



# Indonesia

Project Component 2: Nutrition  
– **Final Report** –

December 2016

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# Executive Summary

The purpose of this final report is to provide insights into the achievements of a particular component of the develoPPP.de strategic alliance Better Rice Initiative Asia (BRIA), namely the Nutrition sub-component of BRIA Indonesia. BRIA has been financed by the German Federal Ministry for Economic Cooperation and Development (BMZ). The Nutrition component was implemented from January 2014 until November 2016.

Indonesia is one of 17 countries with concerning nutrition problems, placing the country's nutrition status at the same level as African countries, according to IFPRI's Global Nutrition Report. The overall component's goal was to enhance the nutrition status of poor population groups in Indonesia. The objectives were (i) to improve quality assurance (QA) and quality control (QC) for Vitamin A fortified edible oil; (ii) increase access to micronutrient-fortified rice, especially for poor and vulnerable population groups; (iii) promote a healthy diet/broader nutrition deriving from the daily rice bowl.

The private sector project partners for oil fortification and rice fortification were BASF Nutrition, DSM and, GAIN, and the main public sector partners were the Indonesian Ministry of Agriculture (MoA), the Indonesian Ministry of National Development Planning (BAPPENAS), as well as the Indonesia National Agency of Drug and Food Control (BPOM). Further partners such as research institutions, schools, rice millers and traders have been involved directly and indirectly in the implementation of several activities in Indonesia.

As part of the BRIA Nutrition Component in Indonesia several activities have been implemented, such as oil fortification, trial production of premix kernels for rice fortification, social market research related to rice fortification, a clinical study of rice fortification, and different stakeholder workshops related to rice fortification and inclusive nutrition as well as rice value chains trainings to promote rice fortification at international, national and regional levels have been conducted.

As a major result, BRIA has successfully stimulated the interest of the private sector to join the fortified rice business since the technology and production process have been tested and proven domestically. A number of small and big companies have become interested in producing premix kernels and fortified rice. The clinical study demonstrated that efficacy of fortified rice on micronutrient status reveals that consuming micronutrient fortified rice (150g per meal, three meals a day) for a period of fifteen weeks increased ferritin level ( $3,31 \pm 1,67$  ng/mL) and folic acid level ( $1,62 \pm 0,45$  ng/mL) of teenage girls. Fortified rice is accepted by consumers as long as it shows the characteristics considered important in rice: large grains, white, fluffy when cooked, and acceptable price increase for fortified rice is Rp 500-1000/kg (USD 0.04-0.08).

These positive results of the clinical study and the remaining nutritional problems in Indonesia lead to a final strong suggestion that **the nutrition program should be continued** to focus on further development and large-scale implementation of the tested and proven interventions.

## List of Abbreviations

<b>AMS</b>	ASEAN Member States
<b>ASEAN</b>	Association of South-East Asian Nations
<b>BAPPENAS</b>	Indonesian Ministry of National Development Planning
<b>B2B</b>	business-to-business
<b>BMZ</b>	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung ( <i>German Federal Ministry for Economic Cooperation and Development</i> )
<b>BULOG</b>	Indonesian Bureau of Logistics
<b>B POM</b>	Indonesia National Agency of Drug and Food Control
<b>BRIA</b>	Better Rice Initiative Asia
<b>DDS</b>	Dietary Diversity Score
<b>FGD</b>	Focus Group Discussion
<b>GAP-CC</b>	ASEAN German Partnership on Climate Change
<b>GAP</b>	Good Agriculture Practices
<b>GAIN</b>	Global Alliance for Improved Nutrition
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
<b>GNP</b>	Good Nutrition Practices
<b>GoI</b>	Government of Indonesia
<b>HPLC</b>	High Performance Liquid Chromatography
<b>IAARD</b>	Indonesian Agency for Agricultural Research and Development
<b>IDA</b>	Iron Deficiency Anaemia
<b>IDI</b>	In-Depth Interview
<b>IDR</b>	Indonesian Rupiah ( <i>also: Rp</i> )
<b>IEC</b>	Information, Education and Communication
<b>IFPRI</b>	International Food Policy Research Institute
<b>IRMTA</b>	Indonesian Rice Millers and Trade Association, known as PERPADI
<b>KFI</b>	Indonesian Nutrition for Food Fortification
<b>MoA</b>	Ministry of Agriculture
<b>MoH</b>	Ministry of Health
<b>MoIA</b>	Ministry of Internal Affairs
<b>OKKP</b>	<i>Otoritas Kompeten Keamanan Pangan</i> /Competent Authority of Food Safety
<b>PERGIZI</b>	Indonesia Food and Nutrition Society
<b>PERPADI</b>	<i>see IRMTA</i>

<b>PERPRES</b>	Presidential Decree
<b>PPP</b>	Public-Private Partnership
<b>QA</b>	quality assurance
<b>QC</b>	quality control
<b>SEAFAST</b>	Southeast Asian Food and Agriculture Science and Technology
<b>SJAP</b>	PT. Surya Jaya Abadi Perkasa ( <i>company name</i> )
<b>SME</b>	Small or Medium-sized Enterprise
<b>SMK</b>	Sinar Makmur Komoditas
<b>SNI</b>	Indonesian National Standard
<b>SOP</b>	Standard Operating Procedure
<b>WFP</b>	World Food Programme
<b>WTO</b>	World Trade Organization
<b>WTP</b>	Willingness to pay

## Better Rice Initiative Asia (BRIA) – Project Context

The Better Rice Initiative Asia (BRIA) is a strategic alliance financed by BMZ under the develoPPP.de programme, planned and implemented by private partners in collaboration with GIZ. BRIA aims at improving rice value chains, which also includes rice-based nutrition components, in the ASEAN<sup>1</sup> region, namely the ASEAN member states (AMS) Indonesia, the Philippines, Thailand, and Vietnam. The approach also allows for covering regional cross-border value chains. BRIA’s focus is to strengthen the nutritional and economic situation of smallholders, both consumers and rice farmers. A special focus is set on the promotion of young farmers in order to combat labour shortage in rural areas and to sustain the rice sector for the future. Improved efficiency and sustainability along the value chain shall be achieved through better knowledge transfer and innovative technologies.

