

Hubungan asupan energi, waktu pemberian MP-ASI, dan panjang badan lahir dengan kejadian stunting pada batita di Desa Mojokerto: Studi Potong Lintang

Association between energy intake, timing of complementary feeding, and birth length with stunting among toddlers in Mojokerto Village: A Cross-Sectional Study

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Abstract

Background: Stunting remains an unresolved nutritional problem in Indonesia, with a prevalence of 21,5% in 2023. Mojokerto Village is one of the areas with a high prevalence, reaching 30%. Factors suspected to be associated with stunting in Mojokerto Village include energy intake, timing of complementary feeding, and birth length. However, to date, no study has simultaneously examined the relationship between energy intake, timing of complementary feeding, and birth length with stunting in this area.

Objectives: This study aims to investigate the relationship between energy intake, the timing of complementary feeding, and birth length with the incidence of stunting among toddlers in Mojokerto.

Methods: This research employs a quantitative methodology with a cross-sectional design. This study comprised 60 toddlers who satisfied the inclusion criteria. The SQ-FFQ questionnaire gathered information regarding food consumption, the timing of complementary feeding was acquired through interview, and birth length was taken from the MCH book. The nutritional status of toddlers was assessed using the WHO Anthro program, and the results were analyzed employing the $\alpha = 5\%$ contingency coefficient test.

Results: A correlation was identified between energy intake and the incidence of stunting in Mojokerto (p -value = 0,039). However, no association was found between the timing of complementary feeding and birth length with the incidence of stunting in Mojokerto (p -value = 0,235, p -value = 0,445).

Conclusion: Energy intake correlates with stunting in toddlers in Mojokerto. The timing of complementary feeding and birth length were not correlated with stunting in Mojokerto.

Keywords:

Energy intake, timing of complementary feeding, birth length, stunting, cross sectional

Abstrak

Latar belakang: Stunting masih menjadi masalah gizi yang belum terselesaikan di Indonesia, dengan prevalensi sebesar 21,5% pada tahun 2023. Desa Mojokerto merupakan salah satu desa dengan prevalensi stunting yang tinggi, yaitu mencapai 30%. Faktor-faktor yang diduga berhubungan dengan kejadian stunting di Desa Mojokerto antara lain asupan energi, waktu pemberian makanan pendamping ASI (MP-ASI), dan panjang badan lahir. Namun, hingga saat ini belum ada penelitian yang secara bersamaan mengkaji hubungan antara ketiga faktor tersebut dengan kejadian stunting di Desa Mojokerto.

Tujuan: Penelitian ini bertujuan untuk mengetahui hubungan antara asupan energi, waktu pemberian MP-ASI, dan panjang badan lahir dengan kejadian stunting pada batita di Desa Mojokerto.

Metode: Penelitian ini menggunakan metode kuantitatif dengan desain cross-sectional. Sebanyak 60 batita yang memenuhi kriteria inklusi dilibatkan dalam penelitian ini. Data asupan makanan diperoleh melalui kuesioner SQ-FFQ, informasi mengenai waktu pemberian MP-ASI diperoleh melalui wawancara, dan data panjang badan lahir diambil dari buku KIA. Status gizi batita

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dianalisis menggunakan aplikasi WHO Anthro, dan hasil dianalisis menggunakan uji koefisien kontingensi dengan tingkat signifikansi $\alpha = 5\%$.

Hasil: Terdapat hubungan antara asupan energi dengan kejadian stunting di Desa Mojokerto (nilai $p = 0,039$). Namun, tidak ditemukan hubungan antara waktu pemberian MP-ASI dan panjang badan lahir dengan kejadian stunting di Desa Mojokerto (nilai $p = 0,235$ dan $p = 0,445$).

Kesimpulan: Asupan energi berhubungan dengan kejadian stunting pada batita di Desa Mojokerto. Waktu pemberian MP-ASI dan panjang badan saat lahir tidak berhubungan dengan kejadian stunting di wilayah tersebut.

