Original Research

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THE EFFECTS OF SOCIAL ASSISTANCE PROGRAMS ON STUNTING PREVALENCE RATES IN INDONESIA

Pengaruh Program Bantuan Sosial Terhadap Tingkat Prevalensi Stunting di Indonesia

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Abstract

Background: Social assistance, such as Non-Cash Food Assistance (BPNT) and the Family Hope Program (PKH), are among the instruments used to eradicate stunting in the short and long term. Therefore, it is important to ensure its effective use by individuals.
Aims: This study aimed to review the effect of social assistance on stunting prevalence rates in Indonesia.
Methods: This research employs a quantitative approach, utilizing numerical measurements and statistical analysis. The data is secondary and sourced from the Central Bureau of Statistics and the Ministry of Finance. The specific method applied is the generalized method of moments (GMM) dynamic panel regression. The research sample encompasses panel data from 34 provinces from 2015 to 2021. This study utilizes the indicator of very short height for children less than five years of age as a proxy for stunting. Furthermore, low height in children is adopted as a measure of stunting. Furthermore, this study adopted a measure of low height in children to indicate stunting.
Results: The results showed that social assistance negatively affected stunting, supported by various other indicators such as the proportion of proper sanitation, the average length of schooling, protein consumption, and drinking water sources. Meanwhile, excessive calorie consumption increased stunting in a certain period.
Conclusion: In this condition, government social assistance was urgently needed since access to the lowest decile households increased stunting rates. The practical implications for policy derived from these findings involve optimizing the efficiency of social assistance initiatives, emphasizing the significance of addressing environmental factors in programs aimed at preventing stunting, integrating health and nutrition initiatives, and implementing educational campaigns within communities to raise awareness about calorie consumption.

Keywords: child health, social assistance, stunting, toddlers

Abstrak

Latar Belakang: *Bantuan sosial seperti Bantuan Pangan Non Tunai (BPNT) dan Program Keluarga Harapan merupakan salah satu instrumen yang diperlukan dalam rangka mengentaskan stunting dalam jangka pendek dan panjang. Untuk itu, perlu intensifikasi bantuan sehingga masyarakat dapat menggunakannya dengan baik.*
Tujuan: *Penelitian ini bertujuan untuk meninjau pengaruh bantuan sosial terhadap pengendalian stunting di Indonesia.*
Metode: *Penelitian ini menggunakan pendekatan kuantitatif dengan pengukuran yang bersifat numerik dan menggunakan analisis statistik. Data yang digunakan adalah data sekunder yang diperoleh dari Badan Pusat Statistik dan Kementerian Keuangan. Metode yang diterapkan adalah regresi panel dinamis* generalized method of momments (GMM). *Sampel penelitian mencakup data panel dari 34 provinsi yang diamati selama periode 2015-2021. Penelitian ini menggunakan tinggi badan sangat pendek untuk usia balita sebagai proksi dari stunting.*
Hasil: *Hasilnya menunjukkan bahwa bantuan sosial berpengaruh negatif terhadap stunting didukung oleh berbagai indikator lainnya seperti proporsi sanitasi layak, rata-rata lama sekolah, konsumsi protein, dan sumber air minum. Sementara itu, dugaan konsumsi kalori berlebihan justru berdampak pada peningkatan stunting dalam kurun waktu tertentu.*
Kesimpulan: *Pada kondisi ini, bantuan sosial dari pemerintah sangat diperlukan mengingat akses rumah tangga desil terbawah terkadang berpotensi meningkatkan angka stunting. Implikasi kebijakan dari temuan ini diantaranya adalah optimasi program bantuan sosial, menyoroti pentingnya perhatian terhadap aspek lingkungan dalam program pencegahan stunting, integrasi program kesehatan dan gizi, serta program edukasi masyarakat tentang konsumsi kalori.*

Kata kunci*: balita, bantuan sosial, stunting, kesehatan anak*

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Introduction

Parents are expected to anticipate exceptional growth and development of their children. However, the expectation is not achieved due to malnutrition-related challenges. In a study conducted by the Ministry of Health, 10.2% of Indonesian children weighed less than 2500 grams, 19.6% exhibited abnormal weight indicative of malnourishment, while 32.2% experienced stunting (Ministry of Health, 2018). The developmental delays were experienced due to malnutrition, and the impact resulted in stunting. According to the World Health Organization (WHO) definition, stunting is manifested when the height of children is minus two standard deviations of the growth median for their age (WHO, 2022). Consequently, stunting children are shorter than their peers of the same age group.

