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# Risk Factors for Underweight in Toddler Age 12-59 Months

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**ABSTRACT**

**Introduction:** Underweight toddlers are conditions where a toddler's weight does not correspond to his or her proper age, which can then affect the growth and development of toddlers. **Objective**: This study aims to determine the risk factors for underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency.. **Method**: The research method used was an observational study with a case control design. The total sample was 82 toddlers (41 cases, 41 controls). The control sampling technique uses a 1:1 matching technique with simple random sampling. The instruments in this study used a characteristics questionnaire, Clean and Healthy Living Behavior (PHBS) household questionnaire, SQ-FFQ form and food photo books for nutritional adequacy levels. **Result**: The results of analysis using chi-square and OR show that the risk factors for underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency were family income (p-value 0.001; OR 5.56), history of infectious diseases (p-value 0.033; OR 3.23), energy adequacy level (p-value 0.000; OR 6.59), carbohydrates (p-value 0.000; OR 5.84), protein (p-value 0.003; OR 4.54), and fat (p -value 0.000; OR 5.87), as well as household PHBS (p-value 0.002; OR 5.1). **Conclusion**: Low family income is at risk 5.56 times, history of infectious diseases 3.23 times, low energy adequacy level 6.59 times, carbohydrates 5.84 times, fat 6.87 times, protein 4.54 times, and household PHBS 5.1 times regarding the incidence of underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency.

**Keywords:** risk factor, toddler, underweight

## Introduction

Underweight is a condition where a toddler's weight does not match their age, as stated by the results of weight measurements according to age (BB/U). The prevalence of underweight in West Java Province is ranked 28th in all provinces in Indonesia, with a figure of 14.2% (Kemenkes, 2022). The prevalence of underweight cases in Tasikmalaya Regency in 2023 was 8.03% (8326 toddlers). Based on data from the report on the nutritional status of toddlers at the Tinewati Health Center in 2023, the prevalence of underweight in Cikunten Village was 13.4% (42 toddlers).

The causes of underweight toddlers are directly related to inadequate food intake and infectious diseases (Cono, Nahak, & Gatum, 2021). Many factors indirectly cause underweight in toddlers, including maternal and attitudes, in addition to food security at the family level, maternal parenting patterns, and the right health environment including access to health services.

The high and low income greatly affects the family's purchasing power for food, which ultimately affects the child's nutritional status (Novfrida, Simatupang, Djami, Pusmaika, & Sumiati, 2022). Insufficient intake of nutrients, especially macronutrients, can cause toddlers to experience a deficit in meeting their body's needs, which will increase susceptibility to infectious diseases. Infectious diseases can be prevented through the implementation of Clean and Healthy Living Behavior (PHBS) (Aprizah, 2021).

To improve the nutritional status of toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency, data on risk factors for underweight are needed. Several risk factors that will be studied are family income because it is related to food provision, history of infectious diseases and family PHBS, and the level of adequacy of macronutrient intake (carbohydrates, protein, fat) and energy which are direct factors related to nutritional status.

## Objective

To analyze the magnitude of the risk posed by low family income, history of infectious diseases, poor household PHBS, and the level of adequacy of macronutrients (carbohydrates, protein, fat) and energy on the incidence of underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency in 2024.

## Method

This research method is observational with a case control approach. The independent variables in this study are family income, history of infectious diseases, energy, carbohydrate, protein, and fat adequacy levels and household PHBS, while the dependent variable in this study is underweight in toddlers aged 12-59 months. The instruments used in this study were the characteristic questionnaire, SQ-FFQ and household PHBS. Data analysis in this study used the chi square test with a significance level of 95% and an Odds Ratio (OR) value.

This research was conducted in Cikunten Village, Singaparna District, Tasikmalaya Regency in 2024. The population in this study were toddlers aged 12-59 months in Cikunten Village totaling 316 toddlers. The sample size of this study was 41 case toddlers and 41 control toddlers with a total sample of 82 toddlers. The sampling of case toddlers used total sampling while the control toddlers used a 1:1 matching technique with case groups based on age, gender, and maternal employment status.

