DESCRIPTION OF MALARIA INCIDENCE IN RIAU PROVINCE IN 2024

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Abstract

Malaria remains a global and national public health problem, including in Indonesia. Although there has been a decline in cases nationally, several regions continue to report persistent malaria transmission. Riau Province is one of the areas with environmental characteristics that potentially support malaria transmission. This study employed a descriptive observational design with a retrospective approach. The data used were secondary data on malaria cases in Riau Province in 2024, obtained from the surveillance system of the Provincial Health Office. Descriptive analysis was conducted to illustrate the distribution of malaria cases by district/city. The results showed that the distribution of malaria cases in Riau Province was uneven. Rokan Hilir Regency recorded the highest number of cases compared to other regions, while most districts/cities reported low or zero malaria cases. This pattern indicates that malaria transmission is concentrated in specific areas. The high number of malaria cases in Rokan Hilir is associated with environmental characteristics such as swampy and coastal areas that provide suitable habitats for malaria vectors, as well as high population mobility. These conditions pose challenges to malaria elimination efforts at the local level. In conclusion, malaria in Riau Province in 2024 remains localized, with case concentrations in particular areas. Strengthening area-based and context-specific malaria control strategies is essential to support the acceleration of malaria elimination.

Keywords: Malaria; Riau Province; Coastal Areas; Environmental Factors; Malaria Elimination

INTRODUCTION

Malaria remains one of the major global public health problems, contributing significantly to morbidity and mortality, particularly in tropical and subtropical regions. Despite decades of control and elimination efforts, the disease continues to pose a serious threat to global health (World Health Organization [WHO], 2025). According to the World Malaria Report 2025, there were an estimated more than 260 million malaria cases and nearly 600,000 deaths worldwide in 2023. The report also indicates that, in recent years, the global decline in malaria cases has slowed, and in some regions, a resurgence has been observed, reflecting substantial challenges in achieving global malaria elimination targets (WHO, 2025).

Various factors contribute to the persistence of malaria transmission, including climate change, environmental dynamics, vector resistance to insecticides, and limitations in surveillance systems and public health response. Changes in temperature and rainfall patterns are known to influence the life cycle of malaria vectors and increase transmission potential in both endemic areas and regions previously considered low-risk (Lemos-Silva et al., 2025; Ryan et al., 2020).

At the national level, Indonesia has committed to achieving malaria elimination gradually through the implementation of various integrated control policies and strategies. However, the distribution of malaria in Indonesia remains uneven across regions. Malaria cases tend to be concentrated in provinces with specific geographical and environmental characteristics, particularly areas with forest, swamp, and coastal ecosystems, as well as regions with high population mobility. This condition indicates that, although malaria cases have declined nationally, the disease remains a persistent public health problem in certain areas and requires context-specific and area-based control approaches (Ministry of Health of the Republic of Indonesia, 2024).

Riau Province is one of the regions in Indonesia with environmental characteristics that potentially support malaria transmission. The presence of swampy areas, river basins, coastal zones, and economic activities based on natural resources such as plantations and forestry contributes to the formation of suitable habitats for malaria vectors, particularly Anopheles spp. In addition, population mobility driven by occupational activities and interregional interactions further increases the risk of malaria transmission, especially in areas where control and surveillance systems are not yet optimal (Tusting et al., 2019).

Malaria case data in Riau Province in 2024 indicate that malaria is still present in several districts/cities, although with varying numbers of cases across regions. The presence of these cases suggests that malaria transmission in Riau Province has not been fully eliminated and still requires serious attention in control efforts. The distribution pattern of cases, which tends to be concentrated in areas with specific environmental conditions, underscores the importance of understanding the local malaria situation as a basis for planning more effective and sustainable interventions (Riau Provincial Health Office, 2024).

Although routine malaria surveillance data are available at the regional level, scientific publications specifically describing the current malaria situation in Riau Province remain relatively limited. In fact, descriptive studies based on local data play an important role in supporting policy-making, evaluating control programs, and planning more context-specific malaria elimination strategies. Information on malaria case distribution at the provincial level is also essential for strengthening early warning systems and improving public health response programs (Snow et al., 2017).

