



## Changes in knowledge of mothers who have stunting and not stunting toddlers using booklet, flipchart and poster media

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### ABSTRAK

**Latar Belakang:** Berdasarkan data Riskesdas 2018, prevalensi stunting di Indonesia meningkat pada tahun 2010 dari 35,6% menjadi 37,2% pada tahun 2013 dan pada tahun 2018 menurun menjadi 30,8%. Anak stunting berasal dari ibu yang memiliki pengetahuan gizi yang kurang pada kelompok ibu yang tidak mendapatkan edukasi gizi. Ibu yang diberikan intervensi gizi mengalami perubahan pengetahuan dan praktik dalam menyediakan makanan sumber protein dan energi. Poster sebagai media edukasi gizi memberikan perubahan pengetahuan bagi para ibu. Booklet, poster dan lembar balik merupakan media cetak yang sering digunakan untuk menyampaikan edukasi kesehatan.

**Tujuan:** Tujuan dari penelitian ini adalah untuk mengetahui perbedaan pengetahuan ibu yang memiliki balita stunting dan tidak stunting setelah diberikan booklet, lembar balik, dan poster.

**Metode:** Penelitian ini menggunakan studi kuasi eksperimen dan uji Wilcoxon. Kriteria inklusi pada penelitian ini adalah ibu yang berusia 20-35 tahun, memiliki anak balita, aktif mengikuti posyandu dan bersedia mengikuti kegiatan penelitian selama 1 tahun. Kriteria eksklusi penelitian ibu yang pindah dari Kecamatan Pasir Putih dan tidak hadir ke Posyandu selama 3 bulan berturut-turut. Teknik pengambilan sampel menggunakan simple random sampling dimana data ibu diperoleh dari kehadiran di Posyandu di setiap RW. Sebelum penelitian dilakukan, kuesioner penelitian telah melalui tahap uji validitas dan reliabilitas dengan menggunakan software komputer.

**Hasil:** Terdapat perbedaan pengetahuan ibu sebelum dan sesudah diberikan edukasi gizi dengan menggunakan booklet (pvalue 0,000), menggunakan lembar balik (pvalue 0,000) dan menggunakan media poster (pvalue 0,000).

**Kesimpulan:** Edukasi gizi efektif digunakan sebagai upaya promotif pada ibu dalam pencegahan stunting, hal ini dapat dilihat dari peningkatan pengetahuan dan asupan gizi sebelum dan sesudah diberikan edukasi.

**KATA KUNCI:** booklet; ibu; lembar balik; poster; stunting



## ABSTRACT

**Background:** According to 2018 Riskesdas data, the prevalence of stunting in Indonesia increased in 2010 from 35.6% to 37.2% in 2013 and in 2018 it decreased to 30.8%. Research in Dakar, Senegal found that 45% of stunted children came from mothers who had insufficient nutritional knowledge in a group of mothers who did not receive nutritional education. Mothers who were given nutritional intervention experienced changes in knowledge and practice in providing food sources of protein and calories. Posters as a media for nutrition education provide changes in knowledge for mothers. Booklets, posters and calendars are print media that are often used to convey health education.

**Objectives:** The aim of this research is to compare mothers' knowledge between stunted and non-stunted children who have been given nutrition education from three different education media : booklets, calendars and posters.

**Methods:** This research used a quasi-experimental study and the Wilcoxon test. The inclusion criteria in this study were mothers aged 20-35 years, having children under five, actively participating in Posyandu and willing to take part in research activities for 1 year. The mother's research exclusion criteria were moving from Pasir Putih Subdistrict and not attending Posyandu for 3 consecutive months. The sampling technique uses simple random sampling where maternal data is obtained from attendance at the Posyandu in each RW. Before the research was carried out, the research questionnaire went through a validity and reliability testing stage using computer software.

**Results:** There was a difference in mothers' knowledge before and after being given nutrition education using booklet (pvalue 0.000), using calendar (pvalue 0.000) and using poster media (pvalue 0.000).