**Result**

The characteristics of the research subjects and respondents can be seen in table 1 below:

Table 1. Subject and Respondents Frequency Distribution (n=82)

| Characteristics | Underweight | | | |
|---|---|---|---|---|
| | Case (n=41) | | Control (n=41) | |
| | n | % | n | % |
| Subject Age (months) | | | | |
| 12-36 (under three years) | 21 | 51,2 | 21 | 51,2 |
| 48-59 (pre school) | 20 | 48,8 | 20 | 48,8 |
| Subject Gender | | | | |
| Female | 18 | 43,9 | 18 | 43,9 |
| Male | 23 | 56,1 | 23 | 56,1 |
| Responden age (years) | | | | |
| 17-25 | 2 | 4,9 | 11 | 26,8 |
| 26-35 | 17 | 41,5 | 19 | 46,3 |
| 36-45 | 21 | 51,2 | 10 | 24,4 |
| 46-55 | 1 | 2,4 | 1 | 2,4 |
| Respondents' Education Level | | | | |
| Elementary School Graduated/Equivalent | 9 | 22 | 7 | 17,1 |
| Junior High School Graduated/Equivalent | 12 | 29,3 | 15 | 36,6 |
| High School Graduated/Equivalent | 17 | 41,5 | 13 | 31,7 |
| College Graduated | 3 | 7,3 | 6 | 14,6 |
| Respondents' Employment Status | | | | |
| Housewife | 34 | 82,9 | 34 | 82,9 |
| Bekerja | 7 | 17,1 | 7 | 17,1 |
| Family Income (Rupiah) | | | | |
| < 2.499.954 | 32 | 78 | 16 | 39 |
| ≥ 2.499.954 | 9 | 22 | 25 | 61 |

Table 1 shows that subjects aged 48-59 months were 48.8% for the case and control groups with the majority being male (56.1%). The age of the toddler's mother in the case group was mostly 36-45 years old, while in the control group most were 26-35 years old. The highest level of education of respondents (41.5%) was high school graduates in the case group where the majority of respondents were housewives, with an average family income level below the minimum wage of Tasikmalaya Regency as much as 78% in the case group.

Table 2 Frequency Distribution of History of Infectious Diseases, Level of Nutritional Adequacy, and PHBS at Household Level

| Variable | Underweight | | | |
|---|---|---|---|---|
| | Case (n=41) | | Control (n=41) | |
| | n | % | n | % |
| History of infectious diseases | | | | |
| Yes | 18 | 43,9 | 8 | 19,5 |
| No | 23 | 56,1 | 33 | 80,5 |
| Energy adequacy level | | | | |
| Less | 29 | 70,7 | 11 | 26,8 |
| Enough | 12 | 29,3 | 30 | 73,2 |
| Carbohydrate adequacy level | | | | |
| Less | 29 | 70,7 | 12 | 29,3 |

| | | | | |
|---|---|---|---|---|
| Enough | 12 | 29,3 | 29 | 70,7 |
| Protein adequacy level | | | | |
| Less | 23 | 56 | 9 | 22 |
| Enough | 18 | 43,9 | 32 | 78 |
| Fat adequacy level | | | | |
| Less | 28 | 68,3 | 11 | 26,8 |
| Enough | 13 | 31,7 | 30 | 73,2 |
| PHBS (Clean and healthy living behavior) | | | | |
| Not good | 21 | 51,2 | 7 | 17,1 |
| Good | 20 | 48,8 | 34 | 82,9 |

Table 2 shows that toddlers with a history of infectious diseases were more often found in the case group (43.9%). The majority of toddlers in the case group had a low energy sufficiency level (70.7%). The carbohydrate sufficiency level in the case group was mostly low (70.7%). In the case group, the most had a low protein sufficiency level (56%) and a low fat sufficiency level (68.3%). For household PHBS, the most cases had poor PHBS (51.2%).

