



## Family characteristics as risk factors of stunting among children age 12-59 month

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### ABSTRACT

*Stunting in children (low height for age) increases morbidity and mortality rate. It can lead to poor intelligence and productivity, and degenerative diseases. The objective of this research was to investigate the associations of family characteristics with stunting in children aged 12-59 months who visited the integrated health posts in Ratu Samban District, Bengkulu City. The hypothesis of this research was there were associations of family characteristics with stunting in children aged 12-59 months who visited the integrated health posts in Ratu Samban District, Bengkulu City. This research was conducted in June, 2017. The type of the research was Analytical Survey and the design was Cross Sectional. The subject was mothers of children aged 12-59 months who visited the integrated health posts in Ratu Samban District, Bengkulu City. The sampling technique was Accidental Sampling and the sample number was 102 mothers. The data were collected by questionnaires and anthropometric assessment. Chi-Square ( $\chi^2$ ) test was used to assess the associations of family characteristics with stunting. The result showed that of 102 mothers, 32 mothers (31,37%) had stunted children. Family characteristics (maternal height ( $p=0.257$ ), maternal education ( $p=0.455$ ), paternal education ( $p=0.250$ ), total of family member ( $p=0.245$ ), and income of family head ( $p=0.320$ ) were not associated with stunting and maternal knowledge ( $p=0.003$ ) was associated with stunting. The researchers suggest to the community health center and the integrated health post can conduct nutrition education, and especially about stunting more intensively to increase the knowledge of productive woman, pregnant woman, and mother of children.*

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## INTRODUCTION

The success of a nation's national development is determined by the availability of quality human resources (HR), namely human resources who have strong physical, strong mentally, and excellent health, in addition to mastery of science and technology. Malnutrition can damage the quality of human resources (Atmarita, 2004).

*Stunting* (short) is one of the problems of malnutrition in Indonesia. As in other developing countries, stunting is a common thing in Indonesia (ACC / SCN, 2000). *Stunting* is the result of measuring the nutritional status of children under five as seen from the TB/U indicator that describes the chronic nutritional status (Thaha, 1996). This means that it arises as a result of long-standing conditions such as poverty, inappropriate parenting, often suffering from recurrent disease due to poor *hygiene* and sanitation (Supariasa, Bakri, & Fajar, 2002).

*Stunting* in children under five has an effect on morbidity and mortality. In the short term can increase the risk of suffering from infectious diseases such as diarrhea, measles, respiratory tract, and malaria, thus disrupting the growth process. Long-term effects can reduce the development of children so that the level of intelligence during school and work productivity at productive age decreases, as well as resulting in lower incomes than those who have a normal nutritional status. In addition, in adulthood, *stunting* children have the risk of suffering from obesity and other metabolic complications, which in turn are more at risk of suffering from degenerative diseases such as heart and blood vessel disease (Uauy, Kain, & Kovarlan, 2011).

Malnutrition problems if left untreated will cause greater problems. Indonesian people can experience *lost generation*. Stunting will have an impact on growth, health, development, and productivity (Soekirman, 2005). The potential economic loss due to stunting in infants in Indonesia reaches Rp. 1.7 million / person / year or Rp.

71,000,000.00 / person for 49 years (productive age 15-64 years) based on 2014 Central Bureau of Statistics (BPS) data (Renyonet, Martianto, & Sukandar, 2016).

Around 178 children aged less than 5 years have stunted. These toddlers live mostly in Sub Saharan Africa, South and Central Asia (Black et al., 2008). A total of 160 million *stunting* children (90.0%) came from 36 countries and had a percentage of 46.0% of the 348 million children in the country (Bhutta et al., 2008). The national stunting prevalence in 2013 was 37.2%, consisting of 18.0% very short and 19.2% short. In 2013, the prevalence of very short showed a decrease, from 18.8% in 2007 and 18.5% in 2010. Short prevalence increased from 18.0% in 2007 to 19.2% in 2013 (Indonesian Ministry of Health, 2013).

