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# Vaccination Status and Household Income as Risk Factors for Stunting in Toddlers

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**ABSTRACT**
Stunting is one of the main health problems in society, especially in toddlers. The prevalence of stunting in Indonesia is still quite high. The prevalence of stunting among children under five in South Konawe Regency has fluctuated in the last 3 years, namely in 2021 it was 15.9%, in 2022 it was 15.3%, and in 2023 it was 18.5%. This study aims to identify risk factors for stunting in toddlers aged 12-59 months in coastal communities in South Konawe Regency. This research uses a quantitative observation method with a case-control study approach. The population was 161 toddlers and the sample was 92 people consisting of two groups, namely the case and control groups with a ratio of 1:1. Statistical analysis using the Odd Ratio (OR) test with α=0.05 (CI=95%). The research results obtained basic immunization status (OR= 2.910; 95% CI = 1.248-6.786) and family income (OR = 1.692; 95% CI = 0.741-3.861). It can be concluded that immunization status is a predictor of stunting incidents in toddlers aged 12-59 months, while family income is not a predictor of stunting incidents in toddlers aged 12-59 months in the coastal areas of South Konawes Regency.



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## INTRODUCTION

Stunting is a condition in which a child's height is shorter than that of the average child; stunting is one of the most common nutritional problems affecting children(Yushananta & Ahyanti, 2022). Stunting occurs due to insufficient nutritional intake by the foetus or infant, leading to malnutrition from the time the baby is in the womb and in the early stages of life (Simamora et al., 2019). To date, stunting remains a problem in various countries, particularly in developing nations (Habimana & Biracyaza, 2019).

Stunting is a condition of growth failure in children caused by chronic malnutrition between the ages of 0 and 59 months, characterised by a Z-score for height-for-age (HFA) or length-for-age (LFA) below -2 SD, resulting in the child's height being below the expected range for their age. Indonesia is one of the developing countries that currently still faces nutritional problems which can hinder the growth and development of young children. One of the most common nutritional problems found in children in Indonesia is stunting(Falmuariat Q, Febriant T, 2022; Indonesian Ministry of Health, 2020).

The World Health Organization (WHO) reported in 2020 that, globally, there were 144.0 million children aged 5 years who were affected by stunting. WHO data from 2021 indicates that globally, the incidence of stunting has risen to 149.2 million children, and in 2022, WHO data shows that the incidence of stunting among children under the age of 5 stands at 149.1 million, 45 million children were *wasting*, and 37 million were *overweight*. In the regions of Southeast Asia and Africa, an estimated 6.8% of children are affected by stunting.13.5 million, or 21% of them, suffer from severe stunting. (WHO, 2022).

The report on the findings of the Indonesian Nutrition Status Survey (SSGI) regarding stunting shows that in 2021 the rate was 24.4%, in 2022 the stunting rate was 21.6%, and in 2023 the stunting rate fell to a prevalence of 21.5%. SSGI data for 2022 shows that there were 10 (Ministry of Health of the Republic of Indonesia, 2022) (Ministry of Health of the Republic of Indonesia, 2023).

According to data from the Southeast Sulawesi Provincial Health Office (2020), the number of children aged 0–59 months suffering from 1>stunting stood at 2,920. This figure is derived from combining the number of children classified as short (approximately 1,811) and very short (1,109) (South East Sulawesi Provincial Health Office 2020). According to the results of the Indonesian Nutrition Status Study (SSGI) (2021), South East Sulawesi ranks among the top five regions with the highest stunting rates in Indonesia, at 30.02%. The stunting rate in Southeast Sulawesi remains above the national average, as the national stunting rate stands at just 24.4%. When examined by district and city data in Southeast Sulawesi, Konawe Kepulauan District ranks among the top four districts and cities with the highest stunting rates, with a stunting prevalence rate of 32.8% (Ministry of Health of the Republic of Indonesia, 2021).

According to a report by the Konawe Kepulauan Health Department, stunting cases over the last three years have shown a fluctuating trend. In 2021, the prevalence was 15.9%, in 2022 it was 15.3%, and in 2023 it increased significantly to 18.5%.(Islands, 2023)

Determining or influencing factors in the occurrence of stunting pessentially, a child's nutritional status whichcan be influenced by direct, indirect, and root-cause factors. Direct factors associated with stunting include dietary intake and health status. Energy intake shows a significant correlation with the incidence of stunting. Similarly, parenting practices, healthcare services and the household environment—as indirect root-cause factors encompassing residential area and economic status are linked to poor child nutritional status (Nurbaiti P, Budi S., 2019; Yuliani Soeracmad, 2019). This study aims to identify the risk factors that predict stunting in under-fives in the coastal areas of Konawe Kepulauan Regency.