Kata Kunci:

Asupan Energi, Waktu Pemberian MP-ASI, Panjang Badan Lahir, Stunting, Cross Sectional

Introduction

The quality of human resources is a fundamental part of a nation's advancement. Enhancing human resources necessitates a focus on health considerations. Health considerations that require ongoing attention pertain to the dietary condition of toddlers. At present, stunting constitutes a nutritional issue for toddlers across all nations. Stunting is a persistent growth failure resulting from recurrent food deprivation and infections, shown by a z-score of body length and height for age (PB/TB/U) < -2 SD (Kemenkes, 2020).

The global prevalence of stunting in 2022 was 22,3%, or approximately 148,1 million children under five. Meanwhile, according to the latest data from the 2023 Indonesian Health Survey (SKI), the prevalence of stunting among children under five in Indonesia was 21,5%. This represents a 0,1% decrease compared to the data from 2022. Although it has declined, a stunting prevalence of 21,5% is still considered a public health problem by the WHO.

The widespread occurrence of stunting globally jeopardizes human resources and adversely affects multiple sectors. Stunting has both short-term and long-term effects. The immediate effects result in a heightened risk of illness in toddlers and impediments to the cognitive, motor, and verbal development of suboptimal children. The long-term consequences include inferior adult posture, diminished cognitive ability, an increased risk of non-communicable disorders such as diabetes mellitus, hypertension, and stroke in adulthood (Soliman et al., 2021).

The adverse effects of stunting across multiple domains have led to much research on the issue in poor nations. According to a scoping analysis by Huriah and Nurjannah, three primary factors affect stunting in underdeveloped nations. The initial factors include parental influences (maternal nutritional status during the first 1.000

days, education, occupation, and height), toddler influences (dietary intake, recurring infectious illnesses, gender, and weaning), and environmental influences (insufficient water sources and sanitation facilities) (Huriah & Nurjannah, 2020).

Sragen Regency in Central Java, Indonesia, exhibits a significant prevalence of stunting. The 2023 Indonesian Health Survey (IHS) indicates that the stunting prevalence in the Sragen Regency was 18,4% (Kemenkes, 2023). This result indicates that nearly one-fifth of toddlers in Sragen Regency are stunted. Stunting in Sragen Regency, Central Java, is significantly lower than the national prevalence. Nonetheless, the prevalence of stunting in Sragen Regency requires continued vigilance.

According to the researcher's observations, Sragen Regency has identified 10 villages as focal points for stunting reduction, with Mojokerto Village exhibiting a high frequency of stunting. According to the preliminary study, of the 20 toddlers assessed, 6 (30%) had stunting. The primary issues faced by stunted toddlers in Mojokerto Village were inadequate energy intake ($< 90\%$ RDA), early initiation of complementary feeding (< 6 months), and low birth length (< 48 cm).

In the study conducted by Mahfouz et al., energy intake was found to be strongly associated with the occurrence of stunting in young children. The chi-square test analysis revealed a p-value of 0,004 ($p < \alpha = 0,05$) (Mahfouz et al., 2022). Inadequate energy intake is linked to stunting as it impacts the function of IGF binding protein-1, thyroid hormones, and other systemic factors involved in Fibroblast Growth Factor (FGF-21), all of which contribute to linear growth, including height and length (Tessema et al., 2018).

Besides energy intake, Octaviana et al. assert that early complementary feeding may also influence stunting. The chi-square test analysis yielded a p-value of 0,001 ($p < \alpha = 0,05$), indicating a correlation between

early complementary feeding and stunting incidence (Octaviana et al., 2024). This study found that toddlers receiving early complementary feeding had a 3,723-fold higher risk of stunting than those receiving complementary feeding at the appropriate age. Introducing supplemental foods to toddlers prematurely diminishes breast milk intake, leading to immunological problems (Paramashanti & Benita, 2020).

Short birth length is associated with stunting because children with short birth length will experience growth faltering in the following age period (Nur Handayani et al., 2018). The length of a baby's body at birth can reflect the linear growth of the baby while in the womb. Poor maternal nutritional intake before and during pregnancy leads to impaired fetal growth in the womb, thus affecting the baby's birth length.

