

Short Communication

Effectiveness of ERKADUTA model to increase stunting prevention behaviors among mothers with toddlers in Indonesia: A quasi-experiment

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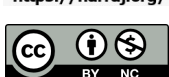
Abstract

Stunting, a persistent nutritional issue arising from prolonged inadequate nutrient intake, poses substantial risks such as heightened morbidity, mortality, and compromised cognitive, psychomotor, and verbal development. In Indonesia, addressing stunting in children under two necessitates urgent community empowerment, given its multifaceted nature. The aim of this study was to assess the effects of an intervention targeting mothers of toddlers, called *RT kawal baduta* (ERKADUTA) model, a local community-based assistance for babies under two years old. A quasi-experiment using pre-test and post-test with a control group design was conducted. Employing a quantitative analytic approach with 112 respondents, the effectiveness of ERKADUTA model to improve the knowledge, attitude, and practice of stunting prevention among mothers with child under two years old was assessed. ERKADUTA program was run for three months. The Wilcoxon test was used to determine score changes before and after program in both groups, while the Mann-Whitney test was used to analyze the score differences of knowledge, attitude and practice between intervention and control groups. Our data indicated that there were changes in knowledge, attitudes, and practices in preventing stunting in both the intervention and control groups. There are significant differences in knowledge ($p < 0.001$, effect size = -0.855), attitude ($p < 0.001$, effect size = -0.864), and practice score ($p < 0.001$, effect size = -0.924) between the intervention and control groups after the intervention. This study highlights that the ERKADUTA model emerged as a potent catalyst in improving stunting prevention behaviors among mothers with toddlers and this model holds promise for addressing the complexities of stunting in Indonesia.

Keywords: Stunting, community-based model, stunting risk factor, behavior, stunting prevention

Introduction

Stunting is a critical public health issue affecting millions of children worldwide [1,2]. Stunting is defined as the impaired growth and development that children experience as a result of poor nutrition, frequent infections, and inadequate psychosocial stimulation [3,4]. Globally, 149 million children under the age of five were stunted in 2020, indicating that approximately one in every four children under five years old was affected by stunting [4]. Stunting prevalence varies significantly across regions. Sub-Saharan Africa and South Asia are the regions with the highest burden of stunting [5].



In 2021, Indonesia's stunting prevalence stood at about 27% for children under five years old [6]. Stunting rates are higher in rural areas compared to urban regions, and certain provinces within the country have higher stunting rates than the national average [6]. There are two districts that have been designated nationally as 100 priority stunting areas, West Bangka and Bangka, in the Kepulauan Bangka Belitung province. In West Bangka, the incidence of stunting in 2018 was 33.27%; in 2019, it rose to 50.00% and in 2020 it reached 50.75% [7].

Several factors contribute to the high rates of infant stunting, including inadequate nutrition, lack of access to sufficient and nutritious food, infections and diseases, poor sanitation and hygiene practices, limited access to quality healthcare, and socioeconomic disparities [8-11]. Additionally, lack of exclusive breastfeeding, mother's attitude towards the early introduction of complementary foods, knowledge about good nutrition, and inappropriate feeding practices also play a role in stunting [12,13]

Stunting is a concerning issue because it can have long-term effects on a child's physical and cognitive development. It is crucial to address this problem early on to prevent any lasting impact on the child's health and well-being [14,15]. Early detection of stunting plays a pivotal role in implementing timely interventions and reducing its long-term impact on child health [16].

Stunting prevention is multifaceted and requires a comprehensive approach that addresses the underlying determinants of malnutrition. Addressing stunting requires a multi-sectoral approach, including improving maternal nutrition, promoting exclusive breastfeeding, enhancing access to nutritious foods, and implementing effective health and nutrition programs [17-19]. The Indonesian government has implemented various programs and initiatives to tackle infant stunting. These efforts include nutrition education and counseling for mothers and caregivers, the promotion of exclusive breastfeeding, improved access to nutritious foods, and community-based interventions to enhance health and sanitation practices [18].

