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STATISTICAL ANALYSIS OF DENGUE FEVER DATA IN CENTRAL JAVA IN 2024

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Abstract

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the dengue virus and transmitted through the bite of Aedes aegypti mosquitoes. This disease remains a major public health problem in many tropical regions, including Indonesia. This study aims to analyze the spatial distribution pattern of DHF cases in several districts of Central Java Province in 2024, namely Banyumas, Klaten, Kendal, Boyolali, and Grobogan. The research method used is a descriptive analysis with a spatial approach based on statistical data of DHF cases in each region. The results show that Banyumas Regency has the highest number of cases at 100.50, followed by Klaten with 92.50 cases, Kendal with 87.40 cases, Boyolali with 85.50 cases, and Grobogan with the lowest number of cases at 77.40. The differences in case numbers among regions are influenced by several factors, including environmental conditions, population density, rainfall, environmental sanitation, and community awareness in mosquito breeding site control. Efforts to control DHF should be carried out through integrated approaches such as strengthening mosquito breeding eradication programs, implementing the 3M Plus movement, increasing community education, and improving health surveillance systems. Spatial analysis is expected to provide an overview of the distribution patterns of DHF cases and support the development of more effective prevention and control strategies.

Keywords: Dengue Hemorrhagic Fever; Spatial Analysis; Central Java; Aedes Aegypti; Public Health.

1. INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by the Dengue Virus (DENV), which has four serotypes: DENV-1, DENV-2, DENV-3, and DENV-4. Transmission occurs through the bite of the Aedes aegypti mosquito. This disease has a widespread impact on human life because approximately 3–6 billion people worldwide live in dengue-endemic areas, with an estimated 390 million infections each year and about 96 million of those exhibiting clinical symptoms. A person can become infected after being bitten by a mosquito carrying the DENV virus, and the infection can be either a primary or secondary infection. Primary infection generally presents as acute fever (dengue fever), which is usually controlled by the immune response within about seven days. In contrast, secondary infections tend to be more severe and have the potential to progress to Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS). Cases of DHF and DSS are more common in children, as reported in Cuba, particularly among those aged 3–14 years with secondary DENV-2 infection, which carries a significant risk of progressing to shock and increasing mortality rates in the adolescent to young adult age group (15–39 years) (Nugraheni et al, 2023).

Central Java is one of the provinces in Indonesia located in the central region of Java Island and plays a strategic role in the development of history, culture, education, and the

economy at the national level. Geographically, the province Central Java is one of Indonesia's provinces, located in the central part of Java Island, and plays a strategic role in the nation's historical, cultural, educational, and economic development. Geographically, the province borders West Java to the west, East Java to the east, the Special Region of Yogyakarta to the south, and the Java Sea to the north, with its capital in the city of Semarang. Central Java is known as a region with abundant cultural wealth, ranging from customs and traditions, the local language—Central Javanese dialect—to various historical relics such as temples, royal palaces, and traditional arts that remain well-preserved. In addition, the local economy is supported by key sectors such as agriculture, industry, tourism, and trade, which significantly contribute to regional development (Muharrom et al, 2022).

Dengue Hemorrhagic Fever (DHF) cases in Indonesia were recorded at 98,071 with a morbidity rate of 35.36 per 100,000 population. In Central Java Province in 2024, the number of DHF cases reported was 6,157 cases with 144 deaths, resulting in an Incidence Rate (IR) of 17.86 per 100,000 population and a Case Fatality Rate (CFR) of 2.2%. Meanwhile, based on data from the P2P Purworejo Regency in 2023, there were 1,434 residents confirmed to be infected with the dengue virus with 5 deaths. Various studies have shown that the incidence of DHF is influenced by several factors, including biological environmental factors such as the density of the Aedes aegypti mosquito vector and the presence of larvae, physical environmental factors such as humidity, air temperature, lighting, house ventilation, and the availability of covers on water reservoirs, and social environmental factors such as population density, residential density, and support from health workers. In addition, other research reveals that the incidence of dengue fever in a region is also related to the incidence of dengue fever in other nearby regions.

