

# The Relationship Between Nutritional Status and Intellectual Intelligence in School-Age Children at State Islamic Elementary School (MIN) 11, West Aceh

<sup>1</sup>Mir Atil Hayati, <sup>2</sup>Sufyan Anwar, <sup>3</sup>Wardah Iskandar, and <sup>4</sup>Itza Mulyani

<sup>1</sup>Department of Nutrition, Faculty of Health Sciences, Universitas Teuku Umar, miratilhyt11@gmail.com

<sup>2</sup>Department of Public Health, Faculty of Health Sciences, Universitas Teuku Umar, sufyan.anwar@utu.ac.id

<sup>3</sup>Department of Nutrition, Faculty of Health Sciences, Universitas Teuku Umar, wardahiskandar@utu.ac.id

<sup>4</sup>Department of Nutrition, Faculty of Health Sciences, Universitas Teuku Umar, itzamulyani@utu.ac.id

**Corresponding author:** Mir Atil Hayati, e-mail: miratilhyt11@gmail.com

## ABSTRACT

Nutritional status plays an important role in children's growth and development, including cognitive function. However, intellectual intelligence in school-age children is influenced by various biological and environmental factors. This study aims to examine the relationship between nutritional status and intellectual intelligence in school-age children at Madrasah Ibtidaiyah Negeri (MIN) 11 Aceh Barat. This study uses an analytical design with a cross-sectional approach. The study population consisted of all sixth-grade students at MIN 11 Aceh Barat, with a total of 104 respondents selected using total sampling technique. Nutritional status was assessed using the Body Mass Index for Age (BMI/A) indicator, while intellectual intelligence was measured using the Culture Fair Intelligence Test (CFIT) Scale 2A. The results showed that most respondents had normal nutritional status (65.4%) and moderate (60.6%) and high intellectual intelligence ((27.9%). The results of Chi Square Test showed that there was no significant relationship between nutritional status and intellectual intelligence in school-age children ( $p = 0.715$ ). Therefore, efforts to improve children's intellectual intelligence need to be carried out comprehensively through a multidimensional approach integrating aspects of nutrition, education, and the environment.

## ARTICLE INFORMATION

**Submitted:** 22/10/2025

**Revised:** 04/11/2025

**Accepted:** 18/11/2025

**Published Online:** 19/11/2025

### Keywords:

intellectual intelligence, nutritional status, school-aged children

**How to cite this article:** Hayati, M. A., Anwar, S., Iskandar, W., & Mulyani, I. (2025). The Relationship Between Nutritional Status and Intellectual Intelligence in School-Age Children at State Islamic Elementary School (MIN) 11 West Aceh. *Journal of Nutrition Science*, 6(2), 46–50. doi:10.35308/jns.v6i2.14638

## Introduction

Children aged school is a group age that plays an important role in development. It is in a phase of physical and developmental growth, as well as ongoing cognitive development. At this stage, this child needs optimal nutrition to support learning, concentration, and intellectual development. Good nutrition supports brain function, so a child with good nutritional status has more opportunities to concentrate and solve problems more effectively than a child with poor nutritional status (Bakhtiar et al., 2019; Susilowati & Quyumi, 2021).

Nutrition is the process by which organisms use food consumed regularly, through digestion, absorption, transport, storage, metabolism, and the excretion of unused substances, to maintain life, growth, and the normal function of organs, and to produce energy (Sulistyoningsih, 2011). Nutritional status can be defined as an expression of a state of balance in the form of certain variables or changes in nutrition. The level of health achieved by a person through food consumption is also known as nutritional status (Adnani, 2011). Nutritional status can be influenced by an individual's level of nutritional knowledge and dietary intake (Lestari, 2020).

Nutritional status is an important factor in evaluating the health and growth of children, who support their

physical and cognitive development during school age (Adriani & Wirjatmadi, 2022). Suboptimal nutritional status during growth can affect the development and decline in children's abilities (Par'i et al., 2017). Poor-quality, low-intake nutrition will result in deficiencies (Sediaoetama, 2017).

Children aged school own risk tall. They lack experience and nutrition, so periodic monitoring of nutritional status is essential to prevent disturbances in growth and cognitive function. In the long term, disturbances, brain effects, and malnutrition can contribute to declines in productivity and creativity in adults (Meiranti & Anggreny, 2023).

