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The relationship between maternal factors and pregnancy weight gain with the incidence of stunting in toddlers East Java Province

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ABSTRAK

Latar Belakang: *Stunting merupakan kondisi gangguan tumbuh kembang balita akibat kekurangan gizi kronis dan penyakit infeksi yang ditandai dengan tinggi badan di bawah batas normal. Pada tahun 2022, prevalensi stunting di Indonesia mencapai 21,6% dan di Jawa Timur mencapai 34,9%. Salah satu faktor yang dapat meningkatkan risiko stunting, kesakitan bahkan kematian pada ibu dan anak yaitu faktor maternal. Faktor maternal stunting meliputi, usia ibu saat hamil, jarak kelahiran, paritas, kenaikan berat badan kehamilan, status gizi ibu, tinggi badan ibu, infeksi, kesehatan mental, IUGR dan kelahiran prematur, dan hipertensi.*
Tujuan: *Tujuan penelitian ini adalah untuk menganalisis hubungan faktor maternal dan kenaikan berat badan kehamilan dengan kejadian stunting pada balita usia 24-59 bulan di Kabupaten Jember.*
Metode: *Jenis penelitian ini adalah observasional analitik dengan desain case control yang dilakukan di 15 Puskesmas Kabupaten Jember pada bulan April-Juli 2024. Sampel penelitian ini adalah 272 balita usia 24-59 bulan yang terdiri dari sampel kasus 136 balita stunting dan sampel kontrol 136 balita tidak stunting dengan responden dari ibu balita. Teknik pemilihan sampel menggunakan cluster random sampling. Data penelitian ini diperoleh dari wawancara menggunakan kuesioner dan studi dokumentasi buku Kesehatan Ibu dan Anak. Selanjutnya, data dianalisis dengan analisis univariat (distribusi frekuensi) dan analisis bivariat dengan uji Chi-square.*
Hasil: *Hasil analisis menggunakan uji chi-square diperoleh hasil terdapat hubungan antara kenaikan berat badan kehamilan dengan kejadian stunting pada balita (p-value = <0,001 dan OR= 4,286 dengan 95% CI (2,556-7,187)). Ibu yang memiliki kenaikan berat badan kehamilan tidak sesuai standar Institute of Medicine (IOM) berpeluang melahirkan anak stunting 4,2 kali lebih besar dibandingkan dengan ibu yang memiliki kenaikan berat badan kehamilan sesuai standar IOM. Tidak terdapat hubungan antara usia ibu saat hamil (p-value= 0,419), jarak kelahiran (p-value= 0,178), dan paritas (p-value= 0,321) dengan kejadian stunting pada balita.*
Kesimpulan: *Kenaikan berat badan kehamilan merupakan faktor risiko stunting pada balita usia 24-59 bulan di Kabupaten Jember.*

KATA KUNCI*: faktor maternal; riwayat kehamilan; stunting*

ABSTRACT

Background: *Stunting is a condition of impaired growth and development of toddlers due to chronic malnutrition and infectious diseases characterized by height below the normal limit. In 2022, the prevalence of stunting in Indonesia reached 21.6% and in East Java reached 34.9%. One of the factors that can increase the risk of stunting, illness and even death in mothers and children is the maternal factor. Maternal stunting factors include, maternal age during pregnancy, birth distance, parity, pregnancy weight gain, maternal nutritional status, maternal height, infection, mental health, IUGR and premature birth, and hypertension.*

Objectives: *The purpose of this study is to analyze the relationship between maternal factors and pregnancy weight gain with the incidence of stunting in toddlers aged 24-59 months in Jember Regency*

Methods: *This type of research is observational analysis with a case control design conducted in 15 Jember Regency Health Centers in April-July 2024. The sample of this study consists of 272 toddlers aged 24-59 months, comprising 136 stunted toddlers as the case sample and 136 non-stunted toddlers as the control sample, with respondents being the mothers of the toddlers. The sample selection technique uses cluster random sampling. The data of this study was obtained from interviews using questionnaires and documentation studies of Maternal and Child Health books. Furthermore, the data was analyzed by univariate analysis (frequency distribution) and bivariate analysis by Chi-square test.*

