



## Original Article

# The Comparison of Dengue Haemorrhagic Fever Cases in Indonesia During the COVID-19 Pandemic

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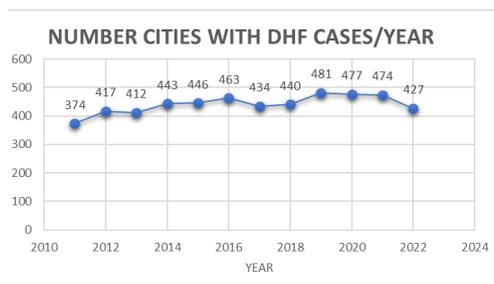
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## ABSTRACT

Since the emergence of the COVID-19 pandemic at the end of 2019, several problems in the world of health have been focused on handling the COVID-19 disease. Hence, it does not spread further out in the world and does not cause severe consequences. As is known, sufferers of the disease are due to the SAR COV-2 virus which infects many patients due to COVID-19. This study aims to depict the incidence rate (IR), Case Fatality Rate (CFR) of Dengue Haemorrhagic Fever (DHF) in Indonesia, and its comparison of the number of cases during the COVID-19 pandemic. As many as 452535 DHF cases from 2021 to 2022 were further analysed in this study. The data were analysed using univariate and bivariate analysis. The T-test was used to compare the number of cases in 2021 and 2022. The number of cities in Indonesia reported the DHF reached the highest during the COVID-19 pandemic and spread in 481 urban districts in 2019. The IR in Indonesia in 2021 was considerably higher than in 2022 in the same month. However, this was slightly in contrast to the CFR value in 2022 which has a higher value in 2022 compared with 2021 in the same month. There was a significant comparison between the number of DHF cases in 2021 and 2022 with a p-value <0.05. Several measures can be taken to mitigate the increase in the incidence rate of DHF during the COVID-19 pandemic and thereafter.

## GRAPHICAL ABSTRACT



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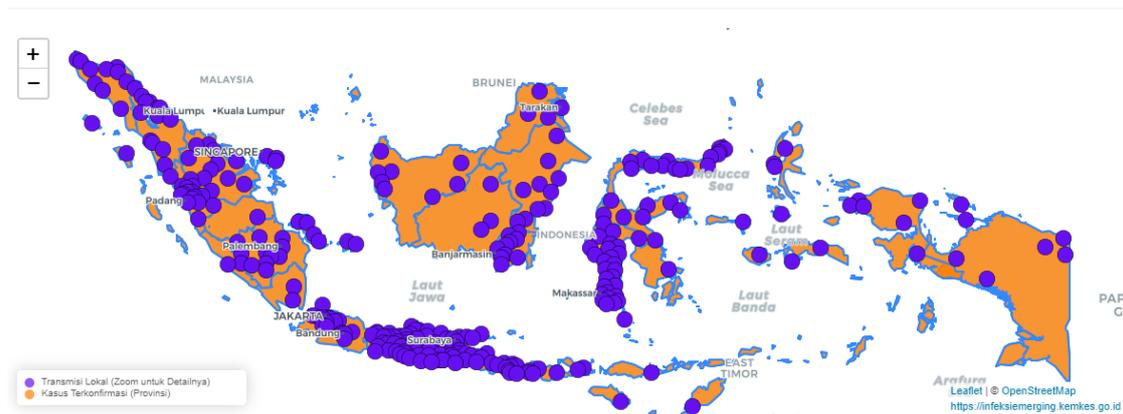
## Introduction

The COVID-19 pandemic has spread widely. On April 20, 2022, the number of sufferers worldwide according to the WHO report was 504,079,039 confirmed cases of COVID-19 [1, 2]. Several steps have been taken to deal with this COVID-19 pandemic, but several diseases also developed during the duration of the COVID-19 pandemic that is still overlooked by researchers.

The two initial patients of COVID-19 were found in Depok Indonesia in the early March 2020 [3]. Furthermore, at the beginning of the year, there

was a death case of one foreign patient on March 11, 2020. In April 2022 with a total of 6,036,909 confirmed cases with 5,814,688 recovered cases (96.3%) and the number of deaths was 155.746 and active cases were 66,475 (1.1%) (Figure 1) [4].