Community-based participation has an important impact on the prevention and early detection of stunting, but its implementation has not been maximized in the community. Therefore, in supporting the government's efforts in carrying out prevention, community-based participation was implemented named as *RT kawal baduta* (ERKADUTA) model or community-based assistance for babies under two years old. In this model, mentoring was given to cadres and mothers who have children under two years old in order to be able to monitor the growth and development of the babies and therefore prevent stunting at the neighborhood level. The aim of this study was to assess the effectiveness of ERKADUTA model on the knowledge, attitude, and practice of mothers in stunting prevention with children under two years of age.

Methods

Study design and setting

A quasi-experiment using pre-test and post-test with control group design was conducted from June to August 2022 in Kepulauan Bangka Belitung province in West Bangka and Bangka districts, Indonesia. The parents were grouped into two groups: the intervention group and the control group. The intervention was carried out in Kundi village and Simpang Tiga village, while the control group was located at Berang village and Pangek village. In the intervention group, booklets and guidebooks were provided to mothers with babies under two years old by first explaining how to study the booklet and guidebook. Then, cadres monitored the mother's house every week for three months. The control group was provided with a booklet without any monitoring from cadres. The flowchart of the study is presented in **Figure 1**. In the initial stage, the characteristics of the intervention and control group were measured and the mothers' knowledge regarding stunting prevention was measured.

Respondents and criteria

The population in this study were 330 mothers who had children under the age of two years in four villages, consisting of Kundi with 84 mothers, Simpang Tiga with 102 mothers, Berang with 73 mothers and Pangek with 71 mothers. Based on Lameshow's sample calculation, the number of samples required was 112 respondents from 330 mothers. The sample was selected based on a purposive sample with 56 respondents as the intervention group and 56 respondents as the

control group. The respondents' inclusion criteria were mothers who had children under two years of age, were willing to monitor their children's growth and development independently and were also willing to be visited by cadres at home. The exclusion criteria are mothers whose children have congenital diseases or other diseases that interfere with growth and development.

