




# The Effect of Feeding Sea Rabbit-Papaya Naget Cakes on Learning Achievement and Hb Levels in Children Primary School for Stunting Suffering - Lack of Nutrition in Bajo Indah Village, Soropia District

Sultan Akbar Toruntju\*<sup>1</sup>, Kameriah Gani<sup>2</sup>, Sirajuddin Sirajuddin<sup>3</sup>, Evi Kusumawati<sup>4</sup>

<sup>1,2,4</sup> Department of Nutrition, Health Polytechnic of Kendari, Kendari, Indonesia

<sup>3</sup> Department of Nutrition, Health Polytechnic of Makassar, Makassar, Indonesia

akbartoruntju21@gmail.com

**Abstract.** Stunting is one dietary issue that affects many elementary school students. Children's health and academic achievement are significantly impacted by stunting in elementary school students. Finding out how providing papaya and sea rabbit fruit cakes affects learning outcomes and hemoglobin levels in undernourished and stunted elementary school students is the goal. A quasi-experimental pre-post test with a control group design is the methodology employed. The samples were divided into two groups, each of which had two control groups (which received fruit juice and a placebo) and three treatment groups (which received sea rabbit-papaya naget cake). given for two months, every two days. The administration of the treatment was double-blind. There were 30 participants in the sample overall, divided into 5 groups (3 treatment groups, 2 control groups). Outcomes Prior to the intervention, at the beginning of the trial, the average learning achievement was 41.2. Despite being slight, there was an increase to 44.58 following the treatment. Statistical testing, however, revealed that the three treatments (A, B, and C) had no discernible impact on raising learning achievement ( $P > 0.05$ ). Hemoglobin, statistical test results show that there are significant differences in the three forms of treatment A B C. Where treatment group A has the highest significance, the Sig.  $0.005 < 0.05$ . In summary Giving Sea Rabbit Papaya Naget Cake has little impact on academic performance. Giving sea rabbit papaya naget cake has the effect of raising hemoglobin levels.

**Keywords:** Sea Rabbit Naget-Papaya, Learning Achievement, Hemoglobin.

## 1. Introduction

Elementary school (SD) children are one of the groups vulnerable to malnutrition. Malnutrition in elementary school children is generally a further impact of Chronic Energy Deficiency (KEK) during the toddler years. One of the problems of malnutrition that is often suffered by elementary school children today is stunting. Stunting in elementary school children will have a major impact on the level of learning achievement and general health status of children.

Based on the results of Basic Health Research (Riskesdas), the prevalence of stunting in children under five is: 30.9% [1], 37.2% [2] and only slightly decreased to 30.8% in Riskesdas 2018. For data from the Nutritional Status Survey Indonesia (SSGI)

© The Author(s) 2024

J. Jumakil et al. (eds.), *Proceedings of the 1st Halu Oleo International Conference on Public Health (HOICPH 2023)*, Advances in Health Sciences Research 77,

[https://doi.org/10.2991/978-94-6463-427-3\\_16](https://doi.org/10.2991/978-94-6463-427-3_16)

data on stunting among toddlers in Southeast Sulawesi, in the last three years 2020 was 32.3%, fell to 30.2% in 2021 and fell again to 27.7% in 2022 [3].

Stunting affects not just the person who experiences it but also future generations and development in general. Short-term health and cognitive issues are among the long-term effects of stunting. This is due to the fact that stunting has a significant long-term effect on the country's economy. This is because stunted human resources are of lower quality compared to normal humans [4].

Many studies demonstrate that toddlers who are stunted have low cognitive capabilities, poor learning outcomes, and poor psychosocial functioning [5]. Severe stunting during the first two years of life strongly correlates with cognitive delays later in childhood, which in turn has a long-term effect on resource quality [6], [7]. Having experienced stunting experiences throughout childhood is linked to delayed motor development and lower IQ [6]. According to additional studies, children (9–24 months) who are stunted not only score lower on IQ tests but also perform worse than typical children in terms of movement, hand-eye coordination, hearing, speaking, and overall performance [8]. Adult productivity loss might be caused by stunted toddlers' growth issues and low cognitive level. Those who are stunted earn less money and are less productive at work than those who are not [9].

The extent to which a child's nutritional needs are met during the fetal, newborn, and toddler years has a significant impact on the child's learning ability. According to [10], children who are stunted during their first two years of life and gain weight quickly perform poorly in school and are more likely to develop chronic degenerative disorders including obesity, hypertension, and diabetes mellitus as adults.

