
RESEARCH ARTICLE

The Effect of Nutrition Education through the Web-Based "Actzi" Application on the Level of Knowledge, Attitudes of Mothers, and Nutritional Status of Toddlers Aged 24-59 Months in Pasuruan District

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ABSTRACT

This study aims to analyze the effect of nutrition education through the website-based "Actzi" application on mothers' knowledge level in Pasuruan Regency, analyze the effect of nutrition education through the website-based "Actzi" application on mothers' attitudes in Pasuruan Regency, and analyze the effect of nutrition education through the website-based "Actzi" application on the nutritional status of toddlers aged 24-59 months in Pasuruan Regency. This study used a combined survey, namely in person and online. The study population was mothers of children under 24-59 months in Pasuruan District. The sample in this study was based on two criteria, inclusion and exclusion. Data collection instruments used the web-based "Actzi" application tool and questionnaires. The study's results using the Mann-Whitney test showed that the average knowledge of mothers in the case data group was 22.33 more than the average knowledge of mothers in the control data group, 19.80. At the same time, the average maternal attitude in the case data group is 31.73 more than the average maternal knowledge in the control data group, 31.20. The conclusion is that there is a significant difference in the level of maternal knowledge and maternal attitudes in the control and case group data. Furthermore, there is no significant relationship between the nutritional statuses of toddlers with data groups of control or case respondents.

KEYWORDS

Nutrition education, mother's knowledge and attitude

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1. Introduction

The policy direction of the 2020-2024 National Medium Term Development Plan (RPJMN) in the health sector is to improve health towards broad health coverage, especially in essential health services. One of the strategies in the 2020-2024 RPJMN includes the main target of accelerating the improvement of community nutrition, namely reducing the incidence of nutritional problems in toddlers. Improving nutrition in early childhood is very important to create quality human resources (Ministry of Health, 2017).

In Indonesia, there are still nutritional problems for children under five that nutrition improvement programs must solve. Based on the 2018 Risesdas, undernutrition was 17.7%, while the Study on the Nutritional Status of Toddlers in 2019 showed that malnutrition in children under five in Indonesia was 16.29%. This situation indicates the unfulfilled nutritional status of children under five.

The problem of malnutrition in children under five is still found in all provinces in Indonesia, including in East Java. According to data from the Nutrition Status Monitoring (PSG) of East Java Province in 2017, malnutrition is still 15.5%, and it is one of the

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provinces in Indonesia that has a relatively high prevalence of malnutrition in children under five. Of the many cities and regencies in East Java that have malnutrition problems in toddlers, Pasuruan Regency is one of the areas with a high prevalence of undernutrition, which was 15.4% in 2020. This figure has increased from 2019, which was 12.9%. The problem of malnutrition in children under five in Pasuruan Regency is thought to be due to multifactorial causes, including mothers' knowledge and attitudes, which will directly affect the nutritional status of children under five.

Based on the Ministry of Health (2003), nutritional status is a physical condition caused by eating or successfully fulfilling nutritional intake and various biological functions needed by the human body (such as body growth, development, activity or productivity, health maintenance, and others). From the factors that cause nutritional problems in children under five, it can be seen that nutritional status plays an important role (UNICEF, 1998).

Toddlers are one of the groups with fragile nutrition, meaning children under five are the most vulnerable to malnutrition. Nutritional problems in toddlers can cause a decrease in nutritional status, so serious interventions are needed to overcome them. Mothers' ignorance can lead to wrong food choices, especially for toddlers. The quality and quantity of nutrients are not enough to meet the needs of the toddler's body (Alamsyah et al., 2017).

Nutrition education is a method that can be used to increase knowledge and lead to good behavior change. Moreover, mothers' limited knowledge about food choices, feeding, and healthcare practices contribute significantly to the outcomes of improving nutritional status for children in most developing countries (Fadare, 2019).

