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Research Article

Description of Extraordinary Events of Dengue Hemorrhagic Fever In Belu Regency, East Nusa Tenggara Province 2020

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ABSTRACT

Belu Regency is located in the province of East Nusa Tenggara (NTT), Indonesia and is an endemic area for dengue fever. Nationally, until June 2020, there were 16,320 cases of dengue fever with a CFR of 0.009%, while in Belu Regency there were 820 cases recorded until June 2020 with a CFR of 0.97%. This study aims to describe the outbreak of DHF by person, place and time as well as the distribution of cases in Belu Regency. this research is descriptive observational with case series design. The source of research data is secondary data on dengue cases obtained from the 2016-2019 Dengue Hemorrhagic Fever (DHF) Report and the DHF outbreak report in January-June 2020, the Belu District Health Office. DHF cases in Belu Regency until June 2020 were 820 cases with symptoms of fever 2-7 days by 100% and supported by laboratory platelet examinations of 73%. The highest IR rate until June 2020 is 367 per 100,000 residents with a CFR of 0.97% spread over 12 sub-districts of Belu Regency. The highest IRs (>20 per 10,000 population) are Atambua city, South Atambua, East Tasifeto, West Atambua, Kakuluk Mesak and West Tasifeto sub-districts. The majority of DHF in the age group 5-14 years 521 cases (27.1%) with female sex as many as 495 cases (51.51%). DHF cases were found since the first epidemiological week at the beginning of the year with peak cases at the 13th week. Belu Regency is a dengue endemic area with an IR of 367/100,000 population with a CFR of 0.97%. The highest cases were in the 5-14 year age group and spread across 12 sub-districts of Belu Regency.

Keywords: KLB, DHF, Belu Regency, NTT Province

ABSTRAK

Kabupaten Belu terletak di Provinsi NTT, Indonesia dan merupakan daerah endemis DBD. Secara Nasional kasus DBD hingga juni 2020 sebanyak 16.320 kasus dengan CFR 0,009% sedangkan di Kabupaten Belu tercatat hingga juni 2020 sebanyak 820 kasus dengan CFR 0,97%. Penelitian ini bertujuan mendiskripsikan KLB DBD menurut orang, tempat dan waktu serta sebaran kasus di Kabupaten Belu. Penelitian ini adalah deskriptif observasional dengan desain case series. Sumber data penelitian yaitu data sekunder kasus DBD yang diperoleh dari Laporan DBD tahun 2016-2019 dan Laporan KLB DBD bulan januari-juni 2020 Dinas Kesehatan Kabupaten Belu. Kasus DBD di Kabupaten Belu hingga juni 2020 sebanyak 820 kasus dengan gejala demam 2-7 hari sebesar 100% dan ditunjang pemeriksaan trombosit lab sebesar 73%. Angka IR tertinggi hingga juni 2020 sebesar 367 per 100.000 penduduk dengan CFR 0,97% yang tersebar di 12 Kecamatan wilayah Kabupaten Belu. IR tertinggi (>20 per 10.000 penduduk) adalah Kecamatan Kota Atambua, Atambua Selatan, Tasifeto Timur, Atambua Barat, Kakuluk Mesak dan Tasifeto Barat. Mayoritas DBD pada kelompok umur 5-14 tahun 521 kasus (27,1%) dengan jenis kelamin perempuan sebanyak 495 kasus (51,51%). Kasus DBD ditemukan sejak minggu epidemiologi pertama awal tahun dengan puncak kasus pada minggu ke-13. Kabupaten Belu merupakan daerah endemis DBD dengan IR sebesar 367/100.000 penduduk dengan CFR 0,97%. Kasus tertinggi pada kelompok umur 5-14 tahun dan tersebar di 12 kecamatan wilayah Kabupaten Belu.

