

The Relationship Between Family Sanitation and Stunting (A Case Study in the Ampenan District, Mataram City)

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Abstract: A densely populated urban area with slum areas, such as Ampenan District, Mataram City, has a risk of worsening sanitation and nutritional status of toddlers. This study aimed to determine the effect of family sanitation on the incidence of stunting in Ampenan District. A total of 99 toddlers and their families were taken as samples through purposive sampling. Stunting data was collected through the PPGBM electronic document review technique from community health centers in Ampenan District. Sanitation data was collected through interviews with the families of the toddlers. The test of the relationship between sanitation and stunting was approached using regression analysis. The prevalence of stunting in Ampenan District is relatively low (6.03%), with the highest vulnerability in toddlers aged 25–36 months. Family sanitation (X) had a significant positive effect on the nutritional status (Z-score) of toddlers (Y), with the model $Y = -7.4532 + 0.0744 X$. The implication is, to target stunting prevention (Z score >-2) in Ampenan, the sanitation score must be >73.3.

Keywords: Family sanitation; Stunting; Toddlers.

Introduction

Children in the toddler growth phase need to fulfill several factors to support their golden age during the first 1000 days of life, including adequate nutritional intake, a clean environment, and healthy living behavior from their family. Failure to meet these various factors can cause children to become ill repeatedly and experience growth and developmental problems, resulting in stunting. Stunting is a condition of chronic malnutrition that reflects impaired growth and development in children, measured by tall for age with a Z-score < -2 (Rezki et al., 2024; Rosidin et al., 2024).

Malnutrition remains a major problem for infants and toddlers, with the global prevalence of stunting reaching 22.2%, or approximately 149.2 million children. This problem is prevalent in developing countries, including Indonesia. In West Nusa Tenggara Province, the prevalence of stunting was recorded at 24.73%, higher than the national figure of 21.6%. According to the WHO, this figure is still considered high, falling within the

20–30% range. This indicates that there are factors causing stunting that have not been fully resolved (Afriawan, 2024; Assani et al., 2024).

Stunting in Indonesia is influenced by several factors, namely first, maternal factors such as gestational age, nutritional status, and breastfeeding patterns; second, child factors, including low birth weight, infectious diseases, and immunization; and third, environmental factors, which include poor sanitation, low education, and exposure to pesticides. An unhealthy environment can increase the risk of diseases such as diarrhea and infections which contribute to the incidence of stunting (Nirmalasari (2020; Soraya et al., 2022).

Ampenan District is a densely populated urban area in Mataram City that faces sanitation challenges because it still has slum areas. Ampenan, dengan masalah kumuh berupa gangguan akses jalan (71%), sampah (67%), bangunan tidak beraturan (59%), drainase (42%), sampah bercampur drainase (13%), genangan air (12%), kebutuhan air minum (4%), dan kebakaran (2%). This condition is in line with the emergence of

various environmental sanitation problems, such as in terms of facilities, the lack of proper waste disposal facilities, where many residents only use plastic containers without covers and which are not airtight. This problem is exacerbated by the behavior of most residents who have not implemented Clean and Healthy Living Behavior (CHLB), the common practice of throwing garbage carelessly, and low awareness of the importance of maintaining environmental sanitation (Desimal *et al.*, 2023; Rahmat *et al.*, 2025).

Unsanitary environments and poor hygiene practices can increase the risk of infectious diseases, particularly diarrhea, in infants and toddlers. Repeated infections can interfere with nutrient absorption and lead to decreased nutritional status. This directly impacts the growth of infants to toddlers and contributes to stunting (Sa'ban *et al.*, 2021; Soraya *et al.*, 2022; Ekaputri *et al.*, 2024; Rezki *et al.*, 2024). Based on the background of the problem above, this study was conducted to determine the distribution of stunting and family sanitation in Ampenan District, Mataram City and to determine the influence of family sanitation on stunting incidents in the district.

Materials and Methods

In general, the implementation of this research consists of a preparation stage, which includes socialization of the research plan, determination of samples and determination of data collection techniques, data collection stage and data analysis (Figure 1)

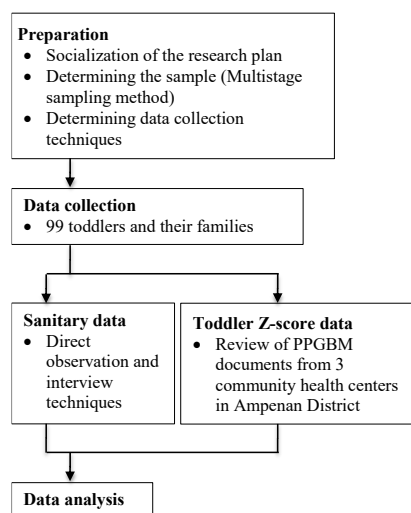


Figure 1. Work flow chart of research on the effect of sanitation on the nutritional status of toddlers in Ampenan District, Mataram City

The samples

Samples of toddlers and their families were taken using a purposive sampling method from 3 community health center work areas in Ampenan District, Mataram City, Puskesmas Ampenan, Puskesmas Pejeruk and Puskesmas Tanjung Karang (Figure 2).

