



## **RELATIONSHIP BETWEEN CLEAN AND HEALTHY LIVING BEHAVIOR AND THE INCIDENCE OF STUNTING IN TODDLERS**

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### **ABSTRACT**

Stunting is a condition of a short body based on the height-for-age index. Clean and healthy living behavior is an important behavior that can prevent stunting. The purpose of the study was to determine the relationship between clean and healthy living behavior and the incidence of stunting in toddlers at the Koto Panjang Ikua Koto Health Center. This study is an observational study with a cross sectional approach, the sampling technique used was proportional sampling with 82 respondents. Data were collected using a microtoise, the maternal and child health book and a questionnaire. The data were analyzed using chi-square and logistic regression test. The results showed a relationship between weighing toddlers and the incidence of stunting ( $p=0,003$ ), exclusive breastfeeding is related to the incidence of stunting ( $p=0,009$ ), the habit of washing hands with soap is related to the incidence of stunting ( $p=0,039$ ), the use of healthy latrines is related to the incidence of stunting ( $p=0,017$ ), eradication of mosquito larvae is related to the incidence of stunting ( $p=0,032$ ). The results of the multivariate analysis showed that weighing toddlers had the most dominant relationship with the incidence of stunting (OR:6,376). Concluded that clean and healthy living behavior is significantly associated with the incidence of stunting.

Keywords: clean and healthy living behavior; stunting; toddlers

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## **INTRODUCTION**

The World Health Organization (WHO) states that Indonesia ranks second highest in stunting cases in the Southeast Asia region, with an average prevalence of stunted toddlers at 24.4% in 2021. However, based on data from the Indonesian Nutrition Status Survey (INSS), this figure decreased to 21,6% in 2022. Nonetheless, this rate is still quite high and has not yet reached the governments's target of reducing stunting prevalence to 14% by 2024 (Kementrian Kesehatan RI, 2021). Efforts to prevent and address stunting should not only focus on improving nutritional interventions but also need to consider other factors such as lifestyle, sanitation, and environmental hygiene (Aprizah, 2021). Clean and Healthy Living Behavior (CHLB) has an indirect effect on the incidence of stunting through a history of infectious disease. Infectious diseases can negatively impact a child's growth and nutritional status because they can cause decreased food intake, impaired nutrient absorption, and direct nutrients loss. Toddlers are vulnerable to various health problems, especially infections such as diarrheas, upper respiratory tract infections, helminthiasis, and other chronic diseases. The implementation of clean and healthy living behavior in daily life, especially within the household environment, plays an important role in reducing the risk of infections in mothers and children. Thus, clean and healthy living behavior can be a supporting factor in achieving public

health indicators. Based on this, it can be concluded that a low level of health can contribute to emergence of nutritional problems in both individuals and families (Agustina, 2022). According to research by Prendergast and Humphrey (2014) stunting is not only caused by nutritional factors but is also influenced by hygiene conditions, sanitation, and access to clean water. In other words, environments with poor sanitation can increase the risk of stunting. Limited access to healthcare service, including sanitation facilities and clean water, makes children more vulnerable to infectious diseases that contribute to growth disorders.

In efforts to realize a Healthy Household, the implementation of clean and healthy living behavior within the household environment aims to build awareness and the ability of family members to know, desire, and be capable of practicing clean and healthy lifestyles, while actively contributing to public health programs. A household is considered healthy if meets 10 indicators, namely : delivery assisted by healthcare professionals, exclusive breastfeeding for infants, monitoring toddlers growth through weighing, consistent use of clean water, habit of washing hands with soap and clean water, use of proper latrines, elimination of mosquito larvae in the home environment, daily consumption of vegetables and fruits, regular physical activity, and no smoking inside the house (Departemen Kesehatan RI, 2009)

Research conducted by Sriyanah et al (2023) at Karuwisi Health Center showed that families who do not implement clean and healthy living behavior tend to have children experiencing stunting, even though some clean and healthy living behavior indicators have been met. Additionally, another study revealed a significant relationship between clean and healthy living behavior at the household level and the incidence of stunting with a p-value of 0,009. Families that do not practice clean and healthy living behavior at home have a 6,5 times higher risk of having stunted children compared to families who properly implement clean and healthy living behavior (Aprizah, 2021).

