

# Gerakan Nusantara Program on Children's Nutrition Practices

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## Abstract

*Gerakan Nusantara* is a nutrition education program that aims to change nutrition knowledge, attitudes, and practices of elementary school children in Indonesia. The program was implemented in 2015–2018 in Jakarta, Bandung, Surabaya, Makassar, Medan, Yogyakarta, Pontianak, East Nusa Tenggara, Pekanbaru, Padang, Jambi, and Sorong. The present study sought to determine effects of *Gerakan Nusantara* on the nutrition practices of elementary school-aged children and describe the extent of changes in each nutrition practice component covered by the program. This study used secondary data on Nutrition and Health Knowledge, Attitudes, and Practices studies collected from students participating in the program and involved 6,132 school children. Seven nutrition practice components studied were consumption of staple foods, plant protein, animal protein, vegetables, and fruits; milk drinking; and exercise. Significant improvements in fruit consumption and exercise were noted in 2015; all variables improved in 2016; significant changes in the consumption of staple food and plant protein and exercise were recorded in 2017; and significant improvements in the consumption of vegetables, plant protein, and animal protein and milk drinking were noted in 2018. Significant differences in nutrition practices before and after program implementation were noted in each year. Overall, the results demonstrated that *Gerakan Nusantara* successfully improved the nutrition practices of elementary school children.

**Keywords:** behavior change, drinking milk, nutrition education, nutrition practices, practice change

## Introduction

Elementary school-aged is an important period in the growth and development of children. In this period, growth tends to be stable, but extensive cognitive, emotional, and social development is only just beginning. This period prepares children to meet the physical and emotional requirements of adolescence. Adequate nutrition is needed by school-aged children to achieve optimal growth and development. Unfortunately, nutrition problems, such as iron deficiency, anemia, dental caries, underweight, overweight, and iodine deficiency, are very common among school-aged children.<sup>1,2</sup>

In Indonesia, the prevalence of school-aged children with nutritional problems is high. The prevalence of wasting in school-aged children in 2010, 2013, 2016, and 2017, for example, was 12.2%, 11.2%, 10.5%, and 10.9%, respectively. The prevalence of overweight increased from 2010 (9.2%) to 2013 (18.8%). In addition, the prevalence of stunting in school-aged children in 2010, 2013, and 2017 was 35.6%, 30.7%, and 27.7%, respectively.<sup>3-6</sup>

Chronic malnutrition in children can exert negative effects on growth and development. Children with poor nutritional status have lower academic performance compared with their healthy counterparts.<sup>7</sup> Malnutrition can also lead to serious health problems later in life and reduce a person's quality of life.<sup>8</sup>

Conversely, overnutrition also has a negative effect on children's health. Children with severe obesity are at greater risk of developing obesity, early atherosclerosis, hypertension, type 2 diabetes, metabolic syndrome, and even early death in adulthood.<sup>9</sup> In addition, obesity can cause low academic performance by indirectly affecting children's memory.<sup>10</sup> Several approaches, one of which is nutrition education, have been implemented to improve the nutrition status of school children. Nutrition education is expected to improve knowledge of child nutrition, motivate changes in diet, and enhance children's health status.<sup>11,12</sup> Behavior change is an indicator of the success of education. Nutrition education can first change knowledge and then change attitudes, thereby leading to changes in practice.<sup>13,14</sup>

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*Gerakan Nusantara* is a nutrition education program implemented in Indonesia in 2015–2018 by PT. Frisian Flag Indonesia in collaboration with the Center for Nutrition and Health Studies (CNHS), Faculty of Public Health Universitas Indonesia and the Indonesian Food and Drug Supervisory Agency. The program featured different activities designed for a general program and a specific program. The activities of the general program included provision of nutritional information related to balanced nutrition guidelines and the importance of milk drinking and physical activities (e.g., exercise). These activities targeted students, teachers, and parents. The activities of the specific program included provision of nutrition education, nutrition training, and seminars by experts (e.g., the CNHS team). Nutrition education was attended by all students/teachers who participated in the program and incorporated a short counseling session on nutrition and health. Nutrition training was attended by representatives of select students and teachers, and an enriched material was provided during nutrition education. Students and teachers who took part in the training were obliged to deliver the information obtained to others (e.g., other students, teachers, and parents). Parent seminars were conducted to provide practical nutrition information to parents so that they could monitor their child's nutrition practices at home. Baseline and endline surveys were conducted at the beginning and end of the program to measure changes in nutrition practices.