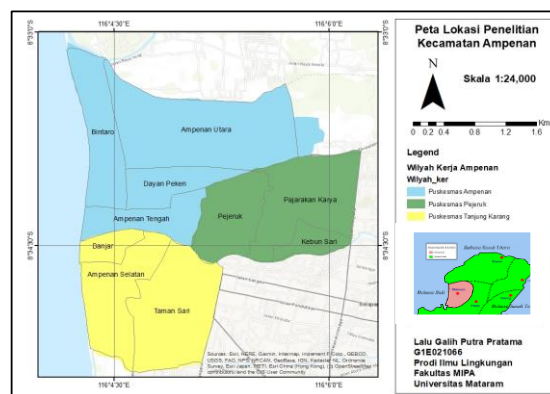


Figure 2. Samples of toddlers and their families were taken from 3 community health center work areas in Ampenan District, Mataram City.

Ninety-nine (99) sample units of toddlers and their families were obtained, consisting of 66 sample units of stunted toddler families and 33 sample units of normal toddler families.

Data collection procedures

Family environmental sanitation data was collected through direct observation techniques and interviews with each head of the sample family. The measurement instrument was a questionnaire using the Guttman Scale (yes = 1 and no = 0) for a number of questions or statements in 7 aspects of sanitation, which are adjusted to produce interval data (Putri and Yuniasih, 2022).

The measurement of family sanitation in these 7 aspects referred to the Indonesian Minister of Health Regulation Number 2 of 2023, namely the availability of clean water, toilets, handwashing with soap (HWS), waste disposal sites, liquid waste management facilities, personal hygiene, and clean and healthy living behaviors (CHLB). Stunting data was taken from the Community-Based Nutrition Recording and Reporting (CBNRR) electronic document from 3 community health center work areas in Ampenan District. Data from the documents were filtered to

obtain data on substantive toddler variables, namely address, age, gender, and the results of the last tall measurement. The nutritional status of toddlers (stunted or not) was determined by the Z-score value, a standard deviation value that shows how far the child's tall deviates from the standard median value. The Z-score was calculated using a comparison between the child's actual height measurement and the median standard deviation of the WHO reference population (Equation 1) (Nugroho *et al.*, 2021; Damayanti & Jakfar, 2023):

$$Z - score = \frac{\text{Child's tall} - \text{Median reference}}{\text{Standard deviation value}} \dots (1)$$

The nutritional status categories of toddlers based on the Z-score can be seen in Table 1.

Table 1. Classification of nutritional status of toddlers based on Z-score values

Nutritional Status	Z-score
Tall (Normal)	≥ -2
Stunted	-2 to -3
Severely stunted	< -3

Data analysis

Testing the relationship between family sanitation scores (X) and Z-score (Y) was approached using adjusted regression analysis (Hasanah *et al.*, 2021; Febrianita *et al.*, 2022). The resulting regression model (if the test results are valid, where the significance $F < 0.01$) can be used to predict standard family sanitation values to achieve the target Z score > -2 (avoiding the risk of stunting).

Results and Discussion

Prevalence of stunting in Ampenan District, Mataram City

Prevalensi stunting (proporsi balita dalam suatu populasi yang mengalami kondisi gagal tumbuh akibat kekurangan gizi kronis) di Kecamatan Ampenan Kota Mataram termasuk kategori rendah (di bawah 10%), yaitu 6.03%. (Tabel 2). In Ampenan District, the prevalence of stunting in male toddlers was slightly higher than in female toddlers. Boys are 2.4 times more likely to experience stunting than girls due to differences in body composition. Boys have more muscle mass and are metabolically more active, requiring more energy and macronutrients to support their more exploratory physical activity. Meanwhile, female toddlers generally

have genetic resistance and a stronger immune system against infections during early development (Herawati *et al.*, 2020; Maliga *et al.*, 2022; Mayasari *et al.*, 2022; Putri & Yuniasih, 2022).

