

## **DETERMINANTS OF WASTING AMONG CHILDREN AGED 12–59 MONTHS: A COMMUNITY-BASED STUDY IN THE TIBAWA HEALTH SERVICE AREA, INDONESIA**

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### **ABSTRACT**

Wasting, defined as a low weight-for-height ratio, serves as a key indicator of acute malnutrition and poses serious risks to a child's physical growth and development. This study investigates the association between personal hygiene, frequency of complementary feeding (MP-ASI), exclusive breastfeeding history, and the presence of infectious diseases with the occurrence of wasting among children aged 12–59 months in the catchment area of Tibawa Health Center, Tibawa Subdistrict, in 2024. Utilizing a cross-sectional design, the study applied analytical survey methods and Chi-Square tests to assess the relationships between the identified variables and wasting. The findings revealed no statistically significant associations between personal hygiene, complementary feeding frequency, exclusive breastfeeding history, or infectious diseases and the incidence of wasting. Despite the absence of significant findings, improper hygiene practices, incorrect MP-ASI administration, and lack of exclusive breastfeeding were observed in some cases, suggesting that these factors may indirectly contribute to the occurrence of wasting. The study concludes that wasting is influenced by multiple factors, many of which were not explored in this research. It underscores the importance of further research to identify additional contributing factors, as well as the need for targeted health education for mothers to improve hygiene, complementary feeding, and breastfeeding practices in order to prevent wasting in children.

**Keywords:** Personal hygiene, complementary feeding (MP-ASI), exclusive breastfeeding, infectious diseases, wasting

### **INTRODUCTION**

Children under five are one of the most vulnerable age groups in the population, alongside pregnant women and the elderly (Coultas et al., 2019; Fall et al., 2015; Liu et al., 2020). Young children are considered the future generation and are expected to become productive human resources. To ensure this, infants must have adequate nutrition and good health; therefore, their nutritional status should be regularly monitored and improved. Nutritional status can be monitored by measuring weight and height at least once a month (Jokhu & Syauqy, 2024). This monitoring is crucial to prevent growth and developmental delays and to ensure that nutritional problems can be addressed promptly.

Undernutrition, overweight, and obesity are common nutritional and health issues among children under five, often due to a lack of routine nutritional monitoring. Monitoring a child's growth is essential, as healthy children are expected to gain weight regularly each month (Chekol et al., 2022). Based on anthropometric indicators, nutritional status can be classified into underweight (weight-for-age), stunting (height-for-age), and wasting (weight-for-height).

Malnutrition continues to pose a significant public health challenge in Indonesia, with wasting representing one of its most pressing concerns. Wasting refers to a significant and rapid reduction in a child's weight or a weight-for-height value that falls below the normal range (Sari & Putri, 2020a). Wasting presents a substantial risk to child survival and growth, as it may contribute to stunting and long-lasting developmental impairments (Habtamu et al., 2022). According to the Indonesian Ministry of Health Regulation No. 2 of 2020 on Child Anthropometric Standards, wasting is divided into two categories: severely wasted (z-score < -3 SD) and wasted (z-score between -3 SD and -2 SD). The public health significance of wasting is categorized as very low (<2.5%), low (2.5–4.9%), medium (5–9.9%), high (10–14.9%), and very high ( $\geq 15\%$ ) (Addawiah et al., 2020). According to a 2020 report by UNICEF and WHO, malnutrition is linked to nearly 50% of all deaths among children under the age of five worldwide.

In 2018, the Global Nutrition Report recorded 150.8 million children suffering from stunting and approximately 50.8 million children suffering from wasting. The 2018 Indonesian Basic Health Research (Riskesdas) found that 10.2% of children under five were wasted, with 3.5% categorized as severely wasted and 6.7% as wasted (Aldi & Alkaff, 2022). This figure marked a decline from 12.2% in 2013, yet the problem remains pressing. Wasting has far-reaching impacts, affecting mental, social, and cognitive development, as well as physical growth. It compromises the immune system, making children more susceptible to infectious diseases (Anggraini & Romadona, 2020). Furthermore, wasting can lower a child's intelligence, productivity, and creativity, ultimately affecting the quality of human resources in the future (Aditianti et al., 2020).