Confirmed COVID-19 cases until April 20, 2022, reached 2.15 per 100000 population per week with a death toll of 0.08 per 100000 population per week. Meanwhile, entering Level 1 which is described in Table 1 for the criteria for patient-level [5].



**Figure 1:** Local transmission distribution and confirmed areas of COVID-19 [4]

**Table 1:** Region COVID-19 transmission rate [5]

Category		Definition
No cases		If there are no new cases were found in the past where indicated 28 days is approximate twice the maximum incubation period, if the strong monitoring system was present means that for the entire population, the risk of infection is almost zero (none).
Imported or sporadic cases		All cases detected in the last 14 days came from outside the region or were sporadic, and there was no clear signal of further local transmission. This can be categorized as minimal infection risk for the general population.
Clustered transmission		Cases were detected for the last 14 days and were limited to well-defined clusters. All cases were interrelated based on the same time, geographic location, and exposure. There may be a small number of unidentified cases in the region. The condition of a low risk of transmission may present to a wider population if it prevents or avoids exposure to this group.
Community-level transmission (Level 1)	1	Low cases locally acquired and widespread cases were identified over the last 14 days; many cases were not related to a particular cluster. Transmission can be targeted at certain sub-groups of the population. Low risk of infection in the community.
Community-level transmission (Level 2)	2	Moderate cases which were locally acquired and widespread cases were identified for the last 14 days; transmission was no longer targeted on certain population subgroups. Moderate risk of infection was occurred for the community.
Community-level transmission (Level 3)	3	High cases which were locally acquired and widespread cases were identified for the last 14 days; transmission was widespread but not targeted on subgroups of the population led to the high risk of infection in the community.
Community-level transmission 4 (Level 4)		Very high cases were locally acquired and widespread cases were found in the last 14 days. Very high risk of infection was happened for the community.

**Table 2:** The classification of community transmission levels is based on three main indicators [5]

Domain	Indicator	Level 1	Level 2	Level 3	Level 4
Confirmed cases	New confirmed cases per 100000 population per week	<20	20-<50	50-<150	150+
Hospitalizations	Incidence of new hospitalizations for COVID-19 per 100000 population per week	<5	5-<10	10-<30	30+
Death	Number of deaths due to COVID-19 per 100000 population per week	<1	1-<2	2-<5	5+

Table 2 indicated the community transmission of COVID-19 encompassing four levels based on the three main categories of the disease and its related indicators [5-8].

### Materials and Methods

This study employed observational-descriptive analytics. The data is configured from web-based open access [9, 10]. The data were analysed using univariate and bivariate analysis. The number of DHF cases analysed in this study encompassed 452535 cases. To compare the number of cases, deaths, and IR of DHF disease, the T-test analysis was employed using SPSS Ver. 26 [11, 12].

### Results and Discussion

Based on the data released by the World Health Organization (WHO) [1] revealed that the number of Dengue Haemorrhagic Fever (DHF) sufferers worldwide from 2000 to 2019 has increased 8 times with the number of cases ranging from 2000 to 2019 which accounted for 505,430 to 5.2 million cases, respectively. This figure is accompanied by the number of deaths of DHF increasing from 960 in 2000 to 4032 in 2015 with the largest distribution of sufferers in the Americas, Southeast Asia, and the West Pacific and leaving a heavy burden where around 70% of cases occur in Asia [13, 14].

The number of cases in America was reported as 3.1 million cases of DHF with 25,000 of them in the severity of the disease. In addition, in Asia, the most cases were reported in the Philippines with 420,000 cases, Vietnam with 320,000 cases, followed by Malaysia with 131,000 cases, and Bangladesh with 101,000 cases. In addition, in 2020, several countries reported an increase in cases compared with the previous years, namely Bangladesh, India, Brazil, Ecuador, Indonesia,

Singapore, Thailand, Pakistan, and Timor-Leste. It is further pivotal to the need for the early prevention in DHF cases by providing health education related to DHF. Hence, societies understand the prevention importance and keeping the environment clean to avoid DHF disease [15].

