

Review

The Participation of Private Healthcare in Malaria Prevention and Elimination: A Systematic Review

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ABSTRACT

Background: Malaria continues to pose a major public health threat globally, affecting millions and causing numerous fatalities annually. This research consolidates findings on private sector healthcare involvement in combating and preventing malaria across different nations. **Methodology:** A systematic review was conducted following PRISMA guidelines, extracting relevant studies from PubMed, ScienceDirect, Cochrane, and Semantic Scholar databases. Selection criteria included observational or interventional research examining private healthcare's role in malaria prevention, published in English between 2015-2024. Analysis was supported by NotebookLM. **Results:** The review identified 24 qualifying studies. Private healthcare providers, including clinics and pharmacies, contribute to malaria management through diagnosis, rapid testing, and treatment advice globally. Though these entities possess some malaria-related knowledge, it remains incomplete. Case reporting and surveillance participation exists among private providers but remains restricted to few facilities. **Conclusions:** Enhanced frameworks and regulations are essential to strengthen public-private partnerships and expand private sector engagement in malaria diagnosis, treatment, and advisory services. Implementation strategies should be tailored to each country's specific context and malaria epidemiology.

Keywords: Private sector; malaria; elimination; systematic review; private healthcare

1. INTRODUCTION

Malaria, an infectious disease transmitted by female Anopheles mosquitoes carrying the Plasmodium parasite, continues to represent one of humanity's most persistent health challenges despite being both preventable and curable. Recent epidemiological surveillance indicates a troubling upward trajectory, with global infections reaching 267 million in 2023—an increase of approximately 5 million cases from the previous year.⁽¹⁾ This deadly disease claimed an estimated 608,000 lives worldwide during this period, with mortality particularly concentrated in vulnerable populations including children under five, who account for nearly 80% of all malaria-related deaths in high-burden

regions. The African continent bears a vastly disproportionate burden, representing 94% of global cases and 95% of recorded deaths. Four countries—Nigeria, Democratic Republic of Congo, Uganda, and Mozambique—collectively account for over half of the worldwide malaria burden. Meanwhile, concerning trends have emerged in the Eastern Mediterranean Region, where case incidence has surged by nearly 60% since 2021, reaching 18.3 cases per 1,000 at-risk individuals. This resurgence occurs despite significant progress in other regions, highlighting the uneven nature of malaria control efforts and the persistent challenges of drug resistance, inadequate healthcare infrastructure, climate change impacts, and population displacement in endemic areas.⁽¹⁾

The WHO Global Technical Strategy (2016-2030), aligned with Sustainable Development Goal (Target 3.3), envisions global malaria eradication by 2030 through comprehensive approaches addressing both disease determinants and intervention implementation.⁽¹⁾ Various prevention strategies have been implemented across nations, with emphasis shifting between prevention, control, and elimination phases.

In this context, non-governmental healthcare services—encompassing both for-profit and non-profit entities—play a critical role. These providers include formally trained professionals (physicians, pharmacists, nurses, midwives) and those with informal training, operating either independently or within organizations, providing clinical services or health-related products including pharmaceuticals.⁽²⁾

The non-governmental health sector constitutes an essential component of contemporary healthcare infrastructure, helping distribute patient loads from primary facilities to specialized services. This is particularly relevant for malaria patients residing in geographically isolated areas—including rural and mountainous regions—where healthcare access is limited by distance and transportation challenges. The extensive network of community-based non-governmental providers facilitates initial malaria diagnosis, prevention measures, and preliminary treatment before referral to advanced care facilities when necessary.⁽³⁾

Despite the significance of this topic, no comprehensive review has systematically analyzed or synthesized evidence regarding non-governmental healthcare sector interventions for malaria control across different geographical contexts. This research aims to

examine the contributions of non-governmental healthcare to malaria management globally, specifically investigating their role in diagnosis, treatment, health education, and surveillance activities. The findings will inform country-specific strategic planning for malaria elimination initiatives tailored to local contexts

2. METHODS

This research employed a comprehensive systematic review approach to examine evidence on private healthcare's role in malaria prevention and elimination worldwide. The methodology adhered to the PRISMA 2015 statement guidelines to ensure procedural rigor and transparency.⁽⁴⁾

2.1 Literature Source and Search Strategy

The study exclusively analyzed peer-reviewed articles from international journals. We conducted searches across multiple authoritative databases including PubMed, ScienceDirect, Cochrane, and Semantic Scholar. The search utilized standardized PICO terms (Table 1) combined through Boolean operators (AND, OR, NOT) to create comprehensive search strings tailored to each database (Table 2).