## RESEARCH METHOD

This study is a quantitative study which observational nature using the Case *Control Control* approach. The population in this study comprised all families with infants, totalling 161 households. The sample size was calculated by taking into account the proportion of stunting cases from references obtained in previous studies. The formula is: n= (za $\sqrt{2\,p2q^2}$ + Zb $\sqrt{p1q1 + p2q2}$)$^2$ /(p1-p2)$^2$ Based on the calculations, the sample size was 92 participants, comprising two groups—cases and controls—in a 1:1 ratio. Sampling was carried out using a non-random sampling technique, specifically purposive sampling, which met the following criteria: (1) Toddlers aged 12–59 months; (2) Toddlers not currently suffering from any specific illness; (3) Toddlers in possession of a Health Card (KMS); (4) Toddlers living with and being directly cared for by their mothers.

In general, the variables in this study are divided into two categories: the dependent variable (effect) is the incidence of stunting among infants aged 12–59 months, and the independent variables (risk factors) are basic immunisation status and family income. The incidence of stunting is divided into two categories: the stunting category and the non-stunting category. Similarly, the status of basic immunisation in this study is divided into two categories: the incomplete category and the complete category. Meanwhile, family income is divided into three categories: low, medium and high, based on the regional minimum wage (UMR) for South Konawe Regency. The research team also sought to control for confounding variables using restriction techniques, namely by limiting the sample pool through the determination of sampling criteria and by restricting the geographical area of the sample source.(Nasir. A, 2015)I don't know what this means.

The instruments used to collect data were questionnaires and MCH (Maternal and Child Health) records. Data on stunting cases or the control group were obtained from community health centres in the study area. The control group consisted of the closest neighbours of the case group. The research analysis was conducted in stages: univariate analysis, aimed at examining the frequency distribution of respondent characteristics and research variables; and bivariate analysis, aimed at determining the independent variables as risk factors for stunting, using Odds Ratio (OR) analysis at a confidence level of 95% (CI=95%) with α=0.05.

## RESULTS AND DISCUSSION

Table 1 shows that the prevalence of stunting and non-stunting is 50% each; the majority (55.4%) of toddlers have completed their basic immunisation schedule; and the majority (57.6%) of families have a sufficient income.

**Table 1**
Distribution of Respondents by Basic Immunisation Status and Household Income

| Research Variable Categories | N | % |
|---|---|---|
| **Stunting** | | |
| Stunting | 46 | 50.0 |
| No Stunting | 46 | 50.0 |
| **Basic Immunization Status** | | |
| Incomplete | 41 | 44.6 |
| Complete | 51 | 55.4 |
| **Family Income** | | |
| Low | 18 | 19.6 |
| Moderate | 21 | 22.8 |
| High | 53 | 57.6 |

The completeness of immunisation, particularly basic immunisation, is a key factor in immunisation programmes. Immunisation is the single most effective method for the prevention and control of various diseases. Infectious diseases such as tuberculosis, polio and measles are diseases that can be prevented through immunisation. Analysis of Table 1 shows that the majority of infants aged 12–59 months have already received a complete basic immunisation schedule. Interviews with mothers of toddlers (respondents) revealed that they already understand the importance of the immunisation programme. Family income data indicates that the majority of families have an income in the high category or above the regional minimum wage (Rp.2,758,984.54). Interview results with respondents showed that all families have an income in the category above the minimum wage. Family income from fishing, as well as the mining and plantation sectors, is considered sufficient to meet the family's needs. The high prevalence of stunting among infants aged 12–59 months is undoubtedly influenced by various factors, such as parenting practices, low birth weight (LBW), a lack of parental knowledge, and so on. In Indonesia, one of the risk factors for stunting is a history of diarrhoea and LBW (Suratri MAL, Putro G, Rachmat B, 2023; Wicaksono et al., 2021).

