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The Relationship Between Eating Junk Food and a Sedentary Lifestyle with Obesity in Elementary School Children

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ABSTRACT

Purpose: Obesity is a long-term condition caused by the accumulation of fat in the body due to an imbalance between energy intake and expenditure. This study aims to investigate the relationship between junk food consumption and a sedentary lifestyle, as well as the incidence of obesity, among elementary school children, particularly at SD 1 Megawon, Kudus Regency. This study also aims to understand the types of fast food consumed and the duration of sedentary behavior in children.

Research Method: The research design employed was quantitative, utilizing a correlational analytical approach and a case-control design. The study was conducted at SD 1 Megawon in March 2025. The sample consisted of 60 respondents, namely 30 children with obesity and 30 children without obesity, selected using purposive sampling. Data were collected through the Food Frequency Questionnaire (FFQ) to assess junk food consumption habits and the Adolescent Sedentary Activity Questionnaire (ASAQ) to measure sedentary activity. Data analysis was performed using bivariate analysis with the chi-square test.

Results and Discussion: The results indicate a significant relationship between the frequency of junk food consumption and sedentary activity levels, as well as obesity, in elementary school children. The p-values for both variables indicate statistical significance ($p < 0.05$).

Implications: These findings provide a crucial foundation for schools and parents to implement healthy eating patterns and encourage physical activity, thereby preventing childhood obesity from an early age.

Keywords: obesity; consumption; junk food; sedentary lifestyle.

Introduction

Obesity is a chronic condition characterized by the excessive accumulation of body fat, resulting from an imbalance between calorie intake and physical activity (Ermayanti, 2020). When energy intake exceeds energy expenditure, fat accumulates in adipose tissue, ultimately disrupting health and increasing the risk of various chronic diseases (Fadhilah *et al.,* 2021). Currently, obesity has become a global health issue affecting not only adults but also children and adolescents (Aditi, 2023). The increased consumption of high-calorie, nutrient-poor foods, lifestyle changes associated with

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urbanization and industrial growth, and a decline in physical activity are the primary factors contributing to the rising prevalence of obesity worldwide (WHO, 2024). According to a WHO report, in 2022, there were over 390 million children and adolescents aged 5–19 years who were overweight. This figure has risen from 8% in 1990 to 20% in 2022, with 160 million of them being obese (WHO, 2024). In Indonesia, over 2 million children are overweight or obese (UNICEF, 2022). Specifically, in Central Java Province, the prevalence of obesity, based on measurements, reached 18.81% (Jateng, 2018), indicating that the obesity issue cannot be ignored. This is also evident in elementary school environments, such as at SD 1 Megawon, where a survey conducted on January 16, 2025, found that 30 students were obese, comprising 18 children with obesity level 1 and 12 children with obesity level 2. Further observations revealed that the consumption of fast food and sedentary activities dominate the daily routines of these children.

Research on childhood obesity is growing rapidly as the prevalence of this condition increases both globally and locally. A critical variable in obesity research is junk food consumption, which refers to the consumption of fast food that is high in calories, saturated fat, sugar, and salt, but low in fiber and micronutrients. According to Saras, (2023), global changes in dietary patterns, driven by technological advancements and globalization, have led to the rising popularity of junk food, including burgers, pizza, nuggets, and fried foods. While convenient, these foods have negative health impacts on children, as they can trigger metabolic syndrome, including insulin resistance (Rustika, 2019). The high glycemic index content in junk food also affects body metabolism by inhibiting the utilization of fat as an energy source, which, if sustained, can lead to fat accumulation and obesity (Ketut *et al.,* 2019). Andriani *et al.,* (2024) reinforce this by stating that the low fiber, vitamin, and mineral content in junk food contributes to excessive weight gain. On the other hand, environmental factors such as family, school, and social factors also influence the intensity of junk food consumption among children. Maesarah *et al.,* (2020) revealed that the consumption habits of fast food among elementary school children are influenced by social support and the availability of food around the school. Meanwhile, Arlinda & Warsiti, (2015) found that consuming fast food at least three times a week is significantly associated with obesity in adolescents. The second variable of primary concern in this study is a sedentary lifestyle, which involves minimal physical activity and a tendency toward passivity. This lifestyle is increasingly prevalent among children due to increased technology use and changes in play behavior. According to Hasdianah *et al.,* (2014), children today spend more time indoors watching television or playing with gadgets, leading to a drastic decrease in physical activity and resulting in weight gain. A sedentary lifestyle exacerbates obesity because the calories consumed are not balanced with the energy burned by the body. Fadilah & Sefrina, (2022) emphasize that one of the leading causes of childhood obesity is a combination of low physical activity levels and a high-calorie diet. The World Health Organization (WHO) (2024) states that a sedentary lifestyle is one of the triggers of the obesity epidemic among children and adolescents, which has sharply increased from 1990 to 2022.