Although numerous studies have linked environmental and climate indicators to the increase in dengue fever cases, several limitations remain, such as differences in regional characteristics, asynchronous entomological data, and statistical analyses that do not fully explain the strength of the relationships between variables in detail. Therefore, a more comprehensive integration of climate, demographic, and spatial data is needed. Spatial analysis can be used to identify factors influencing the spread of dengue fever and map its distribution across regions. Research by Habinuddin (2021) states that a spatial analysis approach can illustrate the distribution and interrelationships of a region's characteristics, thus serving as a basis for formulating dengue control policies. Spatial analysis, as part of a Geographic Information System (GIS), allows the integration of case data based on time, climate variables, demographic data, and entomological indicators at a uniform spatial and temporal scale. Through GIS, areas with high case rates (hotspots) can be identified, spatial correlations between regions can be tested, distribution clusters can be visualized, and priorities for vector control interventions can be determined. In line with this, Terradas (2024) research confirms that the integration of climate and demographic factors with a geographical approach can improve understanding of the spatial patterns of dengue fever while also helping to determine priority areas in case management efforts (Sari et al, 2025).

Based on this background, this study aims to conduct a spatial analysis of Dengue Hemorrhagic Fever (DHF) cases at the district/city level in Central Java Province, specifically in Banyumas, Klaten, Kendal, Boyolali, and Grobogan in 2024. This analysis was conducted using available statistical data to identify distribution patterns, case trends, and interregional linkages, thereby providing a more comprehensive picture of the dynamics of DHF spread in these areas.

2. RESEARCH METHOD

This study employs a descriptive research method with a spatial analysis approach. The data used in this study are secondary data obtained from official government reports and relevant scientific journals published in 2024. The data consist of the number of Dengue Hemorrhagic Fever (DHF) cases in several regencies in Central Java Province, namely Banyumas, Klaten, Kendal, Boyolali, and Grobogan. The data collection technique was carried out through documentation and literature study by collecting statistical data and previous research related to dengue cases. The collected data were then analyzed using a descriptive statistical approach to determine the distribution pattern and percentage contribution of each region. Furthermore, a spatial approach was applied to identify differences between regions and observe the distribution pattern of DHF cases. The analysis process includes data grouping, percentage calculation, and interpretation based on environmental, demographic, and social factors influencing dengue transmission. The results are presented in the form of tables, graphs, and descriptive explanations to facilitate understanding.

3. DISCUSSION

3.1. High number of DHF cases in Central Java

The table presents data on the number of Dengue Hemorrhagic Fever (DHF) cases in several districts/cities in Central Java Province, namely Banyumas, Klaten, Kendal, Boyolali, and Grobogan. This data shows the variation in the number of dengue cases in each region. Based on the table, Banyumas Regency ranks highest with a total of 100.50 cases. This figure shows that Banyumas has the highest dengue incidence rate compared to other areas listed in the table. The second position is occupied by Klaten Regency with 92.50 cases, followed by Kendal Regency with 87.40. Furthermore, Boyolali Regency recorded 85.50 cases, while the lowest number of cases was found in Grobogan Regency with 77.40.

