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**1**  
**Improving the performance of school children meal using meal report at  
Kindergarten School in Indonesia. A Quasi-Experimental Study**

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## Abstract

**Objective.** <sup>1</sup> Kindergarten children are prone to be stunted. Currently, most kindergarten school run school meal program. The aim of the study was to assess the effect of school meal report on the meal performance.

**Methods.** The study was a Quasy Experiment. Four kindergarten schools were selected; two schools as intervention study and the other two schools as the control group. We enrolled 106 mothers. There were five items of food performance to be scored from 6 to 10. While children in the control group were suggested to bring meals every day without a school meal report.

**Results.** At baseline the range score of five items was not significantly different, the average score was  $7.15 \pm 0.21$  vs  $7.09 \pm 0.18$ ;  $p > .05$  in the intervention group and control group respectively. However, at **endline** the scores meal performance in the study group was significantly improve and made it meaningfully different than in the control group ( $8.94 \pm 0.31$  vs  $7.52 \pm 0.40$ ;  $p < .05$ ). The meal performance in both groups started at low performance. However, in study group at week four the scores gradually improved to the best performance at week eight till week twelve, while meal performance children in control group had a low performance.

**Conclusion.** Meal report is effective in improving meal performance of kindergarten children. Future studies need to find the effect of school meal reports on nutritional status and frequency of sickness.

<sup>1</sup>**KEYWORDS:** school children, meal report, meal performance

## **1** **INTRODUCTION**

Much attention has been given to the nutritional status of pre-school children because they are prone to stunting. Currently, one out of three children is suffering from malnutrition [1]. The challenging issue for kindergarten children is healthy school meal to main health and nutrition status [2] and to produce nutritionally school meal model [3], hence less vegetable and fruit intake during childhood play an important role presence of stunting [4] and cardiovascular disease [5].

Currently, most kindergarten schools run school meal programs. The objective of the school meal program is to promote healthy food behavior [2], be part of a healthy lifestyle to improve cognitive function and well-being [6]. The facts of the presence of feeding school affected stunting prevalence of school children, body weight and cognitive performance have been proved [6][7].

However, several studies reported that the food consumption of children did not meet the nutritional suggestion. In Indonesia, the intake of vegetables and fruits of children is very low, only 50-80 grams per day [8]. Similar results come from a study in a developed country, children consume vegetables and fruit only once daily and less vitamin and minerals [9]. World Health Organization (WHO) recommends children and adolescents to consume at least 200-gram vegetables and fruits daily [10][11].

School meal programs could be the solution to that nutritional problem in children. However in preparing school meals for children, for better concentration and school performance, healthy children and smart.[5]. [11]. [12] Based on these studies we concluded that the quality needs to put in high concern for school meal performance.

In this study, we introduce a school meal report in which the scores are used in grading five items of food performance; 1) types of foods, 2) way of processing, 3) the way of serving, 4) food consumed, and 5) type of meal boxes. Each of these items to be scored from six to ten. The higher the score the better the performance. This approach according to achievement motivation theory and risk communication method. The theory mentions that most individuals hope for success and fear failure [12], and risk information can improve mothers' risk perception[13].

In Indonesia, more than 200,000 kindergarten school with around 10 million students taught by more than 750,000 teachers. These can be a potential target in the application of the school meal report program. The objective of the study was to assess the effect of meal reports on school meal performance. The result of this study can be a contrasting model for administering nutrition education for mothers and teachers of kindergarten schools.

## **METHODS**

The study was a Quasi-Experimental study, we selected four kindergarten schools purposively; two as intervention location and the other two schools as control study. Two kindergarten schools were in Lubuk Pakam, North Sumatera Province and the other two schools were in Pekanbaru, Riau Province.

A total of 106 mothers with 106 children aged 4-6 years old involved as respondents and samples; 53 mothers in intervention and 53 in the control group. The schools' selection according to the following criteria; the ratio of teacher to student was 1 and 10, permanent learning classroom, running school meal program, complete school administration. The study was conducted from April until July 2018.