Table 1. Search terms

Concept	Keywords
Participants	Private healthcare, private clinics, private pharmacies
Roles	Diagnosis, RDT, treatment, communication, surveillance, report
Disease/Outcome	Malaria (control)

Furthermore, we expanded our search methodology by manually reviewing the bibliographies of all identified publications to capture additional relevant sources (Figure 1). This comprehensive citation tracing process complemented our database searches and helped identify literature that might have been missed through electronic queries alone. Our literature acquisition concluded on November 1, 2024, encompassing a decade of research published from 2014 through 2024 to ensure the analysis reflected contemporary evidence while providing sufficient historical context.

2.2 Eligibility Criteria

The primary inclusion criterion focused on studies examining private healthcare participation in

malaria prevention and elimination, specifically private clinics and pharmacies. Selection followed specific criteria outlined in Table 3.

Table 2. Query methodology and result quantities

Source	Boolean expressions	Filters	Findings
PubMed	malaria" AND ("private healthcare" OR "private clinics" OR "private pharmacies") AND ("diagnosis" OR "RDT" OR "treatment" OR "communication" OR "surveillance" OR "report")	2014-2024; English; Full-text	53
ScienceDirect	malaria" AND ("private healthcare" OR "private clinics" OR "private pharmacies") AND ("diagnosis" OR "RDT" OR "treatment" OR "communication" OR "surveillance" OR "report")	2014-2024; Research article	283
Cochrane	malaria" AND ("private healthcare" OR "private clinics" OR "private pharmacies") AND ("diagnosis" OR "RDT" OR "treatment" OR "communication" OR "surveillance" OR "report")	2014-2024	25
Semantic Scholar	malaria" AND ("private healthcare" OR "private clinics" OR "private pharmacies") AND ("diagnosis" OR "RDT" OR "treatment" OR "communication" OR "surveillance" OR "report")	2014-2024	253

Table 3. The study selection criterion for the final review

Inclusion criteria	Exclusion criteria
Publication years: from 2014 to 2024	Published before 2014
Population: private healthcare	Not matched with the study subjects
Study Design: Observational, cross-sectional, case-control, cohort studies	Not matching the study design (case series, follow-up studies, and interventional studies)
Article type: Original research	Not the original research (commentary, editorial, letters to editor, review)
The study focuses on the participation of private healthcare in malaria prevention	Not matched with the study outcome
Studies published in English only	The article was published in other languages
Full text available	Unavailability of full-paper

2.3 Study Selection Process

Two independent evaluators conducted a standardized assessment of eligibility using Microsoft Excel to manage database outputs, duplicate checks, and screening processes. Initial screening examined only titles and abstracts, followed by full-text review of potentially qualifying articles. Studies failing to meet selection criteria were excluded. Discrepancies between evaluators were resolved through discussion, with final determinations made by the Principal Investigator.

2.4 Data Extraction and Synthesis

Two authors independently extracted data including author, publication year, country, population, study design, sample size, and key findings. Extracted data were compared for consistency, with discrepancies resolved through discussion. We utilized NotebookLM, an AI tool (<https://notebooklm.google.com/>), to assist with content summarization, followed by researcher verification to ensure accuracy and relevance.

2.5 Quality Appraisal and Data Analysis

Two reviewers independently assessed methodological quality based on PRISMA guidelines. A narrative synthesis approach was employed due to heterogeneity in samples, methods, and outcomes across the 24 included studies, making meta-analysis impractical. The review focused on descriptive outcomes without evaluating associations or comparisons.

This methodical approach balanced search sensitivity and specificity while ensuring comprehensive examination of private healthcare's contributions to global malaria prevention and elimination efforts.