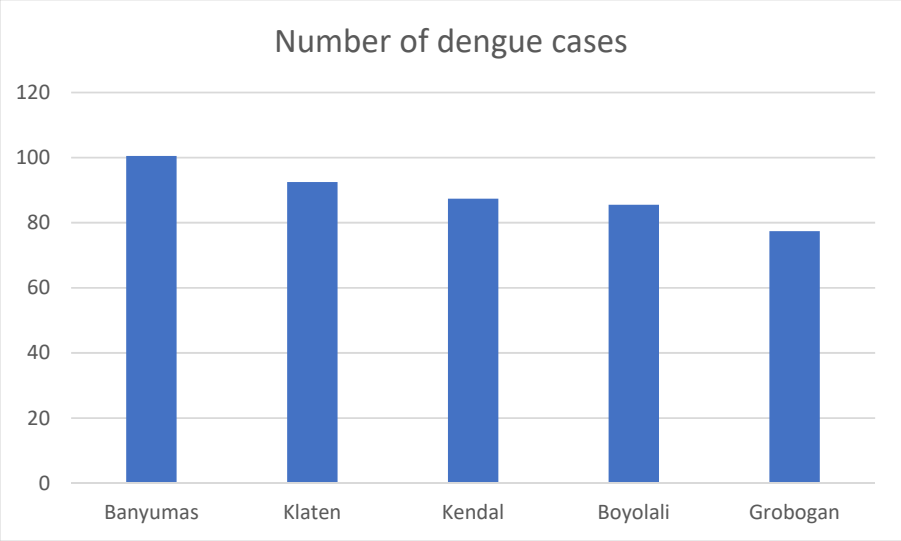
In general, the difference in the number of cases between the highest (Banyumas) and lowest (Grobogan) areas is 23.10. This difference can be influenced by various factors, such as population density, environmental conditions, sanitation, rainfall, and the effectiveness of prevention and control programs for the Aedes aegypti mosquito vector, the main cause of dengue fever. From these data, it can be concluded that dengue cases remain a public health problem in several areas of Central Java. Areas with a higher number of cases require more attention in terms of prevention efforts, such as mosquito nest eradication (PSN), increasing public awareness, and strengthening health services. Further analysis is needed to determine the dominant causal factors and the trend of increasing or decreasing cases over time. In addition, efforts to control dengue fever also need to be carried out in an integrated and sustainable manner, involving various parties, from local governments, health workers, to active community participation. Educational programs regarding clean and healthy lifestyles (PHBS) must continue to be intensified, especially in maintaining environmental cleanliness and avoiding stagnant water that has the potential to become a breeding ground for mosquitoes. Activities such as mosquito nest eradication (PSN) through 3M (draining, covering, and recycling) need to be carried out routinely and consistently by the community in their respective residential environments.

Furthermore, regular monitoring and a rapid response to rising cases are crucial to prevent an extraordinary event (KLB). Local governments also need to increase health service capacity, including the availability of facilities, medical personnel, and an accurate and rapid reporting system. The use of information technology in case tracking can help identify vulnerable areas so that interventions can be more targeted. Furthermore, cross-sectoral collaboration, such as with environmental agencies, education agencies, and community organizations, is essential to strengthen prevention efforts.

Climate change and weather conditions also contribute to the rise in dengue fever cases, necessitating increased vigilance, especially during the rainy season. Therefore, anticipatory measures such as regular outreach campaigns, focused fogging in areas with high numbers of cases, and further research into disease transmission patterns need to be continuously developed. With effective cooperation, increased public awareness, and appropriate policy support, it is hoped that the number of dengue fever cases in Central Java can be significantly reduced and public health can continue to improve over time.

Table 1. the number of dengue cases in Jawa Tengah

District/city Number of dengue cases	Number of dengue cases
Banyumas	100.5
Klaten	92.5
Kendal	87.4
Boyolali	85.5
Grobogan	77.4



The bar graph shows a comparison of the number of Dengue Hemorrhagic Fever (DHF) cases in five regencies in Central Java Province, namely Banyumas, Klaten, Kendal, Boyolali, and Grobogan. Each bar on the graph represents the number of DHF cases in each region, making it easier for readers to see differences in incidence rates between regions. Based on the graph, Banyumas Regency has the highest number of cases at 100.50. The high bar in Banyumas indicates that this region has the most DHF cases compared to other regencies in the data. Second place is occupied by Klaten Regency with 92.50 cases, followed by Kendal Regency with 87.40 and Boyolali Regency with 85.50. Meanwhile, Grobogan Regency shows the lowest number of cases at 77.40, as seen from the lowest bar on the graph. Overall, the graph shows a significant difference in the number of cases between the highest and lowest regions, with a difference of around 23.10. These differences can be influenced by various factors such as population density, environmental conditions, rainfall, sanitation, and the effectiveness of mosquito breeding program eradication programs. With this graphic visualization, readers can easily identify areas that require greater attention in dengue control and prevention efforts. The graph also facilitates comparative analysis between regions more quickly and clearly than simply looking at a table of numbers.