### **Pra - Intervention**

#### **Designing school meal report.**

The idea of designing and using meal report for kindergarten students was based on the evaluation of the existing school meal program. More than half portion of the school meal not be eaten by children. Then observing daily school and making scores and grades are part of teachers activities in kindergarten schools.

The school meal report consists of ten pages, at the second page explains how to use the book. Scoring sheets are four pages and the other pages present nutritional information including samples of attractive school meals.

There are five items of food performance need to score; 1) types of food, 2) way of processing, 3) way of serving, 4) consumed, and 5) meal box. Each item had score range from 6.0 to 10.0

In addition to this meal report, a monitoring book also provided for teachers to score children's daily meals. Prior to use this media in research, a trial had been done in another kindergarten school. Previously, there were seven items recorded in the school meal report, however, two items; drink and nutrient content were excluded.

### **Intervention**

Each mother in the intervention group was given a school meal report book. Three times nutrition education sessions were delivered to mothers and teachers. Lessons focused on proper nutrition for school children, nutritious and attractive food, and the function of the meal report book. The intervention activities took place at school and also at home when the enumerator visited the children's house. Every morning teachers do daily monitoring to score children's meals. Every Friday, teachers put the average scores of the five items into the meal report book. For children with low scores= 6.0 and 7.9 teachers write notes and suggestions to mothers in order to improve the performance of school meals. For those who got higher scores were suggested to maintain the performance of food. Then every Monday, mothers sent back the meal report book to teachers. While teachers in the control group did scoring against the

five items but not to share the score with mothers, but the teachers were guided on how to fill monitoring books and school meal reports.

Three sessions of nutrition education and counseling conducted during the intervention. The first and second sessions took part in class and the third session was running a counseling at home. In this part, enumerators showed the end of scores of children meals the suggested how to improve the scores. The duration of intervention took twelve weeks from April until July 2018.

Informed consent was obtained from mothers who were willing to take part in the study. Ethical approval of the study was obtained from the Health Research Ethics Committee, Polytechnic of Health Medan

### **Sample size, data collection, and processing**

Sample size used this formula,  $n = \frac{\{Z_{1-\alpha/2}\sqrt{2PQ} + Z_{1-\beta}\sqrt{P_1(1-P_1) + P_2(1-P_2)}\}^2}{(P_1 - P_2)^2}$ . Then a 10% was added for drop-out possibility in each group made the total sample size became 55 persons. Based on this calculation, 50-55 mothers were recruited from each school.

Characteristics of children and parents were taken using questionnaires. The demographic data such as age, sex, education level, occupation, family income. Anthropometric assessment; weight and height for age was done to measure the nutritional status of children. This data was presented in distribution frequency and a paired t-test was taken to analyze the equivalence of the two groups.

The five items of food performance were; 1) types of food, 2) way of processing, 3) way of serving, 4) food consumed and 5) meal box. Each item was considered to score of 6 or 8 or 10 depends on the operational definition in table 1. Score 6.0-7.5 means low performance, score 7.6-8.5=good performance, and score 8.6-10.0=best performance. Then the scores of each item were used in analyzing.

Daily scores were collected into the monitoring book then the average scores are entered into the school meal report sheet. Data entry and analysis were done using the Statistical Package for Social Sciences (SPSS) version 17 software. Descriptive statistics and t-test analyses were done by comparing the mean and standard deviation (SD) scores between the intervention and control group.





