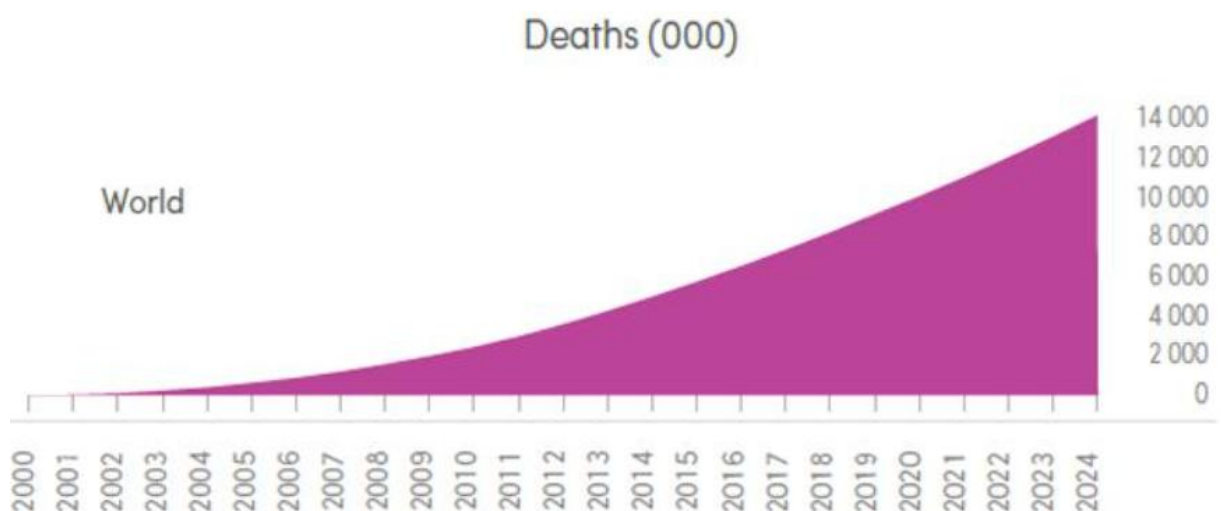


Chapter 1

Introduction

1.1 Background

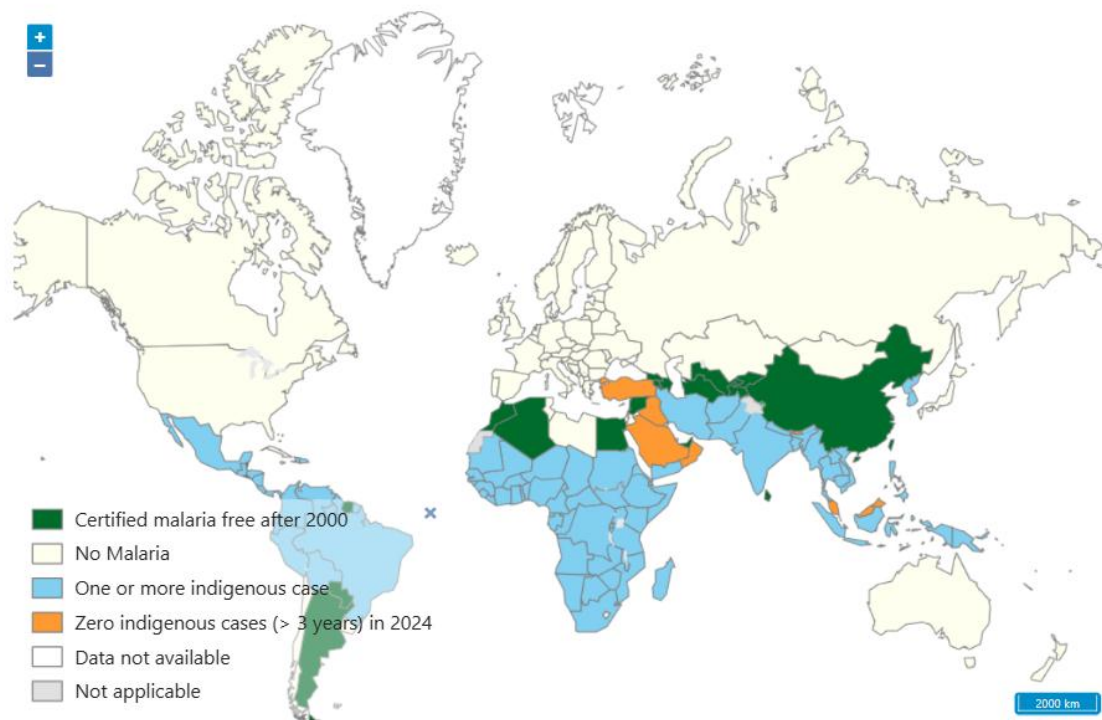
Malaria remains a preeminent global health threat, particularly within tropical and subtropical ecosystems where it contributes significantly to international morbidity and mortality rates. Of the five *Plasmodium* species known to infect humans, *Plasmodium falciparum* is identified as the most virulent, accounting for the vast majority of malarial fatalities. While antimalarial pharmacotherapy serves as the cornerstone of current eradication efforts, its efficacy is increasingly compromised by the rapid proliferation of drug-resistant *P. falciparum* strains. As resistance to existing treatments intensifies, the development of next-generation drug candidates becomes a primary public health priority (Sato, 2021).



