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PREVALENCE AND RISK FACTORS OF STUNTING AMONG TODDLERS IN URBAN AND RURAL

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ABSTRACT

The high prevalence of stunting in Sungai Penuh City makes it necessary to identify the causes of stunting in a local context by looking at the classification of residence. Stunting is influenced by many factors, such as factors from mothers, toddlers, toddler households and environmental conditions. This cross-sectional study was designed to analyze the prevalence and risk factors of stunting among under-fives in rural and urban areas in Sungai Penuh City, Jambi Province, Indonesia. The data for this study used the results of the Indonesian Nutrition Status Survey in 2022 which was conducted in August-September 2022, while data requests were made in January 2024. The sample was 395 toddlers living in Sungai Penuh City. Data that has been cleaned, then carried out descriptive statistical tests starting with frequency distribution, Chi-square test and Logistic Regression test with 95% confidence interval (p-value <0.05) using IBM SPSS statistics version 25 application software. The results of this study indicate that the prevalence of stunting in urban areas is higher than in rural areas, but there are no differences in risk factors for stunting, and overall rural-urban in Sungai Penuh City on the variable of birth length with an OR (95% CI) of 2.30 and maternal education with an OR (95% CI) of 2.22 indicates the risk of having stunted children (p-value <0.005). This study concludes that there are differences in prevalence between rural and urban areas, but there are no differences in the risk factors that cause stunting in toddlers due to the close proximity, so the potential of the region is not much different.

Kata Kunci:

Balita; Ekologi Gizi; Faktor Risiko; Prevalensi; Stunting;

ABSTRAK

Tingginya prevalensi stunting di Kota Sungai Penuh menyebabkan diperlukannya pengidentifikasian penyebab stunting dalam konteks lokal dengan melihat klasifikasi tempat tinggal. Stunting dipengaruhi banyak faktor, seperti faktor dari ibu, balita, rumah tangga balita maupun kondisi lingkungan. Penelitian cross sectional study ini bertujuan untuk menganalisis prevalensi dan faktor risiko stunting pada balita di perdesaan dan perkotaan di Kota Sungai Penuh, Provinsi Jambi, Indonesia. Data penelitian ini menggunakan hasil Survei Status Gizi Indonesia tahun 2022 yang dilakukan pada bulan Agustus-september 2022, sedangkan permintaan data dilakukan pada bulan Januari 2024. Sampel sejumlah 395 balita yang tinggal di Kota Sungai Penuh. Data yang telah di cleaning, selanjutnya dilakukan uji statistic deskriptif dimulai dengan distribusi frekuensi, uji Chi-square dan uji Logistic Regression dengan interval kepercayaan 95% (p-value<0,05) menggunakan software aplikasi IBM SPSS statistics versi 25. Hasil penelitian ini menunjukkan prevalensi stunting di perkotaan lebih tinggi dibandingkan perdesaan, namun tidak ditemukan perbedaan faktor risiko stunting, dan secara keseluruhan perdesaan-perkotaan di Kota Sungai Penuh pada variabel panjang badan lahir dengan OR (CI 95%) 2,30 dan pendidikan ibu dengan OR (CI 95%) 2,22 menunjukkan adanya risiko memiliki anak stunting (p-value <0,005). Penelitian ini menyimpulkan bahwa terdapat perbedaan prevalensi antara perdesaan dan perkotaan, namun tidak ditemukan adanya perbedaan faktor risiko penyebab stunting pada balita, dikarenakan adanya jarak yang berdekatan sehingga potensi wilayah yang tidak jauh berbeda

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INTRODUCTION

Malnutrition is one of the most prevalent public health problems in developing countries around the world. Globally, one in three children is diagnosed with malnutrition, making malnutrition the biggest factor in under-five mortality (International Food Policy Research Institute, 2016). One indicator that illustrates chronic malnutrition in children under five is stunting. Stunting can have an impact on brain dysfunction resulting in cognitive decline, besides that stunting has an impact on child growth disorders, increased risk of infectious and non-communicable diseases and decreased productivity in children (Utami et al., 2019; WHO, 2014). Children diagnosed with stunting are prone to fat accumulation and are at a higher risk of diabetes, hypertension, and dyslipidemia, and those over 2 years of age have an increased risk of obesity (Soliman et al., 2021). The existence of these impacts can lead to a loss of generation in the future (UNICEF, 2020).