The Indonesian Nutrition Status Survey (SSGI) showed that the prevalence of stunting decreased from 24.4% in 2021 to 21.6% in 2022 (Ministry of Health RI, 2023). Even though a decrease was experienced in 2022, the condition remained a severe problem for children health. Wardani *et al*. (2022a) stated that stunting causes a decline in cognitive, language, and motor functions as well as several degenerative diseases. This statement was supported by President Joko Widodo at the BKKBN National Work Meeting, where the condition was reported to be dangerous for children's development, leading to poor learning abilities, mental retardation, and chronic diseases (Bureau of Communication and Public Service, 2023). Tampy *et al.* (2020) stated that normal children could improve their cognitive abilities. Therefore, the condition can affect the quality of human resources in the future.

The causes of stunting are very complex and previous studies showed that there was the influence of maternal factors such as height, age during pregnancy, duration of breastfeeding, dietary nutrition during pregnancy, and maternal education level on the increased risk (Beal *et al.*, 2018; Nurbiah, Rosidi and Margawati, 2019; Tyas and Setyonaluri, 2022; Wardani, Nurrochmah and Mawarni, 2022a). Furthermore, stunted mothers with low education increase the likelihood of stunting (Widyaningsih *et al*., 2022). A large number of children living at home under age five and the lack of mothers attending antenatal care services can also increase the risk (Titaley *et al*., 2019).

In another study, Kandpal *et al*. (2016) examined the Conditional Cash Transfer (CCT) program, one of which was Pantawid for stunting in the Philippines. The program had a significant effect on reducing stunting by using cross-sectional data and providing cash transfers to poor households for education, children's health, and maternal health services. Meanwhile, Muhtar *et al*. (2022) showed that social assistance programs, as measured through the Family Hope Program (PKH) and the Staple Food Program, reduced stunting in Blora, Central Java.

In several previous studies, stunting has often focused on socioeconomic factors and household characteristics (Akbar, Mahardhika and Sihaloho, 2021), as well as maternal (Beal *et al*., 2018; Nurbiah *et al*., 2019; Tyas and Setyonaluri, 2022; Wardani *et al*., 2022b;) and environmental factors (Irianti *et al*., 2019; Cameron *et al*., 2021; Nizaruddin and Ilham, 2022). Furthermore, there are studies linking stunting to food prices (Ilman and Wibisono, 2019). While only a few studies have directly linked cases of stunting to cash assistance programs like Indonesia's PKH, the program does contain elements that can potentially contribute to addressing stunting. Though not specifically designed to tackle stunting, PKH provides financial assistance to households, which can improve their access to nutritious food and essential health services. Therefore, the impact of direct assistance on stunting in Indonesia was examined. This study contributes to the reduction of stunting and provides an overview of the importance of direct cash assistance to improve children's nutritional status, impacting health and decreasing the condition.

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Table 1. Definition of Study Variables

	Variable	Acronym	Definition	Unit	Source
Dependent	Stunting	$Stunting_{it}$	The prevalence of (very short) in children under 5 years/children	Percentage	BPS
Independent	Social Assistance	SA_{it}	Realization of social assistance funds for each province	Percentage	Ministry of Finance
	Sanitation	$Sanitation_{it}$	Households by province and have access to proper sanitation	Percentage	BPS
	Sanitary Proportion	$Sanitary\_Prop_{it}$	Proportion of households that have access to proper sanitation services	Percentage	BPS
	Mean Years School	MYS_{it}	The average number of years spent by residents aged 15 and over	Years	BPS
	Prevalence of Undernourishment	PoU_{it}	An estimate of the proportion of a given population, for which the usual daily energy consumption from food is not sufficient to meet the required energy level	Percentage	BPS
	Average calorie consumption	$Calorie_{it}$	Average calorie consumption for each province	Percentage	BPS
	Average protein consumption	$Protein_{it}$	Average protein consumption for each province	Percentage	BPS
	Internet access	$Internet\_urban_{it}$	Households that have accessed the internet in 3 last month in urban	Percentage	BPS
		$Internet\_rural_{it}$	Households that have accessed the internet in 3 last month in the rural	Percentage	BPS
	Source of drinking water	SDW_{it}	Households with an adequate source of drinking water in urban and rural	Percentage	BPS
		SDW_urban_{it}	Households with an adequate source of drinking water in urban	Percentage	BPS
		SDW_rural_{it}	Households with an adequate source of drinking water in rural	Percentage	BPS