Globally, the nutritional status of children aged 5–19 years in schools and adolescents shows a shift pattern of malnutrition. UNICEF data for the period 2000–2022 shows that the prevalence of underweight (thinness) in groups aged. This trend decreased, but there was also an improvement, with a significant impact on overweight and obesity. Currently, approximately 20 % of children and adolescents, 5–19-year-olds in the world are overweight, with the prevalence of obesity reaching around 9.4%, while the prevalence of underweight is around 9.2 %. This marks a transition in global nutrition, in which excess nutrition has become a serious problem alongside malnutrition. Numbers

show that problem one, nutrition in various forms, remains a significant challenge in various countries (UNICEF, 2025). Balanced nutrition practices aligned with national dietary guidelines are essential for supporting optimal growth and cognitive performance among school-aged children (Ministry of Health of the Republic of Indonesia, 2015).

Based on the 2023 Indonesian Health Survey (SKI), a national health survey that replaced Riskesdas, Indonesia still faces a double burden of malnutrition among school-aged children. The results of the 2023 SKI data processing show that about 11% of children ages 5–12 years are experiencing stunting, while the prevalence of problem nutrition is increasing, with the prevalence of overweight being around 11.9% and obesity around 7.8%. In addition, children with a thin or very thin nutritional status are still found. Condition: This reflects the existence of an imbalance in intake and quality nutrition in children, the potential impact of schools on health and ability. Study of children.

Several studies show that nutritional status is lower, particularly over time, and that this can affect cognitive and intellectual abilities. Deficiencies in certain nutrients can affect brain development and function. On the other hand, nutritional status excess has also been reported to negatively impact cognitive function through metabolic and inflammatory mechanisms. In Putri and Fadji (2021) research, it was shown that nutritional status and the health of children relate to the performance of students in basic school studies. Children with abnormal nutritional status tend to perform and learn worse than children with normal nutritional status.

Another study by Zuraini Mahyiddin, Rais Al'Abqary, and Zahratul Fajri (2020) on students at the State Elementary Madrasah (MIN) Tungkop Aceh Besar found meaningful associations between nutritional status and children's intelligence quotient (IQ) levels. Children with normal nutritional status tend to have higher intelligence than those with suboptimal nutritional status. Research shows that optimal nutritional conditions contribute to the cognitive development of school-age children, even though intelligence is influenced not only by a single factor but also by the environment, education, and learning stimulation. Findings: This underscores the importance of adequate nutrition as one of the efforts to support the development of the intellectual child since age school-based.

At the level regional areas, especially in Aceh Province, scientific publications on assessing the nutritional status of schoolchildren remain relatively limited. Most studies on nutrition in Aceh focus on group-level toddlers and stunting. Limited studies on children aged school-age cause a lack of scientific description of nutritional status and its impact on cognitive development across age groups, it is said. In fact, the child age school is a very strategic group because it is in a transition period, moving from childhood to adolescence, and facing increasingly demanding academic demands.

According to Wechsler (2013), intelligence is the overall ability of an individual to think and act in a

directed manner, and to process and control the environment effectively. Intelligence is a part of the mind that is related to various abilities, for example the capacity to plan and analyze something. Intelligence Quotient (IQ) is a term for grouping human intelligence which was first introduced by Alfred Binet, a French psychologist in the 20th century (Walgito, 2010).

World Population Review published intelligence quotient (IQ) levels for countries worldwide in October 2022. In the world, the highest IQ is in Japan at 106.48, and the lowest is in Nepal at 42.99. Meanwhile, the average IQ of Indonesians reaches 78.49 and is ranked 130th out of 199 countries in the world as well as the final order of 10 ASEAN countries (World population review, 2022; Shoofiyah S et al, 2024).

Given the matter at hand, research on the relationship between nutritional status and intellectual intelligence among children in schools in the State Elementary Madrasah (MIN) 11 West Aceh is needed. This research can contribute to science by describing the relationship between nutritional status and intellectual development in school-aged children, and by serving as a reference for the development of integrated nutrition and education programs in community-based schools.

## Method

**Study** This is a design observational analytic cross-sectional approach aimed at analyzing the connection between nutritional status and Intelligence Quotient (IQ) level in children aged school, basic research. This study was conducted at the State Islamic Elementary School 11, West Aceh, located on Jl. Syiah Kuala, Kuta Padang, Johan Pahlawan District, West Aceh Regency, Aceh Province. held in November - December 2025.

**Population in the study:** All students in Class VI who attend the school at the research site. A sample was drawn using a total sampling technique, yielding 104 respondents who met the inclusion and exclusion criteria. The total sampling approach was chosen to obtain a comprehensive, accurate, and unbiased picture of the relationship between nutritional status and intellectual intelligence. Criteria for inclusion covering student age, school, and the basis of present moment data collection, under the condition of being healthy, and has agreed to participate in the research. Criteria for exclusion: students with a history of chronic disease or neurological disturbance that could affect growth and cognitive function.

