Decentralized evaluation for evidence-based decision making
WFP Office of Evaluation

Evaluation Final Report

An Evaluation of the

2012 – 2015

Local Food-Based School Meal Program (LFBSM)

Papua & Nusa Tenggara Timur Provinces

Indonesia

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LIST OF ABBREVIATIONS

Bappeda	= *Badan Pembangunan Daerah*
BAZ	= Body mass index for age
BCC	= Behavior change communications
DDS	=Dietary diversity score
EIC	= Education information communication
FSVA	= Food security and vulnerability atlas
FCS	= Food consumption score
HAZ	= Height for age
HH	= Household head
LFBSM	= Local food based schools meal
MDGs	= Millennium development goals
MNP	= Micro-nutrient powder
MoE	= Ministry of Education and Culture of Republic of Indonesia
MoH	= Ministry of Health of Republic of Indonesia
NER	= Net enrollment rate
NTT	= Nusa Tenggara Timur
PMT-AS	=School meals program for school children-*Penyediaan Makanan Tambahan bagi Anak Sekolah*
PPS	= Probability proportionate to size
PROGAS	= *Program Gizi Anak Sekolah*
RSUD	= *Rumah Sakit Umum Daerah* = Public hospital at district level
SD	= Standard deviation
TTS	= Timor Tengah Selatan
VITAS	= *Vitamin untuk anak Sekolah*= Vitamin for school children
WAZ	= Weight for age
WFP	= World Food Programmeme
WHO	= World Health Organization

Executive Summary

This executive summary presents findings from a final program evaluation conducted by the South East Asian Ministers of Education Organization (SEAMEO) Regional Center for Food & Nutrition (REFCON) between March - May, 2016. The evaluation was carried out as part of the Indonesian Ministry of Health efforts to improve educational, health, and nutrition indicators among school-aged children through a Local Food-Based School Meals (LFBSM) program in Nusa Tenggara Timur (NTT) and Papua Provinces, Indonesia.

Local Food-Based School Meals Program (2012 – 2015)

The Indonesian Ministry of Health, with support from the World Food Programme (WFP) and partners, identified NTT and Papua provinces for the 2012 – 2015 LFBSM program. The LFBSM program aimed to use school meals as an entry point to improve the health, nutrition, and education of school-aged children in Indonesia. It was also designed to teach important principles around health and nutrition, as well as water, hygiene and sanitation (WASH), to both school-aged children and members of their larger communities, with the larger goal of enhancing health-seeking behaviors to improve nutrition and food security.

The LFBSM program sought to support PMT-AS, the national school meals movement, with the following objectives:

1. To improve school attendance and ability of children to learn
2. To improve knowledge and attitudes of children toward good nutrition and basic personal hygiene
3. To increase access to balanced, nutritious, and diversified local diets
4. To encourage community participation in preparing local foods
5. To increase local community incomes through increased agricultural production

The LFBSM program did so through trainings of school children, school community members, and local stakeholders. Parents, teachers, and community members assisted their children in adopting enhanced health-seeking practices both at school and at home. As part of school meal provision, trainings were also conducted among cooking group members with support from both school teachers and women empowerment groups who prepared safe, nutritious, and sustainable meals. Trained Government staff members from a variety of different sectors jointly cooperated and supported the program. For instance, the Health sector provided regular distribution of deworming tablets for school aged children. Furthermore, the Education sector supported maintenance of overall school facilities and infrastructure. The Agricultural sector empowered and assisted local farmers in order to be able to produce sustainable food locally as ingredients for the school meals. Specifically, the LFBSM program was used as an entry point for delivering an integrated package of program to improve nutrition and food security, as well as education-related outcomes.

More than 30,000 school children in Kupang, TTS and Papua were reached with school meals and with health, hygiene, nutrition education from 2012 to 2015.

Evaluation Objectives

The main objective of this study was to evaluate the LFBSM program processes, nutrition-related outcomes, and health impacts on beneficiaries in both NTT and Papua provinces. The secondary objective was to translate these findings into policy and program-related recommendations.

Methods

This study used a cross-sectional design with a mixed methods approach using both quantitative and qualitative data to address study objectives. The outcome and impact of the LFBSM program was assessed through comparative analysis between findings of LFBSM and non-LFBSM schools. This study covered two provinces where the LFBSM program was implemented: NTT (Timor Tengah Selatan (TTS) and Kupang districts) and Papua Provinces (Kota Jayapura and Jayapura districts). Quantitative data was collected in NTT Province and qualitative data was collected in NTT and Papua Provinces.

The quantitative data collection was conducted only in TTS and Kupang Districts of NTT province in March 2016. The data collection period was several months after the LFBSM program had formally ended in December 2015. No quantitative data were collected in Papua. The qualitative data collection was conducted over 4 weeks in March 2016. In Papua province, data were collected between 15-31 March 2016 in Kota Jayapura and Jayapura Districts.

A total quantitative sample of 866 school-aged children was equally selected between LFBSM schools and non-program schools. Between LFBSM program and non-program groups, the socio-demographic characteristics of the school-aged children were similar in terms of age, gender, and grade levels. The household characteristics were also found similar in both groups. Nearly all households in LFBSM program and non-program group had nuclear family composition (86.4% and 85.9% respectively) with male heads of household (91.5% and 91.9% respectively). There was no difference in average reported monthly income between study arms (p=0.81), but a larger proportion of caregivers had more than 9 years of education in the LFBSM program sample (39.1%) compared to that of the non-program (27.4%). Findings should be considered in light of this educational difference.

Results

Delivery of LFBSM Program Activities

The large majority of core LFBSM program activities were delivered as planned, with 6 out of 8 activities being delivered in excess of targets set during program planning. Greater than 30,000 school-aged children were reached with health, nutrition, and hygiene/sanitation education throughout the program. Trainings were a core component of this program: 790 government officials and partner staff members, and 1,891 cooking staff were reached through training activities. Meeting 73.9% of its program goal, LFBSM successfully improved the handwashing facilities in 113 schools.

School Enrolment, Attendance, Drop Out, and Retention

Improving school enrolment and school attendance among school-aged children participating in LFBSM were two primary outcomes that the program sought to achieve.

Enrolment. Since 2011, the year before LFBSM started, through 2015 the Net Enrollment Rate of school-aged children in Kupang district remained relatively constant, averaging approximately 96.0%, with little variation between LFBSM schools and non LFBSM schools.

Higher Attendance in LFBSM schools. There was a higher overall attendance rate in November 2015 – the month prior to the end of LFBSM programming – comparing enrolled LFBSM students (97.3%) and those in non-program schools (93.3%) (p<0.039). This represented an increase from the 2012 baseline of 86%. Qualitative data suggest that school children were more eager to come to school when school meals were available. Teachers explained that the school meals attracted students to go to school more frequently. These qualitative findings were similar between NTT and Papua.

Lower Drop Out in LFBSM schools. Among LFBSM students, 8 out of 4,431 (0.18%) students dropped out of school during the program, in comparison to 24 out of 3,747 (0.64%) students who dropped out among non-program schools.

Higher Retention in LFBSM schools. To try to measure academic performance and attendance, we also collected secondary data of student retention (i.e., having to repeat the same grade level due to poor grades and/or lack of attendance). Out of a total of 8,178 children in 50 schools total, only 380 had to repeat a grade level. 141 out of 4,431 (3.2%) students had to repeat a grade among LFBSM students and 239 out of 3,747 (6.4%) among non-program students.

Improved Concentration Ability in LFBSM schools

The ability of school-aged children to fully concentrate during classroom activities throughout the school day, without sufficient nutrients, has been reported as a common challenge that school feeding may address. More LFBSM students reported actively responding to teacher questions during class (p<0.02). During qualitative paired-child interviews, school children reported that school meals helped in four primary ways: **1)** gave them more energy to participate in school activities**; 2)** enabled them to understand the lessons better than when they were hungry; **3)** reduced short term hunger pains; and **4)** improved their ability to concentrate during school.

Student & Parent Knowledge, Attitudes, and Practices

The knowledge, attitude and practice of health, hygiene and nutrition topic were evaluated through structured interviews.

Knowledge. School children responses to knowledge questions did not differ by study arm. Parents in the LFBSM program (85.5%) and non-program groups also had similar knowledge (83.1%) about basic health, hygiene and nutrition.

Attitudes. No differences in the attitudes of students or parents toward health-seeking behaviors were found in this evaluation. However, over 95% of the parents in both groups had positive attitudes toward the 5 health-seeking behaviors that were evaluated.

Better Practices. A higher proportion of students in the LFBSM program brushed their teeth twice a day (73.0% vs 61.7%) and had shorter, cleaner nails (43.4% vs 32.6%) compared to non-program

students. More LFBSM school children reported washing hands with soap before eating (95.6% vs 88.7%, $p<0.001$). The same was reported by LFBSM parents when compared with non-program parents (96.3% vs 92.6%, $p=0.017$).

More LFBSM students reported eating breakfast at some time during the school week (91.2% vs. 82.7%, $p<0.01$). This practice was promoted during the LFBSM program. The most frequently consumed food categories from both the LFBSM program and non-program schools were cereal of rice and corn (100% vs 99.5%); vegetables (93.1% vs 90.8%); oil and fats (84.1% vs 86.4%). The proportion of students who reported consuming fruits, meats and eggs was higher among LFBSM participants. A higher proportion of LFBSM students had 'high' dietary diversity scores compared to non-program students (49.2% vs 38.1%) ($p<0.05$). Qualitative data suggested that LFBSM parents communicated to their children about the importance of nutritious foods based on what they had learned in school activities. The proportion of LFBSM households with acceptable food consumption scores was higher than that of the non-program (54.5% vs. 40.1%, $p<0.05$).

Nutritional Status of School-aged Children

The prevalence of anemia among LFBSM school children was lower than that of non-program students (25.9% vs 32.8%, $p<0.05$) but was similar to baseline estimates (26.0%, WFP 2015) and national survey data (26.4% for 5-14 years, MOH 2013). Being in the LFBSM program was a factor contributing to non-anemia status, after controlling for other variables ($p<0.05$). The percentage of school children who received deworming tablets was significantly higher in the LFBMS program (61.7%) than those in non-program sample (54.2%) ($p<0.05$). The prevalence of fever (32.2% vs 43.4%, $p<0.05$) and diarrhea (13.4% vs 18.9%, $p< 0.05$) of the LFBSM program students were significantly lower than those of the non-program schools.

Conclusion

This evaluation was able to illustrate the many benefits of delivering an integrated program through school meals. It also highlighted many improved health and nutrition-related practices of school-aged children who had been exposed to the LFBSM program. Qualitative findings also overwhelmingly pointed to the positive impacts of the LFBSM program and high acceptance of its activities among students and parents. While this evaluation did highlight some areas for improvement, overall the LFBSM program can be recommended for scale-up and used as an effective entry point for improving health and education of school children.

1. Introduction

1.1 Background

Health and Nutrition Situation

Indonesia has maintained stable economic growth during the past decade, yet 11.3% of the entire population or 28.5 million people are living below the national poverty line (US$1.55 per day in Purchasing Power Parity), and 43% of the population lives on less than US$2 a day[1]. According to the 2009 Food Security and Vulnerability Atlas (FSVA), 87 million Indonesians were food insecure, concentrated in the eastern part of the country.

The FSVA of Indonesia in 2015 reported that there were 14 Districts in Nusa Tenggara Timur (NTT) with poverty rates above 20%. NTT province consistently has poor indicators of nutritional status among school children aged 5-12 and 13-15 years of age (43.9% and 56.5% for stunting, respectively; and 19.4% and 25.9% for thinness or underweight, respectively). Over a quarter (26.0%) of children aged 5 – 14 years had anemia[2] in a recent survey.

In Papua province, the situation is similar. Papua Province has a population of 3,091,047[3] with 31.52% living below the poverty line[4]. Out of all 28 districts in Papua, 26 districts (93%) have severe food insecurity[5]. Indicators of poor nutritional status among school-aged children 5 - 12 and 13 - 15 years (34.5% and 47.7% for stunting, respectively; and 9.9% and 11.8% for thinness, respectively). The percentage of school-aged children aged 5 - 14 years with anemia in Papua is 26.4%[6].

Penyediaan Makanan Tambahan Anak Sekolah (PMT-AS) – 1997 National School Meals Program

Living in resource-constrained conditions and with poor nutritional status will influence the productivity of school children, in particular limiting their cognitive development and capacity. To improve health and nutrition among school-aged children in NTT and Papua, a national school meals program called *Penyediaan Makanan Tambahan Anak Sekolah* (PMT-AS) was launched by the government of Indonesia in 1997. The program was implemented in low-income villages in 27 provinces across Indonesia and covering 7.3 million kindergarten and primary school children.

The main goal of PMT-AS was to improve child health and nutritional status through school meals in order to increase their learning ability, as measured by improvement in school performance. This initiative would eventually would support the compulsory National Primary Education through grade 9[7] and aimed at providing kindergarten and elementary school children with school meals, in theory supplementing what they had already received at home. The program was legally stipulated by the Presidential Instruction No. 1/1997 and involved collaboration among many government institutions at national, provincial, and district levels.

[1] BPS, 2015
[2] WFP, 2015
[3] BPS, 2014
[4] BPS, 2013
[5] WFP, 2015
[6] Ministry of Health, Government of Indonesia, 2013. Basic Health Research (RISKESDAS) 2013 Report. Ministry of Health. 2013.
[7] Riyadi, Dedi M. Masykur. 2006. *PMT-AS dan Peningkatan Kualitas SDM DalamPerspektif IPM. Rapat Koordinasi teknis programme PMT-AS* Jakarta 19 September 2006. (The School Feeding Programme and its impact on the increaseof the human resources quality in the IPM's perspective). The meeting oncoordination technique for the implementation of the PMT-AS, Jakarta, September 19, 2006.

Then in 2010, PMT-AS guidelines indicated that foods provided through the school meals had to be obtained locally, provide a nutritious (300 kcal and 5 grams of protein) snack for each child, three times a week, and at a cost of 2,500 Indonesian Rupiah (IDR). This program targeted 2 million school children with one district in each province selected to pilot PMT-AS. It was discontinued in 2012 due to funding cuts.

***Program Gizi Anak Sekolah* (PROGAS) – 2016 National School Meals Program**

In May 2016, the Government launched the School Children Nutrition Program, more commonly known as *Program Gizi Anak Sekolah* (PROGAS), which targets Kupang, Timor Tengah Selatan (TTS) and Belu districts in NTT Province and Tangerang District in Banten Province. It is still ongoing today and was so throughout this evaluation.

***Local-Food Based School Meal* (LFBSM) Program – Supported by the World Food Programme**

In Indonesia, school meal programs were often collaborative efforts to help improve child health, nutrition, and education outcomes with a particular focus on achieving the Millennium Development Goals (MDG). The *Local-Food Based School Meal* (LFBSM), a Government program supported by the World Food Programme (WFP), was no different in this regard.

However, it did include a number of newly designed program enhancements. First, in addition to serving school meals for school-aged children, LFBSM also empowered local stakeholders, including Government partners, to sustain and expand the program. Second, it was designed to include comprehensive training of teachers in behavior change communications (BCC), which were intended to support school-aged children in making informed health and nutrition choices outside of school in their daily lives.