Kata kunci: KLB, DBD, Kabupaten Belu, Provinsi NTT

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INTRODUCTION

One of the infectious diseases that is still a public health problem in Indonesia is Dengue Hemorrhagic Fever (DHF). Dengue Hemorrhagic Fever (DHF) is a disease caused by the Dengue virus which is included in the genus *Flavivirus*, family *Flaviviridae* which has 4 types of serotypes, namely Den-1, Den-2, Den-3, and Den-4 viruses. This virus can cause Dengue Fever (DF), Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS). DHF is transmitted to humans through the *Aedes aegypti* and *Aedes albopictus* mosquitoes.¹ Dengue Hemorrhagic Fever (DHF), if the fever is 2-7 days accompanied by bleeding manifestations, the platelet count is $<100,000/\text{mm}^3$, there are signs of plasma leakage (hematocrit increased by 20%), and or the results of the serological examination in a patient suspected of having DHF show a positive result or an elevation (positive) occurs. IgG alone or IgG and IgM in the dengue rapid test. Dengue hemorrhagic fever often causes extraordinary events so that it causes unrest in the community, because it is at risk of causing death and the spread of cases is very fast. In Indonesia, the first DHF case was reported in Surabaya in 1968 and then spread to all provinces and districts/ cities. In 2018, the number of DHF sufferers was recorded at 65,602 patients, increasing to 138,127 patients in 2019. The number of patients who died also increased from 467 people to 919 people in the same period. Incidence Rate (IR) in 34 provinces in 2018 reached 24.75 per 100,000 population and increased in 2019 to 51.48 per 100,000 population. This figure is still above the national target of 49 per 100,000 population.²

The number of dengue cases in January to July 2020 reached 71,633 cases and in 2019 the number of cases was higher, amounting to 112,954 cases. With the number of deaths from January to July 2020 amounted to 459 people, while in 2019 there were 751 people.³ Dengue

Hemorrhagic Fever is still a health problem in both urban and semi-urban areas. In the Province of East Nusa Tenggara (NTT) dengue cases fluctuated from 2016 to 2019. In 2016, it was reported that there was an increase in the number of cases from 487 cases in 2014 to 1,213 cases. This number decreased in 2017 as many as 542 cases, increased in 2018 by 1,603 cases and continued to increase in 2019 by 4,059 cases. The incidence rate of dengue fever has also increased from 29.08/100,000 population to 74.39/100,000 population in 2019 so that it has not yet reached the 2019 NTT Provincial Health Office strategic plan target, which is 8/100,000 population.⁴ Belu Regency is one of the regencies in East Nusa Tenggara Province which is directly adjacent to Timor Leste, experiencing a significant increase in dengue cases. Where is from 2017 to 2019, it was reported that there was an increase in the number of cases from 6 cases to 101 cases in 2019. The incidence rate of dengue fever also increased from 1.4/100,000 population to 45.88/100,000 population.⁵ Epidemiologically, the emergence of a disease is the result of the interaction between the host, agent and environment. Host refers to a human being who can become sick.⁶ There are many factors that can cause the host to be susceptible to agent exposure, including age, sex, genetics, immunity, nutritional status and behavior.⁷ The pattern of dengue transmission increases during the rainy season. Temperature and rainfall affect mosquito breeding patterns.⁸ Entering the rainy season in January 2020, dengue cases showed an increasing trend in almost all regencies/cities in NTT Province, one of which was Belu Regency. The data from the Belu District Health Office noted that: Early January to June 2020, 820 cases have been reported and 8 of them have died. With an incidence rate of 367/100,000 population and a CFR of 0.97%. Many factors affect cases of dengue fever which if without proper treatment will result in death. Various efforts to control the prevalence of dengue

cases, especially in areas with high or persistent transmission, are needed. Areas that have high transmission are cities/districts with high IR, so that requires careful and fast disease control.⁹ One of the dengue control measures carried out in Indonesia and can be carried out by all ages and from all levels of education is the mosquito nest eradication activity. The government in Indonesia has launched the sustainable cultivation of mosquito nest eradication activity by the community with the core message of 3M plus and realizing the implementation of the 1 house one lartic monitor movement. The success of mosquito nest eradication activity activities can be measured by the larva free rate. If the larva free rate 95% is expected to prevent or reduce cases of dengue transmission.¹⁰

The purpose of this study is to provide an overview of the situation of dengue fever in Belu Regency and as input in e orts to prevent and control dengue cases in Belu Regency.

METHODS

This research is an observational descriptive study with a case series design. The data sources in this study used secondary data, namely the Health Profile of Belu Regency from 2016 to 2019, and DHF data from January to June 2020. This study describes the incidence of DHF cases with an epidemiological case approach according to person, place, and time. The variables studied in this study were Person (gender, age, clinical symptoms and incidence rate per age group), Place (case distribution and incidence rate based on Belu District), and time (seasonal pattern of DHF disease on a weekly, monthly and monthly basis) in Belu Regency. Age variables were grouped into 6, namely age groups 1 year, 1-4 years, 5-14 years, 15-44 years, and 45 years. The Incidence Rate (IR) variable is the result of the division between the number of new cases in a certain period and the total population in the area. The results of these calculations are then classified into 4 groups, namely, very high IR > 20%, high IR 16-20%, moderate

