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The relationship between junk food consumption and the growth and development of preschool children

St. Hasriani*, St. Nurbaya, Windy Khaerati

Muhammadiyah Sidrap Health Center

Corresponding author: *E-mail: sthasrianistkm@gmail.com

Abstract

Background: The increasing consumption of junk food among preschool children has raised concerns regarding its potential impact on growth and development. Ultra-processed foods are typically high in calories, sugar, fat, and salt but low in essential nutrients required for optimal child health.

Purpose: This study aimed to determine the association between a history of junk food consumption and growth as well as developmental status among preschool children.

Method: A quantitative study with a cross-sectional design was conducted involving preschool children aged 3–5 years. Junk food consumption history was obtained through questionnaires. Growth status was assessed using the weight-for-height index, while development was measured using the Pre-Screening Developmental Questionnaire. Data were analyzed using the Chi-square test with a significance level of 0.05.

Results: The analysis showed a significant association between junk food consumption and growth status ($p < 0.05$), indicating that higher intake was related to less favorable anthropometric outcomes. However, no significant relationship was found between junk food consumption and developmental status ($p > 0.05$). Most children demonstrated appropriate development despite moderate levels of junk food intake.

Conclusion: Junk food consumption is linked to children's growth but not directly associated with developmental outcomes. Growth and development are influenced by multiple interacting factors beyond diet alone.

Suggestion: Future studies should include larger samples and additional variables such as socioeconomic conditions, parenting practices, and physical activity to better understand determinants of child health.

Keywords: Child Development; Growth Status; Junk Food; Preschool Children; Weight-For-Height.

INTRODUCTION

Growth and development are processes of change that occur in an individual, encompassing physical, behavioral, and mental aspects from conception to the attainment of maturity. Growth refers to physical changes in the body, characterized by increases in size, including structural and anatomical dimensions (Hidayaturrehmi, Nasitoh, Handayani, & Maribeth, 2024).

Every child inevitably undergoes a continuous process of growth and development. This occurs because each child must pass through specific stages of growth and development before progressing to subsequent stages. Growth can be observed through

increases in body weight, height, and various other physical indicators that can be determined through objective measurements. In contrast, development is reflected in the improvement of fine and gross motor skills, which can only be observed (Brahmani, Laksmi, & Jayanti, 2023). Children who experience delays or difficulties in the process of growth and development are at risk of encountering impairments in both growth and developmental aspects (Alijanzadeh, RajabiMajd, RezaeiNiaraki, Griffiths, & Alimoradi, 2024).

Recent reports from the World Health Organization (WHO) indicate that malnutrition among

children under five years of age remains a serious global public health concern. In 2022, an estimated 149 million children under the age of five were affected by stunting (low height-for-age), 45 million experienced wasting (low weight-for-height), and approximately 37 million were classified as overweight or obese. These conditions represent different forms of malnutrition resulting from unhealthy dietary patterns and inadequate nutritional intake. This evidence suggests that children who frequently consume low-nutrient foods, such as junk food, may be at greater risk of impaired growth and developmental outcomes (World Health Organization, 2024).

Data from Statistics Indonesia (BPS, 2022) indicate that the total number of early childhood population in 2022 reached approximately 30.73 million. Children aged 1-4 years accounted for 58.78% of this population, while those aged 5-6 years comprised 29.11%, and infants under one year of age represented approximately 12.11% (Central Bureau of Statistics, 2022).

The level of junk food consumption among early childhood and school-aged children remains high; for instance, a cross-sectional study involving children aged 5-9 years reported that approximately 70.7% of children consumed junk food three times or more per week, indicating a very high prevalence of low-nutrient food intake in this age group. This finding is consistent with global concerns that unhealthy dietary patterns are becoming increasingly widespread among children and may have negative implications for their health and developmental outcomes (Banstola, Shrestha, & Sharma, 2024). The school-age period is a critical phase for children's growth and development; therefore, adequate nutrition and appropriate dietary intake are essential to support these processes (Hasriani, Qardhawijayanti, & Pratiwi, 2024).

Based on data from the Indonesian Health Profile 2023, the number of preschool children was recorded at 4.879.979 boys and 4.693.374 girls, resulting in a total of 9.573.353 preschool-aged children. The prevalence of growth and developmental delays among children in Indonesia remains relatively high, with approximately 5-10% of children experiencing general developmental delays, indicating a condition that requires serious attention. It is estimated that about two out of every 1.000 infants experience motor

developmental disorders, while among every 100 children, some present with speech delays and lower levels of intelligence. Children constitute approximately 33% of Indonesia's total population, or around 83 million individuals, and this figure continues to increase annually (Ministry of Health of the Republic of Indonesia, 2024).

