

ANALYZING FACTORS AFFECTING THE INCIDENCE OF STUNTING, WASTING AND UNDERWEIGHT IN TODDLERS

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ABSTRAK

Stunting, wasting dan underweight merupakan tiga indikator yang dikenal luas dalam status gizi anak, Malnutrisi memberikan kontribusi yang signifikan terhadap beban global berbagai penyakit. Prevalensi stunting dan wasting di negara-negara Asia dan Afrika lebih tinggi dibandingkan negara lain. Sementara di Indonesia, hasil Riset Kesehatan Dasar (Riskesdas) 2018 menunjukkan prevalensi underweight 17,7%, stunting 30,8%, dan wasting 10,2%.; Tujuan Penelitian: Penelitian ini bertujuan untuk menganalisis faktor-faktor risiko kejadian stunting pada balita usia 6 - 59 bulan; Metode: Penelitian ini merupakan cross sectional study yang dilakukan pada tahun 2022 – 2023 di Puskesmas Simpang Tiga Kota Pekanbaru. Sampel penelitian merupakan seluruh balita usia 6 – 59 bulan yang berkunjung di posyandu wilayah kerja Puskesmas pada tahun 2022 – 2023. Kriteria inklusi pada penelitian ini yaitu balita usia 6 – 59 bulan dengan indeks z-score TB/U < - 2 SD dan indeks z-score TB/U > -2 SD. Balita yang menderita penyakit kongenital dan penyakit kronik, Balita yang sedang mengalami pemulihan dari status gizi buruk, Tempat tinggal yang mengasuh balita sulit dijangkau merupakan kriteria eksklusi pada penelitian ini. Analisis bivariat dan multivariat digunakan pada penelitian ini; Hasil: Hasil analisis chisquare untuk analisis bivariate kemudian pasien dilakukan analisis multivariate dengan uji regresi logistik. Berdasarkan hasil analisis bivariat memperlihatkan bahwa semua variabel faktor risiko mempengaruhi status gizi balita (stunting, wasting dan underweight) dengan nilai $p < 0,05$. Dari hasil uji regresi logistik didapatkan bahwa faktor riwayat pemberian ASI, MPASI dan pendidikan menjadi faktor risiko dominan mempengaruhi kejadian stunting, wasting dan underweight balita yaitu dengan nilai OR > 1; Kesimpulan: Faktor riwayat pemberian ASI, MPASI dan pendidikan menjadi faktor risiko dominan mempengaruhi kejadian stunting, wasting dan underweight balita.

Kata Kunci : Malnutrisi, Stunting, Wasting, Underweight.

ABSTRACT

Stunting, wasting and underweight are three widely known indicators of children's nutritional status. Malnutrition makes a significant contribution to the global burden of various diseases. The prevalence of stunting and wasting in Asian and African countries is higher than in other countries. Meanwhile in Indonesia, the results of the 2018 Basic Health Research (Riskesdas) show a prevalence of underweight 17.7%, stunting 30.8%, and wasting 10.2%; Objective: This study aimed to analyze the risk factors for stunting in toddlers aged 6 - 59 months; Method: This research is a cross sectional study conducted in 2022 – 2023 at the Simpang Tiga Health Center, Pekanbaru City. The research sample was all toddlers aged 6 - 59 months who visited the posyandu in the working area of the Community Health Center in 2022 - 2023. The inclusion criteria in this study were toddlers aged 6 - 59 months with a TB/U z-score index < - 2 SD and a z index -score TB/U > -2 SD. Toddlers suffering from congenital and chronic diseases, toddlers who are recovering from poor nutritional status, and places where children are cared for are difficult to reach are the exclusion criteria in this study. Bivariate and multivariate analyzes were used in this study; Result: The results of the chisquare analysis were for bivariate analysis, then the patient underwent a multivariate analysis with a logistic regression test. Based on the results of bivariate analysis, it shows that all risk factor variables influence the nutritional status of toddlers (stunting, wasting and underweight) with a p value <0.05. From the results of the logistic regression test, it was found that the history of breastfeeding, MPASI and education were the

dominant risk factors influencing the incidence of stunting, wasting and underweight toddlers, namely with an OR value > 1; Conclusion: History of breastfeeding, MPASI and education are the dominant risk factors influencing the incidence of stunting, wasting and underweight toddlers.

Keywords: Malnutrition, Stunting, Wasting, Underweight.