West Sumatra province is one of the regions with the highest stunting rates based on the 2022 INSS data at 25,2%, which is an increase compared to 23,3% in 2021. In Padang City, the prevalence of stunting in 2022 was recorded at 7,1%,. Some health centers with the highest stunting rates include Koto Panjang Ikua Koto Health Center at 16%, Anak Air Health Center at 15,5% and Seberang Padang Health Center at 15,3%. Meanwhile, the coverage of households implementing clean and healthy living behavior reached 72,647 households or 53,35% and in the working area Koto Panjang Ikua Koto Health Center, the percentage of clean and healthy living behavior households was 53,22% (Dinas Kesehatan Kota Padang, 2022).

Currently, most studies on stunting still focus on aspect of nutritional intake and family economic condition. However, there is still limited in-depth research on how Clean and Healthy Living Behavior (CHLB) contributes to the incidence of stunting, especially at the household level. Therefore, this study aims to determine the level of implementation clean and healthy living behavior in households that have toddlers with stunting incidence.

## **METHOD**

This study employed a quantitative approach with an analytical observational design and cross-sectional method. The population in this study consisted of households with toddlers residing in the working area of Koto Panjang Ikua Koto Community Health Center. The sampling technique used was proportional sampling with 82 respondents. Data collection focused on several aspects. Stunting was measured using a microtoise with an accuracy of 0,1 cm, then compared to the WHO growth standards using the z-score table. Delivery assisted by health workers was assessed by recording the history from the maternal and child health book as official proof and documentation that the mother and child received healthcare services. Variables such as exclusive breastfeeding, use of clean water, handwashing habit with soap, use of sanitary latrines, mosquito larvae eradication, consumption of fruits and vegetables, physical activity and smoking behavior inside the home were measured using

a questionnaire. The exclusive breastfeeding questionnaire consist of three statements (asi1,asi2,asi3) whose validity was tested using Bivariate Pearson (Correlation Product Moment), items with a total score of 0,367-0,935 so it can be said that all items are valid with a significance of 0,05. The reliability test use Cronbach's Alpa with a result of 0,747 so that the questionnaire was declared reliable. The clean water usage questionnaire consist of five items (pab1 of pab5) with a total score of 0,415-1,000 so it can be said that all items are valid with a significance of 0,05. The result of 0,872 so that the questionnaire was declared reliable. The handwashing with soap habit questionnaire consist of seven items (ctps1 of ctps7) with a total score of 0,415-0,756 so it can be said that all items are valid with a significance of 0,05. The result of 0,752 so that the questionnaire was declared reliable.

The healty latrine questionnaire consist of six items (js1 to js6) with a total score of 1.000 so it can be said that all items are valid with a significance of 0,01. The result of 1.000 so that the questionnaire was declared reliable. The questionnaire on mosquito larvae eradication consist of four items (jn1 to jn4) with a total score of 0,645-0,756 so it can be said that all items are valid significance of 0,01.. The fruit and vegetable consumption questionnaire consist of three items (bs1,bs2,bs3) with a total score of 0,553-0,829 so it can be said that all items are valid with a significance of 0,01. The result of 0,831 so that the questionnaire was declared reliable. The physical activity questionnaire consist of two item (af1 and af2) with a total score of 0,760-0,877 so it can be said that all items are valid with a significance of 0,01. The result of 0,759 so that the questionnaire was declared reliable. The result of 0,743 so that the questionnaire was declared reliable. The smoking behavior questionnaire consist of two items (pm1 and pm2) with a total score of 0,446-0,772 so it can be said that all items are valid with a significance of 0,01. The result of 0,801 so that the questionnaire was declared reliable. Data analysis in this study was done in three steps. First, univariate analysis was used to show often each variable appeared, both independent and dependent. Second, bivariate analysis was used to see if there was a relationship between the 10 clean and healthy living behavior indicators and stunting, using a chi-square test with a 5% significance level (0,050. Last, multivariate analysis was done to find out how many clean and healthy living behavior indicators were related to stunting and which one had the strongest influence, using logistic regression. This study met ethical feasibility with the certificate issued by The Research Ethics Committee Faculty of Medicine, Universitas Andalas Number 320/UN.16.2/KEP-FK/2025.