Various studies have examined the relationship between junk food consumption and sedentary lifestyles on obesity in children. However, most studies remain separate, and few have integrated both variables simultaneously within a comprehensive research framework. Studies such as those conducted by Arlinda & Warsiti, (2015) focus on fast food consumption and its impact on adolescent obesity, while research by Hasdianah *et al.,* (2014) emphasizes the contribution of a sedentary lifestyle to weight gain in children. Thus, there are still limitations in empirical studies that comprehensively combine unhealthy food consumption patterns and low physical activity as two main factors that mutually influence each other in triggering obesity in elementary school-aged children. Additionally, most previous studies were

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conducted in broader contexts or large urban areas, thus providing limited contextual insights at the local level, such as elementary schools in semi-urban or rural areas. However, social conditions, consumption habits, and access to fast food in these areas may have unique characteristics. From a theoretical perspective, there is limited research that delves into the relationship between children's eating behavior and physical activity in the context of obesity based on primary data from direct observations, such as those conducted at SD 1 Megawon.

This study has two unique features: the simultaneous integration of junk food consumption habits and sedentary lifestyles as behavioral factors contributing to childhood obesity, and a contextual approach based on primary data from elementary school environments in a semi-urban area. Unlike previous studies, which tend to separate analyses of dietary patterns and physical activity or are conducted in areas with general characteristics, this study specifically explores the relationship between these two variables and the occurrence of obesity among students at SD 1 Megawon, as measured through BMI calculations, direct observations, and interviews with the students. Thus, this study is expected to enrich the scientific literature on the determinants of childhood obesity by considering behavioral and local environmental dimensions. Based on the background and identified gaps, the objectives of this study are to analyze and explain the relationship between junk food consumption habits and sedentary lifestyles about obesity incidence among elementary school children, as well as to provide an empirical basis for more targeted nutrition and health education interventions in school settings.

Literature Review and Hypothesis Development

Obesity is a medical condition characterized by excessive and abnormal accumulation of body fat that can potentially cause various adverse effects on health, both physically and metabolically. This condition is generally measured using the Body Mass Index (BMI), which is the ratio of body weight in kilograms to the square of height in meters (kg/m^2). BMI is widely used as an indicator of nutritional status to classify individuals as underweight, normal weight, overweight, or obese. Rubino *et al.,* (2025) emphasize that obesity is not merely a common weight problem but a complex metabolic disorder directly linked to an increased risk of various serious chronic diseases, such as type 2 diabetes, hypertension, coronary heart disease, stroke, sleep apnea, and musculoskeletal disorders like osteoarthritis. One characteristic of obesity is chronic low-grade inflammation, which can lead to endothelial dysfunction, oxidative stress, and insulin resistance, ultimately negatively impacting vascular and metabolic health.

In the context of children, obesity is a serious concern due to its long-term consequences on quality of life and health in adulthood. Verma *et al.,* (2025) explain that a single factor does not influence childhood obesity but is the result of complex interactions between genetic factors, high-calorie and nutrient-poor diets, low physical activity, and social and cultural environmental influences. Consumption of ultra-processed foods, such as instant noodles, high-sugar snacks, and fast food, which is often high in saturated fat, sodium, and calories, frequently serves as the primary cause of excessive weight gain in children. Additionally, increased screen time and habits such as watching television and playing video games lead to significantly reduced physical activity. Such sedentary behavior exacerbates metabolic conditions and accelerates the onset of obesity, especially if not balanced with a healthy diet and regular physical activity. Urban environments, with their ease of access to ready-to-eat foods and limited play spaces for children, further reinforce these unhealthy lifestyles.

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Obesity is no longer just a problem among adults; it has also become deeply rooted among children and adolescents. A study by Paduano *et al.,* (2021) reveals that children who spend more than two hours a day engaging in sedentary activities, such as watching television or playing video games, are twice as likely to be overweight compared to their physically active peers. This phenomenon underscores the importance of acknowledging the impact of a sedentary lifestyle on the growing prevalence of obesity. On the other hand, research by Ghosh *et al.,* (2023) in urban areas of India revealed that a sedentary lifestyle, lack of nutritional awareness, and easy access to fast food significantly contribute to the increase in obesity rates among urban populations. Furthermore, Kueh *et al.,* (2024) also highlighted the emergence of obesity trends among type 1 diabetes patients undergoing long-term insulin therapy, indicating that obesity has now become a common complication across metabolic disease categories. Physiological mechanisms, including hyperinsulinemia and increased appetite resulting from insulin therapy, further strengthen this association. This suggests that obesity can no longer be viewed as merely a lifestyle issue, but rather as a complex and multidimensional clinical entity. The close relationship between obesity and diabetes mellitus has become a global concern in the field of endocrinology. According to Ruze *et al.,* (2023), obesity is a primary risk factor for insulin resistance, which ultimately contributes to the development of type 2 diabetes mellitus. This pathological process involves disruptions in insulin signaling pathways due to visceral fat accumulation, mitochondrial dysfunction, and oxidative stress. Over time, this can lead to reduced cellular sensitivity to insulin, chronic hyperglycemia, and damage to target organs.