In the past decade, 148.1 million children under five in the world were chronically malnourished or stunted, more than half of them in Asia, with Indonesia ranking third highest in Southeast Asia (UNICEF et al., 2023). Nationally, the stunting rate in children under five in 2022 is 21.6%, although it has decreased in the previous year; this figure is still relatively high. Jambi Province is one of the provinces in Indonesia that has experienced a decrease in stunting, but the province consists of 9 districts and 2 cities. The only district/city in Jambi Province that experienced an increase in stunting prevalence was Sungai Penuh City at 26%,which exceeded the national and provincial prevalence of stunting (Kementerian Kesehatan RI, 2022). The high prevalence of stunting is a priority for improving the quality of human resources in Indonesia. To reduce the stunting rate, it is necessary to identify specific risk factors for stunting by considering the potential of the region (Noor et al., 2022).

The factors that cause stunting are multifactorial and complex, one of the causes of impaired growth since the mother's pregnancy is external and internal; external conditions such as socioeconomic status and environment; and internal conditions such as maternal nutritional status, maternal intake, and maternal age (Kuhnt & Vollmer, 2017; Workicho et al., 2019). A comprehensive cause of nutritional status is food security, and low food security in a household over a long period can cause a lack of nutritional intake needs, which can cause chronic malnutrition in mothers and (Motbainor et al., 2015; Wardani et al., 2020). Food security is influenced by the socioeconomic status of households for less than five years. Food access due to distance is a driving factor for poor food security, besides that socioeconomics is also often the root of nutritional problems that can affect many aspects, both in the fields of food, health and the environment (Darin-Mattsson et al., 2017; Laraia et al., 2022). The factors that cause stunting are closely related to the potential of the place of residence; therefore, it is necessary to consider the causes of stunting from the point of view of nutritional ecology, both externally and internally (Raiten & Bremer, 2020).

However, few published studies have focused on nutritional ecology as a local context for identifying the risk factors for stunting in children under five. In addition, few studies have discussed how the characteristics and background elements of nutritional ecology contribute to stunting in Sungai Penuh. The existence of these gaps is a strong reason for this research to be carried out because it uses important variables that can affect stunting in toddlers and with a nutritional ecology approach.

METHOD

Study Design

The purpose of this quantitative research using a *cross-sectional study* design approach is to determine the prevalence and risk factors that affect stunting in toddlers with a nutritional ecology approach in rural and urban areas of Sungai Penuh City. This research is a nationally representative study that focuses on Sungai Penuh City using Indonesian Nutrition Status Survey data from 2022. The dependent variable was stunting, and the independent variables were the birth weight of toddlers, birth length of toddlers, age of the first pregnant mother, mother's education, food security, and wealth index.

Location and Time of Study

The national survey in Indonesia was conducted from August to September 2022. However, this study only focused on one of the city areas in Indonesia that has experienced an increase in the prevalence of stunting, namely Sungai Penuh City, Jambi Province, Indonesia. Determination of the classification of residence follows the classification of the Indonesian Central Agency on Statistics (BPS

Indonesia), based on the characteristics of rural and urban areas. Data requests were made in January 2024 through the official website of one of the Indonesian government agencies.

Population and Sample

The population in this survey is all households with children under five in each predetermined census block. The sample of this study used a census sample so that the population was taken as a whole into the study sample. Based on SSGI 2022 guidelines, the study included 470 homes with children under five in Sungai Penuh City who participated in the survey, ages 0-59 months. (Kementrian Kesehatan RI, 2022). This study used a census sampling technique, where all children under five who participated in the national survey had the opportunity to be sampled. However, after cleaning the data, the sample that had the characteristics of data availability according to the needs of this study amounted to 395 toddlers.

