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BEHAVIORAL EDUCATION FOR IFA SUPPLEMENTATION INTERVENTION

Commit to Iron, Empower Women Across Generations

North America Representation

Harvard Medical School, Harvard Kennedy School,
Harvard T.H. Chan School of Public Health



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BESI: Behavioral Education for IFA Supplementation Intervention

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ABSTRACT

Iron deficiency anemia (IDA) disproportionately affects adolescent girls worldwide. Insufficient iron intake during adolescence can lead to long-term health issues, impacting future productivity and overall well-being. For adolescent girls, iron deficiency is particularly concerning as it can affect their future pregnancies and the health of their offspring. Despite global efforts to combat anemia through iron folic acid (IFA) supplementation, adherence to IFA tablets remains low due to various individual and environmental factors. BESI aims to address low adherence to IFA supplementation among adolescent girls by promoting cross-generation empowerment among women. The project will pair adolescent girls and pregnant women with a mobile app, strengthening IFA supplementation awareness and health monitoring that both parties need. This approach is complemented by taking IFA tablets with oranges activity in schools to reduce barriers to IFA intake. It is a strategy to elevate community elements such as schools and government that shape behavioral decisions behind the adherence to IFA supplementation. A one academic-semester project will be piloted in Indonesia, a country with one of the highest anemia cases among reproductive-age women. We specifically focus on students in the Low-Cost Private Schools (LCPS), as they are highly marginalized due to the socioeconomic background of their families and schools' lack of public funding. Addressing low iron intake in the most challenging setting, as reflected by adolescent girls' studying in LCPS, will generate innovative ways to improve the effectiveness of the IFA supplementation program in Indonesia and countries around the world. The successful execution of this project will significantly contribute to achieving the 2030 Agenda for Sustainable Development, as it is closely aligned with the goals of SDGs 1, 2, 3, and 5. We believe that the behavioral change interventions proposed by this project will complement efforts to enhance the supply chain of IFA supplements, ultimately leading to successful and sustainable IDA elimination.

Keywords: anemia, adolescent girls, behavior change, intergenerational collaboration, low-cost private schools, mobile health apps, youth empowerment, peer-monitoring.

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1. INTRODUCTION AND PROBLEM STATEMENT

1.1. The Global Challenge of Anemia

Anemia is defined as a low red blood cell (hemoglobin) concentration, <13 g/dl for men, <12 g/dl for women, and <11 g/dl for pregnant women.¹ As a result, oxygen cannot be well distributed to our bodies, leading to symptoms such as exhaustion, heart rhythm disturbance, or breathing difficulties.² In adolescents, anemia can reduce concentration and learning ability and negatively impact their growth and development. Later in life, anemia can increase the morbidity and mortality of pregnant women and their newborns. Hence, anemia can cause intergenerational malnutrition and significantly impact our human capital.³

Despite its adverse impact, the burden of anemia remains a global health challenge. In 2021, the global prevalence of anemia across all ages was 24.3%. Although this represents a decrease from 28.2% in 1990, progress has been slow, and disparities persist across age, sex, and geography. Anemia prevalence was highest in children under 5 years at 41.4%. Among individuals aged 15-49 years, females had a significantly higher prevalence compared to males (33.7% vs. 11.3%). The greatest anemia burden was in the Global South compared to the Global North.⁴ Moreover, pregnant women consistently showed a high anemia prevalence compared to non-pregnant women (36% vs. 30% in 2019), indicating that women are not prepared to enter pregnancy with adequate hemoglobin levels.⁵ Pregnant women are the most at-risk group, and this also contributes to the high prevalence of anemia in children under 5. Additionally, the severity of anemia has shifted towards mild anemia, leading many individuals to be unaware that they are anemic.⁵ Meanwhile, the WHO Global Nutrition Target aims to decrease anemia among women of reproductive age by 50% by 2025.⁶

One of the main causes of anemia is iron deficiency due to inadequate intake of iron-rich foods.⁵ This type of anemia is commonly referred to as iron-deficiency anemia (IDA), and is the focus of this project. Adolescent girls and pregnant women are particularly vulnerable due to the insufficient dietary iron intake and absorption, *coupled* with increased iron requirements during these life stages.

During adolescence, iron is essential because of the increased blood volume, as well as for producing myoglobin to develop muscles and enzymes for growth. Adolescent girls require additional iron intake about 0.35 to 0.55 mg/day.⁷ Meanwhile, they are at risk of low iron intake due to dietary habits influenced by peers, such as adopting weight-loss diets to achieve a slim body shape. Additionally, they often prefer fast food, which lacks iron and other essential nutrients, as it is convenient and heavily marketed through appealing advertisements.⁸ Moreover, monthly menstrual blood loss significantly increases their risk of anemia.⁹ As young women's bodies develop in preparation for future childbearing, insufficient iron stores heighten the risk of IDA for both themselves and their future children. During pregnancy, the demand for iron increases significantly to



support fetal growth and to build iron stores for infants, which they will rely on during their first 6 months of life.^{3,10}

Vulnerability arises because dietary iron intake alone often fails to meet the increased iron demands during adolescence and pregnancy.³ Therefore, oral supplementation of iron, usually combined with folic acid (iron-folic acid/IFA), has emerged as a global, cost-effective strategy to prevent and control anemia. Adolescent girls are recommended to take IFA supplement weekly and pregnant women are recommended to take it daily.¹¹ However, a significant challenge persists with **low adherence to IFA supplementation.**^{12,13}

1.2. Youth Empowerment and Anemia

Adolescent girls are both the *target beneficiaries* and *key agents of change* in iron-deficiency anemia interventions. Preventing anemia in adolescent girls is crucial for their health, growth, and learning productivity.³ Additionally, ensuring good hemoglobin levels during adolescence is essential to prepare them for pregnancy and childbirth, as anemia can persist throughout these periods.¹⁴ Adolescence is also a crucial developmental stage where individuals develop capabilities that influence their health and well-being for the rest of their lives. Therefore, establishing a good adherence of taking IFA tablet starting from adolescence can ensure the ongoing IFA supplementation throughout pregnancy.¹⁵

“Failure to invest in the health of the largest generation of adolescents in the world’s history jeopardises earlier investments in maternal and child health, erodes future quality and length of life, and escalates suffering, inequality, and social instability”.

- Resnick, et al. on the 2nd Lancet series on adolescent health

(Source: Resnick MD, Catalano RF, Sawyer SM, Viner R, Patton GC. Seizing the opportunities of adolescent health. Lancet 2012; 379: 1564–67.)

Adolescents have the potential to become key agents of change in addressing anemia. They are at the stage where they can significantly influence their peers and communities.¹⁶ Their growing capabilities, enthusiasm, and social awareness position them to drive positive change. By involving them in initiatives like anemia prevention, it will not only empower them but also amplify the impact of the interventions, as they can effectively communicate and advocate for important health issues within their communities and beyond. [A study on obesity behavior change intervention has shown that adolescents as the health educators can influence positive dietary changes in their adult parents.](#) Engaging adolescents has been an effective strategy in various health prevention initiatives.¹⁷ Additionally, their fluency in technology further enhances the effectiveness of intervention.



1.3. Anemia in Indonesia

Similar to many developing nations, anemia is a significant public health issue in Indonesia. As of 2018, Indonesia's overall prevalence of anemia is 23.7% and 48.9% of pregnant women in Indonesia are anemic.¹⁸ These substantially high percentages are partly explained by Indonesia's large and diverse population, making it challenging from policy perspective to tackle anemia cases. But such a challenge also comes with opportunities, where effective strategies developed and implemented in the country could be adapted and applied in countries with similar social and geographic complexity.

One notable characteristic that made anemia problem in Indonesia stand out is that it affects women of reproductive age (15-49 years old) at a higher prevalence compared to the global average (32.8% vs 29.9%, respectively).^{19,20} Studies have shown that high prevalence among this particular group is a reflection of high anemia rates among adolescents girl.^{21,22} Hence, failure in reducing anemia cases in adolescent girls may carry health burden throughout the life cycle in Indonesia.

