

THE INCIDENCE OF INFECTIOUS DISEASES IN CHILDREN IN TRUNYAN TOURISM VILLAGE

I Made Yulyantara Saputra,^{1*} Made Gede Dwilingga Utama,¹ I Wayan Gustawan,¹

¹ Department of Child Health, Faculty of Medicine, Udayana University/
Prof. Dr. I.G.N.G. Ngoerah General Hospital, Denpasar, Bali, Indonesia

*Correspondence: I Made Yullyantara Saputra
[email: yullyantara_saputra@unud.ac.id]

Background: Infectious diseases are the leading cause of death and morbidity among children. Children with these illnesses are frequently seen in primary healthcare settings. Epidemiological surveillance is essential to monitor and review the incidence of infections. Such surveillance activities provide valuable information about infection rates and emerging patterns. This study aims to determine the incidence of infectious diseases among children in Trunyan Village.

Methods: This study is an analytical observational study using a cross-sectional design. Data were collected from electronic medical records of children aged 0 to 18 years who visited the health center in Trunyan Village between January 2024 and October 2024. All data were processed and statistically analyzed using SPSS version 26. Descriptive statistics, including proportions (percentages), counts, averages (standard deviations), and ranges (minimum–maximum), were calculated. The relationship between dependent and independent variables was assessed using Chi-square analysis, with a significance threshold of $p < 0.05$.

Results: A total of 79 study subjects met the inclusion and exclusion criteria, and 10 infectious diseases were identified. The three most prevalent conditions were upper respiratory tract infections (URTI), pneumonia, and diarrhea. Most patients were male (54.4%). The youngest patient was 1 year old, and the oldest was 17.3 years, with children in the age category of 6–12 years comprising the largest group (38%). Based on anthropometric data, the average body mass index (BMI) was 17.3, with a minimum of 11.1 and a maximum of 29.0. Most children were fully immunized (81%) and had received exclusive breastfeeding (68.4%). Regarding hospitalization history, 27.8% of children had been hospitalized due to conditions such as pneumonia, typhoid, diarrhea, and dengue fever.

Conclusion: Ten common infectious diseases lead children to seek treatment, with four requiring hospital admission (Pneumonia, typhoid fever, diarrhoea, and dengue fever). The incidence of infections is influenced by factors such as exclusive breastfeeding and immunization status.

Keywords: infectious diseases, pediatric infections, risk factors, tourism village

INTRODUCTION

Infectious diseases are the leading cause of death and morbidity in children. In 2019, approximately 5.3 million children under the age of five died from preventable causes, many of which were due to infections.¹ The incidence of infection in children tends to be more frequent and severe compared to adults.² Sulistiowati et al. (2024) reported that 76.6% of children aged 24 to 59 months experience at least one type of infectious disease.³ In Indonesia, pneumonia (14.5%) and diarrhea (9.8) are the leading cause of death in children aged 29 days to 11 months. According to data from the 2018 Basic Health Research report, approximately 2.1% and 6.8% of children under five years old have been diagnosed with pneumonia and diarrhea, respectively.⁴

Several factors contribute to the high incidence of infection in children, such as limited access and availability of health services, which leads to treatment

delays and worsened disease severity. This issue is often compounded by poor environmental condition such as the lack of clean water and sanitation.³ Infectious disease in children are commonly encountered in primary health service settings such as *puskesmas* (community health centers). These facilities manage cases of pediatric infectious diseases daily, caused by viruses and bacteria. Common infections in children include upper respiratory tract infections like acute otitis media (AOM), otitis externa, sinusitis, and pharyngitis, as well as bacterial pneumonia, urinary tract infections, and gastroenteritis.⁵

The untreated or widespread incidence of infections has significant social and economic consequences. Epidemiological surveillance plays a crucial role in infection control, as it provides valuable data on infection rates, emergence patterns, and unusual disease clusters. Timely and appropriate interventions informed by surveillance data can help prevent or control

outbreaks, benefiting not only health institutions but also the broader community, including children's families, schools, and hospitals.²

Foreign tourism to Indonesia has increased steadily over the years. In 2017, an estimated 14.4 million foreign tourists visited Indonesia, with Bali receiving over 5.68 million visitors, accounting for 40.47% of the total visit. Bali, a tropical island, faces unique challenges in disease transmission due to its climate.⁶ One notable destination in Bali is Trunyan Village, located in the Kintamani District of Bangli. The village is famous for its unique funeral tradition, where deceased residents are placed under the Taru Menyan tree instead of being buried or cremated. Trunyan Village is also home to health facilities like the Kintamani Community Health Center, which, like other primary health centers in Indonesia, frequently treats infectious diseases.