The results of the correlation analysis between variables are presented in the following tables:

Table 3. Relationship Between Independent Variables and Underweight

| Independent Variables | | Underweight | | | | p value | OR (95%CI) |
|---|---|---|---|---|---|---|---|
| | | Case | | Control | | | |
| | | n | % | n | % | | |
| a. Family income | Low | 32 | 78 | 16 | 39 | | 5,556 |
| | High | 9 | 22 | 25 | 61 | 0,001 | (2,106-14,653 |
| | Total | 41 | 100 | 41 | 100 | | |
| b. History of infectious diseases | Yes | 18 | 43,9 | 8 | 19,5 | | 3,228 |
| | No | 23 | 56.1 | 33 | 80,5 | 0,003 | (1,201-8,675) |
| | Total | 41 | 100 | 41 | 100 | | |
| c. Energy adequacy level | Less | 29 | 70,7 | 11 | 26,8 | | 6,591 |
| | Enough | 12 | 29,3 | 30 | 73,2 | 0,000 | (2,513-17,287) |
| | Total | 41 | 100 | 41 | 100 | | |
| d. Carbohydrat adequacy level | Less | 29 | 70,7 | 12 | 29,3 | | 5,840 |
| | Enough | 12 | 29,3 | 29 | 70,7 | 0,000 | (2,256-15,122) |
| | Total | 41 | 100 | 41 | 100 | | |
| e. Protein adequacy level | Less | 23 | 56 | 9 | 22 | | 4,543 |
| | Enough | 18 | 44 | 32 | 78 | 0,003 | (1,734-11,901) |
| | Total | 41 | 100 | 41 | 100 | | |
| f. Fat adequacy level | Less | 28 | 68,3 | 11 | 26,8 | | 5,874 |
| | Enough | 13 | 31,7 | 30 | 73,2 | 0,000 | (2,263-15,248) |
| | Total | 41 | 100 | 41 | 100 | | |
| g. PHBS | Not good | 21 | 51,2 | 7 | 17.1 | | 5,100 |
| | Good | 20 | 48,8 | 34 | 82,9 | 0,002 | (1,842-14,118) |
| | Total | 41 | 100 | 41 | 100 | | |

**Discussion**

Table 3 point a shows that in the case group, most (78%) respondents had low incomes, while in the control group only 39% had low incomes. Based on the results of statistical tests, there is a relationship between family income and underweight (p-value 0.001) and a 5.6 times risk of having underweight toddlers compared to high-income families. The results of the study have the same results as the study conducted by Novfrida et al. (2022) in Taban

Village, Jambe Health Center working area, which concluded that family income is 4.9 times at risk of having underweight toddlers. Low income levels and weak purchasing power often lead to inadequate eating habits, which hinder effective nutritional improvement, especially for toddlers (Novfrida et al., 2022). Good economic status allows families to provide adequate health facilities at home, such as proper family toilets (Fitriani, Nislawaty, & Mayasari, 2022). The higher the family's socio-economic status, the better the implementation of a healthy and clean life (Febryani, Rosalina S, & Susilo, 2021).

Table 3 point b shows that almost half of the case group (43.9%) of toddlers had a history of infectious diseases while the control group only 19.5% of toddlers had a history of infectious diseases. Based on the results of statistical tests, there is a relationship between a history of infectious diseases and underweight (p-value 0.033) and a 3.2 times risk of being underweight compared to toddlers who do not have a history of infectious diseases. Research conducted by Samino et al. (2020) in Pringsewu Regency concluded that toddlers who have a history of infectious diseases have a 6.03 times risk of being underweight compared to toddlers who do not have a history of infectious diseases. Diseases such as diarrhea, respiratory tract infections, and measles have the potential to be precursors to malnutrition (Wulandari, Rahayu, & ., 2019). When a toddler experiences an infection, it can cause loss of appetite which will affect the nutritional status of the toddler, causing malnutrition due to lack of energy and nutrient consumption (Kumala, Afrinis, & Afiah, 2023).

In the case group, the majority (70.7%) had insufficient energy adequacy, while in the control group only 26.8% had insufficient energy adequacy. Based on the results of statistical tests, there is a relationship between energy adequacy and underweight (p-value 0.000 and a 6.6 times risk of being underweight compared to toddlers with sufficient energy adequacy (Table 3 point c). Selvianita and Sudiarti (2021) who conducted research in Bogor Regency also stated that toddlers with insufficient energy intake have a 1.92 times risk of being underweight compared to toddlers with sufficient energy intake. Weight loss is a manifestation of energy depletion, so sufficient energy intake is needed to improve the nutritional status of toddlers (Utami and Rahmawati, 2020). Insufficient energy intake when compared to daily needs can cause an imbalance in energy intake (Kumala et al., 2023). Prolonged imbalance in energy intake can cause a decrease in body composition, which can result in underweight in toddlers (Kusumadila, 2021).