To overcome this, cross-sector collaboration and cross-programs in the health and non-health sectors are needed and support from researchers through the results of more in-depth research on efforts to overcome the problem of stunting through the consumption of natural food.

## **2. Research Objectives**

### **2.1 General Objectives**

To determine the effect of giving Sea Rabbit-Papaya nacet cake on learning achievement and Hb levels in school children suffering from stunting in Bajo Village.

### **2.2 Specific Objectives**

- a. Knowing the Prevalence of Stunting in School Children
- b. Looking at the differences in learning achievement between cases and controls, pre and post.
- c. Looking at the differences in Hemoglobin levels, between the case group and the control group, before and after treatment.

## **3. Methods**

### **3.1 Type of Research Design**

The research design in this efficacy study is Quasi experimental Pre-Post test with control group design. With the following conditions:

1. The samples were grouped into 2 groups, namely 3 treatment groups (which were given sea rabbit-papaya naget cake) and 2 control groups (which were given fruit juice and placebo). Given every 2 days for 6 weeks.
2. The treatment is given in a double-blind manner where the researcher and the subjects being studied do not know what is being consumed.

### 3.2 Population, Sample, Time and Research Locations

#### 1. Population

The population in this study were all elementary school children suffering from stunting and/or malnutrition in Bajo Indah Village, Konawe Regency. The total population is 77 elementary school children.

#### 2. Sample

##### a. Sample Subjects

The sample in this study was elementary school children suffering from stunting and/or malnutrition.

##### b. Sample Size

The sample size is calculated based on the following sample formula.

$$2\delta^2 [ Z_{1-\alpha} + Z_{1-\beta} ]^2$$

$$n = \frac{\quad}{(\mu_1 - \mu_2)}$$

$n = 40.3$  rounded to 40 people. However, after treatment was carried out for 1 month during the Covid-19 pandemic, many of the samples dropped out (DO) and 30 people remained. So, the number of case samples is 30 people.

Consists of: Group A = 6 people (Positive control - tuna)

Group B = 6 people (Negative control)

Group C = 6 people (Treatment-1)

Group D = 6 people (Treatment-2)

Group E = 6 people (Treatment-3)

Sampling for each group was carried out randomly.

#### 3. Sample criteria

##### a. Inclusion Criteria:

- 1) Suffering from stunting and/or malnutrition
- 2) Not suffering from other diseases at the time of blood collection, ARI, diarrhea.
- 3) Have a blood Hb concentration:  $< 12.0$  g/dL
- 4) Express your willingness to be a sample, by signing Statement of willingness or Informed Consent (parent/guardian).

b. Exclusion Criteria: 1) Suffering from chronic infectious diseases such as tuberculosis, malaria, thalassemia, (diagnosed by a Puskesmas doctor), 2) Suffering from congenital chronic non-infectious diseases such as heart disease, blood vessels, tumors, cancer, thalassemia. 3) Suffering from acute-chronic bleeding (diagnosed by a Puskesmas doctor).

c. Drop Out Criteria: Recurrent acute bleeding, diarrhea with a frequency of duration high and recurrent, unwilling to have blood drawn at the beginning and end,

withdrawing from research. The research was conducted from June to November 2022.

### 3.3 Research Procedures

1. Field preparation:
  - a. Permit to Regional Research Agency.
  - b. Exploration of the Bajo Indah Elementary School location, Soropia District.
2. Preparation of materials and tools used, including:
  - Tools preparation:
    - a. Respondent identity data includes name, age, education and address.
    - b. FFQ-Semi quantitative.
    - c. Research Team Training (training and discussion)
    - d. Equipment Preparation (Research Instruments and Consumables)
  - Preparation of materials:
    - a. Catching Sea Rabbits in Toronipa Village, Soropia District.
    - b. Making sea rabbit naget cake, with the following composition:

**Table 1.** Sea rabbit naget cake formulation recipe (Per 200 Grams)

Material	Treatment			
	P0	P1	P2	P3
-Wheat Flour	30 gr	30 gr	30 gr	30 gr
-Bread crumbs	10 gr	10 gr	10 gr	10 gr
-My Food Flour	20 gr	20 gr	20 gr	20 gr
-Sea Rabbit	0	40 gr	50 gr	60 gr
-Papaya fruit	40	60 gr	50 gr	40 gr
-Mackarel tuna	60	0 gr	0 gr	0 gr
-Fine granulated sugar	15 gr	15 gr	15 gr	15 gr
-Cinnamon powder	0,6 gr	0,6 gr	0,6 gr	0,6 gr
-Chicken eggs	20 gr	20 gr	20 gr	20 gr
-Skim milk	5,0 gr	5,0 gr	5,0 gr	5,0 gr

3. Making papaya fruit:
  - a. Purchase papaya fruit.
  - b. Making papaya fruit, (washing, peeling, blending with rabbit).
4. Making Sea Rabbit Naget Cake with Papaya fruit.
5. Implementation and Data Collection:
  - a. Approach the research subjects (mothers and children) by explaining the aims and objectives of the research.
  - b. Ask the candidate's willingness to become a respondent.
  - c. Respondents (mothers) sign informed consent if they are willing.
  - d. Prepare the tools and materials needed for research. The intervention materials used were sea rabbits, papaya fruit, tuna.
  - e. Making Naget Cake:
    - Control Group (Positive Control and negative control).
    - Treatment Group (contains Treatment 1, Treatment 2, Treatment 3), which is a collaboration (sea rabbits with papaya).
  - f. Conduct initial semi-quantitative FFQ interviews on students before being given treatment and then before the final blood draw.
  - g. Measuring Hb levels by Lab Maxima, Kendari,

6. Implementation of Intervention:
  - a. Preparing sea rabbit and papaya naget cake
  - b. Divide sample location groups according to sample type (five groups).
  - c. Giving naget cake (Control (+) and Control (-) for 6 weeks.
  - d. Distribute, naget (Treatment 1, 2 and 3) 1 seed/person for 6 weeks, once every two days.

### 3.4 Data Processing

1. Data from the Motor Development Growth Assessment are analyzed
2. FFQ results data using:
  - a. The Indonesian version of the Nutrisurvey Program, TKPI (Indonesian Food Composition Table) and analyzed the 2019 AKG (Nutritional Adequacy Rate).
  - b. Data processing computer program (SPSS-version 20 and Microsoft Excel).
3. Data from laboratory examination results: Hemoglobin levels, processed at the Maxima Laboratory, Kendari.

### 3.5 Data Analysis

Bivariate analysis was carried out to test the difference between initial hemoglobin levels and final hemoglobin levels. The different test used for analysis was the Paired Samples t-Test. Differences, sample age, diet (FFQ-SQ), initial Hb levels and changes in final Hb levels and changes in initial and final levels of motor development. -Paired t-test is used as a different test on the same sample.

## 4. Results

### 1. Research Location

This research activity was carried out at Bajo Indah Elementary School, Soropia District, Konawe Regency. The distribution of this research sample includes 2 classes, namely class 4 and class 5. The initial sample was 62 people who were given treatment, but after treatment there were 14 people who dropped out, leaving the remaining sample at 48 people.

### 2. Ingredients for Sea Rabbit Naget Cake

#### a) Sea Rabbits

Samples of sea rabbits were taken from the beach of Toronipa Village, Soropia District, Konawe Regency. A total of approximately 30 kg of sea rabbits or around 15 kg is rinsed with fresh water 10 times, to reduce salt and mucus levels before boiling. Next, the sea hare is cut into small cubes, then weighed, weighing 500 grams, plus 500 grams of ripe papaya, 300 grams of chicken eggs (6), 200 grams of wheat flour, and 150 grams of table flour. then blend until smooth.

#### b) Papaya Fruit

Making papaya fruit begins with buying ripe papaya fruit at the Mol Mandonga market. Papaya is cleaned, peeled and cut into small pieces, then weighed 500 grams, blended together, until a dough is formed.