## RESULT

Table 1.  
Frequency Distribution of Clean and Healthy Living Behavior Practices

Characteristics	f	%
Birth History		
Not helped by health workers	0	0
Helped by health workers	82	100
Exclusive Breastfeeding		
Not exclusive breasfeeding	34	41,5
Exclusive breastfeeding	48	58,5
Toddler Weighing		
Not routine	37	45,1
Routine	45	54,9
Use of Clean Water		
Not enough	1	1,2
Good	81	98,8
Hand Washing Habits		
Not enough	37	45,1
Enough	45	54,9
Use Of Healthy Latrines		
Not healthy	11	13,4
Healthy	71	86,6

Characteristics	f	%
Eradication of Mosquito Larvae		
Not enough	34	41,5
Enough	48	58,5
Eating Fruit and Vegetables		
Not enough	2	2,4
Good	80	97,6
Physical Activity		
Not enough	1	1,2
Enough	81	98,8
Smoking Behavior		
Smoking in the house	80	97,6
Do not smoke	2	2,4
Clean and Healthy Living Behavior		
Strata I	0	0
Strata II	11	13,4
Strata III	34	41,5
Strata IV	37	45,1

Based on table 1, the percentage of mothers giving birth assisted by health workers is 100%, the history of toddlers not receiving exclusive breastfeeding is 58,5%, routine weighing of toddlers 54,9%, the use of clean water in the good category is 98,8%, handwashing with soap habits in the category is 54,9%, the use of proper sanitation facilities is 86,6%, mosquito larvae elimination in the good category is 58,5%, consumption of fruits and vegetables in the good category is 97,6%, physical activity in the good category is 98,8%, smoking behavior in the house is 97,6% and the behavior of clean and healthy living in category II strata is 13,4%, strata III is 41,5% and strata IV is 45,1%.

Table 2.  
Frequency Distribution of Stunting Incidents

Variable	f	%
Incidence of Stunting		
Stunting	31	37,8
Not stunting	51	62,2

Based on table 2, it shows that the incidence of non-stunting is 51 respondents (62,2%) and the incidence of stunting is 31 respondents (37,8%).

Table 3.  
The Relationship Between Clean and Healthy Living Behavior and The Incidence of Stunting

Variable	Incidence of Stunting				Total		P value
	Stunting		Not Stunting		f	%	
	f	%	f	%			
Birth History							
Childbirth not assisted by health workers	0	0	0	0	0	0	0,009
Childbirth assisted by health workers	31	37,8	51	62,2	82	100	
Exclusive Breastfeeding							
Not exclusive breastfeeding	19	55,9	15	44,1	34	100	0,003
Exclusive breastfeeding	12	25,0	36	75,0	48	100	
Toddler Weighing							
Not routine	21	56,8	16	43,2	37	100	1,000
Routine	10	22,2	35	77,8	45	100	
Use of Clean Water							
Not enough	0	0,0	1	100	1	100	0,039
Good	31	38,3	50	61,7	81	100	
The Habit of Washing Hands with Soap							
Not enough	19	51,4	18	48,6	37	100	0,017
Good	12	26,7	33	73,3	45	100	
Use of Healthy Latrines							
Not healthy	8	72,7	3	27,3	11	100	