INTRODUCTION

Stunting is a condition where a toddler has a length or height that is less or not appropriate for the child's age. Stunting, wasting and underweight are three widely known indicators of children's nutritional status. Although stunting and wasting each indicate chronic and acute malnutrition and underweight is a combined indicator of both acute (wasting) and chronic (stunting) malnutrition. However, various forms of malnutrition can also occur simultaneously in children.

Malnutrition is still a critical public health problem in children under the age of five in developing countries, including Indonesia. Malnutrition is caused by several interrelated factors and has short and long term impacts on health. This affects children's cognitive and physical development, increases the risk of infection and contributes significantly to child morbidity and mortality. Malnutrition makes a significant contribution to the global burden of various diseases. Globally, malnutrition accounts for at least half of all deaths of children under five each year. In 2016, according to the World Health Organization (WHO), at least 155.22 and 99 million children under the age of five experienced stunting, wasting and underweight worldwide. In addition, around 6 million children are reported to suffer from stunting and wasting diseases simultaneously. Malnutrition occurs in developing countries, especially in Africa and South Asia. The prevalence of stunting and wasting in Asian and African countries is higher than in other countries. Meanwhile in Indonesia, the results of the 2018 Basic Health Research (Riskesdas) showed a prevalence of underweight of 17.7%, stunting of 30.8%, and wasting of 10.2%.

The high magnitude of the three indicators of malnutrition in a country reflects the nutritional status of poor people and the health of children under five in a country, so it is necessary to conduct research that explores the factors associated with malnutrition in Indonesian children. There are many factors that contribute to childhood malnutrition. Common determinants reported by several studies include socioeconomic disparities, geographic differences, suboptimal feeding practices and household food insecurity, maternal literacy and child morbidity.

Previous research conducted in Pekanbaru found that the incidence of stunting was 17.8% in the categories of short (11.7%) and very short (6.1%) and the incidence of wasting was 12.2% in the category of malnutrition (8, 1%) and malnutrition (4.2%). Based on age, the incidence of stunting occurs more frequently in toddlers (18.9%) and wasting occurs more frequently in preschools (15.3%), then based on gender, the incidence of stunting in boys and girls is not much different (17.8 % and 17.9%) while wasting occurs more often in men (16.3%). However, research has not been conducted on the factors that cause the correlation between the three indicators of malnutrition in children in this region.

METHOD

This research design uses cross sectional to analyze the risk factors for stunting in toddlers aged 6 - 59 months which was carried out during 2022 to 2023 at the Simpang Tiga Pekanbaru Community Health Center. The sample in this study were all toddlers aged 6 - 59 months who visited the posyandu in the Puskesmas working area in 2022 - 2023 who met the inclusion and exclusion criteria. Toddlers aged 6 – 59 months with a TB/U z-score index < - 2 SD and a TB/U z-score index > -2 SD, Toddlers who live

permanently in the Simpang Tiga District area, toddlers who are cared for directly by both parents or other closest is an inclusion criterion in this study. Meanwhile, the exclusion criteria in this study are toddlers who suffer from congenital and chronic diseases, toddlers who are recovering from poor nutritional status, and places that care for toddlers are difficult to reach. Data collection was carried out after requesting permission from the Simpang Tiga Pekanbaru Health Center. Statistical analysis was performed using SPSS (Statistical Package for Social Sciences, Chicago, IL, USA) software for Mac. An overview of the characteristics of the research subjects is presented in tabulated form and described. Data analysis carried out included bivariate and multivariate analysis using logistic regression tests

RESULT AND DISCUSSION

This research uses a descriptive analytical method, with the research sample being toddlers aged 6-59 months who visited the Posyandu in the Simpang Tiga Pekanbaru Health Center Working Area in 2023. The Simpang Tiga Health Center is one of 20 community health centers in the city of Pekanbaru, based on data from the results performance assessment of the Simpang Tiga Pekanbaru Community Health Center in 2022, the coverage of families who are nutritionally aware is 59%, the coverage of toddlers is weighed at 51.1%, the coverage of babies receiving exclusive breast milk is 49.1% and the data from the Nutrition survey at the Simpang Tiga Community Health Center, Pekanbaru City, Riau Province was obtained from 54 people of toddlers measured, for BB/U there were 22.2% of toddlers with malnutrition and 1.85% of toddlers with poor nutrition.

