



**EFFECTIVENESS OF '4-FIT CEREAL' ON INCREASING  
BODY WEIGHT OF STUNTED TODDLERS AT GUNTUR HEALTH CENTER,  
GARUT REGENCY IN 2025**

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**ABSTRACT**

Stunting is a chronic condition caused by prolonged malnutrition during early growth and development. Supplementary feeding (PMT) is commonly used to improve the nutritional status of malnourished toddlers, typically in the form of fortified biscuits. However, their limited acceptability due to taste, form, and portion size often results in low consumption. To address this issue, an alternative supplementary food, “4-Fit cereal,” made from goat milk, honey, eggs, and edamame, was developed. This study aimed to analyze the effectiveness of “4-Fit cereal” in increasing body weight among stunted toddlers compared to standard PMT. The study employed a quasi-experimental two-group pretest–posttest design involving 42 stunted toddlers at Posyandu under the Guntur Public Health Center, Garut Regency, in July 2025. Samples were selected using quota sampling. Body weight data before and after intervention were analyzed descriptively, while effectiveness was tested using an Independent Samples t-test. Results showed statistically significant differences in body weight between groups ( $p = 0.032$  and  $0.008$ ;  $\alpha = 0.05$ ). Both interventions increased body weight, but the N-Gain score indicated higher effectiveness in the experimental group (0.644, moderate) compared to the control group (0.22, low). Thus, “4-Fit cereal” was more effective than standard PMT in improving body weight among stunted toddlers.

**Keywords:** *Sereal 4-Fit, Stunting Effectiveness, Toddler Body Weight*

## INTRODUCTION

The nutritional status of the community is one indicator of the progress of health development programmes. Nutrition is one of the factors that determines well-being and levels of human health (Nasrudin et al. 2025). Although stunting is measured by height for age (HFA), weight plays an important role in the body. Stunting is a condition of chronic growth failure caused by long-term malnutrition, usually starting in the womb and continuing until the age of two. Stunting is often preceded by a slowdown in weight gain or weight faltering (Kusnadi et al. 2024). This condition indicates that the child is not receiving adequate nutrition, so that their body is unable to grow properly both horizontally (weight) and vertically (height).

According to World Health Organisation (WHO) standards, an area is considered to be in a good category if the prevalence of stunted toddlers is less than 20% and the prevalence of underweight toddlers is less than 5% (Ernawati 2020). An area is said to have acute nutritional problems if the prevalence of stunted toddlers is less than 20% and the prevalence of underweight toddlers is 5% or more. An area is considered to have acute malnutrition if the prevalence of stunted children is less than 20% and the prevalence of underweight children is 5% or more.

According to the Indonesian Ministry of Health's Nutrition Status Study report, the prevalence of stunting in Indonesia decreased from 27.7% in 2019 and 24.4% in 2021 to 21.6% in 2022, with the majority occurring in children aged 3–4 years, amounting to 6%. However, this figure is still not in line with the WHO standard, which targets less than 20%. The government aims to reduce the stunting rate to 17% by 2023 and 14% by 2024 (Wijhati, Nuzuliana, and Pratiwi 2021).

Based on 2023 data, the prevalence of stunting in West Java was recorded at 4.34%. This figure shows that West Java as a whole has succeeded in controlling the

problem of stunting, which is below the alarming threshold. However, there are significant disparities between districts and cities, with Cirebon City, Garut District, Cimahi City, and Tasikmalaya have stunting rates that are higher than the average for West Java. Conversely, Bekasi District and Purwakarta District have relatively low stunting rates (Tiara et al. 2025).

Based on district/city coverage, Garut ranks second in terms of stunting prevalence in West Java, at 9.62% (Rifiana and Agustina 2018). Garut District is a city in South West Java consisting of 42 sub-districts and 67 community health centres. Based on data from measurements and weigh-ins up to June 2025, the highest percentage of stunting was found in the working area of the Guntur Community Health Centre with a percentage of 26.39%.

The Supplementary Feeding Programme for Toddlers in various regions in Indonesia still faces challenges, obstacles, difficulties, and limitations. These obstacles and problems include inadequate and inexperienced staff, lack of training for officers, lack of socialisation, lack of budget funds, the absence of toddler mothers' groups, and the untimely and inaccurate distribution of supplementary food (Christiana et al. 2024).