Data Collection

Data collection is carried out by enumerators who have attended training and perception equations; the questionnaire is used to gather the data., and the completed questionnaire is inputted by the enumerator on the page provided. The SSGI 2022 questionnaire is divided into 3 sections, including the under-five household questionnaire, the under-five questionnaire, and the women's questionnaire. The researchers obtained data by studying the SSGI 2022 questionnaire and guidelines, making a checklist of the data needed, submitting an application, filling out the required data form and sending a proposal that had been tested and approved by the board of examiners through the official website of the Health Policy Development Agency (BKPK), after that, the dataset would be sent to the applicant through the BKPK official website.

Process and Analysis Data

The toddler height indicator in this study indicates that stunting is the dependent variable. Toddlers are deemed stunted if their nutritional status for height for age has a z-score of <-2 SD to <-3 SD. The z-score value is reported as a standard deviation (SD) (Kementrian Kesehatan RI, 2020). The study divides the birth weight variable into two categories: low birth weight (<2500 grams) and normal birth weight (>2500 grams). Similarly, the birth length variable is divided into two categories: short birth length (<48 cm) and normal birth length (>48 cm); the variable age of the mother's first pregnancy was categorized as too young (<20 years), ideal (21-35 years), and too old (>35 years); the variable of maternal education was categorized into low (no school - junior high school) and high (senior high school - college); the variables food security are categorized based on household food security scores, scoring is done using the Food Consumption Score (FCS) method, the scoring results are then categorized into poor (0-21.4), borderline (21.5-29.4), and acceptable (>35); and the variable wealth index based on assets owned by under-five households is categorized based on PCA analysis, the analysis results are then categorized as follows into lower middle (quintiles 1-3) and upper middle (quintiles 4-5).

The researcher first used univariate analysis (descriptive frequency distribution) to analyze the study data, and then, at the 5% significance level, a bivariate test was conducted using the chi-square test to ascertain the relationship between the stunting variable and the independent variables in the study as a whole. To find the causal variables of stunting, the Logistic Regression test was added to the modeling process and used in the multivariate analysis. To find the risk factors for stunting for each classification of residence, three logistic regression models were developed: Model I was built for rural strata, Model II was built for urban strata, and Model III was built for all strata. The results were presented as odds ratios (ORs) with 95% confidence intervals. IBM SPSS Statistics version was used for all data analysis.

RESULTS

Table 1. Distribution of Frequency Characteristics of Toddlers in Sungai Penuh City

Variable	n	%
Gender of Toddlers		
Male	204	51.6
Female	191	48.8
Age of Toddlers		
0-11 months	77	19.5
12-23 months	88	22.3
24-35 months	70	17.7
36-47 months	83	21.0
48-59 months	77	19.5
Birth Weight of a Toddler		
Low Birth Weight	14	3.5
Normal Birth Weight	381	96.5
Birth Length of Toddlers		
Short Birth Length	32	8.1
Normal Birth Length	363	91.9
Age at first pregnancy		
Young	97	24.5
Ideal	294	74.5
Old	4	1.0
Mother's education		
Low	59	14.9
High	336	85.1
Food Security		
Poor	0	0
Borderline	4	1.0
Acceptable	391	99.0
Wealth Index		
Middle To Low	237	60.0
Middle To Upper	158	40.0
Residence Classification		
Rural	308	78.0
Urban	87	22.0
Z-score TB/U		
Mean±SD (Min-Max)	-1.3108-1.3086 (-5.02-4.98)	

Toddlers in Sungai Penuh City, aged 0-59 months, who participated in a national survey conducted periodically in Indonesia were the subjects of the study. Based on Table 1, the majority of study participants had normal birth weight and length, and most of the toddlers had a male birth history. In terms of maternal history, most of the study participants had an ideal age of first pregnancy and higher education. Meanwhile, when viewed from the household aspect, most toddler households have good food security, but the wealth index is middle to lower and most toddlers come from urban residences. Of the 395 toddlers who were the subjects of this study with a mean z-score of -1.3108 SD, the z-score value was close to the threshold for toddlers to be said to be stunted, which is -2 SD.