Table 1 Comparison of toddlers with normal nutritional status and disturbed nutritional status at

Simpang Tiga Pekanbaru Community Health Center		
Nutritional Status of Simpang Tiga Health Centers		
	N	%
Normal	3471	98.10
Abnormal	67	1.9

Table 2 Total of Toddlers with Normal Nutritional Status/Incidences of Stunting, Wasting and Underweight at Simpang Tiga Pekanbaru Community Health Center

Nutritional Status	N	%
<i>Stunting</i>	13	19.40
<i>Wasting</i>	29	43.28
<i>Underweight</i>	25	37.32
Total	67	100

According to 2016 WHO data, Indonesia is the third country with the highest number of stunted children under five in Southeast Asia, with 33.8%. According to the 2015 PSG results, the prevalence of stunting under five in Indonesia was 29%, decreasing to 27.5% in 2016, while the national prevalence of stunting in 2013 was 37.2% (18.0% very short and 19.2% short). Meanwhile, the prevalence of underweight in Indonesia based on Riskesdas results in 2018 among toddlers was 17.7%. Meanwhile, wasting in Indonesia according to Basic Health Research (Riskesdas) in 2018 was 10.2%.⁶⁻⁸ The high prevalence of stunting and wasting that exceeds the threshold also occurs in Riau Province. The prevalence of stunting in Riau Province is 27.4% in the very short category (10.3%) and the short category (17.1%), while the prevalence of wasting is 12.2% in the very thin category (4.2%) and the short category. thin (8.0%). The number of toddlers who

experienced stunting, especially in the city of Pekanbaru, from 2015-2017 was between 8.66% - 19.22% of the sample of 300 children examined, while wasting was between 4.36% - 7.29% of the sample of 300 children.

Table 3 Description of the Distribution of Characteristics of Research Respondents at the Simpang Tiga Pekanbaru Community Health Center

No	Characteristics	N	%	
1.	Parity	Primipara	37	55.2
		Multipara	30	44.8
2.	History of hypertension in pregnancy	No	23	34.3
		Yes	44	65.7
3.	History of anemia in pregnancy	No	18	26.9
		Yes	49	73.1
4.	History of breastfeeding	Exclusive	22	32.8
		Not Exclusive	45	67.2
5.	History of complementary food	Compatible	41	61.2
		Uncompatible	26	38.8
6.	History of low birth weight	Normal	16	23.9
		LBW	51	76.1
7.	History of infant infection	No	21	31.3
		Yes	46	68.7
8.	Educatin	High	36	53.7
		Low	31	46.3
9.	Knowledge	Good	32	47.8
		Less	35	52.2
10.	Socioeconomic	Good	39	58.2
		Less	28	41.8

This research was conducted at the Muara Fajar Community Health Center on all toddlers aged 6-59 months who visited the Posyandu in the working area of the Community Health Center in 2020. An overview of the characteristics of the research subjects when seen from the parity of the respondents, the majority of whom were 37 primiparas, the mother's health history, the majority of respondents had a medical history with hypertension during pregnancy was 44 people (65.7%) and anemia during pregnancy was 49 people (73.1%). Meanwhile, if we look at the history of breastfeeding, some respondents with a history of exclusive breastfeeding were 22 people (32.8%) and 45 people were not exclusive (67.7%). If we look at the history of giving MPASI, some of the respondents were appropriate, namely 41 people (61.2%) and 26 people (38.8%) were not suitable. Furthermore, 51 people (76.1%) had a history of LBW births and 46 people (68.7%) had a history of infection in babies. Meanwhile, regarding the mother's educational history, the majority of respondents had low education, namely 31 people (46.3%) and 36 people (53.7%) had high education. If we look at knowledge, there are 32 people (47.8%) with good knowledge and 35 people (52.2%) with poor knowledge and high socio-economic conditions, namely 39 people (58.2%). Research by Rahman et al illustrates that five factors (region, child's age, father's education, and toilet type, as well as wealth index) have a statistically significant effect on stunting and underweight, while four factors (region, child's age and gender, and wealth index) is significant for wasting.

Table 4 Analysis of Parity History in Pregnancy as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	Parity		Total	
	Primipara	Multipara		
<i>Stunting</i>	8	4	12	<i>p</i> = 0.209*
%	66.7	33.3	100	
<i>Wasting</i>	13	17	30	
%	43.3	56.7	100	
<i>Underweight</i>	16	9	25	
%	64.0	36.0	100	
Total	37	30	67	

Parity is an indirect factor in the occurrence of malnutrition, because parity is closely related to parenting patterns and meeting children's nutritional needs, especially if supported by poor economic conditions. In this study, the p value was <0.05, namely p=0.209, so a statistically insignificant relationship was found between a history of parity and the incidence of stunting, wasting and underweight. The results of this study are in line with Nisa's research that there is no relationship between maternal parity and the incidence of stunting in toddlers aged 24-59 months in the Kedungtuban Community Health Center working area with a p value of 0.272 (0.272 > 0.05) and an OR value of 0.31. Parity is not related to the incidence of stunting because almost the majority of mothers of toddlers have parity in the small category, namely ≤ 3 children.