The monitoring process of child growth and development in Indonesia is conducted in a multi-tiered manner, ranging from the family level to the community level. The developmental checklist contained in the Maternal and Child Health (MCH) Handbook serves as the primary reference. If the assessment results based on the MCH Handbook do not provide a comprehensive evaluation, further examination is carried out through the Stimulation, Early Detection, and Early Intervention of Child Growth and Development program at community health centers. In 2023, the national coverage of toddlers receiving SDIDTK services was recorded at 70.8%. However, this achievement reflects substantial disparities across provinces, with the lowest coverage observed in Papua Pegunungan at 0.1% and the highest reaching 93.8% in the Riau Islands. Provinces with the lowest SDIDTK service coverage for toddlers included Papua Pegunungan (0.1%), Southwest Papua (0.6%), Central Papua (10.7%), East Nusa Tenggara (14.8%), and South Papua (24.1%). In South Sulawesi Province, the percentage of toddlers whose growth and development were monitored in 2023 reached 83.2%, while the coverage of toddlers receiving SDIDTK services was recorded at 67.4%. For children aged 0-59 months, health services provided in accordance with established standards encompass both healthy toddlers and those experiencing illness. Health service efforts for healthy toddlers are conducted through routine monitoring of growth and development documented in the Maternal and Child Health (MCH) Handbook, complemented by developmental screening activities (Ministry of Health of the Republic of Indonesia, 2024).

Development, on the other hand, involves the maturation of motor, cognitive, and communication abilities, as well as other increasingly complex physiological processes. In addition to genetic and environmental factors, children's growth and development are also strongly influenced by their nutritional intake (Nasution, & Reswari, Aspah,

St. Hasriani*, St. Nurbaya, Windy Khaerati

Muhammadiyah Sidrap Health Center

Corresponding author: *E-mail: sthasrianistkm@gmail.com

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Anggraeni, Jahrona, Simbolon, & Fatimah, 2025). The fulfillment of balanced nutrition through food plays a crucial role in supporting children's growth processes. The implementation of balanced nutrition emphasizes the importance of consuming a variety of food types in appropriate quantities as a preventive measure against nutritional problems (Hasriani, Pratiwi, Nurjanna, & Arsyad, 2022). The consumption of junk food and other unhealthy foods has become increasingly widespread among children, particularly those of preschool age, in recent years (Nasution et al., 2025).

With the advancement of technology, there has been a significant increase in the number of restaurants, retail outlets, and even online marketplaces offering various types of junk food. Junk food generally refers to highly processed foods manufactured using advanced food-processing technologies. These products often contain unhealthy ingredients, including chemical additives, and are commonly packaged in plastic, cans, or boxes. The processing of junk food typically involves the addition of various additives to enhance flavor, improve texture, and extend shelf life. Common types of junk food widely available in the market include nuggets, sausages, corn flakes, and similar processed food products. These foods are deliberately processed to be highly palatable, making them attractive and potentially addictive to consumers (Fardlillah, 2024).

The limited nutritional value of junk food may lead to various adverse effects, including impaired cognitive performance and weakened immune function. Daily nutritional requirements cannot be adequately met through junk food consumption alone, and prolonged intake increases the risk of health problems such as hypercholesterolemia, hypertension, vascular disorders, and stroke. Previous studies have also linked frequent junk food consumption to mental and emotional problems, including depression, anxiety, stress, sleep disturbances, and reduced well-being among children. The impact of junk food consumption in early childhood is strongly influenced by parental roles and attitudes, as parents are primarily responsible for determining children's daily dietary patterns (Malmir, Mahdavi, Ejtahed, Kazemian, Chaharrahi, Khonsari, & Qorbani, 2023).

Junk food consumption behavior among children demonstrates a high tendency toward the intake of

low-nutrient fast foods, reflecting unhealthy dietary patterns among school-aged children (Trisna Juansyah). Many children and adolescents frequently consume junk foods such as burgers, French fries, sugar-sweetened beverages, and packaged snacks, which are high in calories and low in essential nutrients (Fardlillah, 2024).

