


# Completeness and Timeliness of Vietnam's National COVID-19 Reporting System Among Schoolchildren in Thai Nguyen City, Vietnam During the Omicron Variant Epidemic

Asia Pacific Journal of Public Health  
2024, Vol. 36(8) 780–783  
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DOI: 10.1177/10105395241282767  
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## Introduction

Despite many pediatric cases being asymptomatic or having mild symptoms, leading to unnoticed outbreaks,<sup>1,2</sup> reporting COVID-19 cases in schools proved valuable for tracking transmission dynamics by age and over time.<sup>3</sup>

Vietnam detected its first Omicron case on December 19, 2021, sparking a nationwide epidemic, which led to the lifting of lockdown measures to testing and home quarantine for suspected cases. In Thai Nguyen city, despite sporadic closures post-reopening on September 28, 2021, secondary schools resumed full-time, in-person education on February 10, 2022, amid rising COVID-19 cases. After May 10, 2022, school reporting of COVID-19 cases ceased to be mandatory, but the school maintained recorded cases for student safety. Simultaneously, Vietnam's National COVID-19 Reporting System (VNRS) tracked cases in the general population.

During COVID-19 pandemic, many countries established school surveillance systems. Some integrated into national networks like Belgium and Germany<sup>4,5</sup> while others operated as dependent systems, as seen in Uganda and Italy.<sup>6,7</sup> In contrast, Vietnam adopted parallel reporting systems—national and school-based—separately. However, anecdotal evidence suggested flaws in reporting school-aged children's cases to the national system. This study aimed to assess VNRS completeness and timeliness for COVID-19 reporting in Thai Nguyen city.

## Methods

This study employed a mixed-methods including quantitative analysis, and used data from the VNRS and Nha Trang Secondary School's reporting database from February to June 2022; qualitative data were obtained from an interview with school health staff. Vietnam's National COVID-19 Reporting System's completeness of reporting was estimated by assuming that every case was detected by the school system.

## Results

A total of 1131 COVID-19 cases were reported in the school system and 88 cases were reported across both reporting systems.

The VNRS functions as a passive surveillance system. Symptomatic individuals must test and report to commune health station (CHS), and updates to VNRS. In case of a cluster, a test team tests all close contacts, reporting polymerase chain reaction (PCR) and/or rapid antigen test results to the Ministry of Health.

The school system, functioning as both an active and passive reporting system, which operated under different scenarios (Supplementary 1). In scenario 1, a positive test at school prompts health staff and homeroom teachers to

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**Table 1.** Characteristics and Completeness of Reporting of VNRS, Stratified by Age, Sex, Ward Address, and Week of Report, Thai Nguyen, February to June 2022.

	No. of records in school system (N = 1131)	No. of records in VNRS <sup>a</sup> (N = 88)	Completeness of reporting of VNRS (%) [95% CI]	P-value*
<b>All cases</b>	1131	88	7.8 [7.5, 8.1]	
<b>Age, Median (IQR)</b>	12 (12;14)	12 (11;14)		
<b>Age (Years)</b>				0.31
14	315 (28%)	26 (30%)	8.3 [7.6, 8.9]	
13	240 (21%)	18 (20%)	7.5 [6.8, 8.2]	
12	307 (27%)	16 (18%)	5.2 [4.7, 5.7]	
11	269 (24%)	28 (32%)	10.4 [9.5, 11.4]	
<b>Sex</b>				0.32
Male	512 (45%)	35 (40%)	8.6 [8.1, 9.0]	
Female	619 (55%)	53 (60%)	6.8 [6.5, 7.2]	
<b>Area of residence</b>				0.72
School ward (Phan Dinh Phung)	880 (78%)	67 (76%)	7.6 [6.6, 8.6]	
Non-school ward	251 (22%)	21 (24%)	8.4 [7.8, 9.0]	

\*P-value calculated by Chi-square test.

<sup>a</sup>Matched cases in both system, considered as COVID-19 cases reported in National reporting system.

report cases to the Department of Education. In scenario 2, a positive test at home leads parents to notify the CHS, updating the VNRS, and informing the school's staff for reporting to the Department of Education.

The completeness of reporting of VNRS was 7.8% (95% CI [7.5, 8.1]) and did not differ substantially by age, sex or residence's area. Eleven-year-olds had the highest completeness of reporting with 10.4% (95% CI [9.5, 11.4]), and lowest were 12-year-old with 5.2% (95% CI [4.7, 5.7]). The completeness greater among male (8.6%, 95% CI [8.1, 9.0]) than female; higher in the non-school ward (8.4%, 95% CI [7.8, 9.0]) than the school ward (7.6%, 95% CI [6.6, 8.6]) (Table, 1).