According to data released by the Indonesian Ministry of Health's Directorate General of P2P, 2022 [9, 10], there is a trend of increasing DHF cases from 2011 to 2022 (Figures 2 and 3). In addition, it can also be seen that in 2019 the number of cities reporting cases of DHF reached the highest in more than a decade since 2011 which reached 481 urban districts and reaching an IR of 51.5 per 100000 population. However, this figure then gradually decreases until in 2022, it reaches IR 6.8 per 100,000 population.

The number of cases in 2021 and 2022 when compared with the same month shows that the total cases in 2021 were higher than the total cases in the previous month and the same in 2022 (Figure 4). Likewise, as compared with the number of deaths due to DHF in 2021, was higher than in 2022 the same month [10].

The same applies to the incidence rate (IR) where the IR in 2021 was higher than in 2022 the same month. However, this was slightly in contrast to the value of the Case Fatality Rate (CFR) in 2022 which has a higher value in 2022 compared with 2021 in the same month (Figure 5) [10].

The comparison of the number of the DHF case, deaths, and IR in Indonesia in 2021 and 2022 were depicted in Table 3. A significant comparison was found in all the number of DHF cases, Deaths, and IR DHF wherein the comparable number of cases, deaths, and IR were significantly higher in 2021 than in 2022 in the same months.

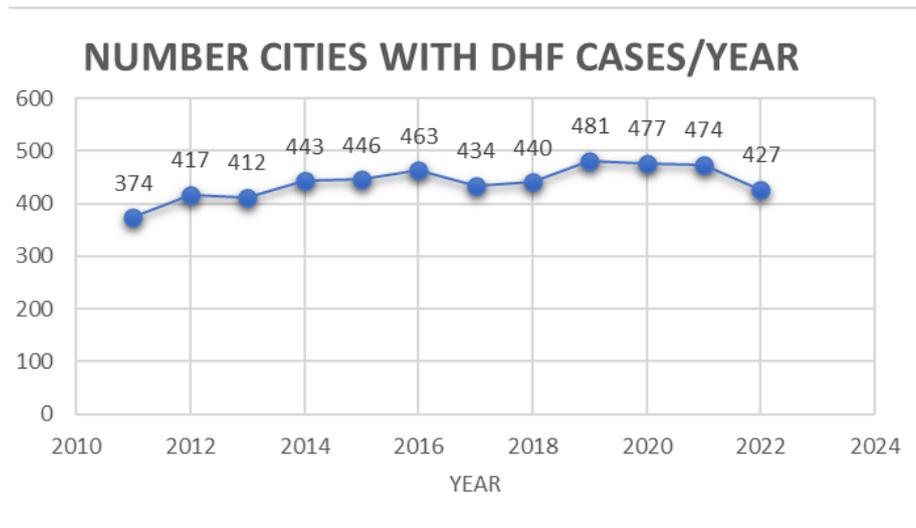


Figure 2: Description of the number of cities in Indonesia with DHF cases in 2011-2022 [9]



Figure 3. The incidence rate (IR) of DHF in Indonesia from 2011-2022 [9]

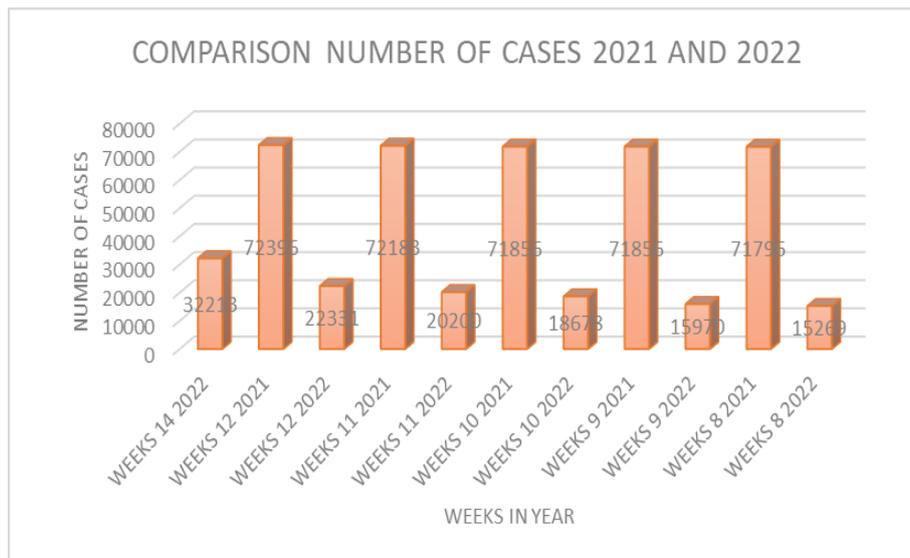


Figure 4: Comparison of the number of DHF cases in Indonesia in 2021 and 2022 (Secondary Source)

