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# Relationship between Parental Education and Food Consumption Diversity on Adequate Energy Intake

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***ABSTRACT***

**Introduction**: Parental education and dietary diversity are predicted to influence the adequacy of energy intake in elementary school children. The purpose of this study was to determine the relationship between parental education and dietary diversity on the adequacy of energy intake. **Method**: This study used 25 samples of male and female students from WADAS 1 Public Elementary School. Research related to parental education was obtained from primary data using a socio-demographic questionnaire, and research related to the eating history of the research subjects using the Dietary Diversity Score (DDS) questionnaire. This study is a quantitative study with a cross-sectional approach. The analysis test used in this study was a correlation analysis test using the Spearman rank test, because the data were declared not normally distributed. **Results:** The results of the univariate study of energy adequacy based on education showed that education was not a determinant of adequate energy intake in children. Meanwhile, energy adequacy based on the diversity of food consumption illustrates that diverse foods cannot necessarily meet the energy intake requirements. The results of the bivariate study showed no significant relationship between parental education and adequate energy intake, indicated by ($p = 0.486 > 0.05$), and no relationship between the diversity of food consumption and adequate energy intake, indicated by ($p = 0.347 > 0.05$). **Conclusion:** The conclusion of this study is that there is no relationship between parental education and adequate energy intake, and there is no relationship between the diversity of food consumption and adequate energy intake. Further researchers can conduct research with a larger number of respondents and with more diverse respondents so that the research results are more representative and can be generalized.

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## INTRODUCTION

Currently, health in early childhood is very important to support growth and development. Research by Nurhaliza (2025), shows that school-age children are still in a critical period regarding the formation of eating patterns because food consumption greatly affects nutritional status, even leading to nutritional problems in children later in life. In line with the research by Juairia et al (2022), which shows that energy deficiency can cause growth disorders such as stunting. Based on Kemenkes (2024), the prevalence of stunting is 19.8%, a decrease from 21.5% based on the 2022 SSGI report. Based on research by Prasetyo et al (2023), it is shown that dietary patterns have numerous assessments that can be determined, such as food diversity, adequate energy intake, and others. However, food consumption diversity remains a problem faced by families in both urban and rural areas. In fact, research by Djamaluddin et al (2022), shows that children in Indonesia have low protein and vitamin consumption habits but high carbohydrate consumption, which is described as poor dietary diversity.

The consumption of food among school-age children is a concern for parents to support their increasing physical activities, such as playing and exercising, which means that nutritional needs also increase to meet energy requirements (Gurnida et al., 2020). Based on research Supriadi et al (2022), it shows that consuming a variety of foods is one component of balanced nutrition. The goal is to prevent the body from experiencing nutrient deficiencies. This is because the principle of food diversity can replace nutrients that have been used up for activities and growth. The portion of staple foods consumed is often larger than other foods such as fruits, vegetables, and animal proteins, which are limited in consumption. This indicates that a lack of food diversity still often occurs in developing countries (Rakhmatika et al., 2023).

Energy adequacy is closely related to parental education, as can be seen from the diversity of food consumption in children, which is highly dependent on parental education. This is in line with the research by Aprillia et al (2024), which shows that parental education plays a significant role in providing and feeding the family. This includes menu planning, cooking, and serving according to the family's preferences and needs. Based on research by Munawaroh et al (2022), it shows that the higher the level of education, the easier it is to receive health information. Especially in the field of nutrition, so that they can increase their knowledge and be able to apply it in their daily lives, especially regarding food diversity and nutritional fulfillment in early childhood. Not only that, food diversity also greatly affects energy adequacy, which is in line with the research Andani & Adhi (2024), which shows that food consumption diversity is one of the factors that can increase energy intake adequacy. This is also in line with the research Qurbani et al(2025), which shows that there is a significant relationship between food diversity and nutritional status in adolescents.

There has been no similar research related to parental education and food diversity on energy intake adequacy at WADAS 1 Public Elementary School. Therefore, the researcher wanted to conduct a study with the aim of determining the correlation between parental education and energy adequacy and food consumption diversity with energy intake adequacy at WADAS 1 Elementary School.

## LITERATURE REVIEW

Parental education is a factor that can influence children's health from a family perspective (Anggraeni et al., 2020). In line with the research Nadhira et al (2024), which shows that parenting, including meeting children's nutritional needs for growth and development, is the responsibility of parents. In general, education can be pursued

through various channels, such as informal, formal, and non-formal education. Informal education usually occurs unconsciously, such as within the family, social circles, and the community. Meanwhile, formal education is pursued consciously at school, such as elementary school, junior high school, high school (vocational high school, technical high school), bachelor's degree, and so on (Handayu, 2020). According to Silvia & Eliza (2020), the level of education is a factor that plays an important role in the growth and development of young children. Usually, parents with a higher educational background have greater ability to provide guidance to their children regarding proper growth and development.