To date, no study has simultaneously evaluated the association between energy intake, timing of complementary feeding, and birth length in the Mojokerto Village. Further research is required to ascertain the correlation between energy intake, the timing of complementary feeding, and birth length with the incidence of stunting in toddlers in Mojokerto Village, Kedawung Subdistrict, Sragen Regency. This study aims to investigate the relationship between energy intake, the timing of complementary feeding, and birth length with the incidence of stunting among toddlers in Mojokerto Village, Kedawung Subdistrict, Sragen Regency.

Methods

Population and Sample

This research employs a quantitative methodology with a cross-sectional design. The event occurred in June 2023 in Mojokerto Village, Kedawung Subdistrict, Sragen Regency. The study population comprised toddlers aged 12 to 35 months in Mojokerto Village, and the sample size was determined using a correlative analytical research technique (Dahlan, 2014). The resulting sample consisted of 60 toddlers. This study employed a simple random sampling technique. The inclusion criteria comprised toddlers aged 12-35 months at the time of measurement, those willing to participate as respondents, residents of Mojokerto Village during data collection, and mothers consenting to interviews. The exclusion criteria encompass toddlers who are ill or whose parents lack documentation of the toddler's birth

length. The independent variables in this research were energy consumption, the timing of complementary feeding, and birth length. The dependent variable in this study was the incidence of stunting among toddlers in Mojokerto village.

Research Instruments

The tool employed to assess newborn feeding intake in this study was the Semi-Quantitative Food Frequency Questionnaire (SQ-FFQ). SQ-FFQ is a modified food frequency questionnaire incorporating household size and food weight in grams. Data collection using the SQ-FFQ was carried out by trained enumerators. Toddlers are classified as having excessive food intake if their consumption is $\geq 120\%$ of the Recommended Dietary Allowance (RDA), normal if it is between 90-119% RDA, mild deficit if 80-89% RDA, moderate deficit if 70-79% RDA, and severe deficit if $< 70\%$ RDA. Data regarding the timing of complementary feeding was obtained through interviews with mothers of toddlers, categorized as early (< 6 months) or appropriate (> 6 months) complementary feeding age (IDAI, 2015). Birth length data for toddlers were sourced from the Mother and Child Health Book, classified as short birth length (< 48 cm) or normal birth length (≥ 48 cm). Toddler body length was measured using a length board, while height was measured with a stadiometer. The nutritional status of children was evaluated using the WHO Anthro program. Toddlers were classified as stunted if the PB/TB/U computations yielded results below -2 SD and not stunted if the results ≥ -2 SD (Kemenkes, 2020).

Statistical Analysis

The outcomes of this investigation were evaluated using univariate and bivariate methods. This study performed a univariate analysis on the familial characteristics of the toddler, including the father's education level, mother's education level, and family income, as well as the toddler's characteristics, such as gender, history of infectious disease, duration of illness, energy intake, timing of complementary feeding, and birth length. Bivariate study of the independent factors (energy intake, timing of complementary feeding, and birth length) and the dependent variable (incidence of stunting) utilizing the contingency coefficient test with $p < 0,05$. This research has received ethical approval from Ngudi Waluyo University, reference number 87/KEP/EC/UNW/2023.

Results

Characteristics of Toddler Families

The participants in this study were toddlers aged 12 to 35 months from Mojokerto Village, Kedawung Subdistrict, Sragen Regency, who satisfied the inclusion criteria. Sixty children were qualified to participate in this study. Table 1 indicates that most dads of toddlers possess the highest educational attainment at the elementary and junior high school levels, totaling 50%. In contrast to fathers, most mothers possess a high school education (55%). The interview results indicate that the family income of toddlers predominantly falls below the minimum wage in Sragen, which is 1.969.569 (53,3%).