According to Figure 6, it is found that the DHF number sufferers per 100000 population in 2020 the province with the highest number, namely the province of Bali with a total of 273.1 per 100000 population, followed by East Nusa Tenggara with a total of 107.7 per 100000 population and DI Yogyakarta with 93.2 per 100000 inhabitants.

Meanwhile, Figure 7 shows that the case fatality rate (CFR) of DHF in 2020 showed a high percentage in Maluku province with a CFR of 6.5% when compared with the total national CFR of 0.7%. The two provinces with a high CFR rank were Central Java and North Maluku, which was 1.9%.

All these data indicated that there is a need for the system for the early detection, maintaining environmental sanitation, and management of disease in health facilities that should be improved [10].

The environment greatly affects the increase in the number of cases where most of the cases are found in densely populated environments and with poor environmental sanitation. In addition, due to the potential of the Indonesian region which has high rainfall, Indonesia has become an endemic area for DHF [16, 17].

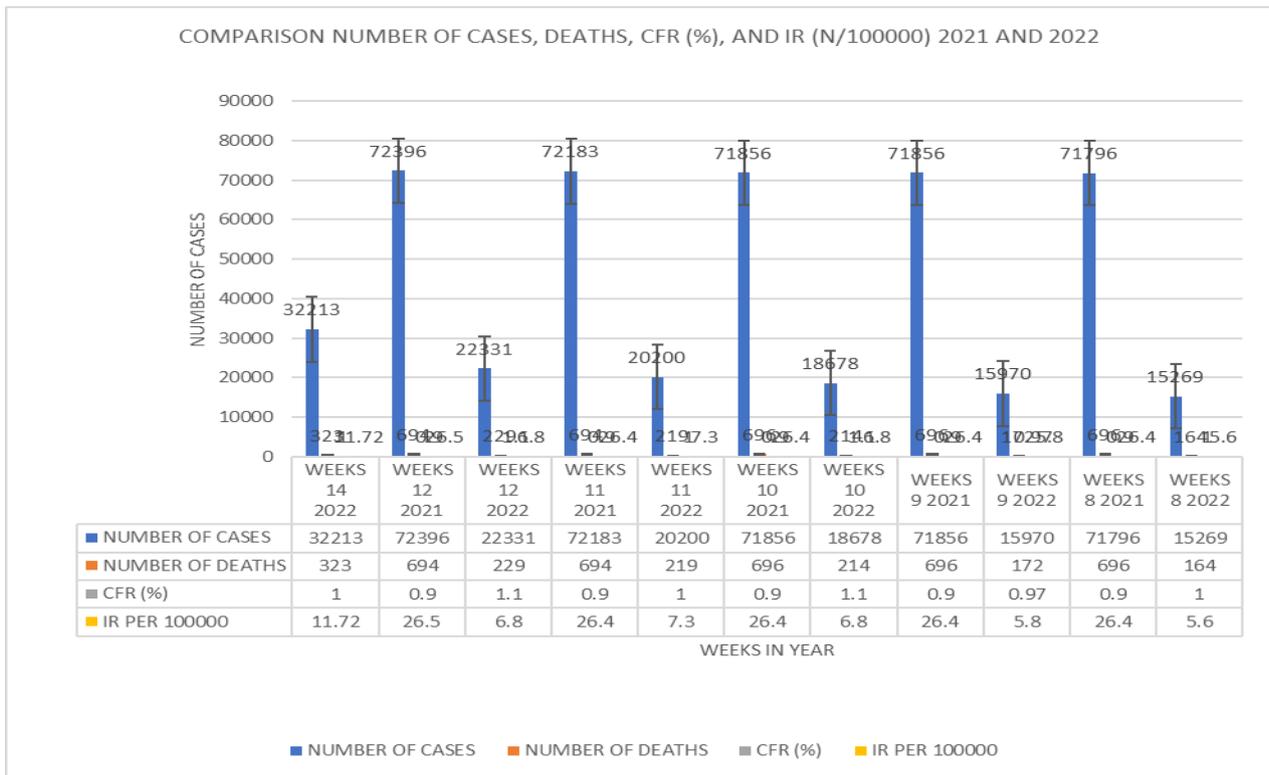


Figure 5: Comparison of DHF trend between 2021 and 2022 (Secondary Source)