WFP started supporting the LFBSM program in NTT province in 2010 and Papua Province in 2012. Since 2011, the fortified biscuit was replaced with locally-grown food items, including maize and mung bean, the main staples of NTT, as well as cassava, sweet potato and taro in Papua. The school meal ingredients were also fortified with a micronutrient powder (MNP) called *Vitamin untuk anak Sekolah* (VITAS), containing 15 vitamins and minerals.

NTT LFBSM Program

Since October 2010 in NTT province, the LFBSM program was initially implemented in 20 schools in Amanuban Barat sub-district (TTS district), and 1 independent school in Kota Soe (funded by the local school with technical assistance from WFP). In 2011 all the 20 schools were covered by the national PMT-AS program through funding by the Government. However, this fund was not adequate to cover all enrolled school children. In the same year, Kupang District Government requested a pilot program in 9 of its schools and added 15 more schools in 2014. The Kupang City Government (Kota Kupang) piloted LFBSM in 23 schools in 2015. By the end of December 2015, a total of 20,455 school children from 2 rural and 1 urban district, were beneficiaries of LFBSM programs in NTT province.

Papua LFBSM Program

In Papua province, WFP introduced the LFBSM program in Kota Jayapura in 10 schools of Muara Tami sub-district in November 2012; and in August 2014, 20 schools in Jayapura district were added to the program. WFP has supported school meal provision to 2,951 beneficiaries in Jayapura district, with at

least 3 meals provided per week. 2 different local school meal recipes were developed to provide a minimum of 300 kcal. and 5 g. of protein per portion.

In 2015, the local Government made a commitment to pilot LFBSM in 4 additional districts of Papua covering 60 schools across several districts, including 10 schools in Kota Jayapura, 20 schools in Jayapura, 6 schools in Merauke, 8 schools in Nabire, 7 schools in Jayawijaya, and 9 schools in Biak Numfor.

Primary school-aged children were the direct beneficiaries of LFBSM. Teachers, parents, and local farmers were secondary beneficiaries, given targeted assistance through health and nutrition education as well as income generating activities linked to the school meals. For instance, ingredients of the school meals were provided by local farmers within LFBSM.

WFP supported LFBSM activities through the local Government bodies of Papua, collaborating at district and provincial levels with the Offices/Ministries of Education, Health, Food Security, Women's Empowerment, and Family Welfare.

1.2 LFBSM Program Overview

The LFBSM program aimed to use school meals as an entry point to improve the health, nutrition, and education of school-aged children in Indonesia. It was also designed to teach important principles around health and nutrition, as well as water, hygiene and sanitation (WASH), to both school-aged children and members of their larger communities, with the larger goal of enhancing health-seeking behaviors to improve nutrition and food security.

In addition to serving 3 nutritious meals per week, the LFBSM program trained school children, school community members, and local stakeholders. The underlying theory was that parents, teachers, and community members would assist their children in adopting the enhanced practices both at school and at home if they themselves had also been trained. As part of school meal provision, trainings were also conducted among cooking group members with support from both school teachers and women empowerment groups who prepared safe, nutritious, and sustainable meals.

Trained Government staff members from a variety of different sectors jointly cooperated and supported the program. For instance, the Health sector provided regular distribution of deworming tablets for school aged children. And the Education sector supported maintenance of overall school facilities and infrastructure. The Agricultural sector empowered and assisted local farmers in order to be able to produce sustainable food locally as ingredients for the school meals.

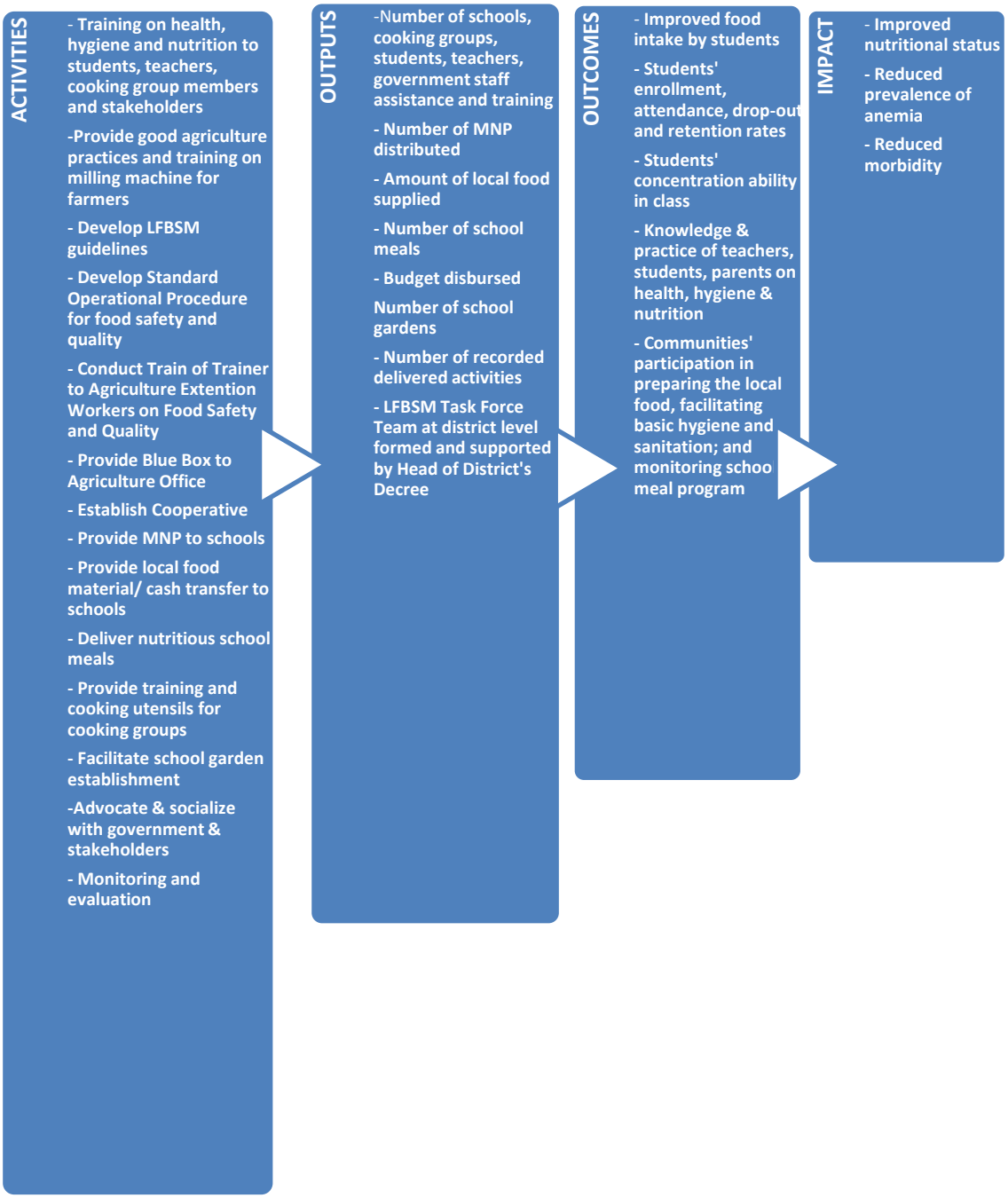
Specifically, the LFBSM program was used as an entry point for delivering an integrated package of program to improve nutrition and food security through the following range of activities:

- **Local food-based recipes**
    - Locally-sourced foods plus Micronutrient powder
- **Community participation**
    - Training and formation of cooking & farming groups
    - Dietary diversity trainings
- **Deworming**
    - Provided by Indonesia Ministry of Health
- **Local food supply**
    - Farmer training on food production, processing and safety

- **Health, hygiene, and nutrition training**
    - Handwashing promotion
    - Personal hygiene
    - Use of latrines
- **School gardens**
    - Increasing local vegetable and fruit production

The figure below lists the specific program activities, and desired outputs, outcomes, and impacts organized within the LFBSM logic model.

Figure 1 Guiding logic model of LFBSM programming



1.2.1 LFBSM Program Objectives

The LFBSM program sought to support PMT-AS, the national school meals movement, with the following objectives:

1. To improve school attendance and ability of children to learn
2. To improve knowledge and attitudes of children toward good nutrition and basic personal hygiene
3. To increase access to balanced, nutritious, and diversified local diets
4. To encourage community participation in preparing local foods
5. To increase local community incomes through increased agricultural production

2. Methods

2.1 Evaluation Study Design

This study used a cross-sectional design with a mixed methods approach collecting both quantitative and qualitative data to address study objectives. The outcome and impact of the LFBSM program was assessed through comparative analysis between findings of LFBSM and non-LFBSM schools. This study covered two provinces where the LFBSM program was implemented: NTT (Timor Tengah Selatan and Kupang districts) and Papua Provinces (Kota Jayapura and Jayapura districts). Quantitative data was collected in NTT Province and qualitative data was collected in NTT and Papua Provinces.

2.2 Study Objectives and Aims

The main objective of this study was to evaluate the LFBSM program processes, nutrition-related outcomes, and health impacts on beneficiaries in both NTT and Papua provinces. The secondary objective was to translate these findings into policy and program-related recommendations.

Specifically, this evaluation sought to address the following research aims:

1. To describe the breadth and number of program activities delivered
2. To describe school enrollment and attendance rates in the LFBSM and non-LFBSM areas
3. To assess concentration abilities of school children in LFBSM and non-LFBSM areas
4. To measure knowledge, attitudes, and practices of school children and families on health, hygiene and nutrition in LFBSM and non-LFBSM areas
5. To describe facilitating factors and barriers to program participation
6. To assess nutritional status of school-aged children in LFBSM and non-LFBSM areas
7. To understand potential factors influencing nutritional status

The results of this evaluation can be a reference point for decision makers, including strategy and policy makers at the Ministry of Health, Ministry of Education, and the local government, to improve the effectiveness of future programming.

2.3 Quantitative Methods

2.3.1 Quantitative Sampling

The subjects of this study were primary school-aged children (7-12 years old) and parents of the school children. Besides school children, representatives from cooking groups or teachers who were involved in the program were interviewed to provide more information about LFBSM implementation.

Since this study compared two groups, there were two levels of criteria to select subjects. The first was criteria to select the schools for the non-program group in order to have comparable conditions with schools in the program group and the second was to select the subjects themselves. Inclusion criteria for non-program schools were:

1. Do not have ongoing school meal program
2. Do not have any program with similar outcome and/or impact as the LFBSM program
3. Have similar socio-demographic characteristics as those of LFBSM program area

Subjects recruited for this study were chosen based on the following criteria:

1. Enrolled in selected elementary school
2. In 4^{th}or 5^{th}grade

3. Available at the time of data collection
4. The parents or caregivers were able to be interviewed

The school children in 4th and 5thgrades in each school were selected given their ability to provide more reliable information compared to lower grades and the fact that they have benefitted from the program since 2012. School boys and girls had the same opportunity to be included in the study.

The sample size was calculated by estimating the difference between two proportion populations formula[8] as follows:

$$n = \frac{(Z_{\alpha/2}+Z_{\beta})^2 x\ (p_1(1-p_1)+p_2(1-p_2))}{(p_1-p_2)^2}$$

n = sample size
$Z_{\alpha/2}$ = level of significance, 95%
Z_{β} = power of study
P_1 = anticipated population proportion 1, 19.8%
P_2 = anticipated population proportion 2, 9.8%

Based on the calculation above, the sample required for each group was 197. After calculating the required sample with the design effect (DEFF) of 2 and adding a 10% non-response rate, the total sample size required for each group, program and non-program, was 433.This study used school as the cluster with a minimum number cluster of 25[9].

Sampling procedures

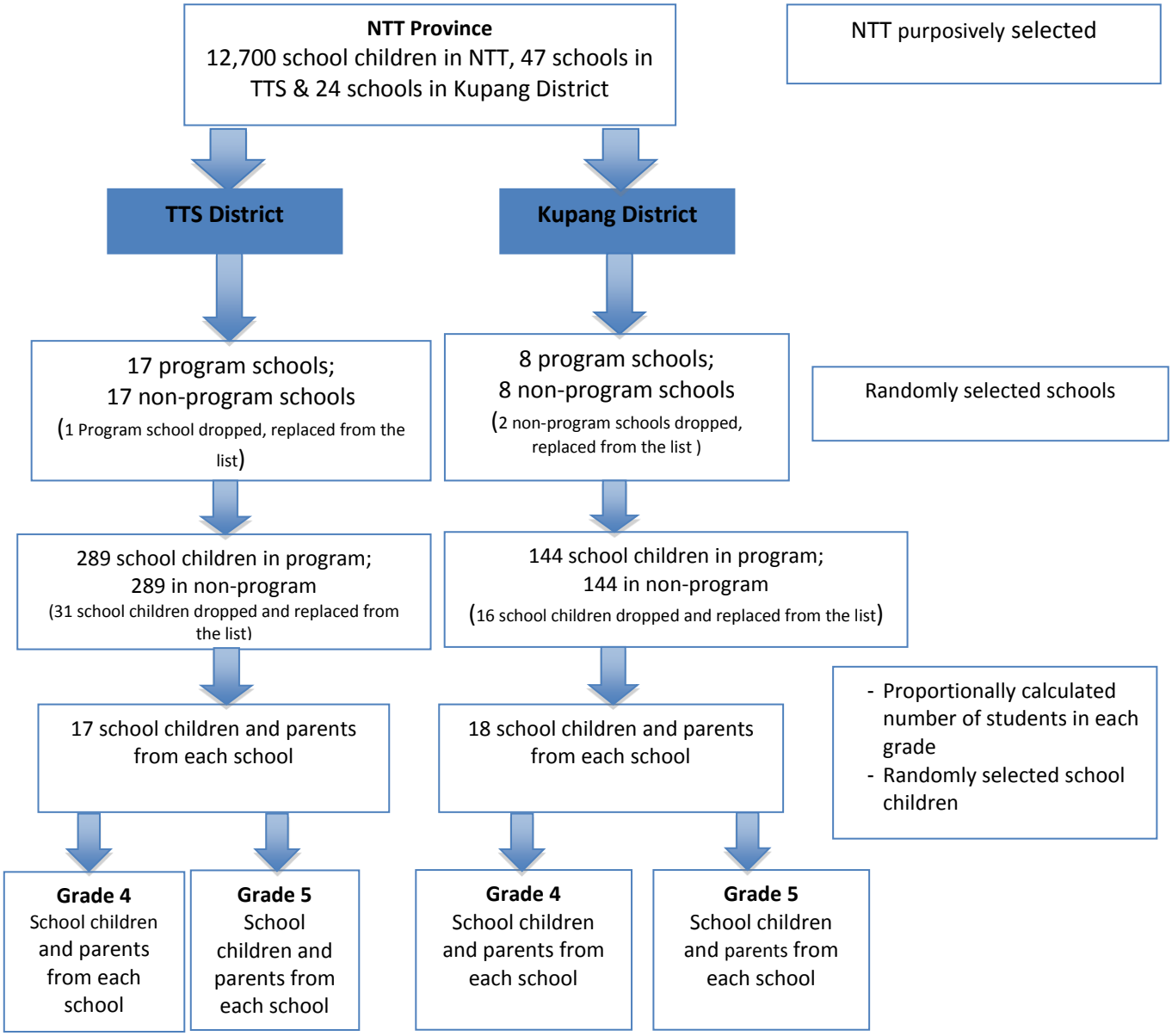
Since the LFBSM program was established in two districts, the number of clusters in each district was determined proportionally based on the PPS (Probability Proportion to Size) method. From 47 schools in TTS district and 24 in Kupang district, there were 17 and 8 schools in TTS and Kupang respectively, which were selected randomly for each group.

