

Telenutrition intervention model on changes in knowledge, attitudes, and dietary diversity of toddlers

Silvia Mawarti Perdana^{1*}, Muldiasman¹, Asparian¹, Budi Aswin¹

¹ Department of Public Health, Faculty of Medicine and Health Science, Universitas Jambi, Indonesia

*Coessponding Authors: silviamp@unja.ac.id

Abstract

Background: Adequate nutrient intake is essential for optimizing growth and development, which supports the nutritional status of children under five years old. Improving parent's knowledge and attitudes regarding toddler feeding practices, as well as enhancing dietary diversity in toddlers, can be achieved through telenutrition interventions (online nutrition education and consultation) as part of the management of nutritional problems. **Objective:** This study aimed to analyze changes in knowledge, attitudes, and dietary diversity of toddlers after telenutrition intervention consisting of nutrition education and consultation using the WhatsApp social media platform. **Methods:** This study employed a quasi-experimental design with one-group pre-test and post-test approach. A total of 53 respondents participated in this study. Nutrition education includes balanced diet for toddlers was delivered through animated videos and flyers, while personal nutrition consultations were conducted using nutrition consultation form to improve toddler's consumption. Parent's knowledge and attitudes toward toddler feeding practices were collected through interviews using questionnaires, while dietary diversity data were obtained using the Individual Dietary Diversity Score (IDDS) instrument based on toddler's daily food consumption. Data analysis was performed using the Paired t-test and Wilcoxon test. **Results:** The study showed that the telenutrition intervention had a significant effect on parent's knowledge and attitudes toward toddler feeding practices ($p < 0.05$). However, there was no significant effect of the telenutrition intervention on toddler's dietary diversity ($p > 0.05$). **Conclusion:** Telenutrition intervention can improve parent's knowledge and attitudes in feeding toddlers by applying the principles of balanced diet.

Keywords: Children; Food diversity; Telenutrition

Cite This Article

Perdana, S. M., Muldiasman, Asparian, & Aswin, B. (2025). Telenutrition intervention model on changes in knowledge, attitudes, and dietary diversity of toddlers. *Proceedings Academic Universitas Jambi*, 1(2). 760-769.

Editor

I Made Dwi Mertha Adnyana, M.Ked.Trop.

Article info

Received: October 04, 2025. Revised: October 30, 2025. Accepted: October 09, 2025



INTRODUCTION

Adequate nutritional intake during the toddler period is essential for the optimal growth and development of children. The nutritional status of toddlers serves as an indicator of growth attainment at specific ages. Optimal child growth and development determine future health and productivity in adulthood. According to the *2024 Indonesian Nutritional Status Survey (SSGI 2024)*, the prevalence of underweight among toddlers increased from 15.9% in 2023 (based on SKI data) to 16.8% in 2024 [1]. Data from the *2023 Indonesia Health Survey* further indicated that the prevalence of underweight toddlers in Jambi Province was 8.9% in 2023. Meanwhile, the prevalence in Jambi City reached 7.2%, based on a weighted sample of 691 children [2]. The occurrence of underweight among toddlers reflects body weight that is too low for age and serves as an indicator of undernutrition.

The diversity of complementary feeding (*Makanan Pendamping ASI*, MP-ASI) represents one indicator that experienced a decline in performance, decreasing from 60.9% to 48.3% in 2024 [1]. The frequency of animal-based protein consumption in Indonesia accounts for approximately 34% of total food consumption. Data indicate that higher consumption frequencies of poultry and red meat are associated with urban residence, higher levels of modernization, and higher socioeconomic status. Conversely, fish consumption tends to be higher among rural island populations and is correlated with lower educational and income levels. Plant-based protein consumption is likewise associated with lower socioeconomic status [3].

Research findings reveal that households within the lowest 20% income bracket remain unable to meet daily per capita energy and protein requirements (energy intake reaching 79.6% of the Recommended Dietary Allowance [RDA] and protein intake reaching 87.6% of the RDA). Moreover, their dietary patterns are insufficiently diverse and balanced (Dietary Diversity Score, PPH = 57.9) [4]. Although protein sources are included in children's meals, portion sizes remain below the balanced nutrition guideline (<100% of the daily recommendation) [5].