IR 11-15%, low IR 6-14%, and very low IR < 5%.¹¹

RESULTS

Dengue Hemorrhagic Fever Disease Pattern Based on Person (Clinical and Laboratory Symptoms)

The results of data analysis showed that in 2016-2020, the majority of cases of dengue fever showed clinical symptoms of fever 2-7 days by 100%, followed by symptoms of nausea/vomiting, joint pain, headache and bleeding. Cases of dengue fever also from the results of laboratory examinations showed that the platelet count was <100,000 M3 by 100% in 2017 and 2018 while hematocrit >40% was the highest in 2020 by 91% and in 2016 by 60% (Figure 1).

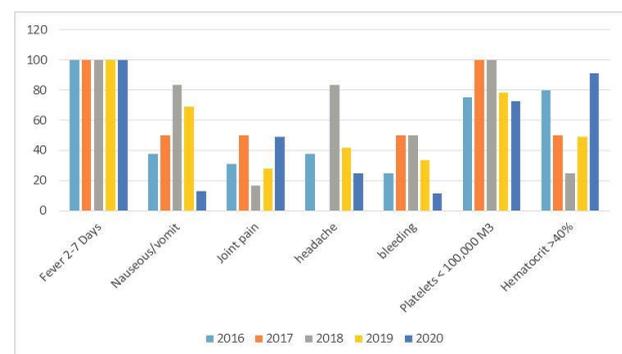


Figure 1. Distribution of DHF cases based on people according to clinical and laboratory symptoms in Belu Regency in 2016 – 2020

Dengue Hemorrhagic Fever Disease Pattern Based on Person (Gender and Age)

The results of data analysis showed that in 2016-2020, the majority of cases of dengue fever occurred in women. The pattern of distribution of dengue fever cases in 2016 to 2020, most suffered by the age group 5-14 years. The pattern of dengue fever incidence compared to gender which shows an increase every year is at the age of 15-44 years. The pattern of occurrence of dengue fever will decrease at the age of 45 years (Table 1).

Table 1. Distribution of DHF Cases by Person (Gender and Age) in Belu Regency in 2016 – 2020

People Approach	Case (Year)					Amount	
	2016	2017	2018	2019	2020	n	%
Gender							
Man	13	0	2	45	406	466	48.49
Woman	19	2	4	56	414	495	51.51
Age (Years)							
1	2	0	1	2	20	25	1.30
1-4	3	1	0	21	130	155	8.06
5-14	22	1	3	31	464	521	27.11
15-44	5	0	2	39	172	218	11.34
>45	0	0	0	8	34	42	2.19
Total	32	2	6	101	820	961	50

Pattern of Dengue Hemorrhagic Fever by Place

The population density in Belu Regency from 2016 to 2020 has increased every year. Until 2020, the population in Belu Regency based on the Central Statistics Agency (BPS) is 223,176 people. Belu Regency is divided into 12 sub-districts and 81 villages (Table 2).

The incidence rate in Belu Regency shows an increasing trend every year. There was a decrease in the trend of cases in 2017 by 1/100,000 but increased in 2018 to 2020. In 2016 it was categorized as moderate IR, while in 2019 to 2020 it was categorized in a very high IR, namely 46 per 100,000 population and 367 per 100,000 population (>20 per 100,000 population) with a CFR of 0.97% (Table 3).

Table 2. Total Population of Belu Regency 2016 – 2020

subdistrict	Number of Villages/Sub-districts	Total population				
		2016	2017	2018	2019	2020
Raimanuk	9	14,428	14,355	14,262	14,166	14,040
Western Tafeto	8	23,020	23,008	22,964	22,913	22,814
Kakuluk Mesak	6	3,307	3,188	3,068	2,952	2,834
Nanaet Dubesi	4	24,228	25,398	26,588	27,826	29,058
Atambua City	4	25,950	26,434	26,888	27,342	27,745
West Atambua	4	31,309	32,031	32,723	33,420	34,059
South Atambua	4	22,947	23,053	23,129	23,196	23,216
East Tafifeto	12	23,034	23,275	23,486	23,693	23,849
Take a look	6	20,551	21,953	23,418	24,974	26,575
Lasiolate	7	4,756	4,534	4,315	4,107	3,899
Lamaknen	9	6,530	6,376	6,217	6,061	5,895
South Lamaknen	8	10,247	9,991	9,725	9,466	9,192
Belu District	81	210,307	213,596	216,783	220,116	223,176

