

DENGUE HEMORRHAGIC FEVER PREVALENCE IN BALI FROM 2015 TO 2020 AND IN COVID-19 PANDEMIC OUTBREAKS

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DENGUE HEMORRHAGIC FEVER PREVALENCE IN BALI FROM 2015 TO 2020 AND IN COVID-19 PANDEMIC OUTBREAKS

Prevalensi Kasus Demam Berdarah Dengue di Provinsi Bali Tahun 2015-2020 dan Dalam Situasi Pandemi Covid-19

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ABSTRACT

Background: Dengue hemorrhagic fever cases increased significantly during the Covid-19 pandemic phase. **Purpose:** This study is to define, describe, and evaluate the dengue hemorrhagic fever incidence in Bali Province from 2015 to 2020 and in the context of the Covid-19 pandemic. **Methods:** The various types of retrospective descriptive study with case series design. The study used an environmental epidemiology approach to analyze the health profile of Bali Province. The number of DHF cases in 2015-2020, DHF-related morbidity and death rates, larva-free rates, climate, population and population density, and gender are all variables in this study. The study took place during May and June 2021. **Results:** The prevalence analysis of dengue hemorrhagic fever cases in Bali Province from 2015 to 2020 revealed a changing tendency. The greatest number of cases was 20,306 in 2016; the highest number of cases was 12,173 in 2020. Buleleng and Badung regencies as endemic locations have the greatest prevalence of DHF cases. The greatest incidence rate was 483/100.000 inhabitants in 2016 and 280.70/100,000 inhabitants in 2020. By 2020, the IR figure had doubled and had fallen short of the national target of 49/100.000 population over the previous five years. CFR levels peaked at 0.43% in 2020 and grew 1.50-fold during the Covid-19 pandemic phase. Every year, Jentik free figures (ABJ) account for 95% of the population in Bali Province. **Conclusion:** DHF has a high prevalence in Bali because to the population, population density, gender, incidence rate, case fatality rate, and free numbers of larva.

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ABSTRAK

Latar belakang: Peningkatan kasus demam berdarah dengue pada masa pandemi Covid-19 kian memprihatinkan. **Tujuan:** Penelitian ini bertujuan untuk menggambarkan, mendeskripsikan dan menginterpretasikan kejadian Demam Berdarah Dengue di Provinsi Bali tahun 2015-2020 dan

dalam situasi pandemi Covid-19. **Metode:** Jenis penelitian deskriptif retrospektif dengan rancang bangun case series. Penelitian dilakukan dengan menganalisis Profil Kesehatan Provinsi Bali dengan pendekatan kasus epidemiologi lingkungan. Jumlah kasus DBD tahun 2015-2020, angka kesakitan dan kematian terkait DBD, angka bebas jentik, iklim, populasi dan kepadatan penduduk, serta jenis kelamin merupakan variabel dalam penelitian ini. Penelitian dilakukan pada bulan Mei – Juni 2021. **Hasil:** Hasil analisis prevalensi kasus demam berdarah dengue di Provinsi Bali tahun 2015-2020 mengalami trend fluktuatif. Jumlah kasus tertinggi pada tahun 2016 sebanyak 20,306 kasus dan tahun 2020 sebanyak 12,173 kasus. Prevalensi kasus DBD tertinggi di Kabupaten Buleleng dan Badung sebagai wilayah endemis. Angka Incidence Rate tertinggi pada tahun 2016 sebesar 483/100.000 penduduk dan tahun 2020 sebesar 280.7/100.000 penduduk. Angka IR mengalami peningkatan 2 kali lipat pada tahun 2020 serta dalam 5 tahun terakhir tidak memenuhi target nasional (<49/100.000 penduduk). Angka CFR tertinggi pada tahun 2020 sebesar 0.43% dan mengalami peningkatan 1.5 kali lipat pada masa pandemi Covid-19. Angka Bebas Jentik (ABJ) di Provinsi Bali < 95% setiap tahunnya. **Kesimpulan:** Tingginya prevalensi DBD di Bali dipengaruhi oleh jumlah penduduk, kepadatan penduduk, jenis kelamin, angka morbiditas, angka mortalitas, dan angka bebas jentik.