Variable	Incidence of Stunting				Total		P value
	Stunting		Not Stunting				
	f	%	f	%	f	%	
Healthy	23	32,4	48	67,6	71	100	0,032
Eradication of Mosquito Larvae							
Not enough	18	52,9	16	47,1	34	100	
Good	13	27,1	35	72,9	48	100	0,140
Eating of Fruits and Vegetables							
Not enough	2	100	0	0,0	2	100	
Good	29	36,3	51	63,8	80	100	0,378
Physical Activity							
Not enough	1	100	0	0,0	1	100	
Good	30	37,0	51	63,0	81	100	0,524
Smoking Behavior							
Smoke	31	38,8	49	61,3	80	100	
Do not smoke	0	0,0	2	100	2	100	0,012
Clean and Healthy Behavior							
Strata II	8	72,7	3	27,3	11	100	
Strata III	8	23,5	26	76,5	34	100	
Strata IV	15	40,5	22	59,5	37	100	
Total	31	37,8	51	62,2	82	100	

Based on table 4, it can be seen that 100% of deliveries are assisted by health workers. Since the data does not vary, it cannot proceed to the chi-square test. The analysis showed a significant relationship between stunting and several variables, including exclusive breastfeeding ( $p=0,009$ ), routine weighing of toddlers ( $p=0,003$ ), handwashing with soap ( $p=0,039$ ), the use of healthy latrines ( $p=0,017$ ), mosquito larvae eradication ( $p=0,032$ ) and overall clean and healthy living behavior ( $p=0,012$ ). Meanwhile, the variables of clean water usage ( $p=1,000$ ), fruit and vegetable consumption ( $p=0,140$ ), physical activity ( $p=0,378$ ), and indoor smoking behavior ( $p=0,524$ ) showed no significant relationship with the incidence of stunting.

Table 5.  
Multivariate Analysis

Variable	p-value	Exp $\beta$ (CI 95%)
Toddlers Weighing	0,001	6,376 (2,096-19,398)
Wash Hands with Soap	0,009	4,444 (1,463-13,500)
Eradication of Mosquito Larvae	0,029	3,238 (1,129-9,288)

Based on table 5, it is found that the variables of weighing toddlers, handwashing with soap habits and mosquito larva eradication are significantly associated with the incidence of stunting. Then, the toddler weighing variable is the most dominant variable related to the incidence of stunting at the Koto Panjang Ikua Koto Health Center with an OR value of 6,376 (2,096-19,398)

## DISCUSSION

### The Relationship Between Delivery Assisted by Health Workers and the Incidence of Stunting

The results of the study revealed that all mother gave birth with the delivery assisted by health workers (100%). This finding is consistent with research conducted by Lestari and Sari (2023) which also showed that all deliveries were attended by medical personnel. One of the main reasons respondents chose to give birth in health facilities with professional assistance was to enable early detection of possible complications that could increase the risk of morbidity and mortality for both mother and babies. Because the data had no variation, a chi-square test couldn't be applied.

### The Relationship Between Weight Monitoring and the Incidence of Stunting

This study shows a relationship between toddler weighing and the incidence of stunting. This findings is consistent with the research by Darmawan et al (2022) which also found a link between the frequency of visits to integrated health service post and stunting cases. The study emphasized

that active participation of mothers and toddlers in health-related activities has a positive correlation. Integrated health service post plays a crucial role in monitoring community health conditions, particularly for children under five. Monitoring toddler growth is essential for the early detection of potential growth faltering. This can be achieved through regular monthly weight measurement, which can be conducted at various health service facilities such as integrated health service post, village maternity clinics, public health centers, and other available venues. Weighing is one of the core components of the integrated health service post program and a key effort in improving the nutritional status of the community (Theresia, 2020).