Source: (Malaria Facts & Statistics 2025, n.d.)

Figure 1. Death Cases of Malaria in Worldwide

Global data indicates a concerning trajectory; while death cases were estimated at 500,000 in the early 2000s, longitudinal trends suggest a rise to nearly 9 million by 2020, with projections potentially reaching 14 million by 2024 if current interventions falter (**Fig. 1**).

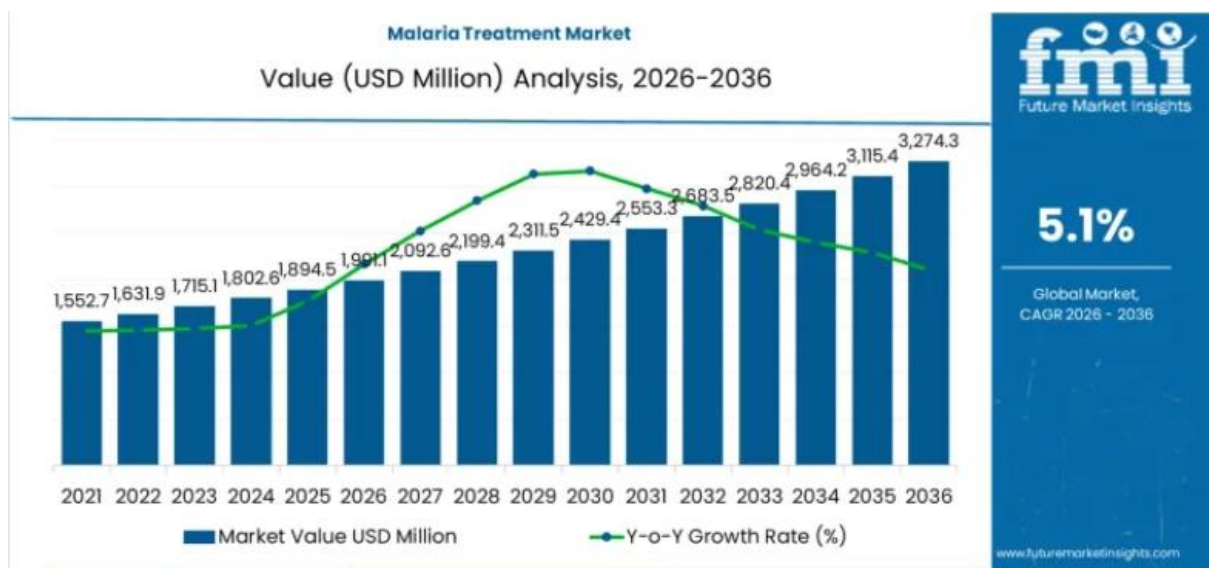


Source: (World Malaria Report 2025: Addressing the Threat of Antimalarial Drug Resistance, n.d.)

