

FINAL REPORT ON THE ACCEPTABILITY TRIALS OF RICE FORTIFICATION IN DILI MUNICIPALITY -TIMOR -LESTE

Acceptability Trial 19th August to 12th September 2019

BACKGROUNDS

The activity of acceptability trials on fortified rice will contribute towards the achievement of national targets for improving nutrition and access to adequate, nutritious and affordable food all year round, as stated in the national Zero Hunger Challenge plan of action, National Nutrition Strategy and Food and Nutrition Security Policy. The overarching goal is hunger and malnutrition-free Timor-Leste by 2025, contributing to the achievement of SDG target 2.2 by 2030.

Food fortification is considered the most cost-effective way to improve nutrition especially when it comes to fortified rice in the country where rice is the main staple food. Therefore, WFP supports rice fortification as an effective approach to improve access to nutritious foods to 13 countries in the world. As more than 80 percent of the household in Timor-Leste consume rice as their staple food, the supplementation of a small number of micronutrients will bring benefits when the fortified rice becomes available through its social safety nets programmes including school feeding and/or through discussions to advocate for mandatory rice fortification in the commercial market. This is because rice is a good vehicle for fortification in schools to reduce malnutrition in Timor-Leste as it has proven in Bangladesh, India, and Cambodia. Therefore, the Government of Timor-Leste through the Ministry of Education requested an official letter to conduct the acceptability trials on fortified rice in 2018 but it has been deterred and completed in 2019.

Therefore, WFP is engaging with the Ministry of Education (MoE) to trial the acceptability of the fortified rice on testing and organoleptic (sensory) quality tests at two schools in the Metinaro administrative post in Dili. The Government of Timor-Leste has established the Technical Advisory Group (TAG) as a taskforce for rice fortification (RF) under the leadership of the Ministry of Agriculture and Fisheries (MAF) as a secretary of KONSSANTIL. This TAG group members decided to pilot the initiatives of rice fortification to be implemented in two schools in Dili municipality, an administrative post of Metinaro. These schools were EBC 03 Metinaro and EBF 1,2 Lebutun. The TAG group members consisted of technical staff from line Ministries under the umbrella of KONSSANTIL who supported the acceptability trials in these two schools. The pilot program will then be considered in 2020 in five schools in Dili Municipality if the acceptability trials of fortified rice are accepted in these two schools.

There were five schools such as EBC 03 Metinaro, EBF 1,2 Lebutun, EBC Farol, EBC 30 de Agosto - Comoro and EBC Esperanca da Patria-Becora defined by MoEYS to replace the 8 pre-selected schools in three different municipalities such as Baucau (**EBF 1,2 Quelicai Antigo, EBF 1,2 Eubere, EBC 3 Afaça /Quelicai, E B Catholica 1,2,3 de Afaça**) Bobonaro (**EBF 1 Daudo**) and Manufahi (**EBF 1,2 Boraulo, EBF 1,2 Daramata, EBF 1,2,3 Fahinehan**) by TAG-RF taskforce members under

KONSSANTIL. The reasons why these 8 schools were replaced by MoEYS is because the pilot program on fortified rice needs strenuous monitoring, supervision, and evaluation to understand the challenges and successes found during the period of the pilot program. Therefore, any challenges and the corrective measures could be documented and well addressed during the scale-up of the rice fortification program in 80 schools in three Municipalities (Baucau, Bobonaro, and Manufahi) in 2021 and beyond. These are the main purpose of having a pilot program for rice fortification because it is scaled up to 80 schools in 2021 and covering more schools beyond 2021.

OBJECTIVES

The objectives of the acceptability trial on rice fortification (RF) are to:

- obtain the acceptable organoleptic trial outcomes from school children during the trial of comparing conventional rice and fortified rice
- assess if fortification brings changes in the sensory qualities of rice through a combined sensory testing and consumption trial in school children

Sensory qualities affecting the acceptability of foods that will be measured in this trial are taste, smell, color, appearance and consistency or texture of rice. Besides, the consumption trial consists of measuring the leftover of rice after each meal has been eaten by each student during the entire duration of the trial. Rice leftover is averaged after each week in both schools and should be less than 25 grams leftover in the served plate where it considered to be finished.

STUDY PROTOCOLS WITH METHODOLOGY

Study designs and Settings

Qualitative research is adopted to obtain the student's perspective on fortified rice during the trial. The organoleptic test is used to obtain students' opinions on taste, smell, colour, appearance, consistency/texture of fortified rice compared with conventional rice during the trial. The single-blinded study was adopted to ensure no selected students who participated in the study noticed the fortified or non-fortified rice was served each period.