Method

In this study, a quantitative method was used with a stochastic model to consider the existence of variables with a probability distribution (Gujarati, 2004). In addition, Generalized Method of Moments (GMM) was used to estimate parameters in dynamic panel data and overcome autocorrelation as well as heteroscedasticity problems. GMM equated the moment from the sample condition to the population. Robustness check was carried out to ensure validation of the estimation results.

This study utilizes secondary data from a panel of 34 Indonesian provinces from 2015 to 2021. The data are sourced from the Central Bureau of Statistics and cover fundamental aspects relevant to stunting, including information on sanitation, malnutrition, education, calorie and protein consumption, and access to clean water. Additionally, the Indonesian

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Ministry of Finance obtained data on local government spending within the social sector, a crucial component of the relevant social security landscape. The starting point of 2015 aligns with the national trend in stunting reduction, while 2021 is the most recent data available across all provinces. Detailed variable definitions are provided in Table 1.

Based on previous study, social assistance programs negatively affect stunting (Aizawa, 2020; Jibril, Puspitarini and Nawangsih, 2022). Programs such as PKH play an essential role in improving the nutritional status of children and can indirectly reduce stunting rates. In addition, sanitary conditions are an essential part of reducing this condition. Several studies showed that proper sanitation was negatively related to the condition (Rah *et al*., 2020; Gizaw *et al*., 2022). Children with proper sanitation are 29% less likely to experience the problem than those with poor sanitation (Rah *et al.,* 2020). Meanwhile, the educational level of parents negatively correlates with stunting (Casale, Espi and Norris, 2018; Chowdhury *et al*., 2022). Insufficient food consumption has a positive relationship with the prevalence (Wardani, Wulandar and Suharmanto, 2020). In the severe category, stunting children are mostly from families with insufficient food consumption or insecurity.

Nutritional status, measured by calories and protein, correlates with stunting. Caloric intake has a negative correlation (Logarajan *et al*., 2023) and can reduce the prevalence. However, some studies stated that the proportion of calories from carbohydrates and protein was not a predictor of the condition (Pratiwi, Irawan and Hidayat, 2019). Protein intake negatively correlates with stunting (Ernalia *et al*., 2018; Rizal, Haya and Maigoda, 2022) and can reduce the incidence. Nutrition, particularly in the form of protein, plays an important role in supporting the growth of children. The absence or deficiency of this essential substance can significantly hinder their development (Rahayu *et al*., 2020). Other variables, such as internet access, negatively affect stunting (Huo *et al*., 2022). Accessing the internet facilitates the acquisition of related information, prevention, and effective strategies for overcoming the condition (Talib *et al*., 2021). The source of drinking water also affects the prevalence. Households with access to proper drinking water sources can reduce stunting (Gupta and Santhya, 2020). Children with an adequate source of drinking water are more likely to prevent the condition than those with access to inadequate drinking water (Mzumara *et al*., 2018; Sunardi *et al*., 2021).

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
stunting	238	10.963	3.551	4.192	22.028
lnSA	238	4.602	1.449	1.662	8.784
sanitation	238	71.056	14.427	23.9	97.12
sanitary_prop	238	70.839	14.539	23.37	97.12
MYS	238	8.838	.879	6.27	11.2
PoU	238	10.785	8.422	1.43	38.35
lnCalorie	238	7.632	.067	7.432	7.841
lnProtein	238	4.074	.109	3.648	4.341
internet_urban	238	76.158	12.121	39.51	95.44
internet_rural	238	47.548	20.65	0	83.4
SDW (Source of drinking water)	238	76.736	12.449	37.35	99.86
SDW_urban	238	65.489	18.156	0	94.55
SDW_rural	238	88.01	7.714	55.34	99.86