Number of school children in every selected school in each district was distributed equally (17 and 18 school children in TTS and Kupang respectively) while the number of school children selected in each grade (4thand 5thgrades) was distributed proportionally. Finally, the school children in each class were selected randomly from the list of school children available in every class. The sampling procedure is shown below.

[8] Gorstein J, Sullivan KM, Parvanta I, Begin F. 2007.*Indicators and methods for cross-sectional surveys of vitamin and mineral status of populations*. Micronutrient Initiative (Ottawa) and Centers for Disease Control and Prevention (Atlanta). USA.

[9] WFP, 2015. WFP Nutrition: Measuring Nutrition Indicators in the Strategic Results Framework (2014-2017) Briefing Package.

Figure 2 Sampling procedure for quantitative data



In summary, there were 25 schools, 25 representatives from cooking groups/teachers and 433 school-aged child / parent pairs from each of the LFBSM program and non-program groups. Detailed sample size information is shown in Table 1 below.

Table 1 Sample size for quantitative data

Respondent	LFBSM Program	Non-program
TTS district:		
Schools	17	17
Cooking group member/teachers	17	17
School children and their parents	289	289
Kupang district:		
Schools	8	8
Cooking group member/teachers	8	8
School children and their parents	144	144
Total (2 districts):		
Schools	25	25
Cooking group member/teachers	25	25
School children and their parents	433	433

2.3.2 Quantitative Data Collection & Fieldwork Procedures

Quantitative data collection was conducted only in TTS and Kupang districts of NTT province during March 2016. This data collection period was several months after the LFBSM program had formally ended in December, 2015. No quantitative data were collected in Papua.

Training of Enumerators

Before data collection commenced, enumerators were recruited, hired, and trained. They participated in 5 days of classroom and practical training sessions that introduced the evaluation objectives and aims, data collection methods, fieldwork protocols, and research ethics.

The questionnaires were pre-tested among enumerators in one non-program school which had similar characteristics to those of the schools to be included in the actual evaluation. Fieldwork guidelines were developed into a Manual of Operations and used as a reference for all staff and enumerators involved in the data collection and management (Annex 2).

Methods and Instruments

Quantitative data was collected using structured interviews among school-aged children, their parents, cooking group members, and teachers (Annex 3); structured observation checklists for school and home environments (Annex 4); anthropometric measurements; biochemical assessments, including hemoglobin (anemia) and malaria status; and analyses of secondary data that include program documents and reports (Annex 5).

Structured interviews

The structured questionnaire was first developed in English and then translated into Bahasa Indonesia for use in the field. It was pre-tested prior to data collection as described above and assessed the following topics:

- Socio-demographic information of individuals and households

- Concentration abilities of school-aged children
- Knowledge, attitudes, and practices of health, hygiene, and nutrition topics
- Household food security, including food consumption score (FCS), household food insecurity access scale (HFIAS), and dietary diversity score (DDS) questions
- Behavior change communications (BCC) indicators, including knowledge, attitudes, and practices related to BCC as well as dose, reach, and fidelity of BCC activities/materials
- Level of community participation in LFBSM programming, including range of process indicators

Anthropometric measurements

Body weight

Student body weight was measured by using SECA weighing scale. For measurement, the scale was placed on a flat surface. Students were asked not to wear any footwear, hats, or heavy clothing that could interfere with accurate weight measurements. They were asked to wear clothing as light as possible. The students were asked to stand in the middle of scale, feet inside the rubber mat area, with their head straight and eyes looking straight forward until the measurement stabilized[10]. The Two measurements were taken for each subject to the nearest 0.1 kg. The maximum allowable difference in weight measurement was 0.1 kg. A third measurement was made only if the difference between the initial 2 measurements was $\geq$0.2 kg. The smallest difference between any 2 or the 3 measurements was then chosen and averaged for a final result.

Body height

Student height was measured by using stadiometer with 1 mm precision. Each stadiometer was placed on a vertical flat wall surface in a school classroom. The students were measured in standing position and were asked not to wear any foot or headwear. Two individuals worked together to take each student's measurements. Measurements were made twice to the nearest 0.1 cm each time[11]. The maximum allowable difference between measurements was 0.2 cm. A third measurement was made only if the difference between the initial 2 measurements was $\geq$0.2 cm. The smallest difference between any 2 or the 3 measurements was then chosen and averaged for a final result.

Biochemical Assessments

Hemoglobin

Hemoglobin levels of school-aged children were analysed using Hemocue*[12]. A drop of blood from a finger prick was taken from each child by a trained nutritionist using a disposable and sterile lancet.

Malaria

[10] Gibson R, 2005. Principle of Nutritional Assessments. Oxford University Press.
[11] Gibson R. 2005. Principle of Nutritional Assessments. Oxford University Press.
[12] Hemocue AB (2016) www.hemocue.com/en/health-areas/anemia.

The study used malaria Pf/Pv Ag rapid test, which is a lateral flow chromatographic immunoassay to detect and differentiate the *Plasmodium falciparum* (Pf) and *vivax* (Pv) antigen in human blood specimens.

Secondary Data Collection

Secondary data analysis was used to evaluate school enrollment, school attendance, drop-out and retention or repeat the class rates. The data were obtained from the sampled schools in this evaluation. Where records were not available, data were collected from several sources, including the education offices of TTS and Kupang Districts, WFP program reports/records, and from archival websites of the Ministry Education and Statistics Office.

Student attendance records from November 2015, when school meals were still on going, were collected from most of the schools of the study. Information to help determine concentration ability of students during that same time period was obtained in part by analyzing WFP monitoring data.

2.3.3 Quantitative Data Management and Analysis Procedure

Quantitative data was analyzed using SPSS 20. The differences between program and non-program groups were tested using independent t-tests for continuous data or chi-square test for categorical data.

Nutritional status of the school children was analyzed by calculating z-scores using the WHO AnthroPlus 2007.The z-scores included Height for Age (HAZ) for screening stunting status, Weight for Age (WAZ) for screening underweight status and BMI for Age (BAZ) for screening thinness status. Thinness in school children is comparable to wasting in children. However, we followed the recommendation from WHO that only children between 5 to 10 years old were analyzed using WHO AnthroPlus 2007. Due to this consideration 193 school children were excluded from thedddd analysis. Besides the concern with age, three students were also excluded from further analysis since their nutritional status was an outlier (HAZ score <-6). Outliers for each nutritional status category were>+6 or <-6 for HAZ and >+5 or <-5 for BAZ. More information about the categories for nutritional status can be found in Annex 6.

Definition of anemia status applied in this study was taken from the WHO[13]. Severity of anemia was categorized based on hemoglobin concentration: severe, moderate, and mild anemia. The severity cut-off for anemia was different among children 5 – 12 years old and above 12 years but the categorization remained the same. The cut-off for anemia can be found in Annex 6.

Food intake of school children was obtained by recall of previous day food consumption by school children. The diversity of food consumed was identified in reference to 12 main food groups defined by WFP[14]. The food groups consumed were summed and then categorized into low and high diversity scores based on median of distribution data.

Food consumption score for household

Food consumption of the households was assessed using Food Consumption Score (FCS) which was developed by World Food Programme[15]. FCS is a composite score based on food frequency, dietary diversity and relative nutrition importance of different food groups. Food frequency was obtained from recall of household food consumption in the past 7 days. The relative nutrition importance was

[13] WHO, 2011.

[14] WFP, 2015. Monitoring Data of Local Food Based School Meal. September 2013 to December 2014.

[15] WFP (2008) VAM Technical Guidance Sheet. Food Consumption Analysis.

indicated by relative weight of a food group. The total sum of the scores makes up the FCS and was categorized as poor, borderline and acceptable.

2.3.4 Quality Assurance/Quality Control (QA/QC) for Quantitative Methods

During fieldwork, we employed specific QA/QC strategies to maintain and control the quality of data being collected and managed.

Deliberate selection and hiring of enumerators and field supervisors

- Educational backgrounds and previous experiences of enumerators and field supervisors were carefully considered by principal and co- investigators during hiring process. Only individuals with previous experience conducting large-scale health and nutrition surveys were considered for these roles.

- Enumerators and field supervisors were trained in order to ensure good understanding of the questions as well as effective interview technique. A training on dietary assessment was given by the principal investigator as explained previously in order to help ensure valid and reliable collection of dietary intake data.

- Anthropometry measurement training was conducted for all enumerators to obtain standardized and qualified measurement procedure and to prevent systematic error. Calculation of intra- and inter-observer reliability was done to select enumerators who had high precision and accuration measurement abilities, with at least intra-observer 1.5% and inter-observer2.0% values[16].

Careful fieldwork procedures

- Both accuracy and consistency of data recording were monitored in the field every day by field supervisors.

- Data collection and data entry guidelines/procedures were developed in order to ensure the same procedures were being reliably implemented by all enumerators on a daily basis (Annex 2).

- Data collection instruments were pre-tested prior to fieldwork

- Weighing scales were calibrated each night prior to the following day of data collection by using a 5 kg-stable weight measurement.

- During data collection, height measurements were taken twice with a maximum allowable difference of 0.2 cm. All measurement results were checked using WHO AntroPlus 2007 software in order to catch extreme z-scores (exclude ± 5SD).

[16] Gibson R. 2005. Principle of Nutritional Assessments. Oxford University Press.

- The HemoCue instruments were calibrated daily prior to data collection using external standards (HemoTrol*) with low concentrations in order to check the reliability of measurements and in addition to using the calibration cuvette provided by the manufacturer.

Data entry and management

- Data cleaning was completed everyday in the field as data were being collected. It consisted of both self-checking and peer review by teammates. All data were cleaned by the data entry supervisor prior to entry into SPSS software (REF).

- A full-time quantitative data manager was employed throughout data collection for close monitoring of all data entry. Also, WFP staff conducted spot checks of data entry throughout the data collection process.

- Data entry was completed by 2 different individuals (cross-inputed) by using a double entry method of 10% of the total data set. Any differences found during the double entry process were traced back to the paper questionnaire and corrected using a team review process.

2.4 Qualitative Methods

Qualitative data were collected to provide complementary information useful for addressing evaluation aims. The qualitative information collected from a variety of different participants at both community and stakeholder levels allowed us to understand the 'why' and 'how' behind some quantitative findings.

2.4.1 Qualitative Sampling

A purposive sampling strategy was used to obtain information-rich participants who had participated in or had been affiliated with the LFBSM program as a beneficiary, implementer, or stakeholder. We used criterion-based sampling to recruit individuals based on specific criteria deemed important for addressing the research objectives and aims, including but not limited to participants of different organizational affiliations, ages and genders, geographic locations, and relationships to the program[17].

Participants included school-aged children, parents, cooking group members, farming group members, WFP implementing staff, and stakeholders from the local government at both district as well as provincial levels of both NTT and Papua. Initial recruitment was carried out in consultation with the WFP and District Education Office/*Bappeda* staff working in the districts of TTS and Kupang in NTT, as well as Jayapura and Jayapura Kota in Papua.

These participants could be categorized into 4 categories: 'Influencers' (stakeholders and teachers), 'Implementers' (farmer and cooking group members), 'Parents' (parents of beneficiaries), and 'Beneficiaries' (school-aged children who were beneficiaries).

2.4.2 Qualitative Data Collection & Fieldwork Procedures

The qualitative data collection was conducted over 4 weeks in March, 2016. In NTT province, data were collected between March 4 - 15 in TTS and Kupang districts. And in Papua province, data were collected between March 5 - 31 in Jayapura and Jayapura Kota districts.

Data were collected using both semi-structured interviews and focus group discussions in Bahasa Indonesian or local languages when necessary with the help of interpreters. Interview data provided personal stories and rich narratives that revealed participant experiences participating in the LFBSM program. Focus groups provided normative data and group-level information that highlighted similarities and differences of perspectives among study participants. The two methods were used in this study design in order to corroborate findings in a form of methodological triangulation[18]. All qualitative data collection was digitally recorded and field notes were taken by interviewers.

Initial sample size estimates were made based on previous experience conducting this type of qualitative data, as well as by following general sampling guidelines in the literature[19]. Data were then

[17] Robinson, O. C., 2014. Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology*, *11*(1), 25-41.

[18] Farmer, T., Robinson, K., Elliott, S. J., & Eyles, J., 2006. Developing and implementing a triangulation protocol for qualitative health research.*Qualitative health research*, *16*(3), 377-394.

[19] Creswell, J. W., & Clark, V. L. P., 2007. Designing and conducting mixed methods research.

collected in each district and among each type of participant until a repetition of themes occurred, an indication of data saturation[20].

The table below outlines the final sample sizes by type of participant, province, and method.

Table 2 Final qualitative sample sizes by participant type, province and method

Province	Arm	Participants	Focus Group (*n*)	In-depth Interview (*n*)
NTT	LFBSM Program	Influencers	-	24
		Implementers	4	2
		Parents	4	-
		Beneficiaries	-	4
Papua	LFBMS Program	Influencers	-	24
		Implementers	3	1
		Parents	2	-
		Beneficiaries	-	4
	Non-program**	Influencers	-	2
		Parents	2	3
		Beneficiaries	-	2
TOTAL			**15 focus groups** (109 people)	**66 interviews**

*Focus groups each included between 6 – 10 participants; **Non-program participants were recruited in Papua only

Data collection instruments

Prior to data collection, training and instrument pilot testing was conducted among a small number of community members to ensure appropriateness of open-ended questions in Bahasa Indonesia. Then throughout the data collection period, qualitative instruments were continually revised and modified based on emergent themes.

Guides were semi-structured in nature, containing open-ended questions and a selection of probes within each category of questions. Five different types of qualitative guides were used during this evaluation. Each one was developed in consideration of participant type and evaluation aims.

All interview guides are presented in Annex 9.

2.4.3 Qualitative Data Management & Analysis Procedures

[20] Morse, J. M., 1995. The significance of saturation. *Qualitative health research*, *5*(2), 147-149.

The transcribers transcribed the recording after the data collection to get immediate information on emerging issues and completeness of data.

Training and Testing

The qualitative instruments were tested during a 5-day training and pilot data collection to ensure appropriate language and data collection procedures. If there were any difficulties regarding the terms used in the instruments, then the qualitative guideline were re-written and revised prior to data collection. The training for the interviewers included familiarization of qualitative data collection methods as well as study aims, interviewing methods (including open-ended questioning and probing), and guidelines for ensuring accurate transcription and translation of technical terms.

