Evaluating the Effectiveness of Animated Video Nutrition Education on Food Label Knowledge among Housewives in Padang City

Evaluasi Efektivitas Edukasi Gizi menggunakan Video Animasi terhadap Pemahaman Label Pangan pada Ibu Rumah Tangga di Kota Padang

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ABSTRACT

Background: Unhealthy dietary patterns are one of the main contributors to the high prevalence of nutritional problems in Indonesia. This issue may stem from low nutrition literacy, including limited understanding of food labeling. Therefore, a nutrition education intervention is needed. It is not only to improve comprehension of food labels but also to promote healthier dietary behaviors.

Objectives: This study aimed to evaluate the effectiveness of nutrition education using animated videos in improving food label comprehension among housewives in Padang City.

Methods: A quasi-experimental design was employed to 90 housewives residing in Padang City. Respondents were then divided into control and intervention groups. The intervention group received nutrition education using animated videos on food labeling, which were delivered four times over four consecutive weeks. A paired t-test was conducted to assess pre- and post-intervention differences within each group.

Results: The findings indicated an increase of 15.5 points in knowledge and 11.0 points in attitude scores within the intervention group. The T-test results showed a significant difference (p-value<0.001 and p-value<0.001) in both knowledge and attitude in the intervention group, while no significant differences were observed in the control group (p-value=0.160 and p-value =0.160). The N-gain scores were 81.15% for knowledge and 50.23% for attitude, suggesting that the video media was effective in improving knowledge, but less effective in enhancing respondents' attitudes toward food labeling.

Conclusions: Nutrition education using animated video media proved to be effective in increasing knowledge and understanding, but was not yet effective in improving food labeling attitudes among housewives in Padang City.

INTRODUCTION

Nutritional problems remain a major public health issue in Indonesia. The country is currently experiencing a triple burden of malnutrition, in which undernutrition problems such as underweight, stunting, and wasting, including micronutrient deficiencies such as anemia, are still prevalent. On the other hand, issues of overnutrition are also widespread. The data from Indonesia Health Survey 2023 showed that 21.5% of children under five were stunted, 15.9% of them were underweight, and 8.2% of them were wasted. Meanwhile, 3.4% of children under five in Indonesia were found to be overweight. The survey also showed that 16.2% of Indonesian people were anemic[1,2].

One contributing factor to nutritional problems is the consumption of unhealthy foods and less balance foods. Food that are high in sugar, salt, and fat are still widely consumed. But in the other hand, food that are high in protein, fiber and essential nutrients were rarely consumed[3,4]. The data also showed that 39.1% children under five in Indonesia had unbalanced diet and 21.6% of them did not have any animal-based protein in their complementary foods[1]. The frequent consumption of processed food also adds more the burden to the existing nutritional problems. Recent studies showed that Indonesian people especially teenagers and early adults consumed processed food 6 to 7 times per day[5-7].

There are many determinants for these behaviors. One of them can be the lack of nutrition literacy. Survey showed that Indonesian people only had medium nutrition literacy with average score within 60-70%. The lower the literacy, the lower the understanding of the importance of balance nutrition[8,9]. Another factor of unhealthy food consumption is the lack understanding of food information. Although the prevalence and the frequency among Indonesian' people in consuming processed food were high, they have low knowledge and understanding in food label. Previous studies showed that 40-55% of Indonesian people had low knowledge and understanding in food label. Studies have shown that

people who do not understand food labels on packaged products usually pay little attention to the nutrient content of the foods they consume. This lack of awareness can lead to poor food choices, which in the long term may increase the risk of obesity, non-communicable diseases, and deficiencies of important nutrients such as iron and calcium[10,11].

Nutrition education is widely recognized as an effective strategy for improving nutrition literacy and promoting healthier dietary behaviors within communities. Nutrition education combined with an understanding of food labelling can empower individuals to recognize and select healthier foods. Understanding food labeling is a key component of nutrition literacy, as it enables consumers to evaluate the nutritional quality of food products and align their choices with recommended dietary guidelines[12,13].