Junk Food Consumption

Junk food consumption can be defined as the habit of consuming foods that are high in energy but low in nutritional quality. These foods typically contain excessive calories from saturated fats, added sugars, and salt (sodium), while fiber, high-quality protein, vitamins, and minerals are minimal. Common examples of junk food include instant noodles, fried potatoes, fried chicken, high-sodium packaged snacks, and MSG, as well as artificially sweetened beverages such as soda and packaged tea. In daily life, especially among children and adolescents, the consumption of junk food has increased significantly due to preferences for salty and sweet tastes, ease of access, affordability, and aggressive marketing through social media and television. A study by Li & Shi, (2025) confirms that the repeated consumption of ultra-processed foods is closely associated with the risk of overweight, obesity, and insulin resistance in children and adolescents. The study observed a strong link between high junk food consumption and the prevalence of metabolic disorders that develop from an early age. In this context, Upreti *et al.,* (2022) state that environmental factors, such as parental upbringing, school environments that do not support healthy eating habits, and exposure to digital content promoting unhealthy foods, are the primary triggers for children's high preference for junk food. This creates a significant challenge in improving family nutrition awareness and fostering healthier eating habits from an early age. In the long term, these habits not only affect nutritional status but also lead to hidden malnutrition due to deficiencies in essential micronutrients, despite high-calorie intake.

Excessive consumption of junk food during childhood can have profound effects on physical growth and psychological development. During the developmental period, balanced nutrition is essential for supporting organ formation, brain function, and immune system development. Hinnouho *et al.,* (2023) explain that regular consumption of processed foods high in sugar and fat, such as energy drinks, packaged sweetened tea, and high-calorie snacks, is significantly associated with increased blood

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glucose levels, LDL cholesterol, and reduced insulin sensitivity. These effects are not limited to children with genetic predispositions but also affect those with previously normal nutritional status. In this context, Güven & Öncü (2022) found through their study on children aged 7–8 years that high daily consumption of junk food directly contributes to an increase in body mass index (BMI), an early indicator of risk for overweight or obesity. Beyond metabolic effects, children accustomed to consuming junk food tend to develop a dependency on specific tastes and textures, making it difficult for them to accept healthy foods such as vegetables or lean animal proteins. This leads to a monotonous and limited diet, increasing the risk of deficiencies in essential nutrients. From a psychosocial perspective, this habit is also associated with reduced cognitive ability, decreased concentration in learning, and a tendency toward physical inactivity due to feelings of fatigue or hormonal imbalances. In Indonesia, this phenomenon is exacerbated by the culture of consuming instant noodles and fried foods as economical quick-fix meals, as well as low nutrition literacy among the general population.

The negative impacts of junk food consumption are not limited to weight and metabolic disorders but also encompass neurocognitive and behavioral development aspects in children. Chiwila *et al.,* (2024) found in their study that high consumption of sugar- and fat-rich processed foods from an early age can affect children's brain structure and function, leading to delays in fine motor skills, social abilities, and short-term memory disorders. These effects are caused by the accumulation of saturated fats and sugars in the body, which trigger low-grade systemic inflammation that can affect neurophysiological functions. In this context, parents play a crucial role in shaping children's food preferences from an early age. Early interventions such as limiting junk food consumption and providing healthy food alternatives need to be consistently implemented in both family and school environments. According to a meta-analysis by Lane *et al.,* (2024), long-term exposure to ultra-processed foods is also closely associated with an increased risk of degenerative diseases in adulthood, such as type 2 diabetes, hypertension, coronary heart disease, and certain types of cancer.

Sedentary Lifestyle

A sedentary lifestyle is a pattern of behavior characterized by low levels of physical activity and a predominance of sitting, lying down, or remaining in a stationary position for prolonged periods. Activities such as watching television, playing with electronic devices, reading while sitting, or using a computer for extended periods are concrete examples of this lifestyle pattern. According to Tremblay *et al.,* (2017), this lifestyle has become a global issue due to technological advancements, urbanization, and social changes that have led to a shift in societies toward a less active lifestyle. Hughes *et al.,* (2020) emphasize that a sedentary lifestyle is not merely a lack of exercise but a condition reflecting an imbalance between high sedentary time and moderate to vigorous physical activity. Furthermore, Ekelund *et al.,* (2019) demonstrate that even if someone regularly exercises, but still spends more than eight hours a day sitting, the risk of mortality and morbidity remains high. This suggests that physical activity cannot fully offset the adverse effects of prolonged sitting time. Therefore, a sedentary lifestyle must be understood as a distinct health issue that impacts an individual's cardiovascular, metabolic, and psychosocial systems. In many countries, particularly in urban areas, children and adolescents are highly vulnerable to this lifestyle due to easy access to digital technology and the increasing scarcity of active play spaces. Comprehensive interventions are needed to prevent this lifestyle from becoming a permanent habit that shapes disease risk profiles from an early age.

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Numerous studies highlight the profound implications of sedentary lifestyles for children and adolescents. One key aspect emphasized by Stierlin *et al.,* (2015) is that the dominance of high-sedentary activities, such as playing video games or watching videos, has led to a decline in physical activity among school-aged children. This trend is further reinforced by increased screen time, which impacts metabolic and psychosocial health. Knaeps *et al.,* (2018) note that excessive sitting time is associated with increased visceral fat levels, an independent risk factor for metabolic diseases, including insulin resistance and fatty liver disease. In an educational context, children with sedentary lifestyles also exhibit lower academic performance and struggle to concentrate on their studies. Lack of physical involvement in outdoor activities also results in a decline in motor and social skills. As reported by Ploeg & Hillsdon (2017), nearly 80% of children in developing countries do not meet the WHO's recommended daily physical activity guidelines. This habit risks creating a generation that is physically inactive, more prone to obesity, and experiences emotional and social development disorders.