The rapid development of the telecommunications industry allows internet technology for nutrition education. Based on data from the Indonesian Internet User Association (APJII), the number of internet users in Indonesia in 2018 was 171.17 million people, or 64.8% of the total population, and they were application users. There is increasing interest in the use and access of digital health service applications, especially the policy direction of the Ministry of Health's 2020-2024 RPJMN to support innovation and the use of technology for essential health services.

A preliminary survey conducted online to 10 mothers of children under five showed that as many as 50% of mothers under five had poor knowledge. As many as 30% of mothers of children under five had wrong attitudes regarding nutrition. Based on the results of the preliminary survey, it can also be seen that as many as 20% of mothers under five have never received health education about nutrition, besides the results of the preliminary survey show that 40% of mothers have accessed information about nutrition for toddlers on the internet. As many as 40% of mothers have accessed information about nutrition for toddlers through the website.

In connection with this, it is necessary to develop an application that can be accessed quickly and practically so that mothers of toddlers can monitor the development of children's nutrition optimally. This research focuses on developing a website-based application called ACTZI (Smart Application for Nourished Toddlers), which has the main feature of being able to provide nutrition education. The website-based application was chosen considering mothers with toddlers in Pasuruan Regency, as many as 62% aged 20-35 years, where this age is also the most significant internet accessor (BPS Kabupaten Pasuruan, 2020). In addition, the process of making website-based applications is faster and cheaper, and access for users will be easier because it does not require large memory for storage.

Based on the background of the problem, the authors are interested in conducting a study entitled The Effect of Nutrition Education through the Website-Based "Actzi" Application on Knowledge Levels, Mothers' Attitudes, and Nutritional Status of Toddlers Age 24-59 Months which was conducted in Pasuruan Regency. Research related to this problem has never been done in Pasuruan Regency.

2. Method

This research is a quasi-experimental research with pre-test and post-test control group design. This study uses a combined survey, namely in person and online. In this study, there were two groups: the intervention group and the control group. The research population is mothers with children under five aged 24-59 months in Pasuruan Regency.

The sample in this study was based on two criteria, inclusion and exclusion. The inclusion criteria consisted of mothers aged 20-45 years and having toddlers aged 24-59 months with poor nutritional status, mothers with formal education up to tertiary education ranging from elementary, junior high, high school, and D3/D4/S1 graduates, mothers who have an Android *smartphone* with a minimum operating system of Android 2.3 Gingerbread or an IOS operating system that can access websites and toddlers who do not experience infectious disease problems. Meanwhile, the exclusion criteria comprised illiterate mothers, mothers who graduated from nutrition education, and children under five who received special care due to illness.

Sampling was determined by random sampling, namely random sampling of samples that met the inclusion criteria. The sampling method needs to be considered so that the sample taken represents the population so that researchers can generalize the study results (Dahlan, 2010).

Based on the calculations, the samples in the control and treatment groups each amounted to 42.2 and rounded up to 43 people. The respondents were taken from 3 sub-districts by random sampling from 24 sub-districts in Pasuruan Regency, and in this study, 10% of the total sub-districts were taken. The population of the three sub-districts will be drawn through the random.org website so that 43 respondents are obtained for each control and treatment group.

Data collection was carried out by researchers assisted by Integrated Healthcare Center cadres and nutritionists at local health centres consisting of primary and secondary data. Meanwhile, the data collection instrument used a website-based "Actzi" application tool and a questionnaire.

The data collected is then examined for completeness. The data can be completed immediately if it is incomplete. The respondent's answers are then classified by giving a code and processed using SPSS. Univariate analysis was used to analyze the mean, standard deviation, minimum value, maximum value, and frequency distribution. Proportion (%) is used to analyze nominal and ordinal scale data. The average value is used to analyze data on an interval scale. In addition, a covariance analysis will be carried out, a statistical measurement that combines the average difference test and regression (Gio & Rosmaini, 2016). Covariance analysis was carried out to minimize unwanted external variables in the study.

3. Results and Discussion

3.1 Descriptive Statistical Analysis

Descriptive statistical analysis is a statistic used in analyzing data by describing or describing the data that has been collected. The following are descriptive statistical results which can be seen in the table below.

