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Enhancing nutritional status of stunted toddlers via supplementary feeding programs in Musi Banyuasin, 2023

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ABSTRACT

Background: Stunting is caused by long-term malnutrition. To reduce this problem, the government has launched the Supplementary Feeding Program (SFP). In Musi Banyuasin Regency, this program is called "BUNDA AS (Bunda dan Anak Sehat)".

Objective: To provide an overview and compare the nutritional status of stunted and wasted toddlers before and after the intervention of supplementary feeding program in Musi Banyuasin Regency in 2023.

Materials and Methods: This study employed a quasi-experimental design with a pre-test and post-test approach. The human subjects in the study were 107 stunted and wasted toddlers aged 6-59 months, all from low-income families in the working area of Primary Health Care Center Musi Banyuasin. Anthropometric parameters were used to assess nutritional status. The Supplementary Feeding Program was implemented for 90 days. There are three main meals, one animal protein snack, and two additional supplementary feeding servings for toddlers aged 6-24 months each day. Paired t-tests was used to analyze the data and evaluate the effectiveness of SFP on the nutritional status of stunted and wasted toddlers.

Results: The results showed significant changes in the nutritional status of toddlers based on the indicators of weight for Age (WAZ), height for Age (HAZ), as well as the ratio of weight to height (WHZ) before and after the BUNDA AS intervention. The paired t-test revealed a significant difference mean weight and height of toddlers ($p = <0.0001$).

Conclusion: There was an effectiveness of SPF on the nutritional status of stunted and wasted toddlers before and after the intervention of the BUNDA AS program in Musi Banyuasin Regency in 2023.

Keywords: BUNDA AS; nutritional status; stunting; toddlers

BACKGROUND

Stunting is a serious problem faced by developing countries, including Indonesia. It is defined as being short or very short based on length/height for age (HAZ), with measurements falling below -2 standard deviations (SD) on the World Health Organization (WHO) growth curve.[1] Stunting is a growth and development disorder for children under the age of five.[2] It is characterized by chronic malnutrition during the first 1,000 days of life and is caused by recurrent infections.[3]

According to United Nations Children's Fund (UNICEF) data from 2023, the prevalence of stunting among children under under-five years old worldwide reached 21.9%, with the highest number of cases in Africa and Asia, including Indonesia. while the global prevalence of wasting is 6.8%, which shows a decline from 2000, although it remains a life-threatening issue for many children and shows an increase in cases especially in some regions in Asia.

According to data from the Indonesian Nutrition Status Survey (SSNI or known as SSGI), the prevalence of stunting in Indonesia decreased from 24.4% in 2021 to 21.6% in 2022. Meanwhile, the Indonesian Health Survey (IHS) recorded a stunting prevalence of 21.5% in 2023. Despite this decline, the figure is still above the national target of 14% for 2024. In South Sumatra Province, SSNI data shows a decrease from 24.8% in 2021 to 18.6% in 2022, but 2023 IHS data recorded an increase to 20.3%. On the other hand, Musi Banyuasin Regency experienced a decrease in stunting prevalence.

In Musi Banyuasin, the prevalence of stunting fell from 23% in 2021 to 17.7% in 2022 and 16.5% in 2023. This decline was due to increased availability of nutritious food, improved nutrition education programs, and better access to health services. In addition, the implementation of supplementary feeding programs and improved sanitation also contributed. However, challenges such as poor environmental conditions and poverty still need to be addressed to maintain a sustainable decline in stunting.

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The Musi Banyuasin Regency has launched an innovative program entitled *Bunda dan Anak Sehat* (BUNDA AS) or Healthy Mother and Children to reduce the prevalence of stunting and wasting. The program targets stunted and wasted toddlers aged 6-59 months from low-income families. Interventions include the provision of three main meals per day, one high-protein animal-based snack per day, three servings of provision of processed food for special medical purposes (isocaloric milk) per day, as well as nutrition education in the form of nutrition counseling, nutrition counseling, and cooking demonstrations for parents of the children. The program aims to ensure adequate nutritional intake and improve parents' knowledge about proper nutrition for children.

The BUNDA AS program not only addresses the direct causes of stunting and wasting, but also identifies indirect factors, such as family income and parents' occupation. By collecting this data, more effective interventions can be designed, including job training for parents from low-income families. The program also provides economic benefits to local cooks in the form of honoraria, which increase their income and improve the local economy by promoting local products.