A sedentary lifestyle in the long term has an impact on various degenerative chronic health conditions. According to Tremblay *et al.,* (2017), prolonged periods of sitting without sufficient physical activity can increase the risk of insulin resistance, chronic low-grade inflammation, and metabolic disorders. This serves as a gateway to various non-communicable diseases such as type 2 diabetes, hypertension, dyslipidemia, and even coronary heart disease. Ekelund *et al.,* (2019) noted that even if someone exercises regularly, sitting for more than eight hours still increases the risk of mortality. In the context of mental health, Owen *et al.,* (2010) showed that excessive exposure to gadgets and digital media in children increases the prevalence of anxiety disorders, depression, and insomnia. This issue is exacerbated by low parental awareness and the lack of school policies that encourage structured physical activity. Therefore, intervention approaches must be comprehensive, not only educating individuals but also creating supportive systems in school and home environments. Active rest programs, movement-based learning, and strict screen time restrictions are examples of strategies that can be implemented to reduce the negative impacts of a sedentary lifestyle. These efforts are crucial in fostering healthy and active lifestyles from an early age, thereby preventing the emergence of dual disease burdens in the future that persistent sedentary habits and a lack of physical activity can cause.

Research Method

This study is a quantitative research conducted at SD 1 Megawon, specifically in Megawon Village, Jati District, Kudus Regency, Central Java Province. The type of research used is quantitative research. According to Sugiyono (2018), quantitative research is a research method that relies on concrete data in the form of numbers, which are then analyzed using statistics as a calculation tool to produce an objective conclusion. This research design employs a correlational analytical approach with a case-control design, an analytical method used to measure the relationship (correlation) between certain factors that are assumed to be related. In this context, the study aims to determine and measure the relationship between junk food consumption habits and a sedentary lifestyle, as well as the incidence of obesity, among elementary school students at SD 1 Megawon.

The population in this study consisted of all students attending SD 1 Megawon in Jati District, Kudus Regency. Based on initial data obtained through a survey, the number of students with obesity was 30, while the number of students without obesity was 108. The sample was selected using purposive sampling, a sampling technique that is based on specific considerations or criteria determined by the researcher. The sample in this study consisted of 60 respondents, comprising 30 obese students and 30

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non-obese students. The research subjects were students from grades 1 to 6 who were willing to be respondents and met the inclusion criteria.

The data collection techniques in this study were conducted in several stages. First, personal identity data and Body Mass Index (BMI) measurements were collected to determine obesity status. The instruments used in this measurement were a weighing scale to determine body weight and a stature meter to measure height. Second, to assess junk food consumption habits, a questionnaire called the Food Frequency Questionnaire (FFQ) was used, which allowed respondents to report the frequency of consumption of various types of fast food. Third, to measure sedentary activity, the Adolescent Sedentary Activity Questionnaire (ASAQ) was used, which was adapted for elementary school children to calculate the duration of inactive activities, such as watching television, playing with gadgets, or sitting for extended periods. All instruments were developed and tested to ensure their validity and reliability.

The collected data were analyzed using two primary approaches: univariate analysis and bivariate analysis. Univariate analysis was used to describe the characteristics of each variable statistically, such as frequency distribution, percentage, mean, and standard deviation. Meanwhile, bivariate analysis is used to determine the relationship between independent variables, specifically junk food consumption and sedentary lifestyle, and the dependent variable, namely obesity. The bivariate analysis techniques employed in this study include the chi-square test and other statistical tests suitable for the type of data and its distribution, to determine the significance level of the relationship between the variables under study.

Results and Discussion

Analysis Result

Table 1. Frequency Distribution of Respondents Based on Gender and Grade

Respondent Characteristics	n	%
Child's Gender		
Man	32	53.3
Woman	28	46.7
Class		
Class 1	3	5.0
Class 2	4	6.7
Class 3	6	10.0
Class 4	14	23.3
Class 5	17	28.3
Class 6	16	26.7

Source: Primary Data 2025

Based on Table 1, it can be seen that of the total 60 respondents, the majority were male, comprising 32 respondents (53.3%), and most of the respondents were in grade 5, with 17 respondents (28.3%) in this grade. Most of the respondents were in grade 5, specifically 17 respondents (28.3%).

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Table 2. Frequency Distribution of Respondents Based on Age of Children, Fathers, and Mothers

Variabel	SD	Mean	Median	Modus	Minimal	Maksimal
Usia Anak	1.5	10.27	11.00	11	6	12
Usia Ayah	6.3	40.9	40	49	28	51
Usia Ibu	6.1	38.1	39	39	27	49

Source: Primary Data 2025

Based on Table 2, it can be seen that the average age of children is 10.27 years, with a standard deviation of 1.5. This indicates that the variation in the ages of the children in this study is relatively small and tends to be centered around the average value. Additionally, the median age of the children is 11.00 years, meaning that half of the children are 11 years old or younger, and the other half are 11 years old or older. Meanwhile, the mode, which is the value that occurs most frequently in the age distribution of the children, is also 11 years. This indicates that 11 years is the most dominant age among the respondents. Furthermore, the youngest age in this group was recorded as 6 years, while the oldest age reached 12 years. The age range of 6 to 12 years indicates that the group of children who were the subjects of this study were in the upper elementary school age range, which is generally a physically and cognitively active period.