Data on infant and young child feeding practices from the *2018 Jambi Province Basic Health Research (Risikesdas)* show that the proportion of children under two years consuming a diverse range of complementary foods had not reached 50%. Among children aged 6–11 months and 12–23 months, only 24.63% and 48.13%, respectively, consumed a diverse range of complementary foods. Food diversity in complementary feeding encompasses seven food groups: 1) cereals and tubers, 2) legumes, 3) milk and dairy products, 4) meat-based foods, 5) eggs, 6) vitamin A-rich vegetables and fruits, and 7) other vegetables and fruits. A diet is categorized as diverse if it includes four or more of these seven food groups [6]. The nutritional intake of children therefore needs to be monitored daily by parents [7].

Numerous studies have demonstrated that nutrition education can improve maternal knowledge and feeding practices [8,9]. Unlike large-group nutrition education, nutrition consultation or counseling provides greater privacy and interactivity as it is conducted in a two-way, one-on-one setting between the consultant and the respondent. Previous studies have shown significant differences in maternal knowledge before and after counseling sessions regarding the prevention of undernutrition [10]. Furthermore, a literature review encompassing ten quasi-experimental studies with pre–post-test designs indicated that nutrition counseling significantly improved the knowledge of mothers of stunted toddlers and community health volunteers (*Posyandu* cadres) concerning balanced nutrition intake [11].

Tahtul Yaman Village was selected as the research site not only because it functions as an *Integrated Laboratory Village (Desa Laboratorium Terpadu, DLT)*

under Jambi University but also because it recorded an underweight prevalence of 1.76% according to data from the Jambi City Health Office in 2023. The urgency of conducting this study lies in the finding that, although the 2024 SSGI reported an overall improvement in Indonesia's child nutritional status—with stunting prevalence decreasing by 1.7% compared to 2023—the prevalence of underweight among toddlers increased by 0.9% from the previous year.

From a theoretical perspective, body weight serves as a growth indicator that can exhibit rapid changes over a short period. Therefore, the implementation of a *telenutrition* intervention is expected to improve the body weight of underweight toddlers through modifications in dietary consumption patterns. This study aimed to analyze changes in knowledge, attitudes, and dietary diversity of toddlers after telenutrition intervention consisting of nutrition education and consultation using the WhatsApp social media platform.

METHODS

Study design and setting

This study employed a quasi-experimental design with a one-group pre-test–post-test approach. The research will be conducted in Tahtul Yaman Village, Pelayangan Subdistrict, Jambi City, from June to November 2025.

Population, samples and sampling

The study subjects are toddlers residing in Tahtul Yaman Village. Respondents will be selected using a stratified random sampling technique, based on the fulfillment of inclusion and exclusion criteria. The inclusion criteria are as follows: Toddlers residing in Tahtul Yaman Village; Parents provide informed consent for participation; Toddlers are physically and mentally healthy; and Parents own a smartphone with the WhatsApp application installed. The exclusion criterion is the inability of a subject to complete the entire study process. The sample size was determined using the Slovin formula, based on a total population of 738 toddlers. With an additional 10% allowance for potential dropouts, the total sample required is 97 toddlers.

Instruments and criteria

The dependent variables in this study are body weight and dietary intake patterns. Body weight will be measured every two weeks for three months using a calibrated digital scale. Nutritional status will be determined using the weight-for-age (W/A) index, analyzed through the WHO AnthroPlus application. The nutritional status categories are defined as follows (17):

1. Severely underweight: z-score < -3 SD;
2. Underweight: z-score between -3 SD and < -2 SD;
3. Normal weight: z-score between -2 SD and $+1$ SD;
4. At risk of overweight: z-score $> +1$ SD.

Procedure and data collection

Data on dietary patterns will be collected using a Food Frequency Questionnaire (FFQ) reflecting the past month's consumption, and 2×24 -hour food recall sheets. The independent variable is the telenutrition intervention, which consists of nutrition education and nutrition counseling. Nutrition education will be delivered once weekly for three months via WhatsApp, conducted at the beginning of each week. Educational materials will be provided through a WhatsApp group using booklets and

videos as media. Nutrition counseling will be provided once weekly at the end of each week via WhatsApp video call for the same three-month intervention period. A schematic flow diagram of the intervention process is presented below.

