

Good Practices Implemented in Malaria-Free Countries as a Lever to Accelerate Elimination in Endemic Areas from 2000 to 2024: A Systematic Review of the Literature

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Abstract

Context: Malaria remains the major cause of morbidity and mortality in many parts of the world. Some countries have succeeded in eradicating the disease from their territories. However, the underlying reasons for their success are not always well documented or transferable to other endemic countries. It is therefore crucial to examine the good practices of these malaria-free countries and to analyse the extent to which they can be adapted and applied in endemic countries. **Objective:** The aim of this study was to assess good practice in malaria-free countries, and to propose strategies that could be applied to endemic countries to ensure effective elimination. **Method:** We searched PubMed, Cochrane, Google Scholar and WHO databases for studies between 2000 and 2024 and produced a narrative synthesis to organize and group the different interventions. The quality of the data was assessed using the Dixon-Woods M technique, and the risk of bias was assessed using the Cochrane ROBIS assessment tool. **Result:** A sample of 17 documents was selected which met our assessment criteria. The seven (07) best practices implemented to eliminate malaria in malaria-free countries are strengthening surveillance systems and integrated vector management (IVM), universal access to healthcare, community empowerment and participation, strong political commitment and sustainable financing, cross-border collaboration and the management of imported

cases. **Conclusion:** This review identified good practices implemented by malaria-free countries. This information provides endemic countries with inspiration and benchmarks for strengthening and optimising their own control strategies.

Keywords

Malaria Elimination, Malaria-Free Countries, Vector Control Strategies, Surveillance Systems, Community Involvement

1. Introduction

Malaria is an infectious disease transmitted by mosquitoes of the genus *Anopheles* [1], and it remains the leading cause of morbidity and mortality in many parts of the world, particularly in sub-Saharan Africa, Southeast Asia, and Central America [1]. Despite progress in the fight against malaria, the disease continues to pose a major challenge to global public health [1].

The World Health Organization (WHO) and other public health actors have put in place strategies to eliminate malaria in endemic regions [2]. However, the transition to malaria-free status in countries where the disease is still endemic remains complex [3]. Some countries have succeeded in reducing malaria cases to a minimum, or even eradicating the disease from their territories. These countries, known as “malaria-free”, have implemented a series of strategies and best practices that have led to these successes [4]. These practices include the implementation of robust surveillance programmes, effective vector control, universal access to anti-malarial treatment, community mobilization and strong political commitment [4] [5]. However, the underlying reasons for their success are not always well documented or transferable to other endemic countries where health systems, socio-economic environments and epidemiological dynamics may be very different. There is therefore a crucial need to examine good practices from malaria-free countries and to analyse the extent to which they can be adapted and applied in endemic countries. Furthermore, malaria-free countries offer valuable examples of success in the fight against this disease. However, the vast majority of countries affected by malaria face complex obstacles in their elimination efforts. The lack of systematic documentation on the best practices observed in these successful countries is a major gap in the scientific literature. Furthermore, the diversity of approaches between these countries poses challenges in terms of their applicability and transferability to different contexts. As a result, identifying and analysing these effective practices could provide a roadmap for endemic countries, adapting proven strategies that could accelerate the global elimination of malaria. Such a review could also highlight gaps in current research, open up new avenues for future studies, and provide evidence on the impact of the strategies implemented.

This systematic review of the literature aims to gather, analyse and synthesize

the available data on good practices in malaria-free countries and their impact on the elimination of the disease in endemic countries. The objective is to provide evidence-based recommendations for policymakers and public health practitioners on the most effective strategies to adopt in order to eradicate malaria in areas still affected by the disease. The main objective of this study is to provide a comprehensive and in-depth analysis of best practices in malaria-free countries, to assess their impact on malaria elimination, and to propose strategies applicable to endemic countries to help them achieve the goal of eliminating malaria in the long term. More specifically, the aim is to: i) identify good practices in malaria-free countries; ii) assess the impact of these practices on malaria elimination; iii) compare contexts and success factors between malaria-free countries; iv) propose recommendations for adapting good practices in endemic countries.