RESEARCH METHODS

This study employed a descriptive observational research design with a retrospective approach, aiming to describe the malaria situation in Riau Province in 2024. This design was selected to obtain an overview of the distribution of malaria cases based on existing data, without implementing any intervention or treatment on the study subjects.

The data used in this study were secondary data derived from the malaria surveillance reports of Riau Province for the year 2024. These data included confirmed malaria cases reported by healthcare facilities and compiled by the Riau Provincial Health Office. The variables analyzed comprised the number of malaria cases, the distribution of cases by district/city, and the basic characteristics of cases according to data availability.

To provide a broader context, the study incorporated supporting data from global malaria reports, particularly the World Malaria Report 2025, as well as national malaria data available through the dashboard of the Ministry of Health of the Republic of Indonesia. These global and national data were used as comparators to better understand the position of Riau Province within the wider malaria context.

The study population consisted of all malaria cases recorded in Riau Province during the period from January to December 2024. The unit of analysis was confirmed malaria cases,

defined as individuals with positive malaria test results based on diagnostic methods applied in healthcare facilities.

Data were collected through the review and compilation of official malaria case reports documented in the surveillance system of the Riau Provincial Health Office. The data collection process ensured the completeness and consistency of available data for the study period. Incomplete data or data not aligned with the research objectives were excluded from the analysis.

Data analysis was conducted descriptively, with findings presented in the form of tables and narrative descriptions. The analysis focused on the distribution of malaria cases by administrative region and time of occurrence to provide an overview of the malaria situation in Riau Province in 2024. The results were presented as numerical summaries and descriptions of case patterns without the application of inferential statistical tests.

RESEARCH RESULTS

The results of the analysis of malaria surveillance data in Riau Province in 2024 indicate that malaria cases were still reported in several districts/cities, with an uneven distribution of cases. Overall, the data suggest a concentration of cases in specific areas, while most other districts/cities reported very low or even zero cases. This condition reflects that malaria transmission in Riau Province is spatially clustered rather than uniformly distributed across the region.

Based on the analyzed data, Rokan Hilir Regency recorded the highest number of malaria cases in 2024, with a total of 2,449 cases. This figure is substantially higher than that of other districts/cities, indicating that Rokan Hilir remains the primary hotspot of malaria transmission in Riau Province. The high number of cases in this area suggests the presence of environmental and social factors that support sustained malaria transmission, such as swampy and coastal geographical conditions, as well as population activities that may increase exposure to malaria vectors.

Indragiri Hilir Regency ranked second, reporting 199 malaria cases in 2024. Although this number is considerably lower than that of Rokan Hilir, it still indicates that malaria remains a public health concern requiring special attention in the area. In addition, Pekanbaru City, as an urban area, reported 42 malaria cases, suggesting that malaria is not confined to rural or remote areas but can also occur in urban settings with high population mobility.

Other districts and cities reported relatively low numbers of malaria cases. Bengkalis Regency reported 7 cases, Kampar Regency 6 cases, Pelalawan Regency 4 cases, Dumai City 8 cases, and Kuantan Singingi Regency 1 case. Meanwhile, several areas, including Indragiri Hulu Regency, Siak Regency, Rokan Hulu Regency, and Kepulauan Meranti Regency, reported no malaria cases in 2024. This variation indicates differences in the level of malaria transmission risk across districts/cities in Riau Province.