3. RESULTS

3.1 Study selection

Using the search terms across four databases, we initially retrieved 614 documents. After reviewing the titles and abstracts, our research team eliminated 324 documents that were not relevant to the topic and removed 76 duplicate documents. In the next step, we searched for the full text of the remaining documents; however, we could not access the full text for 176 documents and 14 documents were in languages other than English. Ultimately, we selected 24 documents for review, and comprehensive details are provided in Table 4. The publication dates of the selected articles range from 2014 to 2024, covering research conducted in countries/areas: Bangladesh, Cameroon, Côte d'Ivoire, Uganda, Ethiopia, India, China, Congo, Kenya, Lao PDR, Vietnam, Benin, sub-Saharan African countries, Asia Pacific, Nigeria, Myanmar. Sixteen articles employed cross-sectional designs, one was an intervention study without a control group, and four was a mixed-method study and others.

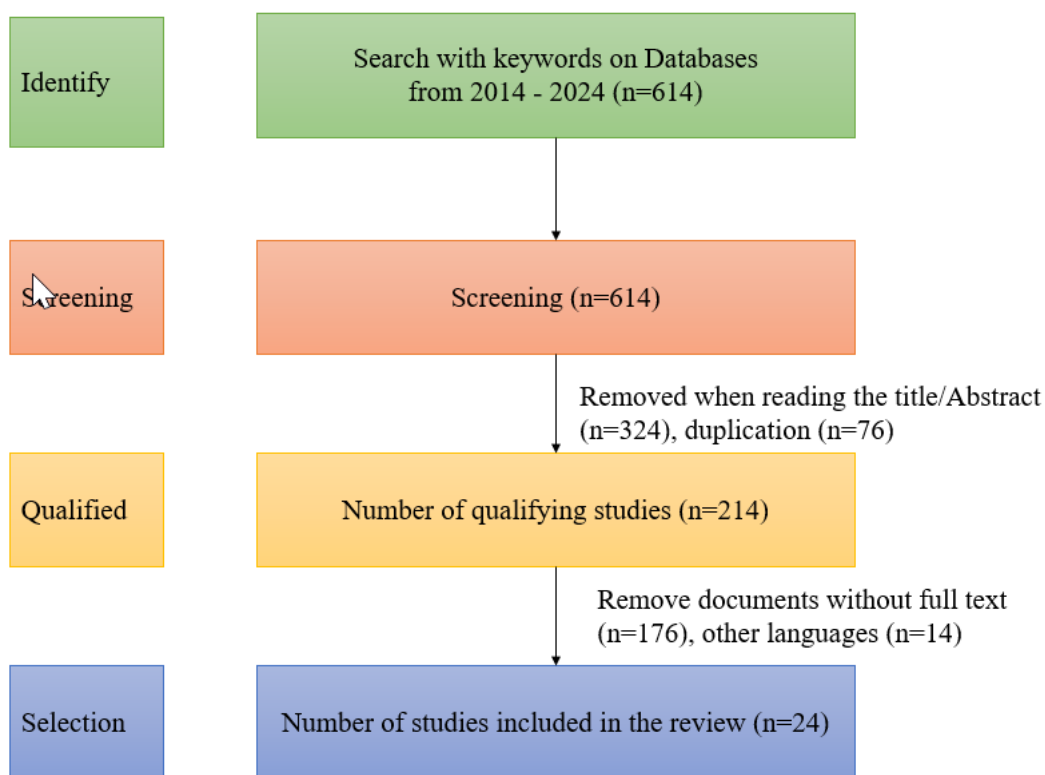


Figure 1. PRISMA flowchart of searching and screening process

Table 1. Summary of study selection

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
1	Alam MS et al. ⁽⁵⁾	2024	Bangladesh	The profit private sector providers	A mixed-method study	104 private health service providers	The majority of rapid diagnostic test (RDT) kits (62.3%) and anti-malarial medications (63.2%) were obtained through local wholesale distributors. Notably, most of the facilities involved were not engaged in providing malaria treatment (81.7%) and did not collaborate with the National Malaria Program (93.3%).	Included
2	Eboumbou Moukoko CE et al. ⁽⁶⁾	2024	Cameroon	Public health facilities and private pharmacies	A cross-sectional and prospective study	06 health facilities and all pharmacies in the area (41 prescribers)	The study assessed 41 prescribers, all of whom were familiar with national malaria treatment protocols. However, 37.7% admitted to prescribing anti-malarial drugs before receiving test confirmation, primarily due to frequent medication shortages in health centers.	Included
3	Bedia-Tanoh VA et al. ⁽⁷⁾	2023	Côte d'Ivoire	Private pharmacies	A descriptive cross-sectional study	447 auxiliaries from 163 private pharmacies	Regarding support staff practices, 91.1% dispensed anti-malarial drugs without requiring a prescription, and nearly half (47.3%) reported using incorrect dosages.	Included
4	Bulafu D et al. ⁽⁸⁾	2023	Uganda	HCWs from private health facilities	A cross-sectional study	339 healthcare workers from private health facilities in 4 selected divisions.	Over the past three months, 36.0% of healthcare workers reported not transferring severe patients to higher-level medical facilities. Despite 92.6% (314/339) being aware of the national malaria treatment guidelines, only 63.1% (214/339) adhered to them	Included
5	Argaw MD et al. ⁽⁹⁾	2022	Ethiopia	Medical records of adult uncomplicated malaria outpatients served in private-	An explanatory sequential mixed method	Approximately 1,650 adults visiting outpatient facilities were believed to have	The proportion of private healthcare providers complying with treatment guidelines for confirmed malaria cases was 20.9% (69/330)	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
6	Gindola Y et al. ⁽¹⁰⁾	2022	Ethiopia	for-profit health facilities Patient files and healthcare workers in private clinics	A mixed-method study	contracted malaria Records from 425 patients were examined and conversations were conducted with 20 medical professionals at independent healthcare facilities	While every interviewed healthcare worker acknowledged knowing about the malaria treatment guidelines, a significant number lacked familiarity with their actual content. Only 40% had received formal training to comprehend and apply the guidelines effectively. Despite this gap, 85% stated that they follow the recommended protocols in practice, whereas 15% admitted to deviating from them.	Included
7	Mbonye AK et al. ⁽¹¹⁾	2020	Uganda	Private healthcare facilities (drug shops, pharmacies, private clinics, and herbal clinic)	A mixed-method study	72 non-public medical establishments include various types: medication vendors, pharmacies, private practices, and an alternative medicine provider	Less than 38% of private healthcare facilities have malaria treatment guidelines, under 15% have iCCM guidelines, only 6% of pharmacies follow iCCM guidelines, and fewer than 13% have protocols for pneumonia and diarrhea treatment	Included
8	Nega D et al. ⁽¹²⁾	2020	Ethiopia	Hospitals, health centers and private clinics	A cross-sectional study	106 healthcare facilities comprise district-level hospitals, local health centers, and independent clinics in differing proportions	Of the surveyed facilities, 91.5% (97) used light microscopes, 2.83% (3) employed RDTs, and 2.9% (3) used a combination of both methods for malaria diagnosis	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
9	Wang XL et al. ⁽¹³⁾	2019	China	Data from the Centre for Disease Control and Prevention	A retrospective descriptive analysis	371 imported malaria cases	12.5% of cases were misdiagnosed in provincial healthcare institutions compared to 98.2% in private clinics, leading to fewer complications at healthcare institutions of higher	Included
10	Wang LT et al. ⁽¹⁴⁾	2018	Uganda	Drug shops	A cross-sectional study	48 drug shops	Injectable antimalarial drugs were available in almost all pharmacies (45 out of 48, or 94%). Among the 3,900 patients who received antimalarial treatment during the study, 2,080 (53.3%) purchased their medication from private pharmacies, while 1,820 (46.7%) obtained it from public healthcare facilities	Included
11	Nkoli Mandoko P et al. ⁽¹⁵⁾	2018	Democratic Republic of the Congo	Private sector pharmacies	A cross-sectional study	404 pharmacies	Antimalarial medications were stocked in all surveyed pharmacies, with artemisinin-based combination therapies available in 88%. The most frequently dispensed treatment was artemether-lumefantrine combinations (93% of pharmacies); however, fewer than 3% of these products were quality-assured	Included
12	Poyer S et al. ⁽¹⁶⁾	2018	Kenya	Private health facilities and registered pharmacies	Two rounds of descriptive cross-sectional study	More than 1,100 healthcare seekers visited approximately 250 different medical establishments	In registered pharmacies, the use of rapid diagnostic tests (RDTs) increased slightly from 52.1% in 2014 to 56.3% in 2015. Across both years, a minimum of 75% of patients who tested positive received treatment with artemisinin-based combination therapy (ACT), aligning with standard malaria treatment recommendations.	Included
13	Simmalavong N et al. ⁽¹⁷⁾	2017	Lao PDR	Document of public-private mix initiative	This descriptive study	Over 2.3 million malaria diagnostics were conducted within public-private	A total of 246,091 individuals (10.7%) tested positive for malaria at PPM (Public-Private Mix) pharmacies and clinics. Among them, 33,565 cases (13.6%) were identified within the same districts where PPM facilities were	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
14	Chen I et al. ⁽¹⁸⁾	2017	Vietnam	Key informants, providers, potential patients, and individuals at risk of malaria	Semi-structured qualitative interviews	61 study participants included policymakers, healthcare providers, potential patients, and individuals with malaria exposure risk	operational, highlighting their contribution to malaria detection in local communities. Many private healthcare providers continue to rely solely on clinical symptoms for diagnosing malaria, rather than using confirmatory tests. As a result, a considerable number of unverified cases remain undocumented and are excluded from the official public health surveillance data	Included
15	Ganfon H et al. ⁽¹⁹⁾	2017	Benin	Private pharmacies	A descriptive cross-sectional study	101 pharmacies	There remains a significant knowledge gap among private providers regarding malaria management. Nearly half (46%) were unaware of the artemisinin-based combination therapy endorsed by the National Malaria Control Program (NMCP) for treating uncomplicated malaria. Additionally, 58.7% could not identify severe malaria warning signs, and 89.8% of dispensers reported routinely supplying anti-malarial drugs based solely on patient requests, without proper diagnostic confirmation	Included
16	ACTwatch Group et al. ⁽²⁰⁾	2017	sub-Saharan African countries	Outlets stocking anti-malarial medicines and/or diagnostics	Repeated national cross-sectional quantitative surveys	Nearly 170,000 healthcare facilities were surveyed	Despite being the most common outlets for anti-malarial drugs, pharmacies and drugstores rarely had these medications in stock across all study areas. The highest availability was recorded in Uganda in 2015, where only 21.5% of such outlets stocked anti-malarials	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
17	Mercado CE et al. ⁽²¹⁾	2017	Asia Pacific	Countries National Malaria Control Programmes (NMCP)	A cross-sectional study	Malaria prevention initiatives across 22 nations in the Asia-Pacific region	Malaria treatment services were provided in private health facilities across 19 out of 21 surveyed countries. Meanwhile, anti-malarial medications were available in private pharmacies in 16 countries and in general retail shops in only 6, illustrating wide variability in access depending on the type of private provider	Included
18	Zeng XC et al. ⁽²²⁾	2016	China	Malaria control consultation and service posts	A retrospective descriptive analytical study A cross-sectional survey	Malaria prevention initiatives across 22 nations in the Asia-Pacific region	The average number of blood smear tests conducted monthly at surveillance posts rose from 44 in 2011 to 109 in 2014. Despite this increase in testing volume, the proportion of confirmed malaria cases dropped significantly over time ($\chi^2 = 90.67$, $P = 0.000$), suggesting a decline in malaria prevalence or improved control efforts	Included
19	Bamiselu OF et al. ⁽²³⁾	2016	Nigeria	Public and private healthcare workers	A comparative cross-sectional study	216 public and 216 private healthcare workers	Rapid diagnostic tests for malaria were accessible in 81.9% of public healthcare facilities but were available in just 19.4% of private ones ($p = 0.001$). Correspondingly, public sector health workers used RDTs far more frequently (85.2%) than their private sector counterparts (32.9%) ($p = 0.000$), indicating a substantial gap in diagnostic practices between sectors	Included
20	Mbonye AK et al. ⁽²⁴⁾	2016	Uganda	Private health facilities	A cross-sectional study	241 private health facilities	Malaria treatment guidelines were scarce across most healthcare outlets. Only 44.1% of private clinics had them on hand, compared to just 17.9% of drug shops and 41.7% of pharmacies, indicating a widespread lack of access to standardized treatment protocols	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
21	Nyunt MH et al. ⁽²⁵⁾	2015	Myanmar	Individuals at risk of malaria	A cross-sectional descriptive survey	832 households	The majority of fever-related illnesses were managed at rural health centers, which handled 38.24% of cases. Drug shops and private clinics followed, accounting for 17.65% and 16.18% of treatments respectively, reflecting the community's dependence on lower-tier health providers for febrile illness care.	Included
22	Argaw MD et al. ⁽²⁶⁾	2015	Ethiopia	Healthcare providers (HCPs) working in Private Health Facilities (PHFs)	A cross-sectional study	264 HCPs from 264 PHFs	Out of all malaria tests conducted, 37.6% returned positive results. However, only 60% of those confirmed cases actually received treatment. When it came to drug choices, healthcare providers prescribed chloroquine in 44.2% of cases, ACTs in 47.9%, and quinine in 77.9%, highlighting inconsistent adherence to the recommended first-line therapies	Included
23	Khin HS et al. ⁽²⁷⁾	2015	Myanmar	Outlets	A cross-sectional survey	3,658 outlets	Retail outlets had limited diagnostic capabilities and treatment options. Only 5% stocked malaria rapid diagnostic tests, and quality-assured ACTs were almost entirely absent, signaling major gaps in the private retail sector's ability to support appropriate malaria case management.	Included
24	Aung T et al. ⁽²⁸⁾	2015	Myanmar	Diverse medication suppliers including general merchandise outlets, mobile medicine sellers, pharmaceutical representatives, and unauthorized	An intervention study	over 600 informal private healthcare providers	The study revealed that community uptake of RDTs was highest when a price subsidy was combined with intensive information, education, and communication (IEC) efforts. This integrated approach not only boosted RDT use more than financial incentives alone but also enhanced the overall quality of malaria-related healthcare services	Included

No.	First author	Published year	Country/Area	Population	Study design	Sample size	Main findings	Appraisal
				pharmacy operators --- Answer from Perplexity: pplx.ai/share				

3.2 Diagnosis and Treatment of Malaria

The private healthcare sector plays a crucial role in providing healthcare services, especially in remote areas where access to public healthcare facilities is limited. Private clinics and pharmacies worldwide are involved in diagnosing, conducting rapid tests, and treating malaria, contributing to the collective efforts to eliminate malaria and reduce the disease burden. However, the knowledge and practices of private healthcare workers in diagnosing and treating malaria have significant limitations, posing challenges to malaria control and elimination efforts.

Diagnostic Services: Private clinics and pharmacies are common places where people seek malaria diagnosis.^{11, 17, 20} **Treatment Services:** The private healthcare sector provides the majority of malaria medications, including recommended artemisinin-based combination therapies (ACTs).^{14, 15, 17, 27} **Service Accessibility:** Private healthcare facilities are often more accessible to the public, especially in remote areas where public healthcare infrastructure is limited.^{5, 17, 20, 25} **Enhancing Diagnostic Capacity:** Public-private partnership programs have been implemented to train private healthcare workers in malaria diagnosis using rapid diagnostic tests (RDTs) and to provide subsidized RDTs.¹⁷

3.3 Health Education

Private clinics and pharmacies around the world have a certain level of knowledge about malaria, including diagnosis, rapid testing, and treatment; however, this knowledge is not comprehensive. Private healthcare facilities also serve as a source of consultation for individuals at risk of malaria living in the area. Communication is often conducted through informal channels. Private providers, especially in remote areas, frequently use informal communication methods such as word of mouth and personal relationships to share information about malaria.²²

The knowledge of private service providers regarding malaria is still limited. Studies have shown that many private service providers lack updated knowledge about the guidelines for malaria diagnosis and treatment, leading to the provision of inaccurate or incomplete information to patients.^{7, 19, 22, 26} Although some training programs on malaria for private service providers have been implemented, their reach remains limited, particularly in remote areas.¹⁸ There is also a

lack of motivation to provide accurate information. Private service providers often focus on selling medications and generating profits, which results in less attention given to providing accurate and comprehensive information about malaria to patients.²²