Anemia in Indonesia can be attributed to several factors such as nutritional deficiencies driven by traditional dietary habits that lacks sufficient iron-rich foods and insufficient health education regarding anemia.^{20,23} In response to this problem, the government of Indonesia has launched its flagship program of IFA supplementation called *Program Suplementasi Tablet Tambah Darah* (re: TTD Program) for women of reproductive age. The program is an adaptation of IFA supplementation that is being practiced in many places worldwide, including India, Vietnam, and Nepal.

One of TTD Program implementation sites is in schools. Schools are ideal locations because they bring adolescent girls together in one place, simplifying both the distribution of IFA tablets and provide opportunities for nutrition education. Despite being conceptually relevant to solving the issue, there are challenges in policy implementation. Adolescents' compliance in taking IFA tablets is low, mainly due to side effects and a lack of awareness. Additionally, poor monitoring practices exacerbate the issue, as girls often choose not to take the tablet at school, opting to take them home and then forgetting to take them.²⁴⁻²⁶

While these studies have shown that anemia prevention in school settings are technically challenging, these research are relatively conducted with a small sample sizes compared to Indonesia's total population of school-aged children.²⁷ This creates another academic challenge in generalizing the study result nationwide but also offer opportunities for future experimentation of school-centered interventions, in which this project aims to focus further.



Box 1. The Neglected Population: Low-Cost Private School (LCPS) Students



Picture 1. LCPS Students in Pekalongan, Indonesia. Photo by Ed Us from Unsplash

The collaboration between health institutions and schools is essential for the success of TTD Program implementation. School administration would have to work closely with health officials from the assigned sub district health facilities. Since the provision of IFA tablets falls under the responsibility of these sub district health facilities, any failures in tablet distribution are largely attributed to the public health officials there. Studies have documented these issues in the field, mainly driven by the shortage of human resources to manage the distribution of IFA tablets and balancing with nutrition education.²⁴

When schools do not receive support from these health facilities, they have to seek alternative ways to implement similar programs independently. From a public finance perspective, public schools have several funding sources that they can temporarily allocate for the TTD Program. In addition to the annually allocated state and subnational budgets, public schools receive funding from *Bantuan Operasional Sekolah* (BOS), or "School Operational Assistance," which covers non-personnel operational costs. This funding can be used for health education programs (such as workshops and distributing educational materials), purchasing medical supplies, including IFA tablets. Private schools, particularly high-cost institutions like international schools, can also procure similar services with their own money. However, low-cost private schools (LCPS) often lack sufficient funding, leaving their students as a relatively neglected part of the TTD Program ecosystem.



LCPS have emerged as a significant part of Indonesia's education system. They offer a system tailored for low-income families seeking affordable yet more advanced education curriculum than the public school, such as additional emphasis on religious education or specialized civic and character development.²⁸ The growth of LCPS is driven by the increasing demand for education among low-income families, particularly in areas where public schools are either non-existent, such as in rural areas, or in densely populated urban areas.

LCPS received funding from BOS similarly with the public schools. But the characteristic of their school being small and remote for rural areas makes the effectiveness of this funding weaker than their public school counterparts. Furthermore, BOS are usually allocated based on the number of students in the school. But this arrangement is applicable only if the school has 60 students or more. Many LCPS have students less than 60 pupils and get their assistance from school fees that are considered low.²⁹ As a result, funds such as BOS are not necessarily sufficient to provide additional health services when sub district health facilities are not capable of providing IFA supplements or any other related health programs.

Therefore, we're choosing this specific community for our project to advocate for their needs and ensure the adolescent girls in these schools are included in the TTD Program ecosystem.

1.4. Problem Statement

Iron-deficiency anemia, particularly during adolescence, can lead to poor health, reduced productivity, and increased risks of future complications, including adverse pregnancy outcomes. Adolescence and pregnancy are critical periods with increased iron demands that cannot be met through diet alone. Therefore, a national IFA supplementation program is essential. However, with low adherence to IFA consumption among Indonesian adolescents, there is an urgent need for innovative strategies to improve the program's effectiveness and empower adolescent girls as key agents of change in addressing anemia among both adolescents and, potentially, pregnant women.



2. PROBLEM ANALYSIS AND BUILDING SOLUTIONS

2.1. Social-ecological Theory

Social-ecological theory posits that individuals exist within larger social systems and interact closely with their environment, influencing their health outcomes. Building on the work of Bronfenbrenner (1977), McLeroy et al. (1988) developed an ecological framework with five levels of influence that shape health behavior: intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors, and public policy.^{30,31}

1. Intrapersonal factors: include characteristics of the individual such as knowledge, attitudes, behavior, self-concept, skills, and developmental history.
2. Interpersonal processes and primary groups: include formal and informal social networks and support systems, including family, work groups, and friendship networks.
3. Institutional factors: include social institutions with organizational characteristics and the formal and informal rules and regulations governing their operation.
4. Community factors: include relationships among organizations, institutions, and informal networks within defined boundaries.
5. Public policy: includes local, state, and national laws and policies.

This framework highlights the complex interplay between individual and environmental factors, providing a better understanding of iron-deficiency anemia and low adherence to IFA supplementation. Its purpose is to focus on the environmental causes of behavior and identify environmental interventions that can influence behavior more effectively than targeting individual characteristics alone.³¹

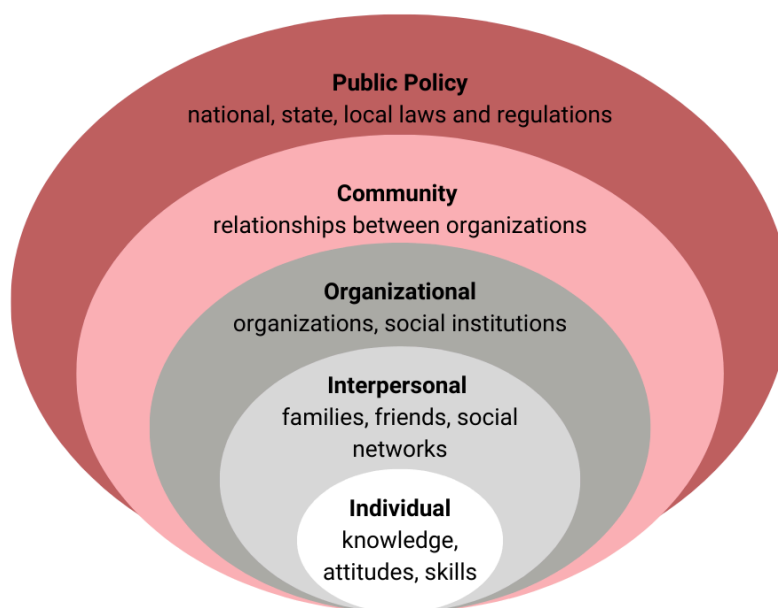


Figure 1. Social-ecological framework. Source: McLeroy, et. al.³¹



2.2. Intrapersonal Factors

The 2023 Indonesia Health Survey found that only 11.5% of girls aged 10-19 who received the IFA tablets actually consumed it. Reasons for non-adherence were primarily related to concerns about taste and smell (29.7%), forgetfulness (29.2%), and skepticism regarding its necessity or benefits (12.8%).³²

This highlights the importance of individual factors, such as comprehensive knowledge, motivation, self-efficacy, and positive attitudes toward IFA supplementation. Insufficient knowledge about the definition, causes, effects, symptoms of anemia, as well as guidelines for taking the supplements and the risks associated with not taking them, can discourage individuals from consuming the IFA tablets.³³ Lack of motivation can also be due to the unpleasant taste and smell of IFA tablets, often described as fishy or metallic. Additionally, side effects such as nausea, dizziness, and constipation are major reasons why people avoid them.³⁴ Moreover, myths surrounding IFA continue to pose challenges to effective supplementation. Some believe they cannot take IFA supplements during menstruation.³⁵

Box 2: Behavioral Biases in Adherence to IFA Supplementation

As mentioned above, behavioral biases play a significant role in adherence to IFA supplementation, such as forgetfulness or irregular tablet consumption. Adolescents with low perceived susceptibility to anemia—believing they are not at risk—will not prioritize regular IFA supplementation.³⁶ This can lead to forgetfulness, or ignorance, particularly since they only need to take it once a week. The “nature” that tablets should only be taken when one is sick also makes it less likely for adolescents to remember taking them.³⁷ Additionally, anemia's nonspecific symptoms, such as fatigue, are often associated with other common illnesses like the flu, further diminishing the perceived risk of anemia.