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) continues to be a public health issue, particularly in Indonesia. Dengue hemorrhagic fever has been observed to occur throughout the year in the tropics, resulting in outbreak in various endemic regions (Sudaryati, et al., 2020). Dengue virus can be transmitted into the human body via probosis when the *Aedes* spp, *Aedes aegypti*, or *Aedes albopictus* mosquito bites (Biswas, et al, 2020; Widjajanti, et al., 2019). The dengue virus is classified into the arthropod-borne virus (albovirus) with the genus flavivirus, sub genus stegomyia and Family Flaviviridae (Dhewantara et al., 2019; Yudhastuti & Lusno, 2020). DHF disease has four types of serotypes namely dengue virus type-1 (DEN-1), dengue virus type-2 (DEN-2), dengue virus type-3 (DEN-3) and dengue virus type-4 (DEN-4) (Musmiler & Ermi, 2020) and has four degrees of clinics namely DBD degree I-IV in accordance with the clinical manifestations produced (Ong, et al., 2021). Dengue serotypes of four different varieties have been identified in several areas throughout Indonesia, including the province of Bali (Yudhastuti & Lusno, 2020).

Bali Province is an area that always reports DHF diseases every year (Bali Health Office, 2021). Bali, which is viewed as an international tourism destination, has its own health challenges. Dengue hemorrhagic fever contributes to the

highest number of cases each year when compared to other diseases. Furthermore, the local health service observed an increase in dengue hemorrhagic fever cases during the Covid-19 outbreak. Increased endemic disease in the context of the Covid-19 pandemic requires immediate action from a variety of stakeholders, most notably the government and the community (Biswas et al., 2020; Masyeni et al., 2021). Preventive efforts have included mosquito nest eradication programs, programs for draining, burying, stockpiling, plus sprinkling temephos powder, thermal fogging, and household pesticide control (Kurniawati, et al., 2020). The government is concentrating its efforts on controlling the development of Covid-19 illness in the population since the dissemination and transmission of SARS COV-2 is easy and quick (Brady & Wilder-Smith, 2021).

Research by Garg & Meena (2021) and Luhulima et al. (2021) indicated a remarkable prevalence of DHF cases during the Covid-19 pandemic period in various regions due to a variety of factors including climate, weather, temperature, moisture, community behavior, population density, environmental hygiene, and the body immune system, as well as misdiagnosis due to similar clinical manifestations between Albovirus and coronavirus infections, such as fever, myalgia, cough, and thrombocytopenia. Cross reactivity between SARS-COV-2 antibodies and DENV antigens arose as a result of this

occurrence, resulting in false positives on serological testing for fast dengue infections. As a result, the primary sickness received less attention and care as a result of this (Araújo, et al., 2021; Harapan et al., 2021).

Dengue hemorrhagic disease has been increasing in each district / city in the province of Bali for the last six years and during the Covid-19 pandemic period, requiring various elements of society and the government to work collaboratively to prevent, control, and treat DHF and Covid-19 disease correctly with intensive care (Brady & Wilder-Smith, 2021). Epidemiological studies are critical for planning preventative and treatment efforts for diseases and infectious diseases such as DHF and Covid-19. Furthermore, epidemiological studies and disease prevalence are utilized to determine the dengue hemorrhagic fever and Covid-19 strategic eradication strategies through comprehensive research that analyzes prior case data, regional analysis, and disease vector habitats. (Suryani, 2018; Yudhastuti & Lusno, 2020).

The purpose of this study is to define, describe, and evaluate the dengue hemorrhagic fever incidence in Bali Province from 2015 to 2020 and in the context of the Covid-19 pandemic. These findings are expected to serve as a benchmark for developing disease management policies and a holistic plan that prioritizes efficiency, effectiveness, and community participation in the Bali Province.

