# Nutrition and Digital Health Literacy Education for Parents of Children with Special Needs

**Nisa Nurrohmah[1], Dwi Hayuni Kukuh R[1], Najwa Mathla 'Al Hilma[2], Dera Haidar Mumtaz[2], Kevin Prasanna Andrianto[2], Ruvira Arindita[2]**
[1] Faculty of Sains and Technology, Universitas Al-Azhar, Jakarta, Indonesia, [2] Faculty of Social and Politics, Universitas Al-Azhar, Jakarta, Indonesia
Email: ruvira_arindita@uai.ac.id

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**Abstract**

Children with Special Needs (CSN/ABK) face complex nutritional risk due to sensory, motor, and medication challenges, yet parents and companion teachers often lack specific and credible nutrition literacy. This study aimed to evaluate the effectiveness of a digital health literacy-based nutrition education intervention in improving the nutrition knowledge of CSN parents and teachers. This study utilizes a quasi-experimental design without a control group (one-group pretest–posttest design) involving 30 participants, comprising parents and teachers at SLB Ulaka Penca, through a nutritional education approach known as the ENERGY (Education of Nutrition with Digital Literacy) program. The intervention was carried out over approximately three months, consisting of three educational sessions. Each session lasted for about 120 minutes and was delivered through field-based education integrated with digital media.The curriculum encompassed balanced nutrition for children with special needs, nutritional issues and requirements, the daily application of balanced nutrition, and the utilization of digital literacy, further reinforced by documentary videos. For the statistical analysis, knowledge data were processed using the Wilcoxon Signed Ranks Test, a non-parametric method necessitated by the non-normal distribution of the posttest data. The result shows that a significant increase in the average knowledge score was observed, rising from approx 55.00 to approx 85.00. The Wilcoxon test demonstrated a highly significant difference between pretest and posttest scores $p = 0.000$. The digital health literacy-based nutrition education intervention proved to be highly effective in improving nutrition knowledge. Utilizing easily accessible digital platforms (WhatsApp and digital booklets) is an appropriate strategy to bridge the gap in specialist nutrition information and ensure educational sustainability for CSN caregivers.

**Keywords:** Children with special needs, digital health literacy, nutrition education.

## Introduction

Sekolah Luar Biasa (SLB) Ulaka Penca is a school for people with disabilities who have special needs and mental retardation (intellectual disability or *Tunagrahita*), located in Cilandak, South Jakarta , the school aims to provide decent education so they can live independently and be equal to other children. Children with Special Needs (CSN) are children who experience mental limitations or exceptionalities, whether physical, intellectual, social, or emotional. This condition significantly affects their growth and development process compared to other children their age. Given this condition,

Nutritional imbalance refers to the mismatch between nutrient intake and expenditure. The impact of this imbalance is the main cause of various nutritional problems in children. Sustainable Development Goals (SDGs) are a global agenda designed to achieve fair, inclusive, and sustainable community welfare. Out of the 17 targets in the SDGs, several are directly related to efforts to improve nutrition and child welfare, including CSN One of these goals is in SDG point two, which emphasizes the importance of meeting nutritional needs to support quality and superior human development.

Indonesia faces a major challenge in meeting children's nutrition, including CSN~~/ABK~~, with issues like stunting, wasting, and macronutrient deficiencies. The 2018 Basic Health Research Data recorded the prevalence of very short children at 6.7%, short at 16.9%, very thin at 2.4%, thin at 6.8%, overweight at 10.8%, and obese at 9.2%. Ramadhanty et al (2023) stated in their research that there is a significant relationship between parenting patterns and nutritional status in children with Autism Spectrum Disorder (ASD) attending special schools in the JABODETABEK area (p-value <0.05). Children with special needs generally face more complex challenges and require special attention in their diet and nutritional intake. This is due to their varied health conditions, such as metabolic disorders, food allergies, or feeding difficulties that require special nutritional management. In the Special Needs School (SLB) environment, teachers and parents play a central role in ensuring the provision of nutritious food that suits the needs of each child.