Epidemiological surveillance is vital for monitoring and controlling infections in Trunyan Village to protect both residents and tourists. Surveillance activities provide critical information about infection patterns and help identify emerging health risks.² Given the public health importance of this issue, this study aims to examine the incidence and characteristics of infectious diseases among children in Trunyan Village.

MATERIALS AND METHODS

Study Design and Data Collection

This study is an analytical observational study using a cross-sectional design. Data collection was conducted by reviewing electronic medical records from the community health center) and Head of Trunyan Village office, where medical records of all children aged 0 to 18 years who visited the health center between January 2024 and December 2024 were examined. The sample size was determined using total sampling. Inclusion criteria included pediatric patients aged 0 to 18 years, while exclusion criteria encompassed children with incomplete medical records and those visiting the health center solely for immunizations.

The collected data included demographic information (age and gender), anthropometric measurements (weight and height), and diagnoses based on ICD-10 classifications. All data were recorded and subsequently processed and analyzed statistically using

SPSS version 26 for Windows. Results were presented in the form of proportions (percentages), counts, averages (standard deviations), and medians (ranges, minimum-maximum).

Statistical Analysis

Bivariate analysis was performed to compare variables. Categorical variables were analyzed using the Chi-square test, with Kolmogorov-Smirnov or Fisher's Exact test used as alternatives if the assumptions for the Chi-square test were not met. Multivariate analysis was conducted using binary logistic regression to evaluate relationships between independent variables—such as gender, immunization status, and exclusive breastfeeding—and dependent variables, including infection status and history of hospital admission. Statistical significance was determined using a p-value threshold of <0.05.

RESULT

In this study, 79 research subjects were pediatric patients from Trunyan Village who met the inclusion criteria. The variables measured included gender, age, height, weight, body mass index (BMI), immunization status, history of exclusive breastfeeding, history of hospital admission (MRS), duration of MRS, water sources, and the presence of infectious diseases. The infectious diseases assessed in this study comprised 11 conditions: upper respiratory tract infection (URI), pneumonia, diarrhea, dengue fever, smallpox, hand-foot-mouth disease (HFMD), measles, typhoid fever, helminth infections, ear infections, and urinary tract infections.

Based on Table 1, most patients were male (n = 43/79; 54.4%), with ages ranging from 1 year to 17.3 years. The largest age category was children (n = 30/79; 38%). Anthropometric data showed that the average BMI was 17.3, with a minimum of 11.1 and a maximum of 29.0. Regarding immunization status as recommended by the Ministry of Health, the majority of children were fully immunized (n = 64/79; 81%) and had received exclusive breastfeeding (n = 54/79; 68.4%). Hospitalization data revealed that a smaller proportion of children had been hospitalized (n = 22/79; 27.8%), with durations ranging from a minimum of 3 days to a maximum of 6 days, and an average hospital stay of 4.5 days.

Table 1. Characteristics of Subjects

Variable	N (%), Total = 79
Gender	
Male	43 (54,4)
Female	36 (45,6)
Age (years)	
Average ± SD	6,6 ± 3,9
Min-Max	1 – 17,3
Age Category	
Infants and Toddlers (0-5 years)	29 (36,7)
Children (5-10 years)	30 (38,0)
Teenager (10-18 years)	20 (25,3)
Body Weight (Kg)	
Average ± SD	24,5 ± 15,3

Min-Max	8,2 – 79,0
Height (cm)	
Average \pm SD	114,3 \pm 25,5
Min-Max	75,0 – 170,0
Body Mass Index (Kg/m ²)	
Average \pm SD	17,3 \pm 4,0
Min-Max	11,1 – 29,0
Immunization Status	
Complete	64 (81,0)
Incomplete	15 (19,0)
Exclusive Breastfeeding History	
Yes	54 (68,4)
No	25 (31,6)
History of Hospital Admission	
Yes	22 (27,8)
No	57 (72,2)
Hospitalization Duration, days (n=22)	
Average \pm SD	4,5 \pm 1,0
Min-Max	3 – 6
Water Sources	
Lake	79 (100)