Table 3: The number of cases, deaths, and IR of DHF analysis in 2021 and 2022

Characteristics	Mean±SD	P-value (*)	(95%CI) (Lower-Upper)
Cases 2021	72017.4±260.71	0.000	71693.69-72341.11
Cases 2022	18489.6±2934.19	0.000	14846.32-22132.88
Deaths 2021	695.2±1.09	0.000	693.84-696.56
Deaths 2022	199.6±29.48	0.000	162.99-236.21
IR 2021	26.42±0.04	0.000	26.36-26.48
IR 2022	6.46±0.73	0.000	5.56-7.36

\*T-test analysis; IR: Incidence Rate; DHF: Dengue Hemorrhagic Fever; SD: Standard Deviation; CI: Confidential Interval

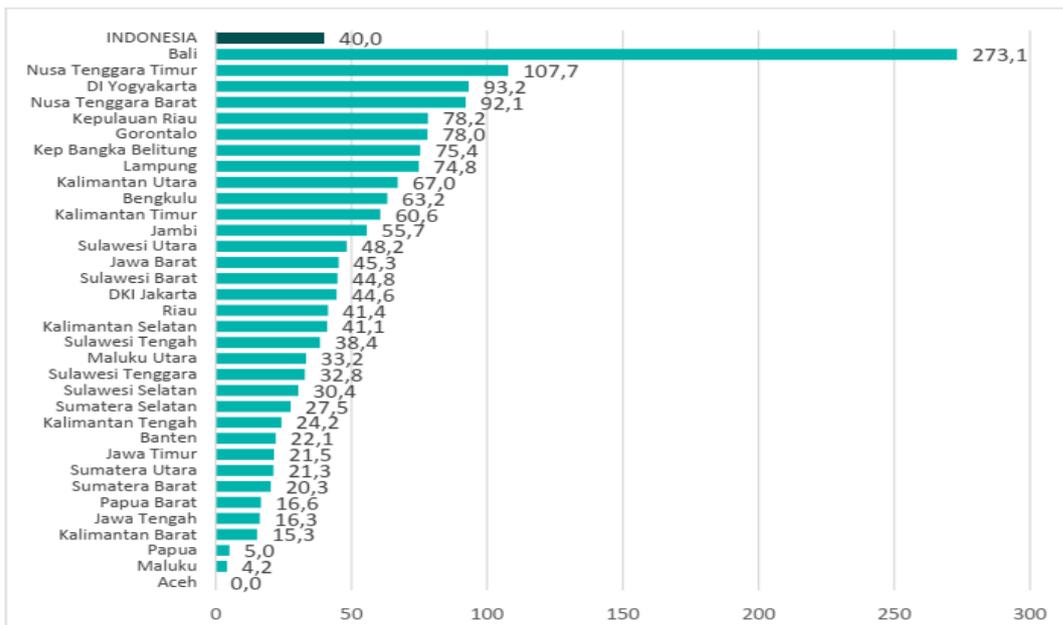


Figure 6: The DHF number sufferers per 100000 population by the province in 2020 [10]

