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Case study of epidemiological investigation of Dengue Hemorrhagic Fever (DHF) in Blitar City

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ABSTRACT

In 2024, there was an upward trend in Dengue Hemorrhagic Fever (DHF) cases in Blitar City, with a total of 135 reported cases. The Incidence Rate (IR) was 92.21 per 100,000 population, and the Case Fatality Rate (CFR) stood at 2.36%. This study aims to investigate DHF cases occurring in three Community Health Centers (Puskesmas) in Blitar City. Using secondary data sources, the highest transmission rate was recorded during the 13th epidemiological week (March 22, 2024) through the 14th week (March 25, 2024). Fatalities were reported in children aged 6 months and 10 years, with the highest Attack Rate found in the 5–14-year age group. In 2024, the Larvae-Free Index (Angka Bebas Jentik/ABJ) in Blitar City was recorded at 94.6%, slightly below the ideal target of >95%. Preventive and promotive efforts were carried out through effective Mosquito Nest Eradication (Eradication of Mosquito Breeding Places/PSN) using the 3M strategy: draining, covering, and recycling water storage containers, along with "Plus" actions such as sprinkling larvicide in hard-to-clean water containers, using mosquito repellent, sleeping under mosquito nets, breeding larva-eating fish, planting mosquito-repellent plants, installing window screens, and regularly inspecting water containers. Individuals experiencing recurrent fever with a body temperature ≥38°C for more than 3 days are advised to seek medical examination promptly and maintain adequate fluid intake. Fogging was conducted within a 200-meter radius around residences where DHF cases or confirmed diagnoses were found. Herd immunity efforts through immunization are considered a cost-effective alternative for controlling the spread of DHF.

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INTRODUCTION

There has been an increasing trend in Dengue Hemorrhagic Fever (DHF) cases in Blitar City in 2024. The rapid transmission often causes panic among the public, with the risk of death. In Indonesia, DHF cases continue to rise and remain a major concern, especially among experts,

researchers, and university students. Additionally, many people still lack early awareness of DHF, which can lead to fatalities (Wongkar et al., 2024).

In Indonesia, based on a 2024 report from the Directorate General of Disease Prevention and Control (P2P), Ministry of Health of the Republic of Indonesia, there were 244,409 DHF cases with an Incident Rate (IR) of 87.34 per 100,000 population and a Case Fatality Rate (CFR) of 0.59%. For the year 2025, as of February, there were 6,050 reported cases with an IR of 2.14 per 100,000 population and a CFR of 0.46% (28 deaths). The cases were spread across 235 cities/regencies in 23 provinces, with fatalities reported in 22 cities/regencies (Pasmar et al., 2023).

In East Java, the highest number of DHF cases in 2024 was recorded at 29,708 with 239 deaths. In 2023, there were 9,401 cases with 134 deaths. In 2022, the number rose to 13,236 with 94 deaths. In 2021, there were 6,760 cases with 72 deaths. During the COVID-19 pandemic in 2020, DHF cases declined to 8,567 with 73 deaths (Susmaneli et al., 2021).

Blitar City, one of the smallest cities in East Java Province, consists of 3 sub-districts, each served by one community health center (Puskesmas). In 2024, the Incident Rate (IR) was 92.21 per 100,000 population, with a Case Fatality Rate (CFR) of 2.36%. There were 135 reported DHF cases with 4 child fatalities. The most affected age group was 5–14 years old, with the majority being female. The peak of the outbreak occurred during the 13th epidemiological week (March 22, 2024) to the 14th week (March 25, 2024).

In 2023, there were 33 cases with no fatalities. The peak occurred in the 2nd week (January 12, 2023). In 2022, 94 cases were reported with 1 death, and the peak occurred in the 54th week (December 13, 2022). In 2021, there were 49 cases with no deaths, peaking in the 46th week (November 17, 2021). In 2020, 85 cases were reported with no fatalities, peaking in the 8th week (February 27, 2020) (Pakpahan et al., 2021).

The trend of DHF cases and the corresponding number of deaths in Blitar City over the past 11 yearsIn Blitar City, DHF-related deaths were recorded across all districts. In Sananwetan District, two child fatalities occurred. The first was a 6-month-old female infant from Sananwetan Sub-district, and the second was a 10-year-old girl from Gedog Sub-district. One death was reported in Sukorejo District, involving a 10-year-old girl. The final case was a 6-month-old female infant from Kepanjenkidul District

RESEARCH METHOD

The research method used was descriptive observational with a case study approach. The data source was secondary data. Reports on the Larvae Free Index (ABJ) submitted by Integrated Larvae Monitoring (ILM) volunteers were followed up by DHF officers at the community health center (Puskesmas), which was then used to map areas with potential increases in case numbers. Environmental observations were conducted to identify risk factors for transmission (Mahbub, 2023).