Table 1. Descriptives

		N	mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max
						Lower Bound	Upper Bound		
Mother's Knowledge	Control	45	19.80	2.427	.362	19.07	20.53	9	25
	Case	45	22.33	2,663	.397	21.53	23.13	12	28
	Total	90	21.07	2.836	.299	20.47	21.66	9	28
Mother's Attitude	Control	45	31.20	2.841	.424	30.35	32.05	23	42
	Case	45	31.73	2.157	.322	31.09	32.38	21	37
	Total	90	31.47	2,523	.266	30.94	32.00	21	42

Based on the table data above, it can be seen that of the 45 respondents (N) who were used as the control sample for the study, the Mother's Knowledge variable had an average value of 19.80 with a standard deviation of 2.427 and the Mother's Attitude variable had an average value of 31.20. with a standard deviation of 2.841. Meanwhile, of the 45 respondents (N) who were used as research case samples, the Mother's Knowledge variable had an average value of 22.33 with a standard deviation of 2.663, and the Mother's Attitude variable had an average value of 31.7 3 with a standard deviation of 2.157.

3.2 Validity test

The validity Test is a test to determine the accuracy of the research instrument according to its function.

a. Validity Test on Control Data Samples of Mother's Knowledge Variables

The following are the results of the validity test on the control data sample of the mother's knowledge variable, which can be seen in the table below.

Table 2. Validity Test Results of Mother's Knowledge Variables

Items	Correlation coefficient	Sig.	Note:
IMD	0.442	0.002	Valid
Breastfeeding	0.475	0.001	Valid
Breastfeeding is Important	0.678	0.000	Valid
Can babies aged 0-6 months be given other than breast milk?	0.351	0.018	Valid
At what age can you?	0.448	0.002	Valid
Washing hands	0.678	0.000	Valid
Best food for baby	0.678	0.000	Valid
Breastfeeding for the first time	0.324	0.030	Valid
Colostrum	0.329	0.027	Valid
Breastfeeding age	0.569	0.000	Valid
Type of food 0-6 months	0.515	0.000	Valid
Type of food 6-12 months	0.425	0.004	Valid
Breast milk can be replaced	0.414	0.005	Valid
MPASI age	0.476	0.001	Valid
MPASI doesn't run out	0.352	0.018	Valid

Based on the table above, it is known that of the 15 questionnaire items used as research instruments on the Mother's Knowledge variable as the control data sample, all of them have a Sig value less than 0.05, which ranges from 0.000 to 0.030 and the value of the correlation coefficient (r count) ranges from 0.324 to 0.678. This shows that the 15 questionnaire items given to the Mother's Knowledge variable as a sample of control data are valid.

b. Validity Test on Mother's Attitude Variables

The following are the results of the validity test on the mother's attitude variable, which can be seen in the table below.

Table 3. Results of the Validity Test of Mother's Attitude Variables

Items	Correlation coefficient	Sig.	Note:
Posyandu schedule	0.331	0.026	Valid
No need counseling	0.394	0.007	Valid
Health workers	0.758	0.000	Valid
Not immunized	0.326	0.029	Valid
PMT	0.758	0.000	Valid
Exclusive breastfeeding for 6 months	0.758	0.000	Valid
MPASI < 6 months	0.393	0.008	Valid
Diarrhea should stop breastfeeding	0.447	0.002	Valid
ORS is given	0.758	0.000	Valid
Washing hands	0.758	0.000	Valid
Formula milk is better	0.375	0.011	Valid
Mother's knowledge is important	0.758	0.000	Valid
I need to find information	0.758	0.000	Valid
The information on the internet is correct	0.405	0.006	Valid
No need counseling	0.368	0.013	Valid

Based on the table above, it is known that of the 15 questionnaire items used as research instruments on the Mother's Attitude variable as the control data sample, all of them have a Sig value less than 0.05, which ranges from 0.000 to 0.029 and the value of the correlation coefficient (r count) ranges from 0.326 to 0.758. This shows that the 15 questionnaire items given to the Mother's Attitude variable as the control data sample are valid.