The results of this study are different from Apriasih's research which stated that parity was related to the incidence of malnutrition. This may be due to the number of respondents not being significantly different (Apriasih & Aprilia, 2019).

Cheikh Mbacké Faye's (2019) research conducted in Nairobi shows that maternal parity and household socio-economic status are important factors associated with time to recover from stunting in the first five years of life.

A large number of children in a family even though the economic situation is sufficient will result in reduced parental attention and affection received by their children, especially if the children are too close, and in terms of meeting food needs the mother will be confused in providing food if there are many children because of the focus of her attention. will be divided because toddlers definitely have problems eating, maybe one child has a good appetite, but the other doesn't, so the mother will be confused about how to feed the child.

Table 5 Analysis of Mother's History of Hypertension in Pregnancy as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	History of Hypertension in Pregnancy		Total	
	Yes	No		
<i>Stunting</i>	11	2	13	P = 0.047*
%	84.6	15.4	100	
<i>Wasting</i>	21	8	29	
%	72.4	27.6	100	
<i>Underweight</i>	12	13	25	
%	48.0	52.0	100	
Total	44	23	67	

According to WHO, stunting is caused by various factors, one of which is maternal factors. Several studies have found several risk factors for stunting in babies and toddlers, including anemia status during pregnancy, chronic energy deficiency (KEK), hypertension in pregnancy (HDK), preterm labor and baby birth weight.14 Based on the distribution

table of characteristics of respondents with a medical history of mothers who had experienced hypertension during pregnancy, the nutritional status results were stunting, 11 people (84.6%), wasting 21 people (72.4%) and underweight 12 people (48.0%). Then a bivariate analysis was carried out to see whether there was a relationship between a history of hypertension in pregnancy and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05 , namely $p=0.047$, so a statistically significant relationship was found. So the hypothesis of this research is proven that a history of hypertension in pregnancy influences the risk of stunting, wasting and underweight in toddlers.

The mother's health history during pregnancy can be a risk factor for stunting in toddlers. A review article regarding the factors that cause stunting in children includes anemia in pregnant women, BMI, history of ANC, history of comorbidities in pregnancy and history of LBW births. Then, based on research conducted by Nengsih in 2020, it shows that there is a relationship between hypertension in pregnancy and the incidence of stunting in babies and toddlers. This is proven by a p-value <0.05 with a p-value of 0.001. The OR value is 4.967 which can be interpreted as indicating that hypertension in pregnancy is a risk for stunting and the 95% CI is (1.179–9.128). In the logistic regression analysis, it was found that there was a relationship between hypertension in pregnancy and the incidence of stunting in infants and toddlers with an OR of 2.423. This result is almost close to three times the risk.

If we look at the history of anemia in pregnancy, the nutritional status of 9 people (69.2%) was stunted, 26 people were wasted (89.7%) and 14 people were underweight (56.0%). Then a bivariate analysis was carried out to see whether there was a relationship between a history of anemia in pregnancy and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05 , namely $p=0.020$, so a statistically significant relationship was found. So the hypothesis from this research is proven that a history of anemia during pregnancy influences the risk of stunting, wasting and underweight in toddlers.

Table 6 Analysis of Mother's History of Anemia in Pregnancy as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	History of anemia in pregnancy		Total	
	Yes	No		
<i>Stunting</i>	9	4	13	P = 0.020*
%	69.2	30.8	100	
<i>Wasting</i>	26	3	29	
%	89.7	10.3	100	
<i>Underweight</i>	14	11	25	
%	56.0	44.0	100	
Total	49	18	67	

The relationship between anemia during pregnancy and the incidence of stunting in children shows that there is a significant relationship between anemia in mothers during pregnancy which can trigger the incidence of stunting in children both in Indonesia and abroad. Anemia in pregnant women can affect the metabolism of the fetus so that it cannot function optimally. This is because in the condition of anemia the mother's body experiences a lack of hemoglobin levels so that the nutritional intake of the fetus is disrupted which results in fetal growth being disrupted, body length and birth weight being low.