Nutritional status is determined by measuring anthropometric indicators, such as weight and height. Body weight is measured with a digital scale accurate to 0.1 kg, and height is measured with a microtoise stature meter accurate to 0.1 cm. Measurement results were then counted become the index mass body according to age (BMI/U) and classified based on Regulation of the Minister of Health of the Republic of Indonesia Number 2 of 2020 (Ministry of Health of the Republic of Indonesia, 2020; Lubis et al., 2021)

Children's intelligence is measured using validated standard IQ tests, namely the CFIT (Culture Fair Intelligence Test) scale 2A, administered according to the measurement procedure. The next IQ score is categorized according to the guidelines' interpretation of the CFIT test scale 2A.

Data analysis was performed univariately to describe respondents' characteristics, the distribution of nutritional status, and IQ levels. Bivariate analysis is used to assess the relationship between nutritional status and IQ using the chi-square test, depending on the data type and distribution. Level of significance:  $p$ -value  $< 0.05$ .

Study: This has received permission from the party school and approval from the respondents. The entire research process was conducted in accordance with the ethical principles of research, including safeguarding confidentiality, respondent anonymity, and data.

## Results

### Distribution Characteristics Based on School Children's Gender

**Table 1.** Distribution Characteristics Based on School Children's Gender

Gender	N	%
Man	34	32.7
Woman	70	67.3
Total	104	100

Based on the results, the respondents were women (70; 67.3%) and men (34; 32.7%). This shows that a big part of the respondents in the study. This is a woman.

### Distribution Characteristics of Nutritional Status of Children Aged School

**Table 2.** Distribution Characteristics of Nutritional Status of Children Aged School

Nutritional status	N	%
Not enough	7	6.7
Normal	68	65.4
Excessive	29	27.9
Total	104	100

Analysis results show that a large number of respondents have normal nutritional status, namely

**Table 4.** Relationship between Nutritional Status and Intellectual Development in Children in School

Nutritional status	Intelligence intellectual						Total	P Value	
	Low		Currently		Tall				
	N	%	N	%	N	%			
Not enough	1	14.3	5	71.4	1	14.3	7	100	
Normal	6	8.8	42	61.8	20	29.4	68	100	
Excessive	5	17.2	16	55.2	8	27.6	29	100	0.715

Among children with nutritional status excess (29 children), more than half (16, 55.2%) are in the intellectual moderate category. Children with intellectual disability totaled 8 children (27.6%), while children with intellectual disability totaled 5 children (17.2%).

68 children (65.4%), while respondents with insufficient nutritional status total 7 children (6.7%) and those with excessive nutritional status total 29 children (27.9%). This indicates that the majority of students in Class VI at MIN 11 West Aceh have appropriate nutritional status with standard growth, as indicated by Body Mass Index according to Age (BMI/U). However, a proportion of children have nutritional status that is below or above the necessary range and need attention.

### Distribution Characteristics Based on Intelligence School Children's Intellectuals

**Table 3.** Distribution Characteristics Based on Intelligence School Children's Intellectuals

Intelligence Intellectual	N	%
Low	12	11.5
Currently	63	60.6
Tall	29	27.9
Total	104	100

Based on results from the CFIT Scale 2A test, a large proportion of respondents were in the intellectual moderate category, comprising 63 children (60.6%). Meanwhile, respondents with intellectual tall totaled 29 children (27.9%), and respondents with intellectual low totaled 12 children (11.5%). This result shows that, in a way, the general age of children in schools at MIN 11 West Aceh is sufficient for Good.

### Relationship between Nutritional Status and Intellectual Development in Children in Schools

Based on Table 4, among children with low nutritional status (7 children), some have their own intellectual abilities: 5 children (71.4%) have intellectual abilities that are low or high, while 1 child (14.3%) falls into the low-high category. In the group of children with normal nutritional status (68 children), some big respondents own intellectual moderate, namely as many as 42 children (61.8%), followed by intellectual tall as many as 20 children (29.4%), and intellectual low as many as 6 children (8.8%).

Statistical test results using the Chi-Square test show a  $p$ -value of 0.715 ( $p > 0.05$ ), which means there is no significant relationship between nutritional status and intellectual intelligence in children aged 11 years at MIN 11 West Aceh.

## Discussion

The Pearson chi-square test shows a p-value of 0.715 ( $p > 0.05$ ), indicating no significant relationship between nutritional status and intellectual intelligence. Thus, the null hypothesis ( $H_0$ ) is accepted. This result aligns with observations made during the research process, in which respondents with different nutritional statuses showed relative intellectual balance in following instructions and understanding the questions.