2. Methods

Inclusion and exclusion criteria

The PICO(S) strategy was adopted for this research, in order to obtain a well-defined, clear, targeted and precise research question [6]. This strategy consists of:

P: (Population): “Malaria-free countries” “endemic countries targeting elimination”; **I:** (intervention): “effective interventions” “Malaria strategy” “malaria prevention” “diagnosis of malaria” “malaria treatment” “malaria surveillance”; **C** (comparison): “Absence” “ineffectiveness of similar interventions in endemic countries”; **O** (out com): “Reduction” “elimination of indigenous malaria cases”; **S** (setting): “Observational studies”, “controlled trials” “qualitative studies”, “WHO reports”, “existing reviews”.

Eligible studies had to meet the following criteria: be a publication detailing elimination strategy in malaria-free countries and their potential adaptation to endemic regions; use a qualitative, quantitative or mixed method; be a study published in peer-reviewed journals or institutional reports (WHO, UNICEF, etc.); be written in English or French; report on the period from 2000 to 2024.

Studies that did not meet the inclusion criteria and articles focusing solely on interventions unrelated to malaria were excluded. The exclusion of publications written in languages other than French and English can be explained, on the one hand, by limited access to professional translators or reliable resources enabling rigorous interpretation of articles written in foreign languages such as Chinese, Russian, Spanish or Portuguese. On the other hand, the review, critical analysis and extraction of data in languages not mastered by the authors could have led to errors of interpretation, thereby compromising the validity and rigour of the synthesis.

Search strategy, study selection and data extraction

Two (2) independent investigators (DO, AK) searched PubMed, Cochrane and Google Scholar electronic databases and WHO databases for interventions in malaria-free and malaria-endemic countries targeting elimination between 2000 and 2024. The latter developed a strategy based on the combination of these keywords:

“malaria elimination, malaria-free countries, vector control strategies, surveillance systems, and community engagement”, for selecting studies, extracting data and analysing them. After an initial screening by title and abstract, a total of 2,723 documents were initially selected. The titles of the studies were then examined after removing all duplicates. Next, a list of relevant articles was also searched for additional publications. Disagreements over inclusion were addressed through a discussion involving all investigators. When title and abstract information were insufficient to make a decision, a reading of the full text was deemed necessary to resolve the problem. Finally, these investigators independently coded and manually grouped the interventions using a guided thematic method based on the main operational categories of malaria control: prevention, diagnosis, treatment, surveillance, policy, and health systems. Relevant data for each study meeting the criteria were then extracted using standardised forms designed to facilitate the synthesis of results. A third investigator (HH) was consulted in cases of disagreement.

The following data were extracted: author, subject matter, year of publication, country where the study was conducted, key interventions, factors contributing to the success of the interventions, and impact on malaria (**Table 1**).

Data collection and analysis

We used the narrative synthesis technique of Petticrew and Roberts to group studies according to the different interventions and innovative actions in malaria control [7].

Assessing document quality and risk of bias

Document quality was determined using the National Health Service (NHS) criteria of Dixon-Woods *et al.* (**Table 2**) [8]. Risk of bias was assessed using the ROBIS risk of bias assessment tool (**Table 3**) [9]. This identified the strengths and weaknesses of the studies, as well as implications for the conclusions and recommendations of the review.

Ethical considerations

The protocol for the systematic review was registered in PROSPERO as CRD420250633619. The review was carried out in accordance with PRISMA guidelines [10]. The review was conducted in accordance with PRISMA guidelines [7]. The review question is: What documented good practices are favourable to malaria interventions and elimination?

3. Results

Selection of studies

Finally, 17 studies were assessed for their methodological merits and included in the analysis. A flow chart illustrating the selection process is presented below (**Figure 1**).