Research conducted by Hastuti in 2020 regarding the relationship between anemia and the incidence of stunting at the Kampar Community Health Center, which carried out

statistical analysis, found a p-value < 0.005, which indicates there is a significant relationship. Then the results of the analysis obtained a significance value from the OR value, namely 0.011 (< 0.05), so the OR is said to be significant, which means it can represent the entire population, while the Confidence Interval value is 2.893 (1.282-6.530), meaning that pregnant women who experience anemia are at 3 times the risk. experience stunting in toddlers compared to pregnant women who do not experience anemia. According to Syaifuddin, 2012 anemia causes more blood flow back to the heart. This causes the amount of blood flowing to other tissues to decrease.

Table 7 Analysis of Exclusive Breastfeeding History as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	History of breastfeeding		Total	P = 0.041*
	Yes	No		
<i>Stunting</i>	4	9	13	
%	30.8	69.2	100	
<i>Wasting</i>	14	15	29	
%	48.3	51.7	100	
<i>Underweight</i>	4	21	25	
%	16.0	84.0	100	
Total	22	45	67	

From the results of the descriptive data analysis of this study, it can be seen that the majority of toddlers with stunted nutritional status did not receive exclusive breast milk as babies, namely 9 people (69.2%) and only 4 people (30.8%) received exclusive breast milk. Then, if we look at toddlers with wasting nutritional status, 14 people (48.3%) received exclusive breast milk and 15 people (51.7%) did not receive exclusive breast milk. The same thing was also seen in toddlers with underweight nutritional status, the majority did not receive exclusive breast milk, namely 21 people (84%) and 4 people (16%) who received exclusive breast milk. Next, a bivariate analysis was carried out to see the relationship between a history of exclusive breastfeeding and the incidence of stunting, wasting and underweight, and it was found that the p-value was <0.05, namely p= 0.041, which means there was a statistically significant relationship. So the hypothesis of this research is proven that exclusive breastfeeding influences the risk of stunting, wasting and underweight in toddlers.

The results seen in Akbar's research in 2021 showed that children who were exclusively breastfed for 6 months found that children who were exclusively breastfed were more likely to experience stunting. Statistically, it is different from previous research, children with a history of non-exclusive breastfeeding are more at risk of experiencing stunting.18 Research conducted by Yuniarti in 2019 stated that children who were not given exclusive breast milk had a 19.5 times greater risk of experiencing stunting. There is a tendency for babies who do not receive exclusive breast milk to be more susceptible to infectious diseases, this is because breast milk can function as an anti-infection so that it can prevent and reduce the risk of stunting in toddlers.

Table 8 Analysis of the history of giving MPASI during pregnancy as a risk factor for increasing the incidence of stunting, wasting and underweight in toddlers

Variable	History of complementary food		Total	
	Compatible	Uncompatible		
<i>Stunting</i>	6	7	13	P = 0.013*
	46.2	53.8	100	
<i>Wasting</i>	14	15	29	
	48.3	51.7	100	
<i>Underweight</i>	21	4	25	
	84.0	16.0	100	
Total	26	41	67	

After analyzing the history of providing MPASI, the majority of respondents under five with stunting nutritional status did not receive appropriate MPASI when they were babies, namely 7 people (53.8%). Then, if we look at toddlers with wasting nutritional status who received appropriate MPASI, there were 14 people (48.3%). The same thing was also seen in toddlers with underweight nutritional status, the majority did not receive appropriate MPASI, namely 15 people (51.7%). Next, a bivariate analysis was carried out to see the relationship between the history of giving MPASI and the incidence of stunting, wasting and underweight, it was found that the p-value was <0.05, namely p = 0.013, which means there was a statistically significant relationship. So the hypothesis from this research is proven that a history of giving MPASI influences the risk of stunting, wasting and underweight in toddlers.

Based on research conducted by Zogara in 2021, it is known that the timing of giving MPASI is related to the nutritional status of toddlers. This research states that toddlers who get MPASI early experience more problems with being thin and very thin compared to toddlers who get MPASI on time when giving MPASI. What needs to be taken into account is the age at which MPASI is given, the type of MPASI, the frequency of giving MPASI, the portion of giving MPASI, and the method. giving MPASI at an early stage. This is in line with the theory put forward by Azriful et al, 2018 which states that even with optimal breast milk, children will become stunted if they do not receive sufficient quantity and quality of complementary breast milk food after 6 months of age. Most incidents of stunting and wasting outside of hunger situations occur in the first 2 years of life when children have high nutritional needs and there are limitations in the quality and quantity of their food, especially after the completion of the exclusive breastfeeding period.