**Conclusions:** Nutrition education effectively used as promotive efforts on mother in the prevention of stunting, it can be seen from the improvement of knowledge and nutritional intake before and after being given education

**KEYWORD:** booklet; calendar; mother; poster; stunting.

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## INTRODUCTION

Stunting is the impaired growth and development that children experience from poor nutrition, repeated infection, and inadequate psychosocial stimulation. Stunting in early life, particularly in the first 1000 days from conception until the age of two, impaired growth has adverse functional consequences on the child. Some of those consequences include poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood, an increased risk of nutrition-related chronic diseases in adult life (1). According to 2018 Riskesdas data, the prevalence of stunting in Indonesia increased in 2010 from 35.6% to 37.2% in 2013 and in 2018 it decreased to 30.8% (2) Stunted children came from mothers

who had insufficient nutritional knowledge in a group of mothers who did not receive nutritional education (3). Mothers who were given nutritional intervention experienced changes in knowledge and practice in providing food sources of protein and calories. Posters as a media for nutrition education provide changes in knowledge for mothers (4) (5) Booklets, posters and calendars are print media that are often used to convey health education (6).

The stunting rate in Indonesia has decreased from 24.4% in 2021 to 21.6% in 2022. The government has set a target for stunting prevalence in Indonesia in 2024 to 14% and requires an acceleration action of stunting

reduction of 3.8% per years to achieve this target (7). Stunting in Indonesia is known as dwarf and midget. Stunting is perceived as something normal and a hereditary factor, having no impact on cognitive, health and productivity. Nutrition education regarding stunting needs to be carried out to change wrong perceptions regarding stunting (8). Nutrition education was the most common nutrition strategies used for management child malnutrition in the Eastern Mediterranean Region (EMR) (9). The prevalence of stunting in Indonesian children was high and was strongly associated with child morbidity (10). The provision of health information provided to mothers can improve feeding behavior. Nutrition education effectively used as promotive efforts on mother in the prevention of stunting, it can be seen from the improvement of knowledge, attitudes and behavior of respondents before and after being given education. Providing nutrition education is related to feeding children, a mother who gets nutrition education will increase knowledge related to feeding with balanced nutrition so that children will fulfill their nutrition (11). Based of several problem above, this research to compare mothers' knowledge between stunted and non-stunted children who have been given nutrition education from three different education media : booklets, flipchart and posters.

## MATERIALS AND METHODS

This research used a quasi-experimental research design. The inclusion criteria in this study weremothers who had stunted toddlers and mothers who had non-stunted toddlers, , aged 20-35 years, actively participating in Posyandu and willing to take part in the research for 1 year. The

exclusion criteria in this study were mothers who moved from Pasir Putih sub-district Province West Java, did not attend Posyandu for 3 consecutive months and asked to leave the study. The sampling technique for this research was simple random sampling where a list of mothers was obtained from the Posyandu data area from each RW for the last 1 year. The media used in this research are booklets, flipchart and posters. The total number of mothers who took part in this research was 223 people and were divided into 3 groups, namely the group of mothers who received booklet, calendar and poster interventions. The intervention was carried out with counseling classes which were held twice with an interval of approximately one month. During the counseling, knowledge was measured (using pre and post questionnaires) and a 2x24 hour recall of the child's eating as an illustration of the food intake consumed by the child.

The analysis used uses computersoftware namely Statistical Product and Service Solution (SPSS). The tests carried out were univariate and bivariate tests using the Wilcoxon and Mann Whitney tests. The Wilcoxon test was carried out to see differences in knowledge before and after nutrition education in the three media groups. Apart from that, we looked at the differences in energy, carbohydrate and protein intake before and after the nutrition education class. The Mann Whitney test was carried out to see the differences between groups given the booklet, flipchart and poster intervention.