METHOD

This research is a retrospective descriptive study with the design of case series (Darwin et al., 2021). The study was conducted for 2 months (May-June 2021). The Health Research Ethics Commission of the Denpasar Health Polytechnic granted Ethics Eligibility to this study, with the number LB.02.03/EA/KEPK/0245/2020. The data in this study uses secondary data, namely Bali Province Health Profile in 2015 - 2020 as well as data with dengue hemorrhagic fever in the Covid-19 pandemic period. Data obtained from the Health Office and the Central Bali Provincial Statistics Agency. This research was conducted by describing and interpreting the events of DHF cases in the province of Bali with an environmental epidemiology approach (Suryani, 2018; Yudhastuti & Lusno, 2020).

The variables studied in this study are the population by district/city in the working area of Bali Province and by gender in 2020 in units of a thousand people (Bali Health Office, 2020a). Data

on climate, weather, and annual rainfall (mm/month) are obtained from projections and reports from the Meteorology, Climatology, and Geophysics Agency for Region III Denpasar (BMKG, 2021). Population density is calculated using the number of inhabitants per hectare (person/ha). The morbidity rate (incidence rate) is calculated based on the number of new cases divided by the total population, as a result the incidence rate (IR) per 100.000 residents is obtained. The mortality rate is obtained from the calculation of the number of people who died divided by the total district/city to obtain the percentage (%) case fatality rate (CFR). Inspection of the larva monitor yields the larva free number. Negative home multiplied by 100 percent, then divided by the number checked. The results of the larva-free number will be shown in percentage units (%), and the success indication for larva free number will be > 95% (Bali Health Office, 2021; Prata et al., 2021; Suryani, 2018). The descriptive technique is used in data analysis, and data is displayed in tables, graphs, and narratives.

RESULTS

The province of Bali consists of the island of Bali as a center of provinces and small islands around it as a companion island like the islands of Nusa Penida, Nusa Ceningan, Nusa Lembongan, Nusa Serangan, dan Nusa Menjangan (Bali Health Office, 2021). In the area, Bali is in the position of coordinates 08°03'40 " -08°50'48" South Latitude and 114°25'53 " -115°42'40" East Longitude. On relief and topography, the island of Bali is equipped with mountainous areas that extend from west to east and among these mountains there is a volcano cluster. The area of Bali province as a whole is 5,780.06 km² or 0.30 percent of the broad Indonesian archipelago and has 8 districts and 1 city (Bali Health Office, 2021).

The province of Bali has a tropical sea climate that is influenced by seasonal winds. Climate and weather in Bali consist of rainy season, dry season and transition season and or transaroba. Based on data submitted by the Meteorology, Climatology and Geophysics Agency showed the average temperature in the Bali Province of 26.3°C - 27.9°C with humidity of 79-86%. Annual rainfall ranges from 1.119.02-3.321.57 mm with the highest risk of rainfall occurring in November, December, January and February. The lowest rainfall occurs in May, August, September and October (Meteorological,

Climatological, and Geophysical Agency-Region III Denpasar, 2021).

According to the study's findings, the population in the province of Bali would reach 4,336.9 million in 2020, according to the Central Statistics Agency's projections and reports. The population and population have always increased year after year (Bali Health Office, 2021). Natality rates are expected to be greater than death rates in 2019, during the Covid-19 pandemic phase in 2020, population mortality will exceed natality rates (Bali Health Office, 2021). Bali Province has a population density of 750 persons per square kilometer, with the highest concentrations in Badung District, Gianyar, and Denpasar City. The region's population density is a result of the district, which serves as the province of Bali's administrative, tourism, and educational centers. The data for areas, population, gender ratio, and population density by district are shown in Table 1.