Based on research by Verger et al (2021), it was found that a high-quality consumption pattern can be assessed from the diversity of food consumption, even based on the principle that no single food can provide the right amount of nutritional intake to maintain optimal health. However, energy needs can be met through diverse food consumption, and energy needs can support the physical growth and mental development of young children (Kamila et al., 2022). The processing of food diversity scores using the Dietary Diversity Score (DDS) is a simple method that can be used to determine the reflection of food consumption diversity on an individual scale (Izzati et al., 2022).

Adequate energy intake is a requirement that can support children's growth during their developmental years. In line with the research by Anggraini et al (2025), which shows that energy intake is one of the direct factors that can determine nutritional status. The energy intake is then used to carry out the body's basic functions. General guidelines for energy intake requirements can be seen in Table 1. 2019 RDAs issued by the Ministry of Health.

**Table 1. 2019 RDAs (Recommended Dietary Allowances) Table**

| Age Group | Body Weight (kg) | Height (cm) | Energy (kcal) |
|---|---|---|---|
| 7-9 years | 27 | 130 | 1650 |
| **Male** | | | |
| 10-12 years | 36 | 145 | 2000 |
| **Female** | | | |
| 10-12 years | 38 | 147 | 1900 |

Source: (Ministry of Health, 2019)

Table 1. shows that the energy intake requirement for the 7-9 year old group for both males and females is 1650 kcal, while for the 10-12 year old group, males have an energy intake requirement of 2000 kcal and females have an energy intake requirement of 1900 kcal.

## METHOD

This study used an observational research design with a cross-sectional approach. *Cross-sectional* in this study is a measurement taken only once on the subjects at the time of the study (Abduh et al., 2021). Research related to parental education was obtained from primary data using a socio-demographic questionnaire and the research subjects' eating history using the Dietary Diversity Score (DDS) questionnaire. In line with the study (Ibnu, 2020), it shows that the food diversity score uses the Dietary Diversity Score (DDS) questionnaire. This study uses correlation research to find the relationship between independent variables (parental education and food consumption diversity) and dependent variables (adequate energy intake).

This study was conducted at SDN WADAS 1 in Teluk Jambe Timur sub-district from March 2025 to May 2025. The sample used in this study consisted of 4A students who were pupils of SDN WADAS 1. A total of 25 students who met the inclusion criteria were selected. The inclusion criteria were students who were pupils of SDN WADAS 1 and were willing to fill out an informed consent form. The exclusion criteria for this population were students who were not pupils of SDN WADAS 1. The sampling method used in this study was purposive random sampling.

In the data collection process, parental education was assessed using a questionnaire included in the informed consent form, while dietary diversity was assessed using a 2 x 24-hour recall questionnaire, which was then processed using the DDS (Dietary Diversity Score*)* questionnaire consisting of 9 food groups. The assessment was carried out with a score of 1 if the food group was consumed and 0 if the food group was not consumed. Respondents' food consumption was classified as not diverse if the DDS score was < 4 and diverse if the DDS score was > 4. Meanwhile, for energy intake adequacy, respondents' 1 x 24-hour recall records were entered into the Nutrisurvey 2007 application, and then energy intake was examined. Energy intake was calculated by dividing energy intake by the 2019 RDAs (Recommended Dietary Allowances) and then multiplying by 100%. Based on the 2019 RDAs (Recommended Dietary Allowances), the energy requirement for 9-year-olds is 1,650 kcal, for 10-12-year-olds, it is 2,000 kcal for males and 1,900 kcal for females. Intake categories are based on the 2014 WNPG (National Food and Nutrition Program), where food consumption can be categorized as severe deficiency if food consumption is < 70% of the requirement, moderate deficit if food consumption is 70-79% of the requirement, mild deficit if food consumption is 80-89% of the requirement, normal if food consumption is 90-119% of the requirement, and above the requirement if food consumption is ≥ 120% of the requirement.

The data was then entered into Microsoft Excel, edited, and coded. The parental education variable was coded from 1 to 4, representing elementary school to bachelor's degree. Meanwhile, the independent variable of food diversity had two categories, namely non-diverse and diverse, which were then converted into codes 1 and 2. The dependent variable of energy intake adequacy had five categories, namely severe deficit, moderate deficit, mild deficit, normal, and above normal. These were then coded from 1 to 5. The coding was based on the lowest to highest categories, assuming that higher education and more diverse food consumption could increase energy intake adequacy. The coded data was entered into SPSS version 27. The dependent variable data on energy intake adequacy was categorical data, so the data was presented in an n (%) table. Before determining the correlation test, a normality test was performed first using the Shapiro-Wilk test because the sample size used was less than 50 respondents. The significance value used was that if the p-value was > 0.05, the data was considered normally distributed, whereas if the p-value was ≤ 0.05, the data was considered not normally distributed. Normally distributed data could use the pearson correlation test, whereas if the data was not normally distributed, the Spearman's rank test could be used. The significance value of these two tests is the same, namely if the p-value is > 0.05, there is no significant relationship between parental education and food consumption diversity on energy adequacy, whereas if the p-value is ≤ 0.05, there is a significant relationship between parental education and food consumption diversity on energy adequacy.