According to data from the Nutritional Status Monitoring (PSG) of Sidenreng Rappang Regency, child health problems related to undernutrition in the region have shown a considerable increase. In 2022, there were 496 children identified as undernourished. This number rose to 540 children in 2023 and is projected to continue increasing to 648 children in 2024. Meanwhile, the number of children classified as obese in Sidenreng Rappang Regency was 404 in 2022, increasing to 427 in 2023, and further rising to 467 in 2024. Nutritional problems among children, particularly undernutrition and obesity, are strongly influenced by the types of foods consumed by children (Ministry of Health of the Republic of Indonesia, 2025).

RESEARCH METHOD

This study employed an analytical observational design with a cross-sectional approach. This design was utilized to examine the association between junk food consumption and the growth and development of preschool-aged children simultaneously. The study was conducted at Aisyiyah 2 Kindergarten in Pangkajene, Sidenreng Rappang Regency, from September 2025. The study population comprised all preschool children aged 3–5 years enrolled at Aisyiyah 2 Kindergarten, totaling 31 children.

The research instruments included a respondent identity questionnaire, a qualitative Food Frequency Questionnaire (FFQ) to assess junk food consumption, the Pre-Developmental Screening Questionnaire (Kuesioner Pra Skrining Perkembangan/KPSP) to evaluate child development, and a digital scale for measuring nutritional status (weight-for-height). Data were analyzed using IBM SPSS Statistics. Univariate analysis was conducted to describe the characteristics of the respondents and the study variables, while bivariate analysis was performed using the Chi-square test to examine the association between the independent and dependent variables.

St. Hasriani*, St. Nurbaya, Windy Khaerati

Muhammadiyah Sidrap Health Center

Corresponding author: *E-mail: sthasrianistkm@gmail.com

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RESEARCH RESULT

Table 1. Distribution of Respondents (N=31)

Variable	Results	P-value
Age (Mean±SD) Months		
36	8/25.0	
48	12/40.6	
60	11/34.4	
Gender (n/%)		
Male	12/38.7	
Female	19/61.3	
Junk Food Consumption Level (n/%)		
Low	3/9.7	
Moderate	28/90.3	
Nutritional Status (W/H) (n/%)		0.03
Overweight	2/6.5	
Normal	8/26.0	
Underweight	10/32.0	
Severely Underweight	11/35.5	
Developmental Screening (n/%)		1.000
Appropriate	30/97.0	
Doubtful	1/3.0	
Deviation	0	

Based on the information presented in Table 1, of the total 31 toddlers aged 3–5 years who participated as respondents, the largest proportion were aged 48 months, accounting for 12 children (40.6%). Meanwhile, 11 children (34.4%) were aged 60 months, and 8 children (25.0%) were aged 36 months. These data indicate that toddlers aged 48 months constituted the highest proportion of respondents compared to those aged 36 months (25.0%) and 60 months (34.4%). Number of female toddlers was higher than that of male toddlers. Of the total toddlers aged 3–5 years, 12 children (38.7%) were male, while 19 children (61.3%) were female. Thus, the difference in the number of male and female toddlers was not substantial. Toddlers with a moderate level of junk food consumption history were more dominant compared to those in the low category. Of the toddlers aged 3–5 years, 28 children (90.3%) had a moderate history of junk food consumption, while 3 children (9.7%) had a low level of junk food consumption. the growth status of toddlers shows that among the 31 respondents involved in the study, 8 children (25.8%) had a normal weight-for-height status. Meanwhile, 10 toddlers (32.3%) were classified as underweight, and 11 toddlers (35.5%) were categorized as severely underweight. In contrast, only 2 toddlers (6.5%) were classified as overweight. These findings indicate that although some toddlers exhibited normal growth, a considerable proportion still require further attention and continuous monitoring. Majority of toddlers who participated as respondents demonstrated age-appropriate development based on the Developmental Screening assessment. A total of 30 children (96.8%) were categorized as having appropriate development, while 1 child (3.2%) was classified as doubtful. No cases of developmental deviation were identified. Although most toddlers

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were assessed as developing appropriately for their age, one child still requires further attention and continuous monitoring to ensure optimal developmental progress and to prevent potential developmental delays.

The Chi-square test showed a value of $p < 0.05$ ($p = 0.03$), indicating that there is a significant association between junk food consumption and growth among preschool children. The more frequently children consume junk food, the greater their tendency to experience growth problems. In the group of toddlers with a low history of junk food consumption, 3 children (9.7%) were classified as having appropriate development. The statistical test yielded a value of $p = 1.000$ ($p > 0.05$), indicating that there was no association between the history of junk food consumption and toddler development.