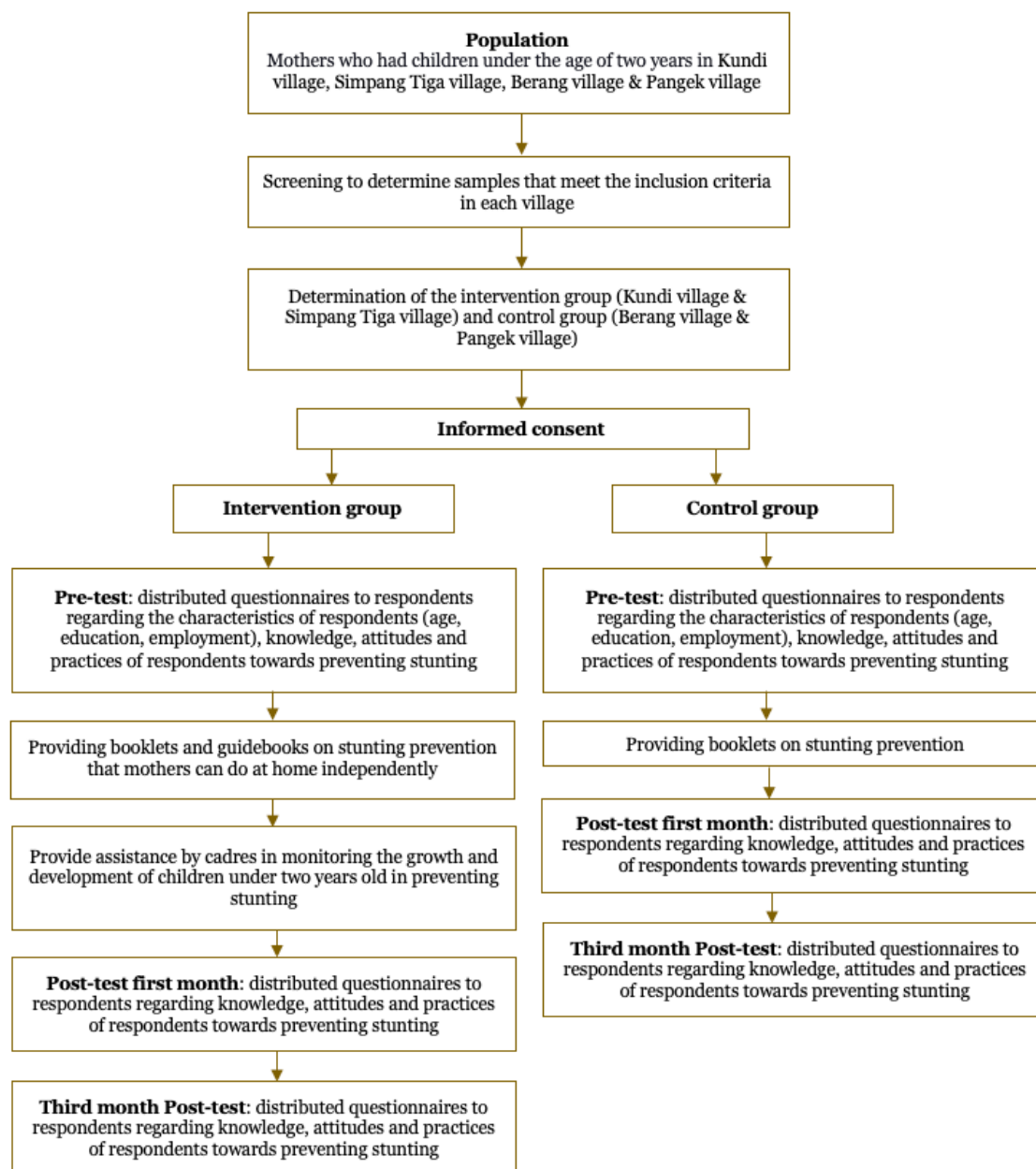


Figure 1. A flowchart of the study describes study major steps in intervention and control groups.

ERKADUTA intervention

Each child under two was examined at the ERKADUTA post to determine the child height and weight. In the intervention group, mothers were provided with a booklet consisting of information on stunting and its prevention strategies. They were also provided with a guidebook on malnutrition, prevention of stunting, correct anthropometric examination and its function, how to calculate BMI and its categories, how to read the Health Card or *Kartu Menuju Sehat* (KMS) and nutrition for children. Therefore, the mothers were able to monitor the children growth and development independently at home. Guidebook books were also provided to cadres who have received previous training; therefore, the cadres could help monitor children's growth and development intensively. Every week cadres visited the mother's house to monitor the child's growth and development.

In the control group, the mothers were provided with a booklet only containing. No monitoring was conducted by cadres. Assessments were conducted every month by cadres and health center at ERKADUTA post only.

Study variables and study instrument

There were three outcomes measured in this study: (1) knowledge about stunting; (2) attitude towards stunting prevention; and (3) behavior on stunting prevention of mothers who have children under the age of two years. In this study, the questionnaire was used to measure knowledge about stunting, attitudes towards stunting prevention, and behavior. The questionnaire was developed, and the validity and reliability tests were conducted in Simpang Gong village, Bangka Belitung Province, Indonesia. This village was chosen because it has almost the same characteristics and social culture as the respondents located in the study sites. Validity and Cronbach alpha tests were conducted by taking valid and reliable statements with a value of more than 0.6. The knowledge, attitudes and behavior domains were declared valid and reliable with Cronbach alpha values of 0.676, 0.783, and 0.944.

Data analysis

The Levene's test was used to check the homogeneity of the intervention group and the control group with a $p > 0.05$. After analyzing the normality, it was found that the scores of knowledge, attitude and practice domains were not normally distributed. The Wilcoxon test was used to determine score changes before and after treatment in both the control and intervention groups. The Mann-Whitney test was carried out to analyze the differences between the control group and the intervention group. Effect size was measured to determine the effect of providing the intervention to the control group, and Cohen's d was used to classify effect sizes. Cohen classified effect sizes into small ($d = 0.2$), medium ($d = 0.5$), and large ($d \geq 0.8$)

Results

Respondents' characteristics

The characteristics of the respondents included in the study are presented in **Table 1**. Based on the characteristics of respondents in the two groups, educational and occupational characteristics did not have significant differences (**Table 1**). However, age was not homogeneous between groups with $p = 0.033$ (**Table 1**).