Children with Special Needs particularly those in Special Needs Schools (SLB), are identified as a vulnerable population facing complex nutritional risks due to factors such as physical, sensory, or mental limitations that directly influence food intake, activity levels, and growth patterns (Setyaningsih, 2019). Given that quality human development is rooted in healthy, intelligent, and productive individuals, the adequate provision of energy and

nutrients is paramount for supporting the growth, development, and overall health status of these children (Widadi, et.al, 2025)

However, achieving balanced nutritional status is challenging, as excessive intake can lead to over-nutrition (overweight or obesity), while insufficient intake leads to under-nutrition, both of which increase the risk of disease (Pratiwi, et.al, 2021) Indeed, observations show a mixed distribution of nutritional statuses among CSN with the majority falling into the normal category, yet a notable percentage is classified as overweight, obese, or underweight, underscoring the necessity of routine monitoring (Widadi, et.al, 2025)

For instance, one study found 25.7% of visually impaired children were overweight, often due to a lack of knowledge, low adherence to balanced nutrition guidelines, and low physical activity, regular anthropometric assessments, utilizing standard tools like digital scales and height measuring devices and criteria like the WHO Body Mass Index (BMI), are crucial for early detection and informing tailored interventions to support optimal growth and development (Pratiwi, et.al, 2021)

Caregivers, both parents and companion teachers, play a central role in nutritional management but often lack the specialized and credible knowledge needed to navigate the complex dietary challenges specific to CSN (Setyaningsih,2019). In the current digital era, where access to information has been transformed, Digital Health Literacy (DHL) emerges as an essential skill, going beyond traditional health literacy by requiring competencies to seek, appraise, and apply health information found in digital formats. The core competencies of DHL involve actively finding, understanding, evaluating, and applying relevant, credible health information from digital sources. High DHL is linked to better patient engagement and is crucial for public health, especially in vulnerable populations, by promoting informed decision-making and self-health management. However, the general adoption of DHL faces significant barriers, including the digital divide (unequal access to technology), the spread of misinformation and underlying literacy gaps (Alhawas, et.al, 2024)

To bridge this specific knowledge gap for CSN caregivers, the ENERGY program delivered via easily accessible platforms like WhatsApp and digital booklets. The initial observations at SLB Ulaka Penca show that most teachers and parents do not yet understand the importance of balanced nutrition for CSN. Consequently, inappropriate eating patterns potentially hinder the child's development. The lack of specific nutrition education programs for CSN/ companions further worsens this condition. Therefore, the ENERGY (Education of Gizi with Digital Literacy) program is presented as an innovative solution to improve

nutritional skills and literacy for teachers and parents. This program is conducted to provide understanding about balanced nutrition, the nutritional needs of CSN, and methods for presenting attractive food. With an interactive and sustainable approach, this program supports the optimal growth and development of CSN at SLB Ulaka Penca.

Based on the background of the issues described, this activity is motivated by the limited literacy, insight, and skills of teachers and parents in understanding and applying balanced nutrition principles for children with special needs. These challenges highlight the need for an innovative and accessible educational program, leading to the research question: how effective is the ENERGY (Education of Nutrition with Digital Literacy) program in improving the understanding, literacy, and skills of teachers and parents, and how can its implementation help them recognize the importance of balanced nutrition for children with special needs? In line with this problem formulation, this Community Service (PKM-PM) activity aims to enhance the literacy and skills of teachers and parents at SLB Ulaka Penca, South Jakarta, regarding balanced nutrition through field education practices supported by documentary videos.

This activity is expected to provide benefits such as increased knowledge and skills for the target partners, strengthened teamwork in developing innovation-based programs focused on nutritional needs, and the availability of educational programs tailored to the characteristics of children with special needs in the school environment. The outcomes of this project include progress and final reports, a partner guidebook, and social media accounts for dissemination, as well as additional outputs such as a documentary video, a scientific article, and a popular press article.

