the school going adolescent girls from East Java and East Nusa Tenggara regarding foods/drinks that enhance iron absorption. However, corn was mentioned only in East Nusa Tenggara, while chicken liver and milk were in East Java. For knowledge about foods/drinks inhibiting iron absorption, it was shown that instant noodles and carbonated drinks were mentioned only in East Java, while alcohol was mentioned only in East Nusa Tenggara.

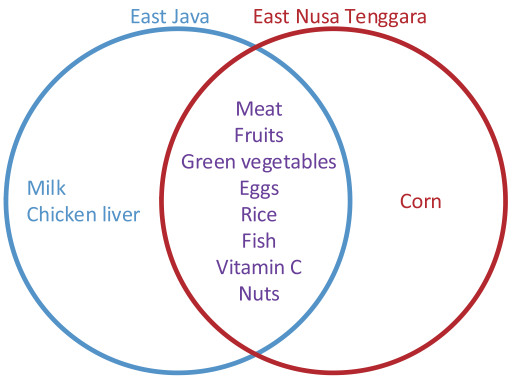

Fig. 1. Knowledge about foods/drinks that enhance iron absorption based on location.

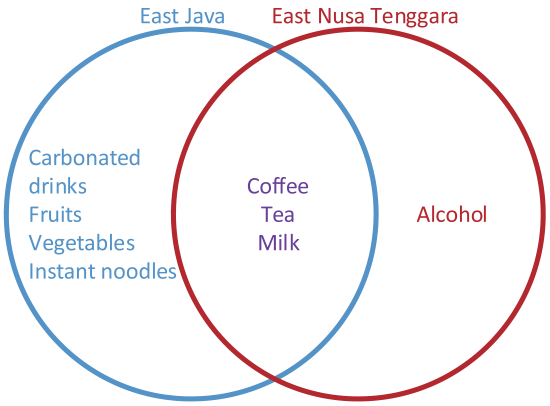

Fig. 2. Knowledge about foods/drinks that inhibit iron absorption based on location.

These findings clearly showed that the knowledge of foods/drinks enhancing or inhibiting iron absorption was not only determined from formal school or information from legitimate sources such as health professionals but also determined by socio-cultural milieu. Corn and alcohol were mentioned in East Nusa Tenggara because corn is their staple food, while alcohol is a drink that is provided in every traditional ceremony. 'Chicken liver', 'milk', 'instant noodles', and 'carbonated drinks' were mentioned only in East Java because these foods/drinks were more accessible by the girls in East Java compared to those from East Nusa Tenggara.

Girls and parents experiences related to anaemia

Regarding their experiences about anaemia, some participants had been diagnosed as anemic, and some had received treatment and medication from a doctor. When a question "have you noticed that your friend (anemic girls) is pale and might have some sickness?" was asked, they answered that they never thought she was sick. Parents who have an anemic daughter also never thought their daughter was anaemic. They only

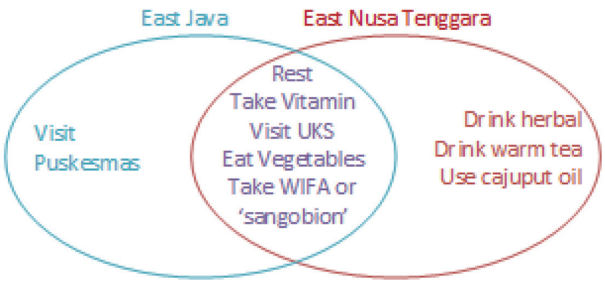

Fig. 3. Decisions when experiencing symptoms of anaemia.

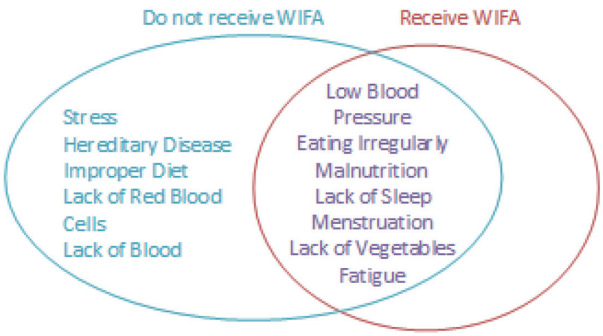

Fig. 4. Differences of understanding between students and parents who have received WIFA and haven't receive WIFA.