### **The Relationship Between Exclusive Breastfeeding and the Incidence of Stunting**

This study shows a relationship between exclusive breastfeeding and the incidence of stunting. This finding is consistent with study by Risnanto et al (2023) which found a significant relationship between exclusive breastfeeding and stunting with a p-value of 0,000. However, the results also revealed that some toddlers who received exclusive breastfeeding still experienced stunting, possibly due to the low quality of breast milk and maternal conditions such as stress and anxiety. The study Nepali and Shakya (2019) found that mothers who received support from their husbands had a higher proportion of exclusive breastfeeding compared to those who did not receive such support. Exclusive breastfeeding is crucial because breast milk contains high levels of calcium and offers optimal absorption, leading to better height outcomes and more appropriate growth patterns according to standard growth curves in breastfed infants compared to those fed with formula milk.

### **The Relationship Between the Use of Clean Water and the Incidence of Stunting**

This study shows that there is no relationship between the use of clean water and the incidence of stunting. This findings is consistent with a study conducted by Nasution et al (2022) which reported a p-value of 0,320, indicating no significant association between clean water usage and stunting. Based on field observations, it was found that the community in Seraya island uses well water for daily needs. However, well water of poor quality is not consumed directly by the respondents. Instead, they purchase clean water from vendors and store it in special containers that are cleaned regularly, one to two times a week. Drinking water is also always boiled until it reaches a rolling boil before being consumed. However, this finding contrasts with the study by Nisa et al (2021) which identified a significant relationship between the use of clean water and the incidence of stunting, with a p-value of 0,047. Water can serve as a medium for transmitting various pathogens, causing different disease, including waterborne and water washed disease. One of the illnesses caused by contaminated clean and water sources is diarrhea. Diarrhea can lead to nutrient malabsorption, and if toddlers in their growth phase experience repeated diarrhea without adequate nutritional intake, it may results in stunting (Desyanti & Nindya, 2017).

### **The Relationship Between the Use of Sanitary Latrines and the Incidence of Stunting**

This study shows a relationship between the use of proper sanitation facilities and the incidence of stunting. This finding is consistent with the results of a study conducted by Dellavega et al (2022) which reported a p-value of 0,045, indicating a significant association between the use of proper latrines and the incidence of stunting. Unsanitary latrines can trigger various infectious diseases such as diarrhea and helminth infections. Poor hygiene and sanitation conditions negatively affect nutrient absorption in the digestive system, which can ultimately hinder the growth of young children. These infectious disease can spread through fecal-oral transmission due to the use of improper latrines, with contamination occurring via media such as soil, water, or other vectors carrying fecal matter (Kurniawati & Abiyah, 2021).

### **The Relationship Between Fruit and Vegetable Consumption and the Incidence of Stunting**

This study shows that there is no relationship between fruit and vegetable consumption and the incidence of stunting. This finding is consistent with the results of a study conducted by Simarmata and Patriawati (2024) which reported a p-value of 0,594, indicating no significant relationship. This

may be due to the fact that fruit and vegetable consumption is influenced by other factors such as household food security, economic conditions, and the mother's level of nutritional knowledge. However, this results contrasts with the findings of Afiah et al (2020) which showed that toddlers who do not finish their meals are three times more likely to experience stunting and the risk increases tenfold if the family does not provide fruits and vegetables. A similar study by Parvin et al (2022) in Bangladesh also found that fruit and vegetable consumption has a positive relationship with children's linear growth. This is due to the essential macronutrients found in fruits and vegetables that help maintain intestinal function, as well as their content of vitamin A and folate, which play important roles in childrens growth and development.

### **The Relationship Between Physical Activity and the Incidence of Stunting**

This study shows that there is no relationship between physical activity and the incidence of stunting. This finding is consistent with the study conducted by Simarmata and Patriawati (2024) which reported a p-value of 1.000, indicating no significant association between physical activity and stunting. However, the benefits of physical activity can still be experienced when it is performed regularly. This result contrasts with the findings of Sari et al (2022) who identifiend a relationship between daily physical activity and the incidence of stunting in children ( $p=0,009$ ). Low levels of physical activity are one of the contributing factors of stunting, even though such activity includes various forms of body movement, including exercise, which serves to balanced energy intake and expenditure, as well as support the efficiency of the body's metabolic processes.