This finding is also consistent with spatial-based research conducted in Semarang Regency, which shows that dengue cases tend to cluster in certain high-risk areas and can shift over time depending on environmental and demographic factors (Muzzaki et al., 2026). In addition, research in Purwokerto indicates that the density of Aedes aegypti larvae is strongly associated with dengue endemicity, highlighting the importance of vector control and regular monitoring in reducing disease transmission (Salsabila et al., 2024).

3.2. Factors Causing Dengue Fever in Central Java The high number of Dengue Hemorrhagic

Fever (DHF) cases in several districts in Central Java Province is generally caused by a combination of environmental, climatic, and behavioral factors. High rainfall and warm temperatures create ideal conditions for the development of the Aedes aegypti mosquito, the primary vector of dengue fever, because stagnant water in gutters, open containers, and household water reservoirs serves as a breeding ground. Furthermore, high population density accelerates the transmission of the dengue virus because interactions between individuals occur more frequently in close proximity. Poor environmental sanitation, such as suboptimal waste management, also increases the number of mosquito breeding sites. Low public awareness of mosquito nest eradication (PSN), such as the 3M activities (draining, covering, and burying), also contributes to the increase in cases. Therefore, the high number of DHF cases is influenced not only by natural factors, but also by community behavior and participation in maintaining environmental cleanliness, as well as the effectiveness of local health programs. Dengue fever control efforts in Central Java require an integrated and sustainable approach, involving various stakeholders, including the government, health workers, and the community. Education on the importance of maintaining environmental cleanliness must be continuously promoted to raise public awareness of the dangers of stagnant water as a breeding ground for mosquitoes. Furthermore, improving the quality of health services, such as early detection and prompt treatment of dengue fever cases, is crucial for reducing mortality rates. Local governments can strengthen mosquito breeding program eradication programs through routine activities and stricter surveillance in residential areas. Active community participation in environmental protection, such as community service and the adoption of clean and healthy lifestyles, is key to preventing the spread of this disease. With strong cooperation between all parties, it is hoped that the number of dengue fever cases can be significantly reduced and public health can be better maintained.

This is supported by previous research conducted in Central Java, which shows that low public awareness and poor environmental sanitation contribute significantly to the increase in dengue cases. Community-based interventions such as mosquito nest eradication (PSN) and health education have been proven to reduce dengue incidence effectively (Kasron et al., 2023).

3.3. Improvement Efforts Efforts to reduce the number of Dengue Hemorrhagic Fever (DHF)

Cases in Central Java Province need to be implemented in an integrated manner through promotive, preventive, and curative approaches. The primary step that must be strengthened is mosquito breeding eradication (PSN) through the 3M Plus movement, which involves regularly draining water reservoirs, tightly closing water storage containers, and recycling or burying used items that could potentially hold water. This is complemented by other preventative measures such as the use of larvicides, installing wire mesh on ventilation, and raising larvae-eating fish. Local governments need to increase education and outreach to the community on a regular basis through schools, integrated health posts (Posyandu), and environmental activities to strengthen collective awareness of cleanliness. Furthermore, strengthening the

epidemiological surveillance system and rapid case reporting is crucial for prompt response to outbreaks. Fogging should be carried out in a targeted manner and according to medical indications to kill adult mosquitoes when cases increase. Improved sanitation infrastructure, better waste management, and providing access to clean water are also supporting factors in reducing mosquito breeding sites. With collaboration between the government, health workers, and active community participation, dengue fever control efforts can be more effective and sustainable. In addition to these measures, regular monitoring and evaluation of dengue fever control programs are also necessary to ensure the effectiveness of each effort. Surveillance data can be used as a basis for more targeted policymaking, allowing interventions to be tailored to conditions on the ground. The involvement of health cadres and community leaders is also a crucial factor in bridging communication between the government and the public, ensuring that health messages are better received.