Table 3. Frequency Distribution and Percentage of Junk Food Consumption and Sedentary Lifestyle

Category	Sub-Category	Frequency (n)	Percentage (%)
Junk Food Consumption	Often	45	75.0
	Not Often	15	25.0
	Total	60	100.0
Types of Junk Food	Snack (Often)	37	61.7
	Instant noodles (Often)	36	60.0
	Fried Chicken (Often)	33	55.0
	Pizza (Not Often)	40	66.7
Sedentary Lifestyle	Height	37	61.7
	Sedang	19	31.7
	Ringan	4	6.7
	Total	60	100.0
Types of Sedentary Lifestyle	Watching TV	60	100.0
	Playing with Gadgets	60	100.0
	Playing/Practicing Musical Instruments	11	11.7

Source: Primary Data 2025

Based on Table 3, it can be seen that out of 60 respondents, the majority frequently consume junk food, with 45 respondents (75.0%), while the remaining 15 respondents (25.0%) rarely consume junk food. The most commonly consumed types of junk food among respondents are snacks, instant noodles, and fried chicken. A total of 37 respondents (61.7%) reported frequently consuming instant noodles more than three times a week. This was followed by fried chicken, which was frequently consumed by 33 respondents (55.0%), and snacks, which were consumed more than three times a day

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by 35 respondents (58.3%). Meanwhile, the least frequently consumed type of junk food was pizza, with 40 respondents (66.7%) stating that they never consumed it. It was also found that 37 respondents (61.7%) had a high level of sedentary lifestyle. Meanwhile, 19 respondents (31.7%) were at a moderate level, and the remaining four respondents (6.7%) had a mild sedentary lifestyle. Furthermore, Table 3 also explains the types of sedentary activities commonly performed by respondents, namely watching TV and playing gadgets, which were done by all respondents (60 people or 100%). The least common sedentary activity was playing or practicing musical instruments, which was reported by only seven respondents (11.7%).

Based on Table 4, which analyzes data from 60 respondents, it was found that 30 respondents (50.0%) had obesity, while 30 respondents (50.0%) did not.

Table 4. Frequency Distribution and Percentage of Obesity Incidence

Incidents of Obesity	n	%
Obesity	30	50.0
Not Obese	30	50.0
Total	**60**	**100.0**

Source: Primary Data 2025

Table 5. Relationship between Junk Food Consumption Habits and Sedentary Lifestyle with Obesity Incidence in Elementary School Children at SD 1 Megawon

Variable	Category	Obesity (n/%)	Not Obese (n/%)	Total (n/%)	OR (95% CI)	p-value
Junk Food Eating Habits	Often	29 (64.4%)	16 (35.6%)	45 (100%)	25.375 (3.0–211.1)	<0.001
	Not Often	1 (6.7%)	14 (93.3%)	15 (100%)		
	Total	30 (50%)	30 (50%)	60 (100%)		
Sedentary Lifestyle	Height	23 (62.2%)	14 (37.8%)	37 (100%)	-	0.023
	Currently	7 (36.8%)	12 (63.2%)	19 (100%)	-	
	Light	0 (0.0%)	4 (100%)	4 (100%)	-	
	Total	**30 (50%)**	**30 (50%)**	**60 (100%)**		

Source: Primary Data 2025

Based on Table 5, the results of the analysis of the relationship between junk food consumption habits and obesity show that 29 (64.4%) respondents who frequently consume junk food experience obesity. Meanwhile, among respondents who rarely consume junk food, 1 (6.7%) experience obesity. The statistical test yielded a p-value of <0.001, indicating a significant difference in the proportion of obesity cases between those with frequent junk food consumption and those with infrequent junk food consumption. It can be concluded that there is a significant relationship between junk food consumption habits and obesity. The analysis also yielded an OR value of 25.375, meaning that children who frequently consume junk food are 25.3 times more likely to experience obesity than children who rarely consume junk food.

The results of the bivariate analysis of the relationship between sedentary lifestyle and obesity found that 23 (62.2%) children with obesity had a high sedentary lifestyle score. Among children with a moderate sedentary lifestyle score, 7 (36.8%) had obesity. Statistical analysis yielded a p-value of 0.023,

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indicating a significant difference in the proportion of obesity cases between high, moderate, and low sedentary lifestyle scores. It can be concluded that there is a substantial association between a sedentary lifestyle and the occurrence of obesity.

Discussion

Overview of Junk Food Eating Habits

Based on the statistical data analysis conducted, it was found that the majority of respondents showed a high tendency to consume fast food or junk food. A total of 45 respondents (75.0%) were categorized as frequently consuming junk food. This indicates that among the child respondents at SD 1 Megawon, three out of four children consistently consume unhealthy foods in significant quantities. Among this group of respondents, the majority, or 29 respondents (64.4%), have a body mass index (BMI) that falls into the obesity category. These findings indicate a correlation between the frequency of junk food consumption and the risk of weight gain to the point of obesity. Furthermore, the frequency of junk food consumption among these respondents was dominated by the habit of eating more than three times a week, indicating a pattern of repeated and excessive consumption. This data supports the hypothesis that exposure to fast food from an early age contributes to the development of eating disorders and body fat accumulation. This trend risks accelerating childhood obesity, which then continues into metabolic disease risk in adulthood.