3.4 Reporting and Surveillance of Malaria

Some private clinics and pharmacies around the world have participated in reporting and monitoring malaria cases; however, this is still limited to a small number. There is a need for specific guidelines and policies to enhance public-private collaboration. **Current Situation of Low Case Reporting:** Private healthcare facilities often do not report malaria cases to the national surveillance system. This is due to several factors, including lack of Awareness: Many private service providers are unaware of the importance of reporting and do not fully understand their role in the malaria surveillance system or do not see the benefits of reporting cases. **Administrative Concerns:** Some private providers are apprehensive about the complex and time-consuming procedures involved in case reporting. **Lack of Motivation:** Private service providers often focus on business operations and may lack motivation to report cases, especially when they do not receive direct benefits from doing so.¹⁸

Inadequate Surveillance Systems: Surveillance systems for malaria are often not fully established. National malaria programs typically focus on the public sector, resulting in a lack of effective surveillance systems for the private healthcare sector.¹⁸ **Limited Public-Private Collaboration:** The lack of cooperation and coordination between the public and private sectors in malaria surveillance hinders the collection of comprehensive and accurate data.^{13, 17, 18, 21}

3.5 Challenges and Solutions

Some limitations of private healthcare include **Limited Knowledge:** Many private healthcare workers lack knowledge of the National Malaria Control Program (NMCP) guidelines for malaria diagnosis and treatment, leading to inappropriate prescribing practices, including the use of non-recommended injectable medications.^{6, 16, 18} **Inaccurate Diagnostic Practices:** Malaria diagnosis at private healthcare facilities often relies on clinical symptoms rather than laboratory test results, resulting in unnecessary or incorrect treatments.^{12, 22} **Low Adherence to Guidelines:** The rate of adherence to NMCP guidelines

for malaria diagnosis and treatment at private healthcare facilities is low,^{8, 9, 23, 24} partly due to a lack of motivation and supervision.^{11, 13, 17, 28} Over-the-Counter Sales of Medications: The sale of antimalarial medications without prescriptions is a common issue in private pharmacies, posing a risk of drug resistance.^{5, 6, 15}

Therefore, the following measures are needed.

Enhanced Training: There is a need to strengthen training for private healthcare workers on malaria diagnosis and treatment guidelines, as well as to raise awareness about the importance of adhering to these guidelines.^{5, 10, 13, 16, 18} **Subsidized RDT Provision:** Providing subsidized rapid diagnostic tests (RDTs) to private healthcare facilities can improve malaria diagnosis and minimize unnecessary prescriptions.^{15, 17} **Encouraging Case Reporting:** Measures should be implemented to encourage private healthcare facilities to report malaria cases to the national surveillance system.¹⁸ **Increased Supervision:** Strengthening the supervision of private healthcare facilities is essential to ensure service quality and adherence to guidelines.^{11, 13, 17} **Public-Private Collaboration:** Promoting collaboration between public and private health sectors is crucial for sharing information, coordinating interventions, and mobilizing resources for malaria control and elimination.^{13, 17, 18} **Encouraging Private Providers' Participation in National Surveillance:** This can be achieved by simplifying the reporting process, providing training and technical support, and creating incentives for reporting malaria cases. ^{13, 21, 29.}

4. DISCUSSION

The synthesis of results from the 24 studies identified indicates that private healthcare in various countries worldwide has contributed to malaria prevention and elimination efforts. The overview indicates that the quality of malaria diagnosis and treatment services at private healthcare facilities can vary. Some facilities provide high-quality services, while others may have lower quality.^{5, 11, 18} There is a need for measures to improve service quality at private healthcare facilities, especially in areas at high risk for malaria. ¹⁸ These measures include providing rapid diagnostic tests (RDTs), training, supervision, and encouraging treatment adherence guidelines.^{27, 28} Private healthcare plays a crucial role in the community healthcare system, as evidenced by the number of

people seeking treatment and purchasing medications from private facilities. ^{30, 31} Public healthcare facilities, particularly Primary Healthcare Centers (PHC), are favored by many residents due to their proximity and reasonable costs. However, residents in informal areas and slums often turn to private pharmacies or first-line drug sellers due to poverty, close proximity, and the lack of 24-hour services at PHCs.³²

