

Determinants of stunting incidence in toddlers age 24-59 months based on the epidemiological triangle in the working area of the Nambo Health Center, Kendari City, 2023

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Abstract

Background: The incidence of stunting in the Nambo sub-district is included in the top five highest stunting prevalence rates in Kendari City out of ten sub-districts. This study focuses on toddlers in coastal areas in Kendari City. This study aims to determine the relationship between *host* factors (gender, birth weight, exclusive breastfeeding, mother's employment status, mother's level of knowledge, family income), *agent* factors, history of infectious diseases, *environment* factors (access to clean water and availability of latrines) with incidence of stunting aged 24–59 months.

Method: This study was conducted directly in the field using observational analytics using quantitative research with a *cross-sectional* research design with the aim of determining whether there is a relationship between sex factors, birth weight, exclusive breastfeeding, mother's employment status, mother's level of knowledge, family income, history of toddler infectious diseases, access to clean water and latrine availability facilities with the incidence of stunting in the working area of the Nambo Health Center in Kendari City in 2023. The sampling technique of this study is *probability* sampling using *stratified random sampling*, which is a sampling technique taken by random *stratification* (based on strata) with a total sample of 248 toddlers.

Results: The variable results showed that for host factors related were birth weight (ρ -Value = 0.000), exclusive breastfeeding (ρ -Value = 0.009) and maternal knowledge level (ρ -Value = 0.003), while the unrelated were the sex of the toddler (ρ -Value = 0.108), mother's employment status (ρ -Value = 0.362), family income (ρ -Value = 0.367), agent factor has no relationship between history of infectious disease (ρ -Value = 0.130), environmental factors have no relationship between access to clean water (ρ -Value = 1.000) and latrine availability facilities (ρ -Value = 0.491) with the incidence of stunting in toddlers.

Conclusion: there is a relationship between birth weight, exclusive breastfeeding and maternal knowledge level with the incidence of stunting and there is no relationship between gender, maternal employment status, family income, history of infectious diseases, access to clean water and means of availability of latrines with the incidence of stunting.

Keywords: Determinants; Stunting; Toddlers; Epidemiological triangle.

1. Introduction

Stunting is a condition of failure to thrive in children under five years old (infants under five years old) due to chronic malnutrition that causes children to be too short of their care. The incidence of stunting toddlers (short) is a nutritional problem that is still widely faced in Indonesia. Based on Nutritional Status Monitoring Data (PGS) for the last three

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years, stunting (short) has the highest prevalence compared to other nutritional problems such as under nutrition, underweight, and fat [1]. Stunting is a condition of toddlers who have less length or height when compared to age [2]

The causative factors of stunting consist of indirect and direct causative factors. An indirect factor causing stunting is drinking water. The physical quality of drinking water, ownership of latrines and *hygiene* are hand washing habits while the direct causes of stunting are the status of pregnant women, toddler nutrition and infectious diseases[3]. Disease is a condition that arises due to its operation with changes in the epidemiological triad, namely *host, agent and environment*. *Disease agents* are inanimate or living objects and even mechanical factors that can cause certain diseases. *Host* is an individual or human who is the place where the agent resides, while the environment is the residence of *the host* that can affect changes to the *host* and *agent*. These three conditions can cause changes in each epidemiological tras that cause humans to fall ill. Disease incidence is defined as the incidence of illness experienced by toddlers 1 or more times a month or at least 4 times in 1 year [4]

World Health Organization (WHO) data for stunting prevalence in 2018 reached 22.9%, with the number of stunting toddlers 154 toddlers, in 2019 reached 22.4%, stunting toddlers 152 toddlers, while in 2020 stunting prevalence reached 22% with the number of stunting toddlers 149 toddlers, stunting toddlers which is one of the factors hampering human development in the world . *The World Health Organization* (WHO) has determined five subregions of stunting prevalence, including Indonesia in the Southeast Asia region (36.4%) [5]

In Southeast Sulawesi Province, based on SSGI data in 2021, the stunting prevalence reached 20.9%, while in 2022 the prevalence of stunting toddlers reached 30.02% (SSGI, 2021) [6]. Based on data from the Ministry of Home Affairs, it is targeted to reduce the stunting rate in 2022 by 17.4%, while the prevalence of stunting in Kendari City is 24.0%, which is still high from the target of reducing stunting rates in Southeast Sulawesi. Although Kendari City is still relatively low compared to other districts in Southeast Sulawesi, this figure is still far from the target of reducing stunting rates in Southeast Sulawesi (Ministry of Home Affairs, 2022).