DISCUSSION

Based on table the majority of children with moderate junk food consumption were classified as underweight and severely underweight, while those in the low-consumption group were more frequently found in the normal category. This pattern suggests that the intake of low-nutrient foods such as junk food may contribute to suboptimal child growth, as ultra-processed foods are generally high in calories but low in essential micronutrients required for physical development. Contemporary studies indicate that high consumption of ultra-processed foods is associated with increased body mass index and a higher risk of obesity among children, reflecting alterations in growth patterns influenced by diet quality (Rosi, Giampieri, Abdelkarim, Aly, Ammar, Frias-Toral, & Grosso, 2025).

The results of the study examining the association between a history of junk food consumption and child growth at Aisyiyah 2 Kindergarten in Pangkajene showed that the Chi-square test produced a p-value of 0.003. Since $0.003 < \alpha$ (0.05), it can be concluded that there is a statistically significant relationship between the history of junk food consumption and children's growth status. These findings indicate that, within the scope of this study, junk food consumption was statistically proven to influence nutritional status as measured by the weight-for-height index.

Evidence from the literature indicates that dietary patterns high in junk food remain associated with anthropometric changes in children. Cross-national studies have reported that the consumption of sugar-sweetened beverages and unhealthy foods during childhood can lead to increases in body mass index as well as body fat percentage. However, the magnitude of these effects may vary depending on the cultural and socioeconomic context of each population (Rosi, Giampieri, Abdelkarim, Aly, Ammar, Frias-Toral & Grosso, 2025).

It is also important to emphasize that children's physical growth is influenced not only by the consumption of non-nutritive foods such as junk food, but also by many other factors, including overall nutritional adequacy, socioeconomic status, and physical activity habits. Recent global evidence highlights that ultra-processed foods frequently dominate children's diets in many regions, contributing to unhealthy growth patterns either toward obesity or undernutrition depending on their complementary dietary intake (Petridi, Magriplis, Karatzi, Charidemou, Philippou, & Zampelas, 2025).

The consumption of ultra-processed foods has been shown to correlate with various anthropometric changes in children. A national study in Lebanon reported that children under five years of age who consumed higher amounts of ultra-processed foods had a greater likelihood of being overweight or obese compared with those who consumed lower amounts, although differences in population contexts may influence the direction of the findings. This evidence suggests that dietary patterns characterized by high junk food intake can affect children's growth status, including potential changes in BMI and unfavorable body weight distribution (Chokor, Ouaijan, Hwalla, Jomaa, & Nasreddine, 2025).

Furthermore, large longitudinal studies have found that increased intake of ultra-processed foods among children and adolescents contributes to rises in BMI over time. The analysis demonstrated that each additional percentage of energy derived from ultra-processed foods was associated with a small but significant increase in BMI, suggesting that dietary patterns characterized by low nutritional quality may adversely affect long-term physical growth (Du, Wang, Martin-Calvo, Dhana, Khandpur, Rossato, & Zhang, 2024).

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Muhammadiyah Sidrap Health Center

Corresponding author: *E-mail: sthasrianistkm@gmail.com

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Global evidence indicates that the intake of ultra-processed foods plays a significant role in shaping children's anthropometric patterns. Numerous studies have reported that the prevalence of ultra-processed food consumption among children is very high and is associated with undesirable weight gain as well as an increased risk of obesity. International data further reveal that the rate of childhood obesity has now surpassed the prevalence of underweight in many countries. This trend is largely driven by the widespread availability and intensive marketing of junk food and ultra-processed products (Rosi, et al., 2025).

High consumption of junk food has the potential to hinder the fulfillment of children's nutritional needs. Junk food is generally high in calories, saturated fat, sugar, and sodium, but low in protein, vitamins, and minerals. Micronutrients such as iron, calcium, vitamin D, and B-complex vitamins play crucial roles in supporting both physical growth and brain development in children. Deficiencies in these essential nutrients can impede linear growth, increase the risk of anemia, and negatively affect cognitive function and developmental outcomes in early childhood. Evidence from national studies supports this: research on early childhood nutrition emphasizes the importance of adequate micronutrient intake for growth and cognitive development, and indicates that insufficient micronutrient consumption is associated with stunting and developmental risk in young children (Isang, Dinatha, Maku, Bay, & Wea, 2024).