When conducting field research, researchers observe that respondents generally understand instructions given under cooperative and capable conditions. The process of measuring nutritional status runs smoothly, and many respondents show a healthy appearance. Likewise, during intelligence data collection, intellectual respondents can follow stages, completing the instrument with a uniform level of relative understanding, without differences among respondents with different nutritional statuses.

Based on the tabulated results, there is a cross between nutritional status and intellectual intelligence, with a visible pattern or trend in distribution, although the statistics are not meaningful. Across nutritional status categories, less, normal, and excess intelligence are currently the most dominant categories. This shows that a large proportion of respondents, regardless of their nutritional status, currently fall into the intellectual category.

In more detail, across nutritional status groups, fewer respondents are in the intellectual moderate category, whereas the proportions with intellectual low and high are relatively small. In the normal nutritional status group, a trend of improvement is seen in the proportion of respondents with intellectual disability, compared to the group with less nutrition, though intellectual disability currently still dominates. In the nutritional status group with excess, intellectual distribution tends to be more spread out, with a higher proportion of individuals with low intellectual, and individuals are slightly taller than those in the group with normal nutrition. This trend shows that respondents with normal nutritional status tend to have higher intellectual abilities, as indicated by higher intellectual quotient, greater intellectual ability, and higher height, compared to those with less favorable nutritional status. However, in the nutritional status group, no consistent improvement was observed in the proportions of intelligence and intellectual tallness, although there was a trend toward improvement in the category of intelligence and intellectual low. This pattern indicates that better nutritional status does not always lead to higher intelligence.

In a reflective way, research shows that intellectual intelligence is not solely influenced by nutritional status at a given moment but rather emerges from a long, complex developmental process. During the ongoing research, researchers observe that respondents come from relatively homogeneous environments, are generally active, have good exposure to education, and have social interaction patterns that allegedly contribute significantly to the development of respondents' intelligence; thus,

differences in nutritional status do not appear to be significantly influential. Environmental health conditions, including exposure to cigarette smoke and sanitation quality, may also indirectly affect children's growth and cognitive outcomes (Hasanah, 2020; Khoiryta, 2023).

In addition, nutritional status was measured in the study. This represents the condition of respondents at the time of data collection, while intellectual intelligence is accumulated over the long term from various factors, such as genetic factors, family environment, cognitive stimulation, and experience and learning. Therefore, although nutritional status plays an important role in supporting cognitive development, it cannot always be measured directly in a cross-sectional study, especially when a large proportion of respondents are in the normal nutrition category.

Research result. This is not yet consistent with a number of previous studies that have found a significant link between nutritional status and intellectual development in children. For example, research by Kristanti et al. (2025) found that nutritional status significantly influences children's intelligence, with children in good nutritional status or better typically having higher cognitive abilities than those with less optimal nutritional status. Using a cross-sectional design, this study shows a meaningful connection between nutritional status and the level of intelligence in children ( $p < 0.05$ ), which indicates that nutritional conditions play an important role in supporting cognitive function development at school age.

In addition, the results of this study differ from those of Bulkis et al. (2022), who studied students in grades 4–5 at SDN 219 Inpres Pannambungan, Maros Regency, and found a significant association between nutritional status and baseline intellectual performance in school ( $p < 0.05$ ). Research shows that children with low nutritional status have significantly lower IQ scores than those with normal nutritional status.

This research still provides a descriptive empirical analysis of the relationship between nutritional status and intellectual intelligence, based on actual field conditions. Although statistics show no significant relationship, nutritional status remains an important factor in supporting children's health and preparedness. Children with good nutritional status tend to have sufficient energy, a strong body, and the ability to concentrate optimally during learning.

## Conclusion

Based on the results, the study shows that there is no significant relationship between nutritional status and intellectual intelligence in children in schools in MIN 11 West Aceh ( $p = 0.715$ ) ( $p > 0.05$ ). This shows in context study, the differences in nutritional status. No meaningful association with the different levels of intellectual child.

Not found a significant relationship between nutritional status and intellectual development, which shows that intelligence is influenced by various factors that are multifactorial, such as age, stimulation, education, family, quality of learning at

school, as well as genetic factors, which cannot all be explained only through nutritional status indicators based on BMI/U.

### Acknowledgement

Thanks to MIN 11 West Aceh and all the respondents who participated in this study.