Based on Riskesdas data in 2007, the prevalence of *stunting* in infants in Bengkulu Province was 36.0% (Ministry of Health Republic of Indonesia, 2008), while the prevalence of stunting in toddlers in Bengkulu Province in 2010 amounted to 31.6% (Ministry of Health RI, 2010). Bengkulu Province is one of the provinces that has a stunting prevalence above the national stunting prevalence in 2013 (Ministry of Health Republic of Indonesia, 2013). Based on the results of a Nutrition Status Monitoring (PSG) survey conducted by the Bengkulu Provincial Health Office in 2015, the prevalence of stunting in Bengkulu Province was 29.0% (Bengkulu Provincial Health Service, 2015) which according to WHO standards is a public health problem in the moderate category.

Maternal height affects the linear growth of offspring during the growth period, related genetic and non-genetic influences, one of which is nutrition (Addo et al., 2013). Research in India found the correlation between maternal height and the incidence of stunting. Only one centimeter increase in maternal height will reduce the risk of

*stunting* (Subramanian, Ackerson, Smith, & John, 2009).

The interaction between maternal height and linear growth of children is related to genetic factors and the mother's environment such as hygiene, nutritional intake, and reproductive health ((Sinha et al., 2018); (Addo et al., 2013)). Short-bodied mothers may have inadequate anatomy and metabolic systems which can have an impact on the health of the mother and fetus, such as low glucose concentrations, and lack of protein and energy stores ((Sinha et al., 2018); (Murphy, Smith, Giles, & Clifton, 2006); (Lowy, 1994)). Mothers who have a short body size have a smaller reproductive organ size and the size of the uterus are limited for fetal growth (Duggleby & Jackson, 2001); (Ibáñez, Potau, Enriquez, & De Zegher, 2000)).

Family economic status and parental education are also risk factors for stunting in infants (Fernald & Neufeld, 2007). Research conducted in North Maluku shows that father's income and occupation are risk factors for stunting (Ramli et al., 2009). Family size, number of children under five in the household, mother's occupation, exclusive breastfeeding, duration of breastfeeding, and complementary feeding methods are associated with stunting (Fikadu, Assegid, & Dube, 2014). Based on the research of Semba et al., The prevalence of stunting in children under five whose family size is more than 4 people is 51.6%, although it is not statistically related (Semba et al., 2008).

The prevalence of stunting in toddlers in Bengkulu City in 2013 was 21.07%. The prevalence of stunting in infants in Ratu Samban District Bengkulu City in 2014 was 20.33%. This prevalence is the highest prevalence when compared to 8 other districts in Bengkulu City and above Bengkulu City prevalence which is only 7.07% (Bengkulu City Health Department,

2014). If the prevalence of stunting is above 20.0%, it is still a public health problem (RI Ministry of Health, 2010). Based on WHO standards (WHO, 1997), the prevalence of stunting in Ratu Samban District in 2014 is still in the medium category.

Based on the results of a PSG survey conducted by the Bengkulu Provincial Health Office in 2015, the prevalence of stunting in children under five in Bengkulu City was 14.8% (Bengkulu Provincial Health Office, 2015). Data on the prevalence of stunting in infants in Ratu Samban Sub-district of the Bengkulu City in 2015 was not available at the Bengkulu City Health Office because PSG for Bengkulu City per sub-district and Puskesmas working area was not conducted.

The purpose of this research was to analyze the correlation between family characteristics (mother's height, mother's education, father's education, mother's knowledge, number of household members, and the level of income of the head of the family) with the incidence of stunting in infants visiting Posyandu in Ratu District Samban City of Bengkulu. Family characteristics consist of mother's height, mother's education, father's education, mother's knowledge, number of household members, and the level of family income. The hypothesis of this research is that there is a relationship between family characteristics and the incidence of stunting in toddlers visiting Posyandu in Ratu Samban District, Bengkulu City.

## METHOD

This type of research is Analytical Survey and the design is *Cross Sectional*. Data collection in the field was conducted on 05-22 June 2017. The research was conducted in 20 Posyandu in Ratu Samban Subdistrict located in two working areas of Community Health Center, namely Anggut Atas and Penurunan. The Posyandu names are listed in Table 1. below:

**Table 1.**  
**The names of Posyandu in Ratu Samban Subdistrict, Bengkulu City**

Names of Posyandu	Districts	Names of Puskesmas
Mawar Putih	Kebun Gerand	Anggut Atas
Kopi	Kebun Gerand	Anggut Atas
Rafflesia I	Anggut Atas	Anggut Atas
Rafflesia II	Anggut Atas	Anggut Atas
Sejahtera I	Anggut Dalam	Anggut Atas
Sejahtera II	Anggut Dalam	Anggut Atas
Melur I	Pengantungan	Anggut Atas
Melur II	Pengantungan	Anggut Atas
Kebun Dahri	Kebun Dahri	Anggut Atas
Kebun Bungsu	Kebun Dahri	Anggut Atas
Bangka Indah	Belakang Pondok	Penurunan
Pondok Indah	Belakang Pondok	Penurunan
Al Manaar	Belakang Pondok	Penurunan
Kasih Ibu	Anggut Bawah	Penurunan
Beringin I	Padang Jati	Penurunan
Beringin II	Padang Jati	Penurunan
Dena Hotel	Penurunan	Penurunan
Cempaka	Penurunan	Penurunan
Sukajadi	Penurunan	Penurunan
Pantai Indah	Penurunan	Penurunan

The research population was all mothers who have toddlers aged 12-59 months who visited the Posyandu in Ratu Samban District, Bengkulu City in 2015 amounted to 1895 toddlers. The sample of this research was mothers who had children aged 12-59 months who visited the Posyandu in Ratu Samban District, Bengkulu City with a total of 102 mothers of toddlers. Inclusion criteria for the sample are willing to be a research sample, have a KMS / KIA book, and children under five can stand tall to measure their height. The sampling technique in this research is Accidental Sampling, which is a technique carried out by taking samples that come when Posyandu is implemented and meet the inclusion criteria. The data consists of primary data and secondary data. Primary data consisted of toddler characteristics, family characteristics, and nutritional status of stunting. Toddler characteristics consist of sex, birth weight, length of birth, and history of exclusive breastfeeding. Family

characteristics consist of mother's height, mother and father's education, mother's knowledge, number of household members, and the level of family income. Primary data were obtained through direct interviews with samples, looking at KMS / KIA books, and measuring height.

Data on sex, birth weight and length were obtained from KMS / KIA. Historical data on exclusive breastfeeding, mother and father education, mother's knowledge, the number of household members, and the level of family income obtained through direct interviews with samples. Data on maternal height were obtained through measurements using Microtoise with an accuracy of 0.1 cm. Stunting nutritional status data were determined using the anthropometric method based on height index according to age (TB / U). Toddler's height is obtained through height measurements using Microtoise with an accuracy of 0.1 cm. The data are entered into the WHO Anthroplus program to get the

nutritional status of stunting. Secondary data were obtained from the Bengkulu City Health Office, which included data on the prevalence of stunting in Bengkulu Province, Bengkulu City, and Ratu Samban District. The data were processed and analyzed descriptively to provide a description of the characteristics of each variable studied, which is presented in the frequency distribution. Data is processed using the SPSS 18.0 program. To determine the significance of the relationship between the independent variable and the dependent variable, the statistical test used was Chi-Square ( $\chi^2$ ) with a degree of confidence of 95.0% ( $\alpha = 5\%$ ). If p-value  $<0.05$ , the statistical test is significant (significant) and if p-value  $> 0.05$ , the statistical test is not significant.

The stunting event can be seen from the z-score for TB / U which is categorized as

stunting if  $<-2$  SD and not stunting if  $\geq -2$  SD. Mother's height is categorized as short if  $\leq 150$  cm, and height if  $> 150$  cm). The education of fathers and mothers under five is categorized into three categories, namely basic education (SD / SMP / MTS), secondary education (SMA / SMK / MA), and higher education (D1 / D2 / D3 / S1 / S2 / S3). Mother's knowledge is mother's knowledge about toddler nutrition which is categorized to be less if the correct answer  $<56\%$ , enough if the correct answer is 56-75%, and good, if the correct answer is 76-100%. The number of household members is categorized into  $\leq 4$  people and  $> 4$  people. The KK income level is categorized as  $<Rp. 1,600,000.00$  and  $\geq Rp. 1,600,000.00$  based on the Bengkulu regional minimum wage standard (UMR) in 2016.