Source: Belu Regency BPS 2020

Table 3. Overview of Incidence Rate /IR and Case Fatality Rate /CFR DHF Belu Regency 2016 – 2020

Variable	2016	2017	2018	2019	2020
Total population	210,307	213,596	216,783	220,116	223,176
Number of Cases	32	2	6	101	820
Die	0	0	0	1	8
IR per 100,000	15	1	3	46	367
CFR	0	0	0	0.99	0.97

Source: Belu District Health Office Profile 2016 – June 2020

The incidence rate value in several sub-districts shows an increasing trend, namely the West Tasifeto sub-district in 2018 IR 7 per 10,000 increased to 23 per 10,000 in 2019, Kakuluk Mesak District, IR in 2018 by 2 per 1,000 increased to 25 per 1,000. West Atambua Subdistrict in 2018 with IR 5 per 10,000 increased to 25 per 10,000 in 2019. East Tasifeto Subdistrict with IR 2 per 10,000 increased to 25 per 10,000 in 2020. South Atambua Subdistrict in 2019 with IR 9 per 10,000 increased to 66 per 10,000 in 2020. Furthermore,

Kota Atambua Subdistrict IR 8 per 10,000 in 2019 increased to 79 per 10,000 in 2020. So the classification of IR in 2020 where the IR is very low (<5) is Raimanuk District, Nanaet Dubesi District, Lasiolat District, Lamaknen District and South Lamaknen District. The low IR (6-14) is Raihat District. Meanwhile, those included in the very high IR (> 20) are West Tasifeto District, Kakuluk Mesak District, West Atambua District, East Tasifeto District, South Atambua District and Kota District (Table 4).

Table 4. Distribution of Incidence Rate /IR and Case Fatality Rate /CFR DHF per District Belu Regency 2016 – 2020

subdistrict	Number of Cases (Year)					IR per 10,000 (Year)				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Raimanuk	0	1	0	4	7	0	1	0	3	5
Western Tasifeto	4	0	0	16	52	2	0	0	7	23
Kakuluk Mesak	3	0	0	7	72	9	0	0	2	25
Nanaet Dubesi	0	0	0	2	0	0	0	0	1	0
Atambua City	5	1	0	21	220	2	0	0	8	79
West Atambua	15	0	0	17	124	5	0	0	5	36
South Atambua	3	0	1	21	153	1	0	0	9	66
East Tasifeto	2	0	2	4	139	1	0	1	2	58
Take a look	0	0	1	5	18	0	0	0	2	7
Lasiolate	0	0	2	2	15	0	0	5	5	4
Lamaknen	0	0	0	2	15	0	0	0	3	3
South Lamaknen	0	0	0	0	5	0	0	0	0	1

Dengue Hemorrhagic Fever Disease Pattern Based on Time

Based on the weekly pattern of the outbreak in 2016 weeks 1-24 it can be seen that cases started in the first week and are still volatile, cases tend to increase at week 12 with peak cases at week 14. In 2017 and 2018 at week 11 and 5 with the tendency of cases to stop immediately. Whereas in 2019 and 2020 the initial cases began to occur in the first week where in 2018 the increase in

cases tended to increase until week 5 with a peak of cases at week 9, and fluctuating at week 10-19 then increased again in week 21 and the trend of cases began to slow to week 26. While in 2020 the trend of cases increased at week 3 and continued to increase until a peak of cases occurred at week 13, however cases began to tend to decline at week 14 and continued to slope until week 26 (Figure 2).