Evidence from recent studies suggests that interactive and experiential learning approaches such as the use of animated or interactive video are significantly more effective in enhancing nutrition knowledge, attitudes, and behaviors compared to traditional didactic methods. These interactive tools engage learners more actively and are particularly suitable for populations with varying levels of literacy and educational backgrounds. The implementation of such educational interventions at the community level has shown promise in fostering sustainable healthy eating habits[14,15].

The implementation of nutrition education and food labelling interventions in communities holds great potential for fostering healthy eating habits. However, previous studies showed that the educations regarding food label were usually applied on to segmented groups such as university students, rarely on to family setting. The family environment, particularly the role of mothers or housewives, usually serves as primary food decision-makers[16,17]. Family can be used as a primary learning setting to serve as a strategic platform for effectively delivering nutrition information[18]. Given this context, the present study aimed to evaluate the effectiveness of a nutrition education intervention using animated videos in improving food label comprehension among housewives in Padang City, Indonesia. By focusing on this setting, the study seeks to contribute to the development of culturally relevant and accessible strategies for improving public nutrition literacy.

METHODS

The present study used a quasi-experimental design. This study involved two groups. One group as control group and another one as intervention group. The intervention in this study was conducted in the form of nutrition education. Ethical clearance for this study had been obtained from Ethical Committee of Faculty of Public Health, Universitas Andalas in ethic certificate number B/108/UN16.12.D/PP/2025 dated July, 10th 2025.

This study was conducted from mid July to the end of August 2025 and employed 90 housewives as the respondents. The number of respondents were calculated using two sample T-test as below[19]:

$$n = \frac{2(Z_{\alpha/2} + Z_\beta)\delta^2}{d^2}$$

n=Sample Size
$Z_{\alpha/2}$=Confidence Level=95%=1.96
Z_β=Power=90%=1.28
δ=Varians=12.50
d=Minimum Difference between Two Means=9.58

The minimum sample calculation resulted in 36 respondents for each group. To anticipate if there would be a drop out, we added 25% of the sample minimum resulted in 45 respondents for each group. We found no drop out in this study, so that we were able to use all 45 respondents for each group. The respondents must be housewives, adult aged 19 to 59 years old, and resided in District Koto Tangah, Kuranji, and North Padang, all located in Padang City. Those three districts were chosen conveniently as those three are among districts with wide area in Padang. Those districts were also chosen to represent the geographical area of Padang city, the coastal area, the city center, and the highland area. The respondents from each area were drawn though open recruitment.

The respondents were then divided into control and intervention groups randomly. The intervention group received nutrition education using animated videos on food labeling as shown in Figure 1. There were three materials that were delivered namely, the introduction to food label, the importance of food label and how to read food label. The intervention were delivered four times over four consecutive weeks in group setting. While the control group received education about balance nutrition using leaflet. Respondents were given pre-test before education and post-test after education.

Figure 1. Screen shoots of animated videos used during intervention in Padang City

In this study we analyzed the knowledge and attitude of the respondents using 10 structured questionnaires. The questionnaires for this study were developed beforehand. They were also tested for the validity and realibility before implemented. In knowledge questionnaire, respondents got 10 points for each correct answer resulted in maximum score of 100. We then categorize the knowledge level into low (<60), medium (60-80), and high (>80).

For attitude analysis, we also employed 10 negative questions. The respondents got 10 points for strongly disagree, 8 points for disagree, 6 points for neutral, 4 points for agree, and 2 points for strongly agree, resulted in also maximum score of 100. We then categorize the attitude level into negative (<60), neutral (60-80), and positive (>80). The negative attitude represents the tendency to disagreement toward good attitude on food label.

A paired T-test using IBM SPSS for Mac Version was conducted to assess pre- and post-intervention differences within each group, while independent T-test was conducted to assess the difference between control and intervention group both on pre and post intervention. The difference was considered significant when the p-value<0.005. We also calculated N-gain score to assess the effectiveness of intervention media on knowledge and attitude. The media was considered effective if the score >76%; effective enough if the score 56-75%; less effective if the score 40-55%, and not effective if the score <40%.