The BUNDA AS program ensures its own sustainability of the program by involving various sectors, including corporate social responsibility (CSR), to increase the impact and suitability of interventions to the needs of the community. Monitoring of children's nutritional status continuously is essential to evaluating the impact of the program and adjust interventions so that every child received the nutrition needed for optimal growth and development. The purpose of this study is to determine the effectiveness of the Supplementary Feeding Program on the nutritional status of stunted toddlers in the BUNDA AS program before and after the intervention.

MATERIALS AND METHODS

This study employs a quasi-experimental design combining pre-test and post-test approaches in accordance with its objectives. The research has been approved by the Health Research Ethics Committee of the Public Health Faculty at Unsri. Letter number 399/UN9.FKM/TU.KKE/2024 confirms that all procedures conducted comply with ethical research guidelines. The program includes 107 children aged 6 to 59 months, who have been diagnosed with stunting and wasting. The children come from underprivileged families in the Musi Banyuasin Primary Health Care Center area. All participants have provided written consent to participate in the Supplementary Feeding Program (SFP) within the BUNDA AS intervention.

This study intervention includes several important components aimed at improving the nutritional status of toddlers. First, main meals were provided three times a day. In addition, children received a high-protein snack once a day. Special medical Foods, such as isocaloric milk, was provided three times a day to support optimal growth and development.

Furthermore, health education was provided, including nutrition counselling, nutrition outreach, and cooking demonstrations. Individual nutrition counselling emphasized interpersonal communication and nutrition outreach took place alongside the *posyandu* (Indonesian literally *Pos Pelayanan Terpadu* or Integrated Service Post) activities for 15-30 minutes. Cooking demonstrations was held once a month after the nutrition outreach, once a month to ensure that the target audience gains knowledge about nutritional and health aspects for toddlers and pregnant women. When determining the menu for the SFP using local food ingredients, there were several basic principles that must be followed to ensure that the food meets the nutritional needs of toddlers. First, the menu has to include a variety of balanced nutritional sources, such as carbohydrates, animal and vegetable proteins, fats, and vitamins and minerals, in accordance with the “My Plate” guidelines. The menu should also be appealing to toddlers, taking into account their preferred shapes and flavors that toddlers like, so that the food is not boring.

Second, the food should be easy to prepare with household equipment. The preparation process should be quick, and the ingredients used should be affordable for low-income communities. They should also be sourced from local products to support the regional economy. Third, food safety is very important. The food provided must be free of preservatives and harmful additives. Proper handling in preparation, storage, and processing must also be considered to avoid contamination.

Finally, the SFP menu should be rich in nutrients, with appropriate portions sizes for one meal. The menu can be prepared simply using ingredients that are familiar and commonly consumed by families. Following these steps will ensure the effective implementation of SFP using local food ingredients can be carried out effectively, meeting nutritional needs and supporting the health of toddlers.

Data collection regarding the weight and height of toddlers were collected weekly by recording information on reporting forms. These forms were used to monitor stunting and wasting and they are accessed via Google Form and the Maternal and Child Health Book, also known as *buku Kesehatan Ibu dan Anak*. Updates on weight and height gain were reported regularly to donors, and the Health Department was done regularly via WhatsApp. The village team also records the daily consumption of the SFP and provide parents with education about how their toddlers' respond to the additional food. Nutritional status monitoring was performed routinely each week by the same staff, using anthropometric parameters using standard tools to ensure measurement accuracy. The researchers employ the paired t-test statistical method to analyze the data and assess the effectiveness of SFP on the nutritional status of stunted and wasted toddlers before and after the intervention.

RESULTS

Characteristics of Toddlers

The following section presents the results of the univariate analysis of the characteristics of stunted and wasted toddlers who received supplementary food. This analysis is based on the gender and age of the toddlers. The results are presented in Table 1:

Table 1. Characteristics of toddlers receiving intervention

Characteristics	Total (n)	%
Gender		
Boys	48	44.9
Girl	59	55.1
Toddler Age		
6-11 month	3	2.8
12-23 month	35	32.7
24-59 month	69	64.5

Source: Muba Health Office in 2023

As shown in Table 1, the result based on gender, the results showed that there were 48 male toddlers (44.9%) and 59 female toddlers (55.1%). It was known that female toddlers received more interventions than male toddlers in the Musi Banyuasin district. Most toddlers who received supplementary food were aged 6-11 months, numbering 3 toddlers (2.8%), followed by those aged 12-23 months, numbering 35 toddlers (32.7%), and finally, toddlers aged 24-56 months, numbering 69 toddlers (64.5%).