Table 2. Distribution of stunted toddlers based on gender and age range in Ampenan District, Mataram City

		Stunted toddlers	
		Number of incidents	Prevalence (%)
Gender			
Boy	1920	123	6.41
Girl	1730	97	5.61
Total	3650	220	6.03
Age range (Months)			
13 – 24	907	52	5.73
25 – 36	899	75	8.34
37 – 48	997	55	5.52
49 – 60	847	38	4.49

Source: Electronic document of Community-Based Nutrition Recording and Reporting, Ampenan District, Mataram City

Toddlers aged 25–36 months had the highest prevalence of stunting, at 8.34%, and toddlers aged 49–60 months had the lowest prevalence (4.49%). The high prevalence of stunting in children aged 25–36 months is a clinical manifestation of cumulative growth failure during the first 1,000 days of life (HPK). The impact of chronic malnutrition during this period generally only becomes apparent after the child is two years old (Lopa *et al.*, 2022; Mayasari *et al.*, 2022). The high vulnerability at the age of 25–36 months is also triggered by several transitional factors, namely the transition from complementary foods to family foods, where children often enter a picky eater phase and are therefore susceptible to chronic calorie deficits, children are in a phase of active motor exploration but do not yet have good hygiene awareness, exposure to repeated infections due to an unhealthy environment, a decrease in the intensity of care because parents consider the child to be old enough, so that details of hygiene and food intake become less supervised (Putri & Yuniasih, 2022; Raihani *et al.*, 2023).

The low prevalence in the 49–60 month age range occurs because the child's digestive tract is more adaptive to adult menus, the immune system has matured, and healthy hygiene habits begin to form so that the frequency of infections decreases. Children approaching the age of 5

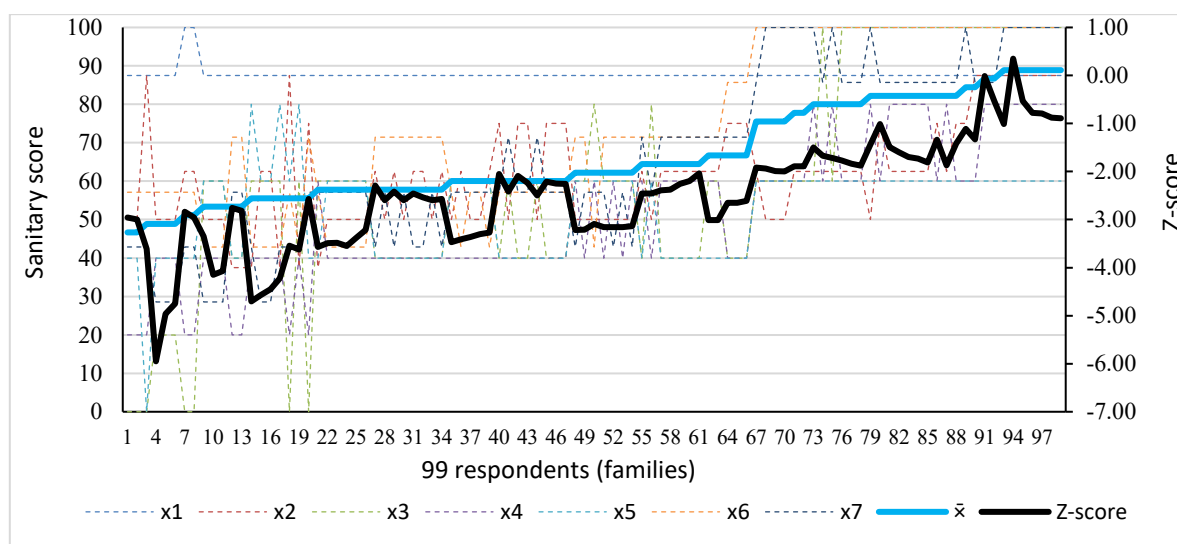
years have also generally entered a pre-elementary school environment where they receive nutritional monitoring and health education from their social environment (Elizabeth *et al.*, 2019; Fadilah, 2022; Nirma & Lado, 2023; Raihani *et al.*, 2023; Widyastuti *et al.*, 2023).

The majority of parents in Ampenan District (76%) had a high school education. This educational background significantly determines their ability to understand nutritional needs, prepare balanced menus, and implement appropriate parenting patterns. The risk of stunting can increase up to 17-fold in families without adequate educational backgrounds. This is in addition to internal household factors and a less supportive physical environment. This high prevalence is also exacerbated by systemic constraints such as the unequal distribution of specific nutrition education, weak post-intervention supervision, and minimal integration of environmental and nutrition health services (Rahayu & Darmawan, 2019; Soeracmad, 2019; Putri *et al.*, 2021). Community health centers (Puskesmas) play a crucial role as the frontline for early detection and comprehensive health services. The incidence of stunting is highly

correlated with the level of health facility utilization. Stunted toddlers generally come from families who are passive in routine visits, while normal toddlers generally come from families who tend to receive regular monitoring and timely nutritional interventions in primary health services (Dewi *et al.*, 2019; Windasari *et al.*, 2020; Yanti *et al.*, 2020).