## RESULTS AND DISCUSSION

The characteristic data in this study included gender, age, parental education, parental occupation, parental income, and energy adequacy. These data can be seen in Table 2.

**Table 2. Characteristics and Energy Intake Adequacy of Respondents (N= 25)**

| Characteristics | Categories | Frequency (n) | Percentage (%) |
|---|---|---|---|
| **Gender** | Male | 12 | 48 |
| | Female | 13 | 52 |
| **Age** | 9 years | 1 | 4 |
| | 10 years old | 18 | 72 |
| | 11 years | 6 | 24 |
| **Parental Education** | Elementary | 0 | 0 |
| | Junior High School | 12 | 48 |
| | High School | 11 | 44 |
| | Bachelor's Degree | 2 | 8 |
| **Parents' occupation** | Not working | 1 | 4 |
| | Laborer | 13 | 52 |
| | Teacher | 2 | 8 |
| | Military | 1 | 4 |
| | Entrepreneurs | 4 | 16 |
| | Employees | 4 | 16 |
| **Parental Income** | < Minimum Wage | 23 | 92 |
| | > Minimum Wage | 2 | 8 |
| **Energy Adequacy** | Severe Deficit (<70%) | 17 | 68 |
| | Moderate Deficit (70-79%) | 5 | 20 |
| | Mild Deficit (80-89%) | 1 | 4 |
| | Normal (90-119%) | 2 | 8 |
| | Excess (≥ 120%) | 0 | 0 |

Based on Table 2, the results of data analysis from 25 samples of elementary school children in WADAS 1 class 4A show that there were 12 male children or 48% and 13 female children or 52%, which means that female children dominated. The results also show that the age of the respondents included 1 person aged 9 years or 4%, 18 people aged 10 years or 72%, and 6 people aged 11 years or 24%, indicating that the majority were aged 10 years. In addition, the students did not know their parents' education levels, with 0 or none having elementary school education, 12 or 48% having junior high school education, 11 or 44% having high school education, and 2 or 8% having a bachelor's degree. The characteristics of respondents in the education category were dominated by parents with a junior high school educational background. Meanwhile, 1 parent or 4% was unemployed, 13 parents or 52% were laborers, 2 parents or 8% were teachers, 1 parent or 4% was in the military, 4 parents or 16% were entrepreneurs, and 2 parents or 16% were entrepreneurs. As for parental income, 23 respondents or 92% had an income below the minimum wage, while 2 respondents or 8% had an income above the minimum wage. Therefore, it can be said that most of the sample had parents who were laborers and had an income above the minimum wage. Based on the energy adequacy of the respondents, 17 children or 68% had a severe energy deficit, 5 children or 20% had a moderate energy deficit, 1 child or 4% had a mild energy deficit, 2 children or 8% were normal, and 0 children or none had an energy surplus.

Based on Table 3, the results of energy intake analysis based on parental education show that there were no students with adequate energy intake among those with an

elementary school educational background, while among those with a junior high school educational background, 9 children or 75% had a severe energy deficit, 2 children or 20% had a moderate energy deficit, and 1 child or 20% had normal energy intake. Among students with high school-educated parents, 7 children (63.6%) had a severe energy deficit, 2 children (63.6%) had a moderate energy deficit, 1 child (9.1%) had a mild energy deficit, and 1 child (9.1%) had normal energy intake. Meanwhile, among parents with a bachelor's degree, 1 child or 50% had a severe energy deficit, and 1 child or 50% had a moderate energy deficit. These data indicate that educational level does not correlate with children's energy intake. This is consistent with the study Casando et al (2022), which shows that there is no relationship between the mother's educational level and the child's nutritional status.

**Table 3. Relationship between Parental Education and Adequate Energy Intake**

| Parental Education | Adequacy of Energy Intake | | | | | | | | | | Total | | *P-Value* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Severe Deficiency | | Moderate Deficit | | Mild Deficit | | Normal | | More | | N | % | |
| | n | % | n | % | n | % | n | % | n | % | | | |
| Elementary | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.486 |
| Junior High School | 9 | 75 | 2 | 16.7 | 0 | 0 | 1 | 8.3 | 0 | 0 | 12 | 100 | |
| High School | 7 | 63.6 | 2 | 18.2 | 1 | 9.1 | 1 | 9.1 | 0 | 0 | 11 | 100 | |
| Bachelor | 1 | 50 | 1 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 100 | |

The results of the Spearman rank test show statistical values, indicating that the p-value is 0.347 ($p > 0.05$), which means that there is no statistical relationship between food consumption diversity and adequate energy intake. This indicates that even though children have diverse food consumption, 10 children or 62.5% are severely deficient, and only 2 children or 12.5% have normal energy intake (Table 4). These results are in line with the research by Fauziana & Fayasari (2020), which shows that respondents who consume less diverse foods tend to experience chronic energy deficiency or inadequate energy intake.