### References

- Adnani, H. (2011). Ilmu kesehatan masyarakat. Yogyakarta, Indonesia: Nuha Medika
- Adriani, M., & Wirjatmadi, B. (2022). Peranan gizi dalam siklus kehidupan. Jakarta: Kencana.
- Bakhtiar, B., Rohaya, S., & Ayunda, H. M. A. (2019). The Addition of Milkfish Bone Flour (Chanos Chanos) as A Source of Calcium and Phosphor for Making Baked Doughnuts. *Jurnal Teknologi dan Industri Pertanian Indonesia*, 11(1), 38-45.
- Bulkis, A., Darmawansyih, D., Abdul Azis, A., & Suryaningsih, R. (2024). The relationship between nutritional status and intellectual intelligence in 4th–5th grade students at SDN 219 Inpres Pannambungan, Maros. *Indonesian Health Journal*, 3(4), 288–305.
- Hasanah, U. (2020). Pengaruh paparan asap rokok terhadap pertumbuhan dan perkembangan anak. *Jurnal Kesehatan Masyarakat*, 15(2), 123–130
- Kementerian Kesehatan Republik Indonesia. (2015). Pedoman gizi seimbang. Jakarta: Kemenkes RI.
- Kementerian Kesehatan Republik Indonesia. (2020). Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2020 tentang standar antropometri anak. Jakarta: Kemenkes RI.
- Khoiryah, H. (2023). Dampak paparan asap rokok terhadap sistem imun dan pertumbuhan anak. *Jurnal Ilmiah Kesehatan*, 12(1), 45–52
- Kristanti, M., Nugrohowati, N., Chairani, A., Kita, B., & Sibarani, A. R. A. (2025). The influence of nutritional status on the level of intelligence in elementary-school children. *The Indonesian Journal of Public Health*, 20(2), 341–353.
- Lestari, P. (2020). Hubungan Pengetahuan Gizi, Asupan Makanan dengan Status Gizi. *Sport and Nutrition Journal*, 2(2), 73-80.
- Lubis, A. I., Putri, S. E., Safrida, S., Ayunda, H. M., & Iskandar, A. (2021). Relationship between Body Mass Index and Visceral Fat of Participants EXPO 2021 Universitas Teuku Umar. *Journal of Nutrition Science*, 2(2), 48-52.
- Mahyiddin, Z., Al'Abqary, R., & Fajri, Z. (2020). Korelasi status gizi terhadap tingkat intelligence quotient pada anak di MIN Tungkop Aceh Besar. *Bunayya: Jurnal Pendidikan Anak*, 6(1), 1–12.
- Meiranti, D., & Anggreny, I. (2023). Dampak kekurangan gizi terhadap perkembangan otak dan produktivitas masa depan anak. *Jurnal Nutrisi dan Kesehatan Masyarakat*, 12(1), 45-56.
- Par'i, H., Wiyono, S., & Harjatmo, T. (2017). Penilaian status gizi. Badan PPSDM Kesehatan Republik Indonesia.
- Putri, U., & Fadji, T. K. (2021). Pengaruh Status Gizi dan Status Anemia Terhadap Prestasi Belajar Siswa SD Negeri 2. *NASUWAKES: Jurnal Kesehatan Ilmiah*, 16(1).
- Sediaoetama, A. D. (2017). Ilmu gizi untuk mahasiswa dan profesi. Jakarta: Dian Rakyat
- Shoofiyah, S., Pelawi, A. M. P., & Dedu, B. S. S. (2024). Hubungan stunting dengan perkembangan kemampuan kognitif anak balita. *Jurnal Penelitian Perawat Profesional*, 6(5), 1989–1995
- Sulistyoningsih, H. (2011). Gizi untuk kesehatan ibu dan anak. Yogyakarta, Indonesia: Graha Ilmu.
- Survei Kesehatan Indonesia. (2023). SKI 2023 dalam angka. Jakarta: Badan Kebijakan Pembangunan Kesehatan, Kementerian Kesehatan Republik Indonesia.
- Susilowati, E., & Quayumi, E. (2021). Pengaruh status gizi terhadap potensi intelektual anak usia sekolah dasar. *JUDIKA (Jurnal Nusantara Medika)*, 4(1), 25–32.
- UNICEF. (2025). Feeding Profit: How Food Environments are Failing Children – 2025 Child Nutrition Report
- Walgito, B. (2010). Pengantar psikologi umum. Yogyakarta: Andi Offset.
- Wechsler, D. (2013). Wechsler Intelligence Scale for Children–Fifth Edition (WISC-V): Technical and interpretive manual. San Antonio, TX: Pearson

\*\*\*\*\*