Table 1. Frequency distribution of respondent characteristics from both intervention and control groups

Variables	Group				p-value	
	Intervention		Control			
	Frequency	%	Frequency	%		
Age (year)	17–25	16	28.6	28	50.0	0.033*
	26–35	35	62.5	23	41.1	
Education	36–45	5	8.9	5	8.9	0.650
	Illiterate	0	0.0	1	1.8	
	Elementary school	14	25.0	16	28.6	
	Junior high school	15	26.8	15	26.8	
	Senior high school	20	35.7	19	33.9	
Employment	Diploma	2	3.6	3	5.4	0.969
	University	5	8.9	2	3.6	
	Employment	3	5.4	2	3.6	
	Unemployment	53	94.6	54	96.4	

* Statistically significant at $p = 0.05$

Differences in knowledge, attitudes, and practices before and after intervention in the intervention group

The differences in knowledge, attitudes, and practice scores on stunting prevention in the intervention group are presented in **Table 2**. The mean of knowledge score increased from 27.63 to 33.77; the mean attitude scores increased from 47.82 to 67.09; and the mean score of practice

increased from 17.39 to 30. There were significant differences in knowledge, attitudes, and practice scores after and before the intervention, with all comparisons had $p < 0.001$.

Table 2. The changes of knowledge, attitude, and practice scores between before and after intervention among those within the intervention group

Domain	Pre-intervention	Post-intervention	p-value
	Mean score \pm SD	Mean score \pm SD	
Knowledge	27.63 \pm 1.982	33.77 \pm 2.063	<0.001*
Attitude	47.82 \pm 4.748	67.09 \pm 2.083	<0.001*
Practice	17.39 \pm 1.139	30 \pm 0.000	<0.001*

* Statistically significant at $p=0.001$

Differences in knowledge, attitudes, and practices before and after intervention in the control group

The differences in knowledge scores, attitudes and stunting prevention practices in the control group are presented in **Table 3**. The mean of knowledge scores changed from 26.61 to 26.70; the mean of attitude scores changed from 46.48 to 46.71; and the mean scores of practices changed from 17.52 to 22.04. The statistical analyses indicated that the mean of knowledge, attitude, and practice scores were significantly different between pre- and post-intervention in the control group with $p=0.025$, $p=0.006$, and $p < 0.001$, respectively (**Table 3**).

Table 3. Changes in knowledge, attitude, and practice scores between before and after intervention among those within the control group

Variables	Pre-intervention	Post-intervention	p-value
	Mean score \pm SD	Mean score \pm SD	
Knowledge	26.61 \pm 1.970	26.70 \pm 1.953	0.025*
Attitude	46.48 \pm 4.737	46.71 \pm 4.540	0.006*
Practice	17.52 \pm 1.206	22.04 \pm 2.009	<0.001**

* Statistically significant at $p=0.05$

** Statistically significant at $p=0.001$

Comparison of knowledge, attitude, and practice between intervention group and control group

The comparisons of knowledge, attitude, and practice scores between intervention and control groups are presented in **Table 4**. Knowledge, attitude, and practice scores in the intervention group had higher mean ranks and sum of ranks compared to the control group indicating that the mean scores of knowledge, attitude, and practice in the intervention group experienced more changes compared to the control group.

Cohen's d classification showed that knowledge had an effect size of -0.855, attitude -0.864, and practice -0.924, indicating that providing the ERKADUTA model had a big effect on knowledge, attitude, and practice scores.

Table 4. Comparison of knowledge, attitude and practice between the intervention group and control group post-intervention

Domain	Intervention		Control		Effect size	p-value
	Mean ranks	Sum of ranks	Mean ranks	Sum of ranks		
Knowledge	84.12	4710.5	28.88	1617.5	-0.855	<0.001*
Attitude	84.50	4732.0	28.50	1596.0	-0.864	<0.001*
Practice	84.50	4732.0	28.50	1596.0	-0.924	<0.001*

* Statistically significant at $p=0.001$

Discussion

The results of the analysis show that there are significant differences between knowledge, attitudes and practices between the intervention group and the control group. The Intervention Group is provided with assistance from cadres who have been trained in the ERKADUTA concept, so that these cadres provide intensive assistance to children under two years old mothers, which can increase knowledge, attitudes, and practices. In knowledge, there was an increase in all indicators of the knowledge variable. There was a significant increase in knowledge on the

importance of weighing clowns to prevent stunting. There was also a significant increase in attitude values for all indicators of the attitude variable in the intervention group. The highest improvement in the attitudes of children under two years old mothers was about the importance of the First 1000 Days of Life, the impact of stunting and implementing clean and Healthy Living Behavior. There was an increase in scores on all ERKADUTA practice indicators; the highest increase in practice was the use of microtois, infantometer, children under two years old body position, and correct measurement of head circumference.