**Table 4. Relationship between Food Consumption Diversity and Adequacy of Energy Intake Energy**

| Food Consumption Diversity | Adequacy of Energy Intake | | | | | | | | | | Total | | *P-Value* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight Deficit | | Moderate Deficit | | Mild Deficit | | Normal | | More | | | | |
| | n | % | n | % | n | % | n | % | n | % | N | % | |
| Not Diverse | 7 | 77.8 | 2 | 22.2 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 100 | 0.347 |
| Various | 10 | 62.5 | 3 | 18.8 | 1 | 6.3 | 2 | 12.5 | 0 | 0 | 16 | 100 | |

The results of the energy intake analysis show that there are 7 children or 77.8% with severe energy deficit intake and 2 children or 22.2% with moderate energy deficit intake in the group with non-diverse intake. Meanwhile, in the group of children with diverse intake, there were 10 children or 62.5% with severe energy deficit intake, 3 children or 18.8% with moderate energy deficit intake, 1 child or 6.3% with mild energy deficit intake, and 2 children or 12.5% with normal energy intake. The data shows that 36% of children from the total respondents experienced a severe energy deficit with a non-diverse intake, and 64% of children from the total respondents had a diverse intake (Table 4). This suggests that consuming a diverse range of foods does not necessarily meet energy intake requirements.

The results of the Spearman's rank test show statistical values, indicating that the p-value is 0.486 ($p > 0.05$) (Table 3), which means there is no statistically significant relationship between parental education and adequate energy intake. These results are in line with the research Ekawati & Puspasari (2024), which shows that there is no significant relationship between parents' knowledge of balanced nutrition and energy intake. In fact, the research Salsabila et al (2023), shows that parents' educational status does not affect children's nutritional status. In line with the research by Casando et al (2022), which shows that there is no relationship between the mother's education level and the child's nutritional status.

One factor that may cause education to have no significant relationship with energy adequacy is poor parenting, as this can also be seen in children with the highest level of education, namely strata-1, who still have severe and moderate levels of energy deficiency. Thus, in line with the research Wandani (2021), which shows that there is no relationship between education and parenting patterns among parents. This study also does not align with the research by Munawaroh et al (2022), which shows that the higher the education level, the easier it is to receive health information. This is because knowledge related to parenting is generally not practiced in raising children. Additionally, the study by Wandani (2021) shows that parents' economic status can also influence the nutritional status of young children. Therefore, education is not the only factor that influences the energy intake of young children.

This study provides an overview showing that a diverse diet does not necessarily guarantee adequate energy intake, as it is related to the portions of rice, side dishes, and snacks. Based on the results of the 2 x 24-hour recall, it was found that students frequently consumed carbohydrates such as rice, noodles, and several snacks made from flour. The majority of students consume half a plate of rice, and protein consumption among students is generally not present at every meal. Even vegetable and fruit consumption is only present in a few of the respondents. Therefore, the energy adequacy of students is not yet sufficient because the portions of animal and plant-based protein and vegetables in a single meal are not in accordance with the contents of the plate. Based on (Darmawanti, 2022), the Ministry of Health's website shows that balanced nutrition guidelines recommend that half of the plate be filled with vegetables and fruit, while the other half be filled with staple foods and side dishes. Food diversity can be influenced by economic factors, consistent with research findings that economic factors contribute to food diversity in families, particularly for young children (Ibnu, 2020).

Therefore, the results of this study support the provision of regular education to parents with diverse educational backgrounds. In line with the research by Oktavia et al (2023), which shows that nutrition education is an alternative means of increasing knowledge to improve children's nutritional status. Thus, further researchers can provide interventions by providing education using media related to increasing knowledge, food diversity, and adequate energy intake for parents.

This study has several limitations in data collection, such as children's lack of understanding of their parents' educational background and their memory of their eating history.

## CONCLUSION

The assessment of the relationship between parental education and energy adequacy showed no statistical relationship, because higher education does not guarantee that practices at home are carried out properly. Similarly, research on the relationship between food consumption diversity and adequate food energy intake found no statistical

correlation. This shows that food consumption diversity remains a problem in early childhood. Moreover, a diverse diet that is not balanced with adequate portions will not provide sufficient energy intake for young children.

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