3.3 Reliability Test

A reliability test is a term used to indicate the extent to which the measurement results are relatively consistent when the measurement is repeated two or more times.

a. Reliability Test on Control Data Samples of Mother's Knowledge Variables

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The following are the results of the reliability test on the control data sample of the mother's knowledge variable, which can be seen in the table below.

Table 4. Item-Total Statistics Variable Mother's Knowledge

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Correlation	Item-Total Cronbach's Alpha if Item Deleted
IMD	18.91	5.310	.328	.643
Breastfeeding	18.78	5.359	.386	.640
Breastfeeding is Important	18.82	5.422	.643	.636
Can babies aged 0-6 months be given other than breast milk?	19.71	5.483	.241	.653
At what age can you?	17.80	5.027	.252	.655
Washing hands	18.82	5.422	.643	.636
Best food for baby	17.82	5.422	.643	.636
Breastfeeding for the first time	18.69	5.492	.200	.657
Colostrum	19.00	5.409	.169	.663
Breastfeeding age	17.13	4.436	.320	.654
Type of food 0-6 months	18.76	5.234	.416	.634
Type of food 6-12 months	15.96	5.089	.226	.660
Breast milk can be replaced	19.67	5.318	.287	.647
MPASI age	17.89	5.101	.327	.640
MPASI doesn't run out	19.44	5.298	.161	.669

Based on the table above, the value of *Cronbach's Alpha if the item deleted* ranges from 0.634 to 0.669, which is greater than 0.6, then the items in the Mother's Knowledge variable as a sample of control data can be said to be reliable, and it can be concluded that the respondents' answers to the statement are consistent and can be trusted.

b. Reliability Test on Control Data Samples of Mother's Attitude Variables

Table 5. Item-Total Statistics Variable Mother's Attitude

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Correlation	Item-Total Cronbach's Alpha if Item Deleted
Posyandu schedule	28.91	4.219	.133	.758
No need counseling	30.58	4.113	.210	.746
Health workers	28.76	4.189	.727	.712
Not immunized	30.67	4.364	.216	.736

PMT	28.76	4.189	.727	.712
Exclusive breastfeeding for 6 months	28.76	4.189	.727	.712
MPASI < 6 months	30.51	4.119	.210	.746
Diarrhea should stop breastfeeding	30.44	3.980	.254	.743
ORS is given	28.78	3.768	.689	.690
Washing hands	28.76	4.189	.727	.712
Formula milk is better	30.53	4.164	.198	.746
Mother's knowledge is important	28.76	4.189	.727	.712
I need to find information	28.78	3.768	.689	.690
The information on the internet is correct	30.64	4.234	.285	.731
No need counseling	30.64	4.280	.245	.735

Based on the table above, the value of *Cronbach's Alpha, if the item deleted* ranges from 0.690 to 0.758, which is greater than 0.6 than the items in the Mother's Attitude variable as the control data sample, can be said to be reliable and it can be concluded that the respondents' answers to the statement are consistent and can be trusted.

3.4 Normality test

Normality testing was carried out on each group to be examined for differences. Normality testing was carried out using the Kolmogorov-Smirnov normality test by comparing the significance values of the two groups of data. If the Sig value > 0.05 in each data group, then the group data is normally distributed.

Table 6. Test of Normality

Data Group	Kolmogorov-Smirnov ^a			Shapiro-Wilk			
	Statistics	df	Sig.	Statistics	df	Sig.	
Mother's Attitude	Control	.261	45	.000	.823	45	.000
	Case	.256	45	.000	.721	45	.000
Mother's Knowledge	Control	.288	45	.000	.757	45	.000
	Case	.179	45	.001	.884	45	.000

Based on the normality test table above, it can be seen that in the *Kolmogorov-Smirnov test*, the Sig value is obtained for the two groups of learning media classes of 0.000, which is lower than 0.05 then the data of the two groups are said to be not normally distributed, then the difference test is carried out with non-parametric statistics, namely the Mann-Whitney test.

