International Journal of Nursing and Midwifery Science (IJNMS)

http://ijnms.net/index.php/ijnms
e- ISSN: 2686-2123
p- ISSN: 2686-0538
ORIGINAL RESEARCH

EPIDEMIOLOGY AND CLINICAL CHARACTERISTICS OF MUMPS AMONG CHILDREN AND ADOLESCENTS: A CROSS-SECTIONAL STUDY IN CISOKA PUSKESMAS, INDONESIA

Muhammad Ikmal Syafii[1], David Christian[2], Indri[3], Trisna Amerdista[3]
[1]Faculty of Medicine, Muhammadiyah University of Jakarta, Jakarta, Indonesia
[2]Faculty of Medicine, Tarumanagara University, Jakarta, Indonesia
[3]Faculty of Medicine, Syarif Hidayatullah Jakarta Islamic State University, Banten, Indonesia
Corresponding Email: ikmallsyafii@gmail.com

ABSTRACT

Background: Mumps remains a vaccine-preventable illness with periodic outbreaks in areas with low immunization coverage. Rural settings often show higher susceptibility due to limited healthcare access.
Aims: To determine the prevalence and clinical characteristics of mumps among children and adolescents at Cisoka Puskesmas, Indonesia.
Methods: A cross-sectional study was conducted on all pediatric patients clinically diagnosed with mumps from January to March 2025 based on WHO criteria. Demographic data, MR vaccination status, clinical features, and household exposures were obtained through interviews and clinical evaluation. Descriptive analysis was performed using SPSS 26.0.
Result: Seventy-six mumps cases were identified, yielding a prevalence of 4.38%. The highest age-specific prevalence occurred in children aged 6–11 years (6.45%). Unilateral parotitis accounted for 71.1% of cases. Common symptoms included fever (96.1%), chewing pain (61.8%), and painful swallowing (51.3%). Only 59.2% had received MR vaccination, and 65.8% lived in close contact with at least one active smoker.
Conclusion: Mumps continues to circulate among the pediatric population in rural Tangerang, driven by inadequate MR vaccination coverage and modifiable household-level exposures such as close contact with smokers. Strengthening immunization uptake and reducing preventable exposures are critical to mitigate future outbreaks.

Keywords

Mumps, Epidemiology, Clinical Characteristics, Children, Adolescents, Rural Health

INTRODUCTION

Mumps is a vaccine-preventable viral illness that primarily affects children and adolescents. It is caused by a paramyxovirus transmitted through respiratory droplets and typically presents with parotid gland swelling, fever, and constitutional symptoms (Rausch-Phung et al., 2025). Although often self-limiting, mumps may lead to complications such as orchitis, oophoritis, meningitis, and hearing loss, particularly among unvaccinated or older pediatric patients (Bhanu et al., 2025; Rausch-Phung et al., 2025). According to the World Health Organization (WHO), mumps should be suspected in individuals presenting with acute unilateral or bilateral parotid swelling lasting at least two days without an apparent alternative cause (CDC, 2024; WHO, 2020).

Before widespread vaccination, mumps posed a major global health burden, with annual incidence rates ranging from 40 to 726 cases per 100,000 population (Su et al., 2020). The introduction of mumps-containing vaccines significantly reduced disease incidence and complications worldwide. Despite this progress, outbreaks have resurfaced in recent years, including among vaccinated individuals, especially in high-exposure settings such as schools and communal environments (Lam et al., 2020; Perez Duque et al., 2021; Shah et al., 2018).

Indonesia has adopted the national measles–rubella (MR) vaccination program as part of its strategy to eliminate measles and control rubella and mumps (Chacko et al., 2023). However, recent surveillance data indicate a resurgence of suspected mumps cases. As of November 13, 2024, the Ministry of Health recorded 6,593 suspected cases, with a substantial increase during November (Menur, 2025). Contributing factors include suboptimal uptake of the complete two-dose regimen, unequal vaccine access, and persistent logistical barriers in rural regions (Albers et al., 2022; Lam et al., 2020).