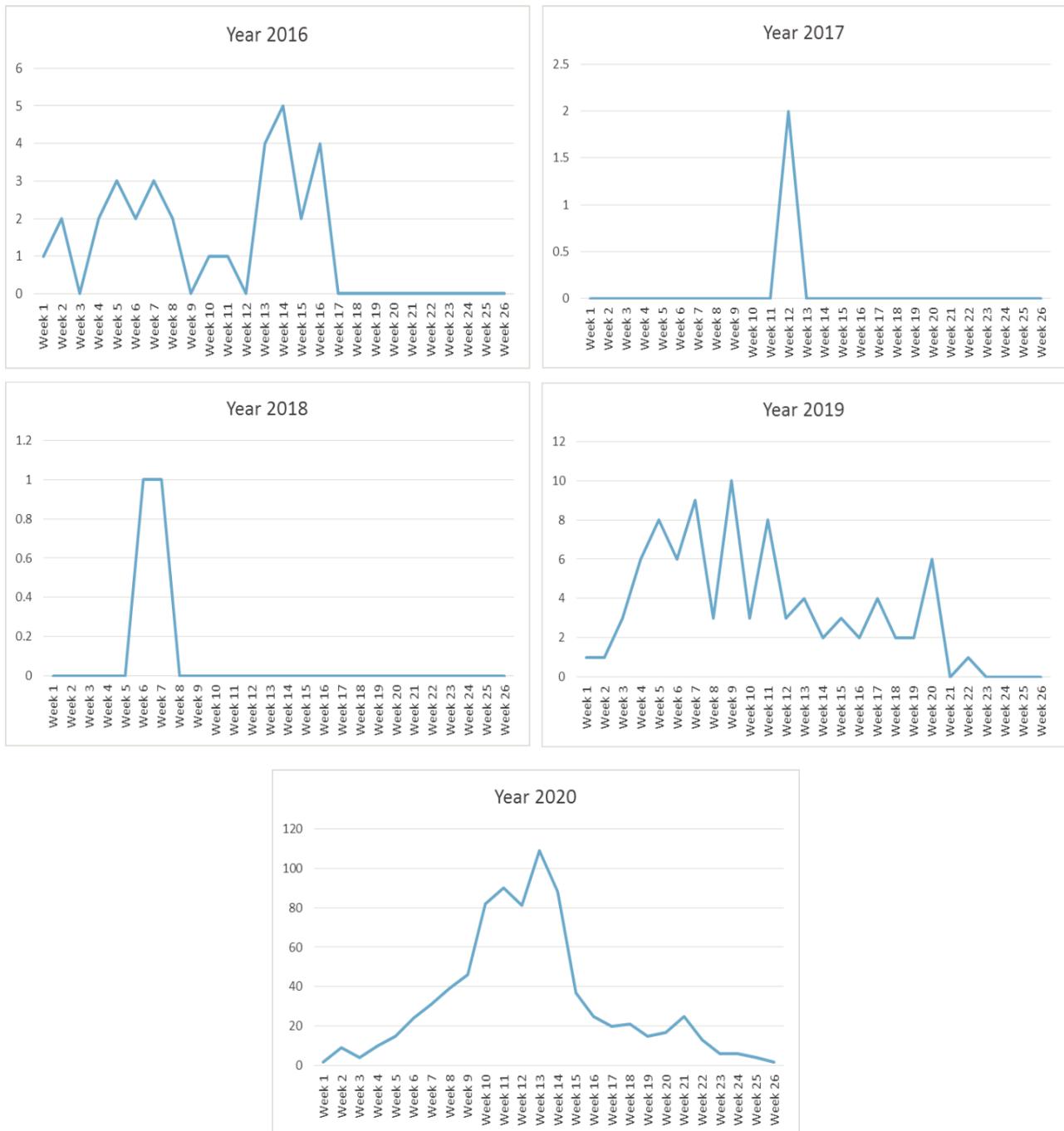


Figure 2. Weekly DHF outbreak week 1 - 26 in Belu Regency 2016 – 2020

DISCUSSION

Dengue Hemorrhagic Fever Disease Pattern Based on Gender, Age, Clinical Symptoms and Laboratory

A study conducted by a research team from Maranatha Christian University Bandung regarding the characteristics of DHF sufferers in Kupang City found the fact that DHF mostly affects

children under 15 years of age and more female sufferers than males.¹² The same study on the characteristics of DHF patients at the Medan Haji General Hospital found that the most DHF patients were aged 11-20 years and there were more female patients than males.¹³ Another study also stated that the gender group stated that the risk of developing DHF for men and women was almost the same, independent of gender.¹⁴