Table 1. Family Characteristics of Toddlers

Family Characteristics	Total (n)	Percentage (%)
Father's Education Level		
Primary education (elementary and junior high school)	30	50
Secondary education (senior high school)	27	45
Higher education	3	5
Mother's education level		
Primary education (elementary and junior high school)	26	43,3
Secondary education (senior high school)	33	55
Higher education	1	1,7
Family Income		
Below The Minimum Wage ($\leq$ Rp. 1.969.569)	32	53,3
Above The Minimum Wage ($>$ Rp. 1.969.569)	28	46,7

Toddler Characteristics

According to the attributes of toddlers in Table 2, the female gender predominates, comprising 55% (33 toddlers). Among these children, 85% (51 toddlers) had a history of infectious diseases. 51,7% (31 toddlers) experienced a prolonged illness duration, specifically over 4 days. Toddlers exhibited a significant energy intake deficit of 50% (30 toddlers), received complementary foods at an early age of 71,7% (43 toddlers), had a normal birth length history of 73,3% (44 toddlers), and 30% (18 toddlers) were classified as stunted.

Table 2. Toddler Characteristics

Characteristics of toddlers	Total (n)	Percentage (%)
Gender		
Male	27	45
Female	33	55
History of Infectious Disease		
History	51	85
No History	9	15
Duration of Illness		
Long ($>$ 4 days)	31	51,7
Not long ($\leq$ 4 days)	20	33,3
Not Sick	9	15
Energy Intake		
Severe Deficit ($<$ 70% RDA)	30	50
Moderate Deficit (70-79% RDA)	9	15
Mild Deficit (80-89% RDA)	11	18,3
Normal (90-119% RDA)	9	15
Excessive ($\geq$ 120% RDA)	1	1,7
Timing of Complementary Feeding		
Early ($<$ 6 months)	43	71,7
Appropriate ($>$ 6 months)	17	28,3
Birth Length		
Short ($<$ 48 cm)	16	26,7
Normal ($\geq$ 48 cm)	44	73,3
Toddler Nutrition Status		
Stunted ($<$ -2 SD)	18	30
Not Stunted ($\geq$ -2 SD)	42	70

The Relationship between Energy Intake, Timing of Complementary Feeding, and Birth Length with Stunting Incidence among Toddlers in Mojokerto Village

The correlation between energy intake and the incidence of stunting in Mojokerto Village is illustrated in Table 3. The contingency coefficient correlation test findings yielded a p-value of 0,039 ($p < 0,05$). This investigation concludes that a correlation exists between energy intake and the incidence of stunting in children aged 12-35 months in Mojokerto Village, Kedawung Subdistrict, Sragen Regency.

This study found no association between the timing of complementary feeding and birth length and the occurrence of stunting. Table 3 presents the outcomes of statistical analyses regarding the correlation of contingency coefficients. The p-value for the timing of complementary feeding is 0,235 ($p > 0,05$), and for the birth length variable, it is 0,445 ($p > 0,05$).

Table 3. The Relationship between Energy Intake, Timing of Complementary Feeding, and Birth Length with Stunting Incidence among Toddlers in Mojokerto Village

Variable	Toddlers Nutrition Status						P-value
	Stunted		Not Stunted		Total		
	n	%	n	%	n	%	
Energy Intake							
Severe Deficit (<70% RDA)	13	72,2	17	40,5	30	50	0,039
Moderate Deficit (70-79% RDA)	4	22,2	5	11,9	9	15	
Mild Deficit (80-89% RDA)	0	0	11	26,2	11	18,3	
Normal (90-119% RDA)	1	5,6	8	19	9	15	
Excessive (≥ 120% RDA)	0	0	1	2,4	1	1,7	
Timing of Complementary Feeding							
Early (<6 months)	11	61,1	32	76,1	43	71,7	0,235
Appropriate (>6 months)	7	38,9	10	23,9	17	28,3	
Birth Length							
Short (<48 cm)	6	33,3	10	23,9	16	26,7	0,445
Normal (≥48 cm)	12	66,7	32	76,1	44	73,3	

Discussion

The Relationship between Energy Intake and Stunting Incidence among Toddlers in Mojokerto Village

Toddlers require energy for their growth and development. All energy required by the organism must be obtained through dietary consumption. Continuous fulfillment of nutritional intake significantly influences growth and development. This results in the toddler's body length or height being inadequate for their age, sometimes termed stunting.