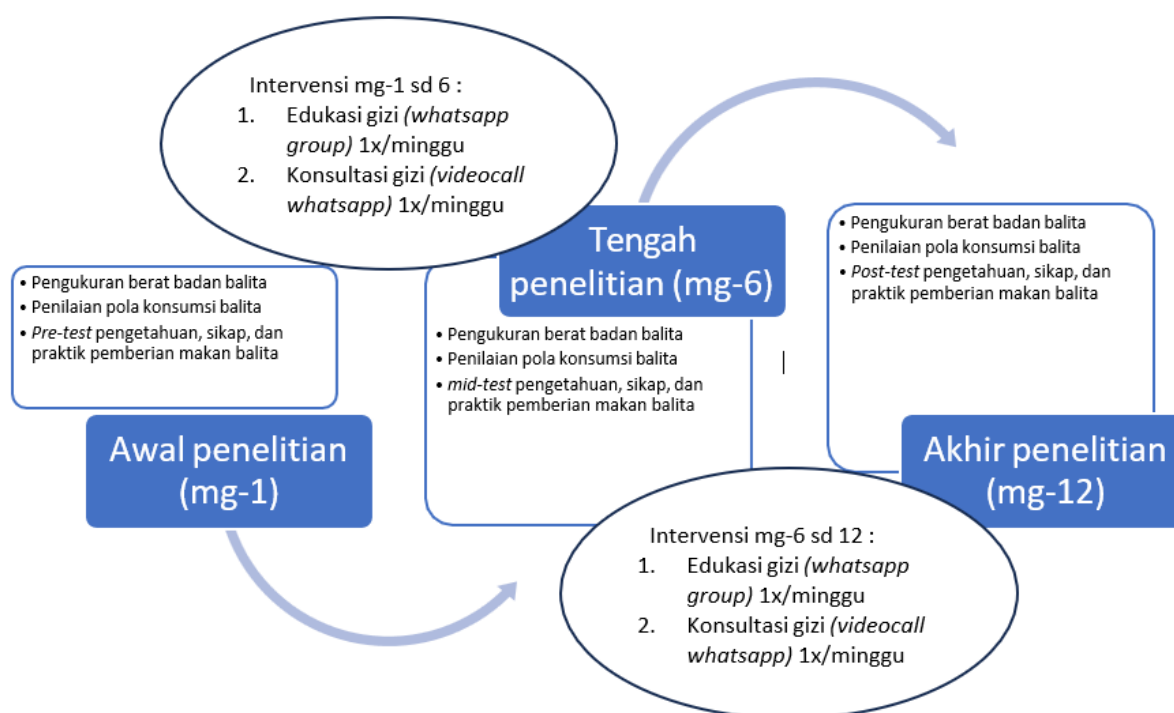


Figure 1. Intervention implementation process

Statistical analysis

All collected data will be analyzed using SPSS software. Univariate analysis will be performed to describe the toddlers' nutritional status, dietary intake patterns, and the data on parental knowledge, attitudes, and feeding practices. Prior to bivariate analysis, data normality will be assessed using the Kolmogorov–Smirnov test. Variables with a normal distribution will be analyzed using the Paired Sample t-test, whereas variables with a non-normal distribution will be analyzed using the non-parametric Wilcoxon Signed-Rank test. Bivariate analysis will be conducted to examine differences in body weight and dietary intake patterns before and after the telenutrition intervention.

RESULTS

The study entitled “*Telenutrition Intervention Model on Changes in Body Weight and Dietary Patterns among Underweight Toddlers in Tahtul Yaman Village*” employed a quasi-experimental design with a one-group pre-test–post-test approach. A total of 54 participants were included as research respondents. The pre-test data collection was completed prior to the implementation of the intervention, coinciding with the *posyandu* (integrated health post) activities. The following section presents the findings of the baseline data obtained in this study.