Overview of the Nutritional Status of Toddlers Before and After the BUNDA AS Intervention

Nutrition during the toddler years is essential for optimal physical growth and cognitive development. In Indonesia, the prevalence of nutritional issues among young children remains a serious challenge, with many children experiencing both undernutrition and overnutrition. Therefore, through the BUNDA AS intervention, changes in the nutritional status of toddlers can be observed, including weight-for-age, height-for-age, and weight-for-height measurements. This data will be presented in the table 2 below.

Table 2 shows the Weight for Age (WAZ) category indicate that before the provision of supplementary food, 41 toddlers (38.3%) were classified as severely underweight, 50 toddlers (46.7%) as underweight, and 16 toddlers (15.0%) had normal weight. After implementing the supplementary feeding program for 90 days, there was a significant improvement in the children's nutritional status. Specifically, the proportion of toddlers classified as severely underweight decreased to 24 toddlers (22.4%) and the proportion of toddlers classified as underweight decreased to 48 toddlers (44.9%). Concurrently, the number of toddlers with a normal weight increased to 35 toddlers (32.7%).

Before the start of the supplementary feeding program, the HAZ category showed that 44 children (41.1%) were classified as “very short,” 60 children (56.1%) as “short,” and three children (2.8%) as “normal.” After the 90-day period of supplementary feeding program, there was a significant improvement in nutritional status, with the proportion of infants who were very short decreasing to 28.0%, and the proportion of infants classified as short decreased to 52.3%. Conversely, the proportion of infants with a normal height for age z score increased to 19.6%.

Table 2. Frequency Distribution of Nutritional Status of Toddlers

Nutritional Status	Before	After

	n	%	n	%
Nutrition Status Weight for Age (WAZ)				
Very Less	41	38.3	24	22.4
Less	50	46.7	48	44.9
Normal	16	15.0	35	32.7
Nutrition Status Height for Age (HAZ)				
Very Short	44	41.1	30	28.0
Short	60	56.1	56	52.3
Normal	3	2.8	21	19.6
Nutrition Status Weight for Height (WHZ)				
Malnutrition	6	5.6	0	0
Undernourished	40	37.4	21	19.6
Good Nutrition	61	57.0	86	80.4
Total	**107**	**100%**	**107**	**100%**

Source: BUNDA AS Intervention in 2023

Based on the weight-for-height (WHZ) nutritional status category, six infants (5.6%) were classified as malnourished, 40 infants (37.4%) were severely malnourished, and 61 infants (57.0%) were moderately malnourished before supplementary feeding. After 90 days of the supplementary feeding program, there was a significant increase with no infants classified as malnourished (0%), while the proportion of infants with poor nutrition decreased to 21 (19.6%). The proportion of infants with good nutritional status increased to 86 (80.4%).

Table 3. Changes in Body Weight and Height Before and After Intervention

Variable	Mean+SD	p*
Weight Before –Weight After	1,039±0,66	<0.0001
Height Before-Height After	2,77±1,49	<0.0001

** Analyzed using paired t-test (Mean±SD, and significant p<0.005)*.*

The findings of the paired t-test in Table 3 demonstrated a substantial alteration in body weight (weight before and after the intervention) with an average value of 1.0391 and a standard deviation (SD) of 0.6634. The t-test yielded a t-value of 16.450 and a degree of freedom of 106. The p-value in this study was found to be less than 0.0001, which is below the significance limit of p-value 0.05. These results suggest that nutritional status differs statistically based on toddler weight.

In a similar vein, the difference in height (height before - height after) was statistically significant, with a mean of 2.7729 and a standard deviation (SD) of 1.4884. The t-test produced a t-value of 19.271 with a degree of freedom of 106. The p-value in this study was found to be less than 0.0001, which is below the significance limit of p-value 0.05.