Data states that the prevalence of stunting in Kendari City reaches 24.0%. With the number of cases in 2022 reaching 227 stunting cases in Kendari City and spread across 15 urban villages. Judging from the sub-district stunting data, Nambo is included in the top 5 highest stunting prevalence rates in Kendari City out of 10 sub-districts. Meanwhile, the Nambo Health Center has a stunting prevalence of 1.70% (Kendari City Health Office, 2022).

2. Sampling Techniques

The sampling technique of this study is *probability sampling* using *stratified random sampling*, which is a sampling technique taken by random stratification (based on *strata*).

3. Results

3.1. Characteristic

Table 1 Distribution of Toddlers by Age in Nambo Health Center Working Area

No.	Age of toddler (Month)	Sum	
		n	%
1.	24 – 35	80	32.3%
2.	36 – 47	70	28.2%
3.	48 – 59	98	39.5%
Sum		248	100

Based on Table 1. shows that the number of toddlers with the highest age is found at the age of toddlers 48 - 59 months as many as 98 toddlers (39.5%), and toddlers with the least age are found at the age of toddlers 36 - 47 months as many as 70 toddlers (28.2%).

Table 2 Distribution of respondents according to maternal age in the Nambo Health Center work area in 2023

No.	Mother's age (Years)	Sum	
		n	%
1.	21 – 30	106	42.7%
2.	31 – 40	120	48.4%
3.	41 – 50	22	8.9%
Sum		248	100

Based on Table 2. shows that the highest number of respondents with maternal age 31-40 years is 120 people (48.4%), and the number of respondents with the least age with maternal age 41-50 years is 22 people (8.9%).

Table 3 Distribution of respondents according to maternal education in the working area of Nambo Health Center

No.	Mother's education	Sum	
		n	%
1.	Not in school/didn't finish elementary school	2	8%
2.	SD/equivalent	32	12.9%
3.	Junior High School / Equivalent	82	33.1%
4.	High School / Vocational School	115	46.4%
5.	Academic/College	17	6.9%
Sum		248	100

Based on Table 3. showed that the number of respondents with the most high school / vocational education was 115 respondents (46.4%), while respondents who had the lowest education were not in school / did not finish elementary school amounted to 2 respondents (2.3%).

Table 4 Distribution of respondents based on addresses in the working area of the Nambo Health Center

No.	Address	Sum	
		n	%
1.	Nambo	48	19.4%
2.	Petoaha	68	27.4%
3.	Bungkutoko	57	23.0%
4.	Sambuli	49	18.8%
5.	Tondonggeu	26	10.5%
Sum		248	100

Based on Table 4. shows that the number of respondents who have the most toddlers are in Petoaha Village with 68 toddlers (27.4%), while respondents who have the least toddlers are in Tondonggeu Village with 26 (10.5%).

3.2. Univariate Analysis

Table 5 Distribution of stunting incidence in toddlers aged 24-59 months in the Nambo Health Center work area in 2023

No.	Incidence of stunting	Sum	
		n	%
1.	Stunting	10	4.0%
2.	Usual	238	96.0%
Sum		248	100

Based on Table 5. It can be seen that out of 248 respondents, there are 10 toddlers (4.0%) who are stunted and there are 238 toddlers (96.0%) who are not stunted (normal).

Table 6 Distribution of Toddlers by Gender in Nambo Health Center Working Area

No.	Gender	Sum	
		n	%
1.	Man	131	52.8%
2.	Woman	117	47.2%
Sum		248	100

Based on Table 6. shows that the number of male toddlers amounted to 131 toddlers (52.8%), while female toddlers amounted to 117 toddlers (47.2%). The table above illustrates that the number of posyandu participants based on gender is more male than female.