Table 1. Characteristics of the respondents

Variabel	N	(%)
Health monitoring post		
Asoka 1	17	31,5
Asoka 2	19	35,2
Asoka 3	18	33,3
Child's gender		
Male	29	53,7
Female	25	46,3
Child's age		
0 – 6 months	5	9,3
7 – 12 months	4	7,4
13 – 24 months	16	29,6
25 – 60 months	29	53,7
Father's age		
≤ 18 years	0	0,0
19 – 29 years	4	7,4
30 – 49 years	48	88,9
≥ 50 years	2	3,7
Father's highest level of education		
Elementary school	6	11,1
Junior High School	7	13,0
Senior High School	37	68,5
Diploma	0	0,0
Collage	4	7,4
Father's job		
Civil servant	3	5,6
Private official	9	16,7
Farmer/trader	4	7,4
Laborer	38	70,4
Mother's age		
≤ 18 years	1	1,9
19 – 29 years	16	29,6
30 – 49 years	37	68,5
≥ 50 years	0	0,0
Mother's highest level of education		
Elementary school	4	7,4
Junior High School	13	24,1
Senior High School	34	63,0
Diploma	1	1,9
Collage	2	3,7
Mother's work		
Housewife	48	88,9
Formal sector (Honorary, PPPK)	4	7,4
Informal sector (merchants, shopkeepers)	2	3,7
Total	54	100

Table 1 presents the distribution of respondents, which was evenly spread across the three *posyandu* (community health posts) located in Tahtul Yaman Village, namely *Posyandu Asoka 1*, *Posyandu Asoka 2*, and *Posyandu Asoka 3*. The majority of the under-five children were male (53.7%), while females accounted for 46.3%. More than half of the children were aged between 25 and 60 months (53.7%). Fathers of the children were predominantly aged 30–49 years (88.9%), had completed senior high school education (68.5%), and worked as laborers (70.4%). Meanwhile, mothers were mostly aged 30–49 years (68.5%), had completed senior high school education (63.0%), and were primarily housewives (88.9%).

Table 2. Nutritional status of the respondents (weight/age index)

Nutritional status category	N	%
Underweight	22	40,7
Normal weight	32	59,3
Risk of being overweight	0	0
Total	54	100

Table 2 presents the nutritional status of children, showing a balanced distribution between underweight (40.7%) and normal weight (59.3%). The prevalence of underweight children under five years of age in Tahtul Yaman Subdistrict, based on data from three community health posts (*posyandu*), is relatively high. According to the 2024 Indonesian Nutritional Status Survey (SSGI), the prevalence of underweight children under five in Indonesia and Jambi Province was 16.9% and 13.8%, respectively. In Jambi City, the prevalence was reported at 13.9% (1). The Tahtul Yaman Community Health Center (*puskesmas*) ranked sixth in 2024 for the highest number of underweight children under five, with 34 cases (4.43%), an increase from its 13th position in 2023.