Table 2. Distribution of Frequency of Bivariate Analysis of Risk Factors for Stunting in Toddlers

Variable	Nutritional Status Based on TB/U				p-value	OR (CI 95%)
	Stunting		Normal			
	n	%	n	%		
Birth Weight of a Toddler						
Low Birth Weight	9	7.7	5	1.8	0.004*	4.55 (1.49-13.88)
Normal Birth Weight	108	92.3	273	98.2		
Birth Length of Toddler						
Short Birth Length	15	12.8	17	6.1	0.026*	2.25 (1.08-4.69)
Normal Birth Length	102	87.2	261	93.9		
Age at first pregnancy						
Young	34	29.1	63	22.7	0.250	-
Ideal	81	69.2	213	76.6		
Old	2	1.7	2	0.7		
Mother's education						
Low	27	23.1	32	11,5	0.003*	2.30 (1.30-4.06)
High	90	76.9	246	88,5		
Food Security						
Poor	-	-	-	-	0.370	2.40 (0.33-17.24)
Borderline	2	1.7	2	0.7		
Acceptable	115	98.3	276	99.3		
Wealth Index						
Middle To Low	60	51.3	177	63.7	0.022*	0.60 (0.38-0.93)
Middle To Upper	57	48.7	101	36.3		
Residence Classification						
Rural	24	20.5	63	22.7	0.638	1.13 (0.66-1.92)
Urban	93	79.5	215	77.3		

* Statistically significant variables at p-value < 0.05, chi-square test

The cross-tabulation results in Table 2 show a significant correlation (p-value <0.05) between the incidence of stunting and birth weight, birth length, maternal education, and wealth index. Compared to low birth weight with appropriate nutritional status, low birth weight had a 4.55 times greater risk of stunting. Compared to short birth length with appropriate nutritional status, short birth length had a 2.25 times greater risk of stunting. Low maternal education has a risk of 2.30 times having stunted children compared to low maternal education having normal children. Meanwhile, the wealth index variable shows that this factor is a protective factor in preventing stunting in toddlers, as evidenced by households with a wealth index that prevents and above being able to protect children from stunting by 1.66 times compared to households with a middle to lower wealth index.

To observe the risk factors that cause stunting in the local context simultaneously in the category of residence classification, the Logistic Regression test with three models can be seen in Table 3, which shows that based on the modeling feasibility test in terms of the Hosmer and Lemeshow Test values, these three models have met the requirements of the logistic regression test, and the model is feasible or appropriate, as evidenced by the significance value of the Hosmer and Lemeshow Test> 0.05. The results of the simultaneous analysis showed that Model I (rural) and Model II (urban) on birth weight, birth length, age at first pregnancy, maternal education, food security, and wealth index did not have a significant relationship with the incidence of stunting in children under five years of age (p-value>0.05). Different results in Model III (overall) after simultaneous analysis showed that the variables of birth length and maternal education had a significant relationship with the incidence of stunting in children under five (p <0.05).

Table 3. Modeling with Logistic Regression Analysis of Prevalence and Risk Factors of Stunting in Rural and Urban Toddlers

Variable	Model I (Rural)		Model II (Urban)		Model III (All)	
	p-value	**OR (CI 95%)**	***p-value***	**OR (CI 95%)**	***p-value***	**OR (CI 95%)**
Birth Weight of Toddler	0.300	4.31 (0.27-68.51)	0.133	2.77 (0.73-10.48)	0.066	3.03 (0.93-9.85)
Birth Length of Toddlers	0.164	6.57 (0.46-92.94)	0.086	2.04 (0.90-4.63)	0.036*	2.30 (1.05-5.00)
Age at first pregnancy	0.732	0.81 (0.26-2.57)	0.731	1.10 (0.61-1.98)	0.922	1.02 (0.61-1.72)
Mother's education	0.064	3.02 (0.93-9.73)	0.081	1.93 (0.92-4.05)	0.012*	2.22 (1.19-4.14)
Food Security	-	-	0.529	1.92 (0.24-15.38)	0.509	2.01 (0.25-16.24)
Wealth Index	0.326	0.58 (0.19-1.71)	0.224	0.72 (0.42-1,22)	0.140	0.70 (0.44-1.12)
Residence Classification	-	-	-	-	0.599	1.16 (0.66-2.01)
Prevalence Stunting	27.58%		30.19%		29.62%	
Hosmer and Lemeshow Test	0.440		0.248		0.065	