Table 9 Analysis of LBW History as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	History of LBW		Total	
	Yes	No		
<i>Stunting</i>	6	7	13	P = 0.017*
%	46.2	53.8	100	
<i>Wasting</i>	23	6	29	
%	79.3	20.7	100	
<i>Underweight</i>	11	14	25	
%	44.0	56.0	100	
Total	26	41	67	

Based on the distribution table of characteristics of respondents with a history of LBW birth, 6 people (46.2%) had stunting nutritional status, 23 people wasting (79.3%)

and 11 people were underweight (44.0%). Then a bivariate analysis was carried out to see whether there was a relationship between LBW birth history and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05, so a statistically significant relationship was found. So the hypothesis of this research is proven that a history of LBW influences the risk of stunting, wasting and underweight at the age of five.

This is in line with research conducted by Purnamasari et al. in 2022 regarding the analysis of risk factors that influence the incidence of stunting in toddlers. Having a history of LBW in children statistically influences the incidence of stunting in toddlers with a p-value of 0.003.22 The same thing was also mentioned by research conducted by Abimayu in 2023 which analyzed the risk factors for stunting, wasting and underweight, showing that toddlers with a history of LBW were 3,181 times more at risk of experiencing stunting, 2.42 times experiencing being underweight and 2,265 times experiencing wasting compared to toddlers who had no history. LBW. In addition, toddlers aged 24-59 months are 2,089 times more at risk of experiencing stunting and 1,726 times being underweight compared to toddlers aged 0-23 months.²³ Several studies that have been carried out also show this. Widiastuti, 2021 stated that birth weight has a big impact on the child's subsequent growth, development and height. Babies born with LBW will be at high risk of morbidity, death, infectious diseases, underweight and stunting from the early neonatal period until childhood.

Table 10 Analysis of history of infection in babies as a risk factor for increased incidence of stunting, wasting and underweight in toddlers

Variable	History of infection in babies		Total	
	Yes	No		
<i>Stunting</i>	9	4	13	P = 0.011*
%	69.2	30.8	100	
<i>Wasting</i>	24	4	29	
%	86.2	13.8	100	
<i>Underweight</i>	12	13	25	
%	48.0	52.0	100	
Total	46	21	67	

Based on the results of descriptive analysis of the distribution of characteristics of respondents with a history of infection in babies, the majority had a history of infection. In terms of nutritional status, 9 people were stunted (69.2%), 24 people were wasted (86.2%) and 12 people were underweight (48.0%). Then a bivariate analysis was carried out to see whether there was a relationship between a history of infectious disease and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05, namely p=0.011, so a statistically significant relationship was found. So the hypothesis from this research is proven that a history of infectious disease influences the risk of stunting, wasting and underweight in toddlers.

Toddlers who frequently experience febrile infections have a 3.25 times chance of experiencing wasting or stunting when compared to toddlers who rarely experience febrile infections. Setyowati et al said in 2016 that the proportion of underweight incidents in children under five who had a history of infectious diseases was 22.8%. The results of the analysis using the chi-square test obtained a p value of 0.047 (p value < 0.05), which means there is a significant relationship between history of infection and underweight nutritional status in children under five. Judging from the prevalence ratio value obtained, it is 1.6, meaning that children with a history of infection are 1.6 times more likely to suffer from underweight compared to children who do not have a history of

infection.25,26

Children who suffer from infectious diseases for a longer duration are more likely to experience stunting. And they are more likely to experience residual symptoms (sequelae) due to general infections which will weaken the child's physical condition as in the research of Solin et al. that the relationship between the incidence of infectious diseases and the incidence of stunting in toddlers was obtained by p value (0.000) < ($\alpha = 0.05$) in toddlers who experienced diarrhea and p value (0.001) < ($\alpha = 0.05$) in toddlers who experienced ARI, which shows that there is a significant relationship between the incidence of infectious diseases and the incidence of stunting in toddlers.

Maternal education plays an important role in determining the health status and nutritional status of toddlers. Maternal education influences the mother's level of knowledge in parenting patterns, providing additional food to toddlers and food availability in the household.