Moreover, the benefits of taking IFA tablets typically manifest over the long term, without immediate perceptible feedback. Instead, some people might feel discomfort due to the taste and smell.³⁷ Consequently, the decision to take IFA tablets is heavily influenced by present bias, where immediate side effects outweigh perceived long-term health benefits.³⁸ Therefore, educational interventions alone are sometimes ineffective. We need to consider these behavioral biases and develop innovative solutions to encourage adolescents to take IFA tablets consistently.

In this specific project, we are focusing the intervention on addressing behavioral biases using cognitive dissonance theory and nudging. Cognitive dissonance theory, developed by Leon Festinger, suggests that people experience discomfort (dissonance) when their behaviors are inconsistent with their attitudes or beliefs.³⁹ If



adolescent girls remind others, in this case pregnant women, to take their IFA tablets, they might feel compelled to take their own supplements to avoid discomfort of acting inconsistently with their advice. Secondly, the nudging component offers perceptible feedback from taking IFA tablets, allowing adolescents to observe the health benefits of IFA supplementation through the real experiences of pregnant women. This approach makes the benefits of IFA supplements more tangible. We will discuss the design of this intervention in Chapter 3.

2.3. Interpersonal Factors

Interpersonal factors, such as parental influence and peer dynamics, significantly shape the consumption of IFA supplements among adolescents. Misconceptions held by parents regarding anemia and IFA supplements can deter their children from taking them, often due to concerns about potential side effects like high blood pressure or dependency. Conversely, supportive parental behaviors such as reminders and supervision can promote adherence to IFA supplementation.³³

Moreover, peers who collectively consume IFA supplements can encourage adolescent girls to do the same. Adolescents heavily rely on peer relationships and peer pressure during this stage, making friends a significant influence that prompts action. Social pressure plays a crucial role in influencing behavioral decisions, including IFA consumption.³³

Teachers at schools also play a crucial role in educating students about the importance of consuming iron tablets weekly. Increased support and guidance from teachers can effectively encourage adherence to IFA consumption among students.³⁴

2.4. Organizational Level

Organizational level also has an important role in anemia problems. It influences long-term health behavioral changes in individuals because individuals spend most of their lives in organizational environments. For example, adolescents spend a half of their time in schools with their peers and teachers. Rules, regulation, or activities in schools influence adolescents' behavior. For instance, if the school provides healthy food in their school cafeteria, students will have awareness about the importance of nutritious food.³¹

A qualitative study also recommends that schools ban advertising of unhealthy foods and beverages within their environments.⁴⁰ Nutrition regulation in school environments could improve quality of diet among students, e.g school lunch program which includes vegetables and fruits, banning candy and sweetened beverage, and prohibiting of junk food in vending machine.⁴¹

In the case of solving the anemia problem, the school environment can support the strategy through school gardening. Many school gardens are not yet well developed.



Meanwhile, a study revealed that school gardens could become sources of nutritious fruits and vegetables for students and could reduce the incidence of anemia among school children.⁴² For example, school gardens could be planted with oranges. Oranges can enhance iron absorption when taken with IFA tablets due to their high vitamin C content. Based on these examples, schools can provide fruits alongside IFA tablets to help minimize the tablet's unpleasant taste and smell. This has been a common recommendation for taking IFA tablets.⁴³ School as an organization plays a crucial role to support the IFA supplementation program to tackle anemia among adolescents.

2.5. Community Level

As explained in previous sections, adolescent girls spend most of their active time in school. Therefore, it is reasonable to assume that the larger school community also plays a substantial role in shaping their health behaviors. However, it is challenging to generalize school communities and design a one-stop intervention that empowers adolescent girls' health. This is due to the fact that school communities are formed by parents' preferences and their socioeconomic backgrounds⁴⁴ as well as recently implemented zoning regulations for public school admission in Indonesia that led to students attending schools in their own neighborhoods.⁴⁵ Given the limited seats, not everyone can be accepted into relatively more affordable public schools. Those with poorer exam performance are often eliminated during the admission process - situations that often affect students coming from lower socioeconomic backgrounds. When public schools are at full capacity, students from poorer households that are eliminated from public school admission often have to seek affordable private schools.⁴⁶ This is where low-cost private schools (LCPS) accommodate such demand. Therefore, students attending LCPS are highly likely to come from marginalized parts of society.

Conceptually, schools are platforms that enable individuals to improve their socioeconomic status through education activities, including health education lectures. In LCPS, community members are coming from lower socioeconomic backgrounds who are also likely to have low awareness of health education. The role of community members in school remains central - especially in adopting school-based adolescent nutrition intervention. A study in urban areas in Indonesia shows that school communities have begun organizing efforts to address issues in adolescent nutrition.⁴⁷ This suggests that communities may generate desirable impact in nutrition improvement among adolescents, including in declining anemia incidences, should they be well-informed about health.

In conclusion, interventions targeted at adolescent girls attending LCPS will help break the vicious cycle of poverty. Empowering this specific group through anemia prevention actions will likely improve their productivity and livelihoods in the long run.



2.6. Public Policy Level

The use of policies and regulatory framework is one of the most crucial parts in providing health within a community. In relation to the community that becomes the focus of this project, the program on IFA distribution in schools for adolescents has been largely driven by a mixed effort of government-sponsored policies and the role of private sectors such as businesses, NGOs, and international organizations.

The government underlined the IFA tablet consumption program under the flagship Program Suplementasi Tablet Tambah Darah (TTD Program) started in 2016. The TTD Program is organized under the Indonesia's Ministry of Health and is regulated under law that emphasizes nutrition interventions, health facilities in schools, and nutrition standards.¹ That said, there has been no dedicated regulation focused on the program.

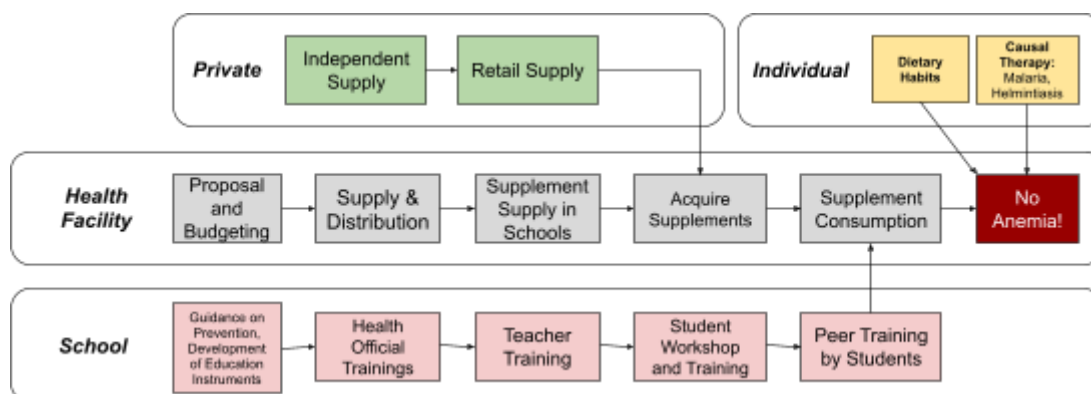


Figure 2. Pathway Anemia Prevention and Eradication in Schools, Source: Ministry of Health (2018)⁴⁸

A guidebook on prevention and eradication of anemia has been published by the government. This guidebook serves as a guidance for health officials to run the TTD Program for adolescent girls and women of reproductive age. The program adopts a “blanket approach”, where targeted beneficiaries are treated similarly regardless of their iron-sufficiency level within their bodies. The following describe the prevention and eradication pathway for anemia cases in school. The guidebook has created a pathway of anemia prevention and eradication that incorporates elements within school (Figure 2). In many cases, however, community members within LCPS are not likely to procure sufficient funding to train teachers and provide student workshops and training. Community members in LCPS largely come from lower socioeconomic backgrounds, resulting in difficulty in gathering sufficient funding from school fees to hold such activities.⁴⁹ Additionally, LCPS also receive less financial support from the government

¹ Anemia is regulated under broad-based nutrition interventions such as Presidential Decree 42/2013 on nutrition improvement acceleration national movement that emphasis on the first 1000 days of live, Joint Decree within several ministries on developing in-school health facilities, Ministry of Health Regulation No.75/2013 and No. 88/2014 on nutrition standard and iron supplement standard for reproductive women and pregnant women. The only specific law instrument was an Instruction Letter No. HK.03.03/V/0595/2016 that are being distributed to the Head of Health Unit across Indonesia, which serves as the weakest regulation instrument.



compared to their public school counterparts, making it harder to gather sufficient financial resources for health intervention programs.²⁹

Financial constraints aside, the current policy framework for IFA tablet supplementation program has involved various parties in different stages (Figure 3). The level starts from the simplest units, namely schools, workplaces, health centers, district and city health offices, provincial health offices, and also the Ministry of Health (MoH). Each of these reporting levels has its own form name (from form 1 to form 7). Reporting is done once every three months. After the report is received from the previous unit, the subsequent unit must analyze the information received and provide feedback in the context of assessment and program development. Adolescent girls and women of childbearing age are the recipients of the IFA supplementation program, receiving the tablet once a week. The success matrix consists of: Policy and National Programs (Availability Guidelines and Governance implementation), commitment in all level, resources (man, money, material), advocacy and education, effective and optimal communication, increasing human resource capacity and participants' activity, surveillance integration, research and development, and reducing the prevalence of anemia of adolescent girls and women in reproductive age.