According to the study's findings in table 1, the region's area in Jembrana District, Tabanan District, and Bangli District shall expand by 2020. The expansion in area was a result of land clearing and the identification of a new district region. Data from the number of men and women has increased by 90.4 thousand people in 2018-2020. In terms of the population density level, Denpasar City (7.412), Badung District (1.601) and Gianyar District (1.392) have a high level of density in categories according to SNI 03-1733-2004. The high level of population density will result in increased mobility in the area. This is due to the high population in the area in the tourism sector. Regions or regions that have a high level of density of population have the potential as endemic areas and risk factors for transmission and dissemination of dengue hemorrhagic fever (DHF) and Covid-19 viruses (Niriella et al., 2021; Widjajanti et al., 2019; Yudhastuti & Lusno, 2020).

Dengue hemorrhagic fever has apparently increased significantly each year (Sudaryati et al., 2020). This was facilitated by favorable environmental circumstances for the development of *Aedes aegypti* and *Aedes albopictus* mosquito vectors, which resulted in an increase in dengue virus cases (Brady & Wilder-Smith, 2021; Yudhastuti & Lusno, 2020). Dengue hemorrhagic fever cases have increased significantly during the

last five years due to a variety of internal and external variables. Internal risk factors include a lack of self-cleanliness and practices that attract mosquitoes, poorly maintained bodily hygiene, and a person's weakened immune system or vulnerability to infection. While exterior risk factors such as the quantity of open water reservoirs, high bulk and rain intensity, a lack of monitoring and understanding about vector control, a lack of sunlight that causes a region to become damp, and reluctance to the use of chemical medications are all external risk factors (Suryani, 2018).

Aedes aegypti and *Aedes albopictus* mosquitoes like regions that are similar to their natural habitat and close to residential areas, as this enables mosquitoes to search for food supplies (proteins found in the blood) (Min Win et al., 2018). Mosquitoes that transmit dengue hemorrhagic fever are often anthropophilic, as they require human blood to complete their eggs, particularly female mosquitoes (Araújo et al., 2021). *Aedes aegypti* mosquitoes are capable of producing eggs that are resistant to extremes in temperature and humidity (Adyatma, et al, 2021). This has the potential to result in explosion of larvae populations and imago in various districts/cities contained in the province of Bali. Based on the results of the study, data on the case of dengue hemorrhagic fever in 2015-2020 experienced a fluctuating trend. Data on DHF cases of each district are presented in table 2.

According to the study's findings in Table 2, the districts with the largest number of Dengue Haemorrhagic Fever (DHF) cases in 2015 were Badung District, Gianyar, and Buleleng. Additional cases were reported in 2016 in five districts: Badung District, Gianyar, Karangasem, Buleleng, and Denpasar City. In 2017, three districts ranked first: Badung District, Buleleng, and Denpasar City. In 2018, four districts ranked first in terms of DHF cases: Badung District, Buleleng, Klungkung, and Denpasar City. In 2019, three districts stood out: Badung District, Buleleng, and Denpasar City. In 2020, four districts were identified as having the highest case, namely Badung, Buleleng, Gianyar, and Denpasar City (Bali Health Office, 2020).

Table 1

The data for areas, population, gender ratio, and population density by district/city

District/City	Area (Km ²)	Population (Thousands of people)			Gender Ratio	Population density (person/ha)
		Male	Female	Total		
Jembrana	841.80	138.00	140.10	278.10	98.50	330
Tabanan	1013.90	221.20	224.50	445.70	98.53	440
Badung	418.60	341.90	328.30	670.20	104.14	1601
Gianyar	368.00	258.50	253.70	512.20	101.89	392
Klungkung	315.00	88.60	90.50	179.10	97.90	569
Bangli	490.70	114.90	112.40	227.30	102.22	463
Karangasem	839.50	208.30	208.30	416.60	100.00	469
Buleleng	1362.70	329.00	331.60	660.60	99.22	484
Denpasar	127.80	483.70	463.40	947.10	104.38	7412
Bali Province	5780.10	2184.10	2152.80	4336.90	101.45	750