3.5 Mann Whitney test

The Mann-Whitney test is a non-parametric statistical test to test whether there is a significant difference between 2 independent or unpaired sample groups if they do not meet the normality requirements of the parametric statistical test.

a. Testing on Mother's Knowledge Level Variables

Hypothesis:

H0: There is no significant difference in the level of knowledge of mothers in the control group and case data

H1: There is a significant difference in the level of knowledge of mothers in the control group and case data

Decision Criteria with one-tailed:

1) If the value of Asymp. Sig. (2-tailed) **0.05, then H0 is accepted.**

2) If the value of Asymp. Sig. (2-tailed) > **0.05, then H1 is accepted.**

Table 7. Test Statistics ^a Mother's Knowledge

	Mother's Knowledge
Mann-Whitney U	354,500
Wilcoxon W	1389,500
Z	-5.397
asypm. Sig. (2-tailed)	.000

Based on the test output in the table above, the Asymp value is obtained. Sig. (2-tailed) $0.000 < 0.05$, then H0 is rejected, and H1 is accepted, meaning that there is a significant difference in the level of Mother's Knowledge in the control and case group data. This also explains that the average knowledge of mothers in the case data group is 22.33, which is more than the average knowledge of mothers in the control data group of 19.80.

b. Testing on Mother's Attitude Variables

Hypothesis:

H0: There is no significant difference in the mother's attitude in the control and case group data.

H1: There is a significant difference in the mother's attitude in the control and case group data.

Decision Criteria with one-tailed:

1) If the value of Asymp. Sig. (2-tailed) **0.05, then H0 is accepted.**

2) If the value of Asymp. Sig. (2-tailed) > **0.05, then H1 is accepted.**

Table 8. Test Statistics ^a Variable Mother's Attitude

	Mother's Attitude
Mann-Whitney U	736.000
Wilcoxon W	1771,000
Z	-2.325
asypm. Sig. (2-tailed)	.020

Based on the test output in the table above, the Asymp value is obtained. Sig. (2-tailed) $0.020 < 0.05$, then H0 is rejected, and H1 is accepted, meaning that there is a significant difference in Mother's Attitude in the control and case group data. This also explains that the average attitude of mothers in the case data group is 31.73 more than the average knowledge of mothers in the control data group of 31.20.

3.6 Chi-Square Test

Chi-Square is a non-parametric comparative test on two variables with nominal data scales.

3.6.1 Testing hypothesis:

H0: There is no significant relationship between the Nutritional Status of Toddlers and the Respondent Data Group.

H1: There is a significant relationship between the Nutritional Status of Toddlers and the Respondent Data Group

3.6.2 Decision Criteria:

a. If the Asymp value. Sig. (2-sided) > **0.05 then H0 is accepted.**

b. If the Asymp value. Sig. (2-sided) < **0.05 then H1 is accepted.**

Table 9. Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	4,161 ^a	2	.125
Likelihood Ratio	4.956	2	.084
Linear-by-Linear Association	.539	1	.463
N of Valid Cases	90		

Based on the *output table of Chi-Square tests* above, it can be seen that the *Asymp value. Sig. (2-sided)* on the *Pearson Chi-Square* (0.125) where it is greater than 0.05, then H₀ is accepted. It can be interpreted that there is no significant relationship between the Nutritional Status of Toddlers and the Control or Case Respondent Data Group.

4. Discussion

4.1 The Effect of Nutrition Education Through the Website-Based "Actzi" Application on Increasing Mother's Knowledge in Pasuruan Regency

One of the contributing factors to nutritional problems in toddlers is mothers' lack of knowledge about the nutritional requirements that toddlers must meet during their growth period. Knowledge is a broad category of symptoms people experience and learn through sensory observation. When a person uses his senses or reason to recognize certain things they have never seen or felt before, that is when knowledge is created.