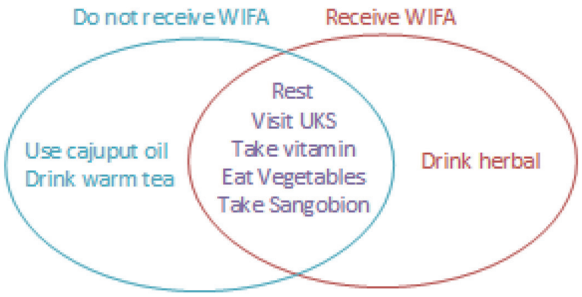

Fig. 5. Differences of experiences between students and parents who have received WIFA and haven't receive WIFA.

knew after their daughters told them about their condition and consulted with the doctor. This shows that girls and parents had difficulties in observing anaemia symptoms, so they did not consider anaemia symptoms could lead to a severe illness.

In response to a question regarding their decision when they have anaemia symptoms, such as easy fatigue and loss of energy, dizziness, pale skin, difficulty concentrating, or fainting, the girls stated they would 'visit public health center', 'visit school health unit', 'rest', 'take vitamin', 'eat vegetables', 'take WIFAS or sangobion (a commercial supplement for anaemia)', 'apply cajuput oil', 'drink warm tea', and 'drink traditional herbal' whereas parents responded with the same answers. The answer 'take WIFAS or sangobion', however, only occurred from students, both from East Java and East Nusa Tenggara, who already received WIFAS at school. Figure 3 presents meaningful findings where only informants from East Java that answered 'visit PUSKESMAS' and 'take vitamin' and only from East Nusa Tenggara that answered 'apply cajuput oil', 'drink warm tea', and 'drink traditional herbal'. These findings showed the urban-rural reality where people in East Java already used to go to public health centers or drug stores, yet people in East Nusa Tenggara would instead use something they have at home, such as cajuput oil, tea, and herbal. In East Nusa Tenggara, public health centers and drug stores were limited in number, and far from residential areas, thus it is understandable if they did not choose to go to public health centers or drug stores.

Girls and parents from East Nusa Tenggara, especially schools that have not received WIFAS, have inadequate knowledge and experience about anaemia. When we asked the girls and parents whether they suffered from symptoms of anaemia, they stated that those symptoms were not because of anaemia but because of superstitious reasons. Teachers from East Nusa Tenggara stated that "we have many students that look pale, easily had a headache, and suddenly fainted ... but it is not because of anaemia. It is because she is possessed by holy spirits". This understanding showed that the teacher associated anaemia symptoms with superstitious phenomena. Instead of seeing anaemia or its symptoms as an illness/lead to severe illness, some people from East Nusa Tenggara tried to address it through superstitions rather than taking resort to any medication from health staff.

There are no significant differences in understanding and experiences between students and parents who have received IFA and have not received WIFA, as shown in Figs. 4 and 5. This finding showed that receiving WIFA or implementation of the WIFA program in school does not guarantee a higher level of understanding about anemia.

Girls and parents understanding about WIFAS

Understanding about WIFAS was divided into four sub-themes: dosage, regimen, benefits, and side effects. The girls gave varied answers about the dosage of WIFAS, where they answered: 'thrice a day', 'once a day', and 'once a month'. However, some girls who already received WIFAS from school answered that they do not know the dosage since they only drank IFA when the teacher gave them. The parents also shared the same answer, while some said they did not know the dosage. The girls answered 'take WIFAS before food', 'take WIFAS after food', and 'take IFA before sleep' as the regimen of WIFAS. The parents shared the same answers, but they added 'do not take WIFAS on menstruation period'. The parents believed that the benefit of WIFAS was: 'adds blood', 'no blood loss while giving birth', and 'become fit'. The girls shared the same answers as parents, but they added 'boost stamina', 'adds iron', 'better digestive system', 'overcoming premenstrual syndrome', and 'adds red blood cell' as the

benefit of consuming WIFAS. As of the side effects of WIFAS, the parents answered 'high blood pressure', 'dependency to take medicine', and 'malaise/nauseous'. The girls only knew 'malaise/nauseous' as the side effects of WIFAS, however, some of them also did not know the side effects of WIFAS.

Girls and parents experience about WIFAS

To understand girls' and parents' experiences of WIFAS, only girls and parents who have received WIFAS from school who could share stories. Most of their stories consist of WIFAS side effects, ways of overcoming side effects, and reason for adherence/non-adherence.