Insufficient energy consumption influences the prevalence of stunting in toddlers. Energy deficiency results in reduced synthesis of Liver Insulin Growth Factor (IGF) and impairs the function of IGF-binding protein-1, thyroid hormone, and other systemic factors associated with Fibroblast Growth Factor (FGF-21), all of which contribute to linear growth, precisely body length or height (Gat-Yablonski & Phillip, 2015).

This research is corroborated by other prior investigations, including Situmeang's (2020) analysis, which yielded a chi-square test p-value of 0,020 ($p < 0,05$). The findings indicate a correlation between energy intake and stunting in toddlers aged 24-59 months in Humbang Hasundutan, North Sumatra (Nelly SD Situmeang et al., 2020). This study's results align with research conducted by Mahfouz et al. (2020) in Upper Egypt, which also identified a relationship between energy intake and toddlers stunting. Statistical analyses utilizing binary logistic regression yielded a p-value of 0,004 ($p < 0,05$) (Mahfouz et al., 2022).

Interviews utilizing the SQ-FFQ form revealed that particular toddlers in Mojokerto Village consumed insufficient portions and frequency, averaging only twice daily. Alongside insufficient

meal frequency, particular toddlers' mothers exclusively provided rice and vegetables. The energy content of vegetables is significantly lower than that of comparable side dishes like eggs, fish, and chicken (Wulandari et al., 2018). Consequently, 83,3%, or 50 toddlers, have a deficit in food intake.

Indriani et al. (2022) indicated a correlation between maternal nutritional knowledge and stunting (Indriani et al., 2022). Among the mothers surveyed, 43,3% had attained elementary and junior high school education, 50% had completed high school, and merely 1,7% had pursued higher education. Knowledge is intricately linked to formal schooling. A mother's elevated educational attainment facilitates her capacity to assimilate and utilize information daily, including selecting dietary options for toddlers.

Alongside knowledge and education, family income is a determinant of toddler food consumption. Income influences child nutrition, as more household income correlates with enhanced access to superior quality and quantity of food. A reduction in money will result in a decline in the quality and quantity of food acquired.

53,3% of respondent families reported earnings below the minimum wage ($\leq$ Rp.1.969.569), with the lowest monthly income recorded being Rp.500.000. If the monthly revenue is merely Rp. 500.000 is accurate if the animal protein consumption of some families falls into the low level. Nevertheless, more than substantial cash is needed to ensure the delivery of superior and suitable nutrition for children.

Interviews with the toddler's mother indicate that the toddler more frequently omits lunch than morning or afternoon meals. The youngster

infrequently consumes lunch due to playing or snacking on sponge cake, wafers, or other snacks. The toddler's mother believes that the primary concern is the toddler's food consumption, disregarding the nutritious value of what is eaten. Research by Atika et al. (2024) indicates a correlation between snack consumption and eating difficulties. Toddlers who consume snacks during mealtimes have a reduction in appetite. This may adversely affect toddler nutrition, notably if the distraction ingested lacks balanced nutritional value.

The Relationship between Timing of Complementary Feeding and Stunting Incidence among Toddlers in Mojokerto Village

No correlation was found between the timing of complementary feeding and the incidence of stunting in Mojokerto Village, Kedawung Subdistrict, Sragen Regency, data analysis indicated that the primary factor influencing stunting in this area was toddlers' energy intake. Moreover, even if the timing of complementary feeding is suitable, more quantity, form, frequency, and intake quality will maintain the toddler's nutritional sufficiency. If this persists, it will result in stunting.