Nutritional problems stem from a combination of direct and indirect determinants. Direct causes encompass infectious diseases and inadequate food intake. Indirect causes include poor parenting practices, limited healthcare access, unhygienic living conditions, and inadequate household food availability and consumption. Foundational causes may include low education levels, poor parenting knowledge, low family income, and large household size (Aldi & Alkaff, 2022). Wasting is also caused by a lack of ongoing training related to child nutrition. The distribution of nutritional assistance is uneven or unsustainable. Many mothers do not understand the importance of animal protein intake or a nutritious diet. Incorrect complementary feeding practices occur. Low rates of mothers exclusively breastfeeding for 6 months (Habtamu, E., Chilo, D., & Desalegn, 2022).

Personal hygiene plays a crucial role in creating a healthy environment for children under five. Poor hygiene can increase the risk of infection, which in turn affects food intake and nutrient absorption. Children may lose their appetite or suffer from vomiting, reducing their nutritional intake and impacting their growth. Poor hygiene can lead to the loss of vital nutrients required for development (Nirmalasari, 2020). Contaminated or spoiled food, and food that is improperly cooked, can cause diarrhea and digestive problems in young children (Hasnita et al., 2023).

A history of infectious diseases also impacts children's health and, if untreated, can hinder physical growth and result in wasting. Studies show a significant relationship between infections and wasting. Common infections associated with wasting include diarrhea, fever, cough, parasitic infections, anemia, vitamin deficiencies, dehydration, gastroenteritis, and respiratory diseases (Coultas et al., 2019; Fall et al., 2015; Hasnita et al., 2023). The provision of complementary feeding (MP-ASI) is a critical component in meeting the nutritional needs of children. After six months of age, breast milk alone no longer meets the full nutritional requirements of a child. MP-ASI must compensate for this gap. Inadequate complementary feeding for children aged 6–23 months contributes to stunting and increases the risk of wasting (Pancarani, 2017; Wardini, 2020). According to WHO estimates, inadequate MP-ASI contributes to 10% of wasting and 32% of stunting in children under five in underdeveloped nations (Addawiah et al., 2020).

Research indicates a relationship between MP-ASI and child nutritional status. More frequent and appropriate MP-ASI is associated with better weight gain in children under two (Aditianti et al., 2020; Aldi & Alkaff, 2022; Anggraini & Romadona, 2020). Poor knowledge and practices related to the timing, type, and texture of complementary foods can lead to growth failures.

From conception to the child's second birthday, or the first 1,000 days of life, proper nutrition is essential. WHO recommends exclusive breastfeeding for the first six months to support optimal health and development. Studies show that exclusive breastfeeding is positively associated with better growth outcomes. Breast milk provides essential hormones, growth factors, immune protectors, and antimicrobial agents, which help prevent infections and reduce allergic reactions (Fewtrell et al., 2007; Ssemukasa & Kearney, 2014). Improper preparation and handling of MP-ASI can lead to diarrhea in young children. Therefore, safe food preparation and gradual introduction of complementary foods are essential. Many growth failures during infancy are linked to poor MP-ASI quality and inappropriate feeding practices (Ssemukasa & Kearney, 2014).

This study focuses on children under five years old (*balita*) in Indonesia as the primary research subject. These children represent a critical age group due to their high vulnerability to nutritional deficiencies and infections. The research examines the prevalence and determinants of wasting among this population, with particular attention to factors such as personal hygiene, infectious diseases, and the adequacy of complementary feeding (MP-ASI). This study seeks to enhance the understanding of the underlying determinants of acute malnutrition among Indonesian children under five and to inform the development of evidence-based public health interventions.

## **METHOD**

A quantitative analytic survey with a cross-sectional design was used in this study to investigate the relationship between the dependent variable, wasting in children aged 12 to 59 months, and a number of independent variables, including personal hygiene, frequency of supplementary feeding (MP-ASI), history of exclusive breastfeeding, and recent infectious diseases. The research was conducted in

February–March 2024 in the working area of the Tibawa Public Health Center Gorontalo Regency, Indonesia. The sample consisted of 318 respondents selected using purposive sampling based on inclusion and exclusion criteria. The inclusion criteria included, Active breastfeeding mothers undergoing examination at the Tibawa Community Health Center in Tibawa District, Mothers with infants aged 12 to 59 months, Respondents willing to participate in the study. And The exclusion criteria included Breastfeeding mothers and mothers of toddlers not registered at the Tibawa Community Health Center in Tibawa District who came to the integrated health post (Posyandu), Unwillingness to be respondents