Translation and Transcription

Interviews were digitally recorded in the language that the informant felt comfortable speaking, usually in Bahasa Indonesia. Field notes were taken during each interview. Translation from local languages into Bahasa Indonesia was performed for those interviews conducted in local dialects. A local translator was hired to help understand interviews/ focus groups using local dialects. A debriefing process to elucidate important information based on the interviews was carried out by the interviewers with the qualitative survey coordinator each day, and a short field notes form was filled out by the data collector for each interview/focus group conducted. This process was useful for discussing missed probes, preliminary findings/themes, and ideas for purposefully sampling new informants in subsequent iterations of qualitative data collection. The transcription process was reviewed by WFP staff as a peer review technique to improve the overall quality of transcripts.

Qualitative Data Management & Analysis

The steps of data management were the following:

1. Data were digitally recorded in the field.
2. Data were uploaded to a computer and into a digital cloud regularly in the field.
3. Debriefing occurred between data collectors and qualitative survey coordinator each day to listen to portions of interviews to ensure completeness of recordings and discuss lessons learned for improvement.
4. Concurrent to data collection, digital files were transcribed verbatim in Bahasa Indonesia by the transcription team. In cases when local languages were used, then the data collection team translated the interviews into Bahasa Indonesia during transcription work. Data collectors and the cordinator supported this process.
5. Final transcribed textual files were uploaded into Dedoose in Bahasa Indonesia for analysis.
6. The qualitative survey coordinator reviewed transcripts on a daily basis to ensure completeness of transcripts, accuracy of contents in comparison to digital recordings, and areas where new questions or additional probing and sampling might be necessary.
7. This process was continued until all interviews and focus groups had been completed and Dedoose had a final data set uploaded.

The transcripts were thoroughly read after uploading. Some memos were taken in Dedoose (Los Angeles, CA: SocioCultural Research Consultants) during this 'read through' process. A codebook then was developed to match the specific contents of the semi-structured interview guides used during phase 1. It contained 20 codes. Using Dedoose, transcripts were coded by team members as well as WFP staff using a combination of codes developed *a priori* as well as those that were emergent, in an inductive process drawing from Grounded Theory, but not doing so exclusively. WFP staff supported the process of data interpretation, which was a peer review process to minimize limitations of individual interpretation. The next step was extractions of quotations to answer research questions. Salient themes and sub-themes were identified. Comparisons and contrasts of all findings by characteristics of the participants were made using the descriptor function within Dedoose. Then findings were presented in data matrices, tables/figures, and exemplar quotes to illustrate key findings.

2.4.4 QA/QC for Qualitative Methods

Both participant and methodological triangulation were used in order to ensure the credibility of the data[21]. The data quality was assured by the development of fieldwork guidelines for data collection, fieldwork supervision, and peer review by WFP on a continual basis.

Local language interpreters were used to make participants feel comfortable using the language they preferred. Locally-trained data collectors supported in these roles.

Verbatim transcriptions were used for qualitative data analysis. In addition to field notes on the first page, the verbatim transcripts provided rich contextual data to be analyzed. Doing so the results were driven by informants' points of view, not the researchers' points of view.

2.5 Ethical Approval

This evaluation study obtained ethical approval from the Health Research Ethics Committee, Faculty of Medicine, University of Indonesia, no:124/UN2.F1/ETIK/2016 on February 22, 2016 (Annex 11). The study also received permission from the Ministry of Internal Affairs, Government of Indonesia, Provincial Government of NTT and Provincial Government of Papua.

[21] Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health services research*, *34*(5 Pt 2), 1189.

3. Results

This section presents the main results of the LFBSM program evaluation organized by the below content listed below.

3.1 Socio-demographic characteristics of study sample
3.2 Delivery of LFBSM program activities
3.3 Rates of school enrollment, attendance and retention
3.4 Indicators of concentration ability among school-aged children
3.5 Knowledge, attitudes, and practices around health, hygiene and nutrition
3.6 Facilitating factors and barriers to program participation
3.7 Nutritional status of school-aged children

3.1 Socio-demographic Characteristics of Study Sample

There were two districts of TTS province included in this evaluation, with one-third of schools sampled from Kupang district and two-thirds from TTS district. All but 2 schools were sampled from rural areas. Those 2 exceptions were sampled from peri-urban areas, located near the district office in TTS.

School-aged children

The number of school-aged children (*n* = 866) were equal between the LFBSM program (*n* = 433) and non-program (*n* = 433) study arms (Table 3). Between LFBSM program and non-program groups, the socio-demographic characteristics of the school-aged children were similar in terms of age, gender, and grade levels.

The mean (±SD) age of school children in both program and non-program areas was the same (11±1.1 years). Between groups, the proportions of male and female students were similar: there were 48.9% and 51.9% males in the LFBSM program and non-program samples, respectively (*p*=0.38). The proportion of children sampled by grade level (4th) was also similar between groups, with 47.8% and 51.0% representing the LFBSM program and non-program areas, respectively (*p*=0.34).

Table 3 Socio-demographic characteristics of school-aged children

Child characteristics			
	LFBSM Program (*N*=433)	**Non-Program (N=433)**	**p-value**
Age (years), mean ± SD	11 ± 1.1	11 ±1.1	*p*=0.39
Gender (male), *n*(%)	212(48.9)	225(51.9)	*p*=0.38
Grade level (4th)*, *n*(%)	207(47.8)	221(51.0)	*p*=0.34

*Children who were not in 4th grade were in 5th grade
**Significant at *p*<0.05

Households

Table 4 compares the basic socio-demographic characteristics of households sampled in this evaluation between study arms, as reported by the caregivers of school-aged children in this evaluation. Nearly all households had nuclear family composition (86.4% vs 85.9%) with male heads of household (91.5% vs 91.9%).

Table 4 Socio-demographic characteristics of households*

Household characteristics	LFBSM Program (*N*=433)	Non-Program (*N*=433)	p-value
Type of household (nuclear), *n*(%)	374(86.4)	372(85.9)	*p*=0.46
Head of household gender (male), *n*(%)	396(91.5)	398(91.9)	*p*=0.81
Head of household age (years), mean ± SD	47.3 ± 10.1	46.4 ±10.5	*p*=0.31
Education background of primary caregiver, *n*(%)			
≤9 years education	364 (49.3)	375 (50.7)	*p*=0.17

*****As reported by each parent of a school-aged child in this evaluation
**Significant at *p*<0.05

3.2 Delivery of LFBSM Program Activities

Key findings:

- The large majority of core LFBSM program activities (75.0%) were delivered as planned, with 6 out of 8 activities being delivered in excess of targets set during program planning
- Greater than 30,000 school-aged children were reached with health, nutrition, and hygiene/sanitation education throughout the program
- Trainings were a core component of his program: 790 government officials and partner staff members, and 1,891 cooking staff were reached through training activities.
- Although only meeting 73.9% of its program plan, LFBSM successfully improved the handwashing facilities in 113 schools

Table 5 describes the LFBSM program delivery according to secondary data sources in possession of WFP. Overall, the majority of the LFBSM program activities was delivered in excess of planning targets, an indication of program fidelity.

Table 5 Indicators of LFBSM program activities in comparison to those planned

No.	Indicators of LFBSM activities	No. of activities delivered	No. of activities planned	Percentage
1.	School-aged children reached with school meals, *n*	15,605 (M) 14,609 (F)	14,000 (M) 13,000 (F)	111.5% 112.4%
2.	Government/national staff reached with trainings, *n*	790	750	105.3%
3.	Children reached with health, hygiene, nutrition education, *n*	30,214	27,000	111.9%
4.	Cooks trained, *n*	1,891	1,700	111.2%
5.	Schools reached (school meals), *n*	153	135	113.3%
6.	Teachers trained, *n*	2,084	1,900	109.7&
7.	Schools with improved handwashing facilities, *n*	113	153	73.9%

* WFP monitoring data from 2012-2015

School meals delivered

Around 6 million meals were delivered to 30,214 school aged children. This number of school meals represents 111.9% of the total number planned.

Training & education activities

As many as 790 officials from various Government institutions and partner organizations received trainings on health, hygiene and nutrition, as well as logistics activities to support successful LFBSM implementation. This number represents 105.3% of the initial LFBSM program target.

Further, the LFBSM program reached 30,214 school-aged children (111.9% of target), 1,891 cooks (111.2% of target), 2,084 teachers (109.7% of target), and 153 schools (113.3% of target) with nutrition, hygiene, and health trainings or educational activities.

Improved facilities

An estimated 113 schools (73.9% of target) in NTT and Kupang had improved handwashing facilities after participating in the LFBSM program, according to household spot checks conducted during this evaluation.

3.3 Rates of School Enrollment, Attendance, Drop Out, and Retention

Key findings

- Enrolment rates appear to have stayed similar in NTT and Papua throughout the past several years, with the exception of 2012 – 2013 in Papua due to zoning changes.
- There is a higher overall attendance rate in November, 2015 – a month prior to the end of LFBSM programming – comparing enrolled LFBSM students (97.3%) and those in non-program schools (93.3%) (p<0.039)
- Both drop-out and retention rates in LFBSM schools were lower compared with non LFBSM schools.

Improving school enrollment and school attendance among school-aged children participating in LFBSM were two primary outcomes that the program sought to achieve. LFBSM used school meals as a vehicle for not only delivering more nutritious foods to school-aged children but also for improving school enrollment and attendance. To evaluate to what the extent LFBSM achieved these outcomes, we used both primary and secondary data to draw conclusions.

School Enrollment

Table 6 describes the Net Enrollment Ratio (NER), an indicator of student enrollment. NER is a ratio comparing the number of school-aged children (7 – 12 years old) enrolled in primary school to the total population of children in that same age range (who should be enrolled). NER is expressed as a percentage. We obtained secondary data from the Ministry of Education in order to present the NER for school-aged children in NTT and Papua since 2007.

Table 6 Net enrolment ratios (NER) of school-aged children in primary education in NTT and Papua provinces (2007-2015)

Area[a)]	Year (%)								
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Kupang district	94.82	95.94	96.31	99.41	96.59	96.64	95.62	95.83	95.71
TTS district	95.48	96.63	99.54	99.76	97.89	98.10	94.92	95.20	94.97
NTT Province	94.58	92.07	92.13	93.22	93.45	93.63	92.21	92.29	92.06
Jayapura district	90.39	91.20	91.29	97.98	96.80	97.01	69.40	70.52	70.35
Jayapura City	94.97	95.99	96.16	97.28	97.83	98.64	74.83	74.92	74.80
Papua Province	90.58	91.46	91.90	90.69	90.89	91.18	59.12	56.72	56.45
National	-	-	-	-	-	95.55	95.71	93.3	93.53

[a)]**Source**: MOE, *Kementerian Pendidikandan Kebudayaan, Pusat Data dan Statistik Pendidikandan Kebudayaan* (2016)

NTT Enrollment

The NER of school-aged children in Kupang district remained relatively constant, averaging approximately 96.0%, with little variation. In TTS, a similar trend existed, ranging between 95.0% and 98.0% during that time frame. And at the provincial level, while slightly lower, an average NER of 92.0% or 93.0% persisted since 2011.

Papua Enrollment

There was a noticeably substantial decrease between 2012 and 2013 with the NERs of school-aged children dropping from 97.0% to 69.4% and 98.6% to 74.8% in Jayapura district and Jayapura city, respectively. The Ministry of Education explained that this decrease was not a reflection of changes in the number of enrolled children, but of changes in zoning of administrative areas as well as updated

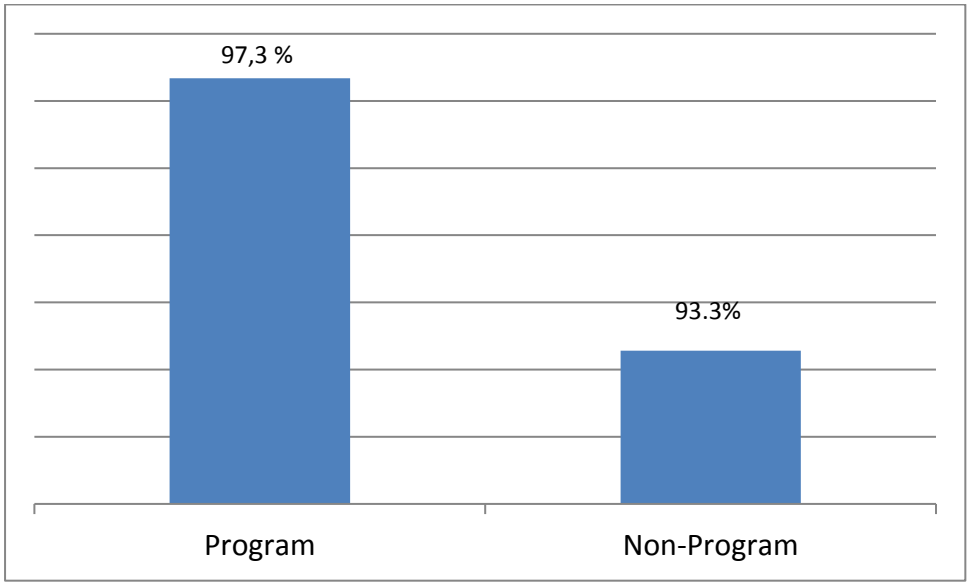
population-level data. These changes led to an increased population in the denominator of the NER calculation[22].

School Attendance

To understand whether school attendance differed between LFBSM program and non-program schools, we collected and analyzed secondary data to compare student attendance in the last full month (November, 2015) when the LFBSM program was being implemented.

Figure 3 presents student attendance reported by LFBSM (*n* = 17) and non-program schools (*n* = 13) one month prior to the end of program in NTT. There is a higher attendance rate in November 2015 among LFBSM schools (97.3%).

Figure 3 Attendance rates of school-aged children in LFBSM



Data from November, 2015 – the final full month of LFBSM program implementation

The qualitative data from TTS support these findings of higher attendance as a result of the LFBSM program. School children were more eager to come to school when school meals were available.

Teachers explained that school children looked happy at school and the school meals attracted students to go to school more frequently.

> *"They (school children) were glad to receive the school meals. They always wanted to eat (the meals). It (school meals) was a good program for the school children....on the school meal day, they (students) were happy .....they liked eating it...the kids were also then excited to study during the afternoon."*
>
> -Teacher interview, NTT province

One student indicated that not only were the school meals acceptable to her but also they eased hunger after she returned home from school.

[22] Ministry of Education and Culture Indonesia, 2016. Kementrian Pendidikan dan Kebudayaan. Pusat Data dan Statistik Pendidikan dan Kebudayaan, Jakarta. 2016.

"I am pleased with the school meals. Because now (now that the school meal program is over) when I come home, I am hungry…but when there were school meals (offered), I was still full after I got home (from school)."

-Female student interview, NTT province

While attendance data were not collected in Papua, the qualitative findings were similarly positive, pointing to increased attendance as a primary benefit of LFBSM. School-aged children reported that they rarely had breakfast at home. During the typical school day, interview data from teachers suggested that students typically went back home during school breaks to get food and would often not return. Teachers explained that LFBSM helped to address this absenteeism issue by providing meals at the schools themselves.

"Now they (students) no longer missed classes like they did before. In the past, they got sick from a stomach ache or missed breakfast, but now with school meals children are always at school, and they always follow the school lessons to the end of the day."

