



## The Effect of Nutrition Education with Monopoly and Leaflet on The Nutritional Knowledge Levels and Consumption Pattern Among 5th Grade Elementary School Students in Surabaya

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### A B S T R A C T

In this era, many school-age children have unbalanced and unhealthy eating behaviors. Low nutritional knowledge levels cause the issues. This paper analyzes the differences in nutritional knowledge levels and consumption patterns before and after nutrition education with monopoly media and leaflets among 5th-grade elementary school students in Surabaya. The research method used a quasi-experimental design. The population was 170 5th grade elementary school students at SDN I and SDN II Surabaya. In addition, this study utilized probability sampling with a sample of 90 students. Next, data analysis used the Mann-Whitney and Wilcoxon tests with a significant level of  $\alpha$  0.05. There were differences in nutritional knowledge levels before and after nutrition education with monopoly media in both schools ( $p=0.000$ ). Meanwhile, there were no differences in nutritional knowledge levels before and after nutrition education with leaflet media (SDN I Surabaya  $p=0.073$  and SDN II Surabaya  $p=0.052$ ). In addition, both schools had differences in consumption patterns before and after nutrition education with monopoly media ( $p=0.000$ ). However, there were no differences in consumption patterns before and after nutrition education with leaflet media (at SDN I Surabaya  $p=0.301$  and SDN II Surabaya  $p=0.307$ ). Nutrition education with monopoly media is more effective in improving nutritional knowledge levels and consumption patterns than leaflet media in 5th-grade students. Further research could compare monopoly with other EGT (educational game tools, such as snakes and ladders nutrition or nutrition puzzle).

## INTRODUCTION

A prosperous country is determined by quality human resources (HR), namely humans with physical and mental solid, excellent health, also good achievement levels. The development of human resources to produce superior quality needs concern from an early age, especially in school-aged children (Amrah, 2013). Furthermore, children's daily intake can determine the quality of consumption (Indrati and Gardjito, 2014).

Nowadays, many school-aged children have unbalanced and unhealthy eating behavior. Issues in children's eating behavior are they often do not eat breakfast, like to eat unhealthy snacks while at school, and consume fewer vegetables, fruit, and milk. In addition, they overeat fast or junk food and foods that contain lots of ingredients, preservatives, colorants, and flavor enhancers. Eating behavior, especially in school-aged children, can be influenced by their knowledge in meeting the proper nutrition in terms of quality and quantity according to their needs (Devi, 2012).

According to Deni and Dwiriani (2009), 40% of school-aged children had a low level of nutritional knowledge, 43.8% had a moderate level of nutritional knowledge, and 16.2% had a high level of nutritional knowledge. Nutritional knowledge can affect food consumption patterns in individuals. A

consumption pattern is a habitual response or behavior related to food consumption. Children's consumption patterns in Indonesia were 93.6% of children eating fewer vegetables and fruit (< 5 servings per day), and 53.1% consumed sweet foods or drinks ( $\geq 1$  time per day). In addition, 40.7% of them ate sweet, fatty, and fried foods ( $\geq 1$  time per day), also 77.3% consumed flavoring ( $\geq 1$  time per day) (Kemenkes RI, 2013).

One Effort to improve nutrition-related problems is by providing nutrition education for school-aged children through communication, information, and education (IEC) about nutrition-related materials (RI, 2007). There are various media methods in nutrition education (Notoatmodjo, 2003); one of them is a nutrition monopoly as an educational game tool (EGT). Nutrition monopoly is a board game containing pictures of the four pillars of balanced nutrition in a balanced nutrition cone. This paper analyzes the differences in nutritional knowledge levels and consumption patterns before and after nutrition education with monopoly media and leaflets in 5th-grade elementary school students in Surabaya.

## METHOD

This research used a quasi-experimental design with a pre-and post-test control group. The population was 5th-grade elementary school students totaling 170 students at Public Elementary School (here and after it is called with SDN) I Surabaya and SDN II Surabaya. Sampling used probability sampling, with proportionate stratified random sampling. The sample size using the Slovin formula obtained a total sample of 90 students with 52 students at SDN I Surabaya and 38 students at SDN II Surabaya. The proportion of groups in SDN I Surabaya consisted of 26 students in the monopoly group (intervention) and 26 students in the leaflet group (control), and the proportion of groups in SDN II Surabaya consisted of 19 students in the monopoly group (intervention) and 19 students in the leaflet group (control). Inclusion criteria were 5th-grade elementary school students, physically and mentally healthy, and willing to be the research sample. Meanwhile, exclusion criteria were sick or recovering from illness, who were not present in the study, and who did not participate until they finished.