Characteristics of included studies and summary of results

Of the 17 studies included in the review, one (1) was from China, one (1) from Sri Lanka, one (1) from Paraguay, one (1) from Algeria and Argentina, one (1) from El Salvador, one (1) from the border region between Ecuador and Peru, one (1) from Cape Verde, one (1) from Egypt, one (1) from Azerbaijan and Tajikistan,

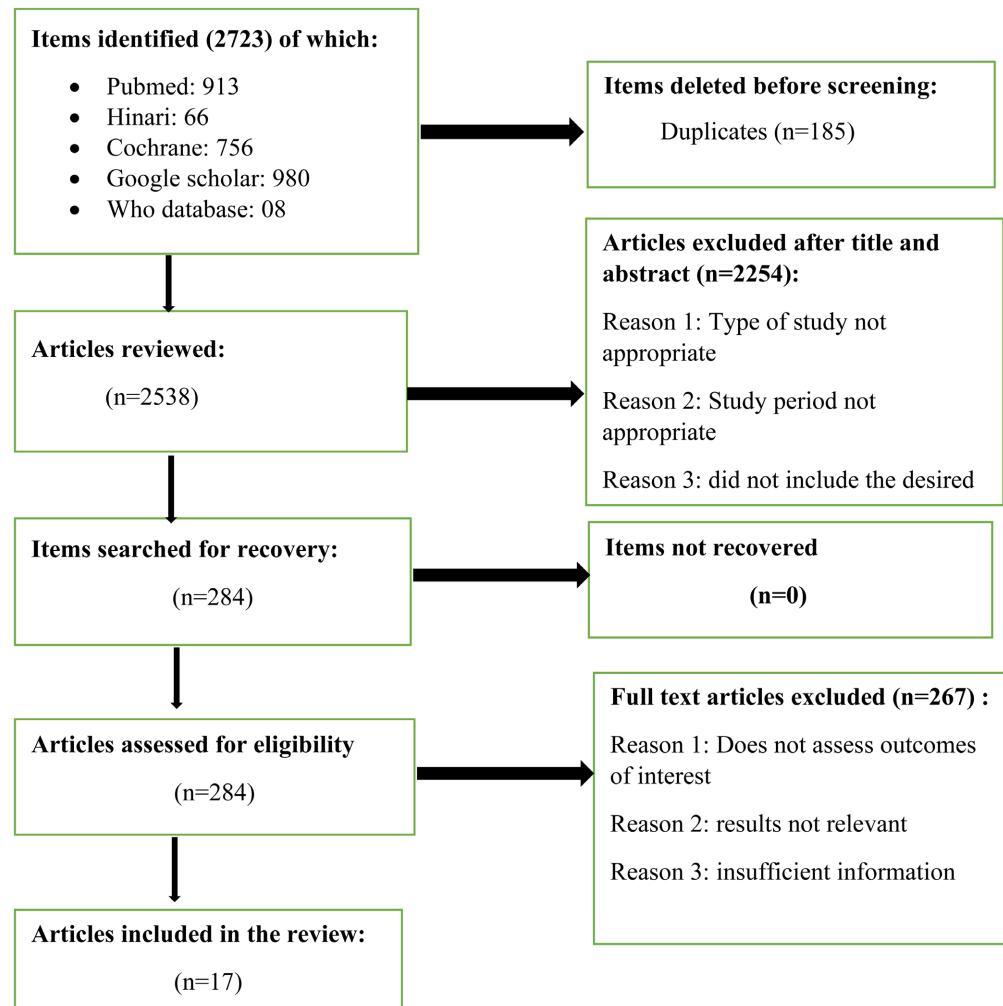


Figure 1. Flow chart for the identification and selection of articles included in this review.

one (1) from Uzbekistan, one (1) from Kyrgyzstan, one (1) from Belize, one (1) from Morocco, one (1) from the Maldives, one (1) from Armenia, one (1) from Oman and one (1) from Bhutan and Timor-Leste.

Two (2) of these were used according to a quantitative method while the other fifteen (15) were used according to a qualitative method.