Based on the tabulated data obtained from respondents at SD 1 Megawon, it was found that several types of junk food are most frequently consumed more than three times a week. These foods include instant noodles (36 respondents, 60.0%), fried chicken (33 respondents, 55.0%), and fried bakwan (31 respondents, 51.7%). These three types of food rank highest in terms of frequency of consumption, indicating that they have become part of the daily consumption pattern of children at the school. Additionally, 37 respondents (61.7%) consumed foods more than three times a day, specifically snack foods. This suggests that sweet or salty snacks have high appeal for children because they are readily available and easy to consume. Based on the overall data, it can be concluded that the majority of children at SD 1 Megawon have a high tendency to consume junk food, such as instant noodles, fried chicken, and fried bakwan, every week. Additionally, snack consumption is excessive daily. This pattern has the potential to negatively impact children's health in the long term, especially if not accompanied by a balanced diet that includes fiber, protein, and essential micronutrients.

Instant noodles and snacks are types of food that contain high levels of sodium (salt) and flavor enhancers. Both foods fall under the category of processed foods that are calorie-dense but low in essential nutrients, such as fiber and protein. Additionally, both are known to have high levels of saturated fat and simple carbohydrates, primarily from wheat flour and added sugar. The characteristics of these foods make them easy to consume repeatedly due to their savory and sweet taste, as well as their low satiety level, leading children to eat in excessive amounts. Aristi *et al.,* (2020) explain that excessive consumption of such foods can lead to rapid weight gain and increase the risk of obesity in children. A high-calorie diet lacking essential nutrients can impair metabolic health, including increased insulin resistance and dyslipidemia from an early age. Frequent consumption of instant noodles and snacks can also disrupt balanced eating patterns by reducing appetite for nutrient-rich foods such as vegetables, fruits, and protein-rich foods.

Other types of junk food frequently consumed by respondents in the <3 The 'times per week' category includes siomay (28 respondents, 46.7%) and grilled meatballs (24 respondents, 40.0%).

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Meanwhile, other fast food items consumed only 1–2 times per week include fried fries or French fries (18 respondents, 30.0%) and kebab (25 respondents, 41.7%). Meanwhile, the majority of respondents tended not to consume foods such as pizza (40 respondents, 66.7%), burgers (38 respondents, 63.3%), and dim sum (28 respondents, 46.7%). This variation in consumption frequency suggests that while there is a high tendency to consume certain types of junk food, not all types of fast food are part of the regular diet of children at SD 1 Megawon. The relatively lower frequency of pizza and burgers may be due to higher prices, limited access, or different taste preferences. This data indicates that the types and intensity of junk food consumption are significantly influenced by availability, price, and family habits.

According to the classification by Nurwanti *et al.,* (2016), foods categorized as junk food are divided into ten main types: sweet cereals, instant noodles, sweet snacks, processed meat, salty snacks, high-fat and high-sugar milk, chocolate and candy products, sweet non-carbonated beverages, and foods with flavor enhancers or additional supplements. This classification indicates that junk food is not limited to fried fast food but also includes various processed products that are high in calories, saturated fat, sugar, or sodium, yet low in essential nutrients. Based on a survey conducted at SD 1 Megawon, it was found that the main reasons children frequently consume this type of food are due to its tasty flavor, personal preference, attractive appearance, and the quick and convenient preparation process. These factors enhance the appeal of junk food compared to home-cooked meals or healthier options, which are often perceived as less appealing. On the other hand, this habit also reflects a lack of control over the food environment around children, both at home and at school. Therefore, a comprehensive nutritional intervention approach is necessary through education, regulation of school canteen environments, and active parental involvement in shaping healthy eating preferences from an early age. If not addressed appropriately, the high tendency to consume junk food from a young age will have long-term impacts on population health, including increased risks of obesity, metabolic diseases, and reduced quality of life in the future.

Overview of Sedentary Lifestyle

A sedentary lifestyle is a pattern of behavior characterized by minimal physical activity and a greater amount of time spent sitting or lying down. Activities that fall into this category include watching television, playing with gadgets, and playing video games for extended periods and repeatedly. This habit not only forms a passive lifestyle but also has a direct impact on physical health, particularly in increasing the risk of obesity in children. Based on a study conducted on elementary school students at SD 1 Megawon, it was found that 23 respondents (62.2%) who were obese had high sedentary scores. Additionally, seven respondents (36.8%) from the obese group had moderate sedentary scores. This data indicates that most children with obesity also have a sedentary lifestyle. This reinforces the hypothesis that a sedentary lifestyle and lack of physical activity significantly contribute to the increase in children's body mass index. When passive activities dominate daily activities, calorie burning becomes very low, contributing to the accumulation of body fat from unused energy intake. Therefore, sedentary lifestyle patterns need to be a serious concern in efforts to prevent childhood obesity. Educational interventions and environments that support physical activity are crucial for fostering healthy lifestyles from an early age, particularly in home and school settings.