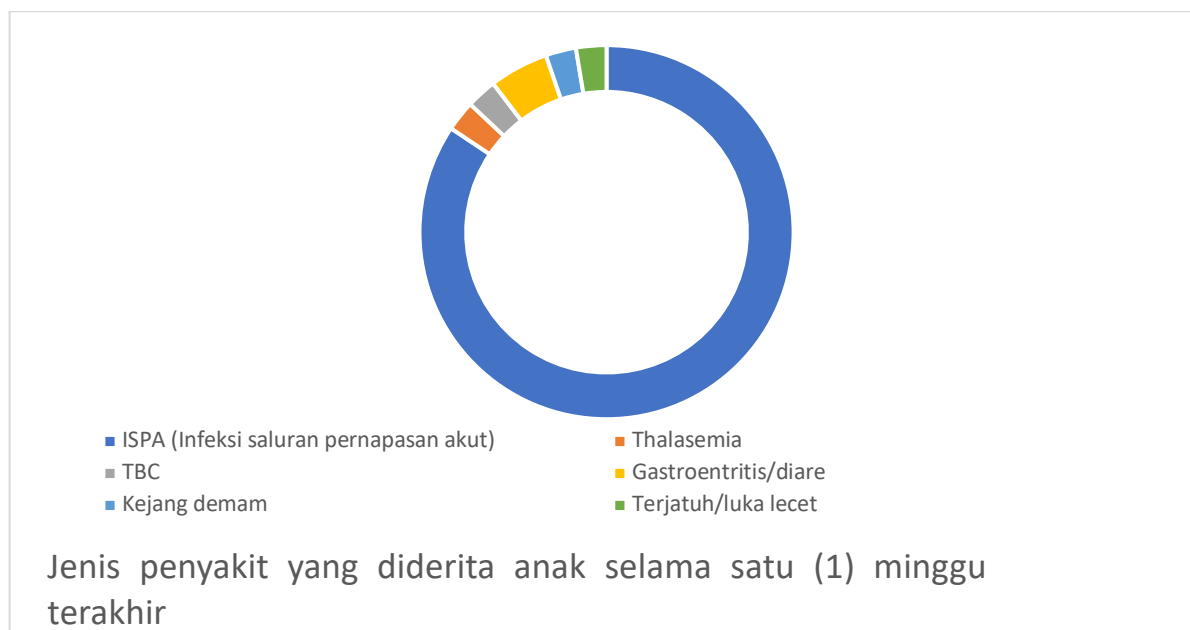


Figure 2. Children's diseases

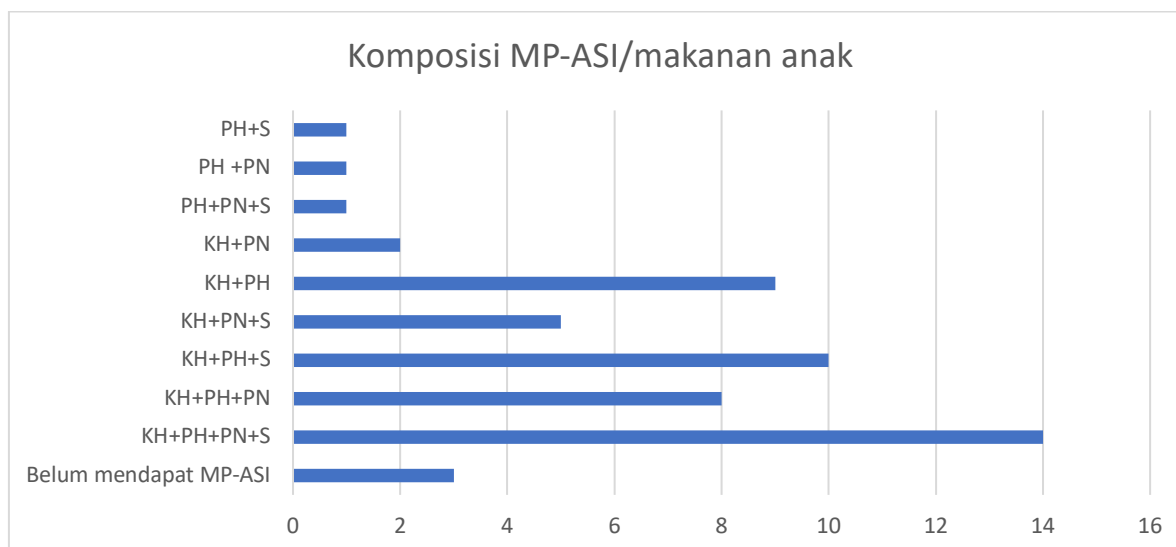


Figure 3. Complementary Feeding (MP-ASI) and Current Child Feeding Practices

Table 3. Parental knowledge before the intervention

No	Knowledge aspect	Number of respondents who answered correctly	
		N	(%)
1	<i>Prinsip gizi seimbang terdiri dari 4 (empat) pilar, kecuali</i>	23	42,6
2	<i>Manakah yang merupakan prinsip gizi seimbang untuk bayi usia 0-6 bulan ?</i>	30	55,6
3	<i>Manakah yang merupakan prinsip gizi seimbang untuk bayi usia 6-24 bulan ?</i>	47	87,0
4	<i>Manakah yang bukan merupakan prinsip gizi seimbang untuk bayi usia 2-5 tahun ?</i>	11	20,4
5	<i>Berikut adalah cara mengatasi berat badan kurang pada anak yang bisa diterapkan oleh para orang tua, kecuali</i>	35	64,8
6	<i>Makanan anak harus terdiri dari komposisi pangan sebagai berikut</i>	42	77,8
7	<i>Berikut ini merupakan pernyataan yang benar tentang peran ayah dalam pemberian makanan dan tumbuh kembang anak, kecuali</i>	31	57,4
8	<i>Manakah yang merupakan contoh makanan berkalori tinggi yang bisa diberikan untuk anak ?</i>	46	85,2
9	<i>Berikut ini penyebab terjadinya infeksi saluran pernapasan pada anak, kecuali</i>	34	63,0
10	<i>Selain faktor makanan, berat badan anak juga dipengaruhi oleh</i>	52	96,3