BRIA consists of five components: four country-specific components and one overall project structure, including the overall BRIA Secretariat.



<sup>1</sup> ASEAN: Association of South-East Asian Nations

## BRIA Indonesia

Better Rice Initiative Asia (BRIA) in Indonesia is a partnership program funded by the Ministry of Economic Cooperation and Development of Germany (BMZ) (public sector), and BASF and DSM (private sector), implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

There are two BRIA components in Indonesia, namely **Agriculture Component** and **Nutrition Component**. The program also strongly involves the Government of Indonesia (GoI) at National, Provincial, and District level. BRIA aims at improving rice value chains to optimize the effectiveness and efficiency of rice sector in Indonesia. Those two components of BRIA in Indonesia implemented under cooperation between GIZ ASEAN German Partnership on Climate Change (GAP-CC) and the Ministry of Agriculture (MoA) of Indonesia.

### Component 1: Agriculture

The BRIA Agriculture Component's main intervention in Indonesia is to promote Good Agriculture Practices (GAP) for sustainable increase in rice productivity, increasing the involvement of young generation in the agriculture sector, and adaptation to climate change. Its approach does not only focus on the development of the rice sector in selected areas by not only improving farming practices, but also taking actions in a number of interrelated areas, including:

- Providing direct training to 7,500 rice farmers and total indirect training to 75,000 rice farmers for the best farming practices and business practices
- Empowering and strengthening rice farmer groups, and improve market linkages to achieve better market access.
- Initiating and establishing young entrepreneurship in the rice sector
- Raising awareness regarding better nutrition for farmers' households
- Developing partnership among farmer groups and rice supply chain actors, as well as rice supply chain supporters

#### Cooperation Partners:

- BASF (Agriculture Component)
- Division of General Food Crops, Ministry of Agriculture Republic Indonesia
- Indonesian Agency for Agricultural Research and Development (IAARD) Ministry of Agriculture.

### Component 2: Nutrition

The nutrition component consists of two sub-components: oil fortification and rice fortification. The overall objective of the nutrition component is to enhance the nutritional status of poor population groups in Indonesia. In order to achieve this goal, interventions focus on broader access to nutritious foods for poor population groups. BRIA has cooperated with public-private partners (with DSM as the main partner) to work on fortification of local rice that is suitable for the nutritional needs and preferences of the Indonesian market, as well as worked with BASF for oil fortification.

### Cooperation Partners

- BASF (Oil Fortification), EUR 518,000
- DSM Nutritional Products AG (Rice Fortification), EUR 535,000
- Global Alliance for Improved Nutrition (GAIN), EUR 23,000
- Food Security Agency, Ministry of Agriculture Republic Indonesia
- Indonesia National Agency of Drug and Food Control, Indonesia
- Indonesian Nutrition for Food Fortification (KFI)

### Implementation Period

The **overall component objective** was to enhance the nutritional status of poor population groups in Indonesia. In order to achieve this goal, interventions focused on broader access to nutritious foods for poor population groups.

Implementation took place from **October 2013 to December 2016**.

### Specific Objectives and Indicators

1. Improved quality assurance and quality control for vitamin A fortified edible oil (BASF)
  - At least 80% of the food inspectors trained apply their knowledge (simple assessment by consultant, indicator fulfilled by end of the project).
2. Increased access to micronutrient-fortified rice, especially for poor and vulnerable population groups (DSM)
  - At least 2 identified “champions” (small-medium enterprise rice mills SME) voluntarily sell fortified rice.
  - A social marketing strategy that is culturally appropriate and acceptable is elaborated, pilot tested and implemented in the pilot region of the project.
  - A concept to fortify rice within the scope of national social safety net programmes is developed and pilot tested together with public entities and private sector.
3. Promotion of a healthy diet/broader nutrition social marketing deriving from the daily rice bowl (GIZ)
  - Nutrition messages about the daily rice bowl are developed, pilot tested and implemented at scale to a larger public.
  - Qualitative assessments show that 50% of the test subjects, identified by simple random sampling, recall at least 3 nutrition messages with unaided recall (simple assessment by consultant, indicator fulfilled by end of the project).



## Achievements against indicators

### Objective 1

#### Improved quality assurance and quality control for vitamin A fortified edible oil (BASF)

##### Result Area 1.1 – Knowledge and capacity building

*At least 80% of the food inspectors trained apply their knowledge (simple assessment by consultant, indicator fulfilled by end of the project).*

The Indonesia National Standard (SNI 7709:2012) for fortification of palm cooking oil with Vitamin A was launched in April 2012 and planned to be mandated in March 2016. The quality assurance and quality control system for fortified palm cooking oil needed to be strengthened.

The Indonesia Agency of Drug and Food Control (BPOM) as the government agency responsible for food and drug control has conducted training for monitoring and control of fortified cooking oil in 2012, 2014 and 2015, in collaboration with Indonesian Nutrition for Food Fortification (KFI), supported by GAIN and GIZ-SAFO.

##### Activities related to Result Area 1.1:

In 2016, BPOM in collaboration with GIZ-BRIA Nutrition Component Project in Indonesia conducted follow up training and capacity building activities for food inspectors who had not attended the previous trainings which had been conducted.

The general objective of the training was to improve the capacity of inspectors under the division of product certification and consumer service, BPOM provincial offices, in quality control of fortified palm cooking oil and the development of campaign materials on cooking oil fortification. The specific objectives were to introduce the SNI of Cooking Palm Oil **SNI 7709:2012**, to introduce the rapid assessment of vitamin A in oil using **i-Check Chrome**, including its strength and weaknesses in comparison to HPLC.

The training is designed to develop participants understanding on palm cooking oil standards and the related regulations especially fortification with vitamin A, and the role of each institution in monitoring the compliance with the mandatory SNI.