Figure 2. Malaria Cases in Worldwide

While **Fig. 2** shows which nations have high rates of malaria transmission. Countries in light blue identify places where one or more indigenous malaria cases are still being reported, which means that the illness is still spreading locally. These locations are mostly in Sub-Saharan Africa, portions of South and Southeast Asia, and some sections of Latin America. This shows where malaria is still a major public health problem. **Fig. 2** also shows countries in dark green are malaria-free since the year 2000. It signifies that these countries managed to stop the spread of malaria for at least three years in a row and have kept their surveillance systems working well. As of 2024, the nations highlighted in orange on the map (**Fig. 2**) represent regions that have successfully maintained zero indigenous malaria cases for over three years. Although these areas are nearing total eradication, they have yet to receive

official certification from health authorities. (*World Malaria Report 2025: Addressing the Threat of Antimalarial Drug Resistance*, n.d.).



Source: (*Malaria Facts & Statistics 2025*, n.d.).

Figure 3. Market Trends of Antimalarial Drugs

The economic landscape for antimalarial interventions demonstrates significant expansion, with the global market value projected to rise from USD 1,552.7 million in 2021 to over USD 3,274.3 million by 2036 (**Fig. 3**). This trajectory represents a consistent upward trend, characterized by an anticipated Compound Annual Growth Rate (CAGR) of approximately 5.1% between 2026 and 2036. The favorable market trend suggests that the malaria treatment sector continues to be economically vital and offers ongoing prospects for pharmaceutical integration and market expansion (*Malaria Facts & Statistics 2025*, n.d.). Data analysis reveals that while year-on-year growth is expected to accelerate in the late 2020s, it will likely reach a period of stabilization by the early 2030s. This sustained growth is fueled by several critical factors:

- The intensification of global malaria control initiatives (Jiram *et al.*, 2025).
- Improved healthcare accessibility within endemic regions (Pradhan *et al.*, 2019).

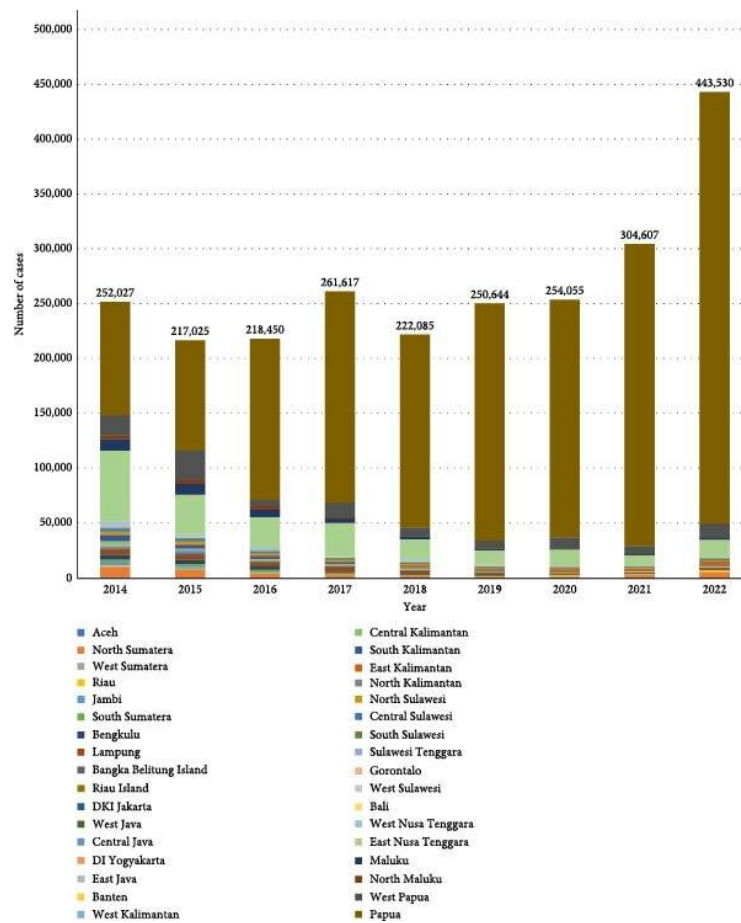
- A continued, heavy reliance on Artemisinin-based Combination Therapies (ACTs) (*Schallig et al.*, 2017).