The provision of standard supplementary food (PMT) in the form of biscuits from the government, despite its noble aim of addressing nutritional problems, is often faced with a series of significant challenges (Rianti 2020). One crucial issue is the often disappointing quality of the biscuits, with reports of them being damaged, mouldy, or unpleasant tasting, which directly reduces recipients' interest and potentially poses a health risk (Kasjono and Suryani 2020). This damage often stems from inadequate storage and distribution processes, poor packaging, or unsuitable storage conditions that can damage the biscuits before they reach the community (Muflihatn et al. 2021).

Additionally, the nutritional effectiveness of PMT biscuits is often questioned, especially in addressing complex nutritional issues such as stunting; many nutritionists suggest that animal protein sources are far more effective than biscuits alone (Helmyati et al. 2020). Another issue arises from the lack of variety and acceptability of the biscuits, which are sometimes too sweet or monotonous, and the excessive amounts of biscuits consumed causes infants and pregnant women reluctant to consume them regularly, which reduces the ultimate positive impact of the programme (Fauziah et al. 2024). Challenges also frequently occur in the procurement and distribution processes, with administrative issues hindering PMT distribution and causing delays in reaching recipients.

Based on the results of interviews conducted by the author with mothers who have stunted toddlers in Wanaraja Subdistrict regarding the provision of PMT for stunted toddlers, it has been found that the provision is in line with needs. However, field observations revealed that the provision of PMT products for stunted infants is still not optimal due to the boring form and taste for infants, as evidenced by the amount of PMT that is not consumed as recommended (Lastyana et al. 2023a).

Based on a special topic report conducted by the author, it is evident that there are issues arising from the distribution of standard PMT for stunted infants, therefore development and innovation are needed to better support the distribution of standard PMT for stunted infants (Lastyana et al. 2023b). Based on the recommendations proposed, it is more necessary and very important for the present and future to innovate a type of PMT that is different from the standard PMT currently available (Rosmalina et al. 2018).

‘Sereal 4-Fit’ is an innovation in PMT to help improve the nutritional status of stunted toddlers with a form that differs from the standard PMT currently available, made from goat's milk, dates, eggs, and edamame, especially formulated to improve

the nutritional status of stunted infants (Kesehatan Masyarakat et al. n.d.).

Dates can improve the growth of stunted toddlers, according to the results of research by (Sirajuddin et al. 2021), which states that there is a difference in height and weight gain after being given date juice.

In addition, eggs also have the benefit of helping to reduce stunting rates. Research findings show the effect of providing animal protein (eggs and fish) on stunting status in infants (Headey, Hirvonen, and Hoddinott 2018).

## METHOD

This study uses a quantitative research method with a quasi-experiment design. The research uses a two-group pretest–posttest design. This design allows the researcher to examine changes in the treatment group compared with the control group (Afriani et al. 2022).

The research variables consist of:

1. Independent (free) variable in this study it is the additional cereal “4-Fit cereal” and the standard supplementary feeding (PMT) available at the community health centre;
2. Dependent (bound) variable in this study it is the increase in the toddler's body weight.

The subjects of this study are stunted toddlers at the Posyandu of the Guntur Community Health Centre in Garut Regency in 2025. The target population of the study is stunted toddlers whose body weight did not increase at the Posyandu of the Guntur Community Health Centre, Garut Regency in 2025. The accessible population in this study are stunted toddlers aged 24–59 months whose body weight did not increase at the Posyandu of the Guntur Community Health Centre, Garut Regency during the period 11–25 July 2025 who meet the study criteria.

The inclusion criteria for both the treatment group and the control group in this study are:

- a. toddlers who are stunted;

- b. did not experience a weight gain from the previous month;
- c. aged 2–5 years.

Exclusion criteria for both the treatment group and the control group

- a) Exclusion criteria for the treatment and control groups in this study were stunted toddlers aged 2–5 years who had tuberculosis, bronchopneumonia, or anaemia.
- b) Drop-out criteria: toddlers who did not continue the intervention due to illness, relocation, or unwillingness to continue the intervention.

The sampling method used in this study was quota sampling. Respondents were selected based on specific characteristics, namely stunted toddlers aged 24–60 months, until the quota set for each category was met.