MATERIALS

The main materials utilised during the acceptability trials were scale precision 0.01gram, precision scale with capacity 5 Kg, basin, handschoen, bucket for mixing FRK with conventional rice, imported white rice, FRK, blacklight, labels, permanent markers, pen, pencil, battery (type AA and AAA) bowl 100 ml capacity, organoleptic quality test's questionnaires, consent forms, monitoring checklists.

METHODS

Questionnaires

The total of 68 out of 612 students selected students from both EBC 03 Metinaro and EBF 1,2 Lebutun schools. They were asked to notify parents so that their parents can complete the consent form prior to attend the trials of fortified rice. The selected students were also asked to complete

the organoleptic (sensory) quality tests ***on taste, smell, colour, appearance and texture*** after they have eaten the served rice from day one to day four each week for one month.

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A total of 1088 portions consisted of conventional and fortified rice was provided during four days of trials each week. The questionnaires adopted a “Likert scale” where the scaling from very bad to very good (1-5) on the mentioned organoleptic (sensory) tests. Each student has a personal code that has been written to each plate before the acceptability trials on rice fortification begin. After the completion of each test, every student was asked to complete the organoleptic (sensory) quality test with each unique code that has been assigned by the investigators.

The observation was also made each day throughout the acceptability trials on rice fortification. The observation was focused on the independence of students to complete the questionnaires each day after they complete the serves meal to avoid any biases for completion of the organoleptic testing on provided questionnaires. Besides, the assistance and the enumerators tasked were also to measure the leftover rice as part of observation if any from the assigned students' plates at both schools (EBC 03 Metinaro and EBF 1,2 Lebutun) as part of consumption trials based on protocols for this trial.

Participants

The eligible students from each school were assigned by the school after gaining approval from each individual and their parents. At EBC 03, a total of 40 students were selected from class 7 and class 8, which composed of 20 girls and 20 boys while from EBF 1,2 Lebutun, class 5 and class 6 were also selected with the total of 28 students where 7 girls and 7 boys from class 6 and 6 boys and 8 girls from class 5. A total of 68 students participated in the acceptability trials for rice fortification during 16 days of the schools' calendar. Each parent and or /caretaker was also asked to sign a consent form as a legal bonding to allow the selected student to participate in the acceptability trials.

Process of providing conventional rice and fortified rice to selected children during the trial

Based on the concepts of the methodology, week 1 and week 3 will only provide conventional rice while fortified rice, which the mixing of fortified rice kernel (FRK) with white rice was given during week 2 and week 4. The single-blinded test was adopted, therefore, all the selected students from both schools did not know about the process and when to serve the conventional and fortified rice. This was to ensure that the judgments that they made will not be based on which week they will be given fortified or conventional rice.

Organoleptic (sensory) quality test

Before the rollout of the acceptability trials on the rice fortification program in each selected school, the enumerators and the assistance investigators briefed the selected students on how the acceptability trials will be done including testing on organoleptic (sensory) quality test on taste, smell, colour, appearance, and texture. This is to ensure their participation in how to complete the provided questionnaires and to inform the process of the trials daily during the determined period for the acceptability trials of fortified rice.

After every student had finished the provided meal every day during 4 days in each week during the trial, the trained enumerators and assistance investigators observed directly to each plate to ensure if there was any leftover rice or not and for those students who had not finished their rice will be weighed and recorded to the provided consumption trial forms. This recorded form then tabulated to calculate the average of the leftover rice (conventional and fortified rice) each week. After that, each student received the organoleptic (sensory) quality test forms from the assistance enumerators or assistance investigators to complete it immediately after the meal each day. There was no student asked other fellow students to rate the scale of each sensorial test each day.

Quality Controls

The mixing of FRK with conventional rice during the second and fourth week of the acceptability trials begin one day before the day of providing the fortified rice at each selected school. This is to ensure the cook group opportunity to cook early the fortified rice that has been mixed one day earlier because school meal hours provided at 10:30-11:00 am every day and if the mixing is done on the same test day may not possible to meet the school meal hours.