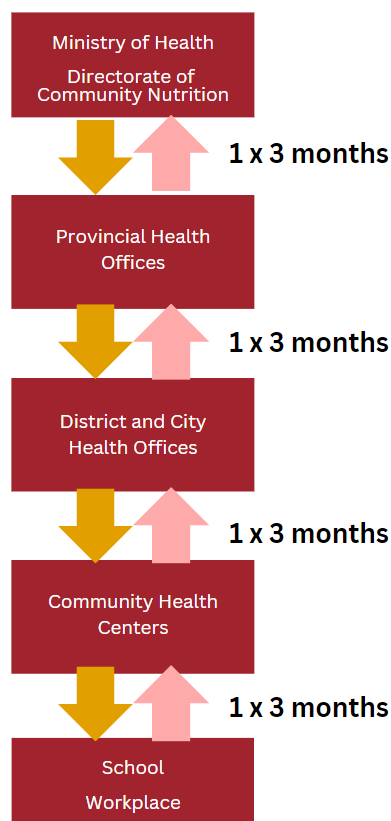


Figure 3. Reporting and Feedback Flow of TTD Program, Source: Ministry of Health (2016)



In cases where schools are not able to provide such actions, private players such as NGOs and international organizations innovate ways to complement this lacking. For example, UNICEF established similar intervention on iron supplementation distribution in several pilot districts in Indonesia titled “Aksi Bergizi” - roughly translated as “Nutritive Action”. The intervention strategy that was made emphasis on social behavioral change communications (SBCC), where they feel that this element is still lacking in the existing strategy made by the government. Furthermore, UNICEF also incorporates the existing TTD Program with Breakfast Session, where it encourages schools to hold breakfast sessions before the class starts, and provide nutrition education after the breakfast. Figure 4 further illustrates the implementation strategy of Nutritive Action.

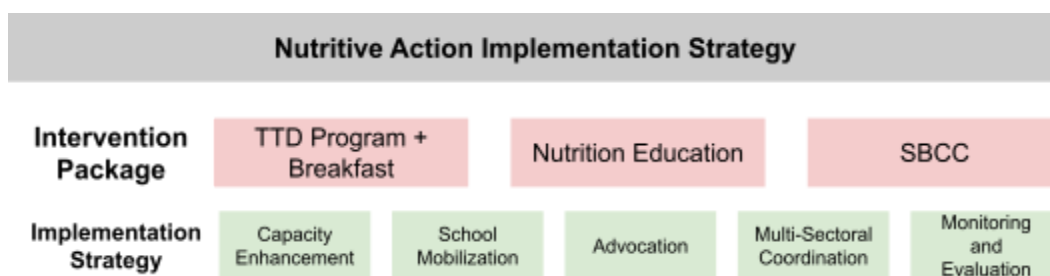


Figure 4. Implementation Strategy of Nutritive Action, Source: UNICEF (2021)⁵⁰

The intervention that was made by UNICEF focuses on training provision for teachers and health officials. UNICEF encountered some challenges in implementing their interventions, including school commitments (school mobilization) and lack of capacity in evaluation and monitoring by schools. Another NGO, Nutrition International, also came up with its own weekly iron supplementation distribution.⁵¹ Their intervention focuses on gender-sensitive nutrition education and counseling for girls and boys. Along with the intervention, the organization performed a study in several provinces in Indonesia, to which it emphasizes the need to develop school peer groups to increase compliance for iron supplement consumptions.⁵² Overall, the nature in which these collaborations are being upheld is sporadic and focuses on micro-scale interventions. There has been no clear literature that suggests successful program scale ups. This provides an opportunity for more experiments on more innovative IFA distribution programs, including what this project aims to develop.

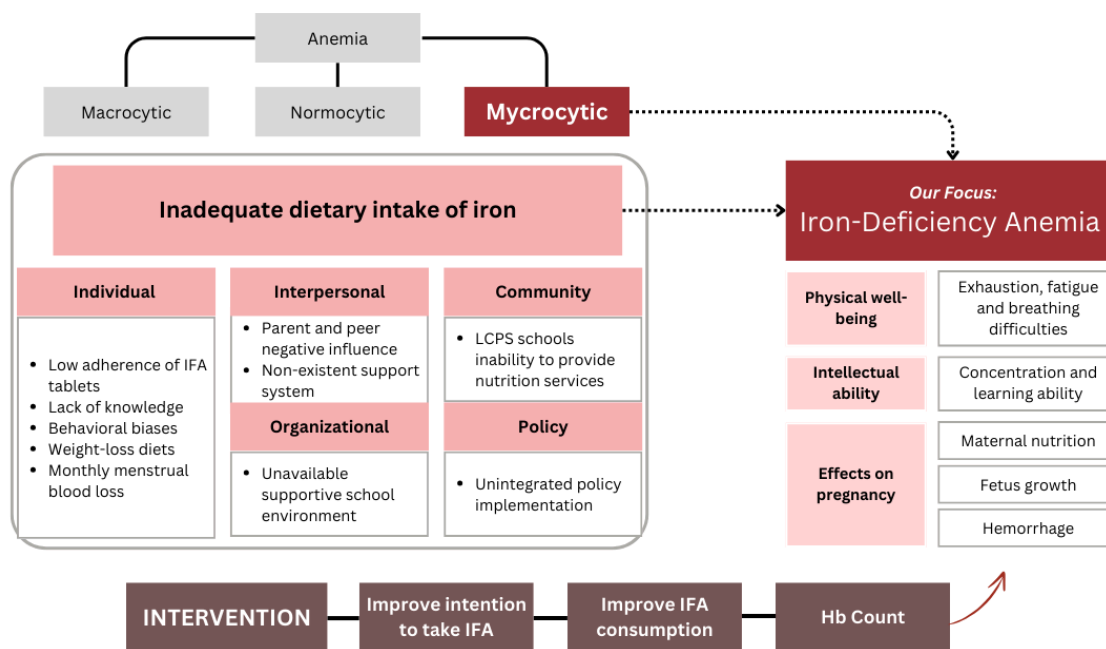


Figure 5. Theoretical Analysis Framework: Causes and Impacts of Anemia

2.7. Looking Back and Moving Forward

Previous sections highlight how adherence to the IFA supplementation program is primarily driven by behavioral habits embedded within individuals and their adjacent communities and further complemented by weak financial support surrounding adolescent girls attending the low-cost private schools. Considering the existing policy enacted by the government and efforts made collectively by school and NGOs, we pinpoint the evidence and the gap of current efforts in the Table 1 below.