Remarks: questions in Indonesian

Tabel 4. Child feeding practices

No	Types of food consumed in the last 24 hours	N	(%)
1	<i>Air putih</i>	50	92,6
2	<i>Air tajin, madu, teh, kopi, air gula, jus buah, kental manis</i>	4	7,4
3	<i>Bubur nasi, nasi, roti, mie, ketela atau singkong, ubi, kentang, biskuit</i>	51	94,4
4	<i>Kacang-kacangan, tempe, tahu</i>	15	27,8
5	<i>Susu selain ASI</i>	26	48,1
6	<i>Keju, yoghurt</i>	0	0,0
7	<i>Daging sapi, daging ayam, daging unggas lain, jeroan, ikan</i>	32	59,3
8	<i>Telur</i>	23	42,6
9	<i>Sayuran sumber vit.A (sayur berwarna oranye/merah) seperti wortel, tomat, labu kuning, dll)</i>	9	16,7
10	<i>Sayuran berdaun hijau gelap (bayam, kangkung, daun singkong, dll)</i>	14	25,9
11	<i>Buah sumber vitamin A (buah berwarna oranye/merah) seperti pepaya, mangga, buah naga, dll)</i>	2	3,7
12	<i>Sayuran lainnya (tauge, kubis putih, mentimun, dll)</i>	4	7,4
13	<i>Buah lainnya (apel, pisang, nanas, melon, jeruk, dll)</i>	12	22,2
14	<i>Makanan ringan/ ekstrudat (berbentuk puffs/kering/kopong) seperti (kerupuk, cheese ball, dll)</i>	33	61,1
15	<i>ASI</i>	22	40,7

Remarks: questions in Indonesian

DISCUSSION

During the past week, several infectious and non-infectious diseases were reported among the under-five child respondents. Infectious diseases influenced by hygiene practices and environmental sanitation are direct factors affecting children's nutritional status [12]. Acute respiratory infections (ARIs) were the most frequently reported illnesses among the children, characterized by symptoms such as coughing, nasal congestion, flu, and sore throat. In addition to ARIs, some children also suffered from tuberculosis (TB) and gastroenteritis.

There is a bidirectional relationship between nutritional status and infectious diseases. Poor nutritional status leads to decreased immunity, making children more susceptible to infections. Conversely, children suffering from infectious diseases are at greater risk of nutritional decline, as their nutritional requirements increase due to the body's defense mechanisms while nutrient intake remains suboptimal. Previous studies have shown that children with anemia are at higher risk of being underweight [13]. A study on food consumption among children under five in Bungo District, Jambi Province, reported that 63.5% of respondents received complementary foods three or more times per day [5]. Research conducted in 2023 found that among children who were underweight or at risk of being overweight, three-quarters experienced a deficit in energy adequacy levels. In contrast to energy intake, data on

protein consumption indicated that nearly three-quarters of children had a high level of protein adequacy. This suggests that children's protein intake primarily came from breast milk and formula milk.

Children under two years of age tend to have unstable eating patterns for various reasons. Low consumption of staple foods contributes to inadequate energy intake. The findings of this study showed that carbohydrate-based foods, which serve as the main source of energy, were consumed by 93% of children, but the amounts did not meet the Indonesian Balanced Nutrition Guidelines [7].

CONCLUSIONS

Telenutrition intervention can improve parent's knowledge and attitudes in feeding toddlers by applying the principles of balanced diet.

CONFLICT OF INTEREST

"The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest."

FUNDING

This research was funded by Universitas Jambi through Faculty of Medicine and Health Sciences.