-Teacher interview, Papua province

Further, school children were described to be more active and enthusiastic than they had been prior to the LFBSM program, allowing them to be better students in the classroom:

"The effect that we felt from the school meal program (in Papua schools) is that children became more diligent at school…and they could understand the lessons somewhat better. It (LFBSM) influenced children's learning in a better way…compared to (schools) without a school meal program. And they (students) looked happy most of all…during the school meal program that is…"

-Stakeholder (Rural Development Authority) interview, Papua province

This finding was also confirmed by the majority of Papua teachers, who had more frequent and close interactions with school-aged children. The teachers reported that the school children were more likely to stay and complete the school day.

Drop-out

Secondary data were collected on the number of students who had dropped out of school in 2014/2015, the final full year of LFBSM program implementation. Table 7 illustrates that the dropout rate in LFBSM school was lower (0.18%) than non LFBSM school (0.64%).

Table 7 Student drop-out data from schools during the 2014/2015 academic year in NTT province

Indicator	Type of School	
	LFBSM Program Schools *n* = 25 (4,431)	**Non-Program schools *n* = 25 (3,747)**
No. of students who dropped out per school		
median (min, max)	(0 - 4, 0)	(0 - 7, 0)
n (%)	8 (0.18%)	24 (0.64%)
Mean ± SD	0.19 ± 0.60	0.50 ± 1.02

Source: 2014/2015 school reports

Retention

To try to gauge academic performance and attendance, we also collected secondary data of student retention (i.e., having to repeat the same grade level due to poor grades and/or lack of attendance). Out of a total of 8178 children in 50 schools total, only 380 had to repeat a grade level (Table 8)

Table 8 Retention data from schools during the 2014/15 academic year in NTT province

Indicator	Type of School	
	LFBSM Program Schools	**Non-Program schools**
No. of students who repeated grade level	141	239

Source: 2014/2015 schools' report

These findings above, especially those drawn from qualitative interviews and focus groups with stakeholders, teachers, parents, and children, highlight the perceived positive impact of LFBSM on student attendance thanks to provision of school meals. Addressing this research aim related to school enrollment and attendance was not easy for two reasons: **1)** accurate and legible record-keeping at the school level is a challenge in this setting, **2)** this evaluation was conducted several months after the LFBSM program had already ended thereby possibly limiting generalizations drawn from attendance records used for interpretation.

3.4 Indicators of Concentration Ability among School-Aged Children

Key findings

- More LFBSM students responded actively to teacher questions during class (p<0.02).
- School children reported that school meals helped in three primary ways: **1)** gave them more energy to participate in school activities**; 2)** enabled them to understand the lessons better; **3)** reduced short term hunger pains; and **4)** had better concentration ability during school.

Feelings of Hunger and Sleepiness

Table 9 presents the responses of school children to hunger and sleepiness, both potential factors that may hinder student concentration during classroom activities. More students reported feeling hungry in class (68.2%) (p<0.01) in non LFBSM school compared to in LFBSM school (59.8%). However, these self-reports came months after the program had ended and therefore may be a relative reflection of feelings when provided with school meals.

Table 9 Responses of school-aged children about feelings of hunger and sleepiness

Description of Question	Sample size (*n*)	LFBSM Program	Non-Program	p-value*
Does not usually feel hungry in class**	433	259 (59.8)	298 (68.2)	p=0.01*
Did not usually feel hungry during LFBSM	170	150 (88.2)	N/A	--
Usually feels sleepy during class**	433	126 (29.0)	107 (24.7)	p=0.35
Did not usually feel sleepy during LFBSM	120	16 (13.3)	N/A	--

*Significance at p<0.05; **student answer based on current situation after LFBSM program has ended

Active Learning

Table 10 below describes findings related to active learning, an indication of increased student concentration during class activities. More LFBSM students reported enjoying class and actively responding to teacher questions during class (p<0.02).

Table 10 Responses of school-aged children reflecting active learning

Description of Question	Sample size (*n*)	LFBSM Program	Non-Program	p-value
Enjoys learning in class**	433	423 (97.7)	418 (96.5)	p=0.32
Actively responds to teacher questions**	433	390 (90.1)	361 (83.4)	p=0.02*
Actively asks questions**	433	262 (60.6)	272 (62.8)	p=0.49

*Significance at p<0.05; **student answer based on current situation after LFBSM program has ended

Qualitative Data about Concentration Ability and School Meals

School children reported having difficulty paying attention to school lessons as a result of hunger mostly at midday. Both teachers and parents agreed, saying that school-aged children were less able to focus on learning activities around noon time and afterwards due to being hungry.

During qualitative paired-child interviews, school children reported that school meals helped in three primary ways: **1)** gave them more energy to participate in school activities**; 2)** enabled them to understand the lessons better than when they were hungry; **3)** reduced short term hunger pains; and **4)** had better concentration ability during school.

> *"Normally I feel tired and sleepy during the day…but after having a school meal I feel pleased. When we eat, we are strong, excited, and can concentrate when studying."*
>
> -Female student, Papua

The qualitative data revealed that school children believe the school meal program should continue. They expressed concern at becoming hungry again during school if the school feeding program were to be discontinued.

Parents echoed the children's views and requested that school meals continue in both NTT and Papua. Interview data revealed the persistent difficulties parents face while trying to provide nutritious foods to their households on a consistent basis and across seasons. Overall, there was a high level of parental appreciation for the LFBSM program and a general understanding that having food during school hours was important for the learning and concentration of students.

> *"The main purpose of school meals is to fulfil the nutritional needs (of children). When the children are eating, they can concentrate better. There are some events in which the school activities finish up late in the afternoon. This would not be a problem if the school children continued to get the school meals…so that they would be able to concentrate better."*
>
> -Parents, Focus Group Discussion, NTT

3.5 Knowledge, Attitudes and Practices around Health, Hygiene, and Nutrition

Key findings

- **Knowledge & Attitudes**: Quite good knowledge & attitudes in both program and non-program areas. The knowledge on food nutrition content and clean water need to be improved.
- **Practices:** Better personal hygiene and hand washing before meals was found among LFBSM students. LFBSM students also reported eating breakfast during the week, higher dietary diversity scores and more acceptable food consumption scores.

3.5.1 Knowledge

Student knowledge

School children's responses to knowledge questions did not differ much by two groups (Table 11). This finding may be due to information related to health and hygiene that was also being provided by the government or delivered as part of the elementary school curriculum, according to qualitative data from teachers and stakeholders. Posters and brochures on washing hands with soap, for instance, have been developed by other institutions and were found at non-program schools.

Table 11 Knowledge on health, hygiene and nutrition of the school children

	Type of School, *n*(%)		
	LFBSM Program (*n*=433)	**Non-Program (*n*=433)**	**p-values**
Knowledge category:			
Higher knowledge (≥11 questions correct)**	355(82.0)	338(78.1)	*p*>0.05
Lower knowledge (<11 questions correct)	78(41.0)	95 (39.0)	

* Significantly different with p<0.05; **"Higher" defined as at least 11 questions correct

Out of the 13 questions assessing knowledge of students, there were 2 questions where LFBSM students did score higher (Table 12) which are "each food has different nutritional contents" and "one time to wash hands to prevent diarrhea is before eating" questions.

Table 12 Knowledge on health, hygiene and nutrition of the school children

Descriptions (Choosing the right statement))	**Type of School (n,%)**	
	LFBSM Program (*N*=433)	**Non program (*N*=433)**
Each food has different nutritional contents*	166 (38.3)	121 (27.9)
One time to wash hands to prevent diarrhea is before eating*	419 (96.8)	407 (91.0)
Nutritious food helps cognitive development	423 (97.7)	415 (95.8)
Colorful vegetables and fruits are rich in vitamins and minerals	402 (92.8)	388 (89.6)
Anemia may be caused by lack consumption of iron-rich food	340 (78.5)	350 (80.8)
Anemic children may have difficulties concentrating at school	352 (81.3)	357 (82.4)
Drinking water is important to avoid weakness of the body	406 (93.8)	414 (95.6)
Clean water has similar safety as potable water	252 (58.2)	220 (50.9)
Fruits and vegetables should be washed before eating	428 (98.9)	424 (97.9)
Raw food should be stored separately from cooked food to avoid contamination	399 (92.1)	398 (91.9)
Food should be cooked thoroughly to kill pathogens	424 (97.9)	418 (96.5)
A meal that is important to maintain energy is breakfast	333 (76.9)	329 (76.0)

Malnutrition may cause children to be shorter than those of the same age	391 (90.5)	383 (88.5)

* Significant at *p*<0.05; **Actual questions were asked in Bahasa Indonesia so specific language terms may differ from English above

Parent knowledge

Similar to the results for the school children, parents in the LFBSM program (85.5%) and non-program groups had similar knowledge (83.1%) about basic health, hygiene and nutrition overall (Table 13).

Table 13 Knowledge of health, hygiene and nutrition of the parents

	Type of School, *n* (%)	
	Program (*N*=433)	**Non-Program (*N*=433)**
Knowledge category:		
Higher knowledge (>11 questions correct)**	370 (85.5)	360 (83.1)
Lower knowledge (<11 questions correct)	63 (14.5)	73 (16.9)

* Significantly different with p<0.05; **"Higher" defined as at least 11 questions correct

Out of the 13 questions assessing knowledge to the parents, there was 1 question ""All food has similar nutrition content" where LFBSM parents scored higher than non-program parents (Table 14). The low score itself (below 50%) shows a need to improve knowledge of food nutrition content among the two groups.

Table 14 Knowledge of health, hygiene and nutrition of the parents

Descriptions (Choosing the right statement)	**Type of school (n, %)**	
	LFBSM program (*N* = 433)	**Non program (*N* = 433)**
All food has similar nutrition content	193 (44.6)	150 (34.6)
One time to wash hands to prevent diarrhea is before eating*	424 (97.9)	414 (95.6)
Nutritious food helps cognitive development	424 (97.9)	417 (96.3)
Colorful vegetables and fruits are rich in vitamins and minerals	408 (94.2)	397 (91.7)
Anemia may be caused by lack consumption of iron rich food	357 (82.4)	351 (81.1)
Anemic children may have difficulty concentrating at school	382 (88.2)	381 (88.2)
Drinking water is important to avoid weakness of the body	416 (96.1)	418 (96.8)
Clean water has similar safety as potable water (*n* = 432)	253 (58.6)	215 (49.7)
Fruits and vegetables should be washed before eating	423 (97.7)	427 (98.6)
Raw food should be stored separately from cooked food to avoid contamination	407 (94.0)	415 (95.8)
Food should be cooked thoroughly to kill pathogens	425 (98.2)	422 (97.5)
A meal time that is important to maintain energy is breakfast	351 (81.1)	349 (80.6)
Malnutrition may cause children to be shorter than those of the same age	382 (88.2)	384 (88.7)

* Significant at p<0.05; **Actual questions were asked in Bahasa Indonesia so specific language terms may differ from English above.

Student attitudes

Out of the attitude questions posed to students, the results were similar between LFBSM and non-program students (Table 15).

Table 15 Attitude toward health, hygiene and nutrition of the students

Descriptions		LFBSM program (*N* = 432)	Non program (*N* = 433)	*p*-value
In my opinion, washing hands with soap before eating is important to prevent diarrhea	Agree	403 (93.3)	418 (96.8)	0.049*
	Neutral	20 (4.6)	8 (1.9)	
	Disagree	9 (2.1)	6 (1.4)	
In my opinion, consumption of varied, nutritious and balanced foods is important to prevent disease and promote healthy growth	Agree	394 (91.2)	400 (100.0)	0.377
	Neutral	21 (4.9)	23 (5.3)	
	Disagree	17 (3.9)	10 (2.3)	
		(N=433)	**(N = 433)**	
In my opinion, regular tooth brushing at least 2 times/day is important to maintain health	Agree	399 (92.1)	405 (93.5)	0.725
	Neutral	30 (6.9)	25 (5.8)	
	Disagree	4 (0.9)	3 (0.7)	
In my opinion, home-prepared meals are safer than those of street foods	Agree	402 (92.8)	414 (95.6)	0.121
	Neutral	18 (4.2)	14 (3.2)	
	Disagree	13 (3.0)	5 (1.2)	
In my opinion, breakfast is important to increase concentration at school	Agree	423 (97.9)	424 (97.9)	0.325
	Neutral	9 (2.1)	7 (1.6)	
	Disagree	0 (0.0)	2 (0.5)	

Significant at p<0.05; **Actual questions were asked in Bahasa Indonesia so specific language terms may differ from English above

Students from both groups valued much the importance of eating breakfast.

> *"For me the importance of breakfast is that it can increase concentration at school and I am more eager to learn at school."*
> -LFBSM student, interview, NTT

> *"I will feel sleepy if I don't have breakfast."*
> -Non-program student, interview, Papua

Data suggests that students in both LFBSM and non-program groups received messaging related to the importance of eating breakfast before school.

Parent attitudes

There were no big differences in the attitudes of parents between LFBSM and non-program groups (Table 16). However, over 95% of the parents in both groups had positive attitudes toward the 5 health-seeking behaviors that were evaluated.

Table 16 Attitude toward health, hygiene and nutrition of parents

Variables		Type of school		p value
		Intervention (*N* = 433)	Non Intervention (*N* = 433)	
In my opinion, breakfast is important to increase student concentration at school	Strongly agree	422 (97.5)	426 (98.4)	0.601
	neutral	10 (2.3)	6 (1.4)	
	Strongly disagree	1 (0.2)	1 (0.2)	
In my opinion, consuming varied, nutritious, and balanced foods is important to prevent disease and promote healthy growth	Strongly agree	415 (95.8)	426 (98.4)	0.07
	neutral	17 (3.9)	7 (1.6)	
	Strongly disagree	1 (0.2)	0 (0.0)	
In my opinion, regularly brushing tooth at least 2 times/day is important to maintain health	Strongly agree	407 (94.0)	412 (95.2)	0.538
	neutral	23 (5.3)	20 (4.6)	
	Strongly disagree	3 (0.7)	1 (0.2)	
In my opinion, washing hands with soap before eating is important to prevent diarrhea	Strongly agree	408 (94.2)	408 (94.2)	0.543
	neutral	19 (4.4)	22 (5.1)	
	Strongly disagree	6 (1.4)	3 (0.7)	
In my opinion, consuming meals prepared at home is safer than eating street food	Strongly agree	420 (97.0)	418 (96.5)	0.907
	neutral	10 (2.3)	11 (2.5)	
	Strongly disagree	3 (0.7)	4 (0.9)	
In my opinion, having breakfast can prevent students from feeling sleepy in the class	Strongly agree	416 (96.3)	420 (97.2)	0.509
		11 (2.5)	10 (2.3)	
	Strongly disagree	5 (1.2)	2 (0.5)	

* Significant at p<0.05; **Actual questions were asked in Bahasa Indonesia so specific language terms may differ from English above

Parents also explained the importance of breakfast during qualitative interviews and focus group discussion.

> *"As parents, in the morning before school, we encourage our children to have breakfast, so that they can learn well at school. Because if they (students) go to school hungry, they will not be able to absorb the lessons well."*
>
> -LFBSM parent, Focus Group Discussion, NTT

The parents were aware that based on their economic status, they could not always provide meals that were nutritionally adequate to fulfill the needs of their children.

> *"We live depending on our economic capability, so if we had (more) money then certainly our meals at home would be more varied…but if there is not enough money then we will just eat what we have (access to) at our home. We are ordinary farmers, not successful ones. Our income is also uncertain, thus obviously if there is money, we*

will have a complete meal at home…sometimes we can afford to have fish, eggs, and meat…but other times (only) rice and vegetables, plus sometimes with additional local foods."

-Parents, Focus Group Discussion, NTT

Student Practices

Personal Hygiene

In terms of personal hygiene practices, a higher proportion of students in the LFBSM program schools brushed their teeth twice a day (73.0% vs 61.7%) and had shorter and cleaner nails (43.4% vs 32.6%) than those school children in non-program schools (Table 17). Observations did reveal a difference in soap availability for hand washing between the two groups (88.5% vs 79.2%).

Table 17 Personal hygiene practices reported by school children

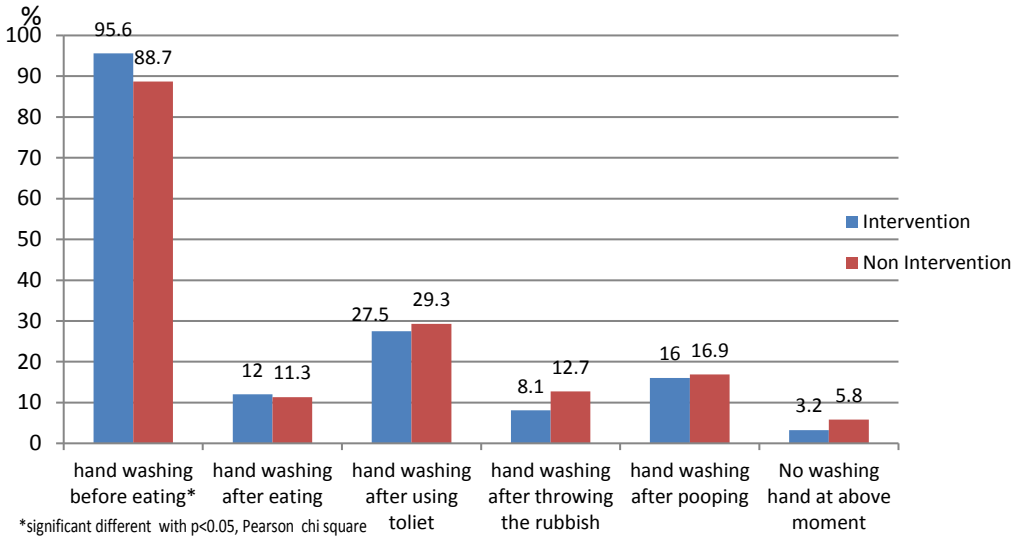
Variables	Type of School (n,%)	
	Program (*N*=433)	**Non-Program (*N*=433)**
Availability of soap for hand washing *	383 (88.5)	343 (79.2)
Frequency of tooth brushing*		
twice a day	316 (73.0)	267 (61.7)
once a day	109 (25.2)	144 (33.3)
Never	6 (1.4)	12 (2.8)
other (three times a day, not every day)	2 (0.5)	10 (2.3)
Frequency of taking bath in a day	**(N = 432)**	**(N = 432)**
twice a day	307 (71.1)	282 (65.0)
once a day	115 (26.6)	136 (31.4)
three times a day	8 (1.9)	19 (2.3)
Never	1 (0.2)	2 (0.5)
other (not every day, sometimes twice a day)	9 (2.1)	13 (3.0)
Observation of school children's hair condition		
dirty and oily	79 (18.2)	93 (21.6)
clean, neat	348 (80.4)	334 (77.0)
others (dried, dried and dirty, unarranged)	6 (1.4)	6 (1.4)
Observation of school children's nail condition*		
long, dirty	88 (20.3)	105 (24.2)
long, clean	16 (3.7)	18 (4.2)
short, dirty	141 (32.6)	169 (39.0)
short, clean	188 (43.4)	141 (32.6)

*significant at $p<0.05$

Handwashing

School children had similar hand washing practices between the two groups (**Figure 4**). Higher percentage of school children in program area washed their hands with soap before eating (95.6% vs 88.7%, p<0.001).

Figure 4 Comparison of different hand washing practices among school children



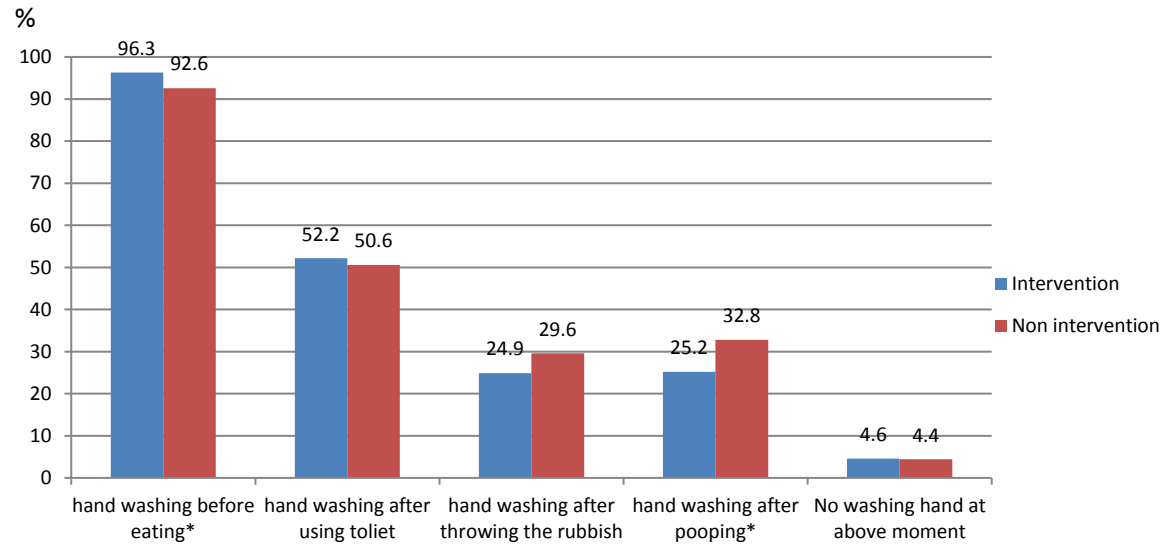
Qualitative data suggest that the LFBSM program helped students grasp the importance of hand washing practices in school by making hand washing mandatory prior to eating during the school day. This practice reportedly helped students make handwashing into a more habitual behavior than it had been previously. Students said that hand washing is important in order to maintain their cleanliness.

Parent practices

Handwashing

Figure 5 shows more parents from the LFBSM program reported 'washing hands before eating' compared to those from the non-program sample (96.3% vs 92.6%, *p*=0.017). Data suggest that parents influenced child handwashing behavior at home, reinforcing key messages learned in the LFBSM program at school activities.

Figure 5 Comparison of different hand washing practices by the parents



n = 433
* Sigificantly different with p<0.05

The parents explained in interviews and focus group discussion that hand washing reduced the risk of getting sick. At home the parents always asked their children to wash hands. The father or mother has a strong influence in affecting these practices:

> *"Sometimes I got angry because my son washed his hands sloppily and just continued eating. I said to him: 'You must wash your hands properly like this and that….' Sometimes he washed his hands in the bathroom or wherever he saw water, that's it.... just like that. I scold him sometimes…"*
>
> -LFBSM parent, Focus Group, NTT

Dietary Practices

More students from the LFBSM program (91.2% vs. 82.7%, $p<0.01$) reported eating breakfast during the school week (Table 18).

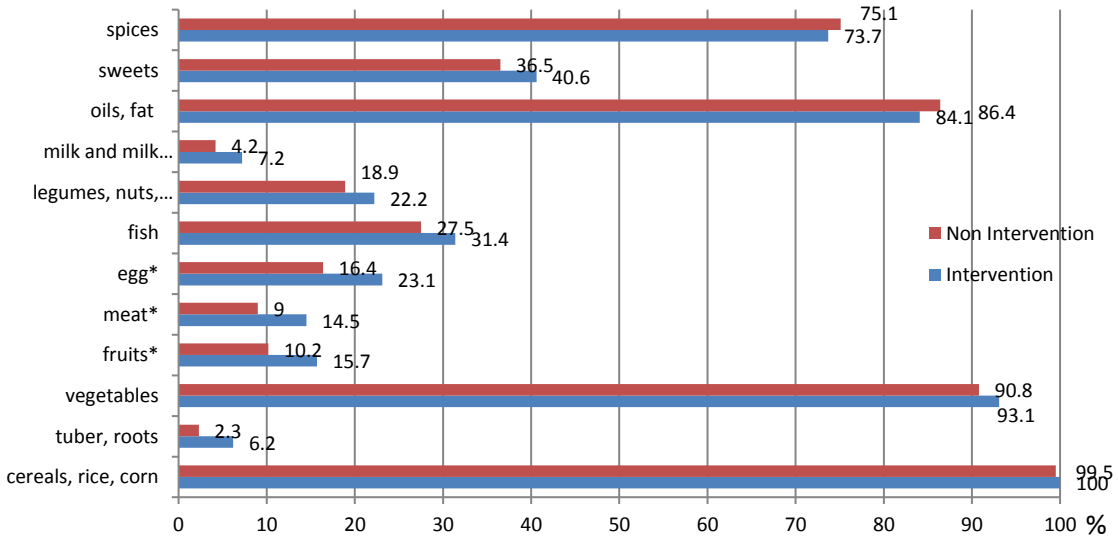
Table 18 Breakfast practices reported by the students

Indicators	LFBSM Program (n, %)	Non-Program (n,%)
Eats breakfast during week* (*N* = 433)	395 (91.2)	359 (82.7)
Frequency of eating breakfast per week (*N* = 429)		
Everyday	359 (83.7)	341 (78.9)
4-6 times	46 (1.7)	64 (14.8)
<= 3 times	24 (5.6)	27 (6.3)

*Significance at $p<0.05$

Figure 6 shows the 24-hour dietary recall of students. The most frequently consumed food groups from the two groups were rice and corn (100% vs 99.5%); vegetables (93.1% vs 90.8%); oil and fats (84.1% vs 86.4%). LFBSM participants tend to consuming more fruits, meats and eggs was higher among LFBSM participants.

Figure 6 24-hour dietary recall findings of school children



* Significance at $p<0.05$, Pearson Chi-Square

Findings of dietary diversity among students are reported in **Table 19** below. Children who consumed ≥5 food groups were classified as having 'high' dietary diversity scores (DDS). A higher proportion of LFBSM students (49.2%) had 'high' DDS compared to non-program students (38.1%) (p<0.05).

Table 19 Dietary diversity score (DDS) of students

Category of DDS	**LFBSM Program (*N*=431) (n,%)**	**Non-Program (*N*=433) (n,%)**
High DDS	212 (49.2)	165 (38.1)
Low DDS	219 (50.8)	268 (61.9)

*Significance at p<0.05, Pearson Chi-Square

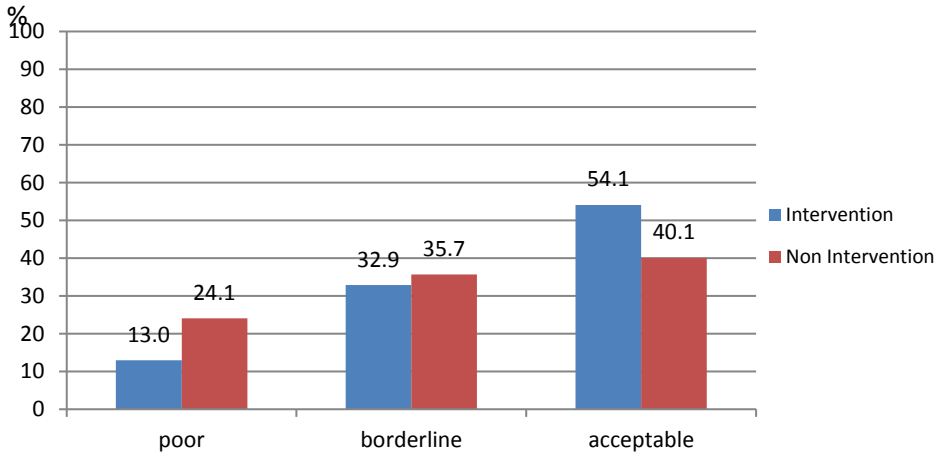
Qualitative data suggested that LFBSM parents communicated to their children about the importance of nutritious foods based on what they learned in school activities.

> *"I sometimes try to provide a varied menu at home, but sometimes not. I sometimes provide vegetables, and also others (foods)…so that children do not get bored. My children sometimes ask 'Why do you always cook spinach soup (bening bayam)?' Then I tell them about the benefits of vegetables for the body…that it contains vitamins. Because nowadays children like to eat snacks, and I tell them to compare the snacks to these vegetables…vegetables are more nutritious."*
>
> -LFBSM parent, Focus Group, Papua

Food Consumption Score (FCS)

Figure 7 presents FCS for households by 3 different categories: poor, borderline, acceptable. The proportion of households with acceptable FCS in the LFBSM program area was higher than that of the non-program (54.5% vs. 40.1%, p<0.05).

Figure 7 Food consumption score



3.6 Nutritional Status of School-Aged Children

Key findings

- The prevalence of anemia in LFBSM school children (25.9%) was lower than that of school children in non-program schools (32.8%), but similar to baseline estimates.
- Students in the LFBSM program had a lower risk of having anemia than non-program students
- A higher proportion of LFBSM students had reported consuming deworming tablets in the last 6 months
- The prevalence of fever and diarrhea of the LFBSM program students were significantly lower than those of the non-program schools

The prevalence of anemia among LFBSM children was lower than that of non-program students (25.9% vs 32.8%, p<0.05). The prevalence of anemia among LFBSM school children was similar to baseline estimates (26.0%, WFP, 2015) and national survey data (aged 5-14 years 26.4%, MOH 2013). Other nutritional status indicators between groups did not differ very much (**Table 20**).

Table 20 Nutritional status of school children

No	Variable		Type of school (n,%)	
			LFBSM Program (*N*=433)	**Non-Program (*N*=433)**
1	Anemia*	anemic	112 (25.9)	142 (32.8)
		normal	321 (74.1)**	291 (67.2)
		severe	68(15.8)	79 (18.3)
2	Stunting	mild	173 (40.1)	157 (36.3)
		normal	190 (44.1)	196 (45.4)
3	Thinness	severe	47 (10,9)	51 (11,8)
		mild	126 (29,1)	140 (32,3)
		normal	259 (59.9)	242 (55,9)
4	Underweight	severe	22 (22,2)	16 (17,2)
		mild	31 (31,0)	31 (33,3)
		normal	47 (47,0)	46 (49,5)

* Anemia cut-off point for <12 years is 11.5 g/dl and >=12 years is 12.0 g/dl
** Significant at p<0.05

Factors influencing anemia status

Being in the LFBSM program was a factor contributing to non-anemia status, after controlling for other variables (p<0.05) (**Table 21**).