Results: *The results of the analysis using the Chi-square test showed that there was a relationship between pregnancy weight gain and the incidence of stunting in toddlers (p-value = < 0.001 and OR = 4.286 with 95% CI (2.556-7.187)). Mothers who have pregnancy weight gain that does not meet IOM standards are 4.2 times more likely to give birth to stunted children compared to mothers who have pregnancy weight gain according to IOM standards. There was no relationship between maternal age during pregnancy (p-value=0.419, birth distance (p-value=0.178), and parity (p-value=0.321) with the incidence of stunting in toddlers.*

Conclusions: *Pregnancy weight gain is a risk factor for stunting in toddlers aged 24-59 months in Jember Regency.*

KEYWORD*: maternal factors; pregnancy history; stunting*

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INTRODUCTION

Stunting is a condition of impaired growth and development in children under five years of age due to chronic malnutrition and infectious diseases, characterized by a height below the normal threshold (1). Stunting remains a global nutritional health problem faced by many countries. The global prevalence of stunting is 22.3%, meaning that 148.1 million children are stunted in 2022 (2). Stunting cases are prevalent in developing countries, including Indonesia. According to the Nutrition Status Survey, the prevalence of stunting in Indonesia in 2022 is 21.6%. Based on an Indonesian Health survey in 2023, the prevalence of stunting in Indonesia is 21.5% which has not been able to meet the RPJMN target 2020-2024 of 14% (3). Based on data SSGI (2022), The issue of stunting is prevalent among children aged 24-59 months. During this age, children experience rapid growth and are vulnerable to malnutrition. Children with stunting are at risk of illness and even death (5). Stunting cases cause 55 million children to experience a reduction in healthy life years each year and even contribute to 15% of toddler deaths worldwide (6). Stunting that is not handled properly can cause growth and development disorders such as short posture, delayed brain development, and the risk of developing non-communicable diseases (obesity, diabetes, heart, and kidneys) in the future (7).

One of the provinces in Indonesia that remains a primary focus for stunting cases is East Java Province, with a prevalence of 19.2% in 2022 (4). Jember Regency is the district that ranks first

with the highest number of stunting cases in East Java in 2022 with a prevalence of 34.9% (4). The stunting prevalence rate has increased by 11% when compared to 2021 of 23.9% (8). Based on Indonesian Health survey 2023 data, the prevalence of stunting in East Java is 17.7% while in Jember Regency it is 29.7%. Based on data from the Jember Regency Health Office, the number of stunted toddlers weighed and recorded in the stunting data register in 2023 is 11.931 toddlers (9). Maternal factors are one of the factors that can increase the risk of stunting, illness, and even mortality in both mothers and children (5). Maternal factors include, maternal age during pregnancy, birth distance, parity, maternal nutritional status during pregnancy, maternal height, infection, mental health, IUGR (Intrauterine Growth Restriction) and premature birth, and hypertension (10,11). Weight gain factors that do not meet the standards of the Institute of Medicine (IOM) are positively correlated with increasing the risk of stunting (12). Pregnancy weight gain factors that do not meet the standards of the Institute of Medicine (IOM) have an indirect risk of stunting in babies. The weight gain in pregnant women is considered normal if the Body Mass Index (BMI) is as follows: BMI <18.5 (weight gain of 12.5-18 kg), BMI 18.5-24.9 (weight gain of 11.5-16 kg), BMI 25.0-29.9 (weight gain of 7-11.5 kg), and BMI >30 (weight gain of 5-9 kg) (33).

