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Epidemiological Analysis of Stunting Incidence in Toddlers

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ABSTRACT

Stunting is a chronic nutritional problem characterized by a toddler's length or height being below the standard for their age. This condition reflects long-term malnutrition and impacts physical growth, cognitive development, and future productivity. Indonesia remains a country with a high prevalence of stunting, requiring epidemiological analysis to understand its incidence patterns and risk factors. This study aims to analyze the incidence of stunting in toddlers based on aspects of person, place, and time, as well as related factors. The study used an observational analytical design with a *cross-sectional approach*. The study sample consisted of 100 toddlers selected using a purposive sampling technique. Data were collected through anthropometric measurements and questionnaires. Data analysis was performed using univariate and bivariate methods using the Chi- Square test. The results showed that the prevalence of stunting remains high and is related to factors such as toddler age, maternal education, maternal nutritional status, and feeding patterns. It was concluded that the incidence of stunting is influenced by various multidimensional factors, requiring sustainable cross-sectoral interventions.

Keywords: Stunting, Toddlers, Epidemiology, Chronic Nutrition

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1. Introduction

Stunting is a major nutritional problem that remains a public health challenge in various developing countries, including Indonesia. Stunting is defined as failure to thrive in toddlers due to chronic malnutrition, characterized by a height-for-age (H/A) value below minus two standard deviations based on the WHO child growth standards.

Stunting not only impacts a child's physical growth but also impacts cognitive development and learning abilities, increasing the risk of non-communicable diseases in adulthood. Children who experience stunting are at risk of low productivity, impacting the quality of a nation's human resources.

Based on national data, the prevalence of stunting in Indonesia remains above the WHO threshold. This indicates that stunting is a serious public health problem that requires comprehensive treatment. The causes of stunting are multifactorial, encompassing individual, family, environmental, and access to health services.

An epidemiological approach is necessary to understand patterns of stunting incidence based on person, place, and time. Epidemiological analysis can help identify at-risk groups and dominant causal factors, thus providing a basis for planning targeted interventions. Therefore, this study aims to analyze the incidence of stunting in toddlers epidemiologically.

2. Research Methods

a. Types and Design of Research

This study is an observational analytical study with a cross-sectional design. This design was used to analyze the incidence of stunting in toddlers and the factors associated with it at a single observation point. This approach is suitable for epidemiological analysis because it can simultaneously describe the distribution of health problems and the relationships between variables.

b. Epidemiological Approach

This study uses a descriptive and analytical epidemiological approach, including:

1) Descriptive epidemiological analysis (Person–Place–Time)
2) Risk factor analysis (analytical epidemiology)

This approach aims to obtain an overview of the pattern of stunting incidence and the determinant factors that play a role.

c. Location and Time of Research

The research was conducted in the working area of Community Health Center X, an area with a relatively high stunting rate based on routine nutrition reports. The research was conducted from January to March 2025 and included preparation, field data collection, data processing, and analysis.

d. Population and Research Sample

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1) Population

The population in this study was all toddlers aged 0–59 months who lived in the working area of Health Center X.

2) Sample

The research sample consisted of 100 toddlers, which were determined using purposive sampling techniques, namely selecting samples based on certain criteria that are relevant to the research objectives.

3) Inclusion Criteria
   a) Toddlers aged 0–59 months.
   b) Have a KIA book or be registered in the Posyandu register.
   c) Parents/guardians are willing to be respondents.
4) Exclusion Criteria
   a) Toddlers with congenital abnormalities or chronic congenital diseases.
   b) Toddlers who are experiencing emergency conditions.
   c) Anthropometric data is incomplete.