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Table 3. Estimation Results of the Effect of Social Assistance on Stunting Prevalence

	(1) stunting	(2) stunting	(3) stunting	(4) stunting	(5) stunting	(6) stunting
_cons	-57.721	23.381	18.74	-98.461***	77.753	-14.724
	(35.688)	(40.311)	(49.529)	(35.865)	(52.333)	(35.062)
L.stunting	.097*	.166***	.164***	.28***	.266***	.491***
	(.056)	(.059)	(.052)	(.052)	(.062)	(.043)
L.lnSA	-.256**					
	(.116)					
L2.lnSA		-.532***	-.44***	-.624***	-.236*	-.584***
		(.126)	(.145)	(.102)	(.132)	(.125)
sanitation	1.078*	2.419***	2.67***	2.668***	3.326***	3.721***
	(.55)	(.834)	(.865)	(.903)	(.86)	(.963)
sanitary_prop	-1.089**	-2.378***	-2.637***	-2.572***	-3.307***	-3.623***
	(.553)	(.84)	(.862)	(.91)	(.868)	(.971)
MYS	-5.912***	-3.462**	-3.14*	-2.468**	-4.241**	-4.12**
	(2.26)	(1.505)	(1.611)	(1.005)	(2.001)	(1.894)
PoU	.131**	-.061	-.089**	-.065	.037	.131**
	(.063)	(.047)	(.043)	(.058)	(.031)	(.052)
lnCalorie	14.884*	17.979***	18.938**	36.545***	-4.859	5.925
	(8.144)	(6.773)	(8.404)	(9.218)	(5.555)	(4.978)
lnProtein	-.048	-30.25***	-32.178***	-39.491***		
	(7.05)	(7.727)	(9.314)	(12.093)		
internet_urban	-.038	-.045		.061		.03
	(.051)	(.045)		(.053)		(.061)
internet_rural	.191***	.128***	.129***		.127***	
	(.033)	(.025)	(.026)		(.033)	
SDW	.011					
	(.025)					
SDW_urban		-.008	.004		-.015	
		(.026)	(.023)		(.023)	
SDW_rural		.028*		.046***		.057***
		(.016)		(.017)		(.017)
Observations	204	170	170	170	170	170
Province	34	34	34	34	34	34
Time Effect	Yes	Yes	Yes	Yes	Yes	Yes
Province Effect	Yes	Yes	Yes	Yes	Yes	Yes
Robust	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R^2	.z	.z	.z	.z	.z	.z

Standard errors are in parentheses
*** p<.01, ** p<.05, * p<.1
SDW: Source of drinking water
Source: Results of the author's estimation

The effect of social assistance programs can be estimated using dynamic panel regression in the form of GMM. In this study, GMM with a variable lag term was constructed to analyze the impulse response to changes in social assistance units. The transmission of the Arrelano-bond and Sargan post-estimator tests is better and more accessible from the classic problems of autocorrelation and heteroscedasticity (Arellano and Bond, 1991; Arellano and Bover, 1995), and the empirical model is shown as follows.

$$Stunting_{it} = lnSA_{it} + sanitation_{it} + sanitary_{prop_{it}} + MYS_{it} + PoU_{it} + lnCalorie_{it} + lnProtein_{it} + Internet_{urban_{it}} + Internet_{rural_{it}} + SDW_{it} + SDW\_urban_{it} + SDW\_rural_{it} + u_{it}$$

Result and Discussion

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Descriptive Statistics

Table 2 shows descriptive statistics and stunting data has an average of 10,963, where the prevalence rate is not too high. The natural logarithm of social assistance also spreads, making it more accurate with the average value. Furthermore, 70,839 households have proper sanitation, and the average length of schooling as measured from years spent by residents aged 15 years and above is nine years or in the Junior High School category. The average insufficient food consumption is 10.785%, which means there are still people who consume food, but slightly less than their energy needs. The nutritional condition as measured by consuming calories and protein has also been shown sufficiently. There is more internet access in cities but the feasibility of drinking water sources in villages is far greater than in cities.