## RESULTS AND DISCUSSION

**Table 2.**  
**The Characteristics of Toddler's Family Who Visited to Posyandu at Ratu Samban Subdistrict**

Families Characteristics	Total (n)	Percentage (%)
<b>Mother's Height</b>		
Short	35	34,31
Not Short	67	65,69
<b>Mother's Education</b>		
Basic	31	30,39
Intermediate	51	50,00
High	20	19,61
<b>Father's Education</b>		
Basic	33	32,35
Intermediate	54	52,94
High	15	14,71
<b>Mother's Knowledge</b>		
Lack	8	7,84
Enough	25	24,51
Good	69	67,65
<b>Total of Household</b>		
$> 4$	44	43,14
$\leq 4$	58	56,86
<b>Income Level</b>		
$< Rp. 1.600.000,00$	39	38,23
$\geq Rp. 1.600.000,00$	63	61,76

Toddlers who experienced *stunting* were 32 toddlers (31.37%). Toddlers who are female more than the male sex, which is 56 toddlers (54.90%). Toddlers who have low birth weight (LBW) as

many as 7 toddlers (6.86%), toddlers who have a short birth length of 10 toddlers (9.80%). There are 53 toddlers (51.96%) who have a history of non-exclusive breastfeeding.

The characteristics of a toddler's family can be seen in Table 2. There are 67 mothers of toddlers who have no short height (65.69%). Mothers with secondary education are more numerous than those with primary and higher education, namely 51 mothers (51.00%) There are 54 fathers (52.94%) who have secondary education. There are 69 knowledgeable mothers (67.65%). There are 58 mothers (56.86%) who have a household

member of  $\leq 4$  people. Mothers who have a KK income level  $\geq$  Rp. 1,600,000.00 more when compared to KK income  $<$ Rp. 1,600,000.00, which is 63 mothers (61.76%).

Bivariate analysis assessing the relationship between family characteristics and the incidence of stunting is shown in Table 3.

**Table 3.**  
**The Correlation between the Family's Characteristics with Stunting**

Characteristics	Stunting		p-value
	Stunting	Not Stunting	
<b>Mother's Height</b>			
Short	14 (13,72)	21 (20,59)	0,257
Not Short	18 (17,65)	49 (48,04)	
<b>Mother's Educations</b>			
Basic	10 (9,80)	21 (20,59)	0,455
Intermediate	18 (17,65)	33 (32,35)	
High	4 (3,92)	16 (15,69)	
<b>Father's Background</b>			
Basic	14 (13,73)	19 (18,63)	0,250
Intermediate	14 (13,73)	40 (39,22)	
High	4 (3,92)	11 (10,78)	
<b>Mother's Knowledge</b>			
Lack	6 (5,88)	2 (1,96)	0,003*
Enough	11 (10,78)	14 (13,73)	
Good	15 (14,71)	54 (52,94)	
<b>Total of Household</b>			
$> 4$ orang	17 (16,67)	27 (26,47)	0,245
$\leq 4$ orang	15 (14,71)	43 (42,16)	
<b>Income Level</b>			
$<$ Rp. 1.600.000,00	15 (14,71)	24 (23,53)	0,320
$\geq$ Rp. 1.600.000,00	17 (16,67)	46 (45,10)	

Mothers who have short stature and have stunting toddlers are 13.72%, while mothers who have no short stature and have stunting toddlers are 48.04%. *Chi-Square* test results ( $\chi^2$ ) show the value of  $p = 0.257$ . This shows that maternal height is not related to the incidence of stunting. The results of the research are not in line with studies in Brazil, Guatemala, India, the Philippines, and South Africa which found that maternal age affects the height of the offspring during growth periods (Addo et al., 2013). Research in India also showed that height was related to the incidence of stunting with  $p < 0.001$ . A 1 cm increase in maternal height can reduce the risk of stunting under five (Subramanian et

al., 2009). Research conducted on toddlers in the provinces of Aceh, North Sumatra, South Sumatra, and Lampung shows that maternal height (OR = 1.36) is a risk factor for stunting (Oktarina & Sudiarti, 2014).

The results of this research are not in accordance with the researcher's hypothesis. This could be due to the relatively small number of research samples. In addition, there are still other factors that also influence the incidence of stunting. A child's height can be influenced by genes from his mother and father. It also can be influenced by children's nutritional intake. Even though the father and mother are short, the child may not be short if the nutritional intake is good. Addo et al.

stated that maternal height influences the linear growth of offspring during the growth period, related to genetic and non-genetic influences, one of which is nutrition (Addo et al., 2013).