Based on additional data from the same study, it was found that 14 respondents (37.8%) were not obese but had high sedentary levels. In comparison, 12 respondents (63.2%) had moderate sedentary levels, and four respondents had low sedentary levels. This finding indicates that a sedentary

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lifestyle not only affects children with obesity but has become a widespread trend among children in general. Children with sedentary habits have a higher likelihood of experiencing an increase in body mass index (BMI) beyond the normal range over time, even if they do not currently exhibit symptoms of obesity. This lifestyle tends to become a persistent habit because it is repeated and does not receive positive influence from the surrounding environment. Children become accustomed to the comfort of passive activities and receive minimal encouragement from parents or the school environment to engage in regular physical activities. In the long term, this condition can worsen children's physical and mental health. Low physical activity is also often associated with reduced cognitive capacity, behavioral problems, and decreased self-confidence. Therefore, families and educational institutions need to create an environment that encourages children's active participation in daily physical activities, such as playing outdoors, joining sports clubs, or engaging in enjoyable yet active community activities. Promotive and preventive efforts against a sedentary lifestyle must be consistently implemented to reduce the incidence of obesity among school-aged children.

Based on further research data, the majority of respondents showed a high tendency to spend more than two hours per day engaging in sedentary lifestyle activities, such as watching television, using gadgets, watching online videos, playing digital games, and using computers. These activities are carried out for extended periods without being interspersed with balanced physical activity. These habits cause the energy obtained from food intake not to be utilized optimally due to the lack of calorie burning through physical movement. In this context, many children also show a very low frequency of physical activity outside of school activities. Most children only engage in physical activity during physical education classes at school and do not make it a daily habit. The lack of participation in active games such as running, cycling, playing ball, or other free physical activities reflects that sports have not become part of their routine. This condition poses a significant challenge in forming healthy lifestyle habits during childhood. Limited access to play facilities, lack of education about the importance of sports, and increasing dependence on technology are some of the factors contributing to this trend. Therefore, intervention strategies should focus on increasing parental awareness, strengthening physical education curricula, and creating safe and attractive open play spaces for children. By integrating physical activity into daily routines, children will have a greater chance of maintaining optimal physical and mental health.

The Relationship Between Junk Food Eating Habits and Obesity

Based on statistical analysis of the distribution of respondents categorized by junk food consumption habits among students at SD 1 Megawon, out of a total of 60 respondents, 45 respondents had a habit of frequently consuming junk food. In comparison, 15 respondents reported rarely consuming junk food. Based on the data analysis, out of the 45 respondents who frequently consume junk food, 29 respondents (64.4%) experienced obesity. This indicates that nearly half of the respondents who frequently consume junk food belong to the obese group. In the group with infrequent junk food consumption, which consisted of 15 respondents, 14 respondents (93.3%) did not experience obesity. This indicates that almost all respondents who frequently consume junk food have unhealthy eating habits, which can contribute to the occurrence of obesity. Based on the results of the tabulated data, it shows that most children at SD 1 Megawon have a high frequency of eating junk food, more than 3 times a week, such as instant noodles (37 respondents, 61.7%), fried bakwan (33 respondents, 55.0%), nuggets (31 respondents, 51.7%), fried chicken (31 respondents, 51.7%), and fried meatballs (30

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respondents, 50.0%). Additionally, the food consumed by respondents more than three times daily includes snacks (35 respondents, 58.3%). Dietary patterns and eating habits are essential predictors of overweight/obesity. Not only in terms of excessive eating frequency or portion size, but also the habit of consuming junk food, snacking, and consuming foods and beverages high in sugar are also associated with obesity (Widyantari *et al.,* 2018). Eating frequency and food type also significantly influence the occurrence of obesity, as the body's ability to store carbohydrates and protein is limited. When consuming junk food with a high glycemic index, some of the carbohydrates are stored as glycogen, and the remainder is converted into fat. Proteins are converted into body proteins, and the remainder is stored as fat. The energy source used comes from glycogen (stored carbohydrates), so the accumulated fat is not utilized. If this continues repeatedly, fat deposits will accumulate, become abnormal, and lead to obesity. It is still found that some parents are unaware of the interaction between foods that can hinder nutrient absorption and have not applied the "My Plate" guidelines for their children (Ridwanto *et al.,* 2024). By adhering to these guidelines, parents and caregivers provide their children with the essential nutrients and care needed for physical and cognitive development. The foundation for future well-being is laid during this early stage of life, setting the stage for a thriving and capable generation (Purnomo *et al.,* 2023).

Based on a study of 60 respondents, 45 respondents were found to have frequent consumption habits of junk food. The data showed that 29 respondents (64.4%) experienced obesity, while 16 respondents (35.6%) did not. A study conducted by Alves *et al.,* (2020) found that the consumption of fast food or junk food among children is associated with an increased risk of obesity. This study indicates that children who frequently consume junk food are more likely to experience obesity compared to those with healthier eating habits. Most children who are obese are those who have the habit of snacking and eating snacks between meals. Children who consume processed meat and its products (e.g., sausages, nuggets, grilled meat) as well as snacks (e.g., potato chips, candy, ice cream) more than twice a week are nearly three times more likely to be overweight or obese (Karki *et al.,*, 2019). A study conducted at SD 1 Megawon revealed that the frequency of junk food consumption was low, with less than three times a week, and 14 respondents (93.4%) not experiencing obesity, while one respondent (6.7%) with low junk food consumption also experienced obesity. This indicates that although some respondents who rarely consume junk food do not experience obesity, there is a possibility that obesity may also be influenced by other factors besides junk food consumption habits, such as lack of physical activity, as well as genetic and metabolic factors.