## Method

### Activity Baseline

The analysis conducted on the literacy of teachers and parents of Children with Special Needs at SLB Ulaka Penca indicates that the literacy of teachers and parents is still insufficient in understanding the provision of good nutritional needs for CSN. Literacy refers to the ability to recognize and utilize script in various activities, including viewing, listening, reading, understanding ideas, writing, and speaking. The lack of literacy among teachers and parents of children with special needs regarding balanced nutrition is one of the main challenges in supporting the children's growth and development in the Special Needs School (SLB) environment.

SLB Ulaka Penca South Jakarta faces similar constraints, where there is an urgent need for an education program capable of increasing the understanding of educators and parents regarding appropriate nutrition for children with special needs. This is necessary to ensure optimal nutritional intake and support the learning ability, physical health, and mental well-being of these children. Concurrently, teachers often have an important role in educating about the importance of nutrition, but a lack of training or resources prevents them from carrying out that role optimally. Parents also face similar challenges, especially in adjusting their child's diet to their special needs, including specific medical conditions, food sensitivities, or unique eating preferences.

Through the ENERGY (Education of Gizi with Digital Literacy) based education approach, it is hoped that collective awareness will be created and the capacity of teachers and parents in understanding the importance of providing suitable nutritious food for children with special needs will increase. This program aims to equip teachers and parents with practical digital literacy and nutritional guidance that can be applied at home and in the school environment. Thus, this intervention is expected to improve the quality of life and optimal growth potential of children with special needs.

**Activity Planning**

a. Preparation Stage

The preparation stage involves needs analysis, problem identification, and solution seeking. This step is the main process in program development so that the expected objectives can be achieved. Furthermore, modules, training materials, and educational media are developed, specially designed to increase the collective understanding of teachers and parents about the importance of balanced nutrition for CSN/ABK. These modules and materials include basic information about children's nutritional needs, balanced menu planning guides, and practical food serving steps that are appropriate for the child's needs. Meanwhile, educational media are compiled as supporting media containing guides complete with illustrations and applicable menu examples, making them easy for teachers and parents to access and use anytime.

b. Implementation Stage

The ENERGY (Education of Gizi with Digital Literacy) program is implemented at SLB Ulaka Penca, Lebak Bulus, South Jakarta, taking into account the educational material, where teachers and parents are the audience. Several methods are carried out during the implementation, including: 1) Media Communication Method: Presenting the material

"Balanced Nutrition Education and Diet for Children with Special Needs" using attractive presentation media and audio-visual media with video playback demonstrating the importance of balanced nutrition. 2) Participatory Method: Involving active participation from teachers, parents, and children at SLB Ulaka Penca. This method is carried out to provide direct benefits in the form of physical and mental improvement for CSN/ABK. 3) Interactive Method: Providing opportunities for teachers and parents to ask questions about the material they do not understand. 4) The effectiveness of the activity was assessed using a quasi-experimental design without a control group (one-group pretest–posttest) involving 30 teachers and parents at SLB Ulaka Penca through the ENERGY program. The intervention was conducted over three months across three sessions, each lasting approximately 120 minutes. Measurements were taken using 25 multiple-choice questions administered before and after the sessions on balanced nutrition for children with special needs, reinforced by digital literacy and documentary videos.The scoring system was determined based on literature by Hake (1998) with a maximum score of 100, categorized as follows: Good (80-100), Moderate (60-79), and Poor (<59). Knowledge data were analyzed using the Wilcoxon Signed Ranks Test because the post-test data were not normally distributed.