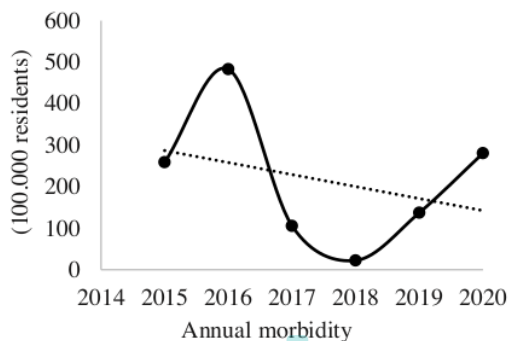
Source: Bali Health Office, 2020

Table 2

Dengue Hemorrhagic Fever data in Bali Province from 2015 to 2020

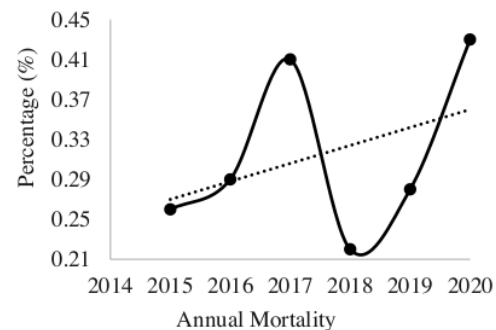
No	District/City	Cases of Dengue Hemorrhagic Fever (DHF)					
		2015	2016	2017	2018	2019	2020
1	Jembrana	366	858	140	36	213	267
2	Tabanan	846	918	316	44	172	340
3	Badung	2,178	2,178	941	366	1,275	2,767
4	Gianyar	2,198	3,673	511	72	715	1,747
5	Klungkung	451	1,564	219	147	340	815
6	Bangli	347	1,251	320	36	230	415
7	Karangasem	790	3,226	221	19	160	919
8	Buleleng	2,007	3,787	890	129	1,631	3,402
9	Denpasar	1,576	2,851	929	114	1,220	1,501
10	Provinsi Bali	10,759	20,306	4,487	963	5,956	12,173

Source: Bali Health Office, 2020

**Figure 1.** Incidence Rate Dengue Hemorrhagic Fever in Bali Province in 2015 – 2020.

Increased cases of dengue hemorrhagic fever in Bali Province resulted in morbidity and mortality rates experiencing a fluctuating trend depending on the total number of cases each year. The morbidity figures are generally shown in the

data incidence rate (IR) per hundred thousand residents while the mortality rate is shown in data case fatality rate (CFR) per percentage. Data Incidence Rate and Case Fatality Rate DHF in Bali Province in 2015 to 2020 are presented in Figure 1 and 2.

**Figure 2.** Case Fatality Rate Dengue Hemorrhagic Fever in Bali Province in 2015 - 2020.

DISCUSSION

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According to the results of the trend analysis of dengue hemorrhagic fever cases in Bali Province, the maximum number of cases was reported in 2016, at 20,306 cases, and the lowest number was reported in 2020, at 12,173 cases. The lowest number of instances occurred in 2018, when 963 cases were reported. The region's identification revealed that Badung and Buleleng District have consistently seen an increase in dengue hemorrhagic fever cases over the last six years. Dengue hemorrhagic fever cases increased significantly in 2020 throughout the district/city of Bali province.

The high case of dengue hemorrhagic fever in 2020 in the province of Bali due to the season and rainfall with high intensity. Meteorological, Climatological, and Geophysical Agency-Region III Denpasar revealed the highest rainfall occurred in January - March (300 mm/ month) while low up to medium rainfall occurred in April - September (100-150 mm/month) and October - December is a dry season With low rainfall, namely <20 mm/month. On climatic and weather variables, the surge in dengue hemorrhagic fever cases in the province of Bali was a result of the Pandemic Covid-19, which concentrated the attention of all segments of society and the government on pandemic countermeasures (Yudhastuti & Lusno, 2020). The control of the eggs and larvae that transmit dengue hemorrhagic fever has deteriorated as a consequence of a lack of preventative measures taken by larva monitoring and the general public, allowing the vector to multiply quickly and resulting in an increase in the DHF vector population. (Budiarti et al., 2020).