Data collection involved structured interviews using a validated questionnaire, along with anthropometric measurements (weight and height) to determine nutritional status according to WHO Growth Standards. Data were processed using SPSS version 25.0. Descriptive statistics were used to summarize respondent characteristics, while bivariate analysis with the Chi-square test assessed associations between independent variables and the incidence of wasting. A weight-for-height z-score (WHZ) of less than -2 SD was considered wasting. Anthropometric instruments including digital scales and stadiometers were utilized for physical measurements, and a structured questionnaire covering hygiene practices, feeding frequency, breastfeeding history, and recent infectious disease history made up the data gathering tool. To assess the strength of relationships, a p-value of less than 0.05 was deemed statistically significant.

## RESULT

### Analysis of the Association Between Personal Hygiene and the Incidence of Wasting in the Working Area of Tibawa Primary Health Center, Indonesia

Table 1. A study of the link between personal hygiene and the amount of waste in the working area of Tibawa Primary Health Center in Indonesia

Personal Hygiene	Wasting Incidence				Total	p value
	Wasting (z-score <-2 SD)		Not Wasting (z-score >=-2 SD)			
	n	%	n	%	N	%
Good	8	4,9	154	95,1	162	100,0
Poor	7	4,5	149	95,5	156	100,0
<b>Total</b>	15	4,7	303	95,3	318	100,0

Source: Primary Data

Table 1, explains the connection between personal hygiene and the prevalence of wasting among children in the Tibawa Primary Health Center's service region between the ages of 12 and 59 months in 2024. Of the 318 total respondents, 162 (50.9%) had good personal hygiene, while 156 (49.1%) had poor hygiene. Among those with good hygiene, 8 children (4.9%) were found to be wasted, compared to 7 children (4.5%) with poor hygiene.

The p-value of 0.530, which is higher than the significance level of 0.05, was obtained by statistical analysis utilizing the Pearson Chi-Square test. This suggests that the incidence of wasting in this population is not significantly correlated with personal hygiene. While hygiene is an important determinant of child health, the findings suggest that other factors such as dietary intake, infectious disease exposure, and socioeconomic conditions may play a more influential role in the occurrence of wasting. Further studies are needed to explore these contributing variables in greater depth.

**A study of the connection between how often MP-ASI is fed and how often it wastes food in the working area of Tibawa Primary Health Center in Indonesia**

Table 2. Analysis of the Relationship Between MP-ASI Feeding Frequency and Wasting Incidence in the Working Area of Tibawa Primary Health Center, Indonesia

MP-ASI Feeding Frequency	Wasting Incidence				Total	p value
	Wasting (z-score <-2 SD)		Not Wasting (z-score >=-2 SD)			
	n	%	n	%		
Appropriate (3-4 times/day)	1	8,3	11	91,7	12	100,0
Inappropriate (< 3 times/day)	14	4,6	292	95,4	302	
<b>Total</b>	15	4,7	303	95,3	318	

Source: Primary Data

Based on Table 2, the analysis of the association between MP-ASI feeding frequency and the incidence of wasting in the working area of the Tibawa Primary Health Center, Indonesia shows that, out of a total of 318 respondents (100%), there were 12 respondents who received appropriate complementary feeding (3-4 times per day). Among these, 1 child experienced wasting, while 11 children (91.7%) did not. Meanwhile, among the 306 respondents who received MP-ASI with an

inappropriate frequency (<3 times per day), 14 children were classified as wasted and 292 children were not.

The results of the statistical analysis using the Pearson Chi-Square test yielded a p-value of 0.446 ( $p > 0.05$ ), indicating that the null hypothesis is accepted, and the alternative hypothesis is rejected. This finding suggests that there is no statistically significant association between the frequency of MP-ASI feeding and the incidence of wasting among children aged 12–59 months in the Tibawa.