##### Outputs related to Result Area 1.1:

- **37 Food Inspectors** of BPOM Central Office and **32 Province Offices** in Indonesia have been trained;
- Increased knowledge/understanding especially on the objectives and benefits of vitamin A fortified cooking oil on the nutrition status of the Indonesian people particularly of the vulnerable population group;
- Understanding of the content of SNI Cooking Palm Oil 7709: 2012 and its implementation guidelines has been achieved;

- Understanding of the the procedures and actions required for acquiring the SNI and distribution licenses, the role and actions required for monitoring and control of the SNI implementation;
- Knowledge required to develop the strategy and techniques on Information Education and Communication (EIC) materials on cooking oil fortification has been increased;
- Understanding of the the strengths and weaknesses of the rapid-test kit (i-Check Chroma) in comparison with High Performance Liquid Chromatography (HPLC) has been achieved;
- The i-Check Chroma rapid test kit has been promoted and used as part of the training to measure vitamin A concentration in cooking oil.

Outputs related to Result Area 1.1:

- The results of pre-test and post-tests showed an increase of knowledge of around 50% of the participants and an increase in the use of i-Check Chroma.
- The Ministry of Trade of the Republic of Indonesia emphasized that SNI 7709:2012 should be declared as mandatory for producers of fortified cooking palm oil in Indonesia while awaiting a notification by the World Trade Organization (WTO).
- The Ministry of Trade along with the Ministry of Industry and the Ministry of Health jointly communicated and promoted the SNI into 11 cities in Indonesia.
- The Director General for Domestic Trade, of the Ministry of Trade Republic of Indonesia, Mr.Gunaryo, stated that the Ministry of Trade along with the Ministry of Industry and the Ministry of Health are preparing a technical guideline of SNI implementation to be complied. As an evidence of implementation, the Ministry of Industry revised the ministerial regulation No.87/M-IND/PER/12/2013 into No.35/M-/PER/3/2015, in order to align the provisions of fortified cooking palm oil be valid as a mandatory from March 2016 onwards.
- There were some changes in the new regulation by the Ministry of Industry:
  - Such as the content of vitamin A in rice at market level was changed from 40 IU to 20 IU based on a recommendation by the Ministry of Health.
  - The SNI certification system, quality test equipment, and standard operating procedure of production at industries level.
  - The National Agency for Drug and Food Control (BPOM) implemented the regulation to ensure distribution and sales of fortified cooking palm oil are compliant with those control points that have been regulated as a part of the law enforcement.

## Objective 2

**Increased access to micronutrient-fortified rice, especially for poor and vulnerable population groups (DSM)**

### **Result Area 2.1 – “Champion” rice mill SMEs**

*At least 2 identified “champions” (small-medium enterprise rice mills SME) voluntarily sell fortified rice.*

#### **Activities of Result Area 2.1**

Three main activities have been conducted to promote micronutrient fortified rice to achieve the result 2.1 of objective 2 which have been funded by DSM as a private sector partner of Better Rice Initiative Asia for Nutrition Component in Indonesia.

The three activities are described as follows:

#### **1. Trial Production of Premix Kernels of Fortified Rice**

The aim was to develop and test premix kernel produced domestically. The activities were conducted in cooperation with the Southeast Asian Food and Agriculture Science and Technology (SEAFAST) Center, Bogor Agricultural University. <http://seafast.ipb.ac.id>

The main **outputs** of activities were:

- The technology (hot extrusion technology) identified and used for trial production of premix kernel. The technology was designed to be suitable for SMEs industry capacity in Indonesia.
- Standard Operating Procedures (SOPs) of premix kernel production, optimization of process production and blending process of fortified rice developed and established, as well as the procedures of production for the laboratory test process.
- Premix kernel product, premix kernel production process, optimization of process production of fortified rice was disseminated at national and regional level along with the Indonesian Rice Millers and Trade Association (IRMTA), known as PERPADI.

#### **Lessons learned and conclusion:**

- Fortifying staple foods is the best way to reach large populations, no compliance issue, delivers consistent, low-dose of micronutrients that improves health over time.
- Referring to the premix kernel production optimization, the optimal mixing time was 20 minutes within which good homogeneity was achieved, either at iron concentration of 5000 ppm or 2500 ppm. Thus, even if we blend the iron at 6500 ppm as proposed by DSM, there will not be any problem with homogeneity.
- Based on hedonic test and triangle test results, the fortified rice resulting from this step, either as uncooked rice or steamed rice, had sensory scores not significantly different as compared to polished rice. Triangle results showed that majority of panellists could not

differentiate between polished rice and fortified rice, either in the form of uncooked rice or steamed rice.

- As Indonesian families are used to rinse the rice before cooking, an experiment to assess the effect of rinsing has been conducted. The results showed that up to three consecutive rinsing preserved the iron level of fortified rice within the expected range (> 50 ppm db).



## **2. Social Market Research of Rice Fortification**

The Better Rice Initiative Asia (BRIA) in Indonesia contracted Savica Consultancy (SAVICA) to implement qualitative consumer-focused social market research in one urban (Surabaya) and one rural (Bojonegoro) area in East Java.

The objectives of this research activity were:

1. To understand the consumers' willingness to pay (WTP) for an added value product (fortified rice) with health benefits (including consumers' WTP a slightly increased price for a product with clear health benefits; and analysis of acceptable price increase);
2. To understand the consumer profile, their attitudes towards and habits related to rice;
3. To evaluate the acceptance of product taste, physical qualities, and preparation process (including consumers' willingness to consume fortified rice/acceptability of fortified rice).

The complete finding of social market research of rice fortification is explained in the section of **Result Area 2.2** below.

## **3. Workshop on rice fortification for a national rice fortification program**

The general objective of the national workshop on rice fortification was to formulate an overall design and direction of national rice fortification program. The specific objectives were:

- To share findings of rice market research, local technology trial premix production and Public Private Partnership (PPP) model ;
- To achieve a common understanding among private sector partners on the stages and activities to be followed by each party in order to achieve efficient and effective synergies;
- To encourage also private sector engagement in rice fortification.