Healthcare staff at clinics and pharmacies, including doctors and pharmacists trained in medicine, have the potential to participate in screening, counseling, diagnosing, and treating malaria if they receive appropriate training and skill development. A study by Amon Nsengimana found that 66.5% of pharmacists had not been trained in the use of m-RDTs (malaria rapid diagnostic tests), and 18.5% were completely unfamiliar with their use. Many pharmacists possess limited knowledge about m-RDTs, which affects their ability to provide diagnostic services to patients. Most pharmacists (91.5%) agreed that licensing the use of m-RDTs after training would promote the rational use of antimalarial medications.³³ Licensing m-RDTs can help minimize presumptive treatment and enhance diagnostic accuracy. This will also improve adherence to prescribing antimalarial medications, thereby reducing the risk of drug resistance.³⁴ However, the issue of inadequate training may affect service quality if m-RDTs are licensed without proper preparation.

The synthesis indicates that health education efforts regarding malaria at private healthcare facilities currently have many limitations and need improvement. To achieve effectiveness, health education programs should be designed to fit specific contexts, target particular audiences, and involve close collaboration among stakeholders. Communication can play a significant role in improving the knowledge, attitudes, and practices of both private healthcare workers and patients. ^{17, 18} Effective health education programs can encourage the use of rapid diagnostic tests (RDTs), treatment adherence, and the implementation of malaria prevention measures.^{17, 18} Forms of communication may include providing educational materials, training sessions, workshops, and discussion forums.¹⁷

Continuous training programs are necessary to update the knowledge of private healthcare staff. Health education programs need to develop messages tailored to target audiences, especially those living in remote areas or with low educational levels. ¹⁸ The lack of coordination between the public and private sectors

poses a significant challenge, limiting the effectiveness of health education programs.¹⁸ There is a need to strengthen the role of non-governmental organizations (NGOs) in providing training and health education programs for the private healthcare sector. ¹⁸ Closer collaboration between public and private sectors is essential to enhance information sharing and resource allocation. ¹⁸ Additionally, it is important to facilitate easier access for private healthcare workers to materials and information regarding malaria. ¹⁷

Public-private coordination yields high effectiveness, with private healthcare serving as an extension of public health, especially in low- and middle-income countries.³ Some studies indicate that leveraging public-private partnerships could be a viable path to achieving malaria elimination goals by 2030. By enhancing collaboration and harnessing the strengths of both sectors, countries can utilize resources to effectively address remaining challenges. ^{35, 36} Policies are needed to mobilize private healthcare to participate more actively in healthcare activities. Private healthcare is a crucial link in the healthcare system, with significant potential to contribute to malaria control and elimination. By addressing challenges and leveraging the potential of private healthcare, we can create a widespread and effective malaria prevention network. In summary, the reporting and surveillance system for malaria at private healthcare facilities is weak and ineffective. Coordinated efforts from multiple stakeholders are necessary to enhance the participation of private healthcare in this work, ensuring effective epidemiological monitoring and malaria control.

If there were important limitations in your methodology, include a section describing them. This study has several limitations that should be noted. First, it is a systematic review that synthesizes results from previous studies without employing meta-analysis. Second, we only included studies published in English from the four electronic databases, which may have resulted in the omission of many studies published in other languages from various countries. Third, the use of AI to assist in synthesizing reviews may sometimes overlook essential information. Future research should focus on meta-analyses to provide evidence-based recommendations for different countries and regions to develop malaria prevention intervention programs tailored to their specific contexts.

5. CONCLUSION

Research from around the world indicates that private healthcare facilities can play a significant role in malaria diagnosis, treatment, communication, and reporting. However, to ensure their effectiveness, specific regulations, guidelines, ongoing training, and the provision of essential resources—such as rapid diagnostic tests (RDTs), medications, and supplies—are necessary. Additionally, the involvement of private healthcare services in various stages of malaria control must be guided by policies that are suitable for each country's unique context..

Ethical Approval

Not required.

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Competing Interests

All the authors declare that there are no conflicts of interest.

Funding Information

No funds were received for this study.

Underlying Data

Derived data supporting the findings of this study are available from the corresponding author on request.

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