The aim of this study is to determine effect of the *Gerakan Nusantara* program on the nutrition practices of school-aged children and describe the extent of changes in each nutrition practice component.

## Method

This study analyzed secondary data from Nutrition and Health Knowledge, Attitudes, and Practices (KAP) studies collected from elementary school children participating in the *Gerakan Nusantara* program from 2015 to 2018. The main variables analyzed in this study were nutrition practices including consumption of staple foods, plant protein, animal protein, vegetables, and fruits; milk drinking; and exercise. Since the KAP studies collected data before and after program implementation, this study adopted a one-group pretest–posttest design to

detect significant changes in nutritional practice components before and after program participation.

This study received ethical approval from the Research Commission and Research Ethics of the Faculty of Public Health, Universitas Indonesia (Nos.101/H2.F10/PPM.00.02/2014 and 466/UN2.F10/PPM.00.02/2017).

In the primary KAP studies, 30 Grade 4 and 5 elementary school students were randomly selected from classes that attended the nutrition education program under *Gerakan Nusantara*. In 2015, 2,100 students in Jakarta, Bandung, Surabaya, Makassar, and Medan participated in the program. In 2016, 2,652 students in Jakarta, Bandung, Surabaya, Yogyakarta, Pontianak, Kupang, and Labuan Bajo participated in the program. In 2017, 919 students in Pekanbaru, Padang, and Jambi participated in the program. In 2018, 461 students in Sorong were selected. The total sample size from 2015 to 2018 included 6,132 students.

The targets of the *Gerakan Nusantara* program varied yearly (Table 1). In 2015, for example, the targets were students and teachers. In 2016, the targets were students, teachers, peer groups, and parents. The educators came from the CNHS team. However, because of the initial efficiency of the program, in 2017, the program was implemented by eliminating peer-group education and providing parent education conducted by trained teachers. The targets of activities in 2018 were identical to those in 2017, but parent seminars were carried out by the CNHS team.<sup>15-18</sup>

Two approaches were implemented to determine the effect of the *Gerakan Nusantara* program on nutrition practices. In the first approach (e.g., the score-based approach), analysis was carried out on the total scores of all nutrition practice components for each year and on the merged data (2015–2018). Comparison of scores obtained before and after program implementation was conducted by using dependent t-test. In the second approach (e.g., the proportion-based approach), the numbers of students who practiced nutrition as recommended before and after the program for each year and also combined data from 2015 to 2018 were compared. In this approach, data analysis was performed by using McNemar's test. The extent of change in each nutritional component practice was also analyzed under this approach.

Table 1. *Gerakan Nusantara* Activities Based on Year of Implementation

Year	Student Education	Teacher Education	Teacher Training (TOT)	Peer-Group Training	Parent Seminar
2015	✓	✓	✓	-	-
2016	✓	✓	✓	✓	✓
2017	✓ (*)	✓	✓	-	✓ (*)
2018	✓	✓	✓	-	✓

Notes: TOT: Training of Trainers, \* implemented by teachers

Statistical significance for both approaches was set at  $p\text{-value} \leq 0.05$ .

## Results

Significant differences ( $p\text{-value} < 0.05$ ) in total nutrition practice scores before and after implementation of *Gerakan Nusantara* were observed. The greatest change in scores was observed in 2018 (Table 2).

Changes in nutrition practices were calculated from the number of students who practiced good nutrition before and after program implementation in seven main similar questions on the year of implementation from 2015 to 2018 (Table 3) and in total (Table 4). Nutrition

practices that showed significant differences ( $p\text{-value} < 0.05$ ) before and after *Gerakan Nusantara* implementation in 2015 were fruit consumption and exercise. In 2016, all nutrition practices showed a significant difference. In 2017, the practices that showed significant differences were staple food consumption, plant protein consumption, and exercise. In 2018, the practices that showed significant difference were consumption of vegetables, plant protein, and animal protein and milk drinking. Differences in nutrition practices before and after implementation of *Gerakan Nusantara* are shown in Table 3.