## RESULTS AND DISCUSSION

### 1. Respondent Characteristics

Characteristic	“Sereal 4-Fit” Group		Standard PMT Group	
	n	%	n	%
<b>Mother’s Education</b>				
Elementary school (SD)	2	5	1	2,4
Junior high school (SMP)	4	9	4	9,5
High school (SMA)	28	67	33	78,5
University (PT)	8	19	4	9,5
<i>Total</i>	42	100	42	100
<b>Mother’s Employment Status</b>				
Employed	26	61.9	28	66.7
Not employed	16	38.1	14	33.3
<i>Total</i>	42	100	42	100
<b>Number of Children (siblings)</b>				
≤ 2	22	52.4	27	64,3
> 2	20	47.6	15	35,7
<i>Amount</i>	42	100	42	100

Based on the study results, it is known that the respondent characteristics in both the “Sereal 4-Fit” group and the

standard PMT group, about education level, show that the vast majority of respondents had completed high school: 28 respondents (66.7 %) in the “Sereal 4-Fit” group and 33 respondents (78.5 %) in the standard PMT group.

In terms of employment status, most respondents were employed: 26 respondents (61.9 %) in the “Sereal 4-Fit” group and 28 respondents (66.7 %) in the standard PMT group. Considering the number of children, most respondents had two or fewer children. In the “Sereal 4-Fit” group there were 22 respondents (52.4 %) and in the standard PMT group 27 respondents (64.3 %).

### 2. Body Weight of Stunted Toddler Before and After Supplementary Feeding (PMT) at the Guntur Community Health Centre Posyandu, Garut Regency, and “Sereal 4-Fit” in 2025

Body Weight	Mean	SD	Min - Maks	95 % CI
“Sereal 4-Fit” Group				
<i>Pretest</i>	13,75	3,3	8,80-19,40	12,21-15,30
<i>Posttest</i>	14,11	3,3	9,30-19,50	12,58-15,64
Group				
Control			9,90-18,40	13,50-15,91
<i>Pretest</i>	14,70	2,63	10,20-18,50	13,61-15,98
<i>Posttest</i>	14,79	2,60		

The provision of “Sereal 4-Fit” to stunted toddlers resulted in a relatively larger increase in body weight compared to the standard PMT. According to the data, the average weight gain was 0.36 kg. The mean body weight of stunted toddlers before the intervention (pretest) in the supplementary-feeding programme was 14.70 kg, whereas after the intervention (posttest) it increased to 14.79 kg — this increase in the PMT group did not represent a statistically significant weight gain.

### 3. Difference in Body Weight of Stunted Toddlers Before and After Administration of “Sereal 4-Fit” and Standard PMT at the Guntur Community Health Centre Posyandu, Garut Regency, 2025

	Mean	$\rho$ value
Pretest		
PMT	14,709	0,032
Sereal 4 Fit	13,757	
Posttest		
PMT	14,795	0,008
Sereal 4 Fit	14,114	

Using an Independent Samples Test, the obtained p-values were 0.032 and 0.008. Because  $p < 0.05$ , the difference in mean body weight between the two groups before and after the intervention is statistically significant. This indicates that providing the “Sereal 4-Fit” drink as well as standard PMT at the Guntur Community Health Centre Posyandu had a real effect on increasing the weight of stunted toddlers.

#### 4. Effectiveness of the “Sereal 4-Fit” Group vs. the Standard PMT Group

Statistic	“Sereal 4-Fit” Group	Standard PMT Group
N-Gain	0.644	0.221

The statistical analysis results indicate that the weight gain of stunted toddlers in the experimental group (“Sereal 4-Fit”) achieved an N-Gain value of 0.644. According to the N-Gain score criteria, this weight gain falls into the moderate category ( $0.3 \leq \text{N-Gain} < 0.7$ ). Meanwhile, the weight gain in the standard PMT group showed an N-Gain value of 0.221. According to the same criteria, this is classified as low ( $\text{N-Gain} < 0.30$ ). These findings suggest that the provision of “Sereal 4-Fit” results in a greater increase in weight among stunted toddlers compared to the standard PMT available at the community health centre. This implies that “Sereal 4-Fit” is relatively more effective in improving body weight of stunted toddlers than the standard PMT, although its effectiveness remains moderate and may be enhanced further through program improvements or adjustments in the intervention.

