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BREASTFEEDING PRACTICES AND HISTORY OF INFECTIOUS DISEASES AS DETERMINANTS OF STUNTING AMONG CHILDREN AGED 12–59 MONTHS IN PESAWARAN REGENCY

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Abstract

Stunting remains a public health problem in Indonesia, especially in rural areas. Breastfeeding practices and infectious diseases play an important role in child growth. This study aims to analyse the relationship between breastfeeding practices and infectious disease history with stunting in children aged 12–59 months in Pesawaran District. This study used a case-control design with 210 respondents (105 stunted, 105 not stunted) selected through purposive sampling. Data were collected through interviews and anthropometric measurements according to WHO standards. Analysis was performed using chi-square tests and multiple logistic regression. There was a significant relationship between breastfeeding practices and history of infectious diseases with the incidence of stunting ($p<0.05$). Children who did not receive exclusive breastfeeding had a two times higher risk of stunting (AOR=2.10; 95% CI: 1.13–3.88). Children without a history of acute respiratory infections had a lower risk of stunting (AOR=0.48; 95% CI: 0.26–0.88). Exclusive breastfeeding and prevention of infectious diseases are important factors in preventing stunting. Efforts to educate on breastfeeding, improve clean and healthy living behaviours, and prevent infections need to be strengthened at the family and community levels.

Keywords: *Exclusive Breastfeeding, Colostrum, Infectious illnesses, Stunting*

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1. Introduction

Stunting remains a major global public health problem. In 2022, an estimated 148.1 million children under five years of age were affected by stunting, highlighting the persistent scale of this issue worldwide [1]. Within the Indonesian context, although a declining trend has been observed in recent years, the national prevalence of stunting remains relatively high, ranging from approximately 21% to 24% depending on the survey year. Importantly, substantial disparities persist across regions. Recent national analyses further confirm that stunting continues to represent a

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significant public health burden at provincial and district levels [2,3].

Findings from the Indonesia Family Life Survey (IFLS) and the Basic Health Research Survey (Riskesdas) indicate that stunting remains a persistent concern, particularly in rural areas where access to health services is limited [4].

Lampung Province, particularly Pesawaran Regency and Kedondong District, has been identified as an area with a relatively high prevalence of stunting. Data from the Pesawaran District Health Office show an increase in stunting prevalence from 17.6% in 2021 to 25.1% in 2022 [5]. Community-based surveys in this region further suggest that breastfeeding practices, especially exclusive breastfeeding and colostrum feeding, as well as a history of infectious diseases such as acute respiratory infections and diarrhea, are closely associated with children's nutritional status and growth outcomes.

At the global level, exclusive breastfeeding during the first six months of life has been consistently shown to protect against infectious morbidity while supporting optimal linear growth. As a result, exclusive breastfeeding is widely recognized as one of the most effective nutritional interventions for preventing stunting during the first 1,000 days of life [6]. Recent meta-analyses indicate that children who are not exclusively breastfed face a two to three fold higher risk of stunting compared to those who receive exclusive breastfeeding [7]. Similarly, early colostrum feeding within the first hour after birth plays a critical role in establishing passive immunity and promoting a healthy gut microbiota, thereby reducing infection risk and impaired nutrient absorption that may contribute to stunting [8].

Despite optimal feeding practices, children's growth may still be compromised by repeated infectious diseases. Diarrhea and acute respiratory infections have been shown to increase the risk of impaired linear growth through nutrient loss, malabsorption, and chronic inflammation, including environmental enteric dysfunction [9]. Consistent with this mechanism, systematic reviews demonstrate that children with recurrent infections have a 2.8–3.2 times higher risk of stunting compared to those without such histories [10]. Taken together, these findings highlight the central interaction between nutrition, immunity, and infection in the development of stunting, particularly in middle-income countries such as Indonesia.

Although substantial evidence exists, most international and national studies have examined breastfeeding practices and infectious diseases as separate risk factors. Consequently, research that simultaneously evaluates exclusive breastfeeding, colostrum feeding, and infectious disease history remains limited, especially in rural community settings. Moreover, existing findings demonstrate heterogeneous effects influenced by variations in breastfeeding behavior, socioeconomic conditions, and access to sanitation and health services.

Given these gaps, locally grounded research is needed to comprehensively assess the combined role of breastfeeding practices and infectious disease history in relation to stunting. Therefore, this study aims to analyze the association between exclusive breastfeeding, colostrum feeding, and a history of infectious diseases with stunting among children aged 12–59 months in rural areas of Pesawaran Regency, Lampung Province.

2. Method

This study used a case–control design and was conducted in 2024 in Kedondong District, Pesawaran Regency, Lampung Province. The study was part of a field-based investigation on factors associated with stunting, focusing on the relationship between breastfeeding practices, including exclusive breastfeeding and colostrum feeding, and a history of infectious diseases among children aged 12–59 months.