The quality control is an important part of the acceptability trials to ensure the mixing of conventional rice with FRK. It is used to be using machinery called rice mixer at factory levels. However, it was only a maximum of 4 Kg of conventional rice to be mixed with 40 grams (ratio 99:1) at EBC 03 Metinaro and 3 Kg of conventional rice mixed with 30 grams of FRK at EBF 1,2 Lebutun in week 2 and week 4. Therefore, the acceptability trials' team members decided to use hand mixing in the provided basin. After mixed, the FRK and conventional rice that become fortified rice with an average of 10 samples with the total of already fortified rice of 100 grams in EBF 1,2 Lebutun and 20 samples with the sampling process at EBC 03 Metinaro. This mixing of FRK with conventional rice was measured the homogeneity of FRK with provided white rice. The FRK grains in each sample were collected of 100 grams of fortified rice the selected and counted to ensure the coefficient of variance (CV) of each sample later in the data analysis for homogeneity purposes. The minimum average of CV from each sample should be less than 15 % to ensure the homogeneity of the mixing of FRK with conventional rice was well mixed before cook.

Number of schools selected for acceptability trials of rice fortification in Municipality of Dili.

The two schools selected to be in the acceptability trial were decided by the members of the task-force of the technical advisory group (TAG) for rice fortification (RF) that was established under the umbrella of KONSSANTIL. The members of KONSSANTIL consisted of Ministry Agriculture and Fisheries (MAF), Ministry of Finance (MoF), National Directorate of Statistics, Ministry of Health (MoH), Ministry of Social Solidarity and Inclusions (MSSI), Ministry of Tourism, Commerce and Industry (MTCI) and Ministry of Education Youth and Sport (MoEYS). The members of the taskforce of TAG-RF consist of Director General, Head of Departments and senior staffs who have technically experienced programming and budgeting from each line Ministry.

The reason these schools were selected because it will be closed for TAG-RF taskforce members to involve daily supervision and monitoring during the acceptability trials. Higher technical levels such as the General Director level can also visit the targeted schools to observe the acceptability trial. Joint monitoring from TAG -RF members, which consisted of MoH, MoEYS, and MAP was done once due to their competing time with another program in their line departments in each Ministry.

Subjects

The students from 5th to 8th grade were selected for this trial. Between 10 to 20 students formed the panel in each grade. Two panels from each school were established in the trial, totaling several 68 participants. Two panels from EBF 1,2 Lebutun and another 2 panels from EBC 3 Metinaro in Dili Municipality. A total of 69 students were expected to be involved in the acceptability trials of

fortified rice. However, one student from EBF Lebutun grade 5th was not involved in the trial because this student has moved to another school when his parents moved away from the sub-village of Lebutun to Metinaro before the trial took place. Therefore, a total of only 68 students involved in the acceptability trials on fortified rice in both selected schools.

The trial imitated the real conditions of school feeding in the study; i.e. using the same quantity of rice, same preparations (dishes), and the same utensils that have been used in the same schools. However, in the second week, the investigator for acceptability trials found out that the school rice from National Logistic Centre (NLC) was a small, dark colour and had bad taste. Therefore, the WFP office decided to buy imported conventional rice (local brand: Folsom) and replace the available conventional rice and mixed with fortified rice kernel (FRK) that has been provided for acceptability trials. There was a recommendation to serve 100 grams of rice for each student by the designed methodology. This seems a small quantity, but it was kept for organoleptic (sensory) quality testing only and the selected students can have their normal rations after trial within each day if they would like to eat more each day after the trials.

Table 1. List of schools and number of students that was selected for the acceptability trials

School	Total current Students in each school	Class	Grade	Age range	M	%	F	%	Total
EBC Metinaro	543	Turma A, B & C	Grade 8	11 – 15 years	10	50	10	50	20
		Turma A,B, C	Grade 7	12 – 14 years	10	50	10	50	20
EBF Lebutun	69	Turma A	Grade 6	11 – 13 years	7	50	7	50	14
		Turma A	Grade 5	10- 12 years	6	43	8	57	14
2 - School		Total			33		35		68

Note: Details of sexes will be provided in the annex documents.

Principles of the acceptability trials

The trial was conducted in a cross-over way by giving conventional rice and fortified rice throughout the trial (4 weeks (16 days). One week before the trial, parents and teachers were informed by school management team members to sign the consent form for their selected children to involve in the trials. Rice was cooked as a normal way and prepared with different ingredients based on a schedule for acceptability trial by using conventional rice in week 1 and week 3 and fortified rice in week 2 and week 4 (see table 2 below). The ration of the rice provided for each student was exactly 100 g per meal /day and the school meal will be served for 4 days each week for four weeks. The questions on organoleptic qualities (OLQ) was completed by the selected students for 4 days in two selected schools in each week under close monitoring of enumerators and investigators.