Several national studies have reinforced the finding that junk food consumption is associated with a higher risk of suboptimal nutritional status among children and adolescents. Research conducted by Fardlillah and Lestari (2024) reported that excessive provision of junk food to young children may adversely affect growth, as such dietary patterns tend to replace nutritious foods with items of low nutritional value (Fardlillah, 2024).

In summary, this study identified a significant association between fast food consumption and children's growth status based on the weight-for-height index. Higher intake of fast food was linked to less favorable anthropometric outcomes. These findings are consistent with the existing literature indicating that ultra-processed foods, which are energy-dense yet poor in essential nutrients, may

disrupt optimal physical development and increase the risk of both malnutrition and obesity.

However, child growth is shaped by many interacting factors, including overall diet quality, socioeconomic conditions, and physical activity. Therefore, improving growth outcomes requires not only limiting fast food intake but also strengthening the role of families, schools, and health professionals in promoting balanced nutrition and healthy lifestyles.

The findings regarding the association between the history of junk food consumption and toddler development at Aisiyah 2 Kindergarten in Pangkajene present results that are both interesting and challenging for further analysis. The Chi-square test yielded a p-value of 1.000. Since this value is greater than the significance level of 0.05, it can be concluded that there is no significant relationship between the history of junk food consumption and the developmental status of toddlers in the study setting. These findings indicate that, within the scope of this research, junk food consumption was not statistically proven to influence developmental status as measured by the KPSP.

Although table did not demonstrate a statistically significant relationship between junk food consumption and KPSP outcomes, existing literature indicates that diets high in ultra-processed foods are associated with poorer overall diet quality and adverse health impacts in children, including increased risk of obesity and nutrient deficiencies (Wanjohi, Asiki, Wilunda, Holdsworth, Pradeilles, Paulo, & Klipstein-Grobusch, 2025). Studies also show that high intake of ultra-processed foods correlates with lower intake of essential nutrients critical for growth and development, and contributes to the global phenomenon of the double burden of malnutrition, where undernutrition and overweight co-exist in pediatric populations (Viana, De Araújo-Moura, & De Moraes, 2025).

The findings presented in table indicate that the majority of toddlers aged 3–5 years with a moderate history of junk food consumption demonstrated appropriate development according to the KPSP assessment. These results suggest that although junk food is commonly classified as a nutrient-poor ultra-processed food, its impact on children's clinical development may not always be immediately observable in general developmental measures such as those captured by the KPSP. Within the context of

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Corresponding author: *E-mail: sthasrianistkm@gmail.com

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children's diets, the literature indicates that the dominance of ultra-processed foods in daily intake can contribute to poor diet quality due to their low levels of essential micronutrients and phytonutrients. Over time, this may influence the overall quality of children's growth and development, even when statistical analyses do not consistently demonstrate significant associations (Chamarthi, Shirsat, Sonavane, Parsi, Ravi, Ponnamp, & Ro, 2025).

Several studies have reported that the consumption of ultra-processed foods is associated with poorer cognitive performance across multiple domains, including attention, executive function, language ability, and visuospatial skills in children and adolescents. The intake of specific ultra-processed products, such as confectionery and bakery items, has also been found to be negatively correlated with verbal ability indices as well as full-scale IQ scores (Nguyen, Walters, Spies, Coppus, Massie, & Bertonha, 2025).

Another relevant issue concerns the role of nutritional literacy in junk food consumption patterns and their impact on children's eating behaviors. Contemporary research among preadolescents in Peru has demonstrated that ultra-processed food consumption is negatively correlated with food literacy, whereby children with lower levels of nutritional understanding tend to have higher intakes of ultra-processed products. This finding suggests that, beyond the quantity of consumption, knowledge-related competencies about food and the ability to make appropriate dietary decisions also influence how junk food intake may affect overall health and development (Ponce-Carreón, Monroy-Campos, Paucar, & Talavera-Mendoza, 2025).

Global evidence indicates that exposure to marketing and accessibility of ultra-processed foods significantly shapes children's dietary patterns, contributing to unhealthy diets that may affect both physical growth and broader developmental outcomes. For example, UNICEF's 2025 Child Nutrition Report highlights extensive exposure of youth to advertisements for unhealthy foods across multiple platforms, reinforcing junk food consumption habits from an early age. Moreover, comprehensive reviews of pediatric health literature show that high intake of ultra-processed foods is associated with poor diet quality and adverse health outcomes in childhood (Nguyen et al., 2025).