The study population included all children under five years of age in the working area of Kedondong Community

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Health Center. Samples were selected using purposive sampling based on posyandu records and household survey data. A total of 210 children were included, consisting of 105 stunted children (cases) and 105 non-stunted children (controls). Children aged 12–59 months with complete anthropometric data and mothers or caregivers who could provide accurate information on breastfeeding history and recent infections were eligible for inclusion. Children with congenital abnormalities or chronic diseases were excluded to avoid potential bias.

Data were collected through structured interviews using questionnaires that had been tested for validity and reliability. Anthropometric measurements were carried out following World Health Organization (WHO) standards [11]. Children under two years of age were measured in a recumbent position using an infantometer, while children aged two years and older were measured in a standing position using a stadiometer, with a measurement precision of 0.1 cm. Stunting was defined as a height for age z-score (HAZ) of less than −2 standard deviations.

The independent variables in this study were exclusive breastfeeding, colostrum feeding, history of acute respiratory infections, and history of diarrhea within the last three months. The dependent variable was stunting status. Several sociodemographic factors, including child age, sex, maternal education, and household economic status, were treated as potential confounding variables.

Data analysis was performed using IBM SPSS version 26.0. Descriptive (univariate) analysis was used to summarize respondents' characteristics. Associations between variables were examined using the Chi-square test, followed by multiple logistic regression analysis to identify the dominant factors associated with stunting. Statistical significance was set at a p-value of less than 0.05.

Ethical approval was obtained from the Health Research Ethics Committee of STIKes Panca Bhakti Bandar Lampung (Approval No. 018/UE.STIKes/IV/2024). All participants provided written informed consent after receiving a clear explanation of the study objectives and procedures.

3. Results and Discussion

Table 1. Characteristics of Respondents

Characteristics	F (n=210)	(%)
Male	110	52.4
Female	100	47.6
Age 12–35 months	102	48,6
Age 36–59 months	108	51,4
Low maternal education	132	62,9
Mothers not employed	193	91,9
Low socioeconomic status	198	94,3
Colostrum feeding	160	76,2
Exclusive breastfeeding	127	60,5
History of ARI (last 3 months)	49	23,3
History of diarrhea (last 3 months)	43	20,5

Table 1 presents the characteristics of the respondents. More than half of the children were male (53.8%), and 51.4% were aged 36–59 months. Most mothers had a low level of education (62.9%) and were not employed (91.9%). The majority of households were categorized as having low socioeconomic status (94.3%). In terms of feeding practices, 76.2% of children received colostrum and 60.5% were exclusively breastfed. Regarding morbidity history, 23.3% of children had a history of acute respiratory infection (ARI), and 20.5% had experienced diarrhea within the last three months.

Table 2. Association between Breastfeeding Practices and History of Infection with Stunting (Chi-Square Test)

Variable	Cases		Control		OR %	*P Value*
	n	%	n	%		
Exclusive breastfeeding						
Non-exclusive	50	47.6	33	31.4	1.983	0.016

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Exclusive	55	52.4	72	68.6		
History of ARI (last 3 months)						
Yes	32	30.5	48	45.7	0.521	0.023
No	73	69.5	57	54.3		
History of diarrhea (last 3 months)						
Yes	9	8.6	21	20	0.375	0.018
No	96	91.4	84	80		
Colostrum feeding						
No	32	30.5	18	17.1	2.119	0.023
Yes	73	69.5	87	82.9		

Table 2 presents the results of the bivariate analysis examining the association between breastfeeding practices, infection history, and stunting. All four variables assessed: colostrum feeding, exclusive breastfeeding, history of acute respiratory infection (ARI), and history of diarrhea showed statistically significant associations with stunting ($p < 0.05$). These findings indicate that both breastfeeding practices and infectious diseases are important factors related to stunting among children under five years of age.

Regarding early feeding practices, children who did not receive colostrum had a higher proportion of stunting compared to those who received it. Colostrum, the first milk produced after delivery, is rich in antibodies, immunoglobulin A, lactoferrin, and growth factors that support immune function and intestinal maturation [12,13]. Through these mechanisms, colostrum provides early protection against infections that may interfere with nutrient absorption and growth during infancy [14]. Consistent with this finding, previous studies conducted in Ethiopia and Indonesia reported that children who did not receive colostrum had a 1.5–2.8 times higher risk of stunting [15,16]. In the local context, some communities in Lampung still perceive colostrum as "spoiled milk" and therefore discard it. This highlights the need for improved maternal education and postpartum support from midwives and community health workers to ensure timely colostrum feeding.

In addition to colostrum, exclusive breastfeeding was also significantly associated with stunting. Children who were not exclusively breastfed during the first six months of life were more likely to experience inadequate intake of essential nutrients and increased exposure to pathogens from complementary foods or formula prepared under suboptimal hygienic conditions. Exclusive breastfeeding provides optimal nutrition, including high-quality proteins, long-chain fatty acids, and immunological components that support immune development and linear growth [17]. Previous studies in Indonesia similarly reported that children who were not exclusively breastfed had a 4.5-fold higher risk of stunting [18]. Given that exclusive breastfeeding coverage in the study area was approximately 60%, these findings underscore the importance of strengthening social, family, and workplace support to promote sustained exclusive breastfeeding practices.