Distribution of family sanitation values and nutritional status of toddlers

The average sanitation score for each sample family is the average of the scores from the 7 sanitation aspects measured. Of the 99 families in three community health center working areas in Ampenan District, the first 66 families had stunted toddlers, with an average sanitation score ranging from 46.67 (does not meet health requirements) to 66.67 (less than adequate) and a Z-score ranging from -5.95 (severely stunted) to -2.04 (stunted). Meanwhile, the next 33 families had toddlers who were not stunted, with an average sanitation score ranging from 75.56 to 88.89 (fairly good to very good) and a Z-score ranging from -1.99 to 0.35 (normal) (Figure 3).



x₁: Availability of clean water; x₂: Toilets; x₃: Handwashing facilities with soap; x₄: Waste disposal facilities; x₅: Wastewater management facilities; x₆: Personal hygiene; x₇: Clean and healthy living habits; X̄: Weighted average sanitation score.

Figure 3. Sanitation scores and Z-scores (nutritional status) of toddlers of 99 family units observed in Ampenan District, Mataram City.

Families with inadequate sanitation, even those that did not meet health standards, were generally caused by the lack of two aspects of sanitation: waste disposal facilities and wastewater management facilities. Field

observations confirm that almost all families lack covered trash bins, leading to the accumulation of waste in residential areas, and the practice of disposing of domestic wastewater directly into open drains without treatment. Poor management

of these two aspects creates a pro-pathogenic ecosystem and invites the presence of disease vectors such as flies and rats, which pose a high risk of triggering intestinal infections in toddlers. As long as these two priority aspects remain unaddressed, the risk of subclinical infections will continue to threaten toddlers, thus preventing stunting from occurring optimally (Bakara, 2023; Rezki *et al.*, 2024; Ministry of Health of the Republic of Indonesia, 2025). Approximately 10% of families have toilets that did not meet health standards. This is due to suboptimal technical and physical aspects of the building, such as minimal natural lighting and inappropriate ventilation size and placement, resulting in poor air circulation. Poor lighting and ventilation create stuffy, damp, and smelly spaces, potentially triggering the growth of pathogenic microorganisms. As a result, even though toilet facilities are functional, they do not meet the criteria for healthy and comfortable sanitation for their users (Pradana, 2021; Zahra *et al.*, 2023; Mariana *et al.*, 2024).

In terms of clean water availability, all observed families had sanitation facilities that met the very good requirements. Fulfillment of these requirements indicates that the community generally has functional and essential physical facilities at the individual level (Zalukhu *et al.*, 2022; Simanihuruk *et al.*, 2023). Although these supporting facilities for clean water provision have been met, their effectiveness in breaking the chain of disease remains highly dependent on the success of broader environmental governance, namely regional waste and wastewater management. The most important finding of this study is that families with inadequate sanitation and those that do not meet health requirements all experienced stunting, while families with adequate to very good sanitation all had toddlers who were not stunted.

The relationship between family sanitation and stunting incidence

The results of the regression analysis showed that family sanitation (X) had a significant positive effect (Significance F: 7.1759E-28) on the Z-score, with the model $Y = -7.4532 + 0.0744 X$. An important interpretation of this model is that improving family sanitation can increase the Z-score (nutritional status) of toddlers or in other words reduce the risk of stunting in the family. If the sanitation scores are arranged in increasing order, the Z-score series

also tended to increase, as can be seen in Figure 3 above.

The implications of the resulting model included that for a target Z-score >-2 (avoiding the risk of stunting), the family sanitation score must be >73.3 . This is because if the score is even slightly lower than that, for example 73.2, then the Z-score = -2.00712. Thus, a sanitation score of 73.5 can be used as a minimum standard for family environmental health with the category of sufficient requirements. The implications of these results should be implemented into stunting prevention programs, particularly in Ampenan District, Mataram City and generally for other districts with similar sanitation conditions in Indonesia. Based on the results of this study, it also shows the need for environmental health interventions, especially for aspects of waste disposal facilities and domestic liquid waste management facilities. Indeed, sanitation does not have a direct influence on the incidence of stunting, because stunting is basically a result of chronic malnutrition, however, sanitation has a fundamental function as a chain breaker for recurrent infections, so that nutritional intake disorders and growth disorders in toddlers can be prevented (Soraya *et al.*, 2022; Nirma & Lado, 2023; Rahmat *et al.*, 2025).

Conclusion

The prevalence of stunting in Ampenan District is relatively low (6.03%), with the highest vulnerability in toddlers aged 25–36 months. Family sanitation (X) had a significant positive effect on the nutritional status (Z-score) of toddlers (Y), with the model $Y = -7.4532 + 0.0744 X$. The implication is that for the target of stunting prevention (Z-score >-2) in Ampenan District, the family sanitation score must be >73.3 .

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