ACKNOWLEDGMENT

The researchers would like to express their gratitude to the University of Jambi for providing research funding, as well as to the Jambi City Health Office and Tahtul Yaman Subdistrict for their willingness to grant research permission.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

This study used artificial intelligence (AI) tools and methodologies in the following capacities: Manuscript writing support: AI-based language models, such as ChatGPT, was employed to Language refinement (improving the grammar, sentence structure, and readability of the manuscript). Generate scientific content, interpret data, and draw conclusions. We confirm that all AI-assisted processes were critically reviewed by the authors to ensure the integrity and reliability of the results. The final decisions and interpretations presented in this article were solely made by the authors.

REFERENCES

- [1] Kemenkes RI. Hasil Survei Status Gizi Indonesia 2024 (SSGI 2024). Jakarta: 2025.
- [2] Kemenkes RI. Survei Kesehatan Indonesia (SKI) Tahun 2023. Jakarta: 2024.
- [3] Khusun H, Februhartanty J, Anggraini R, Mognard E, Alem Y, Noor MI, et al. Animal and Plant Protein Food Sources in Indonesia Differ Across Socio-Demographic Groups: Socio-Cultural Research in Protein Transition in Indonesia and Malaysia. *Fronti Nut* 2022;9:762459. <https://doi.org/10.3389/FNUT.2022.762459/BIBTEX>.
- [4] Kartika R, Martianto D. Optimasi Konsumsi Pangan pada Rumah Tangga dengan Pendapatan 20 Persen Terendah di Provinsi Sulawesi Selatan. *Jurnal Ilmu Gizi Dan Dietetik* 2023;1:165–72. <https://doi.org/10.25182/JIGD.2022.1.3.165-172>.
- [5] Perdana SM, M. Ridwan. Food Consumption Patterns in Toddlers in Lokus Stunting Village, Bungo District. *Jambi Medical Journal* 2023;Special Is:188–94.
- [6] [Kemenkes RI] Kementerian Kesehatan RI. Riset Kesehatan Dasar (Riskesdas) 2018 Provinsi Jambi. Jakarta: Kemenkes RI; 2019.
- [7] Perdana SM, Butar MB, Syah MNH. Study of Complementary Feeding and Children's Nutritional Status in Jambi City. *Journal of Global Nutrition* 2024;4:420–9. <https://doi.org/10.53823/JGN.V4I2.99>.

-
- [8] Dewi Kartini TB, Asikin H, Limbong T, Gizi J, Kemenkes Makassar P, Kebidanan J, et al. Implementasi edukasi gizi pada ibu balita di puskesmas paccerakkang. Panrita Abdi - Jurnal Pengabdian Pada Masyarakat 2022;6:211–8. <https://doi.org/10.20956/PA.V6I1.13294>.
- [9] Herliana I, Lestari NE, Solehudin S, Koto Y, Lannasari L. Edukasi Mengenai Asupan Gizi Seimbang pada Balita dalam Pencegahan Stunting. Jurnal Peduli Masyarakat 2024;6:1079–88. <https://doi.org/10.37287/JPM.V6I3.4177>.
- [10] Akbar FK, Jiwi Aco Syamsi A, Studi Akademi Keperawatan Yppp wonomulyo P. Konseling pada ibu yang memiliki balita gizi kurang. Bina Generasi : Jurnal Kesehatan 2021;12:10–7. <https://doi.org/10.35907/BGJK.V12I2.178>.
- [11] Fadilah N, Kurniasari R, Harianti R, Studi Gizi P, Ilmu Kesehatan F, Singaperbangsa Karawang U, et al. Peningkatan Pengetahuan dan Keterampilan Ibu Balita dan Kader Posyandu Tentang Stunting melalui Konseling Gizi: Literature Review: Media Publikasi Promosi Kesehatan Indonesia (MPPKI) 2024;7:518–22. <https://doi.org/10.56338/MPPKI.V7I3.4624>.
- [12] UNICEF. UNICEF Conceptual Framework on Maternal and Child Nutrition. 2020.
- [13] Salleh R, Ahmad MH, Siew Man C, Wong NI, Sallehuddin SM, Palaniveloo L, et al. Risk Factors Associated with Underweight Children Under the Age of Five in Putrajaya, Malaysia: A Case-Control Study. Jurnal Gizi Dan Pangan 2023;18:89–98. <https://doi.org/10.25182/JGP.2023.18.2.89-98>.