The workshop was carried out on **June 4<sup>th</sup>, 2015** in Jakarta and was attended by a total number of **92** participants who were representatives of the private sector, local government representatives, national government representatives, and representatives of international non-governmental organizations (NGOs):

- Government representation at National level, Ministry of Health (Kemenkes), Ministry of Internal Affairs (Kemendagri), Drug and Food Monitoring Agency (BPOM), National Logistic Agency (Perum BULOG)
- National and International Organizations such as World Food Programme (WFP), GAIN, SEAMEO Recfon, Aisyiah, Tim Penggerak PKK Pusat Pokja III, GIZ, Indonesian Rice Miller and Rice Tradres Association (PERPADI)

The **workshop results** were:

- Rice fortification technology (prototypes of equipment and machineries) so far has been available domestically.
- Supervision and technical guidance dealing with transfer technology, and operations of the machinery to produce fortified rice have been ready.
- The production of rice kernel has to be monitored to ensure the quality of the nutrition added in the kernel. One of the inputs was to involve premix producers to review the production of these rice kernels.
- Target consumers will be defined by each producer as they have specific types of consumers. Thus, fortified rice can be targeted at all consumer categories with low, middle and high income levels.
- Rice millers are interested in producing premix kernel as well as fortified rice producers. They are convinced that this project will provide added value for broken rice.
- The private sector partners interested in rice fortification who have been identified so far during the workshop process are: PT. Mercur Buana, PT. Sinar Makmur Komoditas, PT. Korie Tei, PT. Sanmas, PT. Sinta Rama, PT. Surya Abadiperkasa, PT Ridda Tamma, PT. Karya Jasa Husada, and PT. FITS Mandiri.



## **The Results of Results Area 2.1**

Three small-medium enterprises interested to be “champions” (forerunners) by voluntarily producing and selling fortified rice have been identified.

### **1. PT. Surya Jaya Abadi Perkasa (SAJP)**

SJAP is a food processor located in Probolinggo based in East Java. SJAP was established in 1989 and the current President Director is Mr. Cipto Santoso. The company’s business focus is food processing, within businesses of food processing are corned beef, smoked sausages, fast food meals, vegetables and sauces. The company has the facility to do the "packing" of packaging and produced frozen products, as well as business units on composting, and production of dairy milk which is located in the leg of Bromo Mountain in East Java.

The company was identified to be one of the premix kernel producers. They are interested to be a producer of premix kernel rice fortification and also have received technical assistance under the BRIA Nutrition Component for the production process provided by SEAFAS as award recipient for trial production of premix kernel for commercial fortified rice. Know-how technology transfer was supervised by DSM experts who provided and produced premix products (vitamin and minerals for premix kernel production to be used to produce fortified rice).

A cooperation agreement was signed between SJAP and the GIZ-BRIA Nutrition Component. The purpose was to establish a framework of cooperation and to facilitate collaboration between the parties to meet their jointly determined goals and objectives with regard to implementation of BRIA Indonesia nutrition component. Both parties intend to jointly engage in premix kernel production, influence the government on rice fortification policies, and raise public awareness on nutrition and health benefits of fortified rice. The GIZ-BRIA Nutrition Component in this role provides technical support for quality of premix kernel, SJAP does not only provide equipment or facilities as recommended, as well as human resources to be trained to produce premix kernel, registered the product to the government authority, but also produced premix kernel and committed to use DSM’s premix. SJAP has signed as well business cooperation with Sinar Makmur Komoditas (SMK), a SME based in Jombang, East Java. Its initiation was based on a meeting with PERPADI (Indonesian Rice Millers and Traders Association) of which both SJAP and SMK are member.

### **The Outcomes:**

- The technology of premix kernel production has been transferred to SJAP in East Java.
- Production samples of premix kernel by the machineries SJAP in East Java run well.
- The samples of premix kernel that have produced by SJAP have been sent to DSM Switzerland for final quality test.
- A business-to-business (B2B) cooperation has been signed between SJAP with SMK to produce premium fortified rice product.

## 2. UD.Sinar Makmur Komoditas

Sinar Makmur Komoditas (SMK) is a rice miller SME that operate in Jombang, East Java, is a member of IRMTA. The owner is Mr. Indratan.

SMK is improving the performance of processing equipment to fulfil the standard of production which they are focussing on to produce the premium fortified rice product. In their cooperation, SJAP produces premix kernels within the premix products (vitamin and minerals) sourcing from DSM (the BRIA main private partner), and SMK produces fortified rice for premium commercial product with premix kernels supplied by SJAP.

### The Outcomes:

- SMK received technical capacity training to improve the performance of processing equipment provided by SJAP.
- Markets and consumers have been identified for premium commercial fortified rice of produced by SMK, particularly in East Java.

## 3. PT.FITS Mandiri

PT. FITS Mandiri is a start-up company operating since 2015 which focuses on the production of commercial functional foods, manage by Ms.Retno Wulandari, STP and supervised by Prof. Selamat Budijanto. The company received contract award from Food and Nutrition Society of Indonesia in year 2016 to produced 200 kg split into two production batches of 100 kg each in February and April 2016, as well supplied total of 10,000 kg quality fortified rice to support BRIA Nutrition Component on Clinical Impact Study of Micronutrients Fortified Rice for Teenage Girls in Islamic Boarding School in Medan, North Sumatera.

PT. FITS Mandiri was officially established in year 2000, initiated by the Department of Food Technology, Bogor Agricultural University to raise student awareness of food processing development. In year 2015, PT Bogor Life Science and Technology (BLST) has acquired and transformed the company with the vision to be an excellent learning center of functional food products development. In September 2015, along with the availability of pilot plant and other processing machineries, the business concentrate at IPB Science Park 'Taman Kencana' Bogor, West Java, operated with 4 employees for production and administration, excluding supervisors or experts related to food and nutrition.

PT.FITS Mandiri produces and sells analogue rice (artificial rice), noodle, and chips that are made of maize as sources of raw material, which are developed based on research results invention of SEAFast under the BRIA Component Nutrition.

### The Outcomes:

- The technology was adopted to produce premix kernels fortified rice which the premix supply DSM, the private sector partner of BRIA Component Nutrition.
- PT.FITS Mandiri produced premix kernel of fortified rice, and supply it to Food and Nutrition Society of Indonesia (PERGIZI) for the BRIA fortified rice clinical study in Medan.