There was a difference in mean scores for knowledge, attitude, and practice between the intervention and the control group. This indicated that the ERKADUTA model had a significant influence on the knowledge, attitude, and practice of mothers of children under two years old. Furthermore, the ERKADUTA model had the highest influence on practice.

The ERKADUTA model played a role in increasing the knowledge, attitude, and practices of mothers of children under two years old in stunting prevention. This model was designed to empower the public through group activities targeted towards preventing stunting in mothers of children under two years old, involving cadres. The model focused on providing group support at the RT level, which was expected to be more optimal in stunting prevention because it covered more areas and the target group research had been conducted using the model by accompanying mothers of children under two years old. During the intervention, mothers studied together with cadres who had received training and fulfilled the competence required to be cadres in the ERKADUTA model.

Efforts made through the ERKADUTA model were highly effective in reducing stunting. Moreover, hard work and effort must be conducted to reduce stunting, namely identifying the underlying factors, specifically during pregnancy and postnatally. This period is the most important time in the growth of a child and when not optimized, it can lead to growth disturbance, such as stunting [20,21]. The first two years of a child are crucial as optimal nutrition during this period lower morbidity and mortality rates, reduces the risk of chronic diseases, and promotes overall development [22]. Therefore, increased knowledge, attitude, and practice among mothers through ERKADUTA intervention can reduce the probability of mortality, risk of disease infection, as well as chronic diseases and optimize the development of children under two years old.

The enhancement of mothers' knowledge, attitude, and practice towards stunting prevention behavior was beneficial to children under two years old. Mothers who possess good knowledge, attitude, and behavior towards stunting prevention will provide good preventive measures for their children, such as breast milk. Breastfeeding offers several benefits for newborn children including immunology protection during the transition from the fetal to the extra-uterus life stage [23]. Generally, children do not have fully developed default or adaptive immune responses, making them more susceptible to infection [24]. The adaptive immunity of children consisted of lymphocytes B and T cells. The main role of the B cells in the immune response was the production of antibodies that recognize and bind to proteins on invading cells. However, neonatal B lymphocytes are naive and not capable of responding effectively. This makes children more susceptible to infection because the concentration of circulating immunity is low compared to adults, ranging from 10 to 80% [23]. The low concentration of immunoglobulin also made children susceptible to bacteria and viruses [23].

The prevention and early detection of stunting began with the accurate measurement of weight, height, and head circumference from the beginning of life. This process was routinely carried out every month, generally in the first two years of life. Growth monitoring was the easiest way to detect early malnutrition and the risk of stunting for adequate prevention and management efforts to be carried out [25]. Monitoring the first months of life is important because growth faltering that occurs from birth to eight weeks of age correlates with an IQ deficit at the age of eight years [26]. The assistance to families at risk of stunting was an effective strategy to empower the community and increase the readiness of family members to prevent the risk of stunting [27,28]. Therefore, the ERKADUTA model was necessary because it improved stunting prevention behavior, specifically the practice of mothers of children under two years old.

Conclusion

Most mothers of children under the age of two had a good stunting prevention attitude and a high school education. Furthermore, the majority of them were housewives with good knowledge and medium income. In this research, the ERKADUTA model was used in the form of post-neighborhood assistance with a direct practice method. The implementation of the model improved the knowledge, attitudes, and practices of mothers of children under two years in stunting prevention. All ERKADUTA cadres had good knowledge and practice of anthropometric measurements during the pretest and posttest. Almost all ERKADUTA cadres had a good attitude during the pretest and posttest. There was an increase in the practice value of the cadres from the pretest to the posttest after the training intervention. There were significant differences in knowledge, attitudes, and practices between the intervention and control groups. The ERKADUTA cadres-assisted model affected the knowledge, attitudes, and practices, with the highest influence on the practice of mothers under two years old.

Ethics approval

Ethical clearance was obtained from the Health Research Ethics Committee, Faculty of Public Health, Universitas Diponegoro, Semarang, Indonesia (115/EA/KEPK-FKM/2022).

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

How to cite

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