## c) Sea Rabbit and Papaya Naget Cake Formula

**Table 2.** Type of formula qualification for sea rabbit naget cake - papaya fruit

No	Kode Bahan	Materian Nama	Komposisi Formula	Flour Base
1	A Formula	A Sample	Ext Rabbit 60gm + Pepaya fruit 60 gm	Wheat
2	B Formula	B Sample	Ext Rabbit 50 gm + Papaya Fruit 50 gm	Wheat
3	C Formula	C Sample	Ext Rabbit 40 gm + Papaya Fruit 40 gm	Wheat
4	D Formula	D Sam (control-)	Plasebo	Wheat
5	E Formula	E Sam (control +)	Tuna Fish 60 gm + Papaya Fruit 40 gm	Wheat

Table 2 shows the concentration of treatment ingredients in the naget cake formula given to school children. This formula was completely controlled by the laboratory staff, after the intervention the researcher was informed, (double blind). This treatment ingredient is a combination of several staple food ingredients, including: Sea Rabbit, Papaya, Wheat Flour, Eggs, Bread Flour, My Food Flour, etc. The composition and nutritional content of each treatment 1, 2, 3, 4 and 5, then packaged into groups A, B, C, D and E, is completely unknown to the researcher, only known to the laboratory assistant, but only after the research is completed will it be known.

## d) Nutrient Content of Treatment and Control Ingredients

**Table 3.** Nutrient content of treatment materials (P1 P2 P3) and control (P0)

(Per 100 gm)	Treatment			
	P0	P1	P2	P3
Energi	55,3	41,3	46,9	57,2
Protein	16,7	12,0	15,1	19,6
( $\beta$ -car)	98,6	87,4	103,2	132,3
Vitamin C,	12,4	7,2	9,3	13,3
Ferum (Fe)	10,6	7,9	8,8	12,5
Zincum (Zn)	1,7	1,5	1,9	2,1

Source: Processed primary data, 2021

## 3. Data Collection Results

## 1. Univariate Descriptive Analysis

## a. Hemoglobin Examination Results (Screening)

**Table 4.** Screening results for Hb levels according to class

Class	Anemia		Normal		Total	
	n	%	n	%	N	%
Class 4	14	50,0	23	65,7	37	52,7
Class 5	9	32,1	13	66,6	23	33,3
Class 6	5	30,0	7	70,0	12	13,8

<b>Amount</b>	<b>28</b>	<b>40,0</b>	<b>42</b>	<b>60,0</b>	<b>72</b>	<b>100</b>
---------------	-----------	-------------	-----------	-------------	-----------	------------

Table 4 shows that of the 72 screening participants, 33.8% of them were school children suffering from anemia, with Hb levels < 12.0 gr/dL and 66.6% were not anemic (normal). Due to exam class reasons, class 6 was not taken as a sample. After being treated for 1 month, many of the samples dropped out due to the end of the Covid-19 pandemic, so there were 33 people remaining.

b. Initial and Final Hemoglobin Examination Results

**Table 5.** Initial and final hemoglobin levels

Treatmen, Sample number	Hb Level	
	Before	Afte
1.Treatmen A (6)	12,1	12,7
2.Treatmen B (6)	12,3	12,6
3.Treatmen C (6)	12,4	12,5
4.Control (-) D (5)	13,1	13,0
5.Control (+)E (5)	12,8	12,9
<b>Mean</b>	<b>12,52</b>	<b>12,76</b>

Table 5 shows that when examining the Hb from the beginning to the end of the sample, it was seen that there was an increase in Hb levels from the initial 12.52 gr/dL to 12.76 gr/dL at the end.

c. Results of Energy, Protein and Iron (Fe) Intake Measurements

**Table 6.** Energy, protein, Fe intake levels before treatment

Group	Energ (Kkl)	Prot (Grm)	Fe (mg)	P. Val
1.Treatmen A	1583	38,3	10,4	0,315
2.Treatmen B	1622	35,2	11,3	
3.Treatmen C	1678	37,4	9,8	
4.Control (-) D	1589	33,8	8,2	
5.Control (+)E	1567	40,7	9,7	

Table 6 shows the results of the ANOVA test for the levels of Energy, Protein and Fe intake. This table shows that the five groups above do not differ from each other in terms of energy, protein and Fe intake, with a P value = 0.315 or > 0.05. It can be said that the levels of energy, protein and Fe intake in toddlers do not differ from one another.

d. Learning Achievement Assessment Results at the Beginning and End

**Table 7.** Initial and final learning achievement assessment results

Group	Achievement Scores	
	Before	After
1.Treatmen A	49,76	50,39

2.Treatmen B	43,38	42,75
3.Treatmen C	40,54	40,47
4.Control (-) D	45,83	45,28
5.Control (+)E	47,36	48,67
<b>Mean</b>	<b>41,2</b>	<b>44,58</b>

Table 7 shows that the average results of the learning achievement assessment at the start of the study (before intervention) were 41.2. After treatment, although small, there was an increase in the learning achievement score to 44.58.