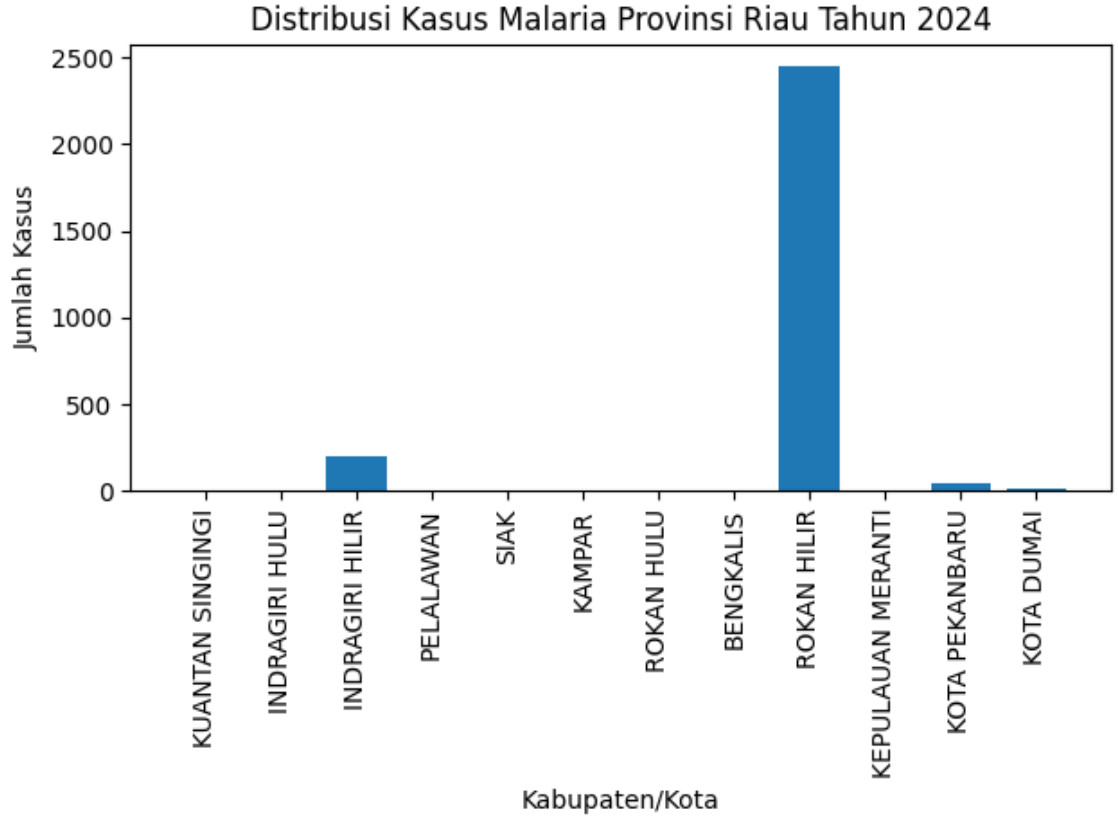

Figure 1. Distribution of Malaria Cases in Riau Province, 2024

The distribution of malaria cases by district/city is presented in Figure 1. The graph shows a striking disparity between Rokan Hilir Regency and other regions. This distribution pattern confirms that malaria transmission in Riau Province is localized, with a very high concentration of cases in a single primary area. This condition indicates that malaria control strategies in Riau Province need to be focused on areas with the highest disease burden, while still maintaining preventive efforts in low-case areas.

These findings suggest that although several regions in Riau Province are approaching malaria-free status, there are still areas with active and sustained transmission. The unequal distribution of cases across regions indicates that malaria elimination efforts in Riau Province have not yet been evenly achieved. Areas with high case numbers have the potential to act as sources of transmission to surrounding regions if control measures are not implemented intensively and continuously.

Overall, the results of this study provide an overview of the malaria situation in Riau Province in 2024, which still requires serious attention, particularly in areas with a high disease burden. This information is essential as a basis for planning more targeted, area-based malaria control programs that are aligned with local characteristics, in order to support the acceleration of malaria elimination in Riau Province.

DISCUSSION

The findings of this study indicate that the distribution of malaria cases in Riau Province in 2024 is uneven, with a very high concentration of cases in Rokan Hilir Regency. This finding confirms that malaria transmission in Riau Province remains localized and is influenced by specific environmental and social characteristics. The dominance of malaria cases in Rokan

Hilir suggests that this area continues to serve as the primary hotspot of malaria transmission, requiring special attention in malaria control and elimination efforts.

Environmental Characteristics and Malaria Transmission Risk in Rokan Hilir

Rokan Hilir Regency possesses environmental characteristics that are ecologically highly conducive to the development of malaria vectors. The area is dominated by swampy ecosystems, peatlands, coastal zones, and extensive river and canal networks. These conditions create shallow and relatively stable water habitats suitable for the breeding of Anopheles spp., the primary malaria vector (Tusting et al., 2019). Furthermore, tidal fluctuations and high rainfall in coastal areas influence the seasonal availability of vector breeding sites (Hinne et al., 2021; Talla et al., 2025).