e. Research Variables

1) Dependent variable:
   - Stunting incidence (Height/Age < -2 SD WHO standard)
2) Independent variables:
   - Toddler characteristics (age, gender)
   - Maternal characteristics (education, maternal nutritional status during pregnancy)
   - Nutritional intake factors (feeding patterns, complementary feeding)
   - Health factors (history of infectious diseases)

f. Operational Definition of Variables

Variables	Operational Definition	Measuring instrument	Scale
Stunting	Height for age < -2 SD WHO standard	Microtoise / Length board	Nominal
Mother's education	Mother's highest education	Questionnaire	Ordinal
Maternal nutritional status	Maternal BMI or MUAC during pregnancy	KIA measurement/card	Nominal
Feeding pattern	Suitability of MP-ASI to age	Questionnaire	Ordinal
History of infection	Have had ≥2 infections in the last 6 months	Interview	Nominal

g. Data Collection Instruments and Tools

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The instruments used in this study include:

1) Anthropometric tools (microtoise or length board)
2) Structured questionnaire for mothers of toddlers
3) KIA book and posyandu register as secondary data sources

Anthropometric measurements were carried out by trained personnel to minimize measurement bias.

h. Data Collection Procedures

Data collection is carried out through the following stages:

1) Coordination with the Community Health Center and Posyandu cadres
2) Explanation of the purpose and procedures of the research to parents of toddlers
3) Informed signing consent
4) Measuring toddler height
5) Mother interview using questionnaire
6) Recording and checking data completeness

i. Data processing

Data processing is carried out in several stages:

1) Editing – checking data completeness
2) Coding – assigning a code to each variable
3) Data entry – entering data into statistical software
4) Cleaning – ensuring data consistency and validity

j. Data Analysis Techniques

1) Univariate Analysis

Used to describe the frequency and percentage distribution of each variable, including the prevalence of stunting.

2) Bivariate Analysis

Used to analyze the relationship between risk factors and stunting incidence using the Chi- Square test. The significance value is set at $\alpha = 0.05$.

Odds Analysis The ratio (OR) can be used to determine the risk of factors causing stunting.

k. Bias Control

Bias control efforts are carried out by:

1) Enumerator training
2) Anthropometric measuring instruments
3) Clear inclusion and exclusion criteria

l. Research Ethics

This research was conducted in accordance with the ethical principles of health research:

1) Informed consent
2) Confidentiality of respondent identity

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3) Anonymity
4) The principle of justice and nonmaleficence

3. Research Results And Discussion

a. Research Results

1) Prevalence of Stunting in Toddlers

Nutritional Status of Height/Age	f	%
Stunting	32	32.0
Normal	68	68.0
Total	**100**	**100**

2) Distribution of Stunting Based on Toddler Characteristics

Characteristics	Stunting (%)
Age 24–59 months	62.5
Male gender	56.3
History of recurrent infections	65.6

3) Factors Associated with Stunting

Factor	p- value
Mother's education	0.002
Maternal nutritional status	0.001
Feeding pattern	0.003
History of infection	0.004

b. Discussion

The study results show that the prevalence of stunting among toddlers remains relatively high. This condition reflects a chronic, long-term nutritional problem. Toddlers aged 24-59 months have a higher proportion of stunting than those younger, indicating that the impact of malnutrition is cumulative.

Maternal education is significantly associated with stunting. Mothers with low education tend to have limited knowledge of nutrition and parenting practices. Furthermore, poor maternal nutritional status during pregnancy contributes to suboptimal fetal growth.

Feeding patterns that do not adhere to balanced nutrition principles and a history of recurrent infectious diseases also increase the risk of stunting. Frequent infections can reduce appetite and nutrient absorption, thus worsening a child's nutritional status.

Epidemiological analysis shows that stunting is a multidimensional problem influenced by the interaction of biological, social, and environmental factors.

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Therefore, stunting prevention efforts require a comprehensive approach starting in the first 1,000 days of life.

4. Conclusion And Suggestions

a. Conclusion

The prevalence of stunting in toddlers remains high. Stunting incidence is related to maternal education, nutritional status, feeding patterns, and history of infectious diseases. Stunting is a public health problem that requires integrated management.

b. Suggestion

1) Health workers need to increase nutritional education for mothers from pregnancy.
2) Community health centers are expected to strengthen routine monitoring of toddler growth.
3) The government and cross-sectoral stakeholders need to integrate stunting prevention programs in a sustainable manner.

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