These favorable market trends underscore the economic vitality of the malaria treatment sector. For the purposes of this study, such growth highlights a significant opportunity for pharmaceutical integration and underscores the necessity of evaluating market acceptance determinants to ensure new therapies can successfully penetrate this expanding global market.

1.2 Malaria Distribution in Indonesia

In Indonesia, the malaria landscape is defined by extreme geographic disparity. High-endemic zones are concentrated in the eastern provinces, such as Papua and West Papua (**Fig. 4 and 5**), which bear the brunt of the national disease burden. In contrast, western regions like Java have achieved lower transmission rates through aggressive urbanization and robust healthcare infrastructure. Despite its status as a low-transmission zone, DKI Jakarta occupies a strategic position in the nation's malaria elimination strategy for three reasons:

- a. **Epidemiological Risk:** High mobility from endemic provinces and international travel creates a persistent influx of "imported malaria," requiring urban healthcare facilities to maintain high standards of diagnosis and prophylaxis (Andrean & Faizi Assafah, 2025).
- b. **Economic and Regulatory Centrality:** Jakarta serves as the nation's pharmaceutical hub, housing regulatory bodies like BPOM and the central administration for the BPJS Kesehatan insurance system. Decisions made here regarding pricing, procurement, and market authorization dictate the availability of medicine in high-burden eastern regions (Kusriastuti & Surya, 2012).
- c. **Consumer Behavior:** Urban consumers in Jakarta often prioritize convenience, shorter treatment courses, and minimal side effects, presenting a unique market for private healthcare preference over standard government-issued ACTs (Parambang *et al.*, 2021).

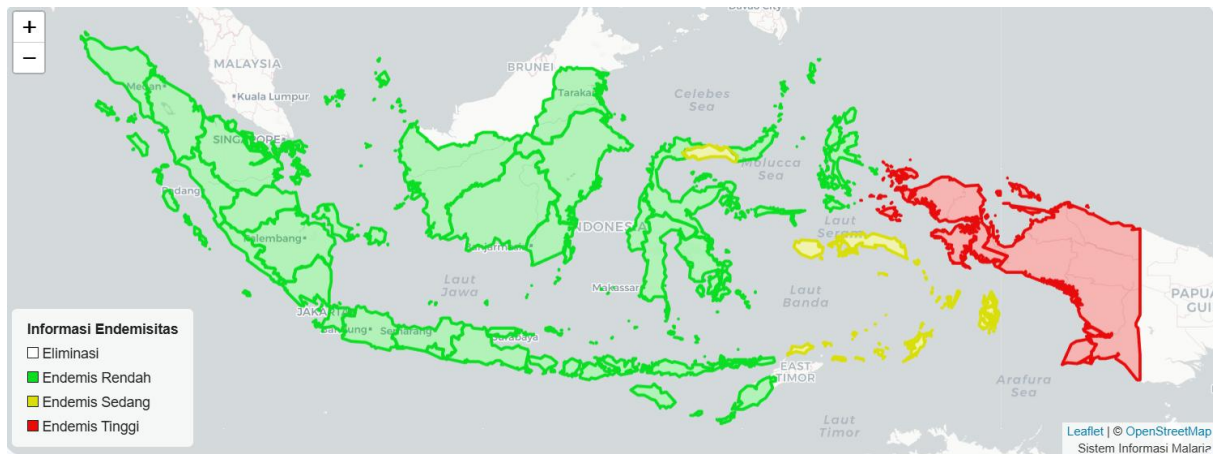


Source: (Aisyah *et al.*, 2024)

Figure 4. Number of Cases of Malaria in Indonesia

The longitudinal trend and regional distribution of malaria cases in Indonesia from 2014 to 2022 is shown in **Fig. 4**, revealing a critical recent upsurge in the national disease burden. While reported cases remained relatively stable between 2014 and 2020, fluctuating around 250,000 annually, the data shows a sharp escalation following 2020, with instances rising to 304,607 in 2021 and surging to a peak of 443,530 in 2022. The stacked bar format highlights a profound geographic disparity, where the eastern provinces, specifically Papua and West Papua (**Fig. 4**), consistently account for the vast majority of cases. In contrast, western regions such as Java and Sumatra report significantly lower cases due to more advanced urbanization, superior healthcare infrastructure, and effective control measures. For this study, such trends emphasize that while DKI Jakarta has low local transmission, its

role as a pharmaceutical and regulatory hub is essential in managing the supply chains and market integration required to combat this intensifying national health crisis.