RESULTS AND DISCUSSIONS

The present study was conducted on 90 housewives living in Padang city. Padang city was chosen conveniently as triple burden malnutrition was still prevalent. The characteristics of the respondents are shown in Table 1.

Table 1. Frequency distribution of housewives' characteristics in Padang City

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
Early Adult (18-39)	50	55.6
Midlife (40-59)	40	44.6
Education		
Primary School Graduate	2	2.2
Middle School Graduate	7	7.8
Highschool Graduate	59	65.6
Associate Graduate	3	3.3
University Graduate	19	21.1
Income (IDR)		
No Income	2	2.2
<2,500,000	63	70
2,500,000-5,000,000	18	20
7,500,000-10,000,000	5	5.6
>10,000,000	2	2.2

Table 1 shows that more than half of the respondents (55.6%) were early adult (aged 18-39 years old). This finding was in line with the demographic condition of adult females in Padang city. The data from Statistic Bureau showed that most adult females in Padang city were in early adult compared to midlife. Most of the respondents (65.6%) were high school graduated. It is expected as Indonesian government make High School mandatory for its people. The findings also showed that 24.4% of the respondents were higher education graduated. Similar findings could also be found on demographic data of Padang city. Most of the people in Padang city had high school diploma and the number of people who had higher education diploma was quite

high. Table 1 also shows that most of the respondents (70%) had income of less than Rp 2,500,000,00. This result is expected as the poverty threshold of Padang city only Rp 698,720,00[20].

This study divided 90 housewives into two groups through randomized setting. The first group (45 housewives) served as control group, received balanced nutrition education using leaflet. The second group (45 housewives) served as intervention group, received nutrition education intervention using video regarding food label for four times. The knowledge level of the respondents for both control and intervention groups are presented in Table 2.

Table 2. Frequency distribution of housewives' knowledge level pre and post intervention in Padang City

Knowledge Level	Pre Intervention		Post Intervention	
	Control Group n (%)	Intervention Group n (%)	Control Group n (%)	Intervention Group n (%)
Low (<60)	3 (6.6)	2 (4.4)	2 (4.4)	0 (0.0)
Medium (60-80)	34 (75.6)	27 (60.0)	31 (68.9)	3 (6.7)
High (>80)	9 (20)	16 (35.6)	12 (26.7)	42 (93.3)
Mean±SD	78.0±13.2	80.9±12.8	80.0±10.9	96.4±6.1
p-value*	0.295		<0.001	

*Independent T-test

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e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
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Table 2 shows that most of the respondents had medium level of nutrition knowledge especially on food label both in control (75.6%) and intervention group (60%) before intervention. Only few of the respondents (6.6% and 4.4%) had low nutrition knowledge. This may relate to the education level of the respondents. The higher the formal education level, the higher the nutritional knowledge. Table 1 shows that most of the respondents had high education level. People with higher education usually had more experience in obtaining information which led to higher exposure of information, hence the higher knowledge level[21].

The mean score of both groups were 7.80±1.32 and 8.09±1.28 respectively before intervention. The intervention group had slightly higher mean score of nutrition knowledge compared to control group but in general both scores were not significantly different (p-value=0.295). It indicates that the base knowledge of both groups was practically similar. Most of the respondents in both groups did not understand that picture was part of food label. They also did not think that sugar and serving size were mandatory information on food label. Most of the respondents also thought that

ingredients were not mandatory to be included on food label.

Table 2 also shows that most of the respondents (68.9%) in control group still had medium level of nutrition knowledge while majority of the respondents (93.3%) in intervention group had high level of nutrition knowledge post intervention. There were also no respondents with low level of knowledge in intervention group post intervention. It indicates that the respondents in this group tended to improve their score in knowledge. The results could be seen on the mean score of both groups. The mean score post intervention in both groups were 8.00±1.09 and 9.64±0.6, which shown a significant different (p-value<0.001), with intervention group was found to have higher mean score. This result was supported with previous studies that showed significant different on mean score of control and intervention group, with intervention group tended to higher. The intervention process exposed and delivered new information on the respondents. It changed from the unknown to be known regarding certain information, resulted in the increased of knowledge level[21,22].