RESULTS AND DISCUSSIONS

Blitar City is a small city located in the southern part of East Java Province, surrounded by Blitar Regency, with a total area of 32.58 square kilometers. To the north, it borders Garum and Glegok Subdistricts; to the south, it borders Sanankulon and Kanigoro Subdistricts; to the west, it borders Sanankulon and Nglegok Subdistricts; and to the east, it borders Kanigoro and Garum Subdistricts.

As of the latest data, Blitar City has a total population of 146,404 people, consisting of 72,587 males and 73,817 females. Administratively, the city is divided into three subdistricts: Sananwetan, Sukorejo, and Kepanjenkidul. Sananwetan Subdistrict comprises seven urban villages (kelurahan) Bendogerit, Gedog, Sananwetan, Karangtengah, Plosokerep, Rembang, and Klampok. Sukorejo Subdistrict also consists of seven urban villages Tanjungsari, Pakunden, Sukorejo, Blitar,

Turi, Karangsari, and Tlumpu. Kepanjenkidul Subdistrict includes the following seven urban villages: Kepanjenkidul, Kepanjenlor, Kauman, Bendo, Tanggung, Sentul, and Ngadirejo.

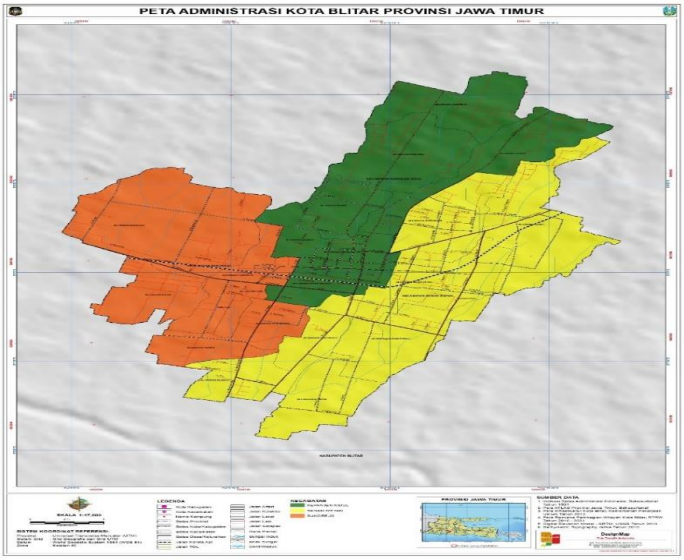

Figure 1. Map of blitar city. source: google earth downloaded on May 26, 2025

In the Sukorejo area, a 10-year-old girl passed away on January 23, 2024. The child was obese, weighing 63.8 kg. Initial symptoms began on January 18, 2024, with intermittent fever accompanied by vomiting. The parents purchased over-the-counter medication from a pharmacy. After two days without improvement, the child was taken to a private hospital in Blitar City, where she was diagnosed with suspected DHF and bronchitis. On January 21, 2024, the symptoms worsened to include fever and hematemesis (vomiting blood). Laboratory tests confirmed DHF Grade 2, and the child's general condition was poor. On January 23, 2024, she was transferred to the ICU with a diagnosis of DHF Grade 3. Despite intensive care, she passed away at 21:47 WIB (Hariyanti et al., 2023).

In the working area of Sananwetan Public Health Center (Puskesmas), a 6-month-old baby girl died on March 17, 2024. According to the epidemiological investigation, the initial symptoms began on March 15, 2024, with fever and diarrhea. The parents gave over-the-counter medication purchased from a pharmacy. On March 16, 2024, symptoms persisted, and the infant was taken to a private general practitioner (DPM). Medication was prescribed, and warning signs of a medical emergency were explained. On the third day, March 17, 2024, the infant experienced seizures and had a body temperature between 38°C–39°C. She was taken to a government hospital, where she was declared dead on the same day.

Another death occurred in the working area of Kepanjenkidul Puskesmas, involving another 6-month-old baby girl. The initial symptom of fever began on Sunday, March 17, 2024, at 2:00 AM. No medication was given by the parents, only warm compresses, as the baby still appeared active. On Monday, March 18, 2024, the infant was brought to a private practitioner in Blitar City and was referred to a government hospital. A full laboratory examination was performed. On Thursday morning, March 21, 2024, at around 10:00 AM, she was transferred to the ICU. She was declared dead at 13:20 WIB (Fitriani et al., 2023).