Before the intervention, respondents were given an explanation regarding the procedures, objectives, benefits and filled out and signed the consent form to become a respondent. Then, respondents were pre-tested by filling out a questionnaire to determine nutritional knowledge and conducting interviews about food consumption patterns for the past month. The next day, nutrition education was carried out using the nutrition monopoly game media in the intervention group. Researchers accompanied respondents from the beginning to the end of the game. Meanwhile, we provided a sheet of nutrition leaflets to be read and understood by the respondents in the control group. Interventions in both elementary schools were carried

out on different days. After the intervention, we gave a questionnaire as a post-test result to determine nutritional knowledge levels with the same questionnaire as during the pre-test and interview the respondents' eating patterns. Data collection consisted of primary data and secondary data. Primary data consisted of respondent characteristics of respondents, knowledge levels, and consumption patterns obtained through a questionnaire. The secondary data in this study was the general description of SDN I Surabaya and SDN II Surabaya received from schools.

Data analysis used the Mann-Whitney test to compare differences between intervention and control groups. In addition, Wilcoxon signed-rank test to compare pre-test and post-test.

## RESULT

### 1. Sex

Table 1. Sex Characteristic

Variable	SDN 1		SDN 2	
	n	(%)	n	(%)
Boys	28	53.8	20	52.6
Girls	24	46.2	18	47.4
Total	52	100	38	100

Table 1. shows that most respondents at SDN I Surabaya (53.8%) are boys, and 52.6% of respondents at SDN II Surabaya are boys.

### 2. Age

Table 2. Age Characteristic

Variable	SDN I		SDN II	
	n	%	n	%
10 years old	8	15.4	3	7.9
11 years old	40	76.9	29	76.3
12 years old	4	7.7	6	15.8
<b>Total</b>	<b>52</b>	<b>100</b>	<b>38</b>	<b>100</b>

Table 2. reports that almost all respondents at SDN I Surabaya (76.9%) are 11 years old, and 76.3% of respondents at SDN II Surabaya are 11 years old.

### 3. Nutritional Knowledge Levels Before Nutrition Education in Monopoly and Leaflet Groups

Table 3. Nutritional Knowledge Levels Before Nutrition Education at SDN I Surabaya

Nutritional Knowledge levels	Monopoly Group		Leaflet Group		<i>P</i>
	n	%	n	%	
High	3	11.5	0	0	0.094
Moderate	7	26.9	5	19.2	
Low	16	61.5	21	80.8	
Total	26	100	26	100	

Table 3 reveals that respondents with high nutritional knowledge levels at SDN I Surabaya are 11.5% in the monopoly group and 0% in the leaflet group before intervention. In addition, the Mann-

Whitney test obtains  $p = 0.094$  ( $\alpha > 0.05$ ). Thus, there was no difference in nutritional knowledge levels before nutrition education between monopoly and leaflet groups at SDN I Surabaya.

Table 4. Nutritional Knowledge Levels Before Nutrition Education at SDN I Surabaya

Nutritional Knowledge levels	Monopoly Group		Leaflet Group		<i>p</i>
	n	%	n	%	
High	2	10.5	0	0	0.080
Moderate	7	36.8	3	15.8	
Low	10	52.6	16	84.2	
Total	19	100	19	100	

Table 4 indicates that respondents with high nutritional knowledge levels at SDN II Surabaya are 10.5% in the monopoly group and 0% in the leaflet group before intervention. In addition, the Mann-Whitney test obtains  $p = 0.080$  ( $\alpha > 0.05$ ). Thus, there was no difference in nutritional knowledge levels before nutrition education between monopoly and leaflet groups at SDN II Surabaya.