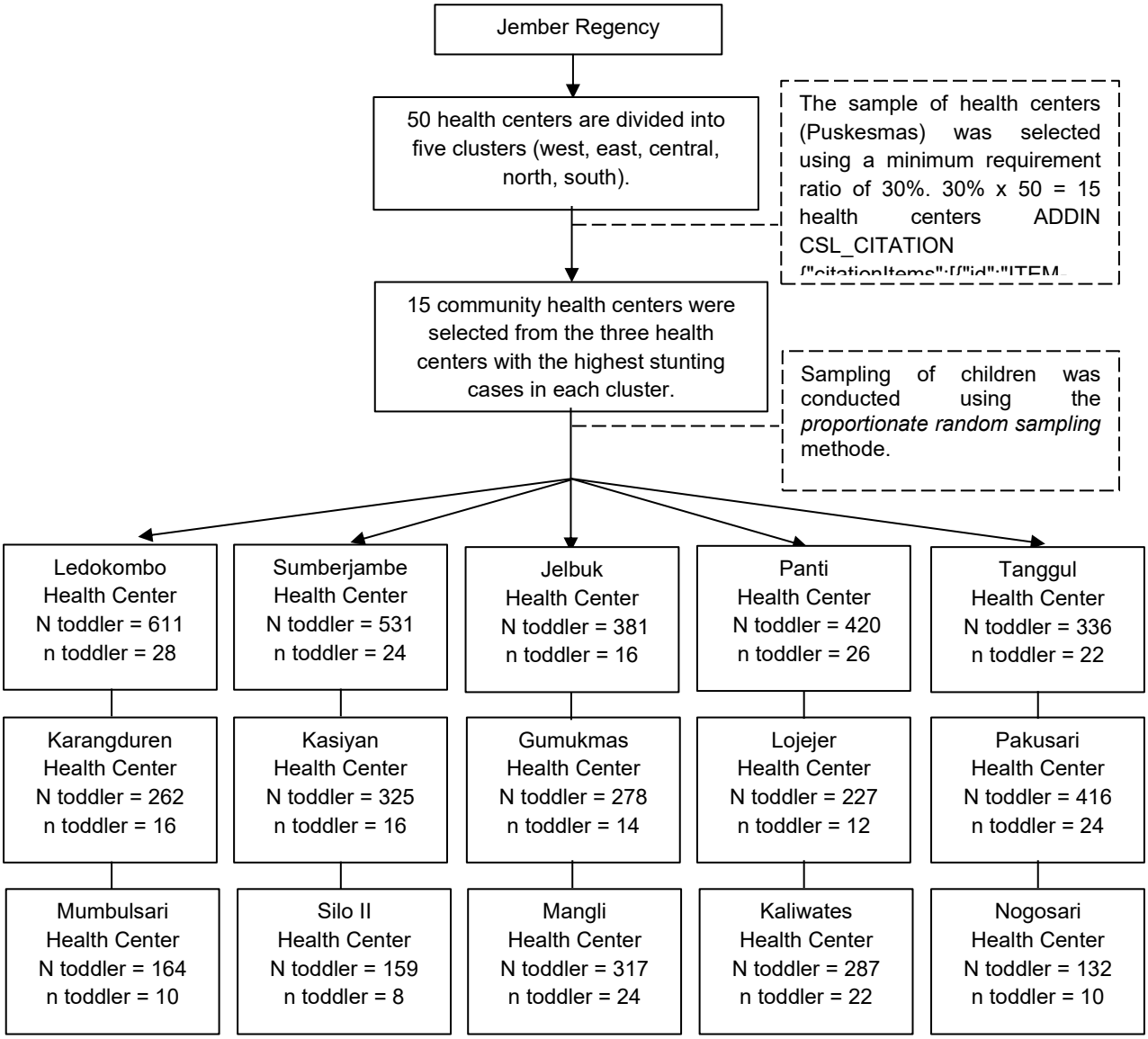
The age factor of the mother during pregnancy (< 20 years or > 35 years) is at risk of causing stunting in toddlers (13). Young pregnancy causes the uterus to not be ready to receive the fetus and needs more nutrients to be distributed to the mother and fetus, so there is a risk of causing malnutrition in the fetus (14). Pregnancy at an old age is 4.3 times more likely to have stunting due to the decline in the function of the mother's reproductive organs, making it vulnerable to pregnancy complications that lead to stunting (16). The birth distance factor is the dominant variable and has a 7.94 times chance of causing stunting in toddlers (17). However, research conducted in Samosir Regency showed that there was no relationship between birth distance and stunting incidence (18). The number of parity factors is 3.25 times greater than that of mothers with a small amount of parity (19). Pregnancy weight gain factors that do not meet the standards of the Institute of Medicine (IOM) have an indirect risk of stunting in babies (12). The standard of maternal weight gain during pregnancy based on the Institute of Medicine (IOM) is adjusted to the mother's Body Mass Index (BMI) at the beginning of pregnancy. The number of stunting cases of toddlers in Jember Regency is still a nutritional health problem that needs to be solved. In addition, several studies related to maternal stunting factors still differ in the results of the study. Therefore, the researcher wants to conduct a study on the relationship between maternal factors and pregnancy weight gain with the incidence of stunting in toddlers aged 24-59 months in Jember Regency.

