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Evaluating the Effectiveness of the BAAS Program in Reducing Stunting in Takalar Regency

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ABSTRACT

Introduction: The complexity of stunting reduction interventions cannot be addressed by the government alone. The state appreciates contributions from all stakeholders, including the community. The Foster Parents for Stunting Children (BAAS) program provides a platform for stakeholder participation in accelerating stunting reduction. As a relatively new program, a review is needed to assess its impact. This study aims to evaluate the effectiveness of the BAAS program in Takalar Regency in 2023.
Methods: This study uses quantitative research with a cross-sectional approach. Data analysis was conducted to determine how much the success measure of the BAAS program based on the target approach (output). In this study, the test used was the Wilcoxon signed rank test to see the impact (outcome) of how significant the program was to reduce the prevalence of stunting.
Results: There is a statistically significant difference between the Z-score TB/U and BB/U before and after the BAAS program with a mean Z-score TB/U before the program of -2.78 and BB/U of -1.83 and a mean Z-score TB/U after the program of -0.40 and BB/U of -0.91. Based on the p-value of Z-score TB/U and BB/U showed a very small value for Z-score TB/U of 0.000 (<0.05). and BB/U of <0.001. This suggests that the program is effective for improving nutritional status and can reduce stunting and wasting in Takalar District.
Conclusion: The BAAS Program successfully demonstrated its effectiveness in improving the nutritional status of children in Takalar District. The Wilcoxon Signed Rank Test results also showed a statistically significant difference between the Z-score values before and after the program with a p value <0.05, confirming that the BAAS Program is effective in improving nutrition and reducing stunting in Takalar District. BAAS is an effective intervention model with the potential for replication and expansion, serving as a reference for sustainable and inclusive community-based stunting prevention policies.

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INTRODUCTION

Public health is one of the main pillars in developing high-quality Human Resources (HR) (1). However, Indonesia still faces significant challenges in addressing nutritional issues, particularly stunting (2). Stunting is a form of chronic malnutrition that not only affects children's physical growth but also impacts cognitive development and long-term economic productivity (3). According to data from the World Health Organization (WHO) in 2022, the global prevalence of stunted toddlers reached 22.3%, or approximately 148.1 million children (4). Southeast Asia has a prevalence rate of 30.1%, with Indonesia ranking second highest in ASEAN after Timor Leste, with a prevalence of 21.6% (2).

At the national level, based on the 2022 Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting in Indonesia was recorded at 21.6%, still above the WHO threshold of 20% (3). The Indonesian government has targeted a reduction in stunting prevalence to 14% by 2024, following the National Medium-Term Development Plan (RPJMN) 2020-2024 (5). However, efforts made still face various obstacles, such as limited cross-sectoral coordination and disparities in implementation across different regions (6).

South Sulawesi Province is one of the regions with a relatively high prevalence of stunting. Based on the 2022 SSGI results, South Sulawesi experienced only a slight reduction in stunting rates, by just 0.2%, from 27.4% in 2021 to 27.2% in 2022 (3). Takalar is one of the districts in this province that still has a high stunting rate, with a prevalence of 31.3% in 2022 (3). This situation indicates the need for innovative strategies to accelerate the reduction of stunting more effectively (8).

So far, various interventions have been implemented to accelerate stunting reduction, including the provision of Supplementary Food (PMT), nutritional education, and community-based intervention programs (7). However, gaps remain in the sustainability of programs and active involvement of the community and non-governmental sectors (8). Moreover, studies on the theoretical framework or conceptual model supporting the BAAS program are still limited, requiring a deeper understanding of the scientific basis underpinning its effectiveness (10). In this context, the Foster Father for Stunting Children (BAAS) Program emerges as an innovative solution that integrates a multisectoral approach by involving non-governmental stakeholders, such as community leaders and private sector partners, to provide direct assistance to families with stunted children.

Unlike other stunting intervention programs that typically focus on healthcare facilities and government-led initiatives, BAAS offers a more personal and sustainable mentoring model. This program enables "foster fathers," consisting of policymakers and private sector partners, to directly provide nutritional support and monitor the growth and development of stunted children through family support teams. In addition to providing nutritious food packages, the program also emphasizes education and behavioral change in families regarding childcare and nutritional fulfilment.