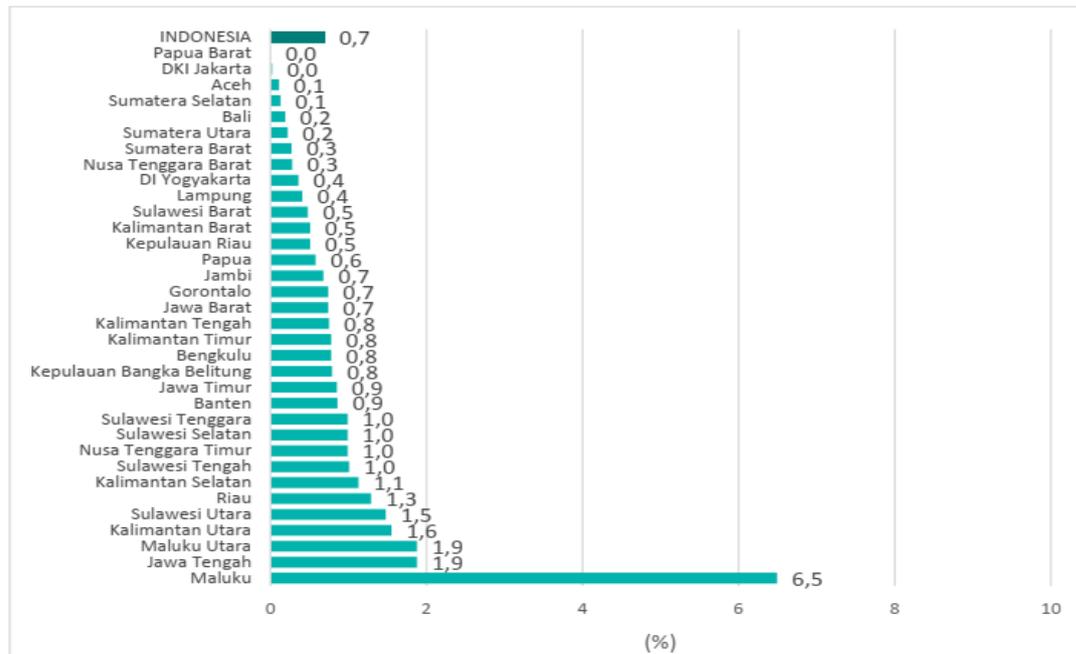


Figure 7: Case Fatality Rate Dengue Fever based on Province in 2020 [10]

Another research reported [18] that a similar incidence was related to an increase in DHF cases in 2019. Another piece of evidence was reported by WHO, in 2022 [1] which delivered the most DHF cases found in 2019.

The duration of eight to twelve days is needed for the development of the *Aedes aegypti* mosquito vector at 25-28 °C. The temperature effect is suspected to be one of the important factors influencing the development of this mosquito vector. In addition, the factor of population density, especially in urban areas, is one of the

causes of the development of this mosquito vector. These mosquitoes thrive in water reservoirs such as flower pots, buckets, old tires, and other water storage places [27].

Several preventive measures can be implemented by preventing the development of mosquitoes in water reservoirs or used goods. In addition, closing used goods or water storage is an effective way. The use of nets on windows and the use of repellents can also be done by the community, especially in the school environment. The use of long sleeves can protect the skin from being bitten

by mosquitoes. Monitoring mosquito larvae is further one of the important things that can be done to control this mosquito vector [1]. Likewise, implementation of health promotion of dengue haemorrhagic fever encouraged societies' knowledge and sanitary health behaviour to prevent the spread of the mosquito vector of dengue fever [19]. The spread of the mosquito vector can be alleviated using ovitrap tools to prevent the development of the *Aedes aegypti* as the dengue mosquito vector [20]. The need to control the environment, to minimize the physical burden such as dengue fever disease may contribute to lessening the health burden during the COVID-19 pandemic leading to minimize anxiety in society [21-23]. The use of promotional health to educate society about mitigating the spread of the dengue vector and the other diseases such as psychological issues related to the COVID-19 pandemic is also worth mentioning [24-26].

### Conclusion

The COVID-19 pandemic has impacted the health of population. Yet, the number of populations who suffer from Dengue Haemorrhagic Fever has also been detected increasingly during the pandemic. Meanwhile, this study, indicated that there was a significant comparison between the number of DHF cases, deaths, and IR DHF in 2021 and 2022 with a p-value <0.05 wherein the number of DHF cases in 2021 was considerably higher than the case in 2022. Although the trend might slightly decrease in the late pandemic, considerable preventive approaches could be taken to alleviate such an increasing number of patients suffering from this disease.

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### Authors' contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

### Conflict of Interest

We have no conflicts of interest to disclose.

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