- PT.FITS Mandiri produced 113.2 kg of premix kernel of fortified rice in total to be with normal rice to produce total **11,327** kg of uncooked fortified rice for the clinical study at Islamic Boarding School in Medan.
- The Islamic boarding school in Medan adopted and used mixing technology (mixer machinery) to produce fortified rice domestically at school within technical capacity training provided by PT.FITS Mandiri and SEAFAST.
- PT.FITS Mandiri received a total amount **IDR 431,970,000** of sub contract from PERGIZI to produce premix kernel, fortified rice, as well as mixer equipment.

## **Result Area 2.2 – Social marketing strategy**

*A social marketing strategy that is culturally appropriate and acceptable is elaborated, pilot tested and implemented in the pilot region of the project.*

BRIA Indonesia assigned Savica Consultancy (SAVICA) to implement qualitative consumer-focused social market research in one urban (Surabaya) and one rural (Bojonegoro) area in East Java. The research was conducted with eight focus group discussions (FGDs) involving 81 participants and 42 in-depth interviews (IDIs) – 36 with households and 6 with rice/rice-based food sellers – conducted between April 6 and April 17, 2015. Inclusion criteria included socio-economic strata (class C to E: average monthly household expenditure up to Rp2.5 million or USD189), household composition, type of rice usually purchased, and location (urban/rural). In addition, six sellers of rice or rice-based cooked meals targeting these customers were selected for IDI. All participants were given a sample of fortified rice to prepare and cook before the interview, or a meal using fortified rice to eat during the FGD.

### Social Market Research Findings

#### **The key findings:**

1. Fortified rice is acceptable as long as it has the characteristics considered important in rice: large grains, white, fluffy when cooked
2. Acceptable price increase for fortified rice is Rp 500-1000/kg (USD 0.04-0.08)
3. It is more important to participants to consume rice than to be healthier so they will only purchase the rice they can afford it.



## Consumer profile: Demography

Description	Urban (n=63)	Rural (n=60)
Women	52	49
Age range (y)	29-70	20-73
Average household size	5	5
Education		
a. Not finished primary	0	10
b. Finished primary	19	25
c. Finished junior high school	16	18
d. Finished senior high school	13	7
e. Some tertiary education	2	0
Socio-economic class		
C	38	18
D	13	20
E	8	22

## Consumers' perception and acceptance of rice fortification

- Most urban participants said they were interested in purchasing the fortified rice under the following conditions: affordable pricing, good taste, fluffy and tender (*pulen*), and if there is no chemical smell. Some participants emphasized the importance of eating tender, good tasting rice because they cannot afford to buy a variety of good-tasting side dishes to go with it. Thus, the good taste and texture of rice becomes crucial to increase their appetite
- **Price** seems to be the main factor in making the decision to buy fortified rice. Several participants directly stated that they would not buy fortified rice if the price were higher than the rice they regularly bought at present, despite the added health benefits of fortified rice. This was linked to the low and irregular income of most participants. Sometimes, some participants even had to borrow money to buy rice. Nutritious food has become a luxury to some of them.
- The urban participants agreed that fortified rice is needed by each and every member of their family as a daily consumption at all times. However, this opinion will not translate into practice if they cannot afford the price. Some of them mentioned that the same condition applies to brown rice. Some of them are supposed to eat brown rice because they have diabetes. But they do not regularly buy brown rice because of the higher price compared to regular rice
- To most participants in the urban area, eating more nutritious rice for healthier lifestyle is not something they would aspire to. This may be caused by the relatively higher cost of living in the urban, compared to the rural areas. Also, the participants have limited understanding of the importance of micronutrients in the fortified rice. Thus, their preference towards fortified rice depends more on the price, texture, and taste of the rice, rather than the health benefits offered.
- In the rural area, the idea of fortified rice that offers additional health benefits was well accepted. The majority of the participants expressed their interest in buying the fortified rice. A few participants were not sure or could not decide whether they wanted to buy the fortified rice or not. None of the participants stated clearly that they did not want to buy the fortified rice (which may be due to cultural constraints to doing so).

### **Analysis of acceptable price increase**

- The price per kilogram of rice usually paid by the participants is Rp7,000 (around USD0.54) – Rp11,000 (USD0.85) (in rural area) and Rp8,500 (USD0.65) – Rp12,000 (USD0.92) (in urban area). Most participants said they would be willing to pay an increase of Rp500 (USD0.04) – Rp1,000 (USD0.08) per kilogram for fortified rice (compared to the price of the rice they usually buy).
- In general, the participants are satisfied with the quality of the rice they currently buy. Therefore, those who are willing to pay a slight increase to buy fortified rice expect that the increase won't be more than Rp1,000 (USD 0.08) per kilogram. An increase of Rp1,000 per kilo would mean an increase of approximately Rp30,000 (USD 2.31) per month, and this is considered a significant increase in relation to the monthly household expenses.
- The participants in rural areas suggested that the fortified rice should be sold within the price range of the common rice they buy, which was Rp7,000 (USD0.54) and Rp7,500 (USD0.58) per kilogram.
- Highest price mentioned by most participants was Rp8,000 (USD0.62) or Rp500 higher than the price of the common rice in the local market, which is Rp7,500 (USD0.58). An increase of Rp500 was said to be the highest increase most participants could afford, as rice was not their only basic need.

### **Consumers' acceptance of product taste, physical qualities, and preparation process**

- Most participants agreed that the fortified rice tasted good. It was said to be fluffy and tender, savoury, and smelled like newly cooked porridge. Some of the participants said that the fortified rice tasted good either eaten plain (without any side dishes) or with any types of side dishes, even soup.

### **Consumers' opinion on packaging and point of sale**

- The urban and rural area communities preferred to buy the fortified rice in packages of one, five or 10 kilograms.
- The male participants mentioned the location where the rice is sold as one of the factors they would consider in buying fortified rice. If the rice is sold in selected locations only, such as modern markets, and is not available in the traditional market nearby, they might not buy the rice.

### **Consumers' understanding of micronutrient deficiencies and their habit to stay healthy**

- Consumers in the urban and rural areas have limited understanding of micronutrients. Their understanding of nutrition is acquired through mass media, particularly TV.