Evaluating the effectiveness of the BAAS program is crucial to determine the extent to which this intervention significantly impacts the reduction of stunting rates (11). To strengthen the analysis, this study also refers to theoretical frameworks related to community-based nutrition interventions and conceptual models in public health policy. Therefore, this study aims to assess the effectiveness of the BAAS program in improving nutritional status and reducing stunting prevalence in Takalar District. Through this study, it is expected that evidence-based recommendations can be obtained for refining the program in the future and replicating it in other regions facing similar challenges in stunting management (12).

The BAAS program is a relatively newly launched program so a review is needed to see the impact of the program. Therefore, based on the description of the data and problems above, the researcher intends to conduct a study entitled "The effectiveness of the Father Fostering Stunting Children (BAAS) program in Takalar Regency in 2023".

METHODS

This study employs a quantitative approach with a cross-sectional design, where variables are measured at a single point in time. The study was conducted in Takalar District, South Sulawesi, in February of this year. The data used are secondary data obtained from BAAS program coverage reports. The population in this study includes all stunted children under five who received interventions from the BAAS program in Takalar District, totalling 942 children. The sampling technique used was total sampling, in which the entire population was included as the study sample.

Secondary data for this study were obtained from records and reports of the BAAS program outcomes by the Takalar District Health Office and P2KBP3A, as well as documentation during program implementation. The collected data include monitoring results of nutritional status before and after intervention.

The data processing stages include: 1) Editing: Checking the completeness, clarity, relevance, and consistency of data from BAAS program monitoring reports and target monitoring by the Family Assistance Team (TPK). 2) Data Entry: Entering data from BAAS program monitoring reports into the SPSS statistical software. 3) Cleaning: Rechecking the entered data to ensure there are no input errors that could affect the analysis results.

Bias Control in Secondary Data Since this study utilizes secondary data, several steps were taken to minimize potential bias: Data Validation – Comparing data with other official sources, such as reports from EPPGBM (Electronic Community-Based Nutrition Recording and Reporting), to ensure consistency of information. Cross-checking with Stakeholders – Interviews with officials from the Health Office and P2KBP3A were conducted to understand data collection procedures and ensure accuracy and completeness in reporting. Consistency Analysis – Checking historical data and trends in nutritional status changes to identify possible anomalies or inconsistencies in reporting. Use of Multiple Data Sources – In addition to BAAS program reports, this study also refers to data from Paysand and other nutrition surveys to obtain a more accurate overview. Identification and Control of Potential Confounding Factors – Factors such as differences in measurement methods, variations in data recording, and socio-economic factors were analysed to reduce their influence on research results. (New revision based on reviewer feedback)

This study obtained approval from relevant institutions, including the Takalar District Health Office and P2KBP3A. The use of secondary data adhered to confidentiality principles and ethical research guidelines. The data used do not include individual identities and are solely for academic analysis purposes. Additionally, this research follows applicable health research ethics guidelines to ensure the protection of research subjects. (New revision based on reviewer feedback)

Data analysis was conducted to assess the effectiveness of the BAAS program in improving children's nutritional status. Data were analysed using the Wilcoxon Signed Rank Test to examine significant changes in nutritional status before and after the intervention. The analysis was performed by calculating differences in Z-scores for TB/U and BB/U before and after the program. The results are presented in the form of frequency distribution tables and percentages. With these steps, the study aims to ensure the validity and reliability of the secondary data used and reduce potential bias in the analysis results.

RESULTS

Overview of the Foster Father Program for Stunting Children

The BAAS program is designed to improve the nutrition of children with developmental problems. BAAS directly monitors the nutrition of its foster children by providing healthy food to the family assistance team under the care of policy makers and partners who act as foster fathers. Based on brief interviews, it is known that the form of care provided by foster fathers includes the distribution of benefit packages and education on fostering patterns to parents of foster children. Based on the information obtained, it is also known that in Takalar District there is a change in the scheme related to the distribution of benefit packages, which was originally carried out by direct distribution to foster children, while the latest scheme is carried out through Dashat (Healthy Kitchen), so the foster father's assistance is accommodated by the sub-district TPK then later will be processed by each TPK in the village to be made into PMT and then distributed evenly every day to foster children.