**Analysis of the Association Between Exclusive Breastfeeding History and the Incidence of Wasting in the Working Area of Tibawa Primary Health Center, Indonesia**

Table 3. Analysis of the Association Between Exclusive Breastfeeding History and the Incidence of Wasting in the Working Area of Tibawa Primary Health Center

Exclusive Breastfeeding History	Wasting Incidence				Total		p value
	Wasting (z-score <-2 SD)		Not Wasting (z-score >=-2 SD)		N	%	
	n	%	n	%			
Exclusive Breastfeeding	1	6,3	15	93,8	16	100,0	0,446
Not Exclusive Breastfeeding	14	4,6	288	95,4	302	100,0	
<b>Total</b>	15	4,7	303	95,3	318	100,0	

Source: Primary Data

Table 3, examines the relationship between the incidence of wasting in children aged 12 to 59 months in the Tibawa Primary Health Center's operational area and the history of exclusive breastfeeding. Out of 318 children, 16 (5%) had a history of exclusive breastfeeding, with 1 child (6.3%) categorized as wasted (z-score < -2 SD) and 15 children (93.8%) not wasted (z-score  $\geq$  -2 SD). In contrast, among the 302 children who were not exclusively breastfed, 14 (4.6%) were classified as wasted, while the remaining 288 (95.4%) were not wasted.

The Pearson Chi-Square test yielded a p-value of 0.547 ( $p > 0.05$ ), indicating no statistically significant association between exclusive breastfeeding history and the incidence of wasting. These findings imply that there was no significant correlation between exclusive breastfeeding and acute malnutrition (wasting) in this cohort. Even though exclusive breastfeeding is a suggested public health approach to provide the best possible nutrition for children, other underlying factors including

infection, complementary feeding methods, and socioeconomic circumstances may have an impact on its ability to prevent wasting.

**Analysis of the Association Between Infectious Diseases and the Incidence of Wasting in the Working Area of Tibawa Primary Health Center, Indonesia**

Table 4. An examination of the relationship between infectious diseases and the prevalence of waste in the Tibawa Primary Health Center's operational area in Indonesia

Infectious Disease	Wasting Incidence				Total		p value
	Wasting (z-score <-2 SD)		Not Wasting (z-score >=-2 SD)		N	%	
	n	%	n	%			
<b>Had a history of infectious disease</b>	14	4,6	288	95,4	302	100,0	0,547
<b>Without a history of infectious disease</b>	1	6,3	15	93,8	16	100,0	
<b>Total</b>	15	4,7	303	95,3	318	100,0	

Source: Primary Data

Table 4, explains the relationship between the history of infectious diseases and the prevalence of wasting among children in the Tibawa Primary Health Center's service region who are between the ages of 12 and 59 months. Of the 318 respondents, 302 children (94.9%) had a history of infectious disease, with 14 (4.6%) classified as wasted and 288 (95.4%) as not wasted. In contrast, among the 16 children (5.0%) without a history of infectious disease, 1 (6.3%) experienced wasting and 15 (93.8%) did not.

Using the Pearson Chi-Square test, the statistical analysis produced a p-value of 0.547, over the significance level of 0.05. This finding suggests that there is no statistically significant correlation between the incidence of wasting in this cohort and a history of infectious disease. Although infectious diseases are known to have a role in poor nutritional outcomes, our data imply that, in this particular setting, their contribution may not be statistically significant on its own. This could be because of other contributing factors like access to health services, sanitation, or feeding patterns.

## **DISSCUSION**

### **Examination of the Relationship Between Personal Hygiene and the Rate of Wasting at the Tibawa Primary Health Center's Workplace, Indonesia**

Personal hygiene is an essential aspect of maintaining good health, as it directly impacts both physical and mental well-being (Anggraini & Romadona, 2020). Proper hygiene practices, such as handwashing before meals and after using the toilet, are crucial in preventing infections that may lead to malnutrition or wasting (Chekol et al., 2022). Nonetheless, the findings of this investigation showed no discernible correlation between the prevalence of wasting in the Tibawa Primary Health Center's working area and personal hygiene. These results concur with those of Mebang's (2021) investigation, which similarly found no connection between wasting and personal hygiene. On the other hand, Yuanita's research revealed a connection between personal hygiene and waste, and (Hutagaol et al., 2022) obtained a similar conclusion, observing strong connections between hygiene habits and waste.