After merging of the 2015–2018 data, significant

**Table 2. Differences in Total Scores of Nutrition Practices before and after *Gerakan Nusantara* Implementation by Year**

Implementation Year	n	Before	After	$\Delta$	p-value
		Mean $\pm$ SD	Mean $\pm$ SD		
2015	2,100	55.5 $\pm$ 18.7	59.2 $\pm$ 19.3	3.7 $\pm$ 0.6	0.000*
2016	2,652	50.2 $\pm$ 16.9	60.7 $\pm$ 18.0	10.5 $\pm$ 1.1	0.000*
2017	919	54.9 $\pm$ 18.4	60.1 $\pm$ 18.5	5.2 $\pm$ 0.1	0.000*
2018	461	59.0 $\pm$ 16.2	72.6 $\pm$ 16.6	13.6 $\pm$ 0.4	0.000*
2015–2018	6,132	53.3 $\pm$ 18.0	61.0 $\pm$ 18.7	7.7 $\pm$ 0.7	0.000*

Notes: SD = Standard Deviation, \*significant at  $p\text{-value} \leq 0.05$ ,  $\Delta$  = the difference in practical changes

**Table 3. Differences in Proportion of Sample with Nutrition Practice as Recommendation before and after Implementation of *Gerakan Nusantara* by Year**

Implementation Year	Practice Component	Before		After		$\Delta$		p-value
		n	%	n	%	n	%	
2015 n = 2100	Staple food	1,582	75.3	1,601	76.2	19	0.9	0.510
	Vegetables	947	45.1	950	45.2	3	0.1	0.950
	Fruits	1,595	76.0	1,710	81.4	115	5.4	0.000*
	Plant protein	1,541	73.4	1,556	74.1	15	0.7	0.621
	Animal protein	1,665	79.3	1,622	77.2	-43	-2.1	0.118
	Milk drinking	1,596	76.0	1,634	77.8	38	1.8	0.168
	Exercise	621	29.6	773	36.8	152	7.2	0.000
2016 n = 2652	Staple food	1,856	70.0	1,916	72.2	60	2.2	0.049*
	Vegetables	1,253	47.2	1,418	53.5	165	6.3	0.000*
	Fruits	774	29.2	1,272	48.0	498	18.8	0.000*
	Plant protein	1,443	54.4	1,699	64.0	256	9.6	0.000*
	Animal protein	1,342	50.6	1,616	60.9	274	10.3	0.000*
	Milk drinking	1,615	60.9	1,842	69.5	227	8.6	0.000*
	Exercise	255	9.6	891	33.6	636	24	0.000*
2017 n = 919	Staple food	582	63.3	627	68.2	45	4.9	0.019*
	Vegetables	498	54.2	508	55.3	10	1.1	0.641
	Fruits	732	79.7	756	82.3	24	2.6	0.136
	Plant protein	348	37.9	468	50.9	120	13	0.000*
	Animal protein	325	35.4	360	39.2	35	3.8	0.090
	Milk drinking	544	59.2	545	59.3	1	0.1	1.000
	Exercise	321	34.9	382	41.6	61	6.7	0.001*
2018 n = 461	Staple food	309	67.0	285	61.8	-24	-5.2	0.095
	Vegetables	315	68.3	411	89.2	96	20.9	0.000*
	Fruits	368	79.8	354	76.8	-14	-3	0.279
	Plant protein	150	32.5	391	84.8	241	52.3	0.000*
	Animal protein	133	28.9	388	84.2	255	55.3	0.000*
	Milk drinking	413	89.6	433	93.9	20	4.3	0.018*
	Exercise	172	37.3	177	38.4	5	1.1	0.766

Notes: \*significant at  $p\text{-value} \leq 0.05$ ,  $\Delta$  = the difference in practical changes