From a nursing perspective, this study draws on community health nursing principles and Pender's Health Promotion Model, emphasizing how parental beliefs, environmental exposures, and preventive behaviors shape mumps susceptibility in pediatric populations (Khoshnood et al., 2020). This framework supports a community-oriented interpretation of the findings.

Despite increasing reports of mumps resurgence nationally, data describing age-specific prevalence and clinical presentations in rural Indonesian primary care settings remain limited. This lack of granular epidemiological information hampers targeted prevention efforts, particularly in underserved areas where vaccination gaps and household-level exposures may differ from urban populations.

Puskesmas Cisoka in rural Tangerang serves a large pediatric and adolescent population with limited healthcare infrastructure, making it a relevant site to characterize local patterns of mumps infection. This study provides new evidence by documenting detailed mumps clinical patterns and age-specific prevalence in a rural primary care facility, which has not been previously reported in Banten Province.

This cross-sectional study aims to determine the prevalence of mumps and describe its clinical manifestations among children and adolescents attending Puskesmas Cisoka. By identifying key demographic and clinical characteristics, the findings are expected to support more targeted public health interventions and strengthen outbreak preparedness in similar rural communities.

METHOD

This cross-sectional study employed total sampling of all pediatric patients presenting to the Cisoka Puskesmas pediatric clinic between January and March 2025. The final sample of 76 cases represented all clinically diagnosed mumps cases during the study period. Data were collected prospectively through structured caregiver interviews and clinical

assessments performed during routine outpatient visits.

Inclusion criteria were: (1) age 0–18 years, (2) clinical diagnosis of mumps with parotid gland swelling with or without constitutional symptoms, and (3) symptom onset within seven days. Exclusion criteria were: (1) incomplete clinical records, (2) known immunodeficiency, and (3) mumps vaccination within the preceding four weeks. Mumps was defined according to WHO criteria as acute onset of unilateral or bilateral parotid swelling without another apparent cause.

Quality control procedures included calibration of the digital axillary thermometer prior to data collection, standardized training of interviewers to ensure consistent history-taking, and cross-checking of clinical findings by two clinicians to enhance interrater reliability. Body temperature was measured using a calibrated digital axillary thermometer, with fever defined as ≥37.5°C. Clinical symptoms, including headache, myalgia, fatigue, pain while swallowing, and pain while chewing, were recorded as presence or absence based on structured caregiver interviews or adolescent self-report. Exposure variables followed operational definitions: household smoker referred to ≥1 person smoking inside the home daily; close contact referred to sharing the same living space for >4 hours per day.

Data were entered into standardized case report forms and analyzed using SPSS version 26.0 (IBM, USA). Analyses were primarily descriptive. This study utilized available electronic medical records with prior permission from Cisoka Rural Health Center and was conducted in accordance with ethical research standards under ethical approval number B/400.7/V/PKM-CSK/2025.

RESULTS

A total of 76 pediatric patients diagnosed with mumps were included. Children aged 6–11 years comprised the largest proportion (57.9%), followed by ages 2–5 years (22.4%) and 12–17 years (19.7%). Females made up 56.6% of cases. More than half reported household exposure to a confirmed case (51.3%), and 65.8% lived with at least one active smoker. MR vaccination coverage among cases was 59.2%.

Table 1. Demographic Characteristics, Exposure History, and Vaccination Status of Mumps Cases

Categories	Total	Percentage
Age Group		
2-5 years	17	22.40%
6-11 years	44	57.90%
12-17 years	15	19.70%
Gender		
Male	33	43.40%
Female	43	56.60%
Close Contact		
Home	39	51.30%
School	37	48.70%
House Smokers		
Yes	50	65.80%
No	26	34.20%
MR Vaccinated		
Yes	45	59.20%
No	31	40.80%

Fever was the most frequent symptom (96.1%), followed by chewing pain (61.8%) and swallowing pain (51.3%). Headache (23.7%), myalgia (13.2%), and fatigue (13.2%) occurred less frequently. Parotid swelling was unilateral in most patients (71.1%), while 28.9% had bilateral involvement. A prior history of mumps was reported by 10.5% of participants.

