

## Epidemiology of Varicella in Kulon Progo District, Indonesia: 2023-2024

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## ABSTRACT

Varicella, a highly contagious disease, spreads easily through respiratory droplets and direct contact, particularly in crowded environments such as schools. The infection can quickly affect many individuals within a short period, making it one of the most common communicable diseases among children. Although most cases are mild and self-limiting, varicella can lead to severe complications such as pneumonia, encephalitis, or even death, especially in vulnerable groups. The rapid spread of the disease reflects both high viral transmissibility and insufficient prevention measures in community and school settings. Monitoring and understanding varicella patterns are therefore essential to guide timely public health responses.

This study focuses on describing the epidemiological characteristics of varicella in Kulon Progo District during 2023 to 2024, highlighting the trends, transmission patterns, and most affected population to support the strengthening of surveillance, prevention, and control strategies.

**Keywords:** Varicella, Epidemiology, Indonesia

## Introduction

Varicella-zoster virus (VZV) is the etiologic agent of varicella (chicken pox), a childhood exanthematic disease that develops as a result of primary infection, and zoster (shingles), caused by reactivation of the virus persisting in a latent form in the dorsal sensory ganglia [1].

Varicella is typically a mild illness; however, complications such as encephalitis, pneumonia, and secondary bacterial infections can occur, leading to hospitalization and, in some cases, death [2].

The disease is characterized by vesicular eruptions that initially appear on the chest, back, and face before spreading across the body. Common symptoms include fever, fatigue, pharyngitis, and headaches, which last approximately 5-7 days [3]. Transmission

occurs via airborne droplets and direct contact with skin lesions, with an incubation period of 14-16 days [4].

Globally, varicella remains a significant public health issue. The World Health Organization (WHO) estimates that varicella affects approximately 140 million individuals annually, with 4.2 million cases requiring hospitalization and 4,200 resulting in death [5].

In Indonesia, varicella incidence is often underreported due to its exclusion from the national immunization program, leaving many individuals vulnerable to infection [6]. Schools, in particular, serve as high-risk environments for transmission due to crowded conditions and frequent close-contact interactions among students.

In the Special Region of Yogyakarta, varicella has been an ongoing public health concern. In 2023, multiple outbreaks were

reported in Bantul Regency and Yogyakarta City, predominantly among students. Similarly, in November 2024, the Kulon Progo Health Office documented a surge in varicella cases, emphasizing the need for increased vigilance, particularly during the rainy season, which may facilitate transmission [7].

To address this issue, the Kulon Progo District Health Office has implemented public health interventions, including routine varicella surveillance, early case detection through the Early Alert and Response System (SKDR), and outbreak investigations. Additionally, health promotion efforts have been intensified to raise awareness among school administrators, parents, and healthcare providers regarding varicella prevention and control measures [8].

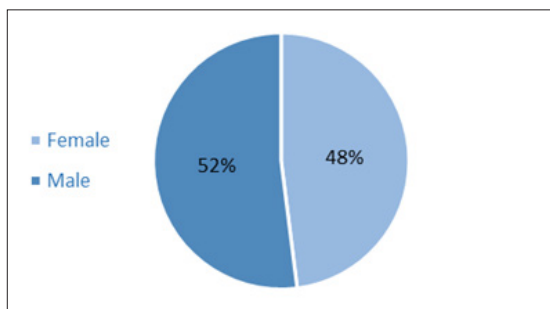
Based on these challenges, this research aims to characterize the epidemiology of varicella in Kulon Progo from 2023-2024 to assess disease burden, transmission patterns, and high-risk groups.

### Materials and Methods

This study used descriptive data utilizing surveillance data from the Early Alert and Response System (SKDR) at district level from 2023 to 2024. Additionally, a retrospective review of outbreak investigation reports from 2024 was conducted to identify patterns, response effectiveness, and key challenges in outbreak management at the district level.

### Result

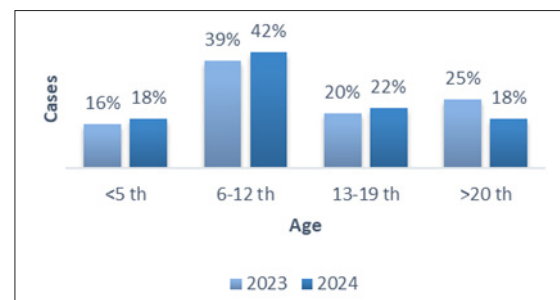
A total of 1,886 varicella cases were reported in Kulon Progo between 2023 and 2024. The distribution of cases was nearly equal between males (52%) and females (48%), indicating no significant gender-based differences in susceptibility in (Figure 1).



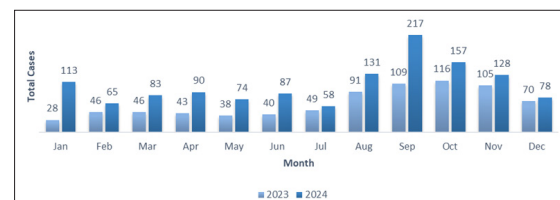
**Figure 1:** Varicella cases by gender, 2023-2024

The highest disease burden was observed among school aged children (6-12 years), with cases increasing from 280 (37%) in 2023 to 446 (39%) in 2024 (Figure 2). This age group was particularly vulnerable due to frequent close-contact interactions in school environments, which facilitated rapid virus transmission.