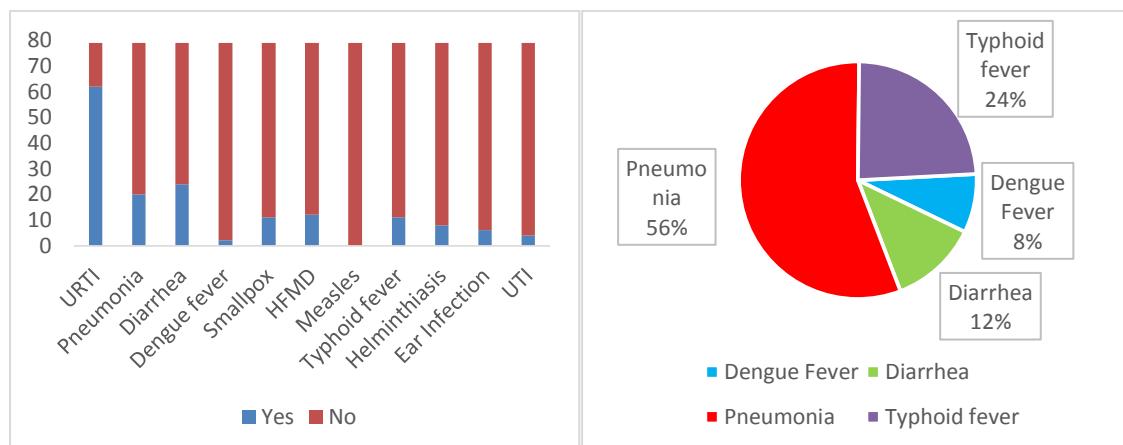


Figure 1. (a) Distribution of Infectious Disease. (B) Responsible Disease Distribution on Hospital Admissions.

In this study, we found there were ten types of infectious diseases that prompt pediatric patients in Trunyan to visit health facilities. These include upper respiratory tract infections (URTI), pneumonia, diarrhea, dengue fever, smallpox, hand-foot-mouth disease (HFMD), typhoid fever, helminth infections (worms), ear infections, and urinary tract infections (Figure 1). The most common causes of infection were URTI (n = 62/79; 78.5%),

diarrhea (n = 24/79; 30.4%), and pneumonia (n = 20/79; 25.3%). Notably, no cases of measles were reported among children visiting health facilities. Based on Figure 1B, four infectious diseases were identified as causes of hospitalization in children: pneumonia, typhoid fever, diarrhea, and dengue fever. Additionally, three children presented with concurrent diagnoses of typhoid fever and diarrhea.

Table 2. Comparison of Exclusive Breastfeeding with Pneumonia Incidence

Exclusive Breastfeeding	Pneumonia		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
No	13 (52,0)	12 (48,0)	0,000*	7,274	2,382	22,211
Yes	7 (13,0)	47 (87,0)				

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher* tests if the conditions from *Chi-Square* are not met. Significance value based on p<0.05 value

Table 2 shows a significant relationship between the absence of exclusive breastfeeding and the incidence of pneumonia in children in Trunyan village (p-value <0.05). was identified as a risk factor for pneumonia, with an

odds ratio (OR) of 7.27 (95% CI: 2.38–22.21). This indicates that children who are not exclusively breastfed have a 7.27 times greater risk of developing pneumonia compared to those who are exclusively breastfed.

Table 3. Comparison of Exclusive Breastfeeding with the Incidence of Diarrhea

Exclusive Breastfeeding	Diarrhea		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
No	16 (64,0)	9 (36,0)				
Yes	8 (14,8)	(85,2)	0,000*	10,222	3,371	30,997

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions from *Chi-Square* are not met. Significance value based on p<0.05 value

Table 3 reveals a significant relationship between the absence of exclusive breastfeeding and the incidence of diarrhea in children in Trunyan village shown by a p value of <0.05. The absence of exclusive breastfeeding was a strong risk factor for diarrhea, with an OR of 10.22 (95%

CI: 3.37–30.99). Children who are not exclusively breastfed are 10.22 times more likely to develop diarrhea than those who receive exclusive breastfeeding.