The results of the study in Figure 1 showed that there was an increase and decrease in the number of incidence rate of the case of dengue hemorrhagic fever in 2015-2020 in the province of Bali. The highest morbidity rate occurred in 2016 as many as 483 per 100,000 population and in 2020 as many as 280.70 per 100,000 population. The lowest morbidity figure is indicated in 2018 which is 22.40 per 100,000 population. The incidence rate in 2015, 2016, 2017, 2019 and 2020 is still far above the national target which has been launched by the Directorate General of Prevention and Disease Control of the Ministry of Health of the Republic of Indonesia, namely the value of the morbidity (IR) <49 per 100,000 population. In 2020 the morbidity figures experienced a 2-fold increase from the previous year (Bali Health Office, 2021).

In terms of the ranking of the DHF cases in Indonesia Bali Province occupied the second position and Buleleng District scored the highest DHF cases in the province of Bali. This shows the preventive efforts carried out by the government such as the 3M-plus program (draining, closing and burying and plus sowing powder Temephos) has not been implemented optimally. The high level of pain taken by dengue hemorrhagic fever (DHF), especially 9 districts/city in Bali Province need to get serious attention, given this endemic disease still appears throughout the year (Dhewantara et al., 2019; Suparyatha et al., 2021; Widjajanti et al., 2019; Yudhastuti & Lusno, 2020). Less-controlled environmental conditions resulted in transmission of cases due to DHF increasing and rapidly. In addition, in the midst of the Covid-19 pandemic the community is required to always maintain the environmental conditions and immunity of the body so that it is not infected with DHF and SARS CoV-2. (Budiarti et al., 2020; Niriella et al., 2021).

The results of the study in Figure 2 showed that there was an increase and decrease in mortality rates (case fatality rate (CFR) of the case of dengue hemorrhagic fever in 2015 to 2020 in the province of Bali. The highest CFR figure was shown in 2020 by 0.43%, then in 2017 the CFR number reached 0.41 % while the lowest CFR figure was indicated in 2018 of 0.22%. The mortality rate (case fatality rate) in the province of Bali has fulfilled the target set on the strategic plan of the Bali Provincial Health Office in 2018-2023 which is <1% (Bali Health Office, 2021).

The consistency of the CFR figure showed a fixed program carried out in a place of health services such as Integrated Health Care, Public Health Center (PHC) and hospitals in the management of dengue hemorrhagic fever already good enough (Syamsir & Pangestuty, 2020; Widjajanti et al., 2019). In 2020 mortality due to dengue hemorrhagic fever occurred in seven districts / cities. Three districts with the most mortality, namely Buleleng District, Badung, and Gianyar. In terms of administrative areas, the three districts / cities are areas that have a high level of mobility and the proximity of the region shows there are spatial autocorrelation with the dispersed category in the area (Dhewantara et al., 2019).

Research conducted by Syamsir & Pangestuty (2020) showed that as the number of DHF cases increases in a highly populated area, the likelihood of morbidity (IR) and mortality (CFR) increases, forming spatial autocorrelation. Additionally, the mortality rate of DHF patients increased 1.50

times during the Covid-19 epidemic period. This is because the rapid spread of albovirus and coronavirus infection makes human-to-human transmission increasingly easy (Brady & Wilder-Smith, 2021; Masyeni et al., 2021). The clinical signs of DHF disease associated with Covid-19 have a high melipion level, including a temperature greater than 38°C, fatigue, abnormal blood components, muscle discomfort, bleeding, and skin rash, as well as shortness of breath (Garg & Meena, 2021; Liyanage, et al., 2021; Niriella et al., 2021).