Complementary feeding refers to providing food and beverages containing nutrients to infants beyond >6 months of age to meet nutritional requirements beyond breast milk. Complementary feeding serves as an intermediary nourishment between breast milk and complementary feeding. The introduction of supplementary foods to children should occur incrementally. According to the Indonesian Paediatric Association, complementary feeding is suitable when the infant reaches 6 months of age, and it is considered early if administered <6 months (IDAI, 2015).

According to Table 2, the % of toddlers who received complementary foods at an early age was 71,7%, equating to 43 individuals. Simultaneously, the proportion of moms of toddlers who provided complementary foods at the right age was merely 28,3%, corresponding to 17 children. The findings of this study correspond with studies conducted at the Soropia Health Centre, which indicated no correlation between the timing of introducing supplemental foods and the prevalence of stunting (Widiastity & Harleli, 2021).

The research conducted by Dewi (2020) yielded identical results. No correlation was seen between the timing of complementary feeding and the prevalence of stunting in toddlers in Puskesmas Sumbang 1, Banyumas Regency. The chi-square statistical test yielded a p-value of 0,823 (>0,05), (Sawitri Dewi & Ikhwah Mu'minah., 2020) in contrast to studies conducted in Sedayu District, Bantul,

Yogyakarta. This study identified a correlation between the timing of complementary feeding and the prevalence of stunting (Khasanah et al., 2016).

Interviews with moms of toddlers indicate that infants are frequently introduced to complementary foods prematurely due to their propensity to scream. Mothers of toddlers believe frequent crying indicates the infant requires nourishment beyond breast milk. Simultaneously, breast milk alone adequately fulfills the nutritional requirements of infants <6 months. From 0 to 2 months, infants require 400 kcal; from 3 to 5 months, they need 550 kcal (IDAI, 2015). However, after the infant surpasses 6 months, complementary feeding becomes necessary due to inadequate breast milk consumption.

Besides infants' frequent crying, another factor that prompts moms of toddlers to introduce supplementary foods prematurely is their lack of knowledge regarding the appropriate age for such introduction. Research interviews indicated that some moms of toddlers believe supplemental foods should ideally be introduced before 6 months of age. This indicates that most women with toddlers need to know the optimal age for complementary feeding. Behavioral modification necessitates a foundation of sound knowledge and positive attitudes. How can complementary feeding be initiated at the appropriate age while knowledge remains insufficient.

The hereditary tradition significantly influences the elevated rate of early supplementary feeding in Mojokerto Village. Mothers of toddlers said that complementary foods were introduced at 3 or 4 months, after that, followed by their parents and grandmothers. The socio-cultural dynamics of the family and local community significantly impact early complementary feeding choices. Behavior is influenced by habits that are informed by social culture. Individuals are perpetually subjected to and affected by environmental practices and societal influences, directly or indirectly (Pratiwi et al., 2021).

Furthermore, infants were introduced to complementary foods <6 months of age based on the belief that breastfeeding is a beverage rather than a food. Consequently, bananas, dragon fruit, and avocados are ingested to promote infant weight gain. These obese infants are regarded as possessing adequate nutritional status even though their excess weight may lead to respiratory complications due to hypertrophied tonsils and limitations in mobility. An overweight infant may not inherently possess appropriate nutritional status. Optimal nutrition should be determined using calculations of nutritional status, including BB/U, TB/U, or BB/TB (Kemenkes, 2018).

In principle, early initiation of complementary feeding may disrupt exclusive breastfeeding and elevate the risk of newborn diarrhea. Infants lack sufficient digestive enzymes to process gritty meals. Infectious disorders can diminish appetite, disrupt metabolism, and impair vitamin absorption, resulting in nutritional deficiencies, particularly inhibiting linear development.

Interviews with mothers of toddlers revealed that only 4 (9,5%) of 42 toddlers who received complementary foods at an early age experienced diarrhea upon initial introduction, whereas 2 (11,7%) of 17 toddlers who were given complementary foods at the appropriate age also experienced diarrhea. This indicates that diarrhea is affected not only early initiation of complementary feeding but also additional factors that elevate the risk of baby diarrhea.