WIFAS side effects and ways of overcoming it. The girls and parents shared that after consuming IFA, 'felt nauseous', 'sleepy', 'had black feces', and 'the after taste is weird'. The girls stated that because of the side effects, they decided not to drink IFA. Several girls also stated that they did not take IFA during the exam period because they felt sleepy. As ways of overcoming it, girls stated they 'eat snacks', 'eat fruits', or 'to take WIFAS before sleep', while parents only answered 'eat fruits'. It has to be noted that no informants answered to take WIFAS before eat.

Reasons for adherence and non-adherence. The girls stated that the reasons of adherence were: (1) 'know the consequences of anaemia', where the most mentioned consequences was 'lack of focus during lesson'; (2) 'know the benefits of WIFAS', where the benefits mentioned were 'WIFAS could overcome premenstrual syndrome' and 'WIFAS could boost stamina'; (3) 'influenced by their friends who also consumed IFA'; (4) 'influenced and monitored by teacher at time of consuming IFA'; (5) 'influenced by parents'; and (6) 'become the student representative that helps the distribution of WIFAS at school' since she feel obligated to become the example for her friends in consuming WIFAS. Parents were also asked for the reasons for adherence of their daughter, some of them answered: 'because we said so (to consume WIFAS)' and 'could overcome premenstrual syndrome'.

As for reasons of non-adherence, some of the parents stated: 'because we said so (to not consume WIFAS)'; 'its side effects' which are 'probability of high blood pressure' and 'the dependency of WIFAS', and 'daughter does not want to drink medicine'. The reasons for non-adherence stated by the girls were: (1) 'they haven't eaten', which shows their understanding of WIFAS possible side effects and how to overcome it. However, this answer could only be found from schools that asked the students to take WIFAS together in class at a designated time; (2) 'forgot'; (3) 'feel healthy', as some girls from East Java stated: "I feel healthy. I found it unnecessary to take medicine."; (4) 'on menstruation period'; (5) 'its side effects', some of the side effects that were stated: 'feels nauseous' and 'feels sleepy' which made them did not want to consume WIFAS during exam week, 'probability of having high blood pressure', and 'do not want to be dependent to WIFAS'; (6) 'influenced by parents' where we also found that some of the source information of side effects misinformations, 'probability of having high blood pressure' and 'the dependency to WIFAS', were from the parents; (7) 'influenced by friends that do not consume IFA'; (8) 'tablet is too big'; and (9) 'do not want to drink any medicine/supplement'. School going adolescent girls from East Nusa Tenggara stated that: "I am not accustomed to drinking medicine. I always feel nauseous after drinking medicine. I'd rather change the way I eat to improve my health than drinking medicine".

Socio-cultural milieu, local dietary habits, and living conditions

It was stated before that the knowledge of girls and parents regarding foods/drinks that enhance and inhibit iron absorption was influenced by socio-cultural milieu and accessibility to foods. However, this knowledge did not support their local dietary habits.

For example, in East Nusa Tenggara, the typical diet for breakfast, lunch, and dinner according to girls were: rice, rice corn (mashed rice and corn), and green vegetables, especially for those who lived in a dormitory or far from their parents. Sometimes for lunch, they only ate snacks at school. Even though girls and parents knew that meat enhances iron absorption, people in East Nusa Tenggara, especially in the rural area, rarely consume meat. Meat was really expensive and only served during traditional ceremony. Traditional ceremony could happen once in a month, however, it is more an adult place than for adolescent girls. Girls still have other activities after school. Girls who did not live with their parents usually had a part-time job after school until evening time, so they usually felt tired at school.

It is also common for students, both from East Java and East Nusa Tenggara, to not had breakfast before schools. Their dietary habits were dominated by carbohydrate-rich foods with a small portion of protein, even though protein food sources were plenty and accessible in East Java. For example, in Madrassah (a religious-based school), students lived in the dormitory with no healthy food provided by the Madrasah. Students had to buy food at food stalls that mostly sold carbohydrated-rich foods. Meat or proteins were provided, but it was considered expensive for Madrasah students.

DISCUSSION

Much has been documented in the literature regarding the low knowledge of anaemia and WIFAS and also its compliance among school-going adolescent girls. This study found that there were still misconceptions about anaemia regarding its causes, consequences, and preventions that needs to be addressed. However, the misconceptions were related to socio-cultural context. Studies in Costa Rica, Bangladesh, Zimbabwe, and Burkina Faso showed that women have misconceptions about anaemia and WIFAS based on their local believes (*13*, *15*, *16*, *22*).