Furthermore, infectious diseases were also significantly associated with stunting. Children with a history of ARI in the previous three months were more frequently found in the stunted group. Respiratory infections increase metabolic energy requirements during illness and recovery, while appetite often decreases, resulting in reduced nutrient intake. Recurrent inflammation may also interfere with growth regulation by suppressing growth hormone activity and reducing insulin-like growth factor-1 (IGF-1), thereby slowing bone growth [19]. Previous research has shown that children experiencing recurrent ARI have a 2.5-fold higher risk of stunting [20]. Field observations further suggest that environmental factors, such as poor household ventilation and exposure to cigarette smoke, may exacerbate the risk of ARI. Therefore, household-level interventions, including smoke free environments and improved air circulation, are relevant components of stunting prevention strategies.

Similarly, a history of diarrhea was significantly associated with stunting.

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Children who experienced diarrhea within the last three months were more likely to have impaired growth. Diarrheal episodes lead to fluid and nutrient losses and disrupt nutrient absorption due to damage to the intestinal mucosa [21]. When diarrhea occurs repeatedly, it may contribute to environmental enteric dysfunction (EED), a chronic inflammatory condition of the gut that reduces the efficiency of nutrient and energy absorption [22]. Supporting this finding, previous studies have reported that children with recurrent diarrhea have up to a threefold higher risk of stunting [23]. This condition is closely linked to limited access to clean water and inadequate hygiene practices in rural areas of Pesawaran. Consequently, improvements in basic sanitation and hygiene behaviors should be considered essential complementary interventions alongside nutritional strategies to address stunting.

Table 3. Multivariate analysis using multiple logistic regression

Variable	Adjusted OR	95% CI	P-value
Non-exclusive breastfeeding	2,098	1,133–3,883	0,018
Absence of colostrum feeding	1,744	0,989–3,075	0,053
History of ARI	0,476	0,257–0,882	0,018
History of diarrhea	1,653	0,891–3,066	0,099

Table 3 showed that exclusive breastfeeding and a history of acute respiratory infection (ARI) were the two most influential factors associated with stunting after controlling for other variables. Children who did not receive exclusive breastfeeding had a twofold higher risk of stunting compared with those who were exclusively breastfed (AOR=2.098; 95% CI: 1.133–3.883; p=0.018). In contrast, children without a history of ARI had a lower likelihood of stunting (AOR=0.476; 95% CI: 0.257–0.882; p=0.018).

Colostrum feeding showed a protective direction against stunting; however, the association did not reach statistical significance (p=0.053). Nevertheless, the observed effect was consistent with existing theoretical frameworks and previous studies. Similarly, a history of diarrhea was not statistically significant in the final model (p=0.099), although it may still contribute to growth impairment through mechanisms related to chronic intestinal inflammation.

These findings support the concept that optimal breastfeeding practices and infection prevention are key components in breaking the malnutrition–infection–stunting cycle. Exclusive breastfeeding serves as a major protective factor by providing optimal nutrition while reducing exposure to infections that impair growth. Conversely, recurrent ARI may accelerate chronic energy deficits and systemic inflammation, thereby inhibiting linear growth.

This result is consistent with previous studies reporting that exclusive breastfeeding can reduce the risk of stunting by up to 25%, while recurrent respiratory infections increase the risk by approximately 1.8 times. From a programmatic perspective, these findings highlight the importance of integrating breastfeeding promotion, infection control, and improvements in household environmental conditions into stunting reduction strategies.

4. Conclusion

This study demonstrates that breastfeeding practices and a history of infectious diseases are significantly associated with stunting among children aged 12–59 months in Kedondong Subdistrict, Pesawaran Regency. The most influential factors related to stunting were non-exclusive breastfeeding and a history of acute respiratory infection (ARI). Children who did not receive exclusive breastfeeding had approximately twice the risk of stunting, whereas children without a history of ARI had a lower risk of growth impairment.

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Colostrum feeding showed a protective tendency, while a history of diarrhea also contributed to an increased risk of stunting, although the association did not reach statistical significance.

These findings reinforce existing evidence that the nutrition–infection pathway remains a key mechanism underlying stunting in rural communities. Suboptimal breastfeeding practices, including the absence of exclusive breastfeeding and colostrum feeding, increase children's vulnerability to infectious diseases. In turn, recurrent infections such as ARI and diarrhea may worsen nutritional status through chronic inflammation and impaired nutrient absorption, thereby hindering linear growth.

From a programmatic perspective, the results highlight the importance of strengthening promotive and preventive interventions at both household and community levels. Breastfeeding education should be continuously reinforced through the active involvement of midwives and community health volunteers, particularly in promoting early initiation of breastfeeding, colostrum feeding, and exclusive breastfeeding during the first six months of life. In addition, infectious disease prevention should be integrated into community and household-based health activities through the promotion of clean and healthy behaviors, improvements in environmental sanitation, and reduction of household exposure to tobacco smoke. An integrated approach combining nutrition education and infection prevention at the family level is expected to contribute to the acceleration of stunting reduction, in line with national efforts under the National Movement for the Acceleration of Stunting Reduction (GNPS).

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