This study focuses on the outcomes before and after six months of the program. The data used is under-five measurement data based on EPPGBM (Electronic Community Based Nutrition Recording and Reporting).

The prevalence data of stunting cases used is data for 2022 and 2023, to find out changes in the prevalence of stunting in each sub-district for more details can be seen in the following table.

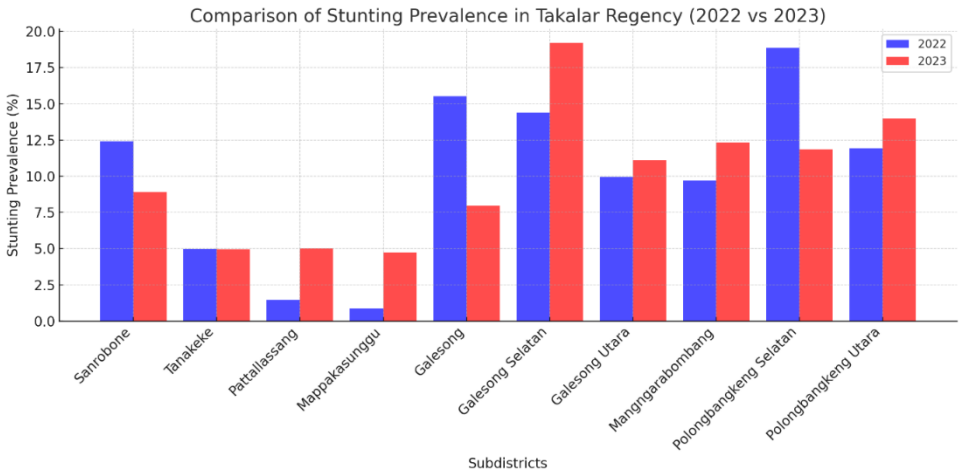

Figure 1. Stunting Prevalence Data by Sub-district in Takalar Regency in 2022-2023, Source: EPPGM, 2024

Based on the data above, it shows that not all sub-districts in Takalar Regency experienced a decrease in stunting prevalence. Of the 10 sub-districts, 5 sub-districts experienced an increase in stunting prevalence and 5 sub-districts experienced a decrease in stunting. Nevertheless, in 2022 there was a decrease in the prevalence of stunting cases in Takalar District from 10.56% in 2022 to 10% in 2023.

Several subdistricts experienced an increase in stunting rates, namely Pattallassang, which rose from 1.44% (35 cases) to 5.01% (85 cases), Mappakasunggu, which increased from 0.87% (21 cases) to 4.72% (80 cases), and Galesong Selatan, which saw a rise from 14.39% (349 cases) to 19.22% (326 cases). This increase can be attributed to several factors. First, limited access to nutritious food, as some subdistricts face challenges in obtaining high-quality food. Second, issues in program socialization and implementation, as not all areas receive optimal coverage of the BAAS program, leading to uneven intervention distribution. Third, environmental and sanitation factors, as some subdistricts still struggle with poor hygiene and limited access to clean water, contributing to chronic malnutrition issues.

Child Nutrition Status

Table 1. Frequency Distribution Data of Outcomes of the Foster Father Program for Stunting Children Based on Z-score Before and After the Program

Nutritional Status	Before		After	
	n	%	n	%
Category TB/U				
Severely Stunted	274	29.1	84	8.9
Stunted	668	70.9	108	11.5
Normal	0	0	687	72.9
High	0	0	63	6.7
Category BB/U				
Severely Underweight	149	15.8	33	3.5
Underweigh	266	28.2	93	9.9
Normal	520	55.2	794	84.3
Overweight	7	0.7	22	2.3
Total	**942**	**100**	**942**	**100**

Source: Secondary Data EPPGM 2024

Based on Table 1, the data on the distribution of children's nutritional status based on TB/U before and after the implementation of the BAAS program based on the Z-score shows significant changes in children's nutritional status before and after the program implementation. Before the program was implemented, 274 children (29.1%) fell into the "Very Short" category, while after the program, this number decreased to 84 children (8.9%). In addition,

children in the "Short" category also decreased significantly from 668 children (70.9%) to 108 children (11.5%) after the program.