It is also found that socio-cultural milieu and local dietary habits influence girls' and parents' decisions related to anaemia and WIFAS. This finding suggests that information dissemination related to anaemia and

WIFAS have to consider the socio-cultural milieu and local dietary habits. For example, identifying local foods/drinks that enhance/inhibit iron absorption is needed to improve the girls' dietary practices. However, the dietary practices of girls are still dependent on their parents. Parents who are knowledgeable about diet to prevent or overcome anaemia are also needed to support their daughters. This shows the dire need for practical information related to anaemia and WIFAS in addition to theoretical knowledge. Practical information means information attuned to its socio-cultural milieu and local dietary habits. Other studies also showed that sometimes local dietary habits contradict with the prevention or mitigation of anaemia (*22*).

There were also some misconceptions about WIFAS that could lead to non-adherence. The right messages about dosage and regimen were needed to prevent side effects of WIFAS. The benefits and side effects of WIFAS were also needed as they influence adherence. The reasons for adherence and non-adherence showed how messages about the consequences of anaemia, benefits of WIFAS, and influence from family members and peer groups were essential factors in delivering knowledge and address misconceptions about anaemia and WIFAS.

Parents, however, were not always the family members that could influence girls' decisions regarding anaemia and WIFA. Several students from Madrasah and in East Nusa Tenggara live far away from their parents, so sometimes their legal guardians are the teachers or their relatives. Students from Madrasah come from other cities while students in East Nusa Tenggara have to live downtown (where the school is more accessible) with their relatives or in the dormitory to go to school. This shows that socialization has to cover not only parents but other family members or relatives that could help in influencing girls in taking WIFAS.

Participation from the girls in delivering WIFAS at school positively influences adherence, as they feel obliged to promote and deliver WIFAS to her friends. This finding suggested that designing an effective delivery system with girls at the center of the delivery process at schools is necessary to increase the adherence of WIFAS consumption. Studies in India revealed that through a student-based approach in delivering WIFAS and information about anaemia, the prevalence of anaemia was reduced because of the high coverage and compliance rate (*9*). However, this study did not explain how this approach could increase the level of knowledge about anemia and WIFAS.

Some schools already implemented "WIFAS Consumption Day", a policy where the girls have to take WIFAS together at school at a designated time. For example, the designated time is every Monday after the weekly ceremony in the morning or on any day before the first lesson starts. However, this can be problematic if the girls have not eaten breakfast as WIFAS should not be taken on an empty stomach. So, some of them would not take WIFAS. Teachers then advised them to take WIFAS at home after they eat, but sometimes the girls forgot to take WIFAS. This approach is also implemented in Uttar Pradesh, India where they called it "UMANG Day" (*9*).

These findings helped to determine: (1) messages that need to be designed in order to increase the awareness of anaemia and WIFAS; (2) social-cultural milieu and local dietary habits are crucial factors in designing relatable messages and practical information to targeted audience about anaemia and WIFAS; (3) family members/relatives and peer groups are needed for knowledge transfer and sharing experience about anaemia and WIFAS as a part of WIFAS intervention; and (4) approaches that are more effective and easy to monitor in order to ensure that girls consume WIFAS at school. In order to increase awareness of anaemia and WIFAS, these factors could help to design a beneficiaries-based and local-based WIFAS program.

It can be concluded that in order to implement the WIFAS program, initial social mapping is needed, especially related to the socio-culture milieu, dietary habits, living conditions, and family members that have influence over the school going adolescent girls. The social mapping will help to design socialization about anemia and WIFAS that attuned with the targeted audience.

Disclosure of state of COI

No conflicts of interest to be declared.

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REFERENCES

1) Ministry of Health Republic of Indonesia. 2016. The Guidebook of Anaemia Prevention and Mitigation for Adolescent Girls and Women of Childbearing Age. Jakarta: Ministry of Health Republic of Indonesia, 44 p.

2) Ministry of Health Republic of Indonesia. 2018. Hasil Utama Riskesdas 2018 (Main Results of Basic Health Research 2018) [Internet]. Jakarta; Available from: http://www.depkes.go.id/resources/download/info-terkini/materi_rakorpop_2018/Hasil Riskesdas 2018.pdf

3) Briawan D, Adriyani A, Pusporini P. 2009. Determinant of the success of iron supplementation on adolescent girl (junior high school students and vocational school) in Bekasi. *Indones J Clin Nutr* **6**(2): 78–83.

4) Fitrianti L, Miko TY. 2019. Factors associated with anemia among adolescence girls at SMAN 1 Telukjambe Kabupaten Karawang in 2015. *In*: The 3rd International Meeting of Public Health and The 1st Young Scholar Symposium on Public Health. KnE Life Sciences, p 454–460.