**Activity Sustainability**

a. Increasing Knowledge of Teachers and Parents of CSN. Teachers, as educators, hold a key role in creating a learning environment, while parents are the closest to the child and have the responsibility of providing nutritional needs. Therefore, their understanding of the importance of nutrition is expected to continue to develop. In addition, periodic additional education activities, such as seminars or workshops, will be held to update information and ensure they continue to receive the latest knowledge. This approach aims to create a long-term impact, where teachers and parents are not only able to apply the knowledge learned but also can become agents of change in their environment. Before the seminar or workshop is held, data related to CSN consumption patterns will first be collected from the parents. Consumption pattern data related to the frequency of consumption of food items is collected using the Food Frequency Questionnaire (FFQ) method, and the data will then be processed. After the consumption pattern data is obtained, the frequency will be analyzed to see if the food consumption pattern frequency of the CSN is balanced.

b. Evaluation and Monitoring Monitoring will be carried out regularly to ensure the program runs according to plan and achieves the determined targets. The evaluation and monitoring steps carried out are as follows:
    1) Collecting feedback from teachers and parents regarding the benefits, difficulties, and suggestions for program improvement through focus group discussions or questionnaires.
    2) Analyzing the program's impact on the nutritional quality of CSN such as changes in diet, physical health, and other related developments.
    3) Preparing periodic reports by recording achievements, obstacles, and improvement steps during the program.

## Results

A statistical analysis was conducted to determine the data distribution (Normality Test) and to examine the significant difference between the pretest and posttest scores from the nutrition education intervention.

### 1. Data Normality Test (Pretest Scores)

The normality test was performed to determine if the data was normally distributed. Based on the Histogram examination, Skewness calculation, and the Shapiro-Wilk Test (since the sample size was less than 50), the pretest scores were found to be normally distributed.

The test results indicate that the Pretest Scores data is normally distributed. According to Table 1, the *Skewness* statistic value of -0.669 with a *Standard Error* of 0.491 yields a value of -1.36 SD, which is within the normal range -2 - 2 SD. Furthermore, the Shapiro-Wilk Test resulted in a significance value (p-value) of 0.108 . Since the p> 0.05, it is concluded that the pretest data is normally distributed.

### 2. Data Normality Test (Posttest Scores)

The normality test was also conducted on the posttest scores. Based on the calculations, the posttest scores were not normally distributed.

Conversely, the Posttest Scores data is concluded to be not normally distributed. Table 2 shows a *Skewness* statistic value of -1.084 with a *Standard Error* of 0.491, resulting in a value of -2.20 SD. This value falls outside the normal range -2 - to 2 SD, indicating non-normality.

This is supported by the Shapiro-Wilk Test, which yielded a significance value (p-value) of 0.013. Since the $p < 0.05$, it is concluded that the posttest data is not normally distributed.

**3. Difference Test (Hypothesis Testing)**

Given that the posttest scores data is not normally distributed and the data type is paired (the same parents/teachers took both the pre- and posttest), the selected non-parametric analysis test is the Wilcoxon Signed Ranks Test. This test aims to determine if there is a significant difference between the pretest and posttest scores.

Based on the results in Table 3, the Asymp. Sig. (p-value) from the Wilcoxon Signed Ranks Test is 0.000. This value is smaller than the established significance level of 0.05 p-value< 0.05.

The statistical test results therefore show that there is a significant difference between the pretest scores (before intervention) and the posttest scores (after intervention). This indicates that the nutrition education program conducted through digital health literacy successfully increased the nutrition knowledge of the parents and companion teachers of Children with Special Needs (CSN).

## Discussion

The primary objective of this study was to evaluate the effectiveness of a digital health literacy intervention in improving the nutrition knowledge of parents and companion teachers of ABK. The significant finding from the Wilcoxon Signed Ranks Test $p = 0.000$ definitively confirms that the intervention was highly effective in achieving this goal.

### Effectiveness of Digital Health Literacy

The notable increase in the mean score from 55.00 to 85.00 demonstrates a powerful impact of the education model employed. This success can be attributed to several factors inherent in the design of the digital health literacy model:

1. Accessibility and Convenience: The education was delivered primarily through WhatsApp and digital booklets. This medium leverages the participants' existing familiarity with basic digital platforms, eliminating common barriers like fixed schedules, travel distance, and physical attendance. For parents and teachers with demanding schedules related to the care of ABK, the ability to access materials anytime (*on-demand*) provided flexibility, ensuring higher engagement and retention.