Table 1. The current evidence and gap of IFA supplementation in Indonesia

Evidence	Gap
The Indonesian Ministry of Health has advised that IFA supplementation should be given to adolescent girls to prevent anemia (caused by iron deficiency), which shown by hemoglobin level <12 gr/dl. ⁵³	There has been a concrete monitoring and evaluation process; however, inconsistency and lack of compliance remain a challenge . The evaluation process needs to be implemented in the 83.763 villages, which is the number of villages in Indonesia according to the Indonesian Minister of Home Affairs, 2021. ⁵⁴



Evidence	Gap
<p>The National Movement for the Acceleration of Nutrition Improvement, as stated in Presidential Regulation Number 42 of 2013, delineates the importance of the first 1000 days of life, which is targeted to girls, adolescents, and women in their reproductive age.⁵⁵ Evidently, the usage of group chat to monitor consumption compliance between teachers and students may easily led them to being dishonest when they're not taking the tablets.²⁵</p>	<p>Psychologically, peer-to-peer support, especially youth empowerment, is needed to ensure that the ones who monitor the process are their own "friends" and in a safe space.</p>
<p>The health promotion by the Ministry of Health, in collaboration with health offices and other important stakeholders.²⁵</p>	<p>Health promotion efforts need to be more innovative and expanded further, as some individuals are already aware of the importance of IFA supplementation, while others are still hesitant, believing there is no clear benefit.</p>
<p>The unpleasant taste and smell of the tablets lead the adolescents to not consuming it.²⁵</p>	<p>There should be an acceptable practice to help them consume the tablets and to ensure that it is done both in a timely manner until it becomes a habit.</p>
<p>The evaluation of compliance of IFA supplementation program was done one time every three months.²⁵</p>	<p>The monitoring should be done every week to ensure that they really understand the importance of taking the tablets and to ensure sustainability of the iron level in their blood.</p>



3. THE PROJECT

3.1. About the Project

Our project aims to improve adherence to IFA supplementation among adolescent girls in low-cost private schools (LCPS) in Indonesia. As explained in the previous chapter, LCPS is a neglected population in the anemia intervention ecosystem. Preventing iron-deficiency anemia (IDA), specifically among these adolescents, can improve their health and well being, and potentially break the vicious cycle of poverty in their communities.

In this intervention, adolescent girls in targeted schools will be both the agents of change and target beneficiaries. We will pair them with pregnant women primarily to provide essential support and health monitoring for their intensive needs during pregnancy. This intervention will also include comprehensive education and hands-on experience in assisting with pregnancy needs, aiming to improve adolescent's intention and behavior to adhere with IFA supplementation, ultimately reducing anemia prevalence among them.

Engaging adolescent girls as volunteers allows them to grasp the significance of IFA consumption organically rather than through direct instruction. By pairing them with pregnant women, we aim for adolescents to gain a deeper understanding of and experience the tangible benefits of IFA supplementation. Additionally, as they remind and advise pregnant women to diligently take their IFA tablets, the adolescents will feel more encouraged to practice what they advise.

To prepare adolescents as volunteers, they will first undergo training in nutrition education and complete online modules designed to increase their knowledge and awareness about anemia and healthy pregnancy. Upon achieving a passing score of at least 80%, they will receive certification, indicating their eligibility as trained volunteers. The online modules will be developed in collaboration with academicians and nutrition experts. Once trained, they will assist and monitor their paired pregnant women through private messaging, video calls, and other means.

The adolescent girls will receive a checklist to monitor the pregnancy needs of their matched pregnant women, including IFA consumption, antenatal care visits, weight gain, and other health indicators (see Annex 1). They will actively assist pregnant women in meeting these requirements for a healthy pregnancy. Throughout this pairing, pregnant women will have the chance to share their knowledge and experiences, highlighting the importance of IFA supplementation and overall health care.

Moreover, trained adolescent girls will support one another, particularly by helping the newly enrolled volunteers within the app. They will form small support groups consisting of 3-4 members to foster mutual encouragement. Through these support groups,



adolescent girls can share their challenges and learn from each other throughout their journey in assisting their paired pregnant women.

Apart from the pairing approach, our project will also introduce a fun, in-person IFA consumption intervention in schools. This initiative will encourage all students to consume IFA tablets alongside oranges, making the process enjoyable and promoting better absorption of iron. Taking it with oranges will help diminish the unpleasant taste, smell, feeling of nausea, and upset stomach from IFA tablets and help compliance improvement.^{56,57} The oranges will be coming from the schools' gardening activities, where students will learn on how to cultivate and nurture the plant. We will coordinate with the schools to schedule the IFA tablet and oranges consumption together after the physical education (PE) class. This timing allows students to utilize their spare time, typically for changing clothes and enjoying the usual longer break that follows their weekly PE class. This approach aims to improve adolescents' adherence to IFA tablet consumption while also providing them with valuable knowledge and social skills for better physical and mental well-being.⁵⁸

We named our project BESI, which stands for Behavioral Education for IFA Supplementation Intervention. "Besi" is the Indonesian word for iron, symbolizing the IFA tablets that adolescent girls and pregnant women need to consume. It also represents strength and resilience, reflecting our hope for the project's beneficiaries.

3.2. Implementation Plan

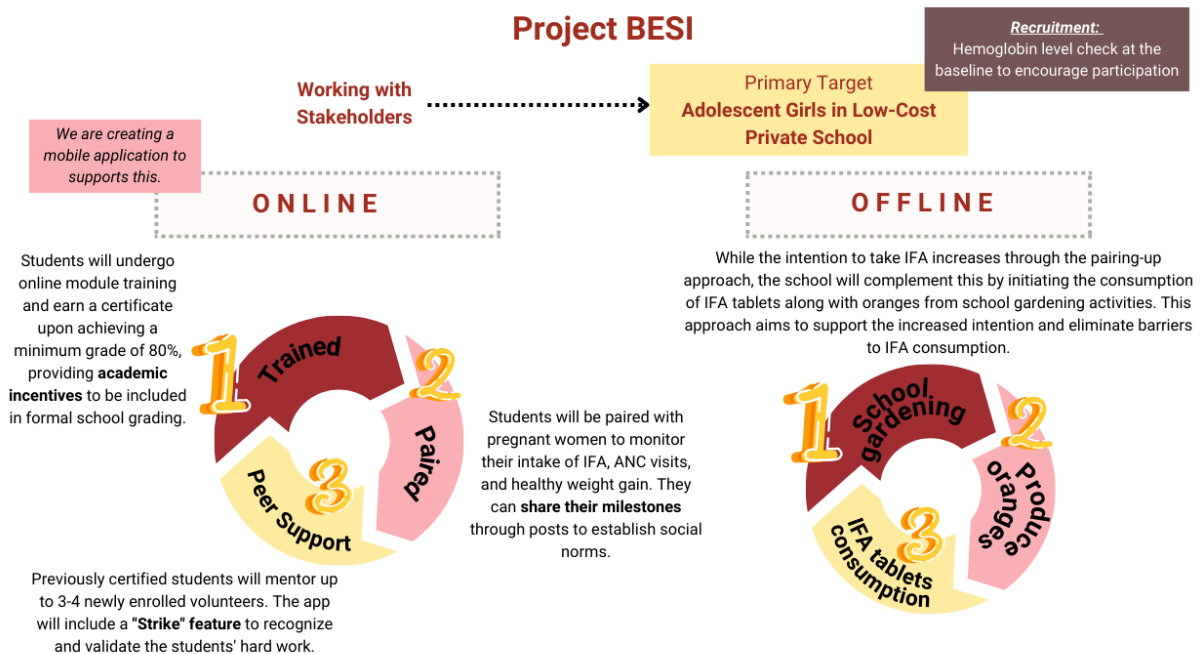


Figure 6. The Implementation Flow



The project will include both online and offline intervention that will complement each other. The primary targets are adolescent girls in low-cost private schools which will be recruited by checking their hemoglobin level at the baseline to encourage them, along with ferritin and physical examination. The online and offline practices will be done in a repeated cycle which will create sustainability (see Figure 6). Figure 7 shows several examples of BESI mobile application features.

Box 3. Strategies to Increase Engagement

To enhance students' participation with BESI project, we will implement several strategies:

1. Academic incentives

We will cooperate with the affiliated school to incorporate the volunteering activity as the student's extracurricular subjects. Another option that we propose to the targeted schools is involving the school's teacher to evaluate the student's performance as part of the student's personality/characteristic score. In Indonesia, student evaluation is comprehensive, which also includes activity outside the classes and their personality. Their academic report will influence higher school evaluation for the student's enrollment application. These approaches will encourage students to join the volunteering activity as it will be integrated into their academic assessment.