#### 4. Nutritional Knowledge Levels After Nutrition Education in Monopoly and Leaflet Groups

Table 5. Nutritional Knowledge Levels After Nutrition Education at SDN I Surabaya

Nutritional Knowledge levels	Monopoly Group		Leaflet Group		<i>p</i>
	n	%	n	%	
High	24	92.3	2	7.7	0.000
Moderate	2	7.7	9	34.6	
Low	0	0	15	57.7	
Total	26	100	26	100	

Table 5 shows that respondents with high nutritional knowledge levels at SDN I Surabaya are 92.3% in the monopoly group and 7.7% in the leaflet group after intervention. In addition, the Mann-Whitney test obtains  $p = 0.000$  ( $\alpha < 0.05$ ). Thus, there was a difference in nutritional knowledge levels after nutrition education between monopoly and leaflet groups at SDN I Surabaya.

Table 6. Nutritional Knowledge Levels After Nutrition Education at SDN II Surabaya

Nutritional Knowledge levels	Monopoly Group		Leaflet Group		<i>p</i>
	n	%	n	%	
High	19	100	1	5.3	0.000
Moderate	0	0	8	42.1	
Low	0	0	10	52.6	
Total	19	100	19	100	

Table 6 reveals that all respondents (100%) in the monopoly group at SDN II Surabaya have high nutritional knowledge levels after the intervention. In addition, a small portion of respondents (5.3%) in the leaflet group have high nutritional knowledge levels after the intervention. The Mann-Whitney test obtains a  $p=0.000$  ( $\alpha < 0.05$ ). Thus, there was a difference in nutritional knowledge levels between monopoly and leaflet groups after nutrition education at SDN II Surabaya.

#### 5. Nutritional Knowledge Levels Before and After Nutrition Education in Monopoly and Leaflet Groups

Table 7. Nutritional Knowledge Levels Before and After Nutrition Education at SDN I Surabaya and SDN II Surabaya

Group	Wilcoxon Test	
	SDN I	SDN II
	<i>p</i>	<i>p</i>
Monopoly	0.000	0.000
Leaflet	0.073	0.052

Table 7. indicates that the Wilcoxon tests have  $p=0.000$  ( $\alpha<0.05$ ) in the monopoly groups at SDN I and SDN II Surabaya. Thus, there were differences in nutritional knowledge levels before and after nutrition education with monopoly media. Meanwhile, the Wilcoxon test obtains  $p=0.073$  ( $\alpha>0.05$ ) in the leaflet groups at SDN I and  $p=0.052$  ( $\alpha>0.05$ ) at SDN II Surabaya. It means that there were no differences in nutritional knowledge levels before and after nutrition education with leaflet media.

#### 6. Consumption Patterns Before Nutrition Education with Monopoly and Leaflet Media

Table 8. Consumption Patterns Before Nutrition Education in SDN I and SDN II Surabaya

	Group	Score	Category	<i>p</i>
SDN I	Monopoly	226	Low	0.472
	Leaflet	174	Low	
SDN II	Monopoly	174	Low	0.842
	Leaflet	129	Low	

Table 8. reports that consumption patterns before intervention in the monopoly and the leaflet group at SDN I and SDN II are low. The Mann-Whitney test at SDN I obtains  $p=0.472$  and at SDN II gets  $p=0.842$  ( $\alpha>0.05$ ). Thus, there were no differences in consumption patterns before nutrition education between monopoly and leaflet groups in both schools.

#### 7. Consumption Patterns After Nutrition Education Monopoly Media and Leaflet

Table 8. Consumption Patterns After Nutrition Education in SDN I and SDN II Surabaya

	Group	Score	Category	<i>p</i>
SDN I	Monopoly	330	High	0.048
	Leaflet	182	Low	
SDN II	Monopoly	256	Moderate	0.045
	Leaflet	172	Low	

Table 9. shows that respondents in the monopoly group had high consumption patterns at SDN I and moderate consumption patterns at SDN II after the intervention. Meanwhile, consumption patterns after intervention in the monopoly and the leaflet group at SDN I and SDN II are low. The Mann-Whitney test at SDN I obtains  $p=0.048$ , and SDN II gets  $p=0.045$  ( $\alpha<0.05$ ). Thus, there were differences in consumption patterns after nutrition education between monopoly and leaflet groups in both schools.