Table 3. Frequency distribution of the improved knowledge attribute's dissection of housewives in Padang City

Attribute	% Respondents Answering Correctly on Both Groups		
	Pre Intervention	Post Intervention	Δ Post Intervention
A food label is any description of food, whether in writing, picture, or symbol.	96.7	96.7	0.0
The benefit of a food label is to provide consumers with accurate and complete information about the contents, quality, and other aspects of packaged food products.	100.0	100.0	0.0
Pictures on the product packaging are considered part of the food label.	52.2	77.8	25.6
Expiration date is mandatory information to include on a food label.	91.1	96.7	5.6
The list of product ingredients is required to be included on a food label.	63.3	76.7	13.3
The Reference Daily Intake for general products is 2,150 kcal.	84.4	93.3	8.9
The statement "high in calcium" is an example of a nutrition claim.	87.8	93.3	5.6
Nutrition facts information is one of the components of a food label.	83.3	93.3	10.0
Sugar is one of the items that can be found in the nutrition facts section.	76.7	81.1	4.4
Serving size needs to be considered when reading nutrition facts information.	58.9	67.8	8.9

Table 3 shows the changes on knowledge attribute of the respondents. During baseline, we found that the respondents had lowest knowledge on "Pictures on the product packaging are considered part of the food label", "Serving size needs to be considered when reading nutrition facts information", and "The list of product ingredients is required to be included on a food label" as only 52.2%, 58.9%, and 63.3% of the respondents

answered correctly. Post intervention, we found a that all attribute had increased in general. For the lowest attribute during pre intervention such as "Pictures on the product packaging are considered part of the food label", there was a significant increased by 25% post intervention. This attribute had the high set increase among other attributes.

Table 4. Frequency distribution of housewives' attitude level pre and post intervention in Padang City

Attitude Level	Pre Intervention		Post Intervention	
	Control Group n (%)	Intervention Group n (%)	Control Group n (%)	Intervention Group n (%)
Negative (<60)	7 (15.5)	3 (6.7)	6 (13.4)	1 (2.2)
Neutral (60-80)	22 (48.8)	25 (55.6)	20 (44.4)	11 (24.4)
Positive (>80)	17 (37.7)	17 (37.7)	19 (42.2)	33 (73.4)

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e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
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Attitude Level	Pre Intervention		Post Intervention	
	Control Group n (%)	Intervention Group n (%)	Control Group n (%)	Intervention Group n (%)
Mean±SD	76.4±16.9	78.2±11.5	78.0±16.8	89.2±13.1
p-value*	0.542		0.001	

*Independent T-test

Table 4 showed that most of the respondents had neutral attitude regarding food label both in control (48.8%) and intervention group (55.6%) before intervention. Only few of them had negative attitude regarding food label (15.5% and 6.7%). Most of the respondents still thought that food label was not important. It was also not mandatory to be included on the food packaging according to them. Furthermore, they stated that nutrition facts were not important, so they never read the nutrition fact on the packaging as they thought that the information provided was not always true.

Table 4 presents the mean pre-intervention attitude scores, with the control group scoring 76.4±16.9 and the intervention group scoring 78.2±11.5. Although the intervention group demonstrated a slightly higher mean score, similar to the pattern observed in knowledge score, the difference between the two groups was not statistically significant (p-value=0.542). This indicates that both groups had comparable baseline attitudes towards food labels prior to the intervention, suggesting a relatively equal starting point for evaluating the effects of the intervention.

However, the post-intervention results revealed a significant difference in attitude scores between the two groups (p-value<0.001). The control group showed minimal change, with 44.4% of participants maintaining a neutral attitude towards food labels. In contrast, the intervention group exhibited a marked improvement. It showed a greater proportion of participants (73.4%) demonstrating a more positive attitude. The respondents in the intervention group showed improvement in their attitude regarding the importance of food label and nutrition facts. They also inclined to believe that the information on food label were always true. This shift suggests that the educational intervention was effective in enhancing participants' awareness and perception of food labels. The improvement in attitude is likely linked to the concurrent increase in knowledge. The better understanding of food label may influence individuals' recognition of their importance. Subsequently, fostering more positive behavioral intentions. These findings are consistent with previous studies showing that knowledge-based interventions can positively impact attitudes toward health-related behaviors[22,23].