Previous research indicates that variables elevating the risk of diarrhea in children under five include eating with hands, insufficient maternal awareness of the significance of handwashing before meals, and the accessibility of clean water facilities (Kasmara & Sarli, 2023) (Watson et al., 2015).

The Relationship between Birth Length and Stunting Incidence among Toddlers in Mojokerto Village

Infants with small birth lengths (<48 cm) are expected to undergo growth faltering during the subsequent age period. Nonetheless, while infants with reduced birth lengths are predisposed to growth issues later in life, they can still achieve growth normalization. Proper nutrition, a consistent diet, 11-13 hours of sleep, and physical activity facilitate height growth in children with a history of short birth length (Kartikawati et al., 2020).

The length of the neonate's body upon birth reflects the growth of the fetus in utero. Malnourished, stressed, or sick mothers during pregnancy can impede the growth and development of the fetus. Toddlers are classified as having a short birth length if their length at birth is <48 cm and as having an average birth length if it is ≥48 cm or over.

This research is corroborated by prior studies, including one conducted in ten communities in the Pidie District of Aceh. This study identified no correlation between birth length and the prevalence of stunting in toddlers (Dasantos & Dimiati, 2020). The Spearman rank correlation test yielded a p-value of 0,227 ($p > 0,05$) and an odds ratio of 1,645. Hidayati et al. (2022) found no correlation between birth length and stunting. Chi-square statistical testing yielded a p-value of 0,225 ($p > 0,05$) (Hidayati et al., 2022).

Short birth length is affected by various factors, including Mid-Upper Arm Circumference (MUAC) <23,5 cm, inadequate nutritional intake, hemoglobin levels <11 mg/dL, insufficient rest duration, and the absence of blood supplement tablets during pregnancy (Jamshed et al., 2020) (Judiono et al., 2023). The issue of malnutrition in pregnant women initiates a deceleration or retardation of fetal growth, referred to as Intra Uterine Growth Retardation (IUGR). This disorder is intricately linked to the mother's nutritional status. In underdeveloped nations, malnutrition during pregnancy or prior to conception can lead to the birth of children with reduced birth lengths.

No correlation exists between birth length and the incidence of stunting in Mojokerto Village, Kedawung Subdistrict, Sragen Regency. The analysis indicates that toddlers' energy consumption significantly influences stunting in Mojokerto Village. Intermittent energy discrepancies may result in nutritional issues. Inadequate food intake in toddlers adversely impacts brain development, leading to stunted growth and impaired cognitive development.

Stunting in Mojokerto Village, Kedawung Subdistrict, and Sragen Regency may be exacerbated by infectious infections and insufficient energy intake. Historically, 85% of toddlers, or 51 individuals, encounter infectious disorders such as diarrhea, cough, influenza, or fever every month. The occurrence of viral infections in toddlers heightens the need for food consumption and impacts their nutritional status. According to research by Sumartini (2022), a correlation exists between viral diseases and stunting (Sumartini, 2022).

Toddlers in Mojokerto Village experience prolonged sickness durations alongside infectious infections. According to the characteristics of the respondents, 51,7% of 31 toddlers experienced an illness lasting more than four days. Agustina's research (2018) indicates a correlation between sick leave duration and babies' nutritional health at the Sangkrah Health Centre in Surakarta City. A prolonged illness results in a more significant decrease in the toddler's appetite.

Conclusions

This study indicates that low energy intake is significantly associated with the incidence of stunting. However, no association was found between the timing of complementary feeding and birth length with stunting among toddlers in Mojokerto Village,

Kedawung Subdistrict, Sragen Regency. Family-based nutrition interventions and daily dietary intake monitoring for toddlers are needed in areas with high prevalence. Further studies are recommended to examine other factors such as feeding frequency, quantity, form of complementary foods, food quality, and environmental sanitation.

Declaration of Conflicting Interests

It is important for authors to declare in their manuscript that there are no potential conflicts of interest from either the author or the institution in connection with the research, authorship, and/or publication of this article.

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