MATERIALS AND METHODS

This research was an observational analytic study with a case-control design conducted in 15 community health centers in Jember Regency (Puskesmas Sumberjambe, Panti, Kasiyan, Pakusari, Karangduren, Mumbulsari, Gumukmas, Kaliwates, Lojejer, Ledokombo, Silo II, Nogosari, Tanggul, Jelbuk, and Mangli) from April-July 2024. The population of stunted toddlers aged 24-59 months is spread across 50 health centers and is divided into five clusters in the Jember Regency area (north, west, south, east, and center). The selection of the puskesmas sample uses a minimum requirement ratio of 30% from 50 puskesmas so that the calculation is 30% x 50 = 15 health centers (23). Diagram illustrating the sample calculation for toddlres aged 24-59 months distributed across 15 health centers can be seen in **Figure 1**. The study population consisted of two groups: the case population included toddlers aged 24-59 months diagnosed with stunting and the control population included toddlers aged 24-59 months who were not diagnosed with stunting, based on data from the Jember Regency Health Office in 2023. The sample size was calculated using the Kelsey formula, resulting in a minimum sample size of 136 for each group (20). This study used a 1:1 ratio of case and control samples so that a sample size of 272 toddlers was obtained, consisting of a sample of 136 stunted toddlers aged 24-59 months and a control sample of 136 toddlers who were not stunted aged 24-59 months. The sampling technique used was cluster random sampling. The

calculation of case and control samples of toddlers in 15 health centers was carried out in proportion. The selection of case and control samples adhered to inclusion and exclusion criteria. The independent variables in this study were maternal age at pregnancy, birth spacing, parity, and pregnancy weight gain, while the dependent variable was the incidence of stunting. This study utilized both primary and secondary data. Primary data were obtained through interviews using questionnaires related to the characteristics of the toddlers and their mothers, while secondary data were obtained from documentation studies of the Maternal and Child Health (KIA) books. Furthermore, the data were analyzed using SPSS 25 software. The analyses included univariate analysis (frequency distribution) and bivariate analysis using the Chi-square test. This study obtained approval from the Health Research Ethics Committee at the Faculty of Public Health, University of Jember, with certificate number No.510/KEPK/FKM-UNEJ/V/2024.

Table 1. Characteristics of Respondents



Parity variables are categorized into two groups at-risk (primiparous parity and grand multiparous parity) and not at-risk (multiparous parity) (34). Multiparous parity refers to mothers who gave birth 2-4 times. Based on research conducted at Kedung II Health Center,

primiparous parity and grand multiparous parity were at risk of causing stunting compared to multiparous parity. Multiparous parity was not at risk of stunting because mothers who had given birth multiple times generally had greater knowledge and experience in child-rearing practices from their previous children. This could help mothers care for their children and reduce the risk of stunting (34).

RESULTS AND DISCUSSIONS

The results of the univariate analysis on the characteristics of the study subjects and respondents can be seen in **Table 1** as follows.

Table 1. Characteristics of subjects and respondents

Characteristics	Stunting (n=136)		Not Stunting (n=136)	
	n	%	n	%
Characteristics of Toddlers				
Age				
24-35 months	41	30.1	45	33.1
36-47 months	38	27.9	46	33.8
48-59 months	57	41.9	45	33.1
Sex				
Male	61	44.9	71	52.2
Female	75	55.1	65	47.8
Characteristics of Toddler Mothers				
Education				
Elementary School / Equivalent	49	36.0	31	22.8
Junior High School/Equivalent	37	27.2	31	22.8
High School/Equivalent	43	31.6	65	47.8
College (D3/D4/S1)	7	5.1	9	6.6
Employment Status				
Not Working	106	77.9	108	79.4
Working	30	22.1	28	20.6
Family Income				
UMK Jember < Rp 2.665.392	107	78.7	87	64.0
UMK Jember > Rp 2.665.392	29	21.3	49	36.0