#### 8. Consumption Patterns Before and After Nutrition Education with Monopoly and Leaflet Media

Table 10. Consumption Patterns Before and After Nutrition Education at SDN I and SDN II

Group	Wilcoxon Test	
	SDN I	SDN II
	<i>p</i>	<i>p</i>
Monopoly	0.000	0.000
Leaflet	0.301	0.307

Table 10. reveals that the Wilcoxon test in the monopoly group at SDN I and SDN II have  $p=0.000$  ( $\alpha<0.05$ ). Thus, both schools had differences in consumption patterns before and after nutrition education with monopoly media. Meanwhile, the Wilcoxon test in the leaflet group at SDN I achieves  $p=0.301$ , and SDN II acquires  $p=0.307$  ( $\alpha>0.05$ ). Thus, there were no differences in consumption patterns before and after nutrition education with leaflet media.

## DISCUSSION

### 1. Nutritional Knowledge Level Before and After Nutrition Education with Monopoly and Leaflet Media

Our findings showed improved nutritional knowledge levels before and after nutrition education with monopoly. In addition, this study revealed no significant improvement in nutritional knowledge levels before and after nutrition education with leaflet (Table 7). It is supported by an investigation by Hamdalah (2013), which obtained a significance of  $p=0.001$  ( $\alpha<0.05$ ). Hamdalah's study found an increased knowledge after dental and oral health education with snakes and ladders game in the intervention group and picture book media in the control group in 3rd-grade students at SDN Patrang 02 Jember Regency. In addition, this study result is in line with the research by Azadirachta and Sumarmi (2017) among students at SDN 021 Sungai Kunjang, Samarinda. The study found a significant difference between knowledge level before and after nutrition education on balanced nutrition with pocketbook media ( $p=0.000$ ). Meanwhile, there was no difference or effect between knowledge levels before and after receiving nutrition education on balanced nutrition with leaflet media ( $p=0.52$ ).

Monopoly media was more effective in improving respondents' nutritional knowledge than leaflet media. It is because monopoly media provides a better stimulus in conveying material to respondents at SDN I and SDN II than leaflet media. Respondents can interact directly in monopoly media during nutrition education and easily remember the material presented. Meanwhile, respondents only read the material presented in leaflet media, so they are bored during nutrition education and cannot correctly receive or remind the material. As a result, respondents' knowledge in the leaflet group did not increase significantly. During the nutrition education activity, respondents in the monopoly group had higher responses and enthusiasm than the leaflet group. It is because the monopoly media can attract

respondents' attention and interest. Thus, nutrition education with monopoly media could significantly increase nutritional knowledge compared to the leaflet media.

## 2. Consumption Patterns Before and After Nutrition Education with Monopoly and Leaflet Media

This study found increased consumption patterns before and after nutrition education with monopoly. In addition, this paper indicated no significant improvement in consumption patterns before and after nutrition education with leaflet media (Table 10). It is supported by Hamdalah (2013) that health education with educational game tools (EGT) had a significant influence on the selection of healthy snacks in children ( $p=0.000$ ). In addition, a study by Siwi, Yunitasari and Krisnana (2014) compared nutrition education with lecture and audio-visual media. Siwi's research found improvement in consuming healthy snacks after nutrition education with audio-visual media ( $p=0.004$ ), but no significant difference after nutrition education by using lecture ( $p=0.527$ ).

Predisposing factors for consumption patterns are nutritional knowledge and exposure to information. This paper found that nutrition education with monopoly increased nutritional knowledge levels, so consumption patterns also improved. Nutrition education with monopoly increases children's motivation and attention to learning and increases curiosity. Knowledge can affect respondents' way of thinking. Next, it can significantly improve respondents' consumption patterns in the monopoly group compared to the leaflet group's consumption patterns. Meanwhile, our findings revealed that nutrition education with leaflets could not increase knowledge levels, so consumption patterns could not improve. Low knowledge levels result in consumption patterns that do not vary, affecting food diversity in individuals.

In addition to knowledge levels, consumption patterns can also be influenced by several factors, including the sex and age of the respondents. Most respondents in this paper were boys (Table 1) and 11 years old (Table 2). Gender and age are related to a person's consumption pattern because the nutritional needs of men and women have differences, but the differences are not significant. Furthermore, the more mature a person's age, the higher his food intake because of increased nutritional needs

## CONCLUSION

Nutrition education with monopoly media is more effective in improving nutritional knowledge levels and consumption patterns than leaflet media in 5th-grade students. Further research could compare monopoly with other EGT, such as snakes and ladders nutrition or nutrition puzzle.

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