Data on the distribution of children's nutritional status based on BB/U before and after the implementation of the BAAS program based on Z-score showed significant changes in children's nutritional status before and after the program implementation. Before the program was implemented, 149 children (15.8%) fell into the "Very Poor" category, while after the program, this number decreased to 33 children (3.5%). In addition, children in the "Less" category also decreased significantly from 266 children (28.2%) to 93 children (9.9%) after the program.

The effect of the Foster Parents for Stunting Children (BAAS) Program on Stunting Reduction

Table 2. *Wilcoxon Signed Rank Test* Data of BAAS Program Outcomes Based on *Z-score* Before and After the Program

Antropometric Measurements	n	min	maks	mean±SD	P Value
Z-Score TB/U					
Before	942	-6.65	2.01	-2.78±0.68	0.000
After	942	-8.41	8.68	-0.40±2.16	
Z-Score BB/U					
Before	942	-5.67	1.64	-1.83±1.13	<0.001
After	942	-4.16	2.64	-0.91±1.04	

Source: Secondary Data EPPGM 2024

Based on the *Wilcoxon Signed Rank Test* in Figure 1, it is known that there is a statistically significant difference between the Z-score TB/U and BB/U before and after the BAAS program with a mean *Z-score* TB/U before the program of -2.78 and BB/U of -1.83 and a mean *Z-score* TB/U after the program of -0.40 and BB/U of -0.91. Based on the *p-value* of Z-score TB/U and BB/U showed a very small value for Z-score TB/U of 0.000 (<0.05). and BB/U of <0.001. This suggests that the program is effective for improving nutritional status and can reduce stunting and wasting in Takalar District.

DISCUSSION

The results of the program achievements in Takalar District are in line with research conducted by Fitrauni (2022) which states that the Regional Government of Sigi Regency has made efforts to accelerate stunting reduction by implementing the pillars of the stunting reduction strategy through the implementation of 8 convergence actions, one of which is the Foster Parents for Stunting Children (BAAS) program which broadly shows a decrease in the percentage of stunting cases in the last 1 (one) year, where in 2020 it was 16.59% which fell to 14.40% in 2021. Efforts to accelerate the reduction of stunting that have been carried out through convergence actions can be seen that all activities carried out have been planned, directed and allocated to support priority activities, especially to increase the coverage and quality of nutrition services, especially the 1000 HPK intervention (13).

The same thing as research conducted by Rahmadani (2023) found that the Lubuk Pakam sub-district performance process was successful in responding to and handling stunting in Lubuk Pakam sub-district so that it experienced a rapid decline starting from applied stunting which showed a rate of 13.9% in 2021 to reach 12.5% in 2022. With the various progresses designed and carried out by the sub-district PPKS which are channeled to the community as well as building targets to achieve success. The purpose of this research was conducted in order to see the performance process of the Lubuk sub-district, namely building health facilities and holding routine stunting counseling, showing a good effort by the government in responding to this stunting. The results of the study were also successful in undergoing two holsic intervention points which were successful in holding routine counseling on stunting and the creation of various health facilities and infrastructure (14).

Complementary feeding in rural Ethiopia has also been shown to reduce child undernutrition. To improve child nutritional status and feeding and hygiene behaviors in rural Ethiopia, a community-based participatory nutrition promotion program (CPNP) was designed, adapting positive deviation theory. The program was implemented to complement the existing Essential Nutrition Action (ENA) and Community Based Acute Nutrition Management (CMAM) programs. Of 2,064 (1,032 per group) child and mother pairs randomly selected from locally prepared child registers in Habro and Melka Bello districts, 1,790 children aged 6 to 12 months and their mothers, 914 and 876 pairs in the control and intervention areas, respectively, were enrolled. The enrolled children were

followed for the next 12 months and measured for length and weight every three months. At each visit, mothers were questioned about the child's diet using a 24-hour-based dietary recall questionnaire, and infant and young child feeding (IYCF) practices monthly, while handwashing practices were asked every six months (15).

In this study, not all toddlers experienced changes in nutritional status from undernutrition to good nutrition. According to the researchers, this is because initially the height before the intervention based on ZS TB/U was only -3.40 and -3.25 which is the lowest limit of TB/U anthropometry. After the intervention for 31 days, the toddler experienced an increase in height by 1 while one did not experience an increase in height. Supplementary feeding aims to ensure that the toddler always gets all the nutrients needed in the right amount and there is no weight loss. The types of nutrients needed at the age of 1-5 years must include protein, fat, carbohydrates, vitamins and minerals, especially iron, because these substances are body builders (16).