In school's data, cases increased rapidly from week 6 (February 7-13) to week 18 (May 2-8) in 2022. In the VNRS cases increased from week 8 (February 21-27) to week 10 (March 7-13). From week 11 (March 14-20) to week 26 (June 27-July 3), the VNRS was notified of few COVID-19 cases, even though the case remained high in the school system (Figure 1).

Compared with the school system, the majority of matched cases were reported earlier in the VNRS. High consistency between the two surveillance systems' testing dates in weeks 8 to 10 indicates simultaneous reporting of infected cases in both systems (Figure 2).

## Discussion

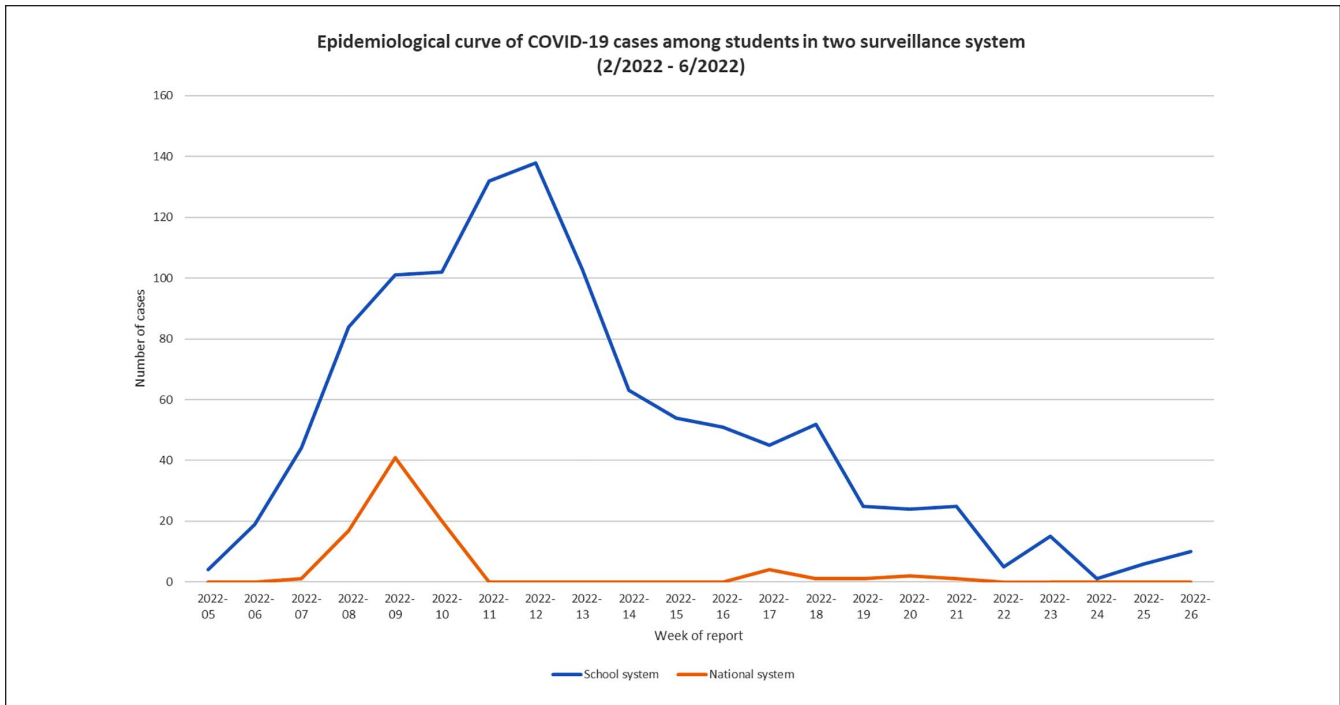
Our findings revealed low completeness in the VNRS, leading to underreported COVID-19 cases among school-aged children, potentially leading to delayed responses, particularly in areas with a high concentration of school-aged children. We found the Phan Dinh Phung ward's (school ward) completeness to be 7.6%, while non-school wards showed 8.4%. We hypothesized that parents primarily reported cases

to the school in the school ward, where students spent most of their time, while cases in non-school wards were reported to the CHS.