Previous studies have shown that areas with swamp and coastal ecosystems have a higher risk of malaria transmission compared to dry or urban environments, particularly in the absence of proper environmental management (Lindsay & Thomas, 2021; Guamene et al., 2024; Zhou et al., 2024). The high number of malaria cases observed in Rokan Hilir in 2024 is consistent with this evidence and indicates that environmental factors remain a key determinant of sustained malaria transmission in this region.

Population Mobility and Malaria Transmission Dynamics

In addition to environmental factors, population mobility plays a crucial role in sustaining malaria transmission in Rokan Hilir. This region is known for its natural resource-based economic activities, such as plantations, fisheries, and forestry, which involve large-scale labor movement both within and outside the area. High population mobility, particularly among seasonal workers and migrants, increases the risk of malaria introduction and spread, especially among populations with limited access to healthcare services (Prothero, 2020).

Population mobility contributes to challenges in case tracking and malaria control efforts, as human movement between regions increases imported cases and complicates the interruption of local transmission chains, particularly in areas approaching elimination (Muller et al., 2025). Individuals moving for work or residence may carry malaria parasites from endemic areas to lower-risk regions, potentially triggering new transmission (Muller et al., 2025; Arisco et al., 2024; Safarpour et al., 2025). This may explain why areas such as Rokan Hilir continue to report high malaria case numbers despite ongoing control efforts.

Malaria Elimination Efforts and Implementation Challenges

Indonesia has established a national malaria elimination target, implementing a phased elimination approach based on regional endemicity levels. Various strategies have been adopted, including early case detection, prompt and appropriate treatment, vector control, and strengthening malaria surveillance systems (Ministry of Health of the Republic of Indonesia, 2024). However, the findings of this study suggest that the implementation of malaria elimination at the local level still faces significant challenges, particularly in regions with complex environmental and social characteristics such as Rokan Hilir.

The high number of malaria cases in Rokan Hilir indicates that generalized interventions may not yet be fully effective in reducing transmission in this area. Malaria elimination strategies need to be adapted to the local context, including strengthening environmentally based vector control, expanding active surveillance coverage, and tailoring healthcare service strategies for highly mobile populations. The World Health Organization also emphasizes that successful malaria elimination depends on the capacity of health systems to identify and address transmission foci in a targeted and sustained manner (WHO, 2025).

Implications for Malaria Control in Riau Province

Overall, the findings of this study highlight that malaria elimination in Riau Province requires a more targeted and area-based approach. Area-based elimination strategies have been discussed by Gosling and Lek, emphasizing that malaria interventions should be adapted to local contexts, with district-level targeting to reach high-risk populations and interrupt geographically heterogeneous residual transmission (Gosling et al., 2020; Lek et al., 2024).

Malaria control efforts in Rokan Hilir need to be strengthened through strategies that consider environmental factors, population mobility, and local socio-economic characteristics. In addition, areas with low case numbers still require preventive measures and early warning systems to prevent malaria reintroduction. Regions that have successfully reduced or eliminated malaria remain at risk of reintroduction from endemic areas, particularly through imported cases, thus requiring strong surveillance systems and preventive actions to avoid renewed transmission (Lusiyana et al., 2025; Lu et al., 2023).

The information on malaria case distribution in 2024 is expected to serve as a basis for planning more effective and sustainable malaria control programs in Riau Province, as well as supporting the achievement of national malaria elimination targets.

CONCLUSION

This study demonstrates that malaria in Riau Province in 2024 remains a public health concern, with an uneven distribution of cases. Malaria cases are predominantly concentrated in Rokan Hilir Regency, while most other districts/cities report low or zero cases. This pattern indicates that malaria transmission in Riau Province is localized and strongly influenced by environmental characteristics and social dynamics in specific areas.

The high number of malaria cases in Rokan Hilir is associated with environmental conditions such as swampy and coastal areas that support the breeding of Anopheles spp., as well as high population mobility driven by natural resource-based economic activities. Although various malaria elimination efforts have been implemented, these findings suggest that elimination at the local level still faces significant challenges. Therefore, more targeted, area-based, and context-specific malaria control approaches are required to support the acceleration of malaria elimination in Riau Province.

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