## 2. Bi Variate Analysis (Inferential)

### 1. Learning Achievement Test Results Before and After

**Table 8.** Normality test of school children's learning achievement

Group	Kolmogorof – Smirnov		
	Statistic	df	Sig.
1.Treatmen A	0,313	8	0,021
2.Treatmen B	0,281	8	0,032
3.Treatmen C	0,253	8	0,039
4.Control (-) D	0,423	8	0,210
5.Control (+)E	0,318	8	0,033

Table 8 shows the results of the Test of Normality for Kolmogorov-Smirnov. The P value for the three groups of toddlers who received treatment was  $<0.05$ , it can be said that the data is normally distributed.

**Table 9.** Test results for differences in mean learning achievement before-after

Treatment	Average Learning Achievement		t	Sig.
	Before	After		
1.Per- A	49,76+0,23	50,39+0,51	-2,32	0,057
2.Per- B	43,38+0,11	42,75+0,40	-1,01	0,067
3.Per- C	40,54+0,54	40,47+0,23	-1,24	0,059
4.Kon(-) D	45,83+1,37	45,28+0,35	-0,75	0,279
5.Kon(+) E	47,36+1,03	48,67+0,27	-0,61	0,082

In Table 9, the average results of learning achievement before and after treatment are shown. Here the results of statistical tests show that the three types of formula have not had a significant (not significant) effect on increasing the learning achievement level of children under five, with  $P > 0.05$ .

### 2. Average Hemoglobin Level Test Results

**Table 10.** Normality Test of Hb Levels

Group	Kolmogorof – Smirnov		
	Statistic	df	Sig.
1.Treatmen A	0,378	8	0,008
1.Treatment B	0,335	8	0,029
2.Treatment C	0,282	8	0,037

3.Control (+) D	0,756	8	0,057
4.Control (-) E	0,301	8	0,040

In Table 10 appears that the results of the Test of Normality for Kolmogorov-Smirnov, the P value for the three groups of toddlers who received treatment was  $<0.05$ , it can be said that the data is normally distributed.

**Table 11.** Paired t – test results average Hb levels before and after

Group	Mean of Hemoglobin Level		t	Sig.
	Before	After		
1.Treatmen A	10,7 $\pm$ 0,32	12,3 $\pm$ 0,41	-3,87	0,005
1.Treatment B	10,9 $\pm$ 0,51	11,8 $\pm$ 0,35	-3,48	0,017
2.Treatment C	11,1 $\pm$ 0,43	11,5 $\pm$ 0,37	-2,79	0,039
3.Control (+) D	12,5 $\pm$ 1,37	12,4 $\pm$ 0,61	-0,75	0,595
4.Control (-) E	11,9 $\pm$ 1,85	12,2 $\pm$ 0,29	-2,53	0,049

Table 11 shows that there was an increase in the average Hb levels before and after treatment. The statistical test results show a significant level of difference in the three forms of treatment A B C. Where treatment group A has the highest level of significance, the value of Sig.  $0.005 < 0.05$ . The same thing also happened in treatment B and treatment C.

## 5. Discussion

### 1. The Effect of Giving Sea Rabbit Naget Cake on Learning Achievement

Learning attainment is the result of a child's learning endeavors. Learning achievement can be defined as the result of a learning activity plus the changes the student makes. According to [11], learning accomplishments expressed as numbers, letters, symbols, or words might represent the outcomes that each student has attained over a specific time period. The aforementioned explanation suggests that the following elements have an impact on students' capacity to learn: internal elements, which originate from within the individual student and include things like physical and spiritual health, and external factors, which originate from the outside and include things like the condition of their family environment.

The results of this study report that there is no effect of giving sea rabbit naget cake on changes in learning achievement in elementary school students. This is because it is based on many other factors that can influence a child's learning achievement, starting from factors that come from within the child as well as factors that come from outside. In this context, [12] out that a variety of elements, including internal ones like physiological and psychological ones as well as external ones like social and non-social ones, affect learning achievement. Another point made by [13] is that environmental, physiological, psychological, and instrumental factors—such as curriculum, programs, tools, facilities, and teachers—all have an impact on students' ability to learn. A lot of the previously mentioned factors also contribute to a child's improved learning accomplishment.