Table 4. Comparison of Exclusive Breastfeeding with HFMD Incidence

Exclusive Breastfeeding	HFMD		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
No	0 (0)	25 (100,0)				
Already	12 (22,2)	42 (77,8)	0,01*	1,286	1,115	1,483

HFMD= *Hand-Foot-Mouth Disease*. *Description: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions of *Chi-Square* are not met. Significance value based on p<0.05 value

According to Table 4, there is a significant relationship between the absence of exclusive breastfeeding and the incidence of HFMD (p = 0.01). Non-exclusive breastfeeding was identified as a risk factor for HFMD,

with an OR of 1.2 (95% CI: 1.11–1.48). This suggests that children who are not exclusively breastfed have a 1.2 times higher risk of developing HFMD compared to those who are exclusively breastfed.

Table 5. Comparison of Exclusive Breastfeeding with Helminthiasis

Exclusive Breastfeeding	Worms		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
No	5 (20,0)	20 (80,0)				
Yes	3 (5,6)	51 (94,4)	0,048*	4,25	0,928	19,469

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions from *Chi-Square* are not met. Significance value based on p<0.05 value

Table 5 indicates a significant relationship between the absence of exclusive breastfeeding and the incidence of helminth infections in children (p = 0.048). However, while the OR value was 4.25, the 95% CI (0.927–19.469)

includes 1, indicating that the absence of exclusive breastfeeding is not a statistically significant risk factor for helminth infections.

Table 6. Comparison of Exclusive Breastfeeding with Hospitalization History

Exclusive Breastfeeding	Admission to the Hospital		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
No	16 (64,0)	9 (36,0)				
Yes	6 (11,1)	48 (88,9)	0,000*	14,22	4,38	46,18

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions from *Chi-Square* are not met. Significance value based on p<0.05 value

Table 6 highlights a significant relationship between the absence of exclusive breastfeeding and the history of hospitalization in children (p < 0.05). Non-exclusive breastfeeding was a risk factor for hospitalization, with an

OR of 14.22 (95% CI: 4.38–46.18). This means children who are not exclusively breastfed have a 14.22 times higher risk of being hospitalized compared to those who are exclusively breastfed.

Table 7. Comparison of Immunization History with the Incidence of Upper Respiratory Tract Infection

Immunization History	ISPA		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
Incomplete	7 (46,7)	8 (53,3)				
Complete	55(85,9)	9 (14,1)	0,001*	0,143	0,42	0,492

ISPA = Upper Respiratory Tract Infection. *Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with the alternative *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions of *Chi-Square* are not met. Significance value based on $p < 0.05$ value

Table 7 shows a significant relationship between incomplete immunization history and the incidence of URTI in children ($p = 0.001$). Interestingly, an incomplete

immunization history appears to reduce the risk of URTI, with an OR of 0.143 (95% CI: 0.42–0.492).

Table 8. Comparison of Immunization History with Smallpox Incidence

Immunization History	Smallpox		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
Incomplete	5 (33,3)	10 (66,7)				
Complete	6 (9,4)	58 (90,6)	0,016*	4,833	1,236	18,896

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions from *Chi-Square* are not met. Significance value based on $p < 0.05$ value

Table 8 shows a significant relationship between incomplete immunization history and the incidence of smallpox ($p = 0.016$). Incomplete immunization was a risk factor for smallpox, with an OR of 4.822 (95% CI: 1.236–

18,896). Children with incomplete immunization history were 4.82 times more likely to develop smallpox than those with complete immunizations.

Table 9. Comparison of Immunization History with the Incidence of Ear Infections

Immunization History	Ear Infections		Nilai P*	Odd Ratio (CI 95%)	Confidence Ratio	
	Yes N (%)	No N (%)			Lower Bond	Upper Bond
Incomplete	6 (40,0)	9 (60,0)				
Complete	0 (0)	64 (100)	0,000*	0,6	0,397	0,907

*Remarks: For categorical data, the p-value is calculated based on the *Chi-Square* test with an alternative to the *Kolmogorov Smirnov* and *Exact Fisher tests* if the conditions from *Chi-Square* are not met. Significance value based on $p < 0.05$ value

Table 9 indicates a significant relationship between incomplete immunization history and the incidence of ear infections in children ($p < 0.05$). However, incomplete immunization history was not a risk factor for ear infections, as the OR was 0.6 (95% CI: 0.397–0.907), suggesting a protective association.

of the children in the study had received complete immunizations ($n = 64/79$; 81%) and exclusive breastfeeding ($n = 54/79$; 68.4%). A small proportion of the subjects had a history of hospitalization due to infectious diseases ($n = 22/79$; 27.8%).