Table 5. Frequency distribution of the improved attitude attribute's dissection of housewives in Padang City

Attribute	Sum of Respondents Scores on Both Groups		
	Pre Intervention	Post Intervention	Δ Post Intervention
Food labels have important benefits.	376	397	21
Food labels must be included on food packaging.	369	389	20
Reading nutrition facts information is important.	377	397	20
The nutrition facts information listed on food packaging should be accurate and reliable.	322	357	35
Nutrition claims have useful benefits for consumers.	293	344	51
The claims stated on food packaging should be truthful and based on evidence.	367	389	22
The serving size listed on each package should be accurate and trustworthy.	383	394	11
The serving size information helps consumers understand the amount of food they consume.	380	394	14
Expiration date information is important to ensure food safety.	318	360	42
The reference standard for nutrition facts should be included on the packaging.	293	341	48

Table 5 shows the changes on attitude attribute of the respondents. In the beginning, we found that the respondents had lowest attitude on the benefits of nutrition claims and reference standard stated in nutrition facts. Post intervention, as the awareness increased, we found that more respondents had more positive attitude towards the benefits of nutrition claims and reference standard used in nutrition facts with the increased scores of 48 and 51 points respectively. An increased of 42 points was also found on the importance of expiration date attitude.

Table 6. Distribution of intervention effectiveness among housewives in Padang City

Variables	Control Group	Intervention Group
Knowledge		
Δ Post Intervention	2	15.5
p-value Pre-Post Intervention**	0.160	<0.001

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Variables	Control Group	Intervention Group
N-gain Score (%)	0.0	81.2
Attitude		
Δ Post Intervention	1.6	11
p-value Pre-Post Intervention**	0.160	<0.001
N-gain Score (%)	6.7	50.4

*Paired T-test

The main objective of the present study was to evaluate the effectiveness of the intervention which using animated video in improving the knowledge and understanding of food label especially on housewives. To establish the effectiveness of the intervention, the present study applied delta score statistics. This study also employed Paired T-test analysis to identify the differences between pre- and post-intervention measurements in both intervention and control groups.

From Table 6, the intervention group showed a substantive increase in knowledge scores with a mean of 15.5 points. This difference was significant statistically (p-value<0.001), indicating a substantial effect of the animated video-based nutrition education on participants' knowledge regarding food labels. For the control group, the increase was a mere 2 points that was not statistically significant (p-value=0.160). It suggests that without specific intervention, there was not much improvement in respondents' knowledge.

The same pattern was identified in respondents' attitude toward food label. The intervention group showed a notable improvement in attitudes according to scores. It showed an average increase of 11 points post-intervention, which showed a significant statistic difference (p-value<0.001). This proves a notable shift toward positive attitude toward food labeling following education exposure. Conversely, the control group experienced a 1.6-points gain in attitude scores. This value was not statistically significant (p-value=0.160). Overall, these results demonstrate that the intervention functioned not just to enhance knowledge but also to positively influence participants' attitudes, with no change recorded for those who received no intervention.

These findings are consistent with previous studies that reported significant differences in mean scores between control and intervention groups, with the intervention groups typically demonstrating higher post-intervention scores. Such outcomes reinforce the effectiveness of educational interventions in influencing knowledge and attitudes, particularly when the content is relevant and directly applicable to the participants' daily lives[14,15,24]. During education intervention, evidence based information were delivered which resulted in knowledge transfer. Later on, it led to understanding acquisition of the respondents showed in the improvement of knowledge score. Better understanding increased better awareness which resulted in shifting beliefs and values[25].