*Statistically significant variables at p-value < 0.05, regression logistic

Overall rural-urban in Sungai Penuh City on the variable of birth length with OR (CI 95%) 2.30 and maternal education with OR (CI 95%) 2.22 indicates the risk of having stunted children. However, in terms of the prevalence of stunting in each characteristic area of residence and overall, the prevalence of stunting was not significantly different between models I, II, and III and exceeded the prevalence of stunting in Jambi Province (26%) and Indonesia (21.6%) in 2022. These results can occur because, first, the distance between village areas classified as urban and villages classified as rural is almost equal, so access to the city center, health facilities, educational facilities, and other public facilities is not much different. Secondly, Sungai Penuh City is an expansion of the previous district, so the culture and habits of the community are still inherent, such as the traditional markets that are held every week in several sub-districts. This has an impact on family food security and the nutritional intake of toddlers. With these results, the researcher considers that there is not much difference in potential between rural and urban areas in Sungai Penuh City.

DISCUSSION

Although the country's stunting prevalence has dropped by 2.8% since 2021, it is still far behind the 14% national objective established by the Indonesian government in 2024 (Kementerian Kesehatan RI, 2020, 2021, 2022). As there were fewer samples in rural areas compared to urban areas, this study found that the prevalence of stunting was higher in urban areas compared to rural areas. Previous research in line with this study showed similar results; research in Pakistan showed that toddlers living in urban areas were more prone to stunting (Khan et al., 2019). This is because the factors found in this study may also be influenced by population density in urban slums, besides that it is also influenced by rapid rural-urban migration, the existence of urban rural migration causes the need for environmental adaptation (Ameye & De Weerdt, 2020; Logarajan et al., 2023; Naresh & Maiya, 2021). The prevalence of stunting in an area is influenced by the potential of different regions; however, the independent variables studied in this study show that there are no differences in the risk factors for stunting in rural and urban areas of Sungai Penuh City. This was most likely due to the unequal number of samples in

rural and urban areas. The existence of urbanization encourages a potential gap in the urban environment, such that the prevalence of stunting is higher in urban areas (Islam et al., 2018).

This study examined risk factors for stunting and found that maternal education and birth length under five were the two main risk factors for stunting in Sungai Penuh City, which is a rural-urban area. The findings of this study are consistent with research from Bangladesh which found that one of the best indicators of a child's nutritional condition is the length of the newborn's weight (Islam et al., 2018; Lewa et al., 2020). Toddlers with a short birth length have a 2.30 times risk of stunting. This is because children's birth length is the main predictor of the linear growth failure experienced by toddlers. Low birth length can occur when malnutrition in toddlers, diseases during pregnancy, postnatal care, and monitoring are prioritized to ensure that the child's body length increases and that subsequent growth is optimal (Hastuti et al., 2020; Sawitri et al., 2021). Research conducted by Hidayati et al. (2022) also showed that infants with low birth length have smaller body proportions and can reduce brain volume and intelligence compared to infants with normal birth length. The findings of this impact are very similar to those of stunting, but this condition can be overcome as long as children get adequate nutritional intake and health is maintained so that toddlers can catch up with growth as they get older (Widiyastuti, et al., 2020).

This study also shows that a risk factor for stunting is the low level of maternal education in rural-urban areas of Sungai Penuh City. This study supports other studies that found a correlation between stunting and mother's education (Khan et al., 2019; Nepali et al., 2019; Nkurunziza et al., 2017). Stunting was 2.22 times more likely to occur in toddlers whose moms had less education. This can happen when moms with poor levels of education are less knowledgeable about health issues and feeding their children, making them more likely to have children who are severely malnourished (Khan et al., 2019). This condition is supported by the research conducted by Yaya et al. (2022), who concluded that the higher the mother's education, the greater the opportunity to reduce the incidence of stunting. Maternal education can bridge this gap in toddlers. Mothers with higher education have a positive impact on stunting because of their knowledge and ability regarding health services, especially understanding nutritional intake problems before pregnancy, during pregnancy, and after childbirth (Azizah et al., 2022; Casale et al., 2018).