Foreign tourist visits to Indonesia have been steadily increasing each year. As a tropical country and a popular destination for international travelers, Indonesia experiences infection patterns distinct from those of non-tropical regions.⁶ The tropics, characterized by a consistently hot climate and high annual rainfall, are associated with a high incidence of infections, particularly those transmitted through vectors, rodents, and waterborne sources.^{10,11} These conditions contribute to the prevalence of zoonotic diseases.¹² This study was conducted in Trunyan Village, a rural area in Indonesia with high humidity that is frequently visited by tourists. Trunyan Village is notable for its unique "dark tourism" attraction—a funeral tradition in which deceased residents are neither buried nor cremated but are placed beneath the Taru Menyan tree. This tree is believed to neutralize the smell of decomposing bodies, attracting both local and international visitors. However, the influx of tourists in any area can lead to an increase in travel-related diseases.

DISCUSSION

This study aimed to investigate the prevalence and characteristics of infectious diseases among children in Trunyan Village as infectious diseases remain the leading cause of death and morbidity in children.¹ A total of 79 study subjects were pediatric patients who visited health facilities due to infectious diseases. Among these, the majority were male ($n = 43/79$; 54.4%), consistent with previous studies reporting that infectious diseases are generally more prevalent in males.^{7,8} The largest age group affected by infections was children aged 5 to 10 years ($n = 30/79$; 38.0%), followed closely by toddlers aged 1 to 4 years ($n = 29/79$; 36.7%), with an average age of 6.6 years. These two subpopulations are more vulnerable to infections due to differences in specific immune response capabilities and a lack of immunological memory compared to adolescents.⁹ Most

Depending on the region and type of activity, approximately 22–64% of tourists experience health issues during or after their travels.^{13,14} This research was conducted to review and monitor the incidence of infectious diseases in Trunyan Village to strengthen surveillance activities in tourist destinations.

In this study, 10 types of infectious diseases were identified. The three most prevalent were upper respiratory tract infections (URTI) (n = 62/79; 78.5%), diarrhea (n = 24/79; 30.4%), and pneumonia (n = 20/79; 25.3%). These infections are commonly reported among tourists traveling to other countries.^{15–17} While respiratory tract infections and diarrhea are often self-limiting, severe cases may require intensive hospital care. Of the 10 identified infectious diseases, four were responsible for the history of hospitalization in children: pneumonia, typhoid, diarrhea, and dengue fever. This finding highlights that some diseases are more severe and require hospital treatment. Pneumonia is the leading cause of death among children under five, accounting for 16% of all deaths in this age group, could be caused by It can be caused by viruses or bacteria, but influenza is the primary contributor in pediatric populations.¹⁹ Diarrhea, a common illness in both children and tourists, can result from various enterovirus pathogens, Escherichia coli, and other bacteria.^{20–22} In some cases, typhoid fever can present with diarrhea or changes in stool consistency in children.²³ Dengue fever, endemic in Indonesia, is another significant health concern.²⁴ It is also a leading cause of fever among foreign tourists visiting dengue-endemic regions.²⁵ Preventive measures could be implemented to reduce the risk of these diseases such as wearing mask to protect against respiratory infections practicing hand hygiene such as washing hands before eating, and using long-sleeved clothing and mosquito nets to avoid mosquito bite.²⁶ This study has some limitations. It lacks detailed information on the specific pathogens causing pneumonia and diarrhea in individual cases. Additionally, the criteria for hospital admission among the patients were not clearly identified.

This study assessed whether internal factors such as gender, history of exclusive breastfeeding, and immunization influence the incidence of infections in children in Trunyan Village. Previous studies have shown that gender plays a role in infectious diseases, with higher morbidity and mortality rates observed in males compared to females.^{7,8} This is correlated to the stronger humoral and cellular immune responses in women than in men, though the exact mechanisms are multifactorial, involving both endocrine and genetic factors. However, no significant relationship between gender and the incidence of infection was found in this study, which aligns with other research examining infections in children, particularly in travel medicine cases.¹⁷ The incidence of infection in children can be influenced by various factors such as age, immunization, nutrition, and living conditions.^{8,17}