The absence of a significant result in this study may be due to the low prevalence of *wasting* in the study population. Furthermore, personal hygiene is not the sole factor contributing to wasting; other factors such as environmental sanitation play a critical role. Observations in the field revealed that while children with good personal hygiene practices generally did not suffer from wasting, some did, which could be attributed to poor environmental sanitation. This highlights that wasting is influenced not only by personal hygiene but also by other factors like sanitation, as supported by Ngure et al., 2014 and Rah et al., 2015, who found a significant relationship between healthy environmental sanitation and nutritional status. Better personal hygiene can lower the prevalence of wasting, even though it is not a direct cause. This highlights the necessity for thorough health education that covers both sanitation and personal hygiene habits.

### **Examining the Connection Between MP-ASI Feeding Frequency and Wasting Activity in the Tibawa Primary Health Center's Work Area, Indonesia**

The study found no significant relationship between the frequency of MP-ASI (complementary feeding) and the incidence of wasting. This result contrasts with

findings from (Hutagaol et al., 2022), who observed a relationship between complementary feeding and the occurrence of stunting and wasting. Similarly, Wardani et al., 2023 highlighted a connection between the frequency of complementary feeding and stunting ( $p=0.020$ , 95% CI).

Despite the lack of a significant association in this study, it was noted that more than 50% of mothers provided MP-ASI incorrectly, and 4.6% of children developed wasting. This finding aligns with (Rah et al., 2015), who reported that improper MP-ASI practices negatively affect children's nutritional status. Wardani et al., 2023 also noted that inadequate MP-ASI feeding practices contribute to wasting. The lack of maternal knowledge about the benefits and correct methods of complementary feeding is a contributing factor to the high incidence of wasting in children.

Improper MP-ASI feeding can lead to growth and development impairments, including wasting, and potentially even death. The study found that 96% of mothers in the region provided MP-ASI incorrectly, which may contribute to increasing rates of wasting. Health workers must intensify education and counseling for mothers regarding appropriate MP-ASI feeding practices to prevent wasting. Proper MP-ASI not only provides the required energy and protein but also essential micronutrients like iron, vitamin A, and folate, contributing to the child's overall nutritional status.

#### **Examining the Relationship Between the History of Exclusive Breastfeeding and the Rate of Wasting in the Tibawa Primary Health Center's Work Area, Indonesia**

Exclusive breastfeeding refers to feeding an infant only breast milk for the first six months of life, with no other liquids or solids. The incidence of wasting was not significantly correlated with a history of exclusive breastfeeding, according to the study's findings.

This finding is consistent with research by Ngure et al., 2014, which found no significant link between exclusive breastfeeding and children's nutritional status. Similarly, (Sari et al., 2021) did not find a meaningful relationship between exclusive breastfeeding and wasting. However, (Wardani et al., 2023) reported a significant association between exclusive breastfeeding and the incidence of wasting among children in the working area of Puskesmas Gunung Medan.

While the study did not find a direct relationship, 95% of children in the study population did not receive exclusive breastfeeding. In the field, it was observed that children who did not receive exclusive breastfeeding were more likely to experience wasting. This suggests that exclusive breastfeeding acts as an indirect protective factor against wasting. Exclusive breastfeeding provides essential nutrients and immune protection, which can reduce the likelihood of malnutrition and infections. Syeda et al., 2021 confirmed that exclusive breastfeeding is linked to a reduced risk of wasting. Although the study found no direct association, other underlying factors not explored in this research may have contributed to the prevalence of wasting in children who did not receive exclusive breastfeeding.

#### **Examination of the Relationship Between Infectious Illnesses and the Rate of Wasting in the Tibawa Primary Health Center's Work Area, Indonesia**

Infectious diseases can lead to decreased appetite and impaired nutrient absorption, making children more vulnerable to wasting. Balita (toddlers) are particularly susceptible to infections due to the ongoing development of their immune systems. Infectious diseases, particularly acute ones, can worsen a child's nutritional status (Farida et al., 2024).

The study's lack of a substantial correlation between infectious infections and wasting is in line with research by (Schoenbuchner et al., 2019), who also reported no significant association. However, it was observed that some children with a history of infectious diseases were diagnosed with wasting, suggesting that infections may indirectly contribute to wasting. Conversely, some children with a history of infectious diseases did not develop wasting, possibly due to other unexamined factors.

Immunization is a protective factor against infections, and studies (Richard et al., 2012; Sudfeld et al., 2013) highlighted a significant relationship between immunization completeness and the occurrence of wasting. The study found that most children in the area had received complete immunization, which likely contributed to their overall good nutritional status. Immunization helps reduce the morbidity and mortality risks in children, improving their nutritional outcomes.