Estimation Results

Table 3 presents the results of regression estimates and focuses on social assistance. The coefficients show that the prevalence of previous stunting has a positive effect on the current result. Specifically, a 1% increase in the previous stunting prevalence leads to an estimated 0.097% increase in the current stunting prevalence. Meanwhile, social assistance consistently has a negative and significant correlation with the prevalence at lag1 and lag2. This suggests that a 1% increase in social assistance in the past year (lag1) is associated with a 0.256% decrease in the current stunting prevalence. Furthermore, the presence of social assistance even one period earlier (lag2) is also consistently associated with a decrease in the current prevalence of stunting. The percentage of households with proper sanitation positively affects the prevalence. However, the proportion of households with proper sanitation is negatively correlated and relatively consistent by adding or subtracting other variables. These results indicate that the higher the proportion of households with proper sanitation, the lower the prevalence of stunting. As seen in the first estimate, when the proportion of proper sanitation increases by 1%, it reduces the prevalence of stunting by 1.08%. Level of education also has a negative and significant effect on the occurrence of stunting. It means the higher the education level, the lower the stunting prevalence rate. In the first estimate, increasing education by one year can reduce the stunting prevalence rate by 5.912%. Insufficient food consumption seen from equations 1 and 6 causes stunting. In the first estimate, when the prevalence of undernourishment increases by 1%, it can increase the prevalence of stunting by 0.131%. Calorie and protein consumption have a positive and negative correlation with the variable. Finally, the percentage of access to the internet and a source of proper drinking water in the village is positively correlated with the prevalence. This suggests that while both internet access and a source of proper drinking water are available within the village, there is still room for improvement in their accessibility or quality.

Discussion

According to Minister of Finance Regulation No 254/PMK.05/2015, Social Assistance Expenditures at State Ministries/ Institutions are in the form of transfers of money, goods, or services provided by the Government to protect society from possible social risks, increase economic capacity, and community welfare. In this context, the concept plays an important role in mitigating social vulnerability, particularly in addressing issues such as stunting. This enables individuals to lead healthy, intelligent lives and give birth to the next generation, free from the burden of stunting.

Social assistance provided is in the form of material and non-material (Ministry of Social Affairs, 2021). Material assistance is usually through programs such as the Smart Indonesia Program (KIP), the National Health Insurance Program (JKN), PKH, and Non-Cash Food Assistance (BPNT). Meanwhile, non-material assistance is provided through psychoeducation at the Family Development Session (FDS). This form of material and non-material assistance can

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be used as well as possible by the community following its designation.

The estimation results have a negative correlation with the prevalence of stunting. The results are in line with the study by Kandpal *et al*. (2016), Aizawa (2020), and Jibril *et al*. (2022), where the existence of social assistance programs reduces the prevalence. Furthermore, the program can be used for spending on children needs by fulfilling nutritious food, which will have a good impact on their growth and development. It is undeniable that social assistance is not used according to children's needs but for other needs. Therefore, socializing and educating the public regarding the importance of maintaining children care and nutrition is important.

The percentage proportion of households with access to proper sanitation services also negatively correlates with the prevalence of stunting. This follows the results of study by Rah *et al*. (2020) and Gizaw *et al*. (2022), where it was found that proper sanitation conditions reduce the prevalence. Sanitation factors include the use and ownership of latrines, defecation behavior, and disposal of children's feces in latrines. Furthermore, open defecation can cause developmental delays in children (Bagcchi, 2015) and this behavior contaminates the environment due to the spread of bacteria in feces. Several bacteria can enter the intestines when children touch bacteria and suck their fingers, leading to potential consequences such as appetite disruption, and malnutrition, contributing to the prevalence.

A high level of parental education also reduces the prevalence of stunting. This is in line with Casale *et al*. (2018) and Chowdhury *et al*. (2022), where parents' education level negatively correlates with the condition. Parents find it easier and faster to access health information, impacting the growth and development of children with higher education. Even the level of a mother education greatly affects the health of children. This is related to the significant role of forming the habit of eating nutritious food. Therefore, the level of education is closely related to nutritional knowledge in children.

The prevalence of stunting is also associated with insufficient food consumption. Insufficient food consumption has a positive correlation with the prevalence and, according to Wardani *et al*. (2020), stunting children tend to come from families with insufficient food intake or insecurity. Inadequate food consumption affects the nutritional adequacy of families, specifically for mothers and children. Lack of nutrition negatively impacts children's growth and leads to stunting.

