

# Underdiagnosis Does not Account for the Decrease in Dengue Cases in Bandung, Indonesia

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## ABSTRACT

**Introduction:** Epidemics caused by outbreaks of the dengue virus (DENV) have been prevalent in Indonesia since it was first reported in 1968. Bandung, the capital city of West Java, Indonesia, is one of the regions where dengue is the most prevalent in Indonesia. Since late 2019; however, the coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2, has become a worldwide public health challenge. Concurrently, a peculiar pattern of DENV incidence has emerged beginning in early 2020. Based on data from the West Java Provincial Health Office, a significant decrease in DENV cases occurred from January to July 2020 compared with that in 2019. One possible cause could be the underdiagnosis of dengue due to the overlap of clinical features with COVID-19.

**Methodology:** To test this hypothesis, we explored the possibility of under diagnosis or co-infection with COVID-19 and DENV by conducting multiplex real-time PCR of common arbovirus (DENV, Zika, Chikungunya) and SARS-Cov-2 on sera from patients with positive or negative COVID-19 swab test PCR results.

**Results:** Of the 284 sera tested, 41 were positive for SARS-Cov-2, and one serum was positive for both SARS-Cov-2 and DENV, whereas the rest were negative for arbovirus (DENV)

**Conclusions:** These results indicate that the co-infection of DENV and COVID-19 occurs only very rarely. We concluded that an underdiagnosis of DENV from January to July 2020 did not account for the significant decrease in cases in West Java, Indonesia.

**Keywords:** DENV; COVID-19; co-pandemic

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## INTRODUCTION

Dengue virus (DENV) epidemics have been a common occurrence in Indonesia since it was first reported back in 1968. Since then, the frequency of cases has increased nationwide [1]. Dengue is a viral infection that results in diseases from mild dengue fever to severe dengue haemorrhagic fever (DHF) and dengue shock syndrome [2]. In 2017 alone, there were 59,047 reported cases of DHF and 444 DHF-associated deaths in Indonesia. The data reflect the infection of 22.55 persons per 100,000 a year, a 0.75% of incidence rate and case fatality rate [3]. Bandung, the capital city of West Java, Indonesia, is one of the most dengue-prevalent regions in Indonesia [4]. Additionally, since late 2019, the coronavirus 2019 disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a worldwide public health challenge. It has disrupted health systems in North America, Europe and throughout Asia. The first cases of COVID-19 in Indonesia were reported in March 2020 [5], and as of August 24, 2020, there were 153,535 confirmed COVID-19 cases in Indonesia [6].

The possibility of a co-epidemic between COVID-19 and DENV would be a serious health threat in tropical regions such as in Indonesia as evidenced by what is occurring in Brazil [7]. COVID-19 and DENV share some similar symptoms and clinical presentation and usually require specific diagnostic tests to differentiate them [8]. However, a strikingly flat pattern of DENV incidence has emerged since early 2020 in Indonesia. The data obtained from the

West Java Provincial Health Office (Fig. 1) showed a significant decrease in reported cases between January and July 2020 compared with the same period in 2019.

Surprisingly, this phenomenon has also been observed in Brazil, where the dengue case incidence decreased following the 7th epidemiological week of COVID-19 [9]. Given this observation of sudden change in the 'dengue epidemiological data, we hypothesised that dengue cases were being significantly underdiagnosed following the introduction of SARS-CoV-2 since the restricted movement of people and access to health facilities during the peak of the pandemic could have impacted epidemiological surveillance efforts in Indonesia. Another possible explanation that could account for the significant decrease in dengue cases could be due to the overlap of clinical features and the cross-reactivity between COVID-19 and DENV, leading to false positive COVID-19 results by rapid tests, which was recently shown to have occurred in several cases in Singapore [8].

To test this hypothesis, we explored the possibility of the underdiagnosis or co-infection between COVID-19 and DENV by conducting multiplex real-time PCR for common arbovirus on sera from both COVID-19 positive and negative patients.

## METHODOLOGY

A total of 284 patients were tested for COVID-19 by real-time PCR with the Allplex™ 2019-nCoV Assay (Seegene, South Korea). They were then further tested by multiplex

real-time PCR using a Dengue, Zika and Chikungunya Virus Multiplex kit (GeneSig, United Kingdom). The samples were collected in Indonesia at the reference hospitals in the West Java.