2. "Strike" features

BESI mobile app will have a strike feature, inspired by best practices seen in other apps. This will allow student volunteers to compete with their fellow volunteers to achieve certain goals within the app. Volunteers will get a higher strike for routine monitoring and filling out the form on the app. When they accomplish the target, they will earn gems or points that can be exchanged with gifts. Through this feature, volunteers can also share their achievement on social media and within the BESI app's community which can indirectly challenge other volunteers.

3. Sharing post for social norm

Another main tool that BESI mobile app have is community posting. Paired students and pregnant women can work together to gain rewards by regularly posting their monitoring goal achievement. For instance, if the student volunteers post their paired pregnant mother's photo of consuming the IFA supplement for one month, the duo will obtain some points that will be shown on the community leaderboard. This method hopefully will create social norms in the app community to fulfill the monitoring targets.

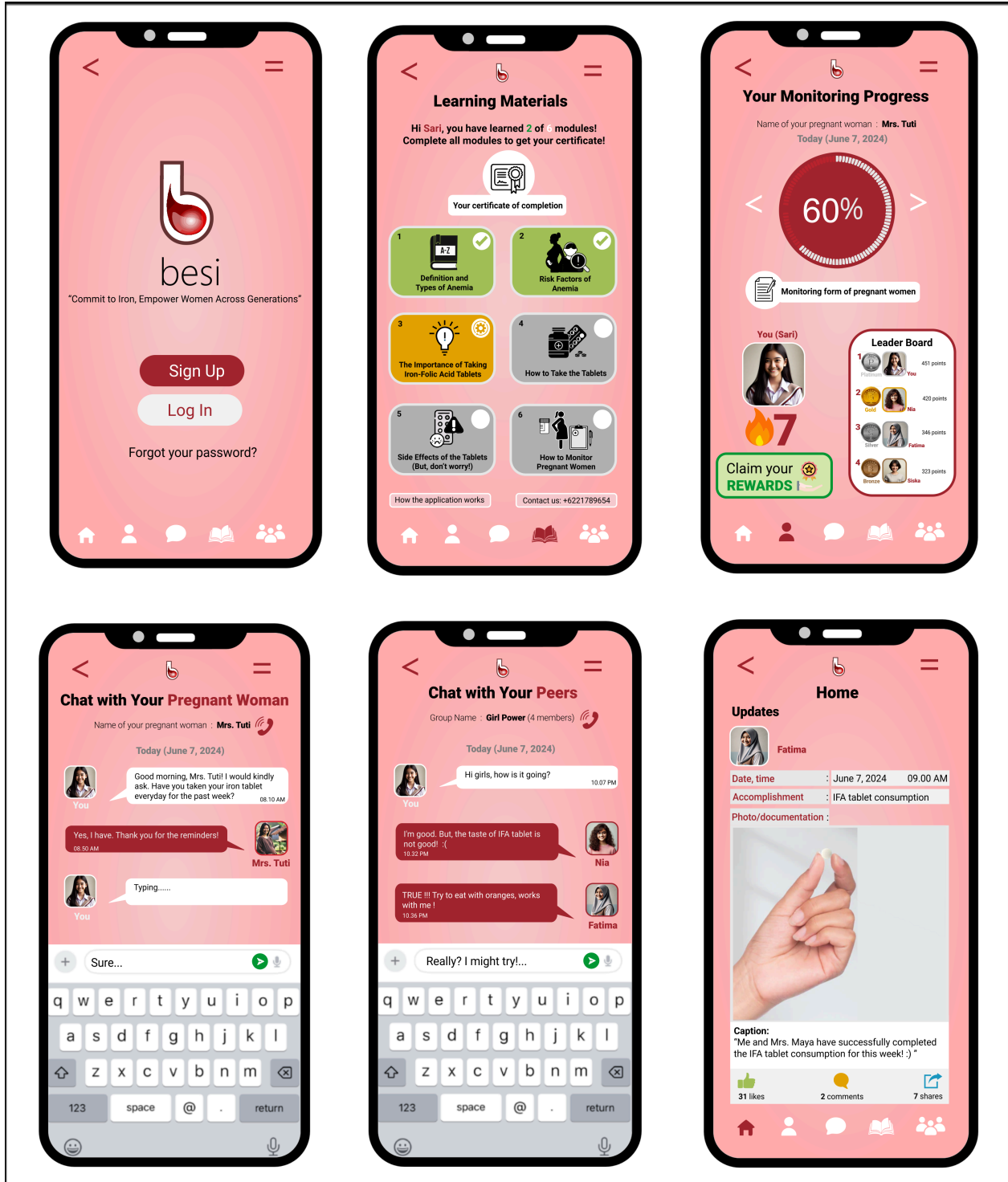


Figure 7. BESI Mobile App Interface



3.3. Project Phase

The project will be implemented in several phases:

Phase 0: Preparation

This phase involves the development of BESI mobile application that will consist of diverse features with the main aims to empower adolescent girls to monitor pregnant women's health conditions. The mobile app will be created by our project team in collaboration with IT and software developers with a rigorous blueprint including security of participants' data and health technology assessment (HTA). In addition, the nutrition module as one of the main features in the mobile app, which ensures the knowledge and skills of adolescent girls, will be developed based on the existing government nutrition module, in consultation with academicians and nutrition experts.

Phase 1: Pilot

We chose West Java as our pilot region because based on the Indonesia Basic Health Survey (SDKI) 2023, the number of respondents who receive IFA tablets was the highest among other provinces in Indonesia, which suggests that access was not a problem for low adherence. Additionally, West Java is the most populous province in Indonesia, with an estimated around 49 million people in 2022, which can better represent the overall population in the region.⁵⁹ The pilot project will test the feasibility and effectiveness of the project in a small-scale area first.

We will select two LCPS schools to implement the pilot project, focusing specifically on senior grade students (11th grade) in these schools. We selected this population as our early intervention group due to the high prevalence of underage marriages within this age group, making them particularly vulnerable to the adverse effects of anemia. Additionally, their academic year is strategic, ensuring that this project will not interfere with their preparation for final school exams and university admission preparation.

We selected this specific population for our early intervention group due to the prevailing incidence of underage marriages in Indonesia within this age range. This demographic is particularly vulnerable to the adverse effects of anemia.

The potential adolescent girls will get baseline examinations to identify symptoms and signs of iron deficiency anemia, including physical examination, hemoglobin and ferritin test. The intervention will be delivered for one whole academic semester (6 months), and those who are diagnosed with iron deficiency anemia or high-risk will be fostered to join the BESI project as student volunteers. The blood test will be repeated after six months (24-30 weeks) of iron supplement administration to evaluate the improvement of the student's condition and blood profile.



During the implementation, monthly monitoring and evaluation will be conducted to assess and address any encountered challenges and issues. Feedback from the adolescents girls, pregnant women, teachers, and parents will be collected to understand their perspective and experience about the projects. The pilot project will prove the effectiveness of the project in preventing and reducing iron deficiency anemia among adolescent girls, especially in neglected populations, so it can become a strong foundation for scaling up the intervention.

Phase 2: Scaling-Up

After the pilot, the project will be scaled up, but still in Java Island because more than half of the Indonesian population reside on this island.⁶⁰ Therefore, we will focus on applying the project to six different schools across West, East, and Central Java provinces, and mixing between urban and rural schools, and also consider adding junior high schools to ensure variability of the population. These specific groups will be included because marriage and pregnancy during or after junior high school is still common in Indonesia. Six schools will execute the same project as the pilot, with a more rigorous monitoring and evaluation framework to track progress and impact of the project. Beyond the involved schools, we will engage and gather feedback from all involved stakeholders, especially with the local policymakers. The diversity of schools that we choose will help to identify and address more potential issues before implementing at the national level.

Phase 3: Nationwide (1 year)

The project will be implemented as a national-wide program after the execution in three different provinces in Java Island. A thorough and detailed plan will be developed based on the comprehensive assessment and result of the pilot and the scale-up phases. We will secure all necessary approval, especially from the Ministry of Education, Ministry of Health, and other national-level relevant stakeholders. Moreover, a multisectoral collaboration with the private sector, such as NGOs will be established to aid and facilitate the implementation of the project. The project will be rolled out starting with high prevalence iron deficiency anemia areas, then expand to other regions across Indonesia. The result of the project will be disseminated and used to inform future health interventions.