At the end of this research, we observed seven good practices for eliminating malaria in malaria-free countries: strengthened surveillance systems, integrated vector management (IVM), universal access to health care, community empowerment and participation, strong political commitment and sustainable financing, cross-border collaboration and imported case management.

Table 1 below provides a brief overview of the main characteristics of the included studies.

Quality assessment results

In terms of the Dixon-Woods quality assessment, three (03) studies received a score of 5/5, one (01) received a score of 4/5, and thirteen (13) received a score of 3/5 (**Table 2**).

Table 1. Summary of selected reviews.

Subject	Year	Type of study	Key interventions	Success factors for interventions	Impact on malaria
Challenges in and lessons learned during the implementation of the 1-3-7 malaria surveillance and response strategy in China: a qualitative study [11]	2016	Qualitative study	“1-3-7” strategy; LLINs; IRS; ACT; environmental management.	<ul style="list-style-type: none"> - Strengthening the surveillance system by notifying suspected and confirmed cases within one day; - Investigation of specific cases within three days; - Targeted investigation followed by targeted control measures (LLINs, IRS, reactive case detection; health education, ACT) within seven days; - Political commitment and sustainable funding. 	WHO-certified elimination of malaria by 2021
Technical and operational underpinnings of malaria elimination from Sri Lanka [12]	2019	Qualitative study	LLINs; IRS; SMC; ACT; surveillance; integrated vector management.	<ul style="list-style-type: none"> - Passive case detection for patients seeking treatment (RDT, microscopy); - Active case detection for the entire population, regardless of the presence of malaria symptoms; - Proactive case detection to prevent reintroduction and ensure sustainable eradication; - Rapid response in the form of preventive measures (LLINs, SMCs, Integrated Vector Management by IRS), treatment (ACTs) and follow-up; - Political commitment and sustainable funding. - Management of imported cases 	WHO-certified elimination since 2016
Malaria elimination certification in Paraguay [13]	2018	Qualitative study	Surveillance; diagnosis and treatment; community involvement.	<ul style="list-style-type: none"> - Strengthening epidemiological surveillance; - Rigorous case management and a public information campaign on diagnosis; and; - Collaboration with communities and education on ways to prevent malaria transmission; - Diagnosis, treatment and prevention of malaria. - Strong political commitment and sustainable funding. 	WHO-certified elimination since 2016
Algeria and Argentina certified malaria-free by WHO [14]	2019	Qualitative study	Political and community involvement; epidemiological surveillance; cross-border collaboration.	<ul style="list-style-type: none"> - Commitment, leadership and expertise from the state, the public and the institutes; - Long-standing and fully national financial support; - Strengthening epidemiological surveillance; - Training of agents; - Rapid response in the form of vector management and treatment; - Cross-border collaboration. 	WHO-certified elimination since 2019
Factors Associated with the Rapid and Durable Decline in Malaria Incidence in El Salvador, 1980-2017 [15]	2018	Qualitative study	Surveillance; integrated vector management; financial resources; community collaboration.	<ul style="list-style-type: none"> - Stratification of malaria risk by determining the geographical distribution and frequency of malaria cases; - A network of volunteers to test and treat febrile individuals; - Decentralization of the network of diagnostic laboratories to shorten treatment times and strengthen local decision-making; - Weekly monitoring and response; - Case management and change of treatment regime through active and passive detection and immediate treatment of individuals; 	WHO-certified elimination since 2021