TIMELINES

Table 2 : Timeline for the acceptability trials at EBC 3 Metinaro and EBF 1,2 Lebutun

ACTIVITY	Week 0	Week 1	Week 2	Week 3	Week 4
Obtaining verbal consent forms from parents	29-31/07/2019				
Training of data Collectors	02/08/2019				
Serving NR/Organoleptic Questionnaire		19-22/8/2019			
Serving FR/Organoleptic Questionnaire			26-29 /8/2019		
Servinng NR/Organoleptic Questionnaire				2-5/9/2019	
Serving FR/Organoleptic Questionnaire					9-12/9/2019

Table 3: OLQ testing everyday was conducted based on below categories

Organoleptic testing every day				
Very bad (1)	Bad (2)	Neutral (3)	Good (4)	Very good (50)

Scenario of Study

Before the start of the trial, the trial team will inform parents, teachers, and students about the objectives of the study and obtain verbal consent at least one week before the trial.

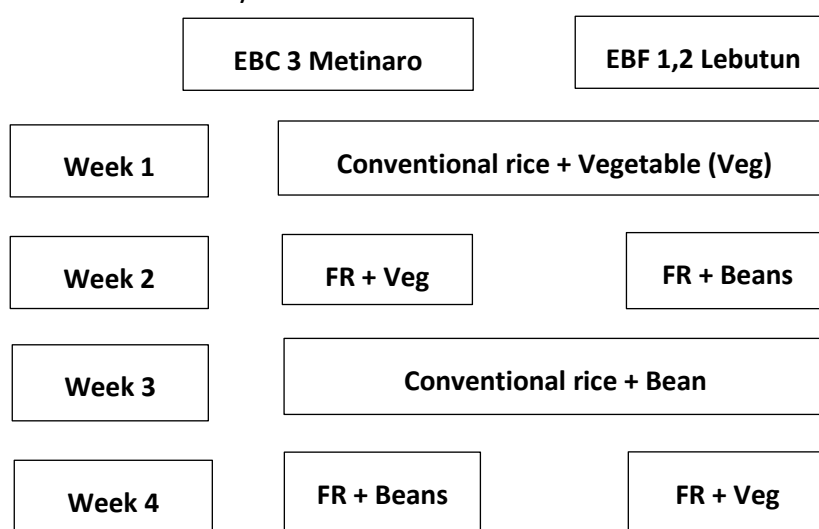


Figure 1. Trial design of the acceptability trial of fortified rice in 2 schools in Dili, Timor Leste

FR= Fortified rice; Normal rice used in school meals before fortification; Veg= Fortified rice with vegetable side dish; Beans= Fortified rice with side dish prepared with beans.

Rice preparation and serving during acceptability trials at two selected schools

Rice was cooked as usual ways by the cook members at the school kitchen and distributed to each class-room that has been defined for testing by each school. Each plate of rice was weighed exactly to the amount of rice approved for the study (**100 grams/person/day for 4 weeks (16 rations or portions)**). Only the acceptability trial investigator, assistance investigators, enumerators, and the cook team members know the served of fortified rice. Therefore, the single-blinded test on the acceptability of rice fortification was adopted. For both schools namely EBC 3 Metinaro and EBF 1,2

Lebutun one enumerator from Ministry of Education (MoE) and Department of Education from municipality of Dili was recruited, assigned and trained to oversees the selected students' attendance, meal distributions, actual consumptions and measurement of any leftover rice on the place that students may not finish every day. At the end of the meal session, the left-over in each plate was weighed and recorded on the provided special form if any, with the name of the student, the date and the student's code on the plate. This was done to know whether the selected students in each school accepted or not accepted the fortified rice based on designed methodology.

Table 4: The contents of fortified rice kernel (FRK) utilised during the trail

No	Vitamin & Mineral	Lot No.	EXP. Date
1	A	15000ugRE	16/09/2019
2	B1	35mg	
3	B6	50mg	
4	B12	100ug	
5	B9	13000ug	
6	B3	420mg	
7	Iron	200mg	
8	Zinc	300mg	

RESULTS

Table 5: Students attendance by gender each week during the trial at both schools

School	Week 1				Week 2				Week 3				Week 4			
	Male	%	Female	%	Male	%	Female	%	Male	%	Female	%	Male	%	Female	%
EBC 3 Metinaro	67	84	78	98	61	76	78	98	72	90	72	90	71	89	70	88
EBF 1,2 Lebutun	34	61	54	96	45	80	52	93	40	71	46	82	39	70	38	68
Total & Percentage (%)	101	74	132	97	106	78	130	96	112	82	118	87	110	81	108	79

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