## **2. Effect of Giving Sea Rabbit Naget Cake on Hemoglobin**

Hb is a globular oxygen-carrying protein (O<sub>2</sub>) that is composed of 95% globular polypeptide and 5% heme, which contains iron. Four metal pyrrole groups make up this pigment, which is a chromogen [14]. Fe Ferro (Fe +2), the primary element of Hb, is present in Hb as an element. This Hb is present in erythrocytes, which are red blood cells. According to [15], each erythrocyte appears to be attached to one protein element (globin) and four molecules of heme or iron (Fe). Because of its Fe content, Hb appears reddish when combined with O<sub>2</sub> and bluish when it has undergone deoxidation. Thus, arterial blood that is completely oxygenated appears red and venous blood that has lost O<sub>2</sub> in the tissue will appear bluish [16].

Hemoglobin (Hb) levels are one of the biomedical markers in assessing a person's anemia status. Normal hemoglobin levels in a person indicate that the person has good health status (not anemic). Likewise, Toruntju et al. (2020) said that Hb is an element that contains ferrous ions (Fe +2) as the main element of hemoglobin. Therefore, Hb levels are greatly influenced by a person's level of nutritional intake, especially iron (Fe) [17].

The study's findings indicate that when schoolchildren underwent sea rabbit naget therapy, their hemoglobin levels rose noticeably. This is consistent with research by [18] that shows milk products derived from corn and green beans can assist undernourished children meet their nutritional needs, particularly in terms of raising hemoglobin levels. It has been demonstrated that providing tempeh, which has the components iron, vitamin B12, and folic acid in amounts adequate to fulfill the RDA, can raise hemoglobin levels in teenagers with anemia [19]. According to the findings of a different study [20], vitamin C supplementation enhanced iron absorption and transit in the colon, which in turn enhanced the body's production of ferritin, an iron reserve.

Some of the results of the studies above show that the more fulfilled the quantity and type of nutritional composition needed to form Hemoglobin, the greater the opportunity to increase a person's blood hemoglobin levels. This is demonstrated by the treatment used in this study, which is the provision of sea hare naget cake, which has the composition mentioned above. Specifically, the main ingredient is sea hare, which is a source of essential amino acids as well as several minerals like calcium, potassium, magnesium, and beta carotene and vitamin C from papaya.

## **3. Research Weaknesses**

In this study also has a number of weaknesses and limitations namely: 1) The sample Droop Out rate is quite high because the sample did not interact intensively with researchers during Covid-19. This situation also had a big impact on the intervention period which was only 4 weeks, not according to the plan, namely 6 weeks. 2) Control of confounding variables was only carried out on energy, protein and iron intake, and infectious diseases were not controlled.

## **6. Conclusion**

It can be concluded that 1) there is an effect of giving Sea Rabbit-Papaya Naget Cake on School Children's Learning Achievement; 2) here is an effect of giving Sea Rabbit-Papaya Naget Cake on increasing Hemoglobin Levels in school children. Thus, researchers suggest for further studies, it is best to intervene for up to 6 or 8 weeks and it is best to carry out a combination of sea rabbit and fruit interventions papaya and vegetables.