**Table 4. Differences in Nutrition Practices before and after *Gerakan Nusantara* Implementation by Practice Variable**

Practice	Before		After		$\Delta$		p-value
	n	%	n	%	n	%	
Staple food	4,329	70.6	4,429	72.2	100	1.6	0.034*
Vegetables	3,013	49.1	3,287	53.6	274	4.5	0.000*
Fruits	3,469	56.6	4,092	66.7	623	10.1	0.000*
Plant protein	3,482	56.8	4,114	67.1	632	10.3	0.000*
Animal protein	3,465	56.5	3,986	65.0	521	8.5	0.000*
Milk drinking	3,229	52.7	3,661	59.7	432	7	0.000*
Exercise	1,369	22.3	2,223	36.3	854	14	0.000*

Notes: \*significant at p-value  $\leq 0.05$ ,  $\Delta$  = the difference in practical changes

changes in the number of children who carried out the recommended nutrition practices before and after implementation of *Gerakan Nusantara* were observed (p-value  $< 0.05$ ). The nutrition practice with the greatest change was exercise, followed by plant protein and fruit consumption (Table 4).

## Discussion

According to the average total scores of the nutrition practices indicated in *Gerakan Nusantara*, a yearly increase in average scores could be observed. The highest increase in average total scores occurred in 2018. The longer the program was implemented, the greater the program improvements and changes in nutrition practices. This finding is in line with other reports stating that nutrition education programs are effective in generating positive behavior changes related to nutrition.<sup>19-21</sup> Several studies reveal that the behavior changes that could occur include increased consumption of fruits, vegetables, and breakfast and reduced intake of sweet drinks and fat.<sup>20,22</sup> The success of nutrition education programs in changing nutrition practices has also been observed among primary school students in China; thus, nutrition education can significantly improve eating behaviors in children.<sup>23</sup>

Changes in nutrition practices are an indicator of the success of a nutrition education program. The results of the present study show an interesting result. Greater changes in nutrition practices can be observed when more school members are involved in these practices. In 2016, for example, nutrition education involved all school components, such as students, teachers, peer groups, and parents, and all practice components changed significantly and positively. Changes in total scores in 2016, which increased to  $10.5 \pm 1.1$ , were also relatively high compared with those in the previous year. The involvement of parents in the program's activities is believed to be one of the key factors influencing the success of this program. Several studies show that children's eating behavior is influenced not only by their school en-

vironment but also by their family environment. The role of families in influencing children's nutritional behavior is even greater than that of schools.<sup>24,25</sup> Monitoring from parents, family eating habits, and the role of parents in providing a good model of eating behavior could significantly affect children's eating behavior.<sup>24</sup>

The success of *Gerakan Nusantara* in changing all nutrition practice variables in 2016 may also be attributed to the implementation of the program among peers. Peers are the closest persons to a child in school, and children tend to listen and follow recommendations by their friends.<sup>1</sup> Campbell, *et al.*,<sup>26</sup> stated that peer-led education is effective in changing children's behavior and health-related habits.

In 2015, when the program involved only students and teachers, the program succeeded in changing only two of the seven nutrition practice variables, namely, fruit consumption and exercise. The increase in total score was  $3.7 \pm 0.6$ , which is not as high as the score obtained in 2016 ( $10.5 \pm 1.1$ ).

In 2017, different from 2016, only three of the seven practice variables showed significant changes, namely, consumption of staple foods and plant protein and exercise. In 2017, activities were carried out by eliminating and changing some of the previous activities. For example, peer-group training was not carried out, and student education and parent seminars were carried out by the school education team (e.g., teachers), not by an expert team from CNHS Universitas Indonesia. Elimination of student training affected the absence of peer roles in influencing child nutrition practices. Parent seminars held by the school proceeded poorly because the teachers appeared to lack confidence; thus, they were unable to provide adequate knowledge and an understanding of nutrition to parents. Nutrition training for teachers, which was conducted only once in this year, is inadequate to equip teachers with the confidence and ability to deliver nutritional material to parents.

Based on experience from the previous year, in 2018, the program was improved by reestablishing the delivery

of nutrition seminars for parents by a team of nutrition experts (e.g., not teachers). In this year, significant changes in the practices of four variables, namely, consumption of vegetables, plant protein, and animal protein and milk drinking, were noted. The total score in 2018 was higher ( $13.6 \pm 0.4$ ) compared with those in previous years. Parent seminars carried out by experts were thus proven to influence changes in child nutrition practices. Knowledge of parents, especially mothers, about nutrition is very important because such knowledge can affect children's eating habits. Yabancı, *et al.*,<sup>27</sup> showed that mothers with higher nutritional knowledge tend to feed their children with more vegetables, fruit, and, nuts and fewer sweet drinks and fast food compared with mothers with lower nutritional knowledge.