Another study with different results conducted in Banjarmasin found that DHF cases were more common in men (147 people) compared to women (98 people). Some of the differences between the sexes of men and women, one of which is the mobility factor. Men basically spend more time outside the house, so the risk of being bitten by mosquitoes is even greater.¹⁵ This study shows that the majority of cases of dengue fever occur in the 5-14 year age group. This study is in line with research conducted in Central Jakarta, Gambir sub-district and large rice field, which showed that the majority of dengue fever sufferers occurred in the 15 year group.¹⁴ This study is in line with research conducted in Thailand which showed that the majority of dengue fever sufferers occurred in the 15 year group.¹⁶ This study is in line with research conducted in Blitar City regarding the description of dengue cases which showed that the majority of dengue fever sufferers occurred in the 15 year group.¹⁷ Symptoms of dengue hemorrhagic fever are initiated by: 1) sudden high fever for 2-7 days (38°C-40°C); 2) hemorrhagic manifestations, with a positive tourniquet test, purpura, conjunctival bleeding, epistaxis, melena; 3) hepatomegaly; 4) shock, pulse pressure decreased to 20 mmHg or less, systolic pressure reached 80 mmHg or less; 5) thrombocytopenia, from day 3-7 found a decrease in platelets to 100,000/mm³; 6) hemoconcentration, increased hematocrit value; 7) other clinical symptoms that may accompany, anorexia, nausea, vomiting, weakness, abdominal pain, diarrhea, seizures and headaches; 8) and pain in muscles and joints.¹⁸ This study showed that the majority of cases of dengue hemorrhagic fever with clinical symptoms of fever 2-7 days, nausea, vomiting, bleeding and decreased platelets <100,000/mm³. This study is in line with research conducted in Palu which showed that the majority of dengue fever sufferers were fever 2-7 days, nausea and vomiting, and decreased platelet count <100,000/mm³.¹⁹

Pattern of Dengue Hemorrhagic Fever by Place

In general, the clustering of DHF events with a tendency to follow a high population density.²⁰

The distribution of dengue cases in Belu Regency tends to be concentrated in areas with densely populated settlements. It is recorded that the population has increased every year until 2020, which is 223,176 people. The incidence rate of Belu Regency in 2019 and 2020 is in a very high position >20%. This shows that the incidence of dengue cases in Belu Regency is very high. Belu Regency is an area with dense population mobility with a high population of people and is a direct border area with the State of Timor Leste. This study shows that the majority of dengue fever cases occur in high population and urban areas. This is in line with research conducted in Banyumas Regency where dengue cases are more widely spread in areas with a dense population such as the former Purwokerto City area with a population ranging from 2001 to 6885 people. In areas with a moderate population distribution between 1000-2000 people there are cases with a moderate distribution rate.¹⁹ Another study conducted in China found that in the area of Guangzhou (one of the major cities in China), Conghua (its border city) and Zengcheng, more cases of DHF were found.²¹ Urban and rural areas on the outskirts of the city are densely populated places so that the transmission of dengue virus through mosquito bites is more. Most of the residents in the new settlements have carriers of different types of virus carriers. An effective intervention to overcome the spread of DHF is vector control. Even though the population is dense, if the vectors are few and not infective, the population will not be vulnerable.^{22, 23}

Dengue Hemorrhagic Fever Disease Pattern Based on Time

In general, the pattern of cases increases during the rainy season and decreases in the dry season. This study showed that the increase in dengue cases occurred in the first week with peak cases in the thirteenth week with high rainfall. High rainfall causes puddles of water which are breeding places for mosquitoes that spread disease.²⁴ This is in line with research conducted in Surabaya which showed that rainfall was positively correlated with the incidence of dengue

hemorrhagic fever.²¹ The same research was also carried out by Sumantri showing that areas/locations with moderate rainfall, namely rainfall between 1000-1500 mm/year, while at high rainfall above 3000 mm/year cases were found to be few.²⁵ The pattern of increasing cases every month has a higher trend in December-May with reduced rainfall, especially in January. This condition is more due to the habit of residents to save water for household purposes, during times of water shortage.²⁰

CONCLUSION

The incidence of DHF in Belu Regency all showed symptoms of fever for 2-7 days with the result laboratory examination of platelets <100,000 M3. The distribution of cases by gender mostly occurred in the female sex from 2016-2020. The pattern of DHF incidence based on age mostly occurs at the age of 5-14 years. The IR pattern in Belu Regency is relatively high because in 2016, 2019 and 2020 the IR rate was > 20 per 100,000 population with a CFR in 2020 of 0.97%. The highest IRs based on sub-districts in 2020 are Kota District, South Atambua District, East Tasifeto District, West Atambua District, West Tasifeto District and Kakuluk Mesak District. The pattern of DHF incidence based on time began to occur in the first week of the year and reached its peak at week 13 where during that time period the average rainfall was high. The pattern of DHF incidence is found in each year, the highest incidence occurs in January and February.

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This research uses secondary data obtained from the DHF report of the Belu District Health Office and processed descriptively, so that the validity of the data in this research is very dependent on the validity of the data contained in the DHF report. In this research, the variables that became risk factors for DHF were not investigated, because they must be adjusted to the availability of data in the DHF report format. So it is hoped that further research can examine the

risk factors for the incidence of DHF in Belu Regency.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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