In a study conducted by (Amalia *et al.,* 2016) titled "The Relationship Between Junk Food Consumption and Overweight Status Among Elementary School Students at Pertiwi 2 Padang," it was found that there is a significant relationship between the frequency of junk food consumption and overweight status ($p < 0.05$), meaning that the frequency of junk food consumption is one of the risk factors for overweight. The relationship between the frequency of junk food consumption and the occurrence of malnutrition among elementary school students is due to poor eating habits and environmental influences, such as easy access to junk food. Based on research conducted by Indraguna *et al.,* (2024) entitled "The Relationship Between Junk Food Consumption Levels and Obesity in Elementary School Children," the results of the chi-square statistical test showed that the relationship between junk food consumption levels and obesity in school-age children yielded a p-value of 0.018. Since $p<0.05$, there is a statistically significant relationship between junk food consumption levels and the incidence of obesity among elementary school children at SD Negeri Bendungan II.

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The Relationship Between Sedentary Lifestyle and Obesity

Based on research conducted at SD 1 Megawon, out of 60 respondents, 37 respondents were categorized as having a high sedentary lifestyle, 23 respondents (62.2%) experienced obesity, and 14 respondents (37.8%) did not experience obesity. From these data, it can be concluded that high sedentary values can lead to someone having excess weight or obesity. Obesity is a pathological condition characterized by the excessive or abnormal accumulation of body fat beyond what is required for normal bodily functions (Silwanah & Amaliah, 2019). Sedentary activity is a habit characterized by a lack of physical activity or movement. Sedentary behavior, such as the use of electronic devices (watching TV, playing games, and using gadgets) in children's rooms, is widespread in today's advanced society, and this can be associated with health risks for children. The results of this study indicate that most children at SD 1 Megawon exhibit high sedentary levels, with 37 respondents (62.2%) spending more than 5 hours per day in sedentary activities, indicating a high sedentary lifestyle. Among these, 23 respondents (62.2%) experienced obesity, while 14 respondents (37.8%) did not. Children with moderate sedentary levels typically spend 2 to 5 hours per day engaging in sedentary activities. There were 19 respondents with moderate sedentary levels; 7 respondents (36.8%) experienced obesity, and 12 respondents (63.2%) did not. According to the data, many children stated that they preferred lying down to watch TV and play with gadgets rather than engaging in other activities, such as cycling, playing ball, or skipping rope. Factors contributing to high sedentary behavior include a lack of physical activity or engagement in sedentary activities. If not addressed, a sedentary lifestyle can contribute to weight gain and the development of obesity.

These results align with a study conducted by Djalilah *et al.,* (2019), which found that among children aged 10–12 years, the highest sedentary activity during weekdays was sitting during school activities. Meanwhile, the highest sedentary activity based on screen time during weekdays was watching TV. During weekends, the most common sedentary activity was reading books, and the most common screen-based sedentary activity was using a mobile phone. Data from another study revealed that four respondents exhibited mild sedentary behavior, engaging in less than 2 hours of sedentary activities per day. All four respondents (100%) did not experience obesity. From the data, it can be concluded that children with mild sedentary levels and who frequently engage in good physical activities are less likely to have excess body weight or obesity. Children prefer to engage in outdoor activities with their friends, such as running, jumping rope, and playing with a ball, rather than just lying around inside the house.

These results align with a study conducted by Azzahra & Anggraini (2022), which states that physical activity influences the risk of obesity among school-aged children. Physical activity plays a role in maintaining overall bodily function. Engaging in good physical activity allows the body to develop more effectively. This is proven by the fact that many respondents with good physical activity have a BMI in the normal category. If physical activity is insufficient, it will affect bodily functions that cannot develop properly. This result is supported by research by Bokau et al (2023) titled "The Relationship Between Sedentary Behavior and Obesity Among Students at SD GMIM Kota." The results obtained showed a P-value of 0.002, where the P-value is less than the α value (<0.05). This suggests a significant relationship between sedentary behavior and obesity among students at SD GMIM Kota, aged 8-11 years.

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Conclusion

This study was conducted to investigate the relationship between junk food consumption habits and a sedentary lifestyle, as well as their impact on the incidence of obesity in elementary school children at SD 1 Megawon. Using a quantitative approach and a case-control design, this study demonstrated a significant relationship between the frequency of junk food consumption and the level of sedentary lifestyle, as well as the incidence of obesity. These findings support the initial hypothesis that unhealthy eating habits and a sedentary lifestyle are two dominant factors that influence children's nutritional status and health, especially in the elementary school age group. The value of this study lies in its contribution to enriching the academic literature on behavioral factors that influence childhood obesity, while providing an empirical basis for the development of contextual and evidence-based nutrition interventions and health promotion.

Practically, the results of this study can be utilized by schools and parents to develop policies and strategies that support healthy eating behaviors and increased physical activity in school and home environments. This study also offers an original approach by integrating two main variables simultaneously and testing them in a local context that has rarely been the focus of previous studies.

This study has limitations, including its limited geographical scope, which is restricted to a single school, and the use of a cross-sectional design, which cannot establish causal relationships in depth. Additionally, data collected through questionnaires may contain subjective biases from respondents. Therefore, it is recommended that future researchers conduct studies with a broader scope and use a longitudinal approach to observe the development of obesity over time. Further research could also integrate other variables such as family role, socioeconomic status, and children's psychological factors to obtain a more comprehensive picture in efforts to prevent childhood obesity holistically.

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