Source: (*Kasus Malaria Di Indonesia*, n.d.).

Figure 5. Number of Cases of Malaria in Indonesia

Fig. 5 delineates the various levels of malaria endemicity across the Indonesian archipelago, categorized into four distinct zones: low endemic (green), moderate endemic (yellow), high endemic (red), and elimination (white). Most of western and central Indonesia, including Sumatra, Java, Bali, and significant portions of Kalimantan and Sulawesi, fall into the low endemic areas (green). This status is attributed to successful control programs, expanded healthcare access, urbanization, and enhanced monitoring systems. The moderate endemic areas (yellow) are observed in parts of eastern Indonesia, such as East Nusa Tenggara and segments of the Maluku islands. Transmission in these areas is sustained by geographical barriers, limited healthcare infrastructure, and environments conducive to malaria vectors. Papua and West Papua exhibit the highest levels of endemicity (high endemic areas in red). Factors contributing to this high intensity include tropical forest habitats, socio-economic challenges, and restricted access to medical facilities.

Although metropolitan hubs like **DKI Jakarta** are classified as low endemic or elimination zones, they remain vulnerable to "imported malaria" caused by high population mobility, domestic

travel from high-burden regions, and international movement (Aisyah *et al.*, 2024). Consequently, urban healthcare facilities still require a consistent supply of antimalarial medications for prevention and treatment. This dynamic directly influences the Market Acceptance Potential (MAP) and supply chain strategies for pharmaceutical companies operating within these critical economic centers.

Current literature on malaria in Indonesia focuses heavily on clinical efficacy and the molecular mechanisms of drug resistance (Rahmasari *et al.*, 2022). However, there is a profound lack of empirical data regarding the Market Acceptance Potential (MAP) of innovative therapies. While the global market for antimalarial treatments is projected to grow at a CAGR of 5.1%, reaching over USD 3.2 billion by 2036 (see **Fig. 2**), the socio-economic and behavioral determinants that drive drug uptake in Indonesia remain under-researched. Specifically, it is unclear how the interplay between affordability, accessibility, and public trust influences the adoption of next-generation drugs within the framework of Indonesia's national health insurance (BPJS).

The justification for conducting this study in DKI Jakarta is strategically sound because the region acts as the essential "gatekeeper" for Indonesia's national malaria elimination efforts. Although Jakarta is a low-transmission zone, it is the country's primary pharmaceutical and regulatory hub, housing the headquarters of BPOM for drug approvals and the central administration for the BPJS Kesehatan insurance system. Consequently, the decisions made in Jakarta regarding drug procurement, pricing, and market authorization directly dictate the availability and accessibility of life-saving medications in high-burden eastern provinces like Papua and West Papua.

Furthermore, DKI Jakarta serves as a critical urban laboratory for assessing Market Acceptance Potential (MAP) due to its unique epidemiological and behavioral landscape. The city faces a persistent risk of "imported malaria" driven by high population mobility from endemic regions, creating a steady demand for prophylaxis and specialized urban healthcare. Thus, by focusing on DKI Jakarta, the research addresses the vital link between central economic drivers and the practical reality of pharmaceutical adoption on a national scale.

1.3 Research Objectives

Currently, Artemisinin-based Combination Therapies (ACTs) represent the global gold standard for malaria treatment. However, over-reliance on a narrow range of pharmacological classes introduces significant strategic and clinical risks, particularly as drug resistance continues to proliferate across Southeast Asia (Parasitologi & Kedokteran, 2021). From both a healthcare and commercial perspective, this lack of therapeutic diversity threatens supply chain stability, complicates long-term investment planning, and jeopardizes the future efficacy of antimalarial interventions (Irdayanti *et al.*, 2025). While legacy medications such as pyrimethamine and quinine remain vital in resource-constrained environments, their strategic market positioning, public acceptance, and formal integration into Indonesia's modern healthcare framework lack sufficient empirical data (Sikora *et al.*, 2019). Consequently, there is an urgent need to evaluate how these and other alternative therapies can be strategically positioned to ensure long-term treatment resilience.