DISCUSSION

Stunting and wasting are significant global health challenges, especially in developing countries. According to research by Victora et al. (2021) showed that the prevalence of stunting remains high in low- and middle-income countries despite various interventions. This emphasizes the need for a multisectoral approach to stunting prevention.[23] Therefore, a comprehensive strategy is required for stunting prevention, including improving dietary patterns, increasing access to health services, and educating parents about the importance of early nutrition.[24]

The Musi Banyuasin Regency has launched an innovative program called BUNDA AS, which aims to accelerate the reduction of stunting and wasting. The program provides provide guidance and assistance to mothers in caring for their children and meeting their nutritional needs. The BUNDA AS program consists of supplementary feeding using local food ingredients. It targets toddlers aged 6-59 months who are stunted and wasted from low-income families. The interventions provided include the provision of three main meals per day, one high-protein animal-based snack a day, three servings of provision of processed food for special medical purposes (such as isocaloric milk) a day, and nutrition education in the form of nutrition counseling, nutrition consultations, and cooking demonstrations for parents of toddlers.

The BUNDA AS program has demonstrated its effectiveness in enhancing mothers' nutritional knowledge in Musi Banyuasin. Through training and counseling sessions, mothers learned about information

on the importance of balanced nutrition for children's growth and development, as well as the various nutrients required. This knowledge helps mothers plan more balanced daily menus and changes their perspective on the importance of nutritious food. As a result, many mothers have begun providing more diverse and nutritious meals, reducing their reliance on instant foods.

The SFP significantly impacts the nutritional status of toddlers, especially in meeting nutritional needs that are not met by daily meals. The SFP is designed to support the growth and development of malnourished toddlers, and often shows positive results such as increased weight and height. This intervention also contributes to a reduction in stunting rates, which is the result from long-term malnutrition.

Research by Yuneta et al. shows a significant relationship between mothers' knowledge levels and the nutritional status of toddlers. Parents' level of education regarding the importance of nutrition can influence children's eating patterns. In addition, inadequate sanitation can also affect children's growth.[16] However, it is important to recognize that factors such as maternal knowledge, parental education, socioeconomic status, and sanitation are only some of the determinants of a toddler's nutritional status. Other influential factors include health services, history of exclusive breastfeeding, and prevalence of infectious diseases.

A SFP was implemented for 90 days to meet the nutritional needs of toddlers. This includes the provision of complete meals that meet nutritional adequacy standards for the target age group, with meal frequency determined by the age of the group. The study results showed a significant decrease in stunting rates among infants, with positive increases in height and weight in many children. Although the BUNDA AS program has shown positive results in reducing stunting, there are still several challenges, such as the difficulty mothers have in applying the knowledge they have acquired, especially in regions with limited access to nutritious food.

It is also important to be aware of the limitations of this study that may affect the results. First, each health center has different cooks, so the quality and type of supplementary food provided may vary, resulting in differences in nutritional intake among children. Second, the children who were intervened had diverse characteristics, such as age, gender, and health conditions, which could affect their response to the intervention. The timing of the intervention in each health center could also affect the final results, mainly due to seasonal changes and food availability. Finally, height and weight measurements could be influenced by various factors, which could potentially cause inconsistent data.

To improve the effectiveness of the BUNDA AS program, focused intervention measures are needed. These measures include improving access to good sanitation facilities for families, developing programs that create employment opportunities for low-income families, and providing parents with more intensive guidance on how to cook and serve nutritious meals. In addition, training for cooks at each community health center, regular monitoring and evaluation, and increased community involvement in the program will be very helpful. These steps will hopefully improve the effectiveness of the BUNDA AS program in reducing stunting and wasting in Musi Banyuasin District.

CONCLUSIONS

The findings of the present study, which examined a 90-day SFP intervention implemented on 107 toddlers in the Primary Health Care Center in the Musi Banyuasin area, provided valuable insights. The intervention, which incorporated a balanced menu of dishes, demonstrated a substantial impact on the weight, height, and nutritional status of the toddlers. SFP through BUNDA AS intervention, when administered to toddlers with a varied menu, was well-received. The targeted toddlers exhibited increased energy and protein intake, contributing to enhanced body weight and improved nutritional status. This research underscores the importance of mothers and families paying close attention to supplementary feeding programs to ensure the optimal nutritional development in toddlers. Furthermore, the study emphasizes the necessity for cross-sectoral collaboration to initiate a community-wide movement to address the pressing issues of undernutrition and malnutrition.

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