This study revealed that parental participation in the program could significantly improve children's nutrition practices. For instance, when parents were not involved in the program (e.g., in 2015), the change in average practice scores, at only 3.7, was low; however, when parents were involved (e.g., in 2016) the change in average practice scores was as high as 10.5. In 2017, when parent seminars were provided by teachers, the change in average score was only 5.2; in 2018, when parents were educated by experts, the average score increased to 13.6. Teachers can be good nutrition educators but must have strong confidence in their ability to deliver nutritional material to parents.<sup>28</sup>

Based on data from 2015 to 2018, the greatest changes in nutrition practices occurred in exercise. This result is in line with the research conducted by Debnath and Agrawal,<sup>12</sup> who showed significant changes in children's physical activity after nutrition education; specifically, children performed physical activities more regularly. Auld, *et al.*,<sup>19</sup> also demonstrated that nutrition education can improve the level of physical activity of children.

The practice of eating fruits and vegetables also showed significant changes. Similar to the present work, the results of Auld, *et al.*,<sup>19</sup> revealed that nutrition education can increase children's intake of fruits and vegetables. Wilson, *et al.*,<sup>29</sup> showed that nutrition education can change a child's eating behavior, especially in terms of fruit and vegetable consumption.

In general, changes in children's eating practices are influenced by other factors besides education, such as the influence of family, mass media, close friends, and the types of food that children prefer to eat.<sup>30</sup> Parents and siblings at home have the greatest influence on children's attitudes toward their food and food choices. Eating behavior, culture, and parents' choice of food, for example, could affect the food preferred by children. Family members who provide healthy food and practice good eating habits tend to be imitated by children and will, therefore,

affect their eating practices.<sup>1</sup> Close friends also influence a child's food selection. Children may choose food based on recommendations from friends.<sup>1</sup>

This study can be used as a reference for future implementations of nutrition education to achieve the expected nutrition practice changes. A limitation of this study is the different number of nutrition practice components applied for different years of program implementation, which limits the scope of practices that may be analyzed. Moreover, external environmental factors related to nutrition practices were not controlled and may introduce confounding effects on the improvement of nutrition practices in terms of location or implementation year. The selection of schools was not under the control of the researchers. In the future, nutrition practice components should be standardized to enhance the ability of researchers to analyze changes in nutrition practices.

## Conclusion

The results of this study indicated an increase in nutrition practices after implementation of *Gerakan Nusantara* from 2015 to 2018. Significant improvements in all nutrition practice variables were found in 2016, a year in which all school components, including teachers, students, peer groups, and parents, were involved. The nutrition practice that changed the most from 2015 to 2018 was exercise, followed by vegetable, protein, and fruit consumption. This study showed a significant relationship between *Gerakan Nusantara* and changes in the nutrition practice scores of school children. The *Gerakan Nusantara* Program can thus be concluded to be successful in improving the nutrition practices of school children.

## Abbreviations

CNHS: Center for Nutrition and Health Studies; KAP: Knowledge, Attitudes, and Practices, TOT: Training of Trainers; SD: Standard Deviation.

## Ethics Approval and Consent to Participate

This study received ethical approval from the Research Commission and Research Ethics of the Faculty of Public Health, University of Indonesia (Nos.101/H2.F10/PPM.00.02/2014 and 466/UN2.F10/PPM.00.02/2017).

## Competing Interest

Author declares that there are no significant competing financial, professional, or personal interests that might have affected the performance or presentation of the work described in this manuscript.

## Availability of Data and Materials

The data was obtained from the Center for Nutrition and Health Studies (CNHS) that had received permission from PT. Frisian Flag Indonesia.



## Authors' Contribution

Syilga Cahya Gemily conducted the study, data analysis and interpretation, prepared the draft of the manuscript; Sandra Fikawati reviewed the manuscript, advised on the data analysis and interpretation; Ahmad Syafiq advised on the data analysis and interpretation and reviewed the manuscript

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