Phase 4: Follow-up

To ensure sustainability and long-term success of the project, we will establish a long-term monitoring and evaluation framework that can be applicable across regions of Indonesia. We also aim to integrate the project with regular health services provided in the school, then collaborating with national government institutions to incorporate the program into national health and education policies. As the regular report will be delivered with the involved stakeholders, the best practices and lessons learned will be shared to other regions and countries that experience similar public health problems.



3.4. Timeline

We have developed a timeline for project implementation, which ranges from finding partners and resources, field activities, one-time activities, to the planning, assessment, and analysis (in-house activities). We also have deadlines for each activity and the availability of the core team members is clarified from the very beginning, to ensure that the project will occur in the right and timely manner according to the schedule. The full timeline can be accessed through this [link](#) and available in Annex 3.

Table 2. Project Timeline

Activities	Team in charge	Phase 0	Phase 1	Phase 2	Phase 3	Phase 4 (Follow-up)
		2024	2025		2026	2027
		Sep-Dec	Jan-June	Jul-Dec	Jan-Dec	Jan-Dec
<u>Application Development</u>						
Collaboration with IT to include data security and HTA	Partnership and Operations					
Platform development and maintenance	Operations					
Nutrition online module development	Operations					
Online module animation design	Operations					
<u>Partners and resources</u>						
Consultation and partnership with government	Partnership					
Logistics related to site selection and cluster allocation	Operations					
Partnership with the selected LCPS	Partnership					
Partnership with community health centers for pregnant women recruitment	Partnership					
School gardening activities	Operations					
<u>Field Activities</u>						
Intervention kick-off event	Operations					
Student volunteers recruitment	Operations					
Training of community partners	Operations					
Community engagement, outreach, and marketing campaign	Testing					
<u>Planning, Assessments and Analysis (In-house activities)</u>						
Baseline assessments	Research					
Biochemical and anthropometric testing (baseline and endline)	Research					
Endline assessments	Research Analysis					
Evaluation analysis	Research Analysis					



3.5. Budget

The budget is planned with US Dollars (USD) with a total of \$67.750 for phase 0-2. We expect the budget will get reduced over time once the mobile application and materials have been developed.

Table 3. The Project Budget

Deliverable / Activity Description	Costs (USD)
Application & Material Development	28.000
Collaboration with IT to include data security and HTA	1.000
Platform development and maintenance	25.000
Nutrition online module development	200
Online module animation design	1.800
Partners and Resources	5.500
Consultation and partnership with government	500
Logistics related to site selection and cluster allocation	1.000
Partnership with the selected LCPS	500
Partnership with community health centers for pregnant women recruitment	500
School gardening activities	3.000
Field Activities	2.750
Intervention kick-off event	500
Student volunteers recruitment	250
Training of community partners	500
Community engagement, outreach, and marketing campaign	1.500
Planning, Assessments and Analysis (In-house activities)	9.500
Baseline assessments	2.000
Biochemical and anthropometric testing (baseline and endline)	3.500
Endline assessments	2.000
Evaluation analysis	2.000
Personnel	22.000
Project Manager	10.000
Stakeholder relation & partnership manager	7.000
Community engagement officer	5.000
TOTAL	67.750



3.6. Goals, Outcomes, Theory of Change, and Monitoring

Our team will conduct monitoring and evaluation at the end of our intervention period, i.e., in December every year. This period is chosen because it will be easier to adjust with students' academic activity, also allowing the change in the student's laboratory profile after months of IFA tablets consumption. Monitoring and evaluation will be conducted by reviewing all the input-output indicators. We will also evaluate our main outcome variable, which is students' hemoglobin profile, by analyzing the pre- and post-intervention changes. Theory of change can also be accessed [here](#).

Table 4. Theory of Change

Stage	Input	Activities	Output	Output Monitoring Indicator	Outcomes
Setting up partnerships with stakeholders	Previous regulations about IFA supplementation in school	Meetings with head of LCPS to facilitate the participation of schools, students, and teachers	All related stakeholders support the project	Approval letter from schools' principals	Stakeholders and community health centers 1. LCPS are included in the IFA supplementation program ecosystem 2. Ideal ANC treatment of pregnant women in the districts improves 3. Adherence of IFA supplement from students
	Existing regulation about ANC guideline for pregnant women	Meetings with community health centers (<i>puskesmas</i>) to assist the participation of pregnant women in the districts		Partnership agreement with community health centers	
	Plantation of orange fruits and distribution of orange fruits to students	1. School facilitates student to cultivate orange plants in the school gardens 2. Students consume orange fruits together after consuming IFA supplement	Acceptance of students towards IFA supplement with fruits	1. Number of orange seeds distributed and planted in each school 2. Number of school harvesting the orange plants 3. Number of oranges and IFA tablets consumed by students	
Application development	IT and Software developer	The project team with input from various experts designed a blue-print for the mobile-application, including the main components, features, user interface, data flow and security.	The mobile application is ready to be utilized by student's volunteers to assist the pregnant women	Adherence to the project timeline for each development stage	Students and community 1. Student volunteers utilized application to assist and monitor their paired pregnant women 2. Student volunteers support their peers in aiding pregnant women 3. Student develop social awareness and build rapport with the community
	Mobile app feature design and user interface	IT and software experts develop the mobile-application based on the developed blue-print.		Number of successful tests conducted	
	Health-Technology Assessment (HTA) plan	The project team develop roadmap that allows for future application development, including strategy and procedure for app maintenance, monitoring, and improvement		App performance indicators	
Training, onboarding, and main activity of student volunteers	Detailed curriculum and syllabus, including the assessment and feedback	Students undergo online training in mobile app, which consists of eight sessions that will cover information mostly about anemia, the impact of anemia, IFA supplements, and pregnancy monitoring.	Students pass 80% passing grade to assist and support pregnant women, monitor their condition, and give relevant information in the community	1. Number of student signed up for volunteering 2. Number of student passed the minimum required score	Students and community 1. Training and certificate of completion improves student capability and outlook for higher studies 2. Student develop health awareness and change their behavior especially related to IFA supplementation adherence 3. Student develop social awareness and build rapport with the community 4. Increase the ideal ANC management, and improve better health outcome among pregnant women in the district
	Health monitoring guideline for healthy pregnancy (national maternal and child health book)	Project team prepares simplified pregnancy monitoring guideline, to be used by student volunteers.		1. Student volunteers gain knowledge and hands-on experiences from the pregnant women about the importance of IFA supplementation 2. Pregnant women receive help for healthy pregnancy	
	Expertise input, such as academicians and nutrition experts	1. Student volunteer will monitor pregnant mother condition based on the developed checklist through private messaging/video calls in the mobile app 2. Student volunteers will engage with the other peers through group and community posting	1. Number of student volunteer complete all pregnancy monitoring checklist 2. Number of student volunteers have increased intention in taking IFA tablets regularly 3. Number of pregnant women satisfied with the program		
Relaying the data to involved local stakeholders	Registered pregnant women at the community health center	The collected data of pregnant women monitoring is delivered to the affiliated community health center to decide further actions	Number of pregnant women enrolled and closely monitored	Number of pregnant women enrolled in the BESI project	Maternal health Improve monitoring and outcome for pregnant women condition Early detection and active surveillance for potential health problems in pregnant women population
	Medical record data of the pregnant women		Improved knowledge of students in health monitoring in pregnancy	Number of pregnant women achieved all of health monitoring goals	



3.7. SWOT Analysis

The table below describes the Strengths, Weaknesses, Opportunities, and Threats to our program.

Table 5. SWOT

Strengths	Weaknesses
<ul style="list-style-type: none"> - Scalable project to be scaled up in various types of schools. - Low recurring cost (money for student rewards). - Utilizing technology among youth who are the highest smartphone users . - Targeting the behavioral biases of adolescents to ensure the effectiveness of intervention. - Not putting further burden on teachers and officers in other partnership institutions. 	<ul style="list-style-type: none"> - Need strong engagement from adolescent girls and pregnant women. - Still didn't change the fact that the IFA tablet has side effects - No identified source of funding for the recurring costs.
Opportunities	Threats
<ul style="list-style-type: none"> - Partnership with community health centers for further health collaboration. - Institutionalization of Project BESlas the national project - Relies only on technology to monitor and evaluate the students' volunteering performance. - Engaging LCPS to be involved in a bigger health intervention ecosystem. 	<ul style="list-style-type: none"> - Security of participants' data in the mobile application. - Misuse of participants' data which are actually collected to monitor their pregnancy.