Figure 1. Flow chart of intervention

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## RESULTS

**1** Table 1. Baseline and end line of meal score in intervention and control study

Time of study	The score of meal performance		p-value
	Intervention Average $\pm$ SD	Control Average $\pm$ SD	
Baseline	7.15 $\pm$ 0.21	7.09 $\pm$ 0.18	0.31
End line	8.94 $\pm$ 0.31	7.52 $\pm$ 0.40	0.00

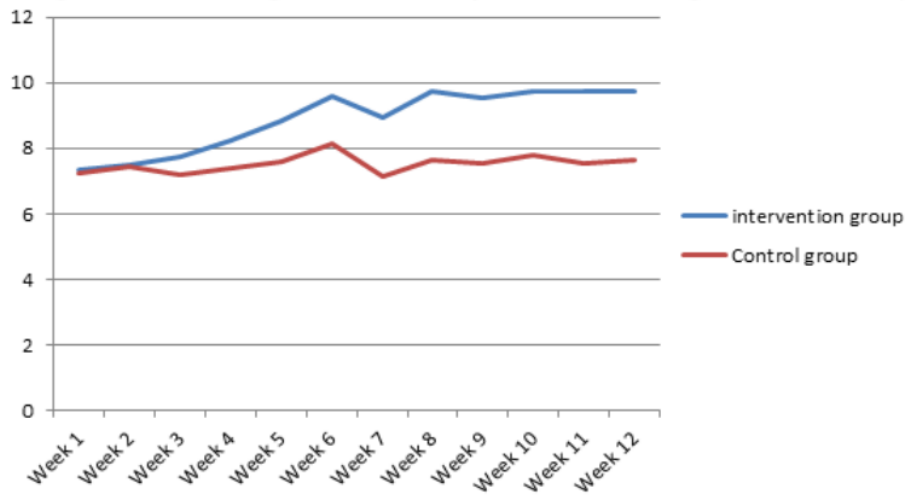
**1** Table 2. Average ( $\pm$ SD) scores of five items of meal performance in intervention and control group at End-line

	Study group	Control group	
	Score $\pm$ SD	Score $\pm$ SD	
types of food	8.62 $\pm$ 0.29	7.21 $\pm$ 0.43	.00
way of serving	9.16 $\pm$ 0.42	8.11 $\pm$ 0.65	.01
way of processing	8.99 $\pm$ 0.43	7.17 $\pm$ 0.45	.00
food consumed	9.12 $\pm$ 0.31	7.87 $\pm$ 0.41	.00
meal box	8.89 $\pm$ 0.41	8.02 $\pm$ 0.42	.02

**1** Table 1 presents the composite score at baseline and end line and Table 2 shows the average scores of five items of meal performance between study and control group. It can be seen that at baseline the school meal performance between the study group and the control was not significantly different, the p-value was .03. The scores of both groups (7.15 $\pm$ 0.21 vs 7.09 $\pm$ 0.18) indicated that the meal performance was low (score 6.0-7.5). Then Table 2 strengthened the findings of Table 1. It shows that among the five items, none of the variables was not significantly different, all p-values < .05. The way of serving and food consumed had higher scores than the other three variables (>9.0 in the study group and >8.0 in the control group).



**Fig.2. Trend of average scores of food performance during 12 weeks of study**



The average score of the five items of meal performance started from score 7.2 and slightly increased at weeks two and three (7.6 and 7.9). On contrary, in the control group, the scores decreased slightly from 7.2 to 7.0. When entering week four to week six, the meal performance in the study area increased meaningfully by 1.6 point (from 7.9 to 9.5), concurrently in the control group went up only 1.0 point (from 7.1 to 8.1). However, in the next one week, the scores in both groups went down 0.6 point and 1.0 at the intervention group and control group respectively. At week 8, the trend of score went up in both groups, from 8.9 to 9.9 in the intervention group and from 7.1 to 7.8 in the control group and then the trend line stay stagnant until week twelve (score 9.9 and 7.8 in study group and control group respectively).

## **DISCUSSION**

### **Using scores in school meal report**

This study proved that using school meal report effectively improved the meal performance of kindergarten students. This achievement can be explained by the relation between scoring system and mothers' motivation. When mothers were informed that their children getting low scores (6.0-7.5) and receive suggestion notes from the teachers, mothers became feel guilty because they did not practice their cognitive ability for their children.