## RESULTS AND DISCUSSIONS

The following is data on the characteristics of the mother and child:

**Table 1. Characteristics of the mother and child**

Variable	n	Frequency(%) or mean $\pm$ SD
Mother's Education		
Elementary school graduate	31	13.9
Junior high school graduates and equivalent	60	26.9
High school graduates and equivalent	87	39
Higher Education / College	45	20.2
Mother's Age	223	32.843 $\pm$ 3.436
Child's Age		
< 12 Month	4	1.8
12 – 24 Month	43	19.3
24 – 60 Month	176	78.9

Variable	n	Frequency(%) or mean $\pm$ SD
Height for Age Z-score	223	0.00 $\pm$ 1
Stunted	90	40.35
Normal	133	59.65
Mother's Occupation		
Honorary Teacher	2	0.9
Housewife	202	90.5
Cadre	5	2.2
Employee	5	2.2
Not Working	6	2.7
Self-employed	3	1.3
Nutrition Education		
Yes	100	44,8
Never	123	55,2
Maternal Nutrition Knowledge		
Less	117	52.5
Good	106	47.5

Based on **Table 1**, it shows that the majority of mothers graduated from high school (39%), The average maternal age is  $33 \pm 3,44$  years and the average age of children is  $2.8 \pm 1.08$  years. The majority of mothers were a housewife (90.5%). In the category of having received counseling, it was found that the majority of respondents had never received nutritional counseling, namely 123

people (55.2%). In the category of maternal nutritional knowledge, it was found that the majority of mothers had nutritional knowledge in the poor category, namely 117 people (52.5%). The following is the difference in knowledge scores before and after the group given the booklet, flipchart and poster media.

**Table 2. Differences in Booklet, Flipchart and Poster Knowledge Scores**

Variabels	Booklet (n=74)				Flipchart (n=74)				Poster (n=75)			
	min	max	SD	P	min	max	SD	P	min	max	SD	P
Stunting												
Pre	0	90	27.4	0.000	10	80	24.30	0.000	0	70	18.67	0.000
Post	0	100	15.6		40	100	16.73		50	100	14.67	
Awareness of Proportion Food												
Pre	0	90	27.4	0.000	10	80	17.31	0.000	10	80	18.48	0.000
Post	40	100	13.6		40	100	12.51		40	90	11.07	

Booklets are book-shaped media used to convey health messages, often accompanied by writing and pictures. Information in booklet media is usually more complete and easier to understand and the design is more attractive. Posters are media that contain messages or information which are generally printed and pasted on walls or public transportation. A flip chart is a flip sheet media that contains messages or images related to the message or information you want to convey. However, calendars or flipcharts require special storage space and require special skills in designing them (6). A literature study conducted by Gina found that the use of booklets, posters and flipchart could increase mothers' knowledge (12). Apart from media use, changes in maternal

knowledge are also influenced by the mother's education level (4).The higher the mother's education level, the higher the knowledge score and feeding practice score by mothers who take part in nutrition education (3). The sample in this study were mothers who actively participated in Posyandu. Stunting is often found in mothers who have low educational status (13). According to research by West J. et al, Posyandu is the government's front guard in overcoming nutritional problems and almost 80% of mothers receive information regarding stunting at Posyandu (14).

Based on **Table 2**, the results show differences in knowledge scores between booklet, flipchart and poster media. In the booklet media, the results of the analysis using Wilcoxon on

knowledge about stunting and Awareness of Food Proportion resulted in a p-value = 0.000. This indicates that there is a significant difference between knowledge before the intervention and after the intervention using booklet media. The results of pre-test and post-test analysis on booklet media showed that the minimum and maximum values regarding stunting were 0 and 90, while the minimum and maximum values regarding Awareness of Proportion Food were 0 and 100. Research on nutrition education in Bau Bau City also found that there were differences in knowledge, attitudes and actions between groups of mothers who received booklet media. Changing maternal knowledge is expected to change the way mothers care for, prepare food and monitor children's growth and development (15).