Therefore, immunization should be considered a key component of preventive health strategies to reduce the incidence of wasting.

## **CONCLUSIONS AND SUGGESTIONS**

Based on the findings of this study, it can be concluded that personal hygiene, the frequency of complementary feeding (MP-ASI), exclusive breastfeeding history, and infectious diseases do not show significant direct relationships with the occurrence of wasting in children aged 12-59 months in the working area of Puskesmas Tibawa, Kecamatan Tibawa. Specifically, there was no significant association between personal hygiene and wasting, frequency of MP-ASI feeding and wasting, exclusive breastfeeding history and wasting, and infectious diseases and wasting. While no significant associations were found, factors such as improper hygiene practices, incorrect MP-ASI administration, and a lack of exclusive breastfeeding were observed in some cases, which may indirectly contribute to the occurrence of wasting. This suggests that wasting is a multifactorial issue, influenced by a range of factors, many of which were not fully explored in this study.

The study highlights the need for further research to examine other potential contributing factors to wasting, including environmental factors, socio-economic conditions, and access to healthcare services. Additionally, it emphasizes the importance of health education for mothers, particularly regarding personal hygiene, complementary feeding practices, and exclusive breastfeeding, as these practices can indirectly influence the occurrence of wasting. Healthcare workers should focus on increasing community outreach and education efforts to ensure that parents are equipped with accurate information on proper nutrition, hygiene, and health practices, ultimately improving the nutritional status and overall health of children in the region.

## **REFERENCES**

- Addawiah, R., Hasanah, O., & Deli, H. (2020). Gambaran kejadian stunting dan wasting pada bayi dan balita di Tenayan Raya Pekanbaru. *Journal of Nutrition College*, 9(4), 228–234.
- Aditianti, A., Raswanti, I., Sudikno, S., Izwardy, D., & Irianto, S. E. (2020). Prevalensi Dan Faktor Risiko Stunting Pada Balita 24-59 Bulan Di Indonesia: Analisis Data Riset

- Kesehatan Dasar 2018 [Prevalence and Stunting Risk Factors in Children 24-59 Months in Indonesia: Analysis of Basic Health Research Data 2018]. *Penelitian Gizi Dan Makanan (The Journal of Nutrition and Food Research)*, 43(2), 51–64.
- Aldi, M. D., & Alkaff, R. N. (2022). Gambaran Kejadian Stunting Balita pada Ibu Pekerja di Aceh: Analisis Lanjutan Data Riskesdas 2018. *Jurnal Masyarakat Sehat Indonesia*, 1(03), 97–103.
- Anggraini, Y., & Romadona, N. F. (2020). Review of stunting in Indonesia. *International Conference on Early Childhood Education and Parenting 2019 (ECEP 2019)*, 281–284.
- Chekol, Y. T., Arefaynie, M., Kassa, A. A., Alene, T. D., & Ngusie, H. S. (2022). Determinants of wasting among children aged 6–59 months in North-East Ethiopia: a community-based case-control study. *BMJ Open*, 12(8), e057887.
- Coultas, J. A., Smyth, R., & Openshaw, P. J. (2019). Respiratory syncytial virus (RSV): a scourge from infancy to old age. *Thorax*, 74(10), 986–993.
- Fall, C. H. D., Sachdev, H. S., Osmond, C., Restrepo-Mendez, M. C., Victora, C., Martorell, R., Stein, A. D., Sinha, S., Tandon, N., & Adair, L. (2015). Association between maternal age at childbirth and child and adult outcomes in the offspring: a prospective study in five low-income and middle-income countries (COHORTS collaboration). *The Lancet Global Health*, 3(7), e366–e377.
- Farida, J., Salimo, H., & Sumardiyono, S. (2024). Analysis of exclusive breastfeeding and history of infectious diseases for wasting in children aged 12-59 months. *Jurnal Gizi Dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, 12(6), 436–444.
- Fewtrell, M. S., Morgan, J. B., Duggan, C., Gunnlaugsson, G., Hibberd, P. L., Lucas, A., & Kleinman, R. E. (2007). Optimal duration of exclusive breastfeeding: what is the evidence to support current recommendations? *The American Journal of Clinical Nutrition*, 85(2), 635S-638S.
- Habtamu, E., Chilo, D., & Desalegn, D. (2022). Determinants of wasting among children aged 6–59 months in Wonago woreda, south Ethiopia. A facility-based unmatched case-control study. *PloS One*, 17(6).
- Habtamu, E., Chilo, D., & Desalegn, D. (2022). Determinants of wasting among children aged 6–59 months in Wonago woreda, south Ethiopia. A facility-based unmatched case-control study. *PLoS One*, 17(6), e0269380.
- Hasnita, E., Noflidaputri, R., Sari, N. W., & Yuniliza, Y. (2023). Faktor-faktor yang Mempengaruhi Kejadian Wasting pada Balita Usia 36-59 Bulan di Wilayah Kerja Puskesmas Rao Kabupaten Pasaman. *Jik Jurnal Ilmu Kesehatan*, 7(1), 130–137.
- Hutagaol, I. O., Situmorang, B. H. L., Arini, A., & Friani, S. R. (2022). Analisis Determinan Kejadian Wasting pada Balita. *Wellness And Healthy Magazine*, 4(1), 69–76.
- Jokhu, L. A., & Syauqy, A. (2024). Determinants of concurrent wasting and stunting among children 6 to 23 mo in Indonesia. *Nutrition*, 122, 112390.
- Liu, H., Liu, F., Li, J., Zhang, T., Wang, D., & Lan, W. (2020). Clinical and CT imaging features of the COVID-19 pneumonia: Focus on pregnant women and children. *Journal*