Table 11 Analysis of maternal educational history as a risk factor for increasing the incidence of stunting, wasting and underweight in toddlers

Variable	Education		Total	
	Low	High		
<i>Stunting</i>	10	3	13	P = 0.031*
%	76.9	23.1	100	
<i>Wasting</i>	14	15	29	
%	48.3	51.7	100	
<i>Underweight</i>	7	18	25	
%	28.0	72.0	100	
Total	31	36	67	

Based on the table above, it shows the distribution of characteristics of respondents with educated mothers who have stunting nutritional status. The majority of mothers' educational history is low education, 10 people (76.9%), the same thing can be seen in the wasting nutritional status of 14 people (48.3%) mothers with a history of high education. Then, if we look at the nutritional status of underweight, 7 people (28.0%) mothers had low education and 18 people (72.0%) mothers had higher education. Then a bivariate analysis was carried out to see whether there was a relationship between maternal education and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05, namely p=0.031, so a statistically significant relationship was found. So the hypothesis from this research is proven that the mother's education level influences the risk of stunting, wasting and underweight in toddlers.

This research is supported by Purnamasari's 2022 research that another factor that has a strong influence on the occurrence of stunting and wasting in toddlers is the mother's formal education level (p-value 0.039). The mother's education level influences the mother's knowledge and understanding of stunting.²² Then the same thing can also be seen from Habimana et al's 2019 research that children born to mothers with low education experience a higher risk of stunting than children born to mothers with a higher level of education with an OR in elementary school of (OR= 0.365), high school (OR=0.337) and college level (OR=0.34). Several previous research results have revealed that the mother's formal education level influences the occurrence of stunting in toddlers and toddlers. Children of mothers who do not have antenatal check-ups during pregnancy have a higher risk of experiencing wasting.

Table 12 Analysis of Mother's Knowledge History as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	Knowledge		Total	
	Less	Good		
<i>Stunting</i>	10	3	13	P = 0.021*
%	76.9	23.1	100	
<i>Wasting</i>	17	12	29	
%	58.6	41.4	100	
<i>Underweight</i>	8	17	25	
%	32.0	68.0	100	
Total	35	32	67	

Based on the analysis of this research, the distribution of respondents' characteristics can be seen from mothers' knowledge regarding the nutrition of children under five who have stunted nutritional status. The majority of mothers have poor knowledge, namely 10 people (76.9%), with underweight nutritional status, 17 people (68.0%) have good knowledge. Then a bivariate analysis was carried out to see whether there was a relationship between maternal knowledge and nutritional status (normal, stunting, wasting and underweight). The p value was <0.05 , namely $p=0.021$, so a statistically significant relationship was found. So the hypothesis of this research is proven that the mother's level of knowledge influences the risk of stunting, wasting and underweight in toddlers.

This research is in line with the results of research by Palupi et al in 2023 which proves that there is a relationship between knowledge about nutrition and the incidence of stunting or malnutrition in children under five with an OR value of 2.7, so that if the mother has high knowledge about nutrition there is a 2.7 times chance that her child will avoid the disease. risk of stunting.³⁰ Mother's knowledge about nutrition needs attention. Good nutritional knowledge in mothers is expected to be able to provide food with the right type and amount according to the needs of the child's growing age so that the child can grow optimally and not experience problems during his growth period. Andi Yohanes Rias in the book Nutrition of the Baby of the Heart says that good nutritional knowledge will cause a person to be able to prepare a good menu for consumption. The more nutritional knowledge a person has, the more they will take into account the type and amount of food they get for consumption.³¹

Programs that have been held by the Ministry of Health and implemented by posyandu need to be known, followed and supported by mothers, for example additional MT for KEK pregnant women, Infant and Child Feeding (IYCF), micronutrient supplementation such as blood supplement tablets for pregnant women and vitamin A and taburia for toddlers.

Table 13 Analysis of socioeconomics as a Risk Factor for Increased Stunting, Wasting and Underweight Incidents in Toddlers

Variable	Socioeconomic		Total	
	Rendah	Tinggi		
<i>Stunting</i>	4	9	13	P = 0.042*
%	30.8	69.2	100	
<i>Wasting</i>	17	12	29	
%	58.6	41.4	100	
<i>Underweight</i>	7	18	25	
%	28.0	72.0	100	
Total	28	39	67	

Socio-economic factors such as family income and number of family members influence the incidence of stunting which leads to poor quality and quantity of nutritional intake and increased incidence of disease (Aida, 2020). Based on the table above, the p-value is 0.042, which is below the probability value (sig) of 0.05 (<0.05), which means there is a significant relationship between socio-economic conditions and nutritional status (normal, stunting, wasting and underweight). So the hypothesis of this research is proven that socio-economic conditions influence the risk of stunting, wasting and underweight in toddlers.