In flipchart media, the results of the analysis using Wilcoxon on knowledge about stunting and Awareness of Food Proportion resulted in a p-value = 0.000. This indicates that there is a significant difference between knowledge before the intervention and after the intervention using flipchart media. The results of the pre-test and post-test analysis on flipchart media showed that the minimum and maximum scores regarding stunting were 10 and 80, while the minimum and maximum scores regarding Awareness of Proportion Food were 40 and 100. Primary research in Arcamanik found that there were differences in the knowledge of mothers who received posters and flipcharts (16).

In poster media, the results of the analysis using Wilcoxon on knowledge about stunting and Awareness of Food Proportion resulted in a p-value = 0.000. This indicates that there is a significant difference between knowledge before the intervention and after the intervention using poster media. The results of pre-test and post-test analysis on poster media showed that the minimum and maximum values regarding stunting were 0 and 70, while the minimum and maximum values regarding Awareness of Food Proportion were 50 and 100.

Changes in knowledge occurred in all mothers who received booklets, posters and calendars flipchart in this study. Changes in maternal knowledge can influence maternal feeding practices (3). A mother must be provided with adequate information to improve their

knowledge and improve their attitudes (17). A mother's knowledge can influence toddlers' food consumption patterns and toddlers' nutritional status. Mothers with an adequate level of knowledge regarding nutrition will apply the knowledge gained into their parenting patterns, especially in providing food that is in accordance with the nutritional needs of toddlers so that toddlers do not experience food intake deficiencies (18). Insufficient food and nutritional intake in toddlers can have an impact on the incidence of stunting in toddlers (19). Increasing nutritional knowledge in mothers can be done by providing nutritional education. Providing nutrition education to mothers has proven effective in improving feeding practices in several countries (20).

In general, the knowledge scores of mothers from all groups increased after being given the intervention. An increase in knowledge shows the success of a media in nutrition education activities (21). The results of the analysis carried out showed that there were significant differences regarding maternal knowledge using the three types of intervention media ( $p < 0.05$ ). The results of statistical tests in the three intervention groups, namely using booklet, flipchart and poster media, obtained a value of  $p = 0.000$  which can be concluded that there is an influence of using these three media in the intervention in increasing maternal nutritional knowledge related to stunting and awareness of food proportion. This is in line with research conducted by Listyarini and Fatmawati (2020) which shows that there is an influence of the use of booklet media on nutritional interventions (22). Research (Siregar et al, 2021) shows that there is an influence of using calendar and poster media in increasing respondents' knowledge (23). Research in Madagascar found that changes in mothers' knowledge regarding the positioning of children will have an impact on changes in feeding practices (20). Based on Table 3, the results show differences in energy, carbohydrate, protein and fat intake scores for each media. The results of the analysis using Wilcoxon for energy intake in the intervention group regarding stunting and awareness of proportion food showed p-value = 0.074 in booklet media, p-value = 0.171 in flipchart media, and p-value = 0.584 in poster media. This indicates that

there is no significant difference between the mother's child's energy intake before the intervention and after the intervention using booklets, flipchart and posters. The results of the energy intake analysis showed that the minimum intake was 63 kcal in the intervention group using flipchart media and the maximum intake was 13,557 kcal in the intervention group using poster media.

The results of the analysis using Wilcoxon for children's carbohydrate intake in the intervention group regarding stunting and awareness of proportion food showed p-value = 0.041 in booklet media, p-value = 0.682 in flipchart media, and p-value = 0.115 in poster media. This indicates that there is a significant difference between carbohydrate intake before the intervention and after the intervention using booklet media, but there is no significant difference between carbohydrate intake before the intervention and after the intervention using flipchart and poster media. The results of the analysis of carbohydrate intake showed that the minimum intake was 15 grams in the intervention group using poster media and the maximum intake was 2016 grams in the intervention group using flipchart media.

The results of the analysis using Wilcoxon for children's protein intake in the intervention group regarding stunting and Awareness of Proportion Food showed p-value = 0.350 in booklet media, p-value = 0.126 in flipchart media, and p-value = 0.926 in poster media. This indicates that there is no significant difference between protein intake before the intervention and after the intervention using booklets, flipchart and posters. The results of the protein intake analysis showed that the minimum intake was 5 grams in the intervention group using booklet media and the maximum intake was 607 grams in the intervention group using booklet media.