The high rainfall and moisture resulting in easy dengue virus brought by *Aedes spp*; *Aedes Aegypti*, and *Aedes Albopictus* mosquitoes enters the human body through proboscis on the skin (Kesetyaningsih et al., 2018; Vicente et al, 2021). DHF sufferers who experienced death during the Covid-19 pandemic were caused by various factors such as thrombocytopenia (Garg & Meena, 2021; Pranata et al., 2021), bleeding on the skin, dehydration, blood component abnormalities (Masyeni et al., 2021), and the decline in body immunity (Luhulima et al., 2021). The consistency of mortality rates (case fatality rate) in the province of Bali due to the local health department has made various efforts to reduce mortality from dengue viruses including the role advocacy of districts/cities in the upstream efforts to carry out the eradication of mosquito nests, programs for draining, burying, stockpiling, plus sprinkling temephos powder, revitalizing the role of the Operating Working Group Coaching Post Development and Integrated Services of DHF until the village level workplace, vector resistance mapping, mapping the subtype of the virus and strengthening the role of larva monitoring (larva) to the household level. The strengthening of the effort has been able to reduce mortality due to dengue hemorrhagic fever in Bali province during 2015 to 2020 (Bali Health Office, 2021).

The investigation of dengue hemorrhagic fever cases in nine districts / towns within Bali Province revealed a rise in the incidence rate and mortality rate (case fatality rate) in 2020. This was influenced by the low number of available numbers, as determined by the Ministry of Health, namely > 95%, climate change, the establishment of new settlements in densely populated areas, extremely high population mobilization, and inconsistent diagnosis standards in hematologic and serological examinations, particularly at the district/city level (Syamsir & Pangestuty, 2020). Using the 2009 WHO criteria for diagnosis, treatment, prevention, and dengue control, as well as the absence of

categorizing dengue fever, dengue hemorrhagic fever, and Covid-19 cases (WHO, 2009).

The Covid-19 Pandemic, if a patient with confirmed dengue hemorrhagic fever underwent a clinical hematological evaluation, an antigen swab and/or swab PCR would be advised to detect the presence of coronavirus exposure (Faridah et al., 2021; Garg & Meena, 2021). Based on the Covid-19 handling task force report in Bali Province obtained an increase in DHF cases accompanied by positive Covid-19. The strategic effort that can be done is to optimize the role and function of the larva monitoring in every household, still implementing a program for draining, burying, stockpiling, plus sprinkling temephos powder in the Pandemic Covid-19 period and maximizing clean and healthy living programs on a household scale. This prevalence analysis is expected to be able to maximize and identify vulnerable and endemic district/city areas of Dengue Haemorrhagic Fever.

This study used the 2015-2020 Bali Province Health Profile data for data collecting, recording, and data reduction. The descriptive analysis was performed on the data collected in line with the study variables. The Restrictions This is a descriptive study using a case series technique, which means it is a study using a population unit rather than an individual unit. As a result, it cannot be used to assess the presence of a causal link because there is no comparison of cases and non-cases in this sort of study.

CONCLUSION

Between 2015 and 2020, the prevalence of dengue hemorrhagic fever in Bali Province fluctuated. In 2016, the highest number of cases was 20,306; in 2020, the highest number of cases was 12,173. Buleleng and Badung District as an endemic area of the DHF vector have the highest prevalence of DHF cases. In 2016, the highest incidence rate was 483/100.000 residents, while the lowest incidence rate was 280.7/100.000 residents in 2020. By 2020, the IR figure had doubled and had fallen short of the national target of 49/100,000 population for the previous five years. In 2020, the highest case fatality rate was 0.43 percent, which increased 1.5-fold during the Covid-19 pandemic. Every year, Jentik free figures (ABJ) account for 95 percent of the population in Bali Province. Dengue hemorrhagic fever is highly prevalent in Bali due to the population, population density, gender, incidence rate (IR) figure, case fatality rate (CFR), and free larval numbers (ABJ).

CONFLICT OF INTEREST

There are no conflicts of interest disclosed of the all authors in this work.

AUTHORS' CONTRIBUTIONS

IMDMA: Research concepts, data processing, findings presentation, review, editing, and final paper acceptance. NLGS: resource management, manuscript editing, and final review; FSSA: data gathering, manuscript review, and manuscript proofreading.

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