				<ul style="list-style-type: none"> - Environmental management and vector control by improving projects to eliminate breeding sites; - National funding environment. 	
Successful malaria elimination in the Ecuador-Peru border region: epidemiology and lessons learned [16]	2016	Quantitative study	Surveillance; community involvement; diagnosis and treatment.	<ul style="list-style-type: none"> - Strengthening surveillance systems; - Community involvement; - Operational research to guide interventions; - Application of treatments adapted to local challenges. 	Elimination of malaria in 2011 and 2012 respectively
Cabo Verde's malaria-free certification: A blueprint for eradicating malaria in Africa [17]	2024	Qualitative study	Surveillance; integrated vector management; management of imported cases; international collaboration.	<ul style="list-style-type: none"> - Strengthening the surveillance system and case management through free access to diagnosis and treatment; - Vector control by IRS and elimination of larval breeding sites; - Community involvement through intersectoral awareness-raising and mobilization, and ongoing political leadership; - WHO technical support and international collaboration; - Management of imported cases, LLINs. 	WHO-certified elimination since 2024
Egypt is certified malaria-free by WHO [18]	2024	Qualitative study	Surveillance; Community involvement; Integrated vector management; Cross-border collaboration.	<ul style="list-style-type: none"> - Strengthening the surveillance system to detect and manage cases rapidly; - Involvement of the community through awareness campaigns to report symptoms and reinforce vigilance; - Integrated vector management to eliminate vectors and breeding sites; - Capacity building of health personnel; - Regional and international collaboration to monitor borders and prevent the reintroduction of malaria. 	WHO-certified elimination since 2024
Certifies Azerbaijan and Tajikistan as malaria-free [19]	2023	Qualitative study	Electronic surveillance; integrated vector management; access to care.	<ul style="list-style-type: none"> - Electronic malaria surveillance systems to detect cases in near-real time and conduct rapid investigations to determine whether an infection is local or imported; - Integrated vector management (IRS, mosquito-eating fish) to eliminate vectors and breeding sites; - Implementation of water management systems and public education on malaria prevention; - Capacity-building for healthcare staff; - Free access to malaria diagnosis and treatment; - Regular evaluation of the judicious use of insecticides for vector control. 	WHO-certified elimination since 2023
Certifies that Uzbekistan has eliminated malaria [20]	2018	Qualitative study	Surveillance; integrated vector management; management of imported cases; international collaboration.	<ul style="list-style-type: none"> - Strengthening the surveillance system to detect and manage cases rapidly; - Integrated vector management (IRS); - Management of imported cases (LLIN, MDA, SMC); - Sustainable funding through international collaboration or financial independence; - Strong political commitment and sustainable funding. 	WHO-certified elimination since 2018
Kyrgyzstan receives WHO certification of malaria	2016	Qualitative study	Integrated vector management;	<ul style="list-style-type: none"> - Large-scale vector control campaign; - Strengthening vector control using IRS and larvicides; - Community involvement; 	WHO-certified elimination

elimination [21]			Community involvement; Collaboration.	- Improved intersectoral and cross-border collaboration.	since 2016
Malaria eliminated in Belize [22]	2023	Qualitative study	Surveillance; Community involvement; Access to care; Integrated vector management; Collaboration.	- Reinforced and rigorous surveillance to identify malaria infections rapidly and refer patients for care and treatment; - Intersectoral collaboration for proactive surveillance; - Community involvement; - Improved access to diagnosis and treatment, complemented by vector control methods, including LLINs and IRS; - Strong political commitment and sustainable funding.	WHO-certified elimination since 2023
Morocco certified malaria-free [23]	2010	Qualitative study	Surveillance; integrated vector management; LLINs; ACT; cross-border collaboration.	- Reinforced epidemiological surveillance to detect and treat all cases; - Vector control using IRS, drainage and sanitation to reduce mosquito breeding sites; - Distribution of LLINs and community awareness campaigns; - Treatment of confirmed cases by ACT and systematic use of RDTs; - Regional collaboration with neighbouring countries to manage imported cases and monitor borders.	WHO-certified elimination since 2010
Malaria-free Maldives [24]	2019	Qualitative study	Surveillance; integrated case management; access to care.	- Adequate and continuous surveillance with good case management; - Ongoing public health and environmental management, general mosquito control; - Specific and targeted management of disease vectors; - Early detection, access to treatment and adequate screening protocols are essential.	WHO-certified elimination since 2015
Role of malaria partners in malaria elimination in Armenia [25]	2019	Qualitative study	Surveillance; political and financial commitment; international cooperation.	- Strengthening the national malaria surveillance system to detect and treat cases rapidly; - Integrated vector management; - High-level political commitment and national funding to prioritise the elimination of malaria, with flexibility in decision-making; - Community empowerment and participation; - Cross-sectoral and international collaboration to benefit from technical expertise and additional resources.	WHO-certified elimination since 2011
The Progress Towards National Malaria Elimination: The Experience of Oman [26]	2023	Quantitative study	Surveillance system; access to healthcare; political commitment; management of imported cases; regional collaboration.	- A well-established and adequately funded national malaria eradication programme; - Extensive surveillance system that includes monitoring, case-finding, contact tracing, screening and programme evaluation; - Surveillance system continuously and regularly monitored through the quality assurance system; - Well-trained human resources in health centres and hospitals; - Free treatment available throughout the country and appropriate laboratory capacity through the adoption of	WHO-certified elimination since 2010