The primary objective of this research is to bridge the gap between scientific innovation and practical marketing strategies to encourage pharmaceutical investment and support malaria elimination efforts. Specifically, the study aims to evaluate the Market Acceptance Potential (MAP) of innovative antimalarial therapies, such as pyrimethamine, quinine, tafenoquine, atovaquone, and piperazine, within the unique socio-economic and regulatory landscape of DKI Jakarta. Previous research compared rapid and delayed adoption of Triple Artemisinin-based Combination Therapies (TACTs) with regular ACT therapies using two individual-based models of *Plasmodium falciparum* epidemiology and evolution. In locations with lower malaria prevalence, earlier TACT implementation could drastically reduce artemisinin-resistant alleles and treatment failure rates.

The findings underscore the necessity of maintaining antimalarial therapy efficacy and preventing drug-resistant variants. However, most antimalarial therapy research focus on clinical efficacy, resistance management, and pharmacological efficacy rather than market feasibility and public

acceptance. Clinical and epidemiological perspectives are important, but social and behavioral issues like pricing, accessibility, perceived need, and public trust all affect antimalarial treatment options. Even scientifically effective antimalarial medications may struggle to be used and treated without public acceptance and healthcare accessibility. To understand what influences public acceptance and use of antimalarial medications, the Market Acceptance Potential (MAP) must be examined (Nguyen *et al.*, 2023).

1.4 Research Gap

Current literature on malaria in Indonesia focuses heavily on clinical efficacy and the molecular mechanisms of drug resistance, providing a deep understanding of how parasites respond to various chemical compounds (Fitri *et al.*, 2023). However, a significant "translational gap" exists between these laboratory findings and real-world application. The primary objective of this research is to bridge the divide between scientific innovation and practical marketing strategies, thereby encouraging pharmaceutical investment and supporting national malaria elimination efforts.

Previous research (Tobing *et al.*, 2024) indicates a profound lack of empirical data regarding the Market Acceptance Potential (MAP) of innovative therapies. While the clinical necessity for new treatments is well-documented due to rising ACT resistance, the socio-economic and behavioral determinants that drive drug uptake in the Indonesian context remain under-researched. Specifically, there is an absence of evidence exploring how the complex interplay between affordability, accessibility, and public trust influences the adoption of antimalarial drugs.

Furthermore, within the framework of Indonesia's national health insurance (BPJS), it remains unclear how centralized procurement and insurance coverage might moderate or hinder the commercial viability of novel treatments (Haryono *et al.*, n.d.). Without this market-specific data, pharmaceutical stakeholders face "strategic blindness," where highly effective clinical candidates may fail to reach the populations that need them most due to unaddressed market barriers. This study

addresses this lack of empirical data by shifting the focus from the clinical viewpoint to the consumer's and regulator's behavior within the DKI Jakarta area.

1.5 Research Problem

This study seeks to address the following unresolved questions within the DKI Jakarta context:

1. To what extent do affordability and accessibility dictate the Market Acceptance Potential (MAP) for innovative antimalarial therapies?
2. How do behavioral factors, specifically perceived need and public trust in health authorities, influence the MAP?
3. Does BPJS coverage serve as a significant moderator in the relationship between economic/structural factors and market acceptance?

1.6 Significance of Study

This research bridges the gap between clinical innovation and market reality. By analyzing the MAP of antimalarial drugs, the findings will:

1. For pharmaceutical firms: provide a blueprint for aligning drug development with the socio-economic expectations of urban and migratory populations.
2. For policymakers: identify barriers to treatment uptake, such as cost or lack of trust, allowing for more effective public health campaigns and procurement strategies.
3. For academia: expand the theoretical understanding of pharmaceutical adoption beyond clinical metrics to include complex social and behavioral variables.