## DISCUSSION

The results of the research show that there is a difference in weight gain among stunted toddlers between those given the ‘Sereal 4-Fit’ drink and those given standard PMT at the Guntur Community Health Centre in Garut Regency.

Supplementary feeding (PMT) is the activity of providing food to infants in the form of safe and high-quality snacks, along with other supporting activities, while considering aspects of food quality and safety. Supplementary food contains nutritional value that is appropriate for the needs of the target group.

Supplementary feeding is an intervention programme for toddlers suffering from malnutrition with the aim of improving the nutritional status of children and 7 significant ( $p=0.000; < 0.05$ ). The results meet the nutritional needs of children to achieve good nutritional status and condition appropriate for their age.<sup>10</sup>

According to Kusuma, the provision of standard supplementary food (PMT) for toddlers is biscuits that have been enriched with nutrients to complement the nutritional needs of children so that they can achieve a weight appropriate for their age. In addition to macronutrients (energy, fat, protein, and carbohydrates), toddler PMT biscuits are also enriched with 10 vitamins and 7 minerals. One biscuit contains 45 kcal of energy. The recommended intake of PMT biscuits for toddlers aged 6–11 months is 8 biscuits per day (for one month) and for those aged 12–59 months is 12 biscuits per day (for one month) (Muflihatin et al. 2021).

This statement is in line with the research by Laelah and Ningsih, which found that changes in the weight and height of stunted infants were tested by giving them PMT biscuits for 3 months using a paired sample t-test. The results showed that there were significant changes in the weight and height of stunted infants after being given PMT biscuits at the Gunung Kaler Health Centre, Tangerang, in 2023.

The hypothesis test results in statistics using the independent samples test yielded a value of  $\rho = 0.008$ , with a value of

$\alpha = 0.05$  ( $\rho < \alpha$ ), meaning there was a difference between the administration of the '4-Fit Cereal' drink and the administration of supplementary food (PMT) at the Guntur Health Centre Posyandu in Garut District in increasing the weight of stunted toddlers. 'Sereal 4-Fit' is an innovative PMT to help increase the weight of stunted toddlers with a form that is different from the PMT currently available. This cereal consists of goat milk, honey, eggs, and edamame, specially formulated to increase the weight of stunted infants (Apriastini et al. 2024).

Goat's milk is very beneficial from a nutritional point of view in terms of protein and lipid fractions. Its higher protein content compared to cow's milk makes it ideal for growth and repair of body tissues. In addition, its abundant calcium is excellent for bone and dental health. Various important vitamins and minerals such as vitamin B12, phosphorus, and potassium also complement the nutritional profile of goat's milk. It is no wonder that goat milk is often referred to as a healthy and nutritious alternative (Pratiwi et al. 2024).

Eggs contain high-quality protein, iron, vitamin B complex, and other nutrients that are necessary for the growth and development of children. The high-quality nutrition from eggs provides essential support for the entire spectrum of children's growth needs, making them an ideal food in efforts to prevent stunting. Eggs are a readily available and affordable source of animal protein. Eggs contain various nutrients that are good and important for children's growth, containing essential amino acids, vitamin A, vitamin B12, iron, and choline (Sulhan and Hartadi 2020).

Based on research findings, there is a significant difference between the provision of the 'Sereal 4-Fit' beverage and the provision of standard supplementary food (PMT) in terms of weight gain in stunted toddlers at the Posyandu Puskesmas Guntur in Garut District. This finding aligns with nutritional theory which states that adequate energy and protein intake, along with sufficient micronutrients, are key

factors in accelerating the growth of children experiencing stunting. This finding aligns with nutritional theory stating that adequate energy and protein intake, along with sufficient micronutrients, are key factors in accelerating the growth of children experiencing stunting. These results also reinforce previous research findings reporting that additional nutritional interventions based on cereal and plant-based and animal-based protein sources can improve the nutritional status of toddlers within a certain period of time (Sitepu and Gultom 2022). Based on the data, theory, and research evidence, the researchers assume that the provision of '4-Fit Cereal' as a nutritional intervention can be an alternative that is more effective than conventional PMT posyandu, making it worthy of development as a complementary programme for nutritional recovery in stunted toddlers (Arini et al. 2020).