A second death in the Sananwetan area occurred on July 7, 2024, involving a 10-year-old girl. Initial symptoms appeared on July 4, 2024, including fever, chills, and vomiting. On July 5, 2024, the child was brought to a government hospital. Laboratory tests were conducted, and her general condition was good, so outpatient treatment was recommended. On July 7, 2024, she

developed vomiting and frequent urination. She was taken to a local Puskesmas, observed in the emergency room, and referred to a government hospital. Later that afternoon, she was reported dead. (Frinaldi et al., 2023), from 2015 to 2025, can be illustrated in the following chart:

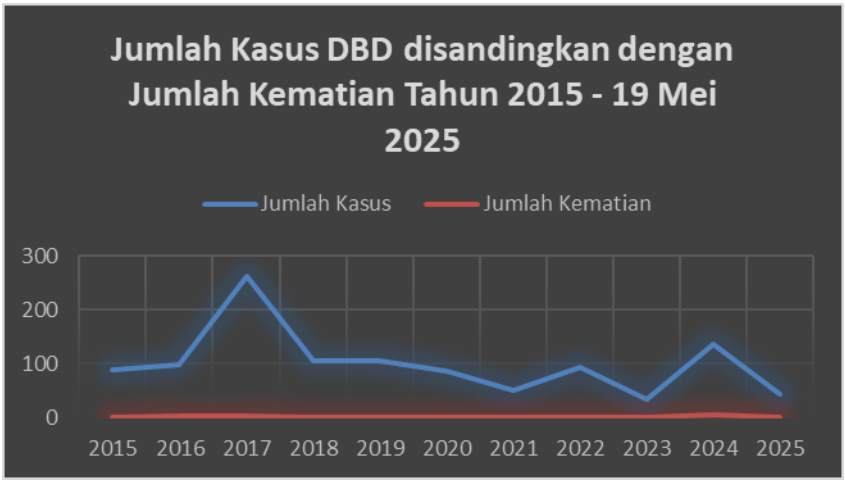

Figure 2. The number of dengue fever cases compared to the number of dengue fever deaths by year in blitar city. data source: health office of blitar city, 2025

Based on the chart above, it is observed that the highest number of DHF cases occurred in 2017, with a total of 263 cases, while the highest number of deaths was recorded in 2024, with 4 fatalities. The lowest number of cases was in 2023, with only 33 reported and no fatalities. It can be concluded that an increase in the number of cases is associated with a higher risk of death, highlighting the importance of disease control through measures such as the Larvae Free Index (ABJ).

Meanwhile, the distribution of DHF cases by gender in Blitar City in 2024 is shown in the following chart:

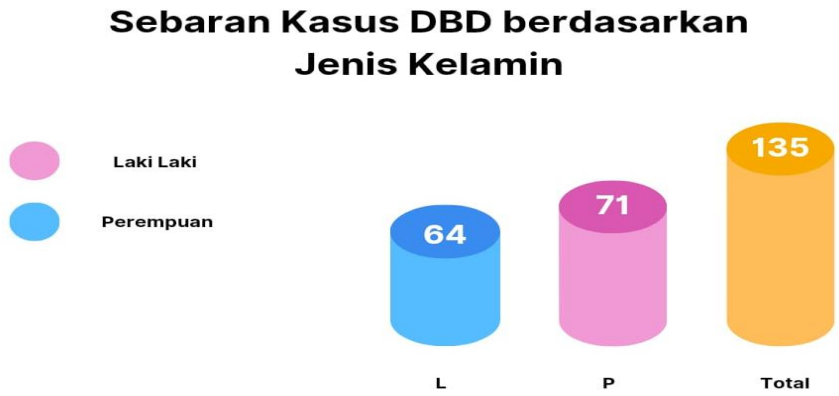

Figure 3. Distribution of dengue fever cases based on gender in blitar city in 2024. source data from the health office of blitar city, 2024

The chart shows that the incidence of DHF was higher among females, with 71 cases, accounting for 52.59% of the total. Meanwhile, the distribution of DHF cases by area or sub-district (kelurahan) in Blitar City in 2024 is illustrated in the following chart:

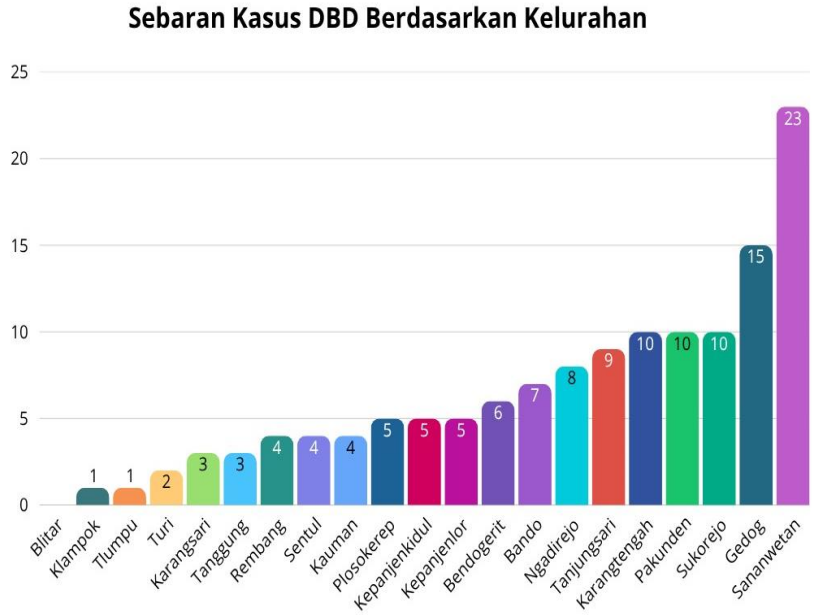

Figure 4. Distribution of dengue fever cases based on the location or sub-district in blitar city in 2024. data source: health office of blitar city 2024

The chart indicates that the highest number of DHF cases in 2024 occurred in Sananwetan Sub-district, with a total of 23 cases, while the lowest was in Blitar Sub-district, which reported zero cases.

Epidemiological investigations were conducted for all four fatal cases. These investigations were carried out collaboratively with the Head of the Puskesmas, the Communicable Diseases Team Leader from the Health Department, the Responsible Doctor for Cluster 4, the DHF Program Coordinator, area midwives, community nurses, and ILP (Larvae Monitoring Inspector) cadres.

Preventive and promotive measures were carried out through effective Mosquito Nest Eradication (PSN) using the 3M strategy: draining, covering, and recycling water containers. Additional "Plus" actions included sprinkling larvicide powder in water reservoirs that are difficult to clean, using mosquito repellents, sleeping under mosquito nets, breeding mosquito larvae-eating fish, planting mosquito-repelling plants, installing wire mesh on windows, and regularly checking water storage areas.

Individuals with recurring fever and fluctuating body temperature are advised to undergo early laboratory testing. In areas within a 200-meter radius of a reported DHF death, fogging is conducted to prevent further transmission. (Dewi & Ma'ruf, 2021).

Figure 5. The number of dengue fever cases by month of occurrence in blitar city tahun 2024.
sumber data: dinas kesehatan kota blitar, 2024

Based on Figure 5, the highest number of DHF cases occurred in March, with two child fatalities reported during that month. In contrast, November recorded the lowest number of DHF cases. The peak of the outbreak occurred during the 13th epidemiological week on March 22, 2024, through the 14th week on March 25, 2024.

To respond to the rising trend of DHF cases, the Blitar City Health Office issued Circular Letter Number 400.7.8/1365/410.102.3/2024 dated December 9, 2024, regarding DHF virus awareness and control efforts. Measures included monitoring and evaluating DHF cases, conducting mortality audits, strengthening the DHF Task Force (Pokjanal DBD) by involving key stakeholders such as Forkopimda, Forkopimcam, cross-sector and cross-program collaboration, and optimizing the involvement of Integrated Primary Service (ILP) volunteers, commonly known as jumantik cadres.In addition, the Blitar City Government, in collaboration with the Health Office, has allocated a budget to implement a dengue vaccination program for children aged 9 and 11 years, or those in 3rd and 5th grade of elementary school (SD/MI or equivalent) (Bayani & Aeni, 2024).

CONCLUSION

There was an increasing trend in Dengue Hemorrhagic Fever (DHF) cases in Blitar City in 2024. Morbidity and mortality rates were evenly distributed across all districts. Preventive surveillance was carried out through risk area mapping and assessment of the Larvae Free Index (ABJ), in collaboration with Integrated Primary Service (ILP) volunteers (jumantik), community health center (Puskesmas) staff, and the DHF Task Force (Pokjanal DBD). In Blitar City, preventive and promotive efforts were implemented through effective Mosquito Nest Eradication (PSN) using the "3M Plus" strategy. One of the key strategies to address the increase in DHF cases is immunization. Immunization serves as a cost-effective method to prevent the spread of *infectious diseases*.

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