Table 7 Distribution of Toddlers According to Baby Birth Weight in Nambo Health Center Working Area

No.	Baby weight born	Sum	
		n	%
1.	Risk	26	10.5%
2.	No Risk	222	89.5%
Sum		248	100

Based on Table 7. It showed that the number of toddlers with birth weight who were not at risk was 222 toddlers (89.5%), the least at risk was 26 toddlers (10.5%).

Table 8 Distribution of respondents based on exclusive breastfeeding in the working area of the Nambo Health Center in 2023

No.	Exclusive breastfeeding	Sum	
		n	%
1.	Not	38	15.3%
2.	Yes	210	84.7%
Sum		248	100

Based on Table 8. showed that of the 248 respondents who did not provide exclusive breastfeeding, 38 respondents (15.3%), and those who gave exclusive breastfeeding were 210 respondents (84.7%).

Table 9 Distribution of respondents according to mother's employment status in the Nambo Health Center work area

No.	Mother's employment status	Sum	
		n	%
1.	Does not work	217	87.5%
2.	Work	31	12.5%
Sum		248	100

Based on Table 9. shows that the highest number of respondents according to employment status is not working as many as 217 respondents (87.5%), while respondents according to employment status are the least employed, namely working as many as 31 respondents (12.5%).

Table 10 Distribution of respondents based on the level of knowledge of mothers in the working area of the Nambo Health Center in 2023

No.	Mother's Knowledge Level	Sum	
		n	%
1.	Not Good	84	33.9%
2.	Good	164	66.1%
Sum		248	100

Based on Table 10. showed that of the 248 respondents who had a poor level of knowledge, there were 84 respondents (33.9%) and a good level of knowledge there were 164 respondents (66.1%).

Table 11 Distribution according to family income in the working area of Nambo Health Center in 2023

No.	Family income	Sum	
		n	%
1.	< from UMK Kendari city	211	85.1%
2.	≥ from UMK Kendari City	37	14.9%
Sum		248	100

Based on Table 11. shows that of the 248 respondents who have a family income of < from UMK in Kendari City Rp. 2,823,312,-/month there are 211 respondents (85.1%) and family income ≥ from UMK in Kendari City Rp. 2,823,312,-/month there are 37 respondents (14.9%).

Table 12 Distribution of respondents based on the history of infectious diseases of toddlers in the working area of the Nambo Health Center in 2023

No.	History of infectious diseases of toddlers	Sum	
		n	%
1.	There is a history	16	6.5%
2.	No History	232	93.5%
Sum		248	100

Based on Table 12. showed that of the 248 respondents with a history of infectious diseases, there were 16 toddlers (6.5%) and those without a history of disease 232 toddlers (93.5%).

Table 13 Distribution of respondents based on access to clean water in the Nambo Health Center working area in 2023

No.	Access to clean water	Sum	
		n	%
1.	Not eligible	109	44.0%
2.	Qualify	139	56.0%
Sum		248	100

Based on Table 13. It shows that of the 248 respondents who have access to clean water that does not meet the requirements, there are 109 respondents (44.0%) and those who have access to clean water that meets the requirements there are 139 respondents (56.0%).

Table 14 Distribution of respondents based on the means of availability of latrines at the Nambo Health Center in 2023

No.	Facilities of latrine availability	Sum	
		n	%
1.	Qualify	174	70.2%
2.	Not eligible	74	29.8%
Sum		248	100

Based on Table 14. It shows that of the 248 respondents who have qualified latrine availability facilities, there are 174 respondents (70.2%) and those who do not meet the requirements there are 74 respondents (29.8%).

4. Discussion

4.1. The relationship between the sex of toddlers and the incidence of stunting in toddlers aged 24-59 months in the working area of the Nambo Health Center in 2023.

A cohort study in Ethiopia stated that male babies have twice the risk of being stunted compared to female babies at the age of 6 and 12 months. Boys are at risk of stunting and underweight compared to girls. but there are several studies in Sub-Saharan Africa showing that preschool boys are more at risk of stunting than girls. In this case. Not yet known the reason. Based on the results of the study, there is no significant relationship between the sex of toddlers and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Working Area in 2023. This is in line with research conducted by Savita (2020) which states that there is no relationship between sex and the incidence of stunting [7]

4.2. The relationship between birth weight and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center work area in 2023.