The estimation results showed that calorie consumption had a positive correlation, but in the correlation matrix, calorie and protein consumption negatively impacted stunting. According to Ernalia *et al*. (2018), Logarajan *et al*. (2023), and Rizal, Haya, and Maigoda (2022), the better the nutrition of children as measured by the consumption of sufficient calories and protein, the less likely there will be a risk of stunting. Protein is needed to develop every cell in the body and maintain immunity (Rizal, Haya and Maigoda, 2022). Calorie intake containing carbohydrates is also the most important energy source for children to experience good growth and be free from malnutrition problems.

Access to the internet and a source of proper drinking water in the village is positively correlated with the prevalence of stunting. This is in contrast to studies by Mzumara *et al*. (2018), Gupta and Santhya (2020), Sunardi *et al*. (2021), and Talib *et al*. (2021), where internet access and adequate drinking water sources are found to reduce the condition. Internet access reflects the possibility that parents have not fully used available resources. In addition, they are not using the access to seek information or knowledge related to the condition but for other purposes. This limited use may not yield significant results in the prevention of the condition. Similarly, proper drinking water sources in the village positively correlate with stunting. The category of having access to a reliable source of drinking water may not necessarily reflect the actual condition for all activities, including drinking, cooking, and toileting. Some households in rural areas still use inadequate water sources for bathing and washing (Nurhidayati and

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Riyadi, 2022). These efforts have also not yielded significant results in terms of improving access to safe drinking water sources within the village and reducing the prevalence of stunting.

This study also had various limitations, for example, the potential for proper sanitation was expanded directly. Furthermore, internet access, which should open up knowledge and information, had a positive impact on increasing stunting. Future research needs to simulate some of the methods used. The positive association between internet access and increased stunting requires further analysis. Research can examine the internet content accessed, the extent to which the information obtained is helpful or even counterproductive to children's health, and identify factors that can increase the effectiveness of sanitation in reducing stunting.

Conclusion

In conclusion, this study was conducted to analyze social assistance programs on the prevalence of stunting in Indonesia. Based on the estimation results, direct social assistance from the government reduced the potential within a certain period. Adequate sanitation and proportions had positive and negative effects on stunting. Meanwhile, the average length of schooling, protein consumption, urban internet access, and rural drinking water sources negatively affected stunting.

Insufficient food consumption, calorie consumption, and drinking water sources in urban areas positively affected stunting. This indicated that the higher assistance given to certain decile people also promoted an increase in decent consumption. However, the increase required specific information from internet accessibility and the availability of food sources as well as water in the surrounding environment. The role of the highly educated head of household promoted knowledge and provided insight into healthy consumption. This potential also depended on the good quality of the surrounding environment to reduce the prevalence.

The implications of this study highlight the importance of various factors in reducing stunting. Comprehensive regulatory efforts are essential to reduce the prevalence of stunting significantly. If used effectively by families, social cash transfers can significantly reduce stunting by helping them meet their children's nutritional and health needs. Through this program, beneficiary families receive cash to buy more nutritious food and access essential health services such as immunizations and regular check-ups. In the long run, cash transfers can improve families' overall social and economic conditions, leading to increased access to essential resources for improving child health.

This study's novelty lies not only in highlighting the significant role of social cash transfers in indirectly reducing stunting but also in linking it to various factors affecting family well-being. These factors include socioeconomic status, health (encompassing nutrition and water sources), and access to information, including the internet. By examining these interconnected aspects, this research provides a valuable foundation for policymakers and relevant agencies to design more effective stunting reduction policies that address the multidimensional nature of the problem.

Abbreviations

WHO: World Health Organization, BKKBN: National Family Planning Coordinating Board; PKH: Family Hope Program, KIP: Smart Indonesia Program, JKN: National Health Insurance Program, BPNT: Non-Cash Food Assistance.

Declarations

Ethics Approval and Consent Participant

Not applicable.

Conflict of Interest

The authors declare that there are no significant competing financial, professional, or personal interests that might have affected the performance.

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Not applicable.

Authors' Contribution
SM, MNF, and SRA conceptualized the study; created the methodology; wrote, reviewed, and edited the manuscript; and wrote the original draft.

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