The research results show that the increase in weight of stunted toddlers in the experimental group showed a score of 0.644. Based on the N-Gain score criteria, the weight gain of stunted infants in the experimental group falls into the moderate category ( $0.3 \leq \text{N-Gain} < 0.7$ ). The N-Gain score calculation for weight gain in stunted infants in the control group is 0.221. Based on the N-Gain score criteria, the weight gain of stunted infants in the control group was in the low category ( $< 0.30$ ). These findings indicate that '4-Fit cereal' has a greater impact on weight gain compared to standard PMT.

'4-Fit Cereal' is an innovation of PMT to help improve the nutritional status of stunted infants with a form that is different from the current standard PMT at the posyandu because it is made from goat's milk, dates, eggs, and edamame, which are specially made to increase the weight of stunted infants. Date can increase the growth of stunted infants according to the results of research by (Ningrum 2019), which states that there is a difference in the increase in height of stunted infants. Dates can improve the growth of stunted infants according to the research by (Susianto

2023), which states that there is a difference in height and weight gain after being given date juice. In addition, eggs also have the benefit of helping to reduce the stunting rate. Research results show that there is an effect of animal protein intake (eggs and fish) on the stunting status of toddlers.<sup>26</sup>

In 50 grams of '4-Fit cereal' contains 416 Kcal, 7 grams of fat, 22 grams of protein, 65 grams of carbohydrates. The protein content in '4-Fit cereal' is superior compared to standard PMT content, where every 10 serving contains 450 kcal, 14 grams of fat, 9 grams of protein, and 71 grams of carbohydrates.

Research shows that adequate protein intake is crucial for the growth and development of infants, including weight gain. Protein is an essential macronutrient that functions as a 'building block' for constructing and repairing body tissues, including muscles and organs (Prabowo and Wardani 2024).

Scientific studies have demonstrated a positive correlation between protein intake and weight gain, particularly in infants experiencing malnutrition or stunting. Research shows that protein-enriched PMT has effectiveness that increases more weight gain in infants compared to standard PMT that is low in protein (Lawal et al. 2024). High-quality protein, such as that from animal products or legumes, aids in body protein synthesis, which ultimately contributes to mass gain.

Based on the results of research, the provision of '4-Fit cereal' is more effective in increasing the weight of stunted toddlers compared to the provision of supplementary foods available at health posts. '4-Fit cereal' has been proven to have a greater impact on weight gain compared to PMT health posts. This is in line with nutritional theory which states that optimal growth in toddlers, especially those experiencing stunting, requires intake of macronutrients such as carbohydrates, protein, and fat in balanced proportions, as well as adequate micronutrient support. The composition of "4-Fit cereal 4-Fit" which contains a combination of cereals, sources of plant-

based and animal-based protein, as well as vitamins and minerals has the potential to accelerate improvements in the nutritional status of posyandu compared to PMT which generally has more limited nutritional content. Previous studies have also shown that nutritional intervention with a special formula can increase children's weight and nutritional status more effectively than standard supplementary feeding. Therefore, '4-Fit cereal' can be a more effective nutritional intervention alternative to support the acceleration of stunting toddlers, so that it is integrated into appropriate growth in the community nutritional recovery programme.

Although its effectiveness is still in the moderate category and has the potential to be improved through programme improvements or adjustments, "4-Fit Cereal" cannot be used as a substitute for main meals in reducing stunting rates. The World Health Organisation (WHO, 2013) divides the causes of stunting in children into four broad categories, namely family and household factors, inadequate complementary feeding, breastfeeding, and infections.

## CONCLUSION

Based on the results of the study on the effectiveness of "4-Fit cereal" in increasing body weight among stunted toddlers at the Guntur Community Health Center, Garut Regency, in 2025, it can be concluded that there is a difference in weight gain between stunted toddlers who received "4-Fit cereal" and those who received standard supplementary food (PMT). Furthermore, the provision of "4-Fit cereal" was found to be more effective in increasing body weight than standard supplementary food for stunted toddlers at Posyandu under the Guntur Community Health Center in Garut Regency.

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