### **The Relationship Between Smoking Behavior and the Incidence of Stunting**

This study shows that there is no significant relationship between thr habit of smoking indoors and the incidence of stunting, although there is tendency for smoking behavior to increase the risk of stunting. These findings are consistent with a study by Sari (2017) which reported a p value of 0,610, indicating no statistically significant association. This may be due to the lack of measurement of nicotine levels inhaled by parents in the study, making it impossible to determine the relevant threshold for inflammation. However, findings from the Pusat Kajian Jaminan Sosial-Universitas Indonesia (2019), indicate that parental smoking behavior contributes to stunting and negatively affects children's intelligence levels. Smoking is also associated with an increased risk of poverty. The study states that smoking households tend to allocate more of their budget to cigarettes, which reduces the allocation for essential nutritional needs such as protein and cabohydrates. As a results, the risk of stunting increases. Children of smoking parents were reported to weigh an average og 1,5 kg less and be 0,34 cm shorter than childrem of non-smoking parents.

### **The Relationship Between Clean and Healthy living Behavior and the Incidence of Stunting**

This study shows a relationship between clean and healthy living behavior and the incidence of stunting. It was found that only two respondents consistently applied all 10 clean and healthy livng behavior indicators in their daily live. The lack of clean and healthy living behavior implementation affect the poor nutritional status of toddlers, as good clean and healthy living behavior contributes to children's nutritional conditions. Implementation the ten clean and healthy living behavior indicators in the household environment enables families, especially mothers, to better optimize efforts to maintain the health of family members. The study by also supports these findings by Setianingsih et al (2024) showing a significant relationship between clean and healty living behavior and the incidence of stunting, with a p-value of 0,000. The study found that toddlers from families with poor clean and healthy living behavior practices were more likely to experience stunting. Clean and healthy living behavior encompasses not only aspects of cleanliness but also daily activity patterns, personal and enviromental hygiene, dietary habits, rest, and balanced nutritional intake. Meeting nutritional needs must be accompanied by a good understanding of nutrition and adequate food availability.

### **Multivariate Analysis**

Based on the results of logistic regression analysis, it was found that the variables of child weighing, handwashing with soap habits and mosquito larvae eradication had a significant relationship with the incidence of stunting, as they showed significant value of less than 0,05. Among these three variables, child weighing was the most dominant factor influencing stunting, with an odds ratio (OR) of 5,019 (95% CI : 0,986-27.648). These findings are consistent with the study by Destiadi A et al (2015) which showed that visits to integrated health service posts were the most influential factor on stunting, based on multivariate analysis using logistic regression. That study reported an OR of 3,1, indicating that toddlers with low visit frequency to integrated health service posts were 3,1 times more likely to experience stunting compared to children who regularly attended.

Weighing, in a broader context, can be understood as an integral part of integrated health service posts activities. Monthly routine weighing conducted at posyandu in one of the simplest and most cost-effective methods for early detection of growth and developmental issues in toddlers. If signs of developmental problems are identified through weighing, immediate interventions or corrective actions can be taken before the condition becomes more serious. When integrated health service post activities are properly implemented, they can contribute significantly to reducing maternal, infant, and toddler mortality rates (Riyadi et al. 2020). In the current context of the double burden of malnutrition, the role of monthly toddler weighing has become increasingly complex and multifaceted. Weighing not only aims to detect and prevent linear growth failure but also serves as a means to monitor the risk of overweight and prevent obesity in children (Chakravarty et al. 2019).

### **CONCLUSION**

The results of the study showed a significant relationship between clean and healthy living behavior (CHLB) and the incidence of stunting in toddlers. Among the 10 clean and healthy living behavior indicators, the most dominant indicator associated with stunting was toddler weighing.

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