The results of the study (Komalasari et al., 2021) show a p value: 0.000 which means there is a relationship between Supplementary Feeding (PMT) on weight gain and height of stunted toddlers. Thus, the lack of nutritional intake in foods in the form of iodine, amino acids and zinc is proven to be the etiology of stunting. (17). Therefore, the fulfillment of complete nutritional supplements has been shown to be effective in preventing stunting in children.In line with research (18). Based on acceptability, most of the toddler samples with acceptability of additional food consumption were good. For weight change, most of the samples of toddlers with weight change were up. Most of the samples of toddlers with the acceptance of additional food consumption with changes in body weight were good and increased. For changes in height or length, most of the toddler samples with changes in height or length were not increasing. Most of the samples of toddlers with the acceptability of additional food consumption with changes in height or length were good and did not increase.This research is used to overcome the problem of malnutrition. So that the impact of malnutrition in toddlers can be reduced. Therefore, it is very important to handle weight in toddlers with malnutrition status, one of which is with non-pharmacological treatment using additional food fortification which is carried out convergently (19).

Based on the research results obtained, there is a decrease in the stunting rate in Samarinda City by implementing this policy, this achievement is one of the objectives of utilizing this policy after it is managed by the Samarinda City Government. In this case, this impact is included in the Positive policy impact, because this impact is related to other health situations and targets outside of the initial target of the policy, namely the food assistance policy for stunted toddlers. The existence of the foster care program for stunted children has a good impact on the budget for handling nutrition for stunted babies / toddlers in Samarinda City in the last few months, which has been resolved since it was managed by the Samarinda City Government and all OPD and health worker stakeholders, which is relatively stable, without a high budget surge. This impact includes the type of policy impact on current conditions and future conditions, because in this case the resulting impact is in accordance with the conditions that occur at this time (20).

Food assistance for stunting sufferers is the state's responsibility to address stunting among 1.4 million at-risk families, according to BKKBN data. This assistance includes 1 kg of chicken meat and 10 eggs, as well as rice for 22.3 million people. Distribution began on September 11, 2023, prioritizing provinces like East Java, West Java, East Nusa Tenggara, Banten, North Sulawesi, and West Sulawesi. The aid targets pregnant women, breastfeeding mothers, and toddlers as part of the government's efforts to tackle food and nutrition crises and reduce stunting rates in Indonesia (21). The National Action Plan for RANPASTI, under the coordination of BKKBN, also calls for family assistance with food support through local food-based Family Nutrition Kitchens in villages. Corporate Social Responsibility (CSR) and public-private partnerships are expected to support these activities as a form of private sector contribution. Managing these programs as partnership projects can accelerate and make the initiative more efficient than relying solely on government management (22).

There are several factors. Government policies that have been implemented so far have not had a significant impact on alleviating food insecurity and improving the nutritional status of children under five because the emphasis of policies and programs often changes and is not sustainable. In addition, community and local government participation is still lacking, as if the policy is the responsibility of the central government. Therefore, in the future, it must be a common awareness that the fulfilment of food for each individual is a human right and its fulfilment is a common obligation, including the individual himself. Alleviating food and nutrition insecurity must be done comprehensively, considering that the causes of the problem are very diverse and complex with a broad perspective. With the concept of *food security and nutrition*, policies can be formulated by combining food policies and nutrition policies so that it is hoped that food and nutrition problems will be equally resolved (20). Integrated interventions

that simultaneously address all the factors that cause stunting and wasting hold great promise for reducing stunting and increasing human capital formation in South Asia and other countries (23).

To further understand the variability in program outcomes, this study considers the role of external factors, including community participation and resource allocation. Active community involvement, including parental commitment and local support networks, has been found to enhance the effectiveness of nutrition programs. In sub-districts where community engagement was high, program adherence and success rates were notably better. Conversely, areas with lower participation faced implementation hurdles, leading to less significant improvements in child nutrition. Additionally, the availability and distribution of resources played a crucial role in determining program outcomes. Adequate funding, access to nutritious food supplies, and trained personnel were critical factors influencing the program's reach and effectiveness. In areas with limited resources, the program encountered operational difficulties, potentially hindering its full impact.