In addition, innovations in prevention methods can also be developed, such as the use of environmentally friendly technology or biological approaches to control mosquito populations. Social media-based education and digital campaigns can also be maximized to reach a wider audience, especially the younger generation. By combining conventional and innovative approaches, it is hoped that dengue fever control efforts will become more adaptive to current developments.

Ultimately, the success of these improvement efforts depends heavily on the consistency and commitment of all parties in carrying out their respective roles. Individual awareness of maintaining environmental cleanliness must be continuously cultivated as part of daily lifestyle. If these efforts are carried out sustainably, the risk of dengue fever outbreaks can be minimized, creating a healthier and safer environment for the entire community.

4. RESEARCH RESULTS

Data on the number of Dengue Hemorrhagic Fever (DHF) cases in five regencies in Central Java Province in 2024 yielded a total of 443.3 million cases. As a percentage, Banyumas Regency had the largest contribution, accounting for 22.67% of the total. This indicates that Banyumas is the region with the highest dengue fever incidence rate compared to other regencies in this study. Klaten Regency came in second with 20.86%, indicating that this region also has a significant contribution of cases.

Kendal Regency contributed 19.71% of the total cases, followed by Boyolali Regency with 19.29%. These two regions had nearly equal contributions, indicating a relatively balanced dengue fever incidence rate. Meanwhile, Grobogan Regency had the lowest percentage, at 17.46%, indicating that this region contributed the least cases compared to other regencies.

These differences in percentages between regions indicate an uneven distribution of dengue fever cases in Central Java Province. Areas with higher percentages represent a greater contribution to cases, thus requiring greater attention in disease control and prevention efforts. This analysis also provides a preliminary overview of priority areas requiring further intervention to reduce dengue fever incidence.

The percentage distribution also indicates that Banyumas and Klaten are the dominant contributors to DHF cases, accounting for more than 40% of the total combined. This suggests that these regions may have higher risk factors, such as higher population density and environmental conditions that support mosquito breeding. Meanwhile, Kendal and Boyolali show relatively similar percentages, indicating comparable environmental and demographic conditions. Although Grobogan has the lowest percentage, it still contributes significantly to the total number of cases, which means that prevention efforts should not only focus on high-case areas but must also be evenly distributed across all regions. This distribution pattern reflects the need for a more targeted and region-specific approach in controlling dengue fever, particularly in areas with higher case concentrations.

5. THE PHILOSOPHY OF BATIK MOTIFS

Batik motif originating from Javanese culture and known for its profound philosophical value. This motif features four symmetrically arranged circles, resembling the fruit or sugar palm fruit. Philosophically, Batik symbolizes purity, balance, and self-control in human life. The regular and symmetrical pattern reflects the harmony between humans and their environment and the importance of maintaining order and balance in life.

This philosophy can be linked to efforts to maintain environmental health in community life. A clean, orderly, and balanced environment plays a crucial role in preventing the emergence of various infectious diseases, including Dengue Fever (DHF). In the context of public health, maintaining environmental balance through residential cleanliness, waste management, and eradicating mosquito nests are crucial steps to prevent the development of the Aedes aegypti mosquito, the vector that causes DHF. Thus, the philosophical value of Batik can symbolize the importance of Batik awareness.

Batik is a work of the Indonesian people which consists of a combination of art and technology by the ancestors of the Indonesian people, what makes batik attractive is because batik has a motif pattern that contains meaning and is full of philosophy that is closely related to customs and culture in human life. Indonesian Batik was officially recognized by UNESCO on October 2, 2009 as an Intangible Cultural Heritage (ICH) or Intangible Cultural Heritage at the UNESCO session in Abu Dhabi. Indonesia has a variety of batik motifs that have their own philosophies, one of the famous motifs is the motif.