3.8. Contribution to SDGs

Youth has become the beacon of movement in addressing some of the most pressing global challenges. Thus, empowering youth will realize the 2030 Agenda for Sustainable Development through achievement of Sustainable Development Goals (SDGs). Given its shared spirits, the project will potentially achieve the following targets within its goals.



"1.2. By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions"



First, the project will empower adolescent girls through better IFA tablets adherence so that long-run productivity among women improves, eventually leading to poverty reduction among women. This will help achieving Target 1.2, as less than 30% countries worldwide will likely to halved poverty by 2030.⁶¹



*"2.2. By 2030, end all forms of malnutrition, ..., and **address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.**"*

Furthermore, the project aims to improve adherence of IFA among women while also complementing the effort with school-based nutrition intervention that may potentially be missing in LCPS.



*"3.7 By 2030, ensure universal **access to sexual and reproductive health-care services**, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes."*



*"5.6 Ensure universal **access to sexual and reproductive health and reproductive rights ...**"*

*"5.b Enhance the use of **enabling technology, in particular information and communications technology, to promote the empowerment of women**"*

Lastly, the project will connect adolescent girls with pregnant women, allowing for cross-generational empowerment to be made, and exchange of nutrition education that is relevant for reproductive health to be embedded among adolescent girls. Execution of this project will continue progress that has been made in nutrition and sexual and reproductive health, as reflected by reduction in adolescent birth rate.⁶¹



4. CONCLUSION AND FUTURE VISION

Iron deficiency anemia is one of the biggest invincible threats faced by adolescent girls around the world as it leads to the decline in women's productivity and nutritional status among themselves, the pregnant women, and eventually reducing the health quality of future generations. For adolescent girls, iron deficiency anemia is one prime example of how their nutrition intake is disproportionately affected by gender inequalities and poverty. As governments may have invested the budget for developing the IFA supplementation program, there remain challenges including low adherence among beneficiaries.

Our vision is to develop an innovative approach to improve IFA intake, a strategy which we believe will empower adolescent girls and overcome their biggest invincible threat of iron deficiency anemia. We leverage community involvement, focusing on pregnant women and harnessing their knowledge and experiences to eventually address behavioral challenges of IFA supplementation adherence.

Through BESI, a platform that connects adolescent girls with pregnant women, we enable empowerment collaboration between both groups that are in need of nutrition and health monitoring. We also complement this approach with comprehensive education and direct provision of IFA tablets and fruits in schools, aiming to improve health awareness and norms among adolescent girls and eventually reduce anemia prevalence.

An initial project implementation in Indonesia provides an opportunity of innovating ways of addressing ineffective IFA programs around the world, particularly due to the fact that Indonesia's diversity and huge anemia incidence among adolescent girls may serve as an experiment pool that countries worldwide can learn and adapt into relevant policy actions.

In the end, we established BESI as a strategic intervention that will generate creative ways to improve IFA compliance while also enabling cross-collaboration among women that transcend generations. We believe that empowering adolescent girls in overcoming iron deficiency anemia will break the poverty cycle driven by undernourishment, and eventually help countries to achieve sustainable development goals.



ANNEX

Annex 1. Pregnant Women's Monitoring Form for Adolescent Volunteer

(adapted from Indonesia's national [maternal and child health book](#))

Monitoring Form

Pregnant mother's profile				
Name				
Date of Birth				
Gestational age (weeks)				
Phone number				
Husband/family contact information				
Primary health care provider				
Health professional emergency contact (midwife/doctor/cadre)				
<i>(Checklist if done, take notes if there's any issues)</i>				
	Notes	Trimester 1 (0-12 weeks)	Trimester 2 (13-27 weeks)	Trimester 3 (28-40 weeks)
Iron supplementation	min. 90 tablets, taken daily			
Weight gain	min. 11.5-16 kg/ 1 kg per month (based on current BMI)			
Mid-upper arm circumference (MUAC)	more than 23.5 cm			
Tetanus immunization status	5 doses			
ANC visits	min. visits: 1,2,5 each trimester (total: 8)			
Has received these health examinations?				
Physical examination by doctor				
Blood pressure	no more than 140/90 mmHg (hypertension)			
Fundal height measurement				
Fetal heart rate check				
Hemoglobin test				
Blood type test				
Urine protein test				
Blood glucose test				
Has received counseling on these?				
Delivery preparation	location, personnel, transport			
Early initiation of breastfeeding	1st hour after birth			
Exclusive breastfeeding	for 6 months			
Postnatal care (PNC)				
Posyandu visits	growth monitoring and promotion post for children up to 5 years old			
Postpartum family planning				
Checking on pregnancy daily routine				
Nutritional intake	Varied and proportional diet; 1 additional portion compared to pre-pregnancy			
Personal hygiene				
Rest	8 hours of sleep with nap time			
Fetus stimulation with partner				
Physical activity				
Signs of pregnancy complications				
Maternal and child health book utilization	Read and filled			



Annex 2. Team Members Full Profile



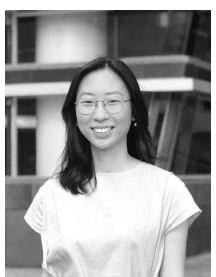
Dwita Nitoya Esterini | Indonesia

Dwita is a graduate student pursuing a Master of Medical Sciences in Global Health Delivery of the Harvard Medical School. Prior to coming to the graduate school, she worked as a general physician in different settings, including urban and rural areas. She was also a research assistant in a neonatology department in one of Indonesian national hospitals. She is now still doing research work focusing on child nutrition and its relation with diseases.



Assyifa Szami Ilman | Indonesia

Ilman is a graduate student at Master of Public Administration in International Development at Harvard University, John F. Kennedy School of Government (HKS). Prior to graduate school, he was a Junior Professional Associate at World Bank's Macroeconomic, Trade, and Investment Global Practice in Jakarta, Indonesia. He is currently a research intern at the Mongolia's Prime Minister Delivery Unit, working on fiscal policy for renewable energy expansion.



Melinda Mastan | Indonesia

Melinda Mastan is a graduate student pursuing a Master of Public Health in Health and Social Behavior at Harvard School of Public Health (HSPH). Prior to her enrollment at Harvard, Melinda worked with a philanthropic organization in Indonesia dedicated to tackling stunting issues. Currently, she is engaged in adolescent nutrition research across multiple African countries and is completing an internship with an NGO in India focused on maternal and child health. Her research interests span on nutrition and social and behavioral change.



Suci Ardini Widyaningsih | Indonesia

Suci Ardini is a graduate student at Master of Medical Sciences in Clinical Investigation, Harvard Medical School (HMS) with interest in pediatrics research. Previously, she earned a medical degree and worked as a project manager of a diarrhea vaccine trial for children in Indonesia. Currently, she is a research student at Global Advancement of Infants and Mothers (AIM) Lab, Brigham and Women's Hospital.



Marwatunnisa Al Mubarakah | Indonesia

Marwa is a graduate student at Master of Medical Sciences in Global Health Delivery at Harvard Medical School. Prior to her enrollment at HMS, Marwa worked as a medical doctor and research assistant in a non-communicable disease screening at Primary Healthcare (PHC) in Southeast Asia. Currently, she is engaged in a research project focusing on Hepatitis care delivery at PHC in Vietnam and Philippines, and PHC transformation in Indonesia.



Annex 3. Detailed Timeline of Implementation

Key to colors:
 Working month
 Part time work
 Field work
 Task completed by partners
 Ongoing task
 Critical deadline

Activities	Phase 0				Phase 1				Phase 2				Phase 3				Phase 4 (Follow-up)											
	2024	2025	2025	2026	2025	2025	2025	2025	2025	2025	2025	2025	2025	2026	2026	2026	2026	2027	2027	2027	2027							
Team in Charge	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Team members availability:																												
Dwila																												
Iliman																												
Melinda																												
Ardini																												
Mawarunnisa																												
Responsibility																												
Application Development																												
Collaboration with IT to include data security and																												
MFA																												
Platform development and maintenance																												
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Endline assessments																												
Evaluation analysis																												



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