Varicella cases in Kulon Progo increased from 741 in 2023 to 1,145 in 2024, marking a 64% rise. A significant surge in cases was observed in September 2024, coinciding with an outbreak at Darat Elementary School in Wates Sub-District.



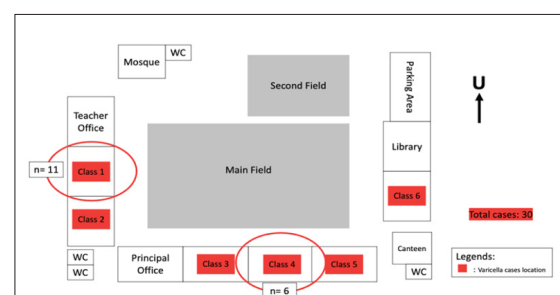
**Figure 2:** Distribution of varicella cases by age group, 2023-2024



**Figure 3:** Trend varicella cases in Kulon Progo District, 2023-2024

Among the 11 sub-districts in Kulon Progo, Wates recorded the highest number of varicella cases, accounting for 15.2% of the total. Notably, in September 2024, outbreaks occurred in two schools within this area: Darat Elementary School (30 cases) and Madrasah Islam Ma'Arif Karangwuni (2 cases).

A spatial analysis at Darat Elementary School revealed that varicella cases were distributed across all grades (1-6). The highest number of cases was recorded in Grade 1 (11 cases), followed by Grade 4 (6 cases). The school's playground, a common area for student interactions, was identified as a potential site for disease transmission.



**Figure 4:** Varicella outbreak map in Darat Ele

### Discussion

Varicella is a highly contagious disease that frequently causes outbreaks in school environments, particularly in primary schools, where children have close interactions, share items, and study in confined spaces, increasing the risk of transmission [9,10]. The findings of this study highlight a significant increase in varicella cases in Kulon Progo from 2023 to 2024, with a 64% rise in reported cases. The highest incidence was among school-aged children (6-12 years), reinforcing the role of school settings in facilitating varicella transmission.

The age distribution observed in this study aligns with findings from previous research. Reported similar trends in Jember,

Indonesia, where children aged 1-4 years and 5-9 years accounted for 23.7% of cases, respectively [11]. Additionally, emphasized that children aged 1-12 years are at higher risk of complications from varicella, highlighting the need for targeted prevention strategies in these age groups [12].

A key factor contributing to the outbreaks in Kulon Progo was the absence of quarantine regulations for infected children. This allowed continuous attendance of contagious students, leading to rapid transmission, particularly in schools with poor hygiene practices and inadequate infection control measures. The outbreak in Darat Elementary School in Wates Sub-District, which resulted in 30 confirmed cases, underscores the vulnerability of educational institutions to varicella transmission. The spatial distribution of cases across all grade levels, with the highest concentration in Grade 1, further supports the role of frequent interactions in spreading the virus.

Similar findings were reported in a study conducted in the Region of Murcia, Spain, where 51 varicella outbreaks were identified, predominantly affecting daycare centers and nursery school classrooms [13]. The study concluded that younger children were particularly susceptible due to their lack of prior exposure to the virus, a factor that is also relevant to the situation in Kulon Progo. The widespread incidence of varicella in childhood is well-documented in the absence of vaccination programs, as seen in multiple studies worldwide [14].

One notable finding in this study is the absence of significant gender differences in varicella incidence, except among individuals aged 15-24 years. This is consistent with research conducted in Sweden, which also found an equal distribution of cases between males and females across most age groups [13]. These findings suggest that gender may not be a key determinant in varicella susceptibility, except in certain age brackets where behavioral or immunological factors could play a role.

One of the key challenges in varicella control in Indonesia is that the varicella vaccine is not yet included in the national immunization program, making it an optional vaccine with limited coverage [15]. This has resulted in a high number of susceptible individuals, especially in settings with low immunization rates. The outbreaks observed in this study highlight the urgent need for stronger vaccination policies and public health interventions to reduce the burden of varicella.

To mitigate the impact of future outbreaks, several measures should be implemented, including strengthening routine varicella surveillance, enforcing quarantine guidelines for infected students, improving hygiene practices in schools, and increasing public awareness about the benefits of varicella vaccination. The findings from this study emphasize the importance of integrating varicella vaccination into Indonesia's national immunization program to protect vulnerable populations and reduce the frequency of outbreaks in educational settings.

This study has several limitations, including reliance on surveillance data and underreporting. The study did not include laboratory confirmation of cases, making diagnosis dependent on clinical observations, which can lead to misclassification.

Additionally, the lack of detailed immunization history for each case limits the ability to assess vaccine effectiveness in preventing outbreaks. Finally, the study is limited to Kulon Progo District, which may not fully represent the epidemiological patterns of varicella in other regions of Indonesia.

## Conclusion

This study highlights a significant increase in varicella cases in Kulon Progo, particularly among school-aged children, with schools serving as key transmission hubs. Addressing gaps in infection control through policy interventions and public health strategies is essential to reduce disease burden and prevent future outbreaks.

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## Declaration of Interest Statement

The authors declare that they have no conflict of interest.

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