The level of public health is strongly influenced by knowledge about nutrition. A lack of nutritional awareness can lead to various health and nutritional problems (Almatsier et al., 2011). Knowledge about healthy living behavior can be influenced by health education. When this knowledge is generated from information input, it will be processed to create knowledge that will be reacted to through attitudes (Notoatmodjo, 2012).

The results of this study indicate that based on the *output* of the Mann-Whitney test, the *Asymp value* is obtained. *Sig. (2-tailed)* $0.000 < 0.05$, then H₀ is rejected, and H₁ is accepted, meaning there is a significant difference in the level of Mother's knowledge level in the control and case group data. This also explains that the average knowledge of mothers in the case data group is 22.33, which is more than the average knowledge of mothers in the control data group of 19.80.

4.2 The Effect of Nutrition Education Through the Website-Based "Actzi" Application on Improving Mothers' Attitudes in Pasuruan Regency

Individuals in the household who are most at risk for malnutrition are children under the age of five. The amount and type of food consumed significantly affect the health of toddlers. Children usually eat minor portions because they eat more slowly and less frequently than the rest of the family, which does not meet the nutritional needs of the developing child. The impact of malnutrition on toddlers will decrease children's intelligence, productivity, and creativity, affecting the lack of human resources. One of the things that affect the occurrence of malnutrition is the mother's mindset.

Nowadays, people more often access many things through their smartphones. The use of smartphones to facilitate all types of activities is essential so that it can be used as a medium to get an education. Based on this, the government's educational efforts to suppress nutritional status problems in toddlers is nutrition education through the website-based Actzi application. The use of web-based applications is one form of technological advance at this time that allows a person to maximize its function and make it easier to provide information to its users.

The results of this study indicate that based on the output of the Mann-Whitney test, the *Asymp value* is obtained. *Sig. (2-tailed)* $0.020 < 0.05$, then H₀ is rejected, and H₁ is accepted, meaning that there is a significant difference in Mother's Attitude in the control and case group data. This also explains that the average attitude of mothers in the case data group is 31.73 more than the average mothers' knowledge in the control data group, 31.20.

4.3 The Effect of Nutrition Education Through the Website-Based "Actzi" Application on Ages 24-59 Months in Pasuruan Regency

Socio-economic elements and sociocultural background factors related to diet and nutrition affect the nutritional habits of toddlers. Inadequate nutrition in children during the first five years of life causes permanent problems with the child's ability to grow and develop physically, mentally, and cognitively. Nutritional status is a benchmark for nutritional fulfillment.

Mothers cannot raise their children properly, and children can be at risk of nutritional problems if they do not understand nutrition. The problem of under-five nutrition is also strongly correlated with the mother's education level. Mothers have an essential role in child development, especially in feeding. To improve the nutritional status of children under five, the role of mothers in this regard is significant. For that, mothers must understand and recognize the nutritional needs of their children. Knowledge is an essential factor in determining the direction of one's actions.

Technological developments have influenced the way of life, one of which is nutrition education activities. Thus, nutrition education through the website-based Actzi application can be interpreted as a learning strategy that utilizes electronic devices as a tool or support in its implementation. However, the implementation is also not as smooth as planned because there are several obstacles, such as not having a gadget, a network that is not supportive, or even the educational material itself not being appropriately packaged so that it is not appropriately conveyed to mothers. Therefore, media is needed, which can be a solution for packaging less attractive material.

The results of this study indicate that based on the *output of Chi-Square tests*, it can be seen that the *Asymp value. Sig. (2-sided)* on the *Pearson Chi-Square* (0.125) where it is more significant than 0.05, then H_0 is accepted. It can be interpreted that there is no significant relationship between the Nutritional Status of Toddlers and the Control or Case Respondent Data Group.

5. Conclusion

Based on the results of data analysis and discussion, it can be concluded that:

1. There is a significant difference in the mother's level of knowledge in the control and case group data.
2. There are significant differences in maternal attitudes in the control and case group data.
3. There is no significant relationship between the nutritional status of children under five and the data group of control or case respondents.

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