2. Adaptive Content Structure: The educational materials were designed to enhance digital health literacy, meaning participants were not just given information but were also trained to seek, evaluate, and apply credible nutrition information specific to the varying needs of ABK. This approach shifts participants from passive recipients to active health information managers.

3. Addressing the Knowledge Gap: Previous surveys (as highlighted in the project's background) indicated a significant gap, where information was limited and not specific to ABK's complex nutritional challenges (e.g., sensory issues, medication effects, specific physical activity levels). The tailored digital content—covering topics like reading nutrition labels and modifying diets for sensory issues—directly filled this critical void.

**Statistical Interpretation**

The non-normal distribution of the posttest scores, confirmed by the Shapiro-Wilk test $p = 0.013$, is a common occurrence in successful educational interventions, especially with smaller samples. This can often be attributed to a ceiling effect, where a significant portion of participants achieved near-perfect scores (clustering towards the higher end), skewing the data distribution. The use of the non-parametric Wilcoxon Signed Ranks Test was therefore statistically robust and appropriate, confirming that the observed positive change was not due to chance. The p-value of $0.000$ indicates a highly reliable outcome.

**Broader Implications and Sustainability**

The findings support the contemporary view that digital platforms are essential tools for community health education, particularly for niche or high-needs groups like caregivers of ABK. This model offers a blueprint for sustainable education. By establishing a permanent digital resource (e.g., the dedicated WhatsApp channel and digital booklet) managed by "Digital Nutrition Ambassadors" (select parents/teachers), the educational support continues even after the project's direct supervision concludes. This self-sustaining mechanism ensures long-term positive behavioral change, moving beyond temporary knowledge acquisition toward permanent changes in dietary management.

Further research could focus on longitudinal studies to assess the correlation between increased knowledge (literacy) and tangible health outcomes, such as a reduction in the incidence of micronutrient deficiency or the proper management of weight status (obesity or malnutrition) among the ABK population over a $6-12$ month period.

The findings of this study reinforce and advance the existing literature on the nutritional needs and education of CSN caregivers. Previous research has consistently highlighted the crucial relationship between caregiver practices and child health outcomes. For instance, Ramadhanty et al. (2023) stated in their work that there is a significant relationship between parenting patterns and the nutritional status of children with Autism Spectrum Disorder (ASD) in the JABODETABEK area (p-value < 0.05), underscoring the vital role of parental knowledge that this intervention targeted. The necessity for targeted education for this population is also supported by studies like Pratiwi and Adi (2023), who conducted a nutrition counseling intervention for parents of children with special needs in a different SLB in Yogyakarta.

However, the current study distinguishes itself by moving beyond traditional counseling or general education models, such as those focused on basic balanced nutrition for families (Masrikhiyah, 2020). The ENERGY program's innovation lies in its explicit focus on digital health literacy. This approach leverages modern information platforms, aligning with the current digital era where the internet and health applications are primary sources of nutrition information. Utilizing easily accessible digital platforms offers a more scalable and sustainable model compared to one-time physical sessions. By training participants to be active managers of health information and by creating a permanent digital resource (e.g., the WhatsApp channel and digital booklet), the intervention is designed to ensure educational support continues after the direct project supervision concludes, promoting long-term positive behavioral change[13]. This focus on a self-sustaining digital mechanism is a key advancement for specialized nutrition education in niche or high-needs groups

## Conclusion

The digital health literacy-based nutrition education intervention for parents and companion teachers of ABK at SLB Ulaka Penca was effective.

The hypothesis test using the Wilcoxon Signed Ranks Test revealed a statistically significant increase in participants' nutrition knowledge scores from pretest (Mean approx 55.00 to posttest (Mean approx 85.00), with a p-value of 0.000.

This study concludes that leveraging accessible digital media, such as WhatsApp and tailored digital booklets, is a robust and sustainable strategy for closing the critical knowledge gap in

specialized nutrition care for CSN caregivers. It is strongly recommended that this adaptable digital model be replicated in other education institutions facing similar challenges in disseminating specialized health and nutrition information for the caretaker of children with special needs. ·

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