**Table 2.**
Analysis of Risk Factors Associated with Basic Immunisation Status and the Incidence of Stunting in Toddlers Aged 12–59 Months

| Status Imunisasi | Stunting | | | | N | % | OR (95% CI) |
|---|---|---|---|---|---|---|---|
| | Cases | | Control | | | | |
| | n | % | N | % | | | |
| Incomplete | 29 | 63 | 17 | 37 | 46 | 50 | 2.910 (1.248-6.786) |
| Complete | 17 | 37 | 29 | 63 | 46 | 50 | |
| **Total** | **46** | **100** | **46** | **100** | **92** | **100** | |

A Toddlers' growth and development can be optimized when parents and healthcare professionals work together to enhance the factors that support healthy development, one of which is reducing vulnerability to disease through immunization. The provision of basic immunization has a significant influence on the growth and developmental process of infants. Children with poor health status are more likely to experience delays in growth and development. Chronic illnesses can reduce a child's ability to develop optimally. Children who are not immunized lack protection against certain infectious diseases, making them more susceptible to illness, which may subsequently lead to a decline in nutritional status. This occurs because infectious diseases are closely associated with immune function and ultimately affect nutritional status, resulting in malnutrition or decreased nutritional status among children (Aprilia & Tono, 2023; Ishomuddin et al., 2024).

The research findings show that the results of the *odds ratio* OR = 2.910: and 95% CI = 1.248–6.786, meaning that incomplete basic immunisation is a risk factor for the occurrence of stunting among infants aged 12–59 months in the coastal area of the Langara Community Health Centre's working area, Konawe Islands Regency, in 2024. The research results show that respondents with infants who had incomplete basic immunisation were 2.917 times more likely to experience stunting than respondents with infants who had complete basic immunisation. This is consistent with the study by Eddy Afriansyah and Lia Fitriyani (2023), which demonstrated that there is an association between basic immunisation and the incidence of stunting in infants $p$=0.042; thus, the p-value is smaller than the α value (0.05), which means that statistically, there is a significant association between the completeness of basic immunisation and the incidence of stunting in infants. This implies that infants with incomplete basic immunisation have a 1.508 times higher risk of experiencing stunting compared to those with a full and up-to-date immunisation schedule.

This study is consistent with the research by Nurhamidi et al. (2022), which demonstrated that there is an association between basic

immunisation and the incidence of stunting in infants, with a chi-square p-value of 0.043. This means that children with incomplete basic immunisation have a 2.3-fold higher risk of experiencing stunting than those with complete basic immunisation (OR = 2.300). This study is consistent with research conducted by Wanda et al., (2021), which stated that the history of basic immunisation status is associated with the incidence of stunting in infants in Hegarmanah village, Jatinangor sub-district, with a p-value (0.000 < 0.05), and that the risk of stunting among toddlers with incomplete immunisation was 4.9 times higher than among those with complete immunisation. Stunting may also be associated with various tropical disease syndromes such as diarrhoeal diseases, acute respiratory infections (ARI) and tuberculosis (TB) (Swaidatul Masluhiya & Irma, 2020) .

Research findings indicate that 17 respondents (37.0%) had toddlers with an incomplete immunisation history but whose toddlers did not suffer from stunting; this was because the toddlers were exclusively breastfed and had a normal birth weight, whereas respondents with infants who had incomplete immunisation and were affected by stunting numbered 29 respondents (63.0%); this was due to a lack of parental knowledge regarding the necessity of complete immunisation, and a lack of confidence in the benefits of immunisation. Therefore, according to the mothers, the babies would remain healthy even without immunisation, resulting in an incomplete basic immunisation status for the babies; other reasons included mothers often forgetting to take their babies for immunisation, and mothers fearing that their toddlers would fall ill if immunised. Consequently, the babies did not receive immunisation according to the schedule, resulting in an incomplete basic immunisation status for their children. Among respondents with toddlers who had a complete basic immunisation schedule but were experiencing stunting, there were 17 respondents (37.0%) due to the failure to provide exclusive breastfeeding to the toddler, and toddlers with abnormal birth weights. Several recent studies and literature explain that stunting is a nutritional problem caused by multiple factors, one of which is immunisation. Other factors include genetics, healthcare provision and many other factors such as a history of infectious diseases(Irma et al., 2021; Setiyabudi, 2019).

The full course of basic immunisations is administered to infants under 12 months of age. The full routine immunisation schedule comprises the basic immunisations: HB0, BCG, polio, DPT-HB-Hib, and MR; the administration of these immunisations is tailored to the child's age. A factor that can increase the risk of stunting during the first 1,000 days of life is failure to undergo immunisation. This is because children who do not receive this passive immunity are at increased risk of infection. (Aprilia & Tono, 2023) .

**Table 3.**

Analysis of Family Income as a Risk Factor for Stunting in Toddlers Aged 12–59 Months

| Pendapatan keluarga | Stunting | | | | N | % | OR (95% CI) |
|---|---|---|---|---|---|---|---|
| | Cases | | Control | | | | |
| | n | % | N | % | | | |
| Low | 27 | 58.7 | 21 | 45.7 | 48 | 52.2 | 1.692 (0.741-3.861) |
| High | 19 | 41.3 | 25 | 54.3 | 44 | 47.8 | |
| **Total** | **46** | **100** | **46** | **100** | **92** | **100** | |

Family income is linked to a household's ability to meet its primary, secondary and tertiary needs. A high family income makes it easier to meet these needs, whereas a low family income makes it more difficult to do so. Low income affects both the quality and quantity of food consumed by the family. Low income levels and weak purchasing power lead to certain eating habits that hinder effective nutritional improvement, particularly for their children. The food obtained is usually less varied and limited in quantity, particularly in terms of ingredients essential for children's growth such as sources of protein, vitamins and minerals thereby increasing the risk of malnutrition. These limitations increase the risk of family members suffering from stunting (Husna et al., 2023).

The results of the study show that the test results for the *odds ratio* OR = 1.692: and 95% CI = 0.741–3.861, meaning that family income is not a risk factor for the occurrence of *stunting* in infants aged 12–59 months in the coastal area of the Langara Community Health Centre (Puskesmas) working area, Konawe Kepulauan Regency, in 2024. The research findings indicate that respondents with low family income are 1 times more likely to have their infants experience stunting compared to respondents with infants from families with high income. This is consistent with the study by Dwiki P. A. Holbala*et al.*., (2022)

which demonstrated no association between household income and the incidence of stunting (*P*=0.819), meaning that toddlers from low-income households face a 0.812 times greater risk of stunting compared to those from high-income households.

This study is consistent with the research by Abd. Wahid et al., (2022) Based on the results of the Fisher's exact test, a p-value of 1.000 was obtained (p > α= 0.05), this means there is no association between the incidence of stunting in toddlers and family income. When examined based on the odds ratio (1.436), this indicates that the risk of stunting occurring in infants from families with lower monthly household income is 1.436 times greater than in infants from families with higher monthly household income. This study is consistent with the research by Annas Aulia Maliket al.,(2023), where the statistical test yielded a p-value of 0.265, indicating that there is no association between family income and the incidence of stunting/ a3>in toddlers, meaning that toddlers from low-income families are 0.4 times more likely to experience stunting compared to toddlers from high-income families (OR = 0.451) (Hendrayati & Asbar, 2022) .

According to the research findings, there were 21 respondents (45.7%) with low household incomes whose infants did not suffer from stunting. This was attributed to exclusive breastfeeding, normal births, and the fact that even parents on low incomes were still able to consume foodstuffs available in their local area. Meanwhile, there were 27 respondents (58.7%) with low household income whose infants suffered from stunting, as with low income, nutritional needs cannot be met, and access to nutritionally balanced food is also difficult to obtain. This insufficient family income can affect a child's growth and development. Coupled with a large family size, it becomes difficult to provide sufficient quality food for the family, which can lead to stunting in infants. Among respondents with high household income whose infants experienced stunting, there were 19 respondents (41.3%) due to a lack of exclusive breastfeeding, low birth weight, and inadequate parenting practices.

High incomes that are not matched by adequate nutritional knowledge can lead people to adopt highly indulgent eating habits in their daily lives, with food choices being based more on personal taste than on the nutritional needs of young children (Beal T, Tumilowicz A, Sutrisna A, Izwardy D, 2018; Wahyuni & Fithriyana, 2020) . A family's purchasing power is determined by its income. The higher a family's income, the more money is expected to be allocated to purchasing foodstuffs, such as vegetables, fruit, meat and so on, to meet the family's nutritional needs. Furthermore, families with a good economic status can access better public services, such as education, healthcare and so on. A family's purchasing power regarding nutritious food is influenced by the household income, as the choice of food purchased depends entirely on the level of income. If income is high, the family can obtain food sources that provide optimal nutrition for the family, particularly for infants. (Astriana Tualaka et al., 2023) . The findings of this study are also supported by research by Utami et al., who also found that a risk factor for stunting in infants and children under five years of age is socio-economic status, particularly household income (Irma & Swaidatul Masluhiya AF, 2020; Yushananta & Ahyanti, 2022) .

## CONCLUSION

Immunisation status and household income are risk factors for stunting in children aged 12–59 months living in coastal areas. A toddler aged 12–59 months with an incomplete basic immunisation status has a 2.91 times higher risk of stunting compared to a toddler aged 12–59 months with a complete basic immunisation status. Meanwhile, toddlers from low-income families have a 1.692 times higher risk of stunting compared to toddlers aged 12–59 months from families with adequate income.

## SUGGESTIONS

Mothers of young children should attend posyandu sessions regularly and ensure their babies receive all their basic vaccinations.

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