Although stunting is a condition that is assessed based on the TB/U index, body weight does not directly correlate with stunting. Other study variables, such as birth weight, did not significantly correlate with the occurrence of stunting (Antun, 2016). The incidence of stunting is not significantly correlated with maternal age at first pregnancy because most mothers of under-fives become pregnant at an optimal age. However, maternal age can have an impact on stunting if the mother becomes pregnant at an age that is at risk and vulnerable to pregnancy complications (Wells et al., 2022). In the same way, the food security variable does not have a significant relationship with the incidence of stunting because food security is comprehensive to nutritional status, but less sensitive to toddlers, and nutritional status of toddlers is more vulnerable to being influenced by health and environmental aspects (Mulu & Mengistie, 2017; Saaka, 2014). The same findings were also found for the wealth index variable, which did not have a significant relationship with the incidence of stunting because the wealth index is not directly able to influence stunting, but as a mediator of other factors such as health facilities, environmental conditions, maternal education, biological factors of feeding practices, and exclusive breastfeeding (Rizal & van Doorslaer, 2019; Tesfaw & Woya, 2022). In the context of the Sungai Penuh City policy, the Sungai Penuh City government has made efforts to improve nutrition by conducting specific and sensitive interventions that focus on mothers and children equally, both in rural and urban areas, although there are still gaps in nutrition problems. However, this is due to the multifactor causes of stunting, so it is possible that there are other factors that have not been studied or have not been further explored.

The findings of this study strengthen the findings of this study, which have not been able to prove a significant relationship that these variables can cause stunting in toddlers in rural and urban areas, even though these variables are predictors of stunting because the number of urban and rural samples is not the same, so the proportions cannot be compared. In addition, the possibility of multifactorial causes of stunting necessitates the identification of causal factors that were not examined in this study, such as food intake and infectious diseases in children, maternal intake during pregnancy,

sanitation and environmental conditions, access to clean water, and health services (Akombi et al., 2019; Anggraini & Romadona, 2020; Sari et al., 2020; Stamenkovic et al., 2016).

The results of this study are consistent with previous studies that found no significant association between the incidence of stunting and residence characteristics (Joshi et al., 2017; Kismul et al., 2018; Yirga et al., 2019). The characteristics of each region can affect different conditions owing to the different potentials of the region (Purwanti & Nurfita, 2019). These differences in characteristics were examined using a nutritional ecological approach. Nutritional ecology is one of the factors that is very instrumental in identifying the causes of disparities in society based on the characteristics of the place of residence (Pantiawati et al., 2023). However, the characteristics of Sungai Penuh City are dominated by urban areas and the proximity of regional borders, and the distance from each village to the city center is not too far, so that the potential of rural and urban areas is not very different (Dinas Ketahanan Pangan Kota Sungai Penuh, 2022), and there is a possibility that access to food, services to health facilities, and health information is not much different from that of urban areas. As this research used secondary data from a national survey, in addition to the unequal proportion of research subjects in rural and urban areas, researchers were also constrained by not knowing the names of villages that were categorized as rural and urban in the survey, which were not accessible to researchers, so that researchers could not know and examine specific regional characteristics.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of stunting is higher in urban areas than in rural areas. Maternal age at birth of a toddler and the mother's overall education level are risk factors for stunting in toddlers, although there was no change in these risk factors in rural and urban areas of Sungai Penuh City, which is most likely due to the sample size that does not have the same proportion, and the close proximity of villages causes potential regional characteristics that are not much different. It is hoped that this research can be one of the recommendations for making policies for handling stunting, the community can increase the desire to update information related to the nutritional status of toddlers, and further research can use a longitudinal study design to identify stunting from other aspects, such as food intake, history of infectious diseases, childcare, feeding practices, and other factors that are directly or indirectly related.

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