### **Sellers' perception and acceptance of rice fortification**

- In general, the sellers are willing to purchase fortified rice, as long as the price is affordable to their customers. They are also willing to promote the health benefits of the rice to the

customers. The health benefits of fortified rice have also convinced them to buy the rice for their families.

- In terms of pricing, according to the sellers in the urban area Rp10,000 (USD0.77) per kilo is the price of the most-selling rice. Thus, the acceptable pricing for fortified rice would be around Rp10,000 or Rp11,000.
- The sellers in the rural area suggest that the price should range between Rp7,500 (USD0.58) and Rp12,000 (USD0.92).
- The profit margin for the rice sellers ranged between Rp500 (USD0.04) and Rp700 (USD0.05) per kilogram.

### **Result Area 2.3 – Rice fortification concept**

*A concept to fortify rice within the scope of national social safety net programmes is developed and pilot tested together with public entities and private sector.*

#### **Nutrition Problem and Rice in Indonesia**

Indonesia is one of 17 countries with concerning nutrition problems, placing the country's nutrition status at the same level as African countries (Global Nutrition Report by IFPRI). Both under and over nutrition problems are faced by Indonesians, such as underweight, stunting, obesity, anaemia, vitamin A and Iodine deficiencies. According to Presidential Decree (PERPRES) No. 43/2013 on Acceleration Nutrition Improvement, the main target groups of the nutrition programs are teenagers, woman at reproductive age, pregnant woman, lactating woman, and young children, particularly among poor, isolated communities, and disaster victims such as refugees.

Rice plays an important role in Indonesians diet. About 97.7% of Indonesians consume rice every day (MOH 2015) with a mean intake of 232.3 grams per capita per day (BPS 2015). The Indonesian population still consumes less than 50% of the amounts of vitamins and minerals required especially iron, calcium, vitamin B1, B2, B3, and B9 (Hardinsyah et al. 2012). Iron Deficiency Anaemia (IDA) is a serious health issue that compromises the cognitive development of young children and increases the risk for maternal death at birth. According to Riskesdas 2013 (Indonesian Basic Health Research) of Ministry of Health, 37.1 % of pregnant woman, 28.1% of children under-five years and 26,4% of school children are anaemic. There is not much change in the prevalence of anaemia among children under-five and school children.

Deficiencies in vitamin B1 and B3 often occur in populations which consume milled rice as their main staple food. Rice is also a poor source of folic acid, which is important for fetus development. Zinc – which plays important roles in bone development and the immune system – is usually inadequate in Indonesian diet. Children with inadequate zinc intake are likely to be stunting and suffer more often from diarrhoea, further compromising their growth. Stunting is prevalent among Indonesian children. Update from data of the Ministry of Health, the prevalence of stunting among children under-five years was 37.2% and among school children (5-12 years) was 30.7 % (Riskesdas 2013).

## **Pilot Test of Rice Fortification**

The Food and Nutrition Society (PERGIZI PANGAN) Indonesia in collaboration with BRIA Nutrition Component Indonesia and GIZ conducted a study on fortified rice production and a clinical impact study to gain evidence on the effectiveness of fortified rice for school children in order to reduce micronutrient malnutrition in Indonesia.

The general objective of this study is to gain evidence on the efficacy of fortified rice for female boarding school teenager students on improving nutritional status.

The specific objectives of this study were:

1. Production and supply of quality fortified rice for boarding school teenage girls.
2. Analysis of the clinical efficacy of rice fortification for boarding school teenage girls on improving their nutritional status.

The study was conducted from January to September 2016, in Medan of North Sumatra Province, Indonesia. Considering the adequate time for study preparation (administration, approaching the school and the local government, workshop, recruiting and training of researchers and field technicians, baseline data collection, and logistic preparation), therefore the intervention started on the 1st of March 2016. The duration of intervention was around four months from March to June 2016. Since the fasting month of Ramadhan started at the second weeks of June, the end of this study was at 11th of June 2016. Four month is the minimum requirement to assess the changes of the nutrition biomarker, such as haemoglobin, ferritin, zinc serum, folic acid, vitamin A.

## **The Efficacy of Fortified Rice on Micronutrient Status**

This efficacy study analysed for six (6) biomarkers of the outcome namely: haemoglobin, ferritin, folic acid, vitamin A serum, zinc serum and CRP. The results show that compared to the control group, the ferritin level and folic acid level in intervention group had significantly increased after the intervention. The other four (4) biomarkers (haemoglobin, vitamin A, zinc, and CRP) did not change significantly.

Further analysis performed by selecting subjects who consumed more than 27.000g of cooked rice (a number of 69 subjects who consumed at least 450g of cooked rice per day for at least two months) showed a consistent result. That means only serum ferritin level and folic acid level were significantly higher after the intervention.

The biomarkers analysed were CRP, ferritin, haemoglobin, folic acid, vitamin A and zinc. The analyses of biomarkers were done in SEAMEO RECFON Laboratory of University of Indonesia. In addition, the study obtained an ethical approval from Faculty of Medicine, University of Indonesia (No: 97/UN2.F1/ETIK/2016).

In this study the effect of intervention (fortified rice) decreased the prevalence of anaemia by 41.4 %, the prevalence of ferritin deficiency decreased by 7.4 %, and folic acid deficiency by 3.2 %). It seems that the lower the prevalence of micronutrient deficiency in the beginning of the

study (such as ferritin deficiency and folic acid deficiency) the lower the changes (delta) in the prevalence after intervention.

Based on regression analysis, the changes in (delta of) haemoglobin level of the subjects were affected by the intervention (fortified rice consumption), the delta of folic acid as well as the delta of vitamin A.

The delta ferritin level was affected by the intervention of rice fortification but not affected by folic acid level, vitamin A level, zinc level, CRP level and initial ferritin level. The delta folic acid level was significantly affected by the intervention of rice fortification. It was also affected by the initial folic acid level but not by the delta zinc level. We intentionally included zinc level into the regression analysis, since the previous study by Ghishan FK et al (1986) showed that under normal physiological conditions a mutual inhibition between folate and zinc exists at the site of intestinal transport. Actually in this study the zinc intake in this level did not inhibit folic acid intake.