Babies with low birth weight will be more susceptible to environmental influences that will come. Low birth weight will also be potentially exposed to infectious diseases. Birth weight is closely related to fetal, neonatal, and postneonatal, infant and child morbidity, and long-term growth and development. Based on the results of the study, it shows that there is a significant relationship between birth weight and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Working Area in 2023. This is in line with research conducted by Dewi (2018) stating that there is a relationship between low birth weight and the incidence of stunting in Baduta in Maron Kidul Village, Maron District, Probolinggo Regency [8]

4.3. The relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center work area in 2023.

Exclusive breastfeeding can reduce child morbidity and mortality. According to the government regulation of the Republic of Indonesia number 33 of 2012 concerning exclusive breastfeeding, exclusive breastfeeding is breast milk that is given to babies from birth for six months without adding and or replacing it with other foods or drinks. Exclusive breastfeeding is a baby who is only given breast milk for six months without the addition of other liquids such as formula

milk, oranges, honey, tea and water, and without additional food or medicine. Based on the results of this study, it shows that there is a significant relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Working Area in 2023. This research is in line with research conducted by Pramulya (2021) which states that there is a relationship between exclusive breastfeeding and the incidence of stunting in the work area of the Selopampang Health Center, Temanggung Regency [9]. And it is not in line with research conducted by Cynthia (2019) which states that there is no significant relationship between exclusive breastfeeding and the incidence of stunting in children aged 12-59 months at Wangaya Hospital Denpasar City [10]

4.4. The relationship between maternal employment status and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center work area in 2023.

Occupation is one of the factors that can affect the socio-economic status of a family. Mothers who work indirectly can increase income for the family, later they will also be able to play a role in determining the economic status of the family. Based on the results of the study, it shows that there is no significant relationship between the employment status of mothers and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Work Area in 2023. This is because the majority of mothers stay at home or work as housewives, so control related to food intake is quite maintained. This result is in line with what was done by Aisyah (2019) who stated that there is no significant relationship between maternal work and the incidence of stunting in SDI Taqwiyyatul Wathon [11]. This result is not in line with research conducted by Savita (2020) which states that there is a relationship between maternal work and the incidence of stunting [7]

4.5. The relationship between maternal knowledge level and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center work area in 2023.

Mother's level of knowledge influences individual behavior. The higher the mother's knowledge, the higher the awareness of participating in society and in her family. Mother's knowledge can be obtained from the experience of oneself and parents. Based on the results of the study, it shows that there is a significant relationship between the level of maternal knowledge and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Work Area in 2023. The results in the field found that from several questionnaires of knowledge the majority of mothers answered incorrectly starting from the question of the function of food for children, feeding that must be adjusted to the age of toddlers but mothers answered according to the child's preferences and there are still many mothers who answer incorrectly regarding what is MP-ASI? which should be complementary foods, mothers even answer breast milk substitutes, it can be concluded that there is still a lack of understanding related to providing nutrition for children. This is in line with research conducted by Angraini (2021) stating that there is a relationship between maternal knowledge and stunting events in the Working Area of the Mumpo Regulation Puskesmas in Central Bengkulu Regency [12]. And it is not in line with research conducted by Adriany (2021) that there is no relationship between knowledge and the incidence of stunting. And stated that the cause of motherhood is because many mothers do not know what stunting is and how stunting occurs in toddlers, as well as how to prevent stunting [13]

4.6. The relationship between family income and the incidence of stunting in toddlers aged 24-59 months in the working area of the Nambo Health Center in 2023.

Income is the level of people's ability to spend their income according to their needs and is a factor that determines the quantity and quality of food they consume. Based on the results of the study, there is no significant relationship between family income and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Working Area in 2023. The results of research in the field found that even though mothers have less income, mothers still try to provide good food for children such as staple foods, vegetables, animal side dishes, and vegetable side dishes. This is in line with what was done by Aridiyah (2015) who stated that there was no significant relationship between the incidence of stunting in toddlers in rural and urban areas [14]. This result is not in accordance with research conducted by Andriani (2020) which states that there is a relationship between family economic status and the incidence of stunting [15]

4.7. . The relationship between the history of infectious diseases and the incidence of stunting in toddlers aged 24-59 months in the working area of the Nambo Health Center in 2023.