**RESULTS**

Forty-one patients were confirmed positive for COVID-19. Of the total 284 sera from both positive and negative COVID-19 patients tested for DENV, Zika and Chikungunya, all except one were negative for arbovirus. Furthermore, the one serum that did test positive for DENV also tested positive for COVID-19 by the swab PCR test. The graph from the amplification curve (Fig. 2) indicates the infection of DENV of the patient (Sample 34). The results showed that the co-infection of COVID-19 and DENV was incredibly low, and the underdiagnosis of cases of DENV infection was not found. Our results also verified that, although very rare, the co-infection of COVID-19 with the endemic DENV is possible and has occurred in West Java.

**DISCUSSION**

Based on the data, the phenomenon of a decrease in dengue cases is most likely caused by the reduced mobility of people due to the social distancing measures implemented in cities. It is known that the transmission of dengue is mediated by the travel of infected individuals since the mosquito vectors only move short distances during their lifetimes [10]. Certainly, the research findings are limited because of the limited pool of samples, and more significant

interpretations will require further, larger studies. Overall, the results reflect the dynamic epidemiology of the tropical environment in West Java, Indonesia, in the months following the onset of the COVID-19 pandemic. Furthermore, these data have elucidated that the decrease in dengue cases in Bandung is not due to underdiagnosis

**CONCLUSION**

To conclude, our study confirmed that the sudden decrease of Dengue in the Bandung region was not likely due to underreporting or the underdiagnosis of cases. When faced with such concerning matters, the use and reconfirmation with RT-PCR testing are advisable and, in this case, illuminating. Additionally, in tropical countries, especially those with low- to middle-income country such as in Indonesia, co-epidemics still represent a considerable challenge for clinicians [11]. Further studies are required to better determine the accuracy of the SARS-CoV-2, DENV, Zika and Chikungunya diagnostic tests as well as on the impact of social measures on the dynamics of epidemiological phenomena such as those occurring in Bandung, Indonesia..

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**Figures**

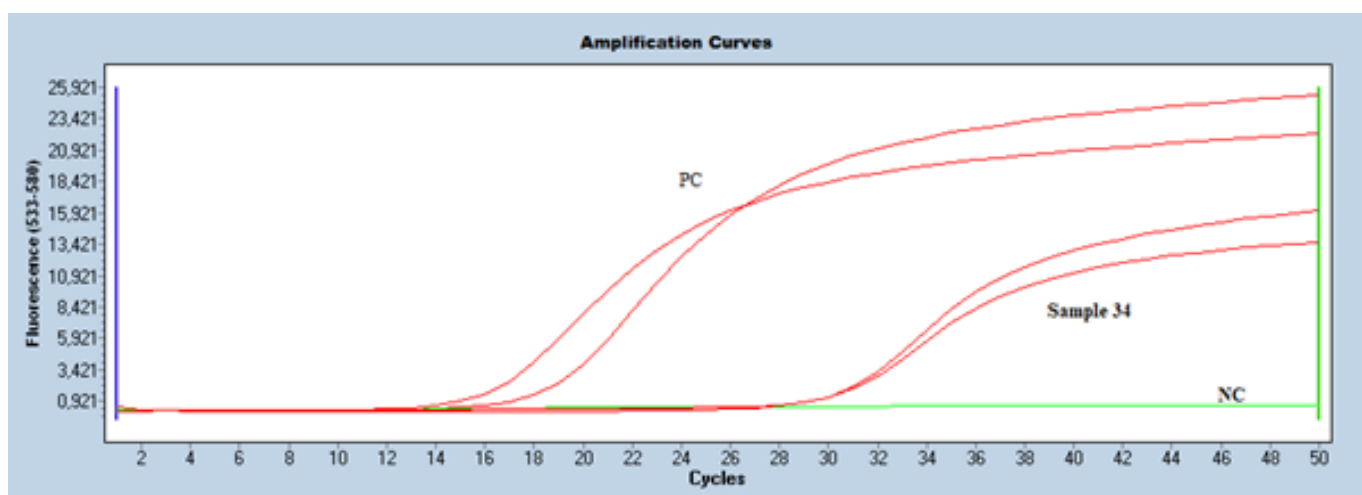


Figure 1. Detection of DENV by arbovirus multiplex rRT-PCR.

One patient with confirmed COVID-19 by swab-PCR test also tested positive for Dengue (Sample 34, in duplicates). Positive (PC) and negative (NC) controls were as expected.

**Tables**

Table 1: West Java Provincial Health Office Dengue Case Recapitulation. The result showed decreased reported cases of DENV between January–July of 2019 and 2020.

No.	Month	2019 cases	2020 cases
1	January	248	2
2	February	330	2
3	March	479	3

4	April	409	2
5	May	365	2
6	June	335	1
7	July	197	0
Total		<b>2363</b>	<b>12</b>

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