Breastfeeding has well-documented protective effects on children, reducing the risk of morbidity and mortality across different age groups, including infants

and toddlers.^{28,29} The protection is largely due to the immune factors present in breast milk.³⁰ Several meta-analyses support the World Health Organization's recommendation for exclusive breastfeeding as a strategy to improve child survival.²⁸ In this study, non-exclusive breastfeeding was found to significantly affect the incidence of several infectious diseases, including pneumonia, diarrhea, hand-foot-mouth disease (HFMD), worms, and hospitalizations. Breastfeeding, particularly exclusive breastfeeding, provides specific protection against diarrheal diseases in the first two years of life.²⁸ In this study, a relationship was found between not breastfeeding exclusively and the higher incidence of infections, such as pneumonia, diarrhea, and HFMD. Children who were not exclusively breastfed had a 7.2 times greater risk of developing pneumonia compared to those who were exclusively breastfed. This is consistent with research by Tromp et al. (2017), which found that exclusive breastfeeding reduced the risk of pneumonia up to the age of 4 years (aOR: 0.71, 95% CI: 0.51–0.98).³¹ Furthermore, children who were not exclusively breastfed had a 10.2 times greater risk of developing diarrhea, a finding consistent with studies by Rohmah et al. (2015) and Horta et al. (2013), which also concluded that exclusive breastfeeding reduces the risk of diarrhea in children.^{32,33} Additionally, children not exclusively breastfed had a 1.2 times higher risk of developing HFMD compared to those who were exclusively breastfed. This finding aligns with Li et al.'s research, which suggested that exclusive breastfeeding for the first 6 months significantly reduces the risk of HFMD, particularly during the first 6–12 months of life (OR 0.701, 95% CI 0.539–0.913).³⁴

In this study, children who were not exclusively breastfed had a 14.22 times higher risk of hospitalization compared to those who were exclusively breastfed. However, unlike previous studies, this research did not find an association between exclusive breastfeeding and the incidence of other infections such as upper respiratory tract infections (URTI), dengue fever, smallpox, typhoid fever, ear infections, or urinary tract infections (UTIs).^{30,31,33,35} Childhood vaccination has played a crucial role in reducing morbidity, mortality, and disorders caused by vaccine-preventable diseases worldwide. Some of the infectious diseases preventable through immunization include chickenpox, polio, measles, rubella, diphtheria, tetanus, hepatitis, and infections caused by *Streptococcus pneumoniae*.³⁶ In this study, the vaccine-preventable infectious diseases observed included pneumonia, measles, and smallpox.

A significant relationship was found between incomplete immunization history and the incidence of smallpox in children in Gianyar Village. Children with incomplete immunization had a 4.82 times higher risk of developing smallpox compared to those with complete immunization. Additionally, a significant relationship was observed between incomplete immunization history and the incidence of upper respiratory tract infections (URTI) in children in Trunyan Village. However, incomplete immunization appeared to reduce the risk of URTI, which

might be linked to post-immunization adverse events (AEFIs) such as fever and upper respiratory tract infections. These side effects could lead immunized children to seek medical care, particularly in health facilities. Despite this, vaccination remains crucial, as children, especially toddlers, are vulnerable to respiratory infections, which can lead to complications such as superinfections, respiratory failure, and impaired respiratory function, especially during pandemics.³⁷ Moreover, a significant relationship was found between incomplete immunization history and the incidence of ear infections in children in Gianyar Village ($p < 0.05$). However, incomplete immunization history seemed to lower the risk of ear infections in children (OR: 0.6, 95% CI: 0.397–0.907). This finding aligns with Hooker et al. (2020), who reported that children who are immunized may be more prone to developing ear infections, such as otitis media.³⁸

The findings of this study provide an overview of infections and the risk factors influencing the incidence of infection in children in Trunyan Village. Notably, the three most prevalent infectious diseases were ISPA, pneumonia, and diarrhea, with pneumonia, typhoid, diarrhea, and dengue fever being the primary causes for hospitalization. In addition, new findings suggest that incomplete immunizations may reduce the risk of ISPA and ear infections. Further research is needed to confirm these results. These findings are expected to serve as recommendations for health service providers and tourists visiting Trunyan Village, particularly in addressing the risk factors for children..

FUNDING

The authors declare that they have no funding for the research

DISCLOSURE

The authors report no conflicts of interest in this work.

DATA AVAILABILITY STATEMENT

The data supporting this study's findings are available from the corresponding author upon reasonable request.