The results of the analysis using Wilcoxon for children's fat intake in the intervention group regarding stunting and Awareness of Proportion Food showed p-value = 0.311 in booklet media, p-value = 0.185 in flipchart media, and p-value = 0.950 in poster media. This indicates that there is no significant difference between fat intake before the intervention and after the intervention using booklets, flipchart and posters. The results of the fat intake analysis showed that the minimum

intake was 3 grams in the intervention group using booklet and calendar media and the maximum intake was 168 grams in the intervention group using poster media.

Low knowledge of mothers regarding the practice of feeding children is one of the factors causing the incidence of malnutrition in children. Maternal knowledge regarding nutrition is very important in feeding children which includes the quality and quantity of children's food (24). Apart from knowledge, providing nutritional education is also useful in increasing awareness and changing behavior to achieve optimal nutritional conditions, such as paying attention to nutritional intake, especially macronutrients.

The results of the analysis show that there is an effect of providing nutritional education using booklet media on carbohydrate intake after being given the education. However, there was no effect of providing nutritional education using booklet media on energy, protein and fat intake after being given the education. The results of the analysis also show that there is no effect of providing nutrition education using calendars and posters on energy, carbohydrate, protein and fat intake after being given the education. This is in line with research conducted in Bengkulu which showed that there was an effect of providing education on carbohydrate intake, but there was no effect of providing education on energy, protein and fat intake (25). Other research that supports this research is research conducted by Sely et al(2020) which shows that there is no effect of providing nutritional education on the level of macronutrient intake (26).

Overall, there was almost no difference in the intake of energy, carbohydrates, protein and fat in the booklet, leaflet and calendar groups. Some of the mothers in this study complained that they did not have enough time and felt tired because some of the mothers worked and had other children who needed attention. This condition is similar to research in Madagascar where the role of the father or husband is needed in supporting the wife in preparing food preparation. Apart from that, economic conditions play an important role in the mother's ability to choose food and the availability of a variety of foods in the household (20).

**Table 3. Differences in children's energy, carbohydrate, protein and fat intake before and after mothers are given intervention**

Variabels	Booklet (n=74)				Flipchart (n=74)				Poster (n=75)			
	min	max	SD	P	min	max	SD	P	mi n	max	SD	P
<b>Calories</b>												
Calories 1	199	7996	989.30	0.074	63	2535	488.59	0.17	178	13557	1549.9	0.584
Calories 2	199	3297	562.74		202	2743	503.09	1	190	3092	631.3	
<b>Carbohydrate</b>												
Carbohydrate 1	28	350	71.27	0.041	27	323	63.03	0.68	15	594	87.43	0.115
Carbohydrate 2	29	415	73.16		18	2016	241.91	2	17	393	84.21	
<b>Proteins (P)</b>												
Proteins 1	8	607	20.35	0.350	11	175	24.48	0.12	6	138	24.62	0.926
Proteins 2	5	96	69.43		6	100	20.88	6	8	143	24.79	
<b>Fat (F)</b>												
Fat1	4	118	25.14	0.311	3	129	24.56	0.18	6	168	28.18	0.950
Fat2	3	156	26.74		3	164	27.26	5	6	119	27.08	

Consumption of proteins such as eggs is also very low, found in households with low economic conditions (27). The following are differences in

knowledge, energy, carbohydrate, protein and fat intake in groups given booklets, calendars and posters:

**Tabel 4. Differences in knowledge, energy intake, carbohydrate, protein and fat in booklet, flipchart and poster media**