5) Handayani I, Suantara I, Sugiani P. 2013. Iron Tablet

Supplementation effectively increases haemoglobin level at adolescent girls In Tampaksiring Gianyar District. *J Nutr Sci* **4**(2): 111–118.

6) Soekarjo DD, Pee S De, Kusin JA, Schreurs WHP, Schultink W, Bloem MW. 2004. Effectiveness of weekly vitamin A (10,000 IU) and iron (60 mg) supplementation for adolescent boys and girls through schools in rural and urban East Java, Indonesia. *Eur J Clin Nutr* **58**: 927–937.

7) Hasyim NA, Mutalazimah, Muwakhidah. 2018. The knowledge of anemia risk, prevention behavior of anemia, and hemoglobin levels on adolescent girls. *PROFESI (Profesional Islam Media Publ Penelit)* **15**(2): 28–33.

8) Patimah S, Royani I, Mursaha A, Thaha AR. 2016. Knowledge, attitude and practice of balanced diet and correlation with hypochromic microcytic anemia among adolescent school girls in maros district, South Sulawesi, Indonesia. *Biomed Res* **27**(1).

9) Vir S, Singh N, Nigam A, Jain R. 2008. Weekly iron and folic acid supplementation with counseling reduces anemia in adolescent girls: a large-scale effectiveness study in Uttar Pradesh, India. *Food Nutr Bull* **29**(3): 186–194.

10) Shah SP, Shah P, Desai S, Modi D, Desai G, Arora H. 2016. Effectiveness and feasibility of weekly iron and folic acid supplementation to adolescent girls and boys through peer educators at community level in the tribal area of Gujarat. *Indian J Community Med* **41**(2): 158–161.

11) Galloway R, Dusch E, Elder L, Achadi E, Grajeda R, Hurtado E, et al. 2002. Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. *Soc Sci Med* **55**(4): 529–544.

12) Priya SH, Datta SS, Bahurupi YA, Narayan KA, Nishanthini N, Ramya MR. 2016. Factors influencing weekly iron folic acid supplementation programme among school children: Where to focus our attention? *Saudi J Heal Sci* **5**(1): 28–33.

13) Compaore A, Gies S, Brabin B, Tinto H, Brabin L. 2014. "There is iron and iron…" Burkinabè women's perceptions of iron supplementation: a qualitative study. *Matern Child Health J* **18**(8): 1976–1984.

14) Bhatt RJ, Metta HK, Khatri V, Chhaya J, Rahul K, Patel P. 2013. A study of access and compliance of iron and folic acid tablets for prevention and cure of anaemia among adolescent age group females in Ahmedabad district of India surveyed under multi indicator cluster survey 2011. *Glob J Med Public Health* **2**(4): 1–6.

15) Tinago C, Annang IL, Blake C, Frongillo E. 2017. Individual and structural environmental influences on utilization of iron and folic acid supplementation among pregnant women in Harare, Zimbabwe. *Matern Child Nutr* **13**(3): e12350.

16) Nguyen P, Sanghvi T, Kim S, Tran LN, Mahmud Z, Menon P. 2017. Factors influencing maternal nutrition practices in a large scale maternal, newborn and child health program in Bangladesh. *PLoS One* **12**(7): e0179873.

17) Nagata JM, Gatti LR, Barg FK. 2012. Social determinants of iron supplementation among women of reproductive age: A systematic review of qualitative data. *Matern Child Nutr* **8**(1): 1–18.

18) Griffiths M. 2002. Communication strategies to optimize commitments and investments in iron programming. *Am Soc Nutr Sci* **132**: 834–838.

19) Nandi R, Nanda RB, Jugran T. 2015. Evaluation from inside out: The experience of using local knowledge and practices to evaluate a program for adolescent girls in India through the lens of gender and equity. *Eval J Australas* **15**(1): 38–47.

20) Sedlander E, Rimal RN, Talegawkar SA, Yilma H, Munar W. 2018. Designing a socio-normative intervention to reduce anemia in Odisha India: A formative research protocol. *Gates Open Res* **2**(15).

21) Miles MB, Huberman AM, Saldana J. 2014. Qualitative Data Analysis: A Methods Sourcebook. 3rd Ed. SAGE Publications, London.

22) Jefferds MD. 2002 Concepts of iron deficiency anemia and public health measures in rural Costa Rica. *Soc Sci Med* **55**(7): 1143–1156.