REFERENCES

- Perin J, Mulick A, Yeung D, Villavicencio F, Lopez G, Strong KL, et al. Global, regional, and national causes of under-5 mortality in 2000–19: an updated systematic analysis with implications for the Sustainable Development Goals. *Lancet Child Adolesc Heal.* 2022;6(2):106–15.
- 描述醫院從留宿幼兒中心接收的兒童感染傳染病的模式, 以及辨識入院患者. *Infectious diseases in children admitted from a residential child care centre.* *Hong Kong Med J.* 2006;12(2):119–24.
- Sulistiyowati N, Tjandrarini DH, Titaley CR, Que BJ, Hidayangsih PS, Suparmi, et al. Suboptimal child healthcare practices and the development of multiple infectious diseases in children aged 24–59 months. *Front Public Heal.* 2024;12:1340559.
- Badan Penelitian dan Pengembangan Kesehatan Kementerian RI. *Riset Kesehatan Dasar (Riskesdas)* 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019. 674 p.
- Alter SJ, Vidwan NK, Sobande PO, Omoloja A, Bennett JS. Common childhood bacterial infections. *Curr Probl Pediatr Adolesc Health Care.* 2011;41(10):256–83.
- Apsari PIB, Suryanditha PA, Widhidewi NW, Masyeni DAPS. Characteristics of the Health Problems Among International Travelers Visiting International Hospital in Bali. *WMJ (Warmadewa Med Journal).* 2023;8(1):23–6.
- Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012;380(9859):2095–128.
- Kyu HH, Vongpradith A, Sirota SB, Novotney A, Troeger CE, Doxey MC, et al. Age–sex differences in the global burden of lower respiratory infections and risk factors, 1990–2019: results from the Global Burden of Disease Study 2019. *Lancet Infect Dis [Internet].* 2022 Nov 1;22(11):1626–47. Available from: [https://doi.org/10.1016/S1473-3099\(22\)00510-2](https://doi.org/10.1016/S1473-3099(22)00510-2)
- Prendergast AJ, Klenerman P, Goulder PJR. The impact of differential antiviral immunity in children and adults. *Nat Rev Immunol.* 2012;12(9):636–48.
- Chen S, Law R, Zhang M. Review of research on tourism-related diseases. *Asia Pacific J Tour Res.* 2021;26(1):44–58.
- Zumla A, Ustianowski A. Tropical diseases: definition, geographic distribution, transmission, and classification. *Infect Dis Clin North Am.* 2012 Jun;26(2):195–205.
- Lim TK, Siow WT. Pneumonia in the tropics. *Respirology.* 2018;23(1):28–35.
- Steffen R, debernardis C, Baños A. Travel epidemiology—a global perspective. *Int J Antimicrob Agents.* 2003;21(2):89–95.
- Pisutsan P, Soonthornworasiri N, Matsee W, Phumratanaprapin W, Punrin S, Leowattana W, et al. Incidence of health problems in travelers to Southeast Asia: a prospective cohort study. *J Travel Med.* 2019;26(7):taz045.
- Wu Y, Liu MY, Wang JL, Zhang HY, Sun Y, Yuan Y, et al. Epidemiology of imported infectious diseases, China, 2014–18. *J Travel Med [Internet].* 2020 Dec 1;27(8):taaa211. Available from: <https://doi.org/10.1093/jtm/taaa211>
- Pepe F, AKINCI E, Bodur H. What to Know About Travel Related Infections. *Mediterr J Infect Microbes Antimicrob.* 2018;
- Herbinger K, Drerup L, Alberer M, Nothdurft H, Sonnenburg F von, Löscher T. Spectrum of Imported Infectious Diseases Among Children and Adolescents Returning From the Tropics and Subtropics. *J Travel Med [Internet].* 2012 May 1;19(3):150–7. Available from: <https://doi.org/10.1111/j.1708-8305.2011.00589.x>