Table 2. Clinical Features and Parotitis Distribution Among Mumps Patients

Clinical	Total	Percentage
Symptoms		
Fever	73	96.10%
Headache	18	23.70%
Myalgia	10	13.20%
Fatigue	10	13.20%
Swallowing	39	51.30%
Chewing Pain	47	61.80%
Parotitis Laterality		
Left	27	35.50%
Right	27	35.50%
Bilateral	22	28.90%
History of Mumps		
Yes	8	10.50%
No	68	89.50%

Age-specific prevalence analysis showed the highest prevalence among children aged 6–11 years (6.45%), followed by adolescents aged 12–17 years (4.53%) and children aged 2–5 years (2.36%). The overall prevalence of mumps among the pediatric population at risk was 4.38% (95% CI: 3.42%–5.35%).

Table 3. Age-Specific Prevalence of Mumps Cases in the Pediatric Population of Cisoka Puskesmas, January–March 2025

Age Groups	Total Cases (n)	Population at Risk	Prevalence %
2-5 years	17	721	2.36
6-11 years	44	682	6.45
12-17 years	15	331	4.53
Total	76	1734	4.38

DISCUSSION

This study describes the epidemiological and clinical characteristics of pediatric mumps in the Cisoka Puskesmas region during early 2025. The overall prevalence of 4.38% is noteworthy, with the highest burden among children aged 6–11 years (6.45%). This age pattern likely reflects intense school-based exposure and insufficient herd immunity in partially vaccinated communities.

Most patients exhibited classic mumps features, including fever (96.1%), chewing pain (61.8%), and swallowing pain (51.3%), consistent with international clinical patterns (CDC, 2024; Rausch-Phung et al., 2025). However, many did not develop systemic symptoms such as fatigue or myalgia, highlighting variability in presentation and the importance of diagnostic vigilance in primary care.

Unilateral parotitis was more frequent (71.1%) than bilateral swelling (28.9%). This contrasts with earlier studies reporting predominantly bilateral involvement, 73.3% in Bhat et al. and 68.4% in Bhanu et al. (Bhanu et al., 2025; Bhat et al., 2023). Early presentation within three days of fever may explain this difference, as bilateral enlargement often emerges later in the disease course.

Only 10.5% reported a history of prior mumps, suggesting most infections were primary, although the potential for recall bias remains. No complications such as orchitis, meningitis, or hearing loss were documented, possibly reflecting younger age, prompt evaluation, and generally mild disease severity.

MR vaccination coverage was low, with only 59.2% receiving at least one dose. This figure remains well below the 95% herd immunity threshold recommended to prevent outbreaks (Ainurafiq et al., 2025). Suboptimal coverage likely sustained community transmission, consistent with findings from previous studies (Melgar et al., 2022).

Indonesian studies highlight persistent inequalities in MR vaccine uptake. Challenges include geographic disparities, urban-rural differences, limited access to health facilities, and fragile immunization infrastructure (Ainurafiq et al., 2025). Behavioral barriers also play a major role. Parental hesitancy is reinforced by misinformation, low health literacy, and

limited trust in health authorities (Hadi, 2024; Pronyk et al., 2019). Cultural and religious perspectives affect acceptance, emphasizing the need for deeper community-level engagement (Pronyk et al., 2019).

Although large-scale initiatives like the 2017-2018 MR campaign demonstrated government commitment, their long-term effectiveness may be compromised if these structural and behavioral barriers remain unaddressed. Experience from Japan similarly shows that targeted vaccination programs can still fall short without strong communication strategies and logistical support (Sato et al., 2025).

A substantial proportion of patients (65.8%) lived with active smokers. Passive smoke exposure may increase susceptibility to viral infections by irritating the respiratory tract and impairing mucosal immunity (Qiu et al., 2016; Strzelak et al., 2018). Past outbreak investigations also link smoking to higher mumps transmission risk. Ladbury et al. reported that smoking during a youth event tripled the risk of infection (RR 3.1; 95% CI: 1.6–6.0) (Ladbury et al., 2014). Similar exposure dynamics may be occurring within households in this study.