In this process, achievement motivation theory and risk communication method properly work. These findings according to Brunstein stated that most individuals hope for success and fear of failure. It can be assumed that mother has fear if her child fail in achieving better performance for his school meal[12]

Numbers and scoring systems are frequently used to motivate patients to follow doctor's suggestions and currently, numbers, ratios, and percentages are used in public health [13],[14],[15].

The information exchange between teachers and mothers through meal reports in which the teachers send and resend messages during three months intervention might play important role in improving mothers nutritional behavior. It is in line with the study by Verbeke, found that communication and information markedly affected food consumers [15]

This study proved that the involvement the headmaster, teachers, mothers and students are crucial in such school based study. The presence of school meal report in fact enhance the school accreditation. What we have done is accordingly to study conducted by Rodrigo. He suggested that the ideal school-based nutrition study should consider the interest of school, students and teachers.[16]

The three sessions of nutrition education in this study might have affected the mothers nutritional behavior in particular in preparing school meal for their children. This findings was in line with several studies proved that nutrition education can change someone nutritional behaviors[17], fast food choice by adolescents[10] and nutrition status of children[18].

#### **Five items of meal performance**

This study determined that to have good meal performance, the school meal should contain foods such as rice, fish, vegetable, fruits and variation. These types of food contain carbohydrates, protein, vitamin, and minerals that needed by the body. The way of processing and serving should not monotonic. Children will get bored to eat food if they only eat fried rice or fried noodles. In serving in meal boxes, garnishing is needed because it will attract children to eat more food. The more the children consume food it will meet the minimum intake of calories 200-300 calories. Then the criteria of meal boxes should heat resistant to prevent children from food-borne disease.

Most researches on meal for children used those criteria. Children require micronutrient, the intake should meet the dietary recommendation[6]-[19]-[20], energy source of meal should meet 15-30% of total daily needs[21] and food safety for children[22]. Fung stated that foodborne disease can emerge from media used like meal boxes, plastic matters, and the Indonesian Food and Drug Monitoring Board prohibited to use plastic bag for children food.

#### **The duration to take the effect of intervention**

As seen in figure 2. the effect of intervention took at least four weeks after the meal report send to mothers. During these four weeks, teachers and mothers have been maintaining a communication through the meal report media. Teachers write notes to mothers and mothers send the response by changing food types, variations of serving of children meal. However, in the next two weeks, there was a downtrend. It can be assumed that it need more time is not easy to change mothers' behavior.

At week 9 until week twelve, the meal performance increased to the best performance. These processes is accordingly to the theory of planned behavior. As study conducted by Steinmetz concluded intervention conducted in groups are more successful than individuals and intervention effectiveness behavior depends on the change method used [23].

### **1 Implication of findings**

The implication of this research, kindergarten school should consider two main things; firstly, the burden of teachers and mothers to do daily food observation and preparing healthy meals for children and the benefit of the application school meal report to get better accreditation and healthy children.

### **1 Limitations and strengths**

This study has some limitations. First of all, potential risk may arise from a lack of information of family income and children breakfast at home. Children who did not consume food at school, could be because he is not hungry at school mealtime. Secondly, we did not count energy source, energy intake and number of vegetables and fruit consumed.

One of the strengths of this manuscript, to our knowledge that giving scores to five items of school meal, make it easy to evaluate the meal performance. Previously we were doubt of mothers to interpret scores and teachers suggestions. It is because mothers put a high belief that what teachers suggest is best for their children.

## **CONCLUSION**

Using scoring system in meal report is effective in motivating mothers to improve the performance of children meal. Five items of food performance that need to improve and it needs a month for mothers to be aware the importance of food performance. The successful of intervention is highly depending on the interest of school head master and role of teachers.

This study concluded that meal report book can be an instrumental value for school, children and for parents.

Future studies need to more schools and respondents and evaluate the composition of school meal and to produce the nutritionally school meal model.

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