## References

1. Riskesdas, *Riset Kesehatan Dasar, Kementerian Kesehatan Republik Indonesia*. 2007.
2. Riskesdas, *Riset Kesehatan Dasar, Kementerian Kesehatan Republik Indonesia*. 2013.
3. Kemenkes RI, *Buku Saku: Hasil Survei Status Gizi Indonesia (SSGI) 2022*. Jakarta: Kementerian Kesehatan RI, 2022.
4. S. A. Toruntju, A. Syam, S. Palutturi, M. Arif, V. Hadju, and A. R. Thaha, "Study of Hemoglobin and Ferritin Profile as Indicators in Children Hematology of 12-15 Years Provided Local Rice Fortification," *Int. J. Sci. Basic Appl. Res.*, vol. 32, no. 1, pp. 352–364, 2017.
5. L. A. Achadi, *Seribu Hari Pertama Kehidupan Anak. Disampaikan pada Seminar Sehari dalam Rangka Hari Gizi Nasional ke 60. FKM UI, Maret 2012, Depok*. 2012.
6. R. Martorell *et al.*, "Weight Gain in the First Two Years of Life is an Important Predictor of Schooling Outcomes in Pooled Analyses from Five Birth Cohorts from Low- and Middle-Income Countries," *J. Nutr.*, vol. 140, no. 2, pp. 348–354, Feb. 2010, doi: 10.3945/jn.109.112300.
7. H.-J. Brinkman, S. de Pee, I. Sanogo, L. Subran, and M. W. Bloem, "High Food Prices and the Global Financial Crisis Have Reduced Access to Nutritious Food and Worsened Nutritional Status and Health," *J. Nutr.*, vol. 140, no. 1, pp. 153S–61S, Jan. 2010, doi: 10.3945/jn.109.110767.
8. S. M. Chang, S. P. Walker, S. Grantham-McGregor, and C. A. Powell, "Early Childhood Stunting and Later Fine Motor Abilities," *Dev. Med. Child Neurol.*, vol. 52, no. 9, p. 831—836, 2010, doi: doi.org/10.1111/j.1469-8749.2010.03640.x.
9. J. M. Hunt, "The Potential Impact of Reducing Global Malnutrition on Poverty Reduction and Economic Development," *Asia Pac. J. Clin. Nutr.*, vol. 14, no. (CD Supplement), pp. 10–38, 2005.
10. C. G. Victora *et al.*, "Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital," *Lancet*, vol. 371, no. 9609, pp. 340–357, 2008, doi: 10.1016/S0140-6736(07)61692-4.
11. M. Z. Rosyid, Mustajab, and A. R. Abdullah, *Prestasi Belajar*. Madura: Literasi Nusantara, 2019.
12. V. Wahab, N. Rahman, and M. Fitri, "Pengaruh Kedisiplinan Belajar dan Motivasi Belajar terhadap Prestasi Belajar Siswa di SMA Muhammadiyah Maumere," *Econ. Educ. J.*, vol. 3, no. 1, pp. 63–72, 2021, doi: 10.33503/ecoducation.v3i1.1182.
13. S. B. Djamarah, *Prestasi Belajar dan Kompetensi Guru*. Surabaya: Usaha Nasional, 2015.
14. D. U. Silverthorn, *Fisiologi Manusia: Sebuah Pendekatan Terintegritas*, 6th ed. Jakarta: Buku Kedokteran EGC, 2013.
15. S. A. Toruntju, L. Banudi, P. Leksono, M. Rahmat, and W. O. Salma, "Identification of Secondary Metabolite Contents on Marine Rabbit Extract (*Dolabella Auricularia*)," *IOP Conf. Ser. Earth Environ. Sci.*, vol. 465, no. 1, pp. 1–7, 2020, doi: 10.1088/1755-1315/465/1/012038.
16. L. Sherwood, *Fisiologi Manusia: Dari Sel ke Sistem*. Jakarta: Penerbit Buku EGC, 2001.
17. S. A. Toruntju, B. La, P. Leksono, M. Rahmat, and W. O. Salma, "The Influence of Wedge Sea Hare (*Dolabellaauricularia*) Extract and Papaya Juice on Hemoglobin (Hb) and Feritin

- Levels of Mice Strain (Balb / C) with Anemia,” *Medico-Legal Updat.*, vol. 20, no. 1, pp. 1347–1352, 2020, doi: 10.37506/v20/il/2020/mlu/194490.
18. D. D. Yusuf, “Pengaruh Pemberian Sujakaju terhadap Peningkatan Kadar Hemoglobin (Hb) Anak Gizi Kurang di Kelurahan Heledulaa Utara Kota Gorontalo,” Universitas Negeri Gorontalo, 2019.
  19. L. Pinasti, Z. Nugraheni, and B. Wiboworini, “Potensi Tempe sebagai Pangan Fungsional dalam Meningkatkan Kadar Hemoglobin Remaja Penderita Anemia (Potential of Tempeh as a Functional Food in Increasing Hemoglobin Levels in Adolescent Anaemia),” *AcTion Aceh Nutr. J.*, vol. 5, no. 1, pp. 19–26, 2020, doi: 10.30867/action.v5i1.192.
  20. N. D. Astuti, B. Wirjatmadi, and M. Adriani, “The Role of Addition of Vitamin C in Iron Supplementation on Ferritin Serum Levels in Anemia Adolescent Females,” *Heal. Notions*, vol. 2, no. 3, pp. 332–338, 2018, doi: doi.org/10.33846/hn.v2i3.147.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