The Batik Motif is a batik motif shaped like a circle resembling a ruit (a type of coconut or sometimes also considered as sugar palm or sugar palm) arranged neatly geometrically. The kawung motif means perfection, purity and holiness. The batik motif is believed to have been created by one of the Sultans of the Mataram kingdom. This batik motif was first known in the 13th century, precisely on the island of Java. Initially, this motif appeared on wall carvings in several temples in Java such as Prambanan. In relation to the word suwung which means empty, the motif symbolizes the emptiness of worldly desires and passions, thus resulting in perfect self-control. This emptiness makes a person neutral, impartial, not wanting to stand out, going with the flow of life, allowing everything around him to run according to the will of nature. This type of batik motif is always worn by Semar as a depiction of a wise figure. society in maintaining a healthy environment to reduce the risk of disease spread.

Furthermore, the values embodied in the Batik motif can also serve as guidelines for modern life, particularly in addressing increasingly complex environmental and health challenges. The philosophy of purity, balance, and self-control teaches humans to live more wisely in utilizing natural resources and maintaining harmony with the surrounding environment. In today's context, this can be realized through simple yet impactful behaviors, such as disposing of trash properly, maintaining clean water, and properly managing household waste to prevent environmental pollution.

Furthermore, collective public awareness of maintaining a healthy environment also plays a crucial role in suppressing the spread of disease, including those transmitted by vectors like mosquitoes. Efforts such as cleaning water reservoirs, recycling, and regularly maintaining environmental cleanliness reflect the value of balance embodied in the Batik motif. Furthermore, discipline and responsibility born of self-control are also key to developing a healthy and sustainable lifestyle.

Thus, Batik is not only a cultural heritage with high aesthetic value, but also rich in philosophical meaning that can be implemented in everyday life. These values can inspire us to build a society that is more environmentally conscious, physically and spiritually healthy, and able to maintain a balance between human needs and environmental sustainability. Therefore,

preserving batik, particularly the motif, is important not only as a national cultural identity but also as an educational tool to instill life values that benefit current and future generations.

The integration of cultural values such as those found in Batik with public health awareness can serve as an innovative approach in health promotion. By linking traditional philosophy with modern health issues, communities may better understand and internalize the importance of maintaining environmental balance. This approach can strengthen public participation in preventing diseases such as dengue fever.