				<ul style="list-style-type: none"> legislation; - Political commitment through strong governance and regional collaboration to ensure universal access to prevention, diagnosis, treatment and national vector control; - Management of imported cases through enhanced surveillance, prevention measures (CPS), diagnostic tests and treatment. 	
Sustaining progress towards malaria elimination by 2025: Lessons from Bhutan & Timor-Leste [27]	2022	Qualitative study	Political and community commitment; cross-border collaboration; access to care; surveillance.	<ul style="list-style-type: none"> - Maintain the political commitment of government agencies to a whole-of-government approach to elimination; - Encourage cross-border collaboration to prevent the re-introduction of malaria; - Community involvement in prevention and control efforts to ensure universal coverage and access to health services for all vulnerable populations. - Strengthening the surveillance system and integrating response mechanisms is essential to prevent the reintroduction of malaria; - Focus on innovation in service delivery to prevent, detect, test and treat every case of malaria to ensure that no case of fever goes undiagnosed. 	Significant progress towards malaria elimination, although not yet officially certified

Table 2. Correspondence matrix between the 17 studies included and the 7 good practices.

Subject\best practices	Strengthening surveillance systems	Integrated vector management (IVM)	Universal access to healthcare	Community empowerment and participation	Strong political commitment and sustainable funding	Cross-border collaboration	Management of imported cases
Challenges in and lessons learned during the implementation of the 1-3-7 malaria surveillance and response strategy in China: a qualitative study	✓	✓	✓	✓	✓		
Technical and operational underpinnings of malaria elimination from Sri Lanka	✓	✓	✓	✓	✓		✓
Malaria elimination certification in Paraguay	✓	✓	✓	✓	✓		
Algeria and Argentina certified malaria-free by WHO	✓	✓	✓	✓	✓	✓	
Factors Associated with the Rapid and Durable Decline in Malaria Incidence in El Salvador, 1980–2017	✓	✓	✓	✓	✓	✓	

Successful malaria elimination in the Ecuador-Peru border region: epidemiology and lessons learned	✓	✓	✓	✓	✓		
Cabo Verde's malaria-free certification: A blueprint for eradicating malaria in Africa	✓	✓	✓	✓	✓	✓	✓
Egypt is certified malaria-free by WHO	✓	✓	✓	✓	✓	✓	
Certifies Azerbaijan and Tajikistan as malaria-free	✓	✓	✓	✓	✓		
Certifies that Uzbekistan has eliminated malaria	✓	✓	✓	✓	✓		✓
Kyrgyzstan receives WHO certification of malaria elimination	✓	✓		✓	✓	✓	
Malaria eliminated in Belize	✓	✓	✓	✓	✓	✓	
Morocco certified malaria-free	✓	✓	✓	✓	✓	✓	
Malaria-free Maldives	✓	✓	✓	✓	✓		
Role of malaria partners in malaria elimination in Armenia	✓	✓	✓	✓	✓	✓	
The Progress Towards National Malaria Elimination: The Experience of Oman	✓	✓	✓	✓	✓	✓	✓
Sustaining progress towards malaria elimination by 2025: Lessons from Bhutan & Timor-Leste	✓	✓	✓	✓	✓	✓	✓

Table 2. Dixon-woods quality assessment results.