The results of this study were similar to the result of the studies done by Angeles-Agdeppa et al (2011), Perignon et al (2015) and Martorell et al (2015). The study among school children and mothers in Philippines showed that the fortified rice decreased anaemia prevalence among children (from 17.5% to 12.8%) but not among mothers (from 13.0% to 12.5%) after 9 months of study (Angeles-Agdeppa et al, 2011).

The limitation of this study was the inadequate duration (only fifteen weeks) because of fasting month, the lack of side dish effect on the quantity of rice consume by the subjects, as well as a tight schedule for breakfast and lunch for the boarding schools students.

### **Conclusion and Recommendation**

This study tested the effects of micronutrient-fortified rice that was acceptable to be consume by teenage girls. The micronutrients fortified into rice include iron, zinc, folic acid, vitamin B1, vitamin B12 and vitamin A.

This results of the study revealed that consuming fortified rice – 150g per meal, three meals a day for a period of fifteen weeks – increased haemoglobin level, ferritin level ( $3,31 \pm 1,67$  ng/mL) and folic acid level ( $1,62 \pm 0,45$  ng/mL) of teenage girls. This study also demonstrated the efficacy of the micronutrient fortified rice in reducing the prevalence of anaemia, ferritin and folic acid deficiencies. The formula of the fortified rice already developed could be used for improving haemoglobin, ferritin and folic acid status of teenage girls. The researchers realized that there are limitations of the studies, such as the inadequate length of the study, lack of side dish (animal protein intake) of the subject and very limited time available for student to eat meal. Further studies are required to identify the efficacy of other micronutrients (other than iron and folic acid) fortified into the rice that did not show the effects in this study, such as vitamin A.

### **The Outcomes**

- Evidence showed that consuming micronutrient fortified rice – 150g per meal, three meals a day for a period of fifteen weeks – increased haemoglobin level, ferritin level ( $3,31 \pm 1,67$  ng/mL) and folic acid level ( $1,62 \pm 0,45$  ng/mL) of teenage girls.

- In conclusion, this efficacy study showed that the rice fortification had a beneficial effect on increasing haemoglobin level, ferritin level and serum level of teenage girl students.
- The result of clinical study was disseminated to the stakeholders in North Sumatera at a half day seminar in North Sumatera conducted by the Regional Development Planning Agency of North Sumatera Province, Department of Health.
- The abstract of *Rice Fortification and Its Efficacy* resulting from the clinical study was reviewed and accepted for oral presentation on the 1<sup>st</sup> Public Health International Conference, December 1-2, 2016.
- A model for scaling up of rice fortification in Indonesia through PPPs was promoted on *Responding to the Nutrition Transition in the Asia Pacific Region* workshop and seminar conducted by SEAMEO RECFON, the Southeast Asian Ministers of Education Organization, and the Regional Center for Food and Nutrition, on November 4<sup>th</sup>, 2016 in Jakarta.
- The result of study will be presented on 1<sup>st</sup> Southeast Asia Public Health Nutrition Conference in conjunction with Nutrition Society of Malaysia 32<sup>nd</sup> Annual Scientific Conference “Together in Advancing Public Health Nutrition” that will be held on May 14-17, 2017, at Hotel Istana, Kuala Lumpur Malaysia.

### **Rice Fortification Policy**

Based on the results and recommendation of *National Workshop on Rice Fortification* that had been conducted by the Indonesian Rice Millers and Traders Association, supported under BRIA Nutrition Component, the Government of Indonesia authorized that:

- Rice fortification products should be registered under the Food Security Agency, Ministry of Agriculture Republic of Indonesia, not under BPOM.
- It was affirmed based on the *Article 1* of Government Regulation No.28/2004 about Safety, Quality and Nutrition of Food, that rice and/or fortified rice belongs to the category of **fresh food**, and is *not* a derivative product.
- Furthermore, in *Article 42* (point 1 and 2) the regulation stated that only processed food products must be registered under the National Agency for Drug and Food Control (BPOM).
- There are several information requirements to be fulfilled by producers, such as a company profile, a certificate of company registration, and an SOP of the production process.

## Objective 3

### **Promotion of a healthy diet/broader nutrition social marketing deriving from the daily rice bowl (GIZ)**

#### **Result Area 3.1 – Communication on nutrition**

*Nutrition messages about the daily rice bowl are developed, pilot tested and implemented at scale to a larger public.*

#### **Nutritional patterns for Indonesia**

In Indonesia at national level, desired nutritional patterns should be promoted as a part of nutrition message about the “daily rice bowl”. It was intended to facilitate and to promote diet diversify score and balanced nutrition. In accordance to the recent national statistical data, average national rice consumption was decreasing from 139.15 kg/capita/year to 135.01 kg/capita/year. The decrease in consumption was indicated due to changes in lifestyle of communities that tend to consume less of rice as the middle class was growing, as well as changes of diets diversify score of population.

According to the diets diversify score, the population still consumes excess amount of rice (39.4gram/capita/day), and consume more category oil and fat (2.6 gram/capita/day). There was huge deficit consumption for the category of tubers (61.2gram/capita/day), meat (57.8gram/capita/day), and the category of vegetables and fruits only reached (38.6gram/capita/day).

#### **Fortification Rice Introduction at National Rice Festival**

There are various kinds of rice in Indonesia. To introducing new products and raise awareness on agricultural business especially rice, the Ministry of Agriculture (MOA) had conducted the Nusantara Rice Festival Event at the Epicentrum Walk (EPIWALK) Building, Jakarta, 23-24 November 2015.

BRIA Indonesia Nutrition component in collaboration with partners consisting of the association of rice millers and rice traders, fortified rice producers namely Surya Jaya, Fits Mandiri and Graha Diva Nutrisindo Companies displayed their products such as premix kernel as well as fortified rice in this event and distributed brochures providing information about fortified rice as BRIA project to visitors.

At this event, the first meeting of the Indonesian government on rice fortification regulation had been conducted, with an understanding that the registration of fortified rice will be under MOA, excluding the registration of functional rice (for health risk reduction claim : diabetic, stroke, etc.).

The output of this event is Indonesia government convinced that the fortified rice already circulated in the market without regulation and the first meeting of Indonesia government on rice fortification regulation had been conducted, with agreement that registration of fortified rice (for

nutrient content claims) will be serviced by MoA (OKKP both central and provinces) excluding the registration of functional rice (for health risk reduction claim : diabetic, stroke, etc).

The OKKP (Otoritas Kompeten Keamanan Pangan or The Competent Authority of Food Safety) is an authority which has been established at the national and provincial levels in Indonesia under the Food Security Agency of Ministry of Agriculture. The role of OKKP is to provide quality assurance of fresh food products, as well as to control food safety of food fresh products of agriculture commodities.

### Result Area 3.2 – Effectiveness of interventions

*Qualitative assessments show that 50% of the test subjects, identified by simple random sampling, recall at least 3 nutrition messages with unaided recall (simple assessment by consultant, indicator fulfilled by end of the project).*

#### Dietary Diversity Score (DDS)

A qualitative assessment was used to assess the effectiveness of intervention on the DDS by assessing change in the dietary habits of target household members. DDS is measured by recording from how many food groups foods are consumed over a given period of time (24 hours). There are 12 food groups within score to be 0-12. There 12 different food groups: cereals; roots and tubers; vegetables; fruits; meat, poultry, off all; eggs; fish and seafood; pulses, legumes and nuts; milk and milk products; oil and fats; sugar and honey; miscellaneous.

#### Example:



Rice, sambal (onion, chili)

**DDS = 2**



Rice, cucumber, sambal (chili and onion), egg, groundnut, salt fish, fish in tomato, onions and spices sauce (Total **DDS = 5**)

The aim was to improve the variety and quality of household dietary intake and thereby improve the health and wellbeing of rice farming households. This in turn should have a long-term positive effect of the cognitive ability of household members, especially younger household members, improving their ability to learn and apply improved rice cultivation techniques and thus the productivity of their farms. In combination with this, improved physical health of adult farmers should be improved, leading to a positive long-term impact on farmer productivity, since insufficient nutrition in rice value chains might lead to decreased productivity. In 2007 the World Bank demonstrated that increasing agricultural production and household income does not sufficiently reduce malnutrition.

#### **Inclusive Nutrition Training at Farmer Level**

The BRIA in Indonesia initiated a nutrition-sensitive agricultural development model which aims to achieve positive nutrition outcomes through agricultural development interventions. The



intention of intervention was to enhance public awareness, to reduce malnutrition of rural populations whose livelihoods are generally based on agriculture.

The nutrition training was designed to be integrated into existing training of the BRIA Agriculture Component at farmers' level, targeted at farmers who have participated in Farmers Field Schools to attend one day of additional training on good nutrition practices. The training provides an overview of good nutrition practices, information of nutrition and how to create a balanced diet for family members, including vulnerable groups such as pregnant women, children, female teenagers, as well as the importance of quality food intake for the body to function well for the activities. The value chain development and nutrition improvement almost by nature do not match. Since the value chain is commodity-oriented it does not link with nutrition improvement (diversity of food products), and designing value chains with explicit nutrition objectives has not yet been done.

Inclusive nutrition (Good Nutrition Practices) training was conducted at rice farmer level of BRIA Agriculture Component who had been trained as well on Good Agriculture Practice on Rice. In total, **896** farmers have been trained in three districts in two provinces targeted by BRIA Agriculture Component and BRIA Nutrition Component. Among the participants in the nutrition training, **40.84** percent were female and **50.16** percent were male farmers.

Province	District	Male	Female	Total
North Sumatera	Langkat	127	110	237
	Serdang Bedagai	182	183	365
East Java	Jember	221	73	294
<b>Total</b>		<b>530</b>	<b>366</b>	<b>896</b>

To support the training field activities on Good Nutrition Practices at rice farmer level, a training manual has been developed which emphasizes 3 (three) key messages as follows:

**01** Nutrition definition and why nutrients are required by the body

- Nutrients Function
- Macro and Micro Nutrients
- Tumpeng Gizi Keluarga (Balance Nutrients Pyramid)

**02** Balanced Nutrition Principles

- Guidelines for Balanced Nutrition
- Nutrient Status

**03** Vulnerable Group of Nutrition

**DDS Evaluation Survey 2017**

In earlier 2017, the project under BRIA Agriculture Component planned to conduct a DDS survey to assess changes in the dietary habits of target farmer households who had received training on Good Agriculture Practices on rice, plus additional training on Good Nutrition Practices.

## Recommendations

1. In general, it is recommended to continue the implementation of the Nutrition Component in Indonesia based on the results explained before and under the following considerations:
  - The Revision of Ministry of Industry Regulation No.87/M-IND/PER/12/2013 into No.35/M-/PER/3/2015, in order to align the provisions of fortified cooking palm oil be valid as a mandatory on March 2016 onwards need to be supported, and ensure its implementation at industries and ground level.
  - Continuous improvement of premix kernels production domestically in Indonesia is needed to enhance its quality and to reduce the loss of micronutrients (vitamins and minerals) during the production process.
  - The incentives and technical assistance technology transferred are need to be promoted and provided for the industries to produce premix kernels of rice fortification and fortified rice.
  - Public awareness of rice fortification at all stakeholder levels, government, private sectors, and communities need to be initiated, enhanced and supported.
  - Rice fortification evidence research or studies at several interventions are needed to initiate for a comprehensive evidence results.
2. The DSS Survey at rice farmer level will be conducted in 2017 for the last group of BRIA Agriculture Component farmers who had been trained in 2015-2016.
3. The nutrition program intervention is remaining a main important program in Indonesia with the consideration as follows:
  - Indonesia has become one of the 17 countries with concerning nutrition problems, placing the country's nutrition status at the same level as African countries according to the Global Nutrition Report by IFPRI.
  - According to Riskesdas 2013 (Indonesian Basic Health Research) of Ministry of Health, 37.1 % of pregnant woman, 28.1% of children under-five years and 26.4% of school children are anaemic.
  - There is not much change in the prevalence of anaemia among children under-five and school children.
  - The value chain development and nutrition improvement almost by nature do not match, since value chain commodity orientation does not link with nutrition improvement (diversity of food products), and designing value chains with explicit nutrition objectives not (yet) done, needs to be continued.

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