of *Infection*, 80(5), e7–e13.

- Ngure, F. M., Reid, B. M., Humphrey, J. H., Mbuya, M. N., Pelto, G., & Stoltzfus, R. J. (2014). Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: making the links. *Annals of the New York Academy of Sciences*, 1308(1), 118–128.
- Rah, J. H., Cronin, A. A., Badgaiyan, B., Aguayo, V. M., Coates, S., & Ahmed, S. (2015). Household sanitation and personal hygiene practices are associated with child stunting in rural India: a cross-sectional analysis of surveys. *BMJ Open*, 5(2), e005180.
- Richard, S. A., Black, R. E., Gilman, R. H., Guerrant, R. L., Kang, G., Lanata, C. F., Mølbak, K., Rasmussen, Z. A., Sack, R. B., & Valentiner-Branth, P. (2012). Wasting is associated with stunting in early childhood. *The Journal of Nutrition*, 142(7), 1291–1296.
- Sari, N., Manjorang, M., Zakiyah, Z., & Randel, M. (2021). *Exclusive breastfeeding history risk factor associated with stunting of children aged 12–23 months*.
- Schoenbuchner, S. M., Dolan, C., Mwangome, M., Hall, A., Richard, S. A., Wells, J. C., Khara, T., Sonko, B., Prentice, A. M., & Moore, S. E. (2019). The relationship between wasting and stunting: a retrospective cohort analysis of longitudinal data in Gambian children from 1976 to 2016. *The American Journal of Clinical Nutrition*, 110(2), 498–507.
- Ssemukasa, E. L., & Kearney, J. (2014). Six months of exclusive breastfeeding recommendation: how applicable is the universal exclusive breastfeeding recommendation policy? *African Journal of Food, Agriculture, Nutrition and Development*, 14(4), 9071–9084.
- Sudfeld, C. R., Giovannucci, E. L., Isanaka, S., Aboud, S., Mugusi, F. M., Wang, M., Chalamilla, G., & Fawzi, W. W. (2013). Vitamin D status and incidence of pulmonary tuberculosis, opportunistic infections, and wasting among HIV-infected Tanzanian adults initiating antiretroviral therapy. *The Journal of Infectious Diseases*, 207(3), 378–385.
- Syeda, B., Agho, K., Wilson, L., Maheshwari, G. K., & Raza, M. Q. (2021). Relationship between breastfeeding duration and undernutrition conditions among children aged 0–3 Years in Pakistan. *International Journal of Pediatrics and Adolescent Medicine*, 8(1), 10–17.
- Wardani, P. K., Sary, Y. N. E., & Hidayati, T. (2023). The Relationship Between Mother's Level of Knowledge and Giving MP-ASI (Weaning Food) on Babies Under 6 Months. *Health and Technology Journal (HTechJ)*, 1(4), 386–392.