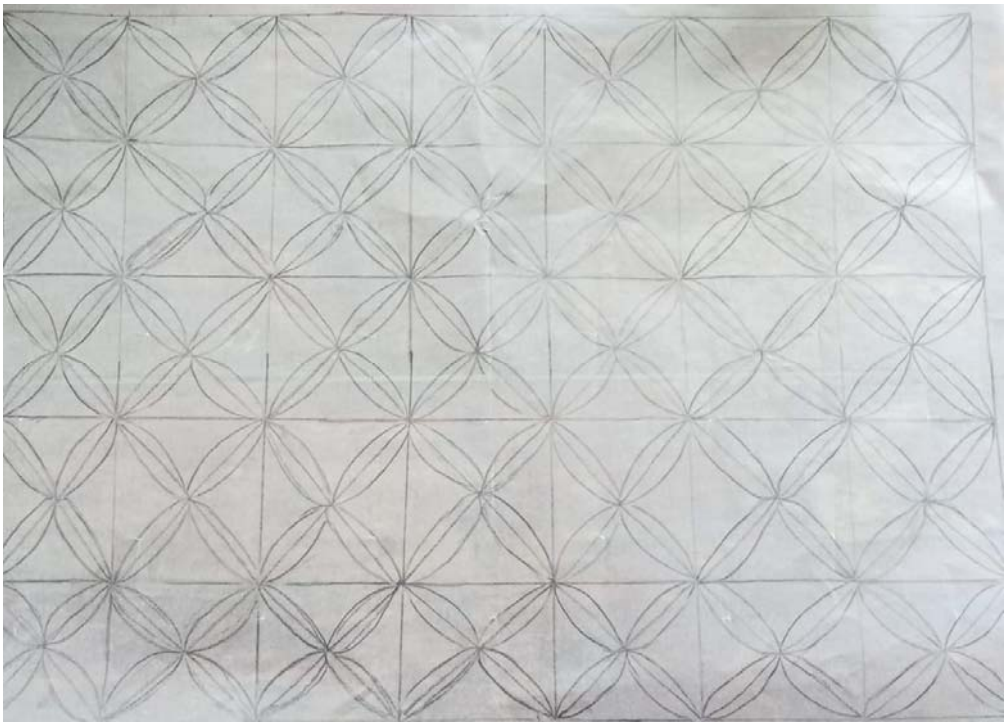


Figure 2. Batik Motif on Tracing Paper

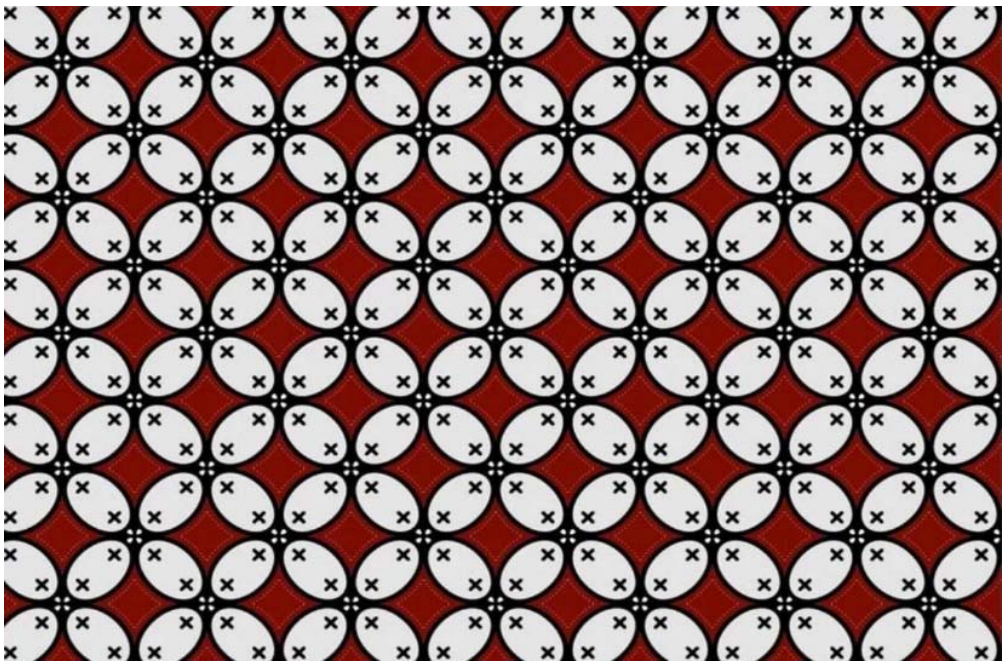


Figure 3. Batik Motif

5. CONCLUSION

Based on the analysis of dengue fever (DHF) case data in five regencies in Central Java Province in 2024—Banyumas, Klaten, Kendal, Boyolali, and Grobogan—it can be concluded that there are differences in the number of DHF cases in each region. Banyumas Regency had the highest number of cases, at 100.50, while Grobogan Regency had the lowest number of cases, at 77.40. These differences in case numbers are influenced by various factors such as population density, environmental conditions, rainfall, environmental sanitation, and public awareness of mosquito breeding areas.

Spatial analysis can provide a picture of the distribution of dengue fever cases between regions, thus helping to identify areas requiring increased attention in disease control efforts. Therefore, dengue fever prevention and control efforts need to be implemented in an integrated manner through increased mosquito breeding eradication activities, public education, and strengthening health surveillance systems in each region.

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