The study results **Table 1** showed that the majority of stunted toddlers were in the age group of 48-59 months at 57 (41.9%), while the majority of non-stunted toddlers were in the age group of 36-47 months at 46 (33.8%). Most of the stunted toddlers were female at 75 (55.1%), and most of the non-stunted toddlers were male at 71 (52.2%). The educational level of the mothers of stunted toddlers was predominantly elementary school or equivalent at 49 (36.0%) respondents, while the educational level of the mothers of non-stunted toddlers was predominantly high school or equivalent at 65 (47.8%) respondents. The majority of the mothers of both stunted and non-stunted toddlers were unemployed, at 106 (77.9%) and 108 (79.4%) respondents, respectively. The majority of the families of both stunted and non-stunted toddlers had incomes below the Jember Regency Minimum Wage of < Rp 2,665,392, at 107 (78.7%) and 87 (64.0%) respondents, respectively.

The results of the bivariate analysis of stunting risk factors in toddlers can be seen in **Table 2**. The results of the study **Table 2** showed that the p-value is 0.419 (> 0.05) which means there was no relationship between the age of the mother during pregnancy and the incidence of stunting in toddlers in Jember Regency. Most of

the respondents in this study were mothers who became pregnant at the age of 20-35 years, which is considered a non-risk age category for pregnancy. According to the Ministry of Health, the ideal age for a mother to get pregnant is in the range of 20-35 years because at this age a mother's reproductive organs are ready for pregnancy and can minimize the risk of pregnancy complications that can lead to stunting (21). The results of this study were consistent with the research conducted in Banjar Regency, which found that maternal age during pregnancy was not associated with the incidence of stunting (22). The decrease in marriage dispensation is related to an increase in ideal age marriages and low-risk pregnancies. Maternal age during pregnancy is an indirect risk factor for stunting. Indirect risk factors for stunting indicate that there are stronger causes that can lead to stunting in toddlers. This statement is consistent with research conducted in Tanggamus Regency which stated that there was no relationship between maternal age during pregnancy and stunting because this factor is considered an indirect risk factor for stunting (24).

Table 2. Risk factors for stunting in toddlers

Variable	Stunting Incidence				*P* value	OR (CI 95%)
	Stunting		Not Stunting			
	n	%	n	%		
Mother's Age During Pregnancy						
At Risk (<20 and >35 years)	26	19.1	20	14.7	0.419	1.371 (0.724-2.596)
No Risk (20-35 years)	110	80.9	116	85.3		
Birth Distance						
At Risk (<2 years)	53	39.0	65	47.8	0.178	0.697
No Risk (≥ 2 years)	83	61.0	71	52.2		(0.431-1.129)
Parity						
At Risk (First time or ≥ 5 times)	49	36.0	58	42.6	0.321	0.757 (0.465-1.234)
No Risk (2-4 times)	87	64.0	78	57.4		
Pregnancy Weight Gain						
At Risk (less or more than IOM standards)	102	75.0	56	41.2	<0.001	4.286 (2.556-7.187)
No Risk (as IOM standards)	34	25.0	80	58.8		

** A p-value < 0.001 indicates a highly statistically significant association based on the chi-square test.*

The results of the study **Table 2** showed that the p-value is 0.178 (> 0.05) which means there was no relationship between birth distance and the incidence of stunting in toddlers in Jember Regency. This could be because the majority of respondents, both in the stunting and non-stunting groups, had mothers with birth distance of ≥ 2 years. This shows that many respondents in Jember Regency have participated in the family planning program to regulate birth distance. This statement is in aligns with the data on active family planning in Jember Regency which tends to increase from 357,640 in 2020 to 385,947 couples of childbearing age in 2021 (27). The results of this study were consistent with research conducted in East Kota Agung District that there was no relationship between birth distance and the incidence of stunting because the study sample lacked diversity and the majority of respondents were already following the family planning program to manage birth distance (24). Other research also explained that there was no relationship between birth distance and the incidence of stunting because birth distance was considered an indirect cause of stunting (28,14). This was due to an intermediate variable, namely

the suboptimal fulfillment of nutritious food for babies with birth distance of less than two years. This statement was also supported by research conducted in South Tapanuli Pargarutan Community Health Center stated that short birth distance indirectly influenced the incidence of stunting because it was related to the suboptimal provision of breastfeeding, as children had to be weaned earlier, and the mother's care for the child was not optimal because attention and affection were already divided for the subsequent pregnancy (29). Another study states that birth distance is not a risk factor for stunting because if families pay attention and take good care of their children, the risk of stunting can be minimized, regardless of the birth distance. Mothers who are able to provide good care and adequate nutrition can prevent stunting even though they have a close birth distance (11).