Mothers with low education and having stunting toddlers are 9.80%, while mothers with high education and having stunting toddlers are 15.69%. Chi-Square test results ( $\chi^2$ ) show the value of  $p = 0.455$ . This shows that mother's education is not related to the incidence of stunting. The results of this research are not in line with the results of Rahayu and Khairiyati's research which found that there was a significant relationship ( $p < 0.05$ ) between maternal education and the incidence of stunting in children aged 6-23 months in Banjar Baru. Mothers with low levels of education are 5.1 times more likely to have stunted children (Rahayu & Khairiyati, 2014). The research found a positive relationship between mother's educational level with knowledge of nutrition and family health (Amelia, Muljati, & Puspitasari, 2010). Research in Nairobi shows that maternal education is a strong predictor of children's nutritional status (Abuya, Ciera, & Kimani-Murage, 2012).

Mothers can more easily absorb and understand nutritional knowledge if education is better. In addition, mothers will be more responsive if there are nutritional problems in their families and are expected to act appropriately and as soon as possible (Suhardjo, 2003). Highly educated mothers will get higher incomes, practice better feeding practices for their children, good health knowledge, and ease in getting access to health, using good health services (Abuya et al., 2012).

The results of this research are not in accordance with the researcher's hypothesis. It can be seen that the percentage of mothers with higher education are less when compared to mothers with low and middle education. This is due to those who come to the Posyandu, on average housewives with low and middle education. Highly educated

mothers work more and do not have time to go to Posyandu or prefer to visit clinics, midwives or doctors. In addition, the results of this research indicate that although mothers have low education, their nutritional knowledge is also sufficient and good so that when applied in the household, the child's nutritional status will be good.

Fathers with low education and having stunting toddlers were 13.73%, while fathers with higher education and having stunting toddlers were 10.78%. Chi-Square test results ( $\chi^2$ ) show the value of  $p = 0,250$ . This shows that father's education is not related to the incidence of stunting. The results of this research are in line with the results of Sari's research in Yogyakarta City which showed that father's education was not related to the incidence of stunting ( $p = 0.31$  and  $OR = 1.34$ ) (Sari, 2017). Father's education was not related to the incidence of stunting in infants aged 6-23 months in Sedayu District, Bantul, Yogyakarta ( $p = 0.15$ ,  $OR = 1.46$ ) (Amin & Julia, 2016). Research in Surabaya shows that father's education is not related to the incidence of stunting in infants ( $p = 0.320$ ,  $OR = 1.859$ ) (Ni'mah & Nadhiroh, 2016).

The results of this research are not in accordance with the researcher's hypothesis. This may be due to highly educated fathers who are not necessarily knowledgeable about good nutrition and play a role in childcare because maybe in this research mothers are more involved in childcare. According to Rahayu & Khairiyati, the role of forming children's eating habits, preparing food, arranging menus, shopping, cooking, preparing food, and distributing food is mostly done by mothers (Rahayu & Khairiyati, 2014). Fathers spend more time to work so that the role of childcare is done more by mothers (Ni'mah & Nadhiroh, 2016).

The limitation of this research is that the researchers only asked the education of mothers and fathers without being proven by their diplomas because the research was conducted at the Posyandu. This condition

resulted in not allowing toddlers mothers to show their diplomas and their husbands as proof that they had completed their education.

Mothers who lack knowledge and have toddlers with stunting nutritional status of 5.88%. Mothers who are well-informed and have toddlers with non-stunting nutritional status of 52.94%. Chi-Square test results ( $\chi^2$ ) show the value of  $p = 0.003$ . This shows that mother's knowledge is related to stunting. The results of the are in line with the results of Ni'mah and Nadhiroh's research in Surabaya which shows that maternal knowledge is a factor associated with the incidence of stunting in infants ( $p = 0.015$ ,  $OR = 3.877$ ) (Ni'mah & Nadhiroh, 2016). Mother's knowledge about nutrition is related to the incidence of stunting in Jember (Aridiyah, Rohmawati, & Ririanty, 2015). The results of the research were not in line with the results of Rahayu and Khairiyati's research which showed that maternal nutrition knowledge was not related to the incidence of stunting ( $p = 0.288$ ,  $OR = 0.75$ ) (Rahayu & Khairiyati, 2014).