Variabel	Media	Mean	Pvalue
Knowledge	Booklet	76.76	0.3
	Poster	75.2	
	Flipchart	75.54	
Calories (Kkal)	Booklet	951.75	0.02
	Poster	1200.05	
	Flipchart	1016.76	
Carbohydrate (Gr)	Booklet	123.21	0.004
	Poster	163.62	
	Flipchart	167.38	
Proteins (Gr)	Booklet	33.41	0.022
	Poster	43.09	
	Flipchart	38.13	
Fat (Gr)	Booklet	39.38	0.18
	Poster	47.03	
	Flipchart	41.81	

Based on **Table 4**, the results of the Kruskal Wallis test on knowledge (pvalue= 0.3), energy intake (pvalue=0.02), carbohydrates (pvalue= 0.004), fat (pvalue= 0.18) and protein (pvalue= 0.022) are obtained. on booklets, posters and flipchart. This shows that there is no difference in mothers' knowledge and toddlers' fat intake when mothers are given booklet, poster and flipchart interventions. Apart from that, the research results also showed that there were differences in toddlers' energy, carbohydrate and protein intake when mothers were given booklets, posters and flipchart. In this study, using the Wilcoxon test, there was a change in knowledge before and after the three media. However, during the Kruskal Wallis test, there was no difference in knowledge between the three media. This happens because the three media provide changes in knowledge to mothers. This is proven by the post test scores on the three media, there were quite significant changes.

In this study, the majority of mothers had a senior high school education so that the group of mothers had no difficulty in participating in nutrition education activities. The research lasted for approximately 3 months so there were differences in knowledge (**Table 2**) and intake of carbohydrates, energy and protein. Mothers

have an important role in making decisions regarding the beginning of a child's life starting from breastfeeding, giving MP-ASI, immunization, giving vitamin A (28). Research in Tanzania in 2023 found that there were differences in energy consumption (p 0.02), protein (p 0.001) and fat (p 0.03) using booklets (4)(27). Research in Cambodia found that nutritional education in mothers can increase the diversity of foods consumed by children, including staple foods, fruit and vegetables (24). Nutrition education needs to be carried out continuously in the community and groups need to be formed and lay people trained so that the nutrition education process can be sustainable. Differences in energy, carbohydrate and protein intake occur due to changes in the mother's knowledge regarding feeding practices in the mother's feeding practices. Changes in food intake are expected to provide changes in children's growth so that they can suppress and reduce stunting in children (29). Providing positive nutritional education and self-efficacy to mothers will have a positive impact on meal preparation practices in children. This will increase food intake in children which is related to the child's nutritional status (TB/U) (5).

Adequate macronutrients which include energy, carbohydrates, fat and protein influence

the incidence of stunting in toddlers. Inadequate energy intake can cause an energy imbalance in the body. Prolonged energy imbalances cause nutritional problems in toddlers. Toddlers with low levels of energy intake affect the function and structural development of the brain, which can result in stunted growth and cognitive development and the risk of stunting (30).

Carbohydrates are the main energy provider, if carbohydrate needs are not met then protein and fat will play a role in the process of providing energy for the body (31). Long-term lack of carbohydrates causes protein to be converted into an energy source so that protein cannot carry out its function as a building material and has an impact on children's growth being hampered (32). Lack of protein intake can interfere with the formation of antibodies, which makes toddlers vulnerable to infectious diseases. Toddlers who are exposed to infectious diseases are at risk of stunting. Insufficient protein intake will also affect the production and work of the IGF-1 hormone. The IGF-1 hormone itself is in the process of growth so low protein intake can increase the risk of stunting. Fat has a role as a transporter and solvent for fat-soluble vitamins in the body, where these functions greatly influence the growth of toddlers (33). From the discussion above, it can be concluded that fulfilling macronutrient intake (energy, carbohydrates, protein and fat) according to needs can prevent stunting.

#### CONCLUSIONS AND RECOMMENDATIONS

The group of mothers experienced changes in knowledge before and after being given nutrition education classes using booklets, posters and flipchart. There were no differences between the three media, including booklets, posters and flipchart, because each media provided changes in knowledge, but there were significant changes in the post test results for the three media. There were differences in children's energy, carbohydrate and protein intake between mothers who received booklets, flipchart and posters.

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