18. DeAntonio R, Yarzabal JP, Cruz JP, Schmidt JE, Kleijnen J. Epidemiology of community-acquired pneumonia and implications for vaccination of children living in developing and newly industrialized countries: A systematic literature review. *Hum Vaccin Immunother*. 2016;12(9):2422–40.
19. Brooks WA, Goswami D, Rahman M, Nahar K, Fry AM, Balish A, et al. Influenza is a major contributor to childhood pneumonia in a tropical developing country. *Pediatr Infect Dis J*. 2010;29(3):216–21.
20. Aman AT. The rotavirus causing acute gastroenteritis in children of under 5-year of age in Indonesia 1972–2018: a review. *J Med Sci (Berkala Ilmu Kedokteran)*. 2021;53(1).
21. Adler A V, Ciccotti HR, Trivitt SJH, Watson RCJ, Riddle MS. What's new in travellers' diarrhoea: updates on epidemiology, diagnostics, treatment and long-term consequences. *J Travel Med* [Internet]. 2022 Jan 1;29(1):taab099. Available from: <https://doi.org/10.1093/jtm/taab099>
22. Jiang ZD, DuPont HL. Etiology of travellers' diarrhea. *J Travel Med* [Internet]. 2017 Apr 1;24(suppl_1):S13–6. Available from: <https://doi.org/10.1093/jtm/tax003>
23. Wang H, Zhang P, Zhao Q, Ma W. Global burden, trends and inequalities for typhoid and paratyphoid fever among children younger than 15 years over the past 30 years. *J Travel Med* [Internet]. 2024 Dec 1;31(8):taae140. Available from: <https://doi.org/10.1093/jtm/taae140>
24. Utama IMS, Lukman N, Sukmawati DD, Alisjahbana B, Alam A, Murniati D, et al. Dengue viral infection in Indonesia: Epidemiology, diagnostic challenges, and mutations from an observational cohort study. *PLoS Negl Trop Dis*. 2019;13(10):e0007785.
25. Duvignaud A, Stoney RJ, Angelo KM, Chen LH, Cattaneo P, Motta L, et al. Epidemiology of travel-associated dengue from 2007 to 2022: A GeoSentinel analysis. *J Travel Med* [Internet]. 2024 Oct 19;31(7):taae089. Available from: <https://doi.org/10.1093/jtm/taae089>
26. Weinberg M, Weinberg N, Maloney S. Traveling Safely with Infants & Children. In: CDC Yellow Book 2024:Health Information for International Travel. 2023.
27. Muenchhoff M, Goulder PJR. Sex differences in pediatric infectious diseases. *J Infect Dis*. 2014;209(suppl_3):S120–6.
28. Lamberti LM, Fischer Walker CL, Noiman A, Victora C, Black RE. Breastfeeding and the risk for diarrhea morbidity and mortality. *BMC Public Health* [Internet]. 2011;11(3):S15. Available from: <https://doi.org/10.1186/1471-2458-11-S3-S15>
29. Prentice AM. Breastfeeding in the Modern World. *Ann Nutr Metab* [Internet]. 2022 Jun 9;78(Suppl 2):29–38. Available from: <https://doi.org/10.1159/000524354>
30. Froń A, Orczyk-Pawiłowicz M. Breastfeeding beyond six months: Evidence of child health benefits. *Nutrients*. 2024;16(22):3891.
31. Tromp I, Kieft-de Jong J, Raat H, Jaddoe V, Franco O, Hofman A, et al. Breastfeeding and the risk of respiratory tract infections after infancy: The Generation R Study. *PLoS One*. 2017;12(2):e0172763.
32. Rohmah H, Hafsa T, Rakhamilla LE. Role of exclusive breastfeeding in preventing diarrhea. *Althea Med J*. 2015;2(1):78–81.
33. Horta BL, Victora CG, Organization WH. Short-term effects of breastfeeding: a systematic review on the benefits of breastfeeding on diarrhoea and pneumonia mortality. 2013;
34. Li Y, Deng H, Li M, Wang W, Jia X, Gao N, et al. Prolonged Breastfeeding Is Associated With Lower Risk Of Severe Hand, Foot And Mouth Disease In Chinese Children. *Pediatr Infect Dis J*. 2016;35(3):353–5.
35. Shaaban KM, Hamadnalla I. The effect of duration of breast feeding on the occurrence of acute otitis media in children under three years. *East Afr Med J*. 1993;70(10):632–4.
36. Talbird SE, Carrico J, La EM, Carias C, Marshall GS, Roberts CS, et al. Impact of Routine Childhood Immunization in Reducing Vaccine-Preventable Diseases in the United States. *Pediatrics* [Internet]. 2022 Aug 22;150(3):e2021056013. Available from: <https://doi.org/10.1542/peds.2021-056013>
37. Bianchini S, Argentiero A, Camilloni B, Silvestri E, Alunno A, Esposito S. Vaccination against Paediatric Respiratory Pathogens. *Vaccines*. 2019 Nov;7(4).
38. Hooker BS, Miller NZ. Analysis of health outcomes in vaccinated and unvaccinated children: Developmental delays, asthma, ear infections and gastrointestinal disorders. *SAGE Open Med*. 2020;8:2050312120925344.