Table 3 point d shows that toddlers in the case group most (70.7%) have a low carbohydrate sufficiency level, while the control group only 29.3% have toddlers with a low carbohydrate sufficiency level. Based on the results of statistical tests, there is a relationship between the level of carbohydrate sufficiency and underweight (p-value 0.000). Toddlers who have a low energy sufficiency level are 5.8 times more at risk of being underweight compared to toddlers with a sufficient carbohydrate sufficiency level. Research by Tanjung and Nazara (2023) states that there is a relationship between carbohydrate intake and malnutrition in toddlers (p-value 0.000). Lack of carbohydrate intake will trigger the body's response to use energy stored in muscles and fat tissue. This can cause decreased growth, characterized by a thinner body because the body is unable to maintain body weight (Anwar and Setyani, 2022).

In the case group, half (56%) had low protein levels, while toddlers in the control group were only 22% with low protein adequacy levels. Based on the results of statistical tests, there is a relationship between protein adequacy levels and underweight (p-value 0.003). Toddlers

with low protein adequacy levels are 4.5 times more at risk of being underweight compared to toddlers with sufficient protein adequacy levels (Table 3 point e). Research conducted by Listyawardhani and Yunianto (2024) had the same results by concluding that toddlers with low protein adequacy levels are related to the incidence of underweight (p-value 0.004). Protein is very important for toddlers because at this age they are in optimal growth mass. The function of protein includes the formation of new tissue and increasing muscle mass which contributes to improving nutritional status (Kumala et al., 2023). Lack of protein intake in the body will have an impact on the body's immunity, if the body is susceptible to disease, the body will easily experience weight loss (Wijayanti, 2017).

Table 3 point f shows that toddlers in the majority of the case group (68.3%) have insufficient fat adequacy, while in the control group only 26.8% of toddlers have insufficient fat adequacy. Based on the results of statistical tests, there is a relationship between fat adequacy and underweight (p-value 0.000). Toddlers with insufficient fat adequacy have a 5.9 times greater risk of being underweight compared to toddlers with sufficient carbohydrate adequacy. Research conducted by Tanjung and Nazara (2023) found that toddlers with insufficient fat intake are associated with malnutrition in toddlers (p-value 0.000). Toddlers need fat because 20% of their muscle mass requires fat. Therefore, adequate fat consumption not only supports the development process but also helps to gain weight so as not to experience underweight conditions (Kumala et al., 2023). Inadequate fat intake can change body mass and tissue, which has an impact on body weight (Febriani, Wahyudi, & Haya, 2019).

Table 3 point g shows that in the case group, half (51.2%) had poor household PHBS, while in the control group only 17.1% had poor household PHBS. Based on the results of the statistical test, there is a relationship between PHBS and underweight (p-value 0.002) and a 5.1 times risk of having underweight toddlers compared to good household PHBS. This is similar to the research by Amellia and Wahyani (2020) which showed a significant relationship between PHBS and the nutritional status of toddlers with the results of the statistical test p = 0.000. Environmental factors play an important role in determining the level of family health. The environment can act as a cause, support or transition media that affects health, and can worsen existing disease conditions Amellia and Wahyani (2020). PHBS is related to individual actions in maintaining and improving health and preventing infectious diseases. This includes personal hygiene, choosing healthy and nutritious food, maintaining environmental cleanliness, using clean water that meets health standards, as well as using healthy toilets and not smoking in the house (Nuzuliana Alviolita, 2021).

**Conclusion**

There is a relationship between family income, history of infectious diseases, energy, carbohydrate, protein, fat and PHBS at household level with underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency in 2024. Low family income has a risk of 5.56 times, a history of infectious diseases has a risk of 3.23 times, low energy adequacy has a risk of 6.59 times, low carbohydrate adequacy has a risk of 5.84 times, low protein adequacy has a risk of 4.54 times, low fat adequacy has a risk of 5.87, and poor PHBS at household level has a risk of 5.1 times of underweight in toddlers aged 12-59 months in Cikunten Village, Singaparna District, Tasikmalaya Regency in 2024.

**Ethical Consideration**

No: DP.04.03/F.XLVIII.14/337/2024, Health Research Ethics Committee of Mataram Health Polytechnic.

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