Infectious diseases are one of the direct causes of stunting, the relationship between infectious diseases and the fulfillment of nutritional intake cannot be separated. The presence of infectious diseases will exacerbate the situation if there is a lack of nutritional intake. Based on the results of the study, it shows that there is no significant relationship between a history of toddler infectious diseases and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Work Area in 2023. The results in the field found that there were several toddlers affected by diarrheal diseases and ARI, where the data obtained was seen from the history of toddlers in the last three months. This is in line with research conducted by Khairani (2020) which states that there is no relationship between a history of

infectious diseases and the incidence of stunting in toddlers at the Posyandu, Ratu Samban District, Bengkulu City [16]. This result is not in accordance with research conducted by Tandang (2018) which states that there is a significant relationship between a history of infectious diseases and the incidence of stunting in toddlers with a positive correlation direction in the Wae Nakeng Health Center Area in 2018 [17]

4.8. The relationship between access to clean water and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center work area in 2023.

Maintenance of clean water sources that meet health requirements in households is proven to reduce the risk of diarrheal disease between 30-40. Based on the results of the study, there is no significant relationship between access to clean water and the incidence of stunting in toddlers aged 24-59 months in the Nambo Health Center Working Area in 2023. This is because there are already clean water access facilities from the government so that the majority of respondents obtained have used pump/plumbing well water even though there are still some respondents who use dug wells, where in this study it is seen from the good (odorless, tasteless, colorless) and bad (smelly, tasteless and colored) categories with direct observation with the naked eye. This result is in line with what was done by Lestari (2014) which stated that there is no significant relationship between access to clean water and the incidence of stunting [18]. This result is not in line with research conducted by Ahmad (2019) which states that there is a relationship between access to clean water and the incidence of stunting [19]. Stating that families who do not have access to clean water will be significantly more at risk of stunting than families who have access to clean water. And also not in line with research conducted by Angraini (2021) which states that there is a relationship between access to clean water and the incidence of stunting [13]

4.9. The Relationship between Availability of Latrines and Stunting in Toddlers Age 24-59 Months in the Work Area of the Nambo Health Center in 2023.

Healthy latrines are latrines that meet health requirements that can prevent the spread due to direct human feces and can prevent disease-carrying vectors in latrines users and those in the surrounding environment. Based on the results of the study, it was shown that there was no significant relationship between the availability of latrines and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023. This was because most respondents had goose neck latrines and had septic tanks, although there are still respondents who have latrines but do not have a septic tank (directly in the sea) and there are also respondents who are found living in a neighbor's/public toilet. Latrines are categorized as eligible (if they do not result in the direct spread of hazardous materials and can prevent disease-carrying vectors to users and the surrounding environment) and are not eligible (if they result in the direct spread of hazardous materials and cannot prevent disease-carrying vectors to users and the surrounding environment) based on Permenkes No. 3 of 2014 [20]. This is in line with research conducted by Ahmad (2019) which shows that there is no significant relationship between having latrines that do not meet the requirements and the incidence of stunting [19]. And these results are not in accordance with research conducted by Purnama (2019) that there is a relationship between the type of latrines and the incidence of stunting in toddlers which states that [21]

5. Conclusion

- There is no significant relationship between the sex of toddlers and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is a significant relationship between birth weight and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is a significant relationship between exclusive breastfeeding and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is no significant relationship between the mother's employment status and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is a significant relationship between the level of mother's knowledge and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is no significant relationship between family income and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is no significant relationship between the history of infectious diseases in toddlers and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is no significant relationship between access to clean water and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.
- There is no significant relationship between the availability of latrines and the incidence of stunting in toddlers aged 24-59 months in the Working Area of the Nambo Health Center in 2023.

Compliance with ethical standards

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Disclosure of conflict of interest

All authors in the making of this scientific article have no conflict of interest.

Statement of informed consent

All informants/respondents involved in this study have stated their consent as informants/respondents to be interviewed and provided information/information in accordance with research needs.

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