The results of **Table 2** showed that the p-value is 0.321 (> 0.05) which means there was no relationship between parity and the incidence of stunting in toddlers in Jember Regency. This was because the majority of respondents, both in the stunted and non-stunted groups, had mothers with 2-4 deliveries. The results of this study were consistent with the research conducted in Lebong Regency, sowed that parity was not related to stunting (32). Research conducted at the Kedungtuban Health Center also indicated no relationship between parity and stunting because most mothers of toddlers who were respondents in the study had a low number of parities ≤ 3 children (31). This was due to the fact that most mothers had already used contraception to manage the number of children by participating in the Family Planning program. This statement aligns with BPS data showing that the use of active contraception in Jember Regency increased from 357,640 in 2020 to 385,947 in 2021 (27). Mothers who have a large number of parity supported by adequate economic status, good child nutrition knowledge, and optimal parenting can reduce the risk of stunting in toddlers. This statement is in line with research conducted by Soleha and Zelharsandy, stating that there is a more dominant factor to affect stunting than the number of parity factors.

In contrast to the research conducted at the Anreapi Health Center which stated that there was a relationship between parity and the incidence of stunting (10). The number of parities that were more than four times more risk to stunting. Mothers with many children often faced suboptimal caregiving and inadequate nutritional provision for their toddlers because they had to divide their attention among several children. Additionally, if families with many children were not supported by sufficient family income, it could lead to an imbalance in nutritional intake, which, if prolonged, might result in chronic malnutrition and stunting in toddlers (25).

The results of the study in Table 2 showed that the p-value is <0.001 (< 0.05) which means there was a relationship between Pregnancy weight gain and the incidence of stunting in toddlers in Jember Regency. Based on the OR value = 4.286 with a 95% CI (2.556-7.187) showed that pregnancy weight gain was a risk factor for stunting. Mothers who experienced weight gain during pregnancy below the Institute of Medicine (IOM) standards were 4.28 times more likely to give birth to a stunted baby compared to those whose weight gain was in accordance with IOM standards. This finding was consistent with research conducted in Timor Tengah Selatan Regency, which found a significant relationship between pregnancy weight gain during pregnancy and stunting (30).

Pregnancy weight gain is related to pre-pregnancy nutritional status and weight gain during pregnancy. Pregnancy weight gain affects the nutritional needs of both the mother and the fetus. The availability of nutrition for fetal growth heavily relies on maternal nutrient intake, placenta function, hormones, and maternal metabolism (12). If pregnant women do not consume nutritious food, it could affect fetal nutrition. Mothers who gain weight below IOM standards may have unmet nutritional needs for both themselves and their fetus, potentially disrupting fetal growth and development, resulting in low birth weight babies and possibly leading to stunting (30). Research conducted in Tanzania indicated that inadequate weight gain could lead to low birth weight and stunting (12). Another study conducted in Tulungagung Regency explained that weight gain below normal limits could result in Chronic Energy Deficiency (CED) in the mother, leading to inadequate nutrition for the fetus, which could

impact stunting later on (28). Pregnancy weight gain exceeding the IOM standards was found to pose a risk for stunting. Pregnant women with excessive weight gain were associated with the birth of babies with large birth weights or macrosomia, which increased the risk of pregnancy complications such as gestational diabetes and preterm birth. Other research conducted in Tanzania also explained that excessive pregnancy weight gain could lead to preterm birth in toddlers (12). This finding was consistent with research in East Nusa Tenggara, which concluded that preterm birth in babies contributed as a risk factor for stunting (26).

CONCLUSION AND RECOMMENDATION

Pregnancy weight gain is a risk factor for stunting in toddlers aged 24-59 months in Jember Regency. Mothers whose pregnancy weight gain does not meet IOM standards are 4.2 times more likely to give birth to stunted children compared to mothers whose pregnancy weight gain meets IOM standards. Recommendations for the Government to optimizing the implementation of posyandu (integrated health service posts) in each working area of the health centers in Jember Regency by maximizing the function of 5 table for health education related to the importance of Antenatal Care (ANC) for pregnant mothers.

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