Good nutritional knowledge will cause someone to be able to compile a good menu for consumption. The better a person's nutritional knowledge, the more he will calculate the type and amount of food he gets for consumption (Soeditama, 2009). Mother's nutritional knowledge plays a role in determining the growth and development of children as seen from their child's nutritional status (Dahlia, 2012).

Mothers who have household members > 4 people and have stunting children are 16.67%, while mothers who have household members 4 people and have children who are not stunting are 42.16%. Chi-Square test results ( $\chi^2$ ) show the value of  $p = 0.245$ . This shows that the number of household members is not related to the incidence of stunting. The results are not in line with the results of research in Southern Ethiopia, which shows that family size is associated with the incidence of stunting. Children who

live in households with members of 5 to 7 people and 8 to 10 people are more at risk of becoming stunted than 2 to 4 family members (Fikadu et al., 2014).

The results of the research are in line with the results of Amin and Julia's research in Yogyakarta, where the size of the family is not related to the incidence of stunting ( $OR = 1.17$   $p = 0.53$ ) (Amin & Julia, 2016). Ni'mah and Nadhiroh's research results in Surabaya showed that family size was not a factor associated with stunting in infants ( $p = 0.615$ ,  $OR = 1,464$ ) (Ni'mah & Nadhiroh, 2016).

A Large family is very influential, especially in low-income families. With the increasing number of family members, animal food consumption will decrease. If the size of the family increases, the food for each child decreases. Parents are less aware that children who are very young need relatively more food than people who are older, so young children may not get enough food (Suhardjo, 2003). The increasing number of family members causes food for each child to be reduced and the food distribution is uneven, causing toddlers to experience malnutrition (Chaudhury, 1984).

The results of the research are not in accordance with the research hypothesis because the distribution of sqmpel is not evenly distributed between those who have household members > 4 people and  $\leq 4$  people. Based on findings in the field, many of the samples that came to Posyandu were young families with a small number of children under five. If a toddler has received complete basic immunization for ages 0-9 months, many toddlers will no longer be taken to the Posyandu again.

Mothers who have a KK income level <Rp. 1,600,000.00 and have stunting toddlers at 14.71%. Mothers who have a KK income level  $\geq$  Rp. 1,600,000.00 and do not have stunting toddlers at 45.10%. Chi-Square test results ( $\chi^2$ ) show the value of  $p = 0.320$ . This shows that the KK income level is not related to the incidence of stunting. The results of the



research are not in line with the results of studies in Ni'mah and Nadhiroh in Surabaya which show that family income is a factor associated with the incidence of stunting in infants ( $p = 0.044$ ,  $OR = 3,250$ ) (Ni'mah & Nadhiroh, 2016). These results are also not in line with the results of studies in Semarang (Candra, Puruhita, & Susanto, 2011) and in North Maluku which show that low income is a risk factor for stunting in infants (Ramli et al., 2009).

Families with good economic status will be able to get better public services such as education, health services, access roads, and so that it can affect the nutritional status of children. Family purchasing power will increase so that family access to food will be better. Families with high incomes will be easier to get access to education and health so that the nutritional status of children can be better (Bishwakarma, 2011).

The results of the research are not in accordance with the hypothesis of the researcher. This can happen because even though the mother has a KK income of  $\geq$  Rp. 1,600,000.00, if the income is not prioritized to meet the needs of food and nutrition for their children, then the child's nutritional status will not be good. In addition, other income factors for working mothers can also influence the incidence of stunting because family income will be greater and can meet the nutritional needs of toddlers better.

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A limitation in this research is that information about KK income is only limited to mothers' answers. If KK is her husband, it is possible that her husband will not disclose the total income to the mother and not be given entirely to the mother. Mothers might also not share their KK's income fully with the researchers because they would feel ashamed if their KK income was small.

## CONCLUSIONS AND SUGGESTIONS

Family characteristics that include mother's height, mother's education, father's education, number of family members, and family income level are not related to stunting. Family characteristics related to stunting are mother's knowledge. The Puskesmas and Posyandu need to do nutrition education, especially regarding stunting to the community, especially to women of childbearing age, pregnant women, and toddlers to prevent the occurrence of stunting in toddlers.

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