To further enhance the effectiveness and implementation of the BAAS program, the following actionable recommendations are proposed: Strengthen Community Engagement: Increase awareness and participation by conducting regular workshops and educational programs for parents and caregivers on child nutrition and hygiene. Improve Resource Allocation: Secure long-term funding from government and private sector partnerships to ensure program sustainability and expansion. Enhance Monitoring and Evaluation: Implement a more comprehensive tracking system to monitor the nutritional progress of children and identify areas needing improvement. Standardize Implementation Across Regions: Develop guidelines and best practices to ensure uniformity and effectiveness in program delivery across different districts. Foster Multi-Sectoral Collaboration: Engage various stakeholders, including local government, NGOs, and private institutions, to create a more coordinated approach in tackling child malnutrition. Scale-Up the Program: Expand the BAAS model to other high-risk regions, adapting it to local socio-economic conditions to maximize impact. By implementing these recommendations, the BAAS program can continue to evolve and better serve children suffering from malnutrition, ultimately contributing to national efforts in reducing stunting rates.

Comparison with Previous Studies

Based on the literature review above, it can be concluded that there are several differences with previous research from the aspects of location, variables and type of program. Previous studies have only focused on one location and have not discussed in detail the variables of input, process, output and outcome of the implementation of the Foster Parents for Stunting Children (BAAS) program because previous studies only discussed the socialization of the program and several other stunting intervention programs and there has been no research related to the BAAS program conducted in South Sulawesi so that researchers are interested in discussing in more detail and conducting research related to the implementation of the stunting foster father program and comparing the impact of the BAAS program in two districts in the stunting locus in South Sulawesi Province.

Implications for Public Health

Providing knowledge and insight into the Foster Parents for Stunting Children (BAAS) program in Jeneponto and Takalar Districts, and increasing public awareness of the importance of stunting prevention efforts. The results of this study are expected to be used as a source of information and evaluation material that can be one of the bases for determining policies and improving performance in stunting reduction programs, especially in Jeneponto and Takalar districts.

Limitations and Concerns

Researchers only conducted in-depth interviews with the BKKBN Office, P2KBP3A Office and the Health Office. The description of programs carried out by other OPDs was only based on document review and information from the P2KBP3A Office so that no details were obtained about the implementation of programs implemented by other sectors that also contributed to accelerating stunting reduction in Jeneponto Regency.No direct measurement of program targets was carried out to see changes in nutritional status in toddlers who had been given interventions. However, researchers only took secondary data from the measurement results at Posyandu from the EPPGM data.

Recommendations for Future Research

Based on the insights gained from this study, future research should focus on examining the implementation of the BAAS program using different variables. Conducting direct measurements to the targets of the BAAS program to see the real impact and conducting research that focuses on deeply examining community perceptions of the BAAS program.

CONCLUSIONS

The BAAS program has demonstrated its effectiveness in improving the nutritional status of children in Takalar District. Data shows a decrease in the prevalence of stunting from 10.56% in 2022 to 10% in 2023. In addition, there were significant improvements in children's nutritional status, with a decrease in the number of children classified as "Very Short" and "Short", and an increase in the number of children classified as "Normal" and "Tall" after six months of the program. *Wilcoxon Signed Rank Test* results also showed statistically significant differences between TB/U and BB/U Z-scores before and after the program with p values <0.05, confirming that the BAAS Program is effective in improving nutrition and reducing stunting and wasting in Takalar District.

AUTHOR CONTRIBUTION STATEMENT

In this study, Dwi Santy Damayati was responsible for designing the research, collecting and analyzing data, and writing the main sections of the manuscript, including the introduction, methodology, results, and discussion. Azriful contributed to data processing, statistical analysis, result validation, and the interpretation of findings, as well as assisting in the preparation of the discussion and conclusion. Rudi Sumarlin played a key role in conducting the literature review, coordinating with relevant stakeholders, and reviewing and editing the final manuscript before submission. All authors have made substantial contributions to this research and have approved the final version of the manuscript.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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