From a nursing standpoint, these findings align with community health nursing principles, emphasizing early detection, household risk mitigation, and community-level prevention strategies. The patterns observed also reflect key constructs from Pender's Health Promotion Model, where parental beliefs, environmental exposures, and preventive behaviors, particularly vaccination, shape pediatric vulnerability to infectious diseases (Khoshnood et al., 2020).

The study's cross-sectional design limits causal inference, and its single-center setting may restrict generalizability to broader rural populations. Self-reported vaccination status is vulnerable to recall bias. While clinical diagnosis is acceptable during outbreaks, the lack of laboratory confirmation (RT-PCR or IgM testing) may affect diagnostic precision.

Overall, mumps continues to affect school-aged children in rural Indonesia. Gaps in MR vaccination coverage and household environmental exposures contribute significantly to ongoing transmission. Strengthening immunization programs, promoting parental education, improving early clinical recognition, and addressing domestic risk factors, such as smoking, are essential for reducing disease burden and preventing future outbreaks.

CONCLUSIONS

This study shows that mumps remains present in Cisoka Puskesmas, with an overall prevalence of 4.38%, concentrated among school-aged children. Suboptimal MR vaccination coverage and household exposures, particularly passive smoke, continue to support transmission. Strengthening immunization uptake, improving parental awareness, and addressing modifiable home environments are key steps to reducing mumps burden in similar rural communities.

REFERENCES

Ainurafiq, A., Asrianti, T., Sartika, S., Salim, E. S. A., & Indar, I. (2025). Measles-Rubella Vaccination: Epidemiological Issue, Immunology, and Ethical Challenges. *Pancasakti Journal Of Public Health Science And Research*, *5*(1), Article 1. https://doi.org/10.47650/pjphsr.v5i1.1641

Albers, A. N., Thaker, J., & Newcomer, S. R. (2022). Barriers to and facilitators of early childhood immunization in rural areas of the United States: A systematic review of the literature. *Preventive Medicine Reports*, *27*, 101804. https://doi.org/10.1016/j.pmedr.2022.101804

Bhanu, K. S. S., Nadimpalli, M., Manchu, M. M., Duggirala, M., & Vantaku, V. V. (2025). A study on mumps infection in children aged 1-12 years in a tertiary care hospital, South India: A cross-sectional study. *International Journal of*

Contemporary Pediatrics, *12*(1), 118–123. https://doi.org/10.18203/2349-3291.ijcp20243865

Bhat, U. M., Mir, N. Y., Farooq, W., Zaman, B. U., & Malik, M. I. (2023). Clinical profile of mumps in children in a tertiary care hospital in Kashmir. *International Journal of Contemporary Pediatrics*, *10*(3), 290–294. https://doi.org/10.18203/2349-3291.ijcp20230421

CDC. (2024, June 10). *Clinical Features of Mumps*. Mumps. https://www.cdc.gov/mumps/hcp/clinical-signs/index.html

Chacko, S., Kamal, M., Hastuti, E. B., Mildya, F., Kelyombar, C., Voronika, V., Epid, Yosephine, P., Tandy, G., Anisiska, D., Karolina, S., Dewi, L. A., Khanal, S., Bahl, S., Wijayanti, F., Merrill, R. D., Hsu, C. H., & Morales, M. (2023). Progress Toward Measles and Rubella Elimination—Indonesia, 2013–2022. *Morbidity and Mortality Weekly Report*, *72*(42), 1134–1139. https://doi.org/10.15585/mmwr.mm7242a2

Hadi, E. N. (2024). Parents' Perspectives on Vaccination Rubella Measles in Children. *Jurnal Kesehatan*, *15*(1), 18–27. https://doi.org/10.35730/jk.v15i1.1086

Khoshnood, Z., Rayyani, M., & Tirgari, B. (2020). Theory analysis for Pender's health promotion model (HPM) by Barnum's criteria: A critical perspective. *International Journal of Adolescent Medicine and Health*, *32*(4). https://doi.org/10.1515/ijamh-2017-0160