Table 20 Results of logistic regression of factors influencing student anemia status

Potential factors	p-value	Odds Ratios	95% CI (lower-upper)
Program school	0.048*	1.372	(1.002 – 1.847)
Age	0.188	1.285	(0.885- 1.867)
Education of household head	0.392	1.159	(0.826 – 1.627)
Deworming status	0.274	1.185	(0.812-1.568)
Food security status	0.513	1.111	(0.812-1.596

*significance at p<0.05

Deworming

The percentage of school children who received deworming tablets was significantly higher in the LFBSM schools (61.7%) than those in non-program schools (54.2%) (p<0.05). The majority of respondents reported receiving the tablets at school as part of LFBSM activities.

Table 21 Deworming tablet consumption by the school children

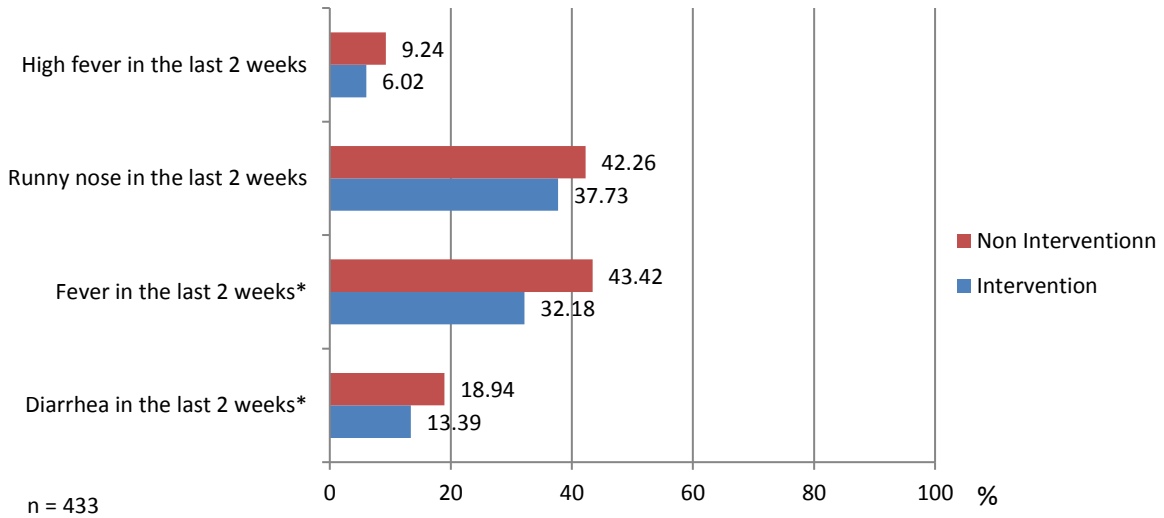
Variable		
	LFBSM Program (*N*=433)	**Non-program (N=433)**
Received/consumed deworming tablet in the past 6 months	266 (61.4)	234 (54.2)
From school	225 (52.0)	191 (44.1)
From health center	34 (7.9)	33 (7.6)
Did not receive/consume deworming tablet	167 (38.6)	198 (45.7))
Other	1 (1.6)	11 (2.6)

* Significance at p<0.05

Health status

The prevalence of fever and diarrhea reported by the LFBSM students were significantly lower than those of the non-program schools. No cases of malaria was found in either group.

Figure 8 Health status of school children reported by parents



n = 433
* Significance at p<0.05

3.7 Facilitating Factors and Barriers to LFBSM Program Participation

Key findings

- Most of the parents were aware of the importance and benefits of the school meals for their children (100.0%) and 64.0% of them had contributed to the program with in-kind donation of food and labor.
- All cooking group members had good knowledge on the benefits of school meals and VITAS.
- LFBSM were implemented following the WFP Standard Operational Procedures
- The program facilitated the school children's personal hygiene practices through provision of clean water and soap.

Table 23 shows parental awareness and various involvements in the school meal program. Around 70% of the parents were aware of the program's objectives. Slightly over a quarter of the parents responded that they had tried to cook similar foods at home, and a majority tried the sweet recipe. Over 60% of the parents claimed that they have contributed at least one food items to the program such as sweet potatoes, roots, vegetables, banana, papaya, coconut, firewood, chicken, corn, mung bean and or money.

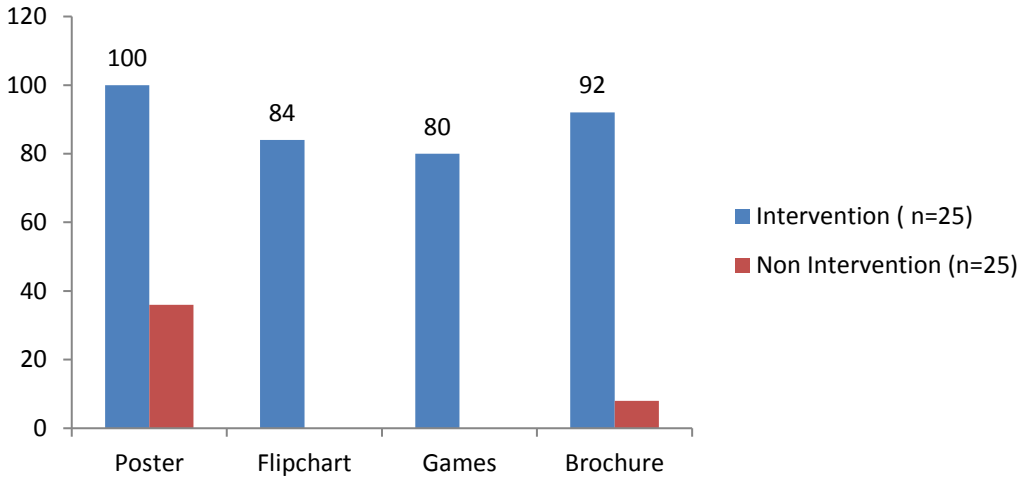
Table 22 Knowledge of parents about school meal program in the program area

Descriptions(N=433)	n (%)
Know about LFBSM program	392 (90.5)
Know about program activities	320 (74.2)
Know objective of the program	302 (69.7)
Stakeholder who prepared the food at school:	
Parents	259 (59.8)
Teacher	44 (10.2)
School committee	8 (1.8)
Cooking group+	54 (12.5)
Not relevant	40 (9.2)
Other (school children, WFP)	15 (3.5)
Do not know	13(3.0)
Ever cook the same food at home	119 (27.5)
salty recipe	14 (3.2)
sweet recipe	76 (17.6)
both recipes	28 (6.5)
other, mungbean-cake	1 (0.02)
Contribution to the program	274 (63.3)
1 type of food items	155 (35.8)
2 types	68 (15.7)
3 types	39 (9.0)
4 types	12 (2.8)

IEC materials

Figure 9 describes the availability of IEC materials such as posters, flipcharts, games, and brochures at the program and non-program schools. The figure shows that all IEC materials were spotted at the program schools. Topics observed on the IEC materials included hand washing with soap to prevent diarrhea, balanced diet, eating a variety of food, nutritious local food, benefits of VITAS, "snake and ladder" games about healthy behavior. Posters and brochures about personal hygiene and health behavior were spotted at a few of the non-program schools.

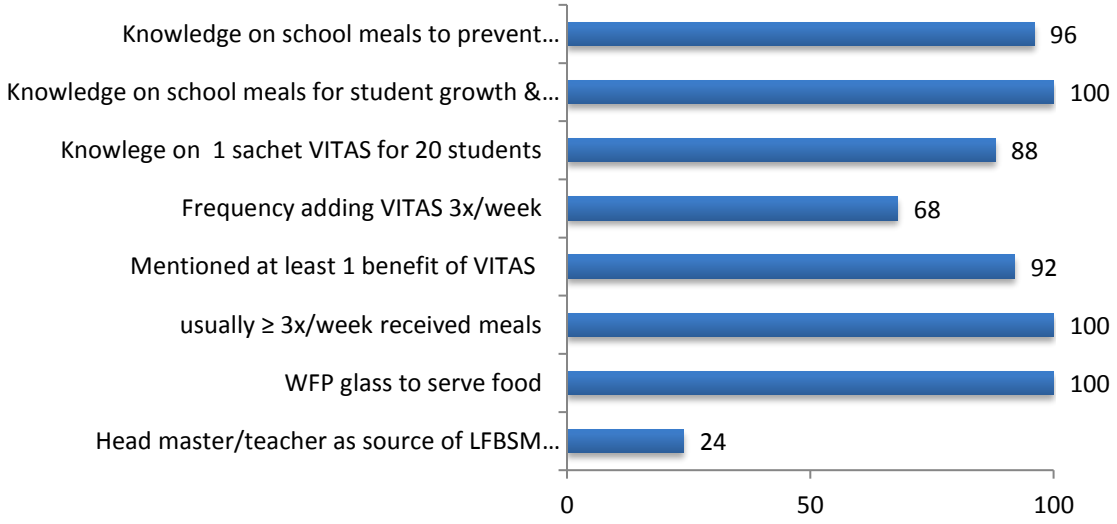
Figure 9 Observation on availability of IEC materials on health, hygiene, and nutrition at school



Cooking group members

The cooking group members reported that the meals were distributed to school children at least three times a week and believed that the meals influenced the growth and development of the student. Most of them (92%) were able to mention at least one benefit of VITAS.

Figure 10 Knowledge and practices of cooking group members on school meals implementation



School meals implementation/process data

Table 24 presents LFBSM implementation measures at 25 schools as reported by cooking group members or teachers. All schools had cooking groups. Parents were the majority of members in the cooking groups. 14 cooking groups had fewer than 10 members (ranging from 4 to 36 persons). Most cooking groups finished cooking after 7 a.m. (ranging from 6 to 11 a.m. across the schools) and served meals before 10 a.m. around the first break (ranging from 6 to 9 a.m. across the schools).

Table 24 Response of cooking group members at 25 schools

Variables (n=25)	n (%)	Mean±SD (min-max, med)
Number of cooking group members *: <10	14 (56.0)	(4-36, 5)
Member of cooking group:		
Teacher	2 (8.0)	
Parents	18 (72.0)	
Others[1]	5 (20.0)	
Time for food preparation (cooking) finish *: ≥ 7 am	19 (76.0)	(6-11, 7.30)
Time food served *: < 10 am	16 (64.0)	(6-9, 9.3)
Time for holding cooked food *:< 60 minutes	6 (24.0)	(15-240,120)
Frequency of meal provision: 3 times/week	21 (84.0)	NA
Method of serving the meals: In the plastic or glass from WFP	25 (100.0)	NA
Total meals served in a month: ≥ 12 times	21(84.0)	NA
Time for meal distribution: at the first break	23 (90.0)	NA
The portion of meals		NA
½ glass (110 gram)	7 (28.0)	NA
1 glass (220 gram)	18 (72.0)	NA
Availability of person in charge of meals distribution [a]	25 (100.0)	NA
Availability of person who encouraged students to finish meals [b]	25 (100.0)	NA

Included cadre and school committee [2]Included both teacher and cooking group members
[3] Included the member of cooking group, WFP worker, person in charge of school meal program
*n(min-max-med)
[a] Respected teacher (1(4.0%)), the member of cooking group (22(88.0%)), others (2(8,0%)a
[b] Respected teacher (14(56,0%)), parents (1(4.0%)), others (10(40.0%))

Most schools provided meals three times per week, and in total about ≥ 12 times in a month for the last feeding program. VITAS were added almost every time meals were provided. All schools used the WFP plastic cup to serve the food that was filled in a 220 gram portion (i.e., one full glass).

School facilities (WASH in school)

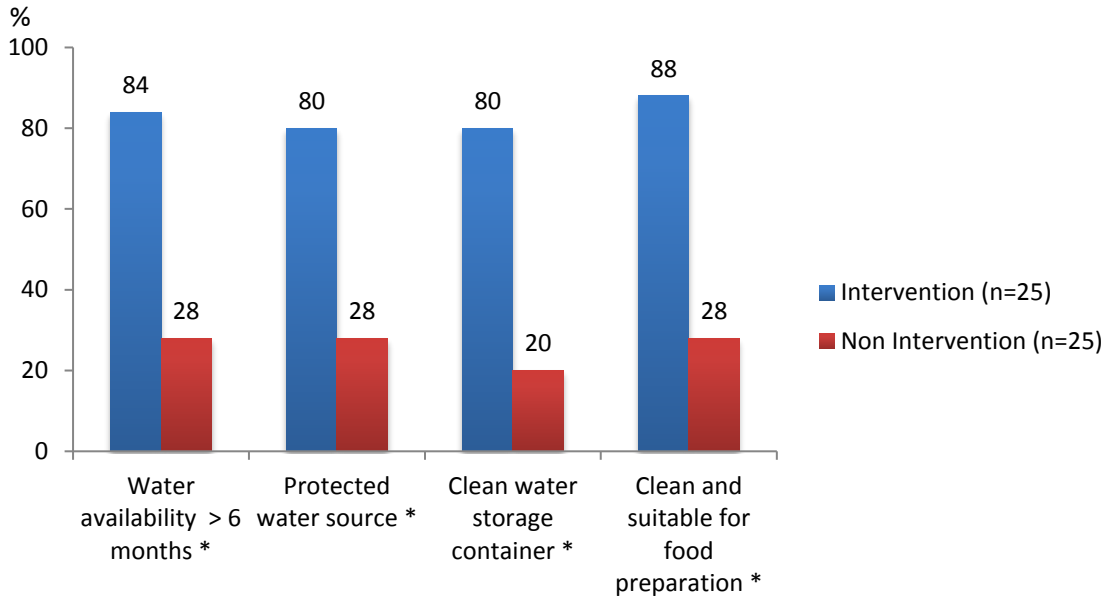
Availability of school facilities related to health, hygiene and sanitation such as soap in the toilets, and clean water, soap and towels in the washing basins were significantly higher in the program schools as compared to the non-program schools.
Table 23 School facilities related to health, hygiene and sanitation

Variables	Program n = 25	Non-Program n = 25	P values
Availability of clean and functioning toilet	22 (88.0)	20 (80.0)	0.538
Availability of soap in toilet	20 (80.0)	7 (28.0)	0.001*
Availability of clean water in toilet	22 (88.0)	19 (76.0)	0.471
Availability of clean water for washing hands	19 (76.0)	9 (36.0)	0.032*
Availability of clean soap for washing hands	17 (68.0)	5 (20.0)	0.002*
Availability of clean hand dryer (towel) for drying hands	11 (44.0)	3 (12.0)	0.022*
Availability of clean and functioning water container for hand washing	12 (52.0)	5 (20.0)	0.166

*Significantly different with p<0.05, Pearson Chi-Square

Figure 11 shows that water availability in the last 6 months, availability of protected water source, clean water containers, and clean water for food preparation were mostly observed at the programs schools.

Figure 11 Water source and quality at school



*significant different if p < 0.05, Pearson chi square

3.8 Recommendations and Strategies for Handover

The WFP's LFBSM program ended at the end of 2015. Interviews and focus group discussions were conducted in this study to assess potential hand over strategies for the local government. Table 26 describes the summary of recommendations from the relevant stakeholders. The recommendations were categorized into 4 groups including; (1) community participation; (2) design and implementation; (3) funding and budget; (4) institutional arrangement and legal framework as well as budget source.