The improvement observed in the intervention group can be attributed to the exposure to new and relevant information during the educational sessions. The intervention process effectively transformed previously unknown or misunderstood concepts into accessible knowledge for the participants. This transition from a state of limited awareness to informed understanding contributed significantly to the increased knowledge levels. As knowledge forms the foundation for shaping attitudes and behaviors, this enhancement likely played a key role in fostering the more positive attitudes observed in the intervention group post-intervention[14,15,24].

Our study also analyzed the effectiveness of the media used during intervention. Our study used an animated video as the media of our intervention. We employed N-gain score calculation regarding this matter. Table 4 shows, that the N-gain score for knowledge was 81.2%. This implicates that the media used during intervention was effective in improving respondents' knowledge. This finding also highlights the importance of education and its media in improving knowledge effectively. Without intervention or any media used, there would be 0% N-gain score as shown by control group. These findings supported previous studies that showed animated video as an effective media in improving respondents' knowledge towards better and healthier behavior. Previous studies showed a range of 70 to >80% of N-gain scores[26,27].

Similar pattern was also seen on Table 4 regarding respondents' attitude. Education and interactive media were better in improving respondents' attitude toward more positive one compared to no education. But the media used in this study, the animated video, apparently only gave a N-gain score of 50.1% or less effective compared to its effect on knowledge. Previous study also showed similar finding. Although the video was effective in improving the knowledge, it was not effective in improving the attitude as the N-gain score showed a value of 40%. There are many factors that influence the effectiveness of the media. Not only the media itself but also the duration of the intervention. The present study only employed 4 weeks long intervention. The duration of the intervention had significant correlation in improving the effectiveness of an education media. We suggest in employing longer duration to have a better effectiveness[26].

The present study uses family in this case housewives as the setting for the intervention. This setting, especially on the topic of food label, was rarely used. The previous studies usually use university students as the main target for their intervention. In Indonesian culture, housewives usually serve as primary food decision-makers. It is important for housewives to have good knowledge and attitude regarding food or in this case food label, to be able to choose a healthier food for their family. Housewives usually also serve as primary educator in Indonesian culture. By improving their knowledge, they will be able to transmit the new knowledge to another family member[16,17].

In this study, we found also some limitations. Our study was limited in analyzing the intervention using

Amerta Nutrition

e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
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animated video on the respondents' knowledge and attitude only. We did not observe the practices regarding food label on our respondents due to our limited resources and time frame during intervention. We suggest a longer duration to be able to observe the impact on the practices regarding food label.

Regardless, our findings recommended that the government implement targeted nutrition education programs to improve public understanding and use of food labels. Despite respondents' relatively high education levels, many lacked essential knowledge and held neutral or negative attitudes toward key aspects of food labeling, such as sugar content and serving size. The significant improvement observed after the intervention highlights the effectiveness of structured educational efforts. Therefore, nutrition education should be integrated into school curricula, community health programs, and public media campaigns. Additionally, food labeling regulations should be revised to ensure clearer, more consumer-friendly formats. Collaborative efforts between health authorities, educators, and the food industry are essential to promote informed food choices and support the prevention of diet-related diseases.

CONCLUSIONS

The findings of this study indicate that both the control and intervention groups had comparable baseline levels of nutrition knowledge and attitudes towards food labels prior to the intervention. Following the educational intervention, there was a significant improvement in both knowledge scores and proportion of respondents with a high level of nutrition knowledge. Similarly, attitudes toward food labeling shifted positively, with more participants recognizing the importance of nutrition information. These outcomes suggest that targeted educational interventions using video can effectively enhance both understanding and perception of food labels. Our findings also highlight the importance of nutrition education program for community to improve their knowledge and attitude regarding nutrition and health. It may also serve as an effective strategy to tackle nutritional problems.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST AND FUNDING DISCLOSURE

AUTHOR CONTRIBUTIONS

RKD: conceptor, data curation, funding acquisition, methodology, writing original draft, writing review & editing, supervision; RM: project administration, supervision, validation, data analysis; MAS: project administration, data analysis.

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e-ISSN: 2580-1163 (Online)
p-ISSN: 2580-9776 (Print)
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