Socio-economic factors such as family income, number of family members, and also parental education influence the incidence of stunting which leads to poor quality and quantity of nutritional intake and increases the incidence of disease in children. Research by Paudel et al. 2012 who conducted research on the determinant factors of stunting in Nepal, explained that low income was 3.11 times the risk of stunting.33,34

The relationship between socioeconomic status and health shows that higher family income is associated with better health in children. Wealthy parents have more income to pay for health care. Both are causal relationships, namely more parental income will result in better child health. This is in line with Fikrina's research in 2017. Based on the results of the analysis, the proportion coefficient (p) was 0.000. Thus, p-value = 0.000 is smaller than the error level used at the $\alpha = 0.05$ level so that there is a significant relationship between socio-economic conditions or family income and the incidence of stunting in toddlers aged 24-59 months.

Table 14 Multivariate Analysis of Variables that Influence Stunting, Wasting and Underweight

Characteristic	SE	Wald	Sig	Exp (B)	CI	
					Lower	Upper
Parity	0.845	0.015	0.902	1.110	0.212	5.816
History of hypertension in pregnancy	0.840	0.085	0.770	1.278	0.246	6.638
History of anemia in pregnancy	1.107	0.874	0.350	2.816	0.321	24.674
History of breastfeeding	1.122	3.595	0.058	8.389	0.931	75.602
History of complementary food	1.111	6.610	0.010	17.408	1.972	153.690
LBW	0.851	2.940	0.086	4.303	0.812	22.818
History of infant infection	1.059	1.281	0.258	3.314	0.416	26.388
Education	0.863	4.124	0.042	5.764	1.063	31.252
Knowledge	0.957	5.019	0.025	8.531	1.308	55.653
Socioeconomic	0.965	1.585	0.208	3.372	0.508	22.369

Based on the results of bivariate analysis, it shows that all risk factor variables influence the nutritional status of toddlers (normal, stunting, wasting and underweight) including the mother's health history, breastfeeding and complementary foods, LBW, history of baby infections, mother's education and knowledge and socio-economic conditions. From the results of the logistic regression test, it was found that these three factors have a strong influence on the incidence of stunting, wasting and underweight in toddlers, namely with an OR value > 1 , which means that a history of giving MPASI, a history of LBW and a history of infant infection are the determining factors that cause stunting, wasting and underweight.

Research by Poda in showed that factors such as history of LBW, maternal education and level of maternal knowledge and multiple or multiple births were associated with stunted growth. Apart from that, factors at the community level such as improving water quality, cleanliness and sanitation are also determining factors in the occurrence of

stunting. For mothers, clean water sources, gender equality, food availability and education are important factors in reducing stunting.³⁶ This is in line with Malahayati's research in 2019 which stated that five nutrition programs were obtained that had a significant effect after carrying out a multivariate regression analysis on the percentage of underweight and stunting among toddlers in Indonesia, namely the percentage of babies receiving exclusive breast milk and the method of providing MPASI, the percentage of underweight toddlers receiving additional food, percentage of pregnant women at risk of CED, and history of infection in babies.³⁷

Research conducted by Bentian in 2015 stated that the most dominant variable associated with stunting in children was LBW. The OR value for the LBW variable is 4.535, this means that if a child is born with LBW it will be followed by an increase in the incidence of stunting by 4.535 times.³⁸ The results of the Badriya study, 2019, show that the factors related to the three nutritional problems of stunting, wasting and underweight are gender and LBW. Apart from that, other factors that are related to stunting are exclusive breastfeeding and economic status, wasting is the number of ART members, and underweight is the number of ART members and economic status. This research shows the need for a multisector approach to alleviating nutritional problems in children under two years of age. This is because the risk factors for malnutrition in children under two years of age, including stunting, wasting and underweight, are LBW, economic status, gender and number of household members.

CONCLUSION

The results of the logistic regression test showed that history of breastfeeding, MPASI and education were the dominant risk factors influencing the incidence of stunting, wasting and underweight toddlers. There is an influence of LBW status, genetics, exclusive breastfeeding and MPASI, nutritious food intake and the incidence of stunting, wasting and underweight in toddlers. Risk factors for malnutrition in toddlers that mothers can avoid include LBW, infectious diseases, economic conditions, low education and knowledge of the mother, mother's height or genetics.

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