There were some strategies related to funding and budget source of the program. Heads of the Districts Jayapura and Kupang released official letters that encouraged village heads to use Village Allocated Fund (*Anggaran Dana Kampung*) for the implementation of school meal activities particularly to purchase local raw food material and provide incentives for the cooks. District Health Office could use Special Autonomy Allocated Fund (*Dana Otonomi Khusus*) for school meals program in Jayapura Kota. The implementation of LBSM program in Jayapura district was coordinated by a School Feeding Working Group (*POKJA PMTAS*) under the leadership of the Head of Women Welfare (*Ketua Tim Penggerak PKK*).

Table 24 Recommendations for the LFBSM program

Community participation	Promote to families and grass-roots about the program's benefit to school children
	Promote the program using local language and local community group
	Promote parental contributions
	Incentives or rewards for the cooks
	Promote local wisdom of"*gotong royong*" or mutual aid
Design and implementation	Add variety of recipes
	Increase number of supervisors
	Improve supervision/control to the implementation
	Strengthening farmer capability
	Increase number schools particularly in remote areas (close to river and sea) in Papua
	Establish similar programs in other regions
	Make available written procedures of activities
	Integrate with *Kebun, Koperasi dan Kantin Sehat* (Healthy - Garden, Cooperative and Canteen) program
	Integrate with *Sekolah Ramah Anak* (Child Friendly School) Program
Institutional arrangements and legal framework	Improve inter-sectoral coordination and communication
	Clear and written role of different sectors or institutions
	Establishment of working group or task force
	Availability of legal framework *(Surat Keputusan or edaran* from top management)
Funding and budget source	Local government budget
	Central government budget
	Joint cooperation program of different sectors
	Special budgetary fund

The facilitating factors included positive attitude from the top and low levels, as well as community support. The barriers included lack of incentives for the implementers and the geographical constraints in each location.

Table 25 Facilitating factors and barriers by types of informant

Type of informant	Positive perception	Community support	Lack of incentive	Geographical constraint
Influencers	Influencers perceived the program as impactful for children and parents	Parents had an important role in the success of the program	Community seemed to have missed the value of togetherness 'gotong royong'	Not all of the program schools were appropriately monitored due to challenging geographical conditions
Implementers	Implementers perceived the program as an acceleration program	Actively involved in school meal program	Number of cooking groups was getting smaller following the decreasing number of members in the cooking groups	Issues related to water scarcity, market and ingredients availability, living far from the school (having to cross the lake with a boat)
Parents	Parents positively perceived the program	Participated in providing food and incentives	Cooking groups consisting of parents were getting smaller	Only parents who lived nearby the school were involved. Parents who lived far from school were not involved because transportation fare was expensive
School children	School children perceived the program as positive	Participate in bringing firewood	-	Water scarcity

NTT and Papua provinces had unique geographical constraints. In NTT province, water scarcity was a major constraint in the implementation of the LFBSM program. Water scarcity did not occur all the time, but it was commonly experienced during the dry season and could cause the interruption of the program. Therefore, to overcome this water problem, several schools in the NTT province requested the school children bring water from home or fetch the water from the area around the school.

> *"One of the major challenges of the LFBSM program was drought. Sometimes when we did not get enough water from our well, we bought water by ourselves. Since I did not have money I asked the school children to get the water from the well and bring the water to school. So during the drought, the students brought water to school."*
>
> -Teacher, Female, NTT

In Papua there were some schools located far from the capital and were close to the border region of Papua New Guinea. One school was located in the middle of Lake Sentani so they needed a speedboat to cross the lake and this created high transportation costs. Moreover, there was no available local market in small islands around Lake Sentani so the school had to cross the lake to buy foods at the local market. This has resulted in high costs for transportation and the cooking group members sometimes had to spend personal money to cover the cost. Based on this fact several cooking group members left the groups.

> *"Money that the cooking group received was not enough. They were facing difficulties with the transportation cost to the market, they got the money for their job as a cook but then it was all used for the transportation cost to buy food ingredients."*
>
> -Male, School Meal Supervisor, Papua

"There used to be a lot of people who were involved in the cooking group. But there was only one group left in this school who was responsible for providing meals."

-Female, Focus Group Discussion, Papua

The factors that supported the success of the school meal program included a positive perception about the program from society, especially the school, parents and school children. Some parents and teachers considered the school meals program as an effective tool to make children enroll in school.

"I think this is because we felt the huge benefits for the children especially those who had poor thinking abilities and also poor body immunity. The vitamin contents from the school meal were needed for the health of these children, and also may impact better learning. The school meal made the school children get more motivated to come to school and this could attract the school children especially from the lower socio economic group to come."

-Female, Influencer, Papua

Other influencers added that the LFBSM program was appropriate since some parents reported paying less attention to providing food and nutrients needed by their children at home.

"Early in the morning...sometimes the parents did not provide breakfast for the children. Another reason was because the ingredients to be cooked were not yet available. Thus, the meals managed by the committee would help children with the breakfast."

-Female, Influencer, Papua

"This program emphasized meeting the nutritional requirements for the school children. This program was a good program that was carried out at school. Thus, I think that it helped the parents to provide nutrition for their children. The effect will not be seen now but in the future because the children are getting smarter."

-Male, Influencer, Papua

Another factor includes the participation by the people with very positive attitude. Each school had its own strategy in implementing the LFBSM program. Some schools asked school children to bring firewood, other schools requested the parents to bring groceries, and some asked for money donations from the parents. The qualitative study of this evaluation survey found that the parents and school children had no objection to participate by bringing firewood and groceries. In NTT province, the in-kind donations in the form of foodstuffs were more prominent than that in Papua province. This was partly because most parents in NTT were farmers, thus the vegetables that they grew in the field were ready for consumption or donation to the school when needed. The combination of positive attitude about the program and taking ownership has made the LFBSM program a success.

4. Conclusions & Recommendations

This evaluation was able to illustrate the many benefits of delivering an integrated program through school meals. It also highlighted many improved health and nutrition-related practices of school-aged children who had been exposed to the LFBSM program. Qualitative findings also overwhelmingly pointed to the positive impacts of the LFBSM program and high acceptance of its activities among students and parents. While this evaluation did highlight some areas for improvement, overall the LFBSM program can be recommended for scale-up and used as an effective entry point for improving health and education of school children.

The study found that the attendance rate of the LFBSM schools was higher (97.3%) than non-program schools (93.3%). The drop-out rate was lower in LFBSM schools (0.18%) than in non-program schools (0.64%) in 2014/2015 academic year. Furthermore, the retention rate in non LFBSM schools was higher (239 students) compared to LFBSM school (141 students). The school children's concentration ability improved. Children from the program schools recalled that they were not feeling hungry (88.2%) or sleepy (86.7%) in class when the school meal was served. These findings were confirmed by the qualitative data collected from interviews and FGDs with the parents and teachers.

The proportion of school children and parents who practiced better hygiene and nutrition were significantly higher in the program schools. The study found that the school and parents supported the school children to adopt such practices through provision of facilities such as clean water, soap and water container for hand washing as well as nutritious food.

The proportion of school children in the program group (49.2%) who consumed more diversifed foods (categorized as having "high DDS") was significantly higher compared to the school children in the non-program schools (38.1%).

Most of the parents were aware of the importance and benefits of the school meals for their children (100.0%) and 64.0% of them had contributed to the program with in-kind donation of food and labor.

School meals were implemented following WFP's Standard Operational Procedures which included method of food preparation, time and method of serving, frequency of meal distribution and the use of MNP.

The proportion of the program schools that had soap in the toilets, clean water, soap and towel in hand washing facilities were significantly higher compared to the non-program schools. The availability of water in the last 6 months, protected water source, clean water containers, and clean water for food preparation were mostly observed at the programs schools.

School children in the program were 1.4 times less likely to be anemic than those not in the program. Prevalence of anemic school children in the program schools was lower than in the non-program schools (25.9% vs 32.8%, p=0.025). The proportion of school children who received deworming tablets was also significantly higher. These conditions may have contributed to the effectiveness of the program to influence anemia status of the school children. However, the program did not influence the anthropometry nutritional status of the beneficiaries where prevalence of stunting, thinness and underweight were not significantly different between school children in the program and non-program schools.

The health and nutrition education delivered during the school meals program may affect their awareness of adopting such health and hygiene behaviors. Dietary practices of students and families as reflected by the Dietary Diversity Score and Food Consumption Score were significantly higher in the program schools.

Recommendations

The findings and conclusions of this study have led the evaluation team to propose the following recommendations to improve input, process and output:

Geographical conditions restricting the access to schools was one of the challenges reported by teachers and cooking group members. Strengthening the local government's commitment and investment on road and transportation will increase access to the school.

We recommended strengthening awareness about the importance of micronutrient rich plants through promotion of Green School Garden approach which integrates the School Cooperation and Healthy School Canteen program (*3K :Kebun, Koperasi, KantinSehat*).

Improving health and nutrition promotion using local language and involving parent and teachers' association are recommended.

Farmer group management and capacity should be strengthened under coordination of Local Agriculture Offices to ensure sustainability and quality of the local food supply.

The recipes of school meals should be increased. The meals could be a mix of locally produced raw materials. We recommend involving the school children, parent and teachers' association as well as the women's welfare association during the development of new recipes.

The long time required for meal preparation was a concern raised by the cooking group members who themselves were mostly housewives. Regular incentives or rewards shall be provided to the cooks as compensation for time and workload.

Most parents (64%) in NTT contributed to the school meals with in-kind food. Home Grown School Meals was also initiated in Jayapura, however it faced challenges in terms of the quantity and quality for continuous supply. In NTT, local food was purchased from trained farmers in coordination with school cooperation and farmer groups to ensure the quality and supply of raw food materials.

Strengthening the LFBSM coordination under School Meal Task Force in NTT and Papua Provinces seems to have effectively supported the program implementation. The members of the Working Group came from different sectors of government offices and had a legal framework that may influence the political will and identify local budget sources.

Regarding the budget of the program, it is necessary that the local governments increase their support, particularly to provide raw food materials, incentives and cooking facilities which may lessen the communities' burden.

Anemia status may be influenced by the infection status of the intestines. Strengthening the coordination with Health Offices may support the continuous distribution of deworming tablet.

Strengthening the Health Centre's capabilities for nutrition promotion, nutritional status assessment and management may ensure an effective nutrition surveillance program for school aged children in the area.

5. Limitations

The evaluation study was conducted 2 or 3 months after the LFBSM program ended. It is possible that the respondents may have forgotten programme details, particularly among the school children and cooking group members. However, some efforts to maintain reliability of the findings were done including thorough direct observation, family member interviews and secondary data assessment from schools and WFP offices.

The study used a cross-sectional research design and was unable to assess the causal effect of particular phenomena. A comparison with the non-program area may help to provide further information on the impact of the given programs. Findings obtained through qualitative methods provided rich information which may not be captured by quantitative methods.

Biochemical assessment on intestinal parasite infections and iron storage status of the school children would be necessary to support the findings related to the impacts of school children's anemia status. However, the assessments were not done due to time and budget constraints.

Questions posed to the school children, teachers and parents about their perceived experiences would be reliable to represent the environment but not accurate enough to provide information on students' concentration skills. Unfortunately, psychometric measurements for cognitive parameters which may provide more accurate information on individual school children's concentration abilities were not conducted in this study.

References

Creswell, J. W., & Clark, V. L. P., 2007. Designing and conducting mixed methods research.

Danquah A O, Amoah A N, Steiner-Asiedu M, Opare-Obisaw C. Nutritional Status of participating and non participating pupils in the Ghana School Feeding Program. Journal of Food Research 1.3 (Aug 2012): 263-271.

Farmer, T., Robinson, K., Elliott, S. J., & Eyles, J., 2006. Developing and implementing a triangulation protocol for qualitative health research.*Qualitative health research*, *16*(3), 377-394.

Gibson R. 2005. Principle of Nutritional Assessments. Oxford University Press.

Gorstein J, Sullivan KM, Parvanta I, Begin F. 2007.*Indicators and methods for cross-sectional surveys of vitamin and mineral status of populations*. Micronutrient Initiative (Ottawa) and Centers for Disease Control and Prevention (Atlanta). USA.

Levinger B, 1983. School Feeding Programs in Less Developed Countries: An Analysis of Actual and Potential Impact. Horace Mann-Lincoln Institute of Teachers College, Columbia University and Office of Evaluation, Bureau for Food and Voluntary Aid, the Agency for International Development.

Ministry of Education and Culture Indonesia. *KementrianPendidikandanKebudayaan. Pusat Data danStatistikPendidikandanKebudayaan, Jakarta. 2016*

MOH. Ministry of Health of Indonesia. 2010. *Basic Health Research (RISKESDAS) 2009 Report.* Ministry of Health. 2010.

MOH. Ministry of Health Republic of Indonesia. 2013. *Basic Health Research (RISKESDAS) 2013 Report.* Ministry of Health. 2013.

MOH. Ministry of Health Indonesia. 2010. *KeputusanKementrianKesehatan*Republik Indonesia. 1995/MENKES/SK/XII/2010 *tentangStandarAntropometriPengukuran Status GiziAnak. Direktorat Bina Gizi, Direktorat General Bina GizidanKesehatanIbudanAna*k. Jakarta.

Morse, J. M., 1995. The significance of saturation. *Qualitative health research*, *5*(2), 147-149.

Neervoort F, von Rosenstiel I, Bongers K, Demetriades M, Shacola M, Wolffers I.Effect of a school feeding programme on nutritional status and anaemia in an urban slum: a preliminary evaluation in Kenya.J Trop Pediatr. 2013 Jun;59(3):165-74.

Patton, M. Q. (1999). Enhancing the quality and credibility of qualitative analysis. *Health services research*, *34*(5 Pt 2), 1189.

Riyadi, Dedi M. Masykur. 2006. *PMT-AS dan Peningkatan Kualitas SDM DalamPerspektif IPM. Rapat Koordinasi teknis programme PMT-AS* Jakarta 19September 2006. (The School Feeding Programme and its impact on the increaseof the human resources quality in the IPM's perspective). The meeting oncoordination technique for the implementation of the PMT-AS, Jakarta, September 19, 2006.

Robinson, O. C., 2014. Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology*, *11*(1), 25-41.

World Food Programme (WFP). 2008. Food Consumption Analysis: Technical Guide. Rome.

WFP. 2012. Baseline Study on the WFP:Local Food Based School Meal (LFBSM) Programme in Timor Tengah Selatan (TTS) and Kupang Districts.

WFP-CHR UGM. 2013. Effectiveness study on the integration of micronutrient Powder (MNP) into local Food Based Meals in TTS and Kupang Districts of NTT Province. WFP- Center for Reproductive Health (CRH) Facultyof Medicine Gajah Mada University.

WFP. Monitoring Data of Local Food Based School Meal. September2013 to December 2014.

WFP. 2015. WFP Nutrition: Measuring Nutrition Indicators in the Strategic Results Framework (2014-2017) Briefing Package.