Child development is widely recognized as the result of complex interactions between biological, nutritional, psychological, and environmental factors. Adequate parental care and stimulation at home may act as protective factors that help children maintain appropriate developmental trajectories even in the presence of dietary risks. Moreover, early educational environments provide additional cognitive and social stimulation that supports developmental achievements (Predheeba Muthusamy). Therefore, although unhealthy dietary patterns such as frequent junk food intake may pose risks, their impact may be mitigated when other supportive factors are present (Morcel, Béghin, Michels, Vanhelst, Labreuche, Drumez, & Gottrand, 2022).

However, the findings at Aisiyah 2 Kindergarten in Pangkajene revealed no significant association between junk food consumption and developmental outcomes. This result may be explained by the presence of other protective factors, such as parents continuing to provide nutritious staple foods at home, social interaction and stimulation obtained from the school environment, or hereditary factors that help maintain children's development along appropriate trajectories despite frequent junk food intake. In other words, child development is not determined by a single factor, but rather represents the outcome of a complex interaction among biological, psychological, environmental, and nutritional influences (Muthusamy, Davies, Ainley, & Loganathan, 2020).

Although the present study at TK Aisiyah 2 in Pangkajene did not find a statistically significant association between junk food consumption and developmental outcomes, current literature emphasizes that child development is shaped by a complex interaction of multiple factors, including nutrition, family environment, and psychosocial stimulation. For instance, environmental and genetic influences have been shown to jointly affect language, cognitive, and motor domains in children, underscoring the multifactorial nature of child neurodevelopment (Schiavon, Burton, Hemager, Greve, Spang, Ellersgaard, & Nudel, 2025).

Moreover, research in disadvantaged urban settings found that nutritional status and the quality of the home stimulation environment were key determinants of cognitive and language development, suggesting that supportive caregiving environments can promote development even in the presence of

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Muhammadiyah Sidrap Health Center

Corresponding author: *E-mail: sthasrianistkm@gmail.com

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dietary risks (Sheikh Jamal Hossain). Additional evidence from early childhood programs indicates that socioeconomic context and maternal mental health influence parenting quality and child development, further illustrating that multiple protective and risk factors interact to shape developmental trajectories (Laura M. T. Dal'Ava dos Santos). Finally, studies of children under two years old highlight that nutritional status, stimulation, and family context together play significant roles in determining developmental outcomes, pointing to the importance of holistic approaches rather than single-factor explanations (Andriyani, Fadlyana, & Tarigan, 2023).

The researchers assume that the absence of a significant association may be influenced by the homogeneity of respondents and the characteristics of the study environment. Toddlers at Aisyiyah 2 Kindergarten in Pangkajene are likely to have relatively similar dietary patterns and access to food, resulting in limited variability in junk food consumption that may not be sufficient to produce meaningful differences in developmental outcomes. In addition, the relatively small sample size may also have reduced the statistical power to detect potential associations between variables.

Nevertheless, the researchers argue that these findings still provide an important insight, namely that the risks associated with junk food consumption are not always immediately observable in short-term indicators of growth and development among toddlers. The adverse effects of junk food are often cumulative and may only become apparent later in childhood, such as during the school-age years or adolescence, manifesting as obesity, metabolic disorders, or decreased academic performance resulting from deficiencies in essential nutrients.

Therefore, even though this study did not identify a statistically significant association, the role of parents and health professionals remains crucial in educating the community about the potential risks of excessive junk food consumption and in emphasizing the importance of balanced nutrition to support optimal child growth and development.

CONCLUSION

This study found that junk food consumption was significantly associated with the growth status of preschool children based on the weight-for-height

index, where higher intake tended to relate to less favorable anthropometric outcomes. However, no significant relationship was observed between junk food consumption and developmental status measured using KPSP. These findings indicate that while diet quality contributes to physical growth, child development is multifactorial and may be influenced by other factors such as family environment, stimulation, and caregiving practices.

Future researchers are advised to include larger and more heterogeneous samples to obtain stronger statistical power and broader generalizability. It is also recommended to apply longitudinal approaches and incorporate additional variables, such as parental feeding patterns, socioeconomic status, and physical activity, in order to better understand the complex interactions affecting children's growth and development.

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St. Hasriani*, St. Nurbaya, Windy Khaerati

Muhammadiyah Sidrap Health Center
Corresponding author: *E-mail: sthasrianistkm@gmail.com

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St. Hasriani*, St. Nurbaya, Windy Khaerati

Muhammadiyah Sidrap Health Center
Corresponding author: *E-mail: sthasrianistkm@gmail.com

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