Ladbury, G., Ostendorf, S., Waegemaekers, T., van Binnendijk, R., Boot, H., & Hahne, S. (2014). Smoking and older age associated with mumps in an outbreak in a group of highly-vaccinated individuals attending a youth club party, the Netherlands, 2012. *Euro Surveillance: Bulletin Europeen Sur Les Maladies Transmissibles = European Communicable Disease Bulletin*, *19*(16), 20776. https://doi.org/10.2807/1560-7917.es2014.19.16.20776

Lam, E., Rosen, J. B., & Zucker, J. R. (2020). Mumps: An Update on Outbreaks, Vaccine Efficacy, and Genomic Diversity. *Clinical Microbiology Reviews*, *33*(2), 10.1128/cmr.00151-19. https://doi.org/10.1128/cmr.00151-19

Melgar, M., Yockey, B., & Marlow, M. A. (2022). Impact of vaccine effectiveness and coverage on preventing large mumps outbreaks on college campuses: Implications for vaccination strategy. *Epidemics*, *40*, 100594. https://doi.org/10.1016/j.epidem.2022.100594

Menur, A., & Erni. (2025). *Beyond the Mumps: Lessons From Indonesia's Recent Outbreak*. https://ina-respond.net/2025/02/18/beyond-the-mumpslessons-from-indonesias-recent-outbreak/

Perez Duque, M., San-Bento, A., Léon, L., Custódio, P., Esperança, M. A., Albuquerque, M. J., Nascimento, M., Balasegaram, S., & Sá Machado, R. (2021). Mumps outbreak among fully vaccinated school-age children and young adults, Portugal 2019/2020. *Epidemiology and Infection*, *149*, e205. https://doi.org/10.1017/S0950268821002028

Pronyk, P., Sugihantono, A., Sitohang, V., Moran, T., Kadandale, S., Muller, S., Whetham, C., & Kezaala, R. (2019). Vaccine hesitancy in Indonesia. *The Lancet Planetary Health*, *3*(3), e114–e115. https://doi.org/10.1016/S2542-5196(18)30287-0

Qiu, F., Liang, C.-L., Liu, H., Zeng, Y.-Q., Hou, S., Huang, S., Lai, X., & Dai, Z. (2016). Impacts of cigarette smoking on immune responsiveness: Up and down or upside down? *Oncotarget*, *8*(1), 268–284. https://doi.org/10.18632/oncotarget.13613

Rausch-Phung, E. A., Davison, P., & Morris, J. (2025). Mumps. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK534785/

Sato, S., Ono, S., Sasabuchi, Y., Uemura, K., & Yasunaga, H. (2025). Changes in the mumps vaccine coverage and incidence of mumps before and after the public subsidization program: A descriptive study using a population-based database in Japan. *American Journal of Infection Control*, *53*(1), 82–86. https://doi.org/10.1016/j.ajic.2024.09.011

Shah, M., Quinlisk, P., Weigel, A., Riley, J., James, L., Patterson, J., Hickman, C., Rota, P. A., Stewart, R., Clemmons, N., Kalas, N., & Cardemil, C. (2018). Mumps Outbreak in a Highly Vaccinated University-Affiliated Setting Before and After a Measles-Mumps-Rubella Vaccination Campaign—Iowa, July 2015–May 2016. *Clinical Infectious Diseases : An Official Publication of the Infectious Diseases Society of America*, *66*(1), 81–88. https://doi.org/10.1093/cid/cix718

Strzelak, A., Ratajczak, A., Adamiec, A., & Feleszko, W. (2018). Tobacco Smoke Induces and Alters Immune Responses in the Lung Triggering Inflammation, Allergy, Asthma and Other Lung Diseases: A Mechanistic Review. *International Journal of Environmental Research and Public Health*, *15*(5), 1033. https://doi.org/10.3390/ijerph15051033

Su, S.-B., Chang, H.-L., & Chen, K.-T. (2020). Current Status of Mumps Virus Infection: Epidemiology, Pathogenesis, and Vaccine. *International Journal of Environmental Research and Public Health*, *17*(5), 1686. https://doi.org/10.3390/ijerph17051686

WHO. (2020). *Mumps*. https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/norms-and-standards/vaccine-standardization/mumps