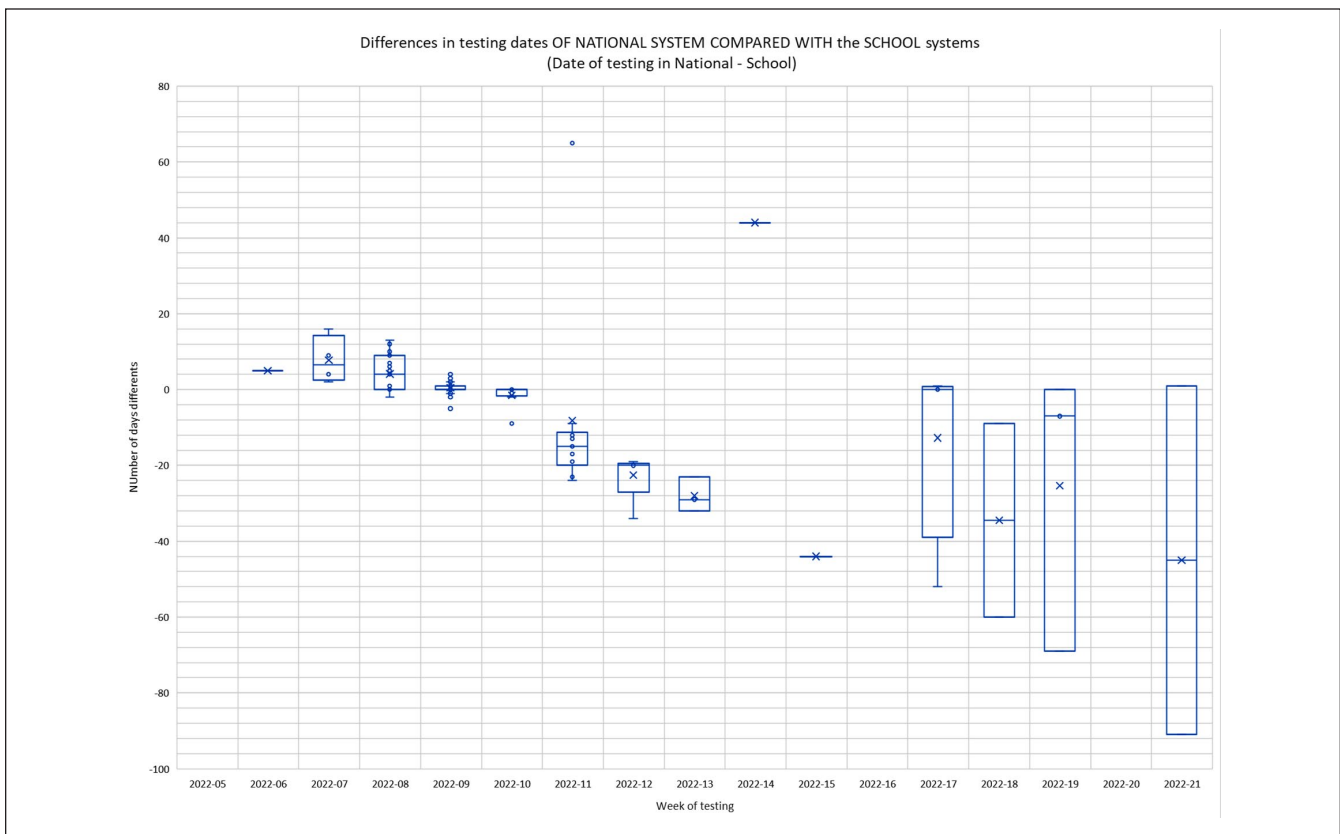
The similarity between the systems in weeks 7 and 10 of 2022 may result from collaboration between the school and health care systems, facilitating updates in case information for both. For instance, during the return to school in weeks 7 to 10 (February 14 to March 13), students underwent COVID-19 screening before vaccination, coordinated by both school and CHS. In June 2022, reported cases decreased, partly due to the school discontinuing daily updates. Some cases were reported in the VNRS up to 91 days earlier than in the school system, possibly because parents reporting cases when registering for a booster vaccine. In Vietnam in 2022, only Pfizer was administered to children under 18, with the second dose three weeks later and the third after three months. Thus, many COVID-19-infected children were reported by their parents before the second or third injection. This underscoring the importance of school and community health collaboration for timely updates on COVID-19 cases.

Incorporating case surveillance into one data system like Belgium and Germany, as shown by Joanna Merckx et al,<sup>4</sup> is achievable and beneficial for monitoring epidemics among schoolchildren, contributing to public health surveillance and pandemic preparedness.<sup>5</sup> In Uganda, schools are mandated to conduct daily surveillance, however, as of January 2022, only 2.5% of schools actively reported, attributed to inadequate training and information.<sup>6</sup> One more example for the implementation of good data is a study in the United States, providing web-based applications for public access helps identify districts and schools at higher risk.<sup>8</sup>

In Vietnam, parents are responsible for reporting their children's health status to schools and CHS. However, as parents



**Figure 1.** Epidemiological curve of COVID-19 cases among students in two surveillance systems.



**Figure 2.** Differences in testing dates between the national and school systems (days) box plot graph.

sometimes forget to specify reasons for children's absences, resulting in missing data. In addition, unreported COVID-19 cases were found during prevaccination screening.

Limitations of our study included restricted access to data from only some schools in Thai Nguyen city, hindering generalization. We propose a broader study encompassing all city and nationwide schools.

## Conclusion

Parallel reporting systems should link data between schools and the national level; coordinated efforts between schools, the Department of Education, and the Ministry of Health are crucial for an efficient monitoring and reporting system.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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## Supplemental Material

Supplemental material for this article is available online.

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