Authors	Scores by domain					Total
	Are the aims and objectives of the research clearly stated?	Is the research plan clearly specified and adapted to the aims and objectives of the research?	Do the researchers provide a clear account of the process by which their results were reproduced?	Do the researchers present sufficient data to support their interpretations and conclusions?	Is the analysis method appropriate and sufficiently explained?	

Challenges in and lessons learned during the implementation of the 1-3-7 malaria surveillance and response strategy in China: a qualitative study	1	1	1	1	1	5
Technical and operational underpinnings of malaria elimination from Sri Lanka	1	1	0	1	1	3
Malaria elimination certification in Paraguay	1	1	0	1	0	3
Algeria and Argentina certified malaria-free by WHO	1	1	0	1	0	3
Factors Associated with the Rapid and Durable Decline in Malaria Incidence in El Salvador, 1980-2017	1	1	1	1	1	5
Successful malaria elimination in the Ecuador-Peru border region: epidemiology and lessons learned	1	1	1	1	1	5
Cabo Verde's malaria-free certification: A blueprint for eradicating malaria in Africa	1	1	0	1	0	3
Egypt is certified malaria-free by WHO	1	1	0	1	0	3
Certifies Azerbaijan and Tajikistan as malaria-free	1	1	0	1	0	3
Certifies that Uzbekistan has eliminated malaria	1	1	0	1	0	3
Kyrgyzstan receives WHO certification of malaria elimination	1	1	0	1	0	3
Malaria eliminated in Belize	1	1	0	1	0	3
Morocco certified malaria-free	1	1	0	1	0	3
Malaria-free Maldives	1	1	0	1	0	3
Role of malaria partners in malaria elimination in Armenia	1	1	0	1	0	3
The Progress Towards National Malaria Elimination: The Experience of Oman	1	1	1	1	0	4
Sustaining progress towards malaria elimination by 2025: Lessons from Bhutan & Timor-Leste	1	1	0	1	0	3

Table 3. ROBIS assessment results.

Authors	Phase 2			Phase 3	
	Study eligibility criteria	Identification and selection of studies	Data collection and study evaluation	Summary and conclusions	Risk of review bias
Challenges in and lessons learned during the implementation of the 1-3-7 malaria surveillance and response strategy in China: a qualitative study	Low	Low	Low	Low	Low
Technical and operational underpinnings of malaria elimination from Sri Lanka	Low	Moderate	Low	Low	Moderate
Malaria elimination certification in Paraguay	Low	Low	Moderate	Moderate	Moderate
Algeria and Argentina certified malaria-free by WHO	Low	Low	Moderate	Moderate	Moderate
Factors Associated with the Rapid and Durable Decline in Malaria Incidence in El Salvador, 1980-2017	Low	Low	Low	Moderate	Moderate
Successful malaria elimination in the Ecuador-Peru border region: epidemiology and lessons learned	Low	Low	Low	Low	Low
Cabo Verde's malaria-free certification: A blueprint for eradicating malaria in Africa	Low	Low	Moderate	Moderate	Moderate
Egypt is certified malaria-free by WHO	Low	Low	Moderate	Moderate	Moderate
Certifies Azerbaijan and Tajikistan as malaria-free	Low	Low	Moderate	Moderate	Moderate
Certifies that Uzbekistan has eliminated malaria	Low	Low	Moderate	Moderate	Moderate
Kyrgyzstan receives WHO certification of malaria elimination	Low	Low	Moderate	Moderate	Moderate
Malaria eliminated in Belize	Low	Low	Moderate	Moderate	Moderate
Morocco certified malaria-free	Low	Low	Moderate	Moderate	Moderate
Malaria-free Maldives	Low	Low	Moderate	Moderate	Moderate
Role of malaria partners in malaria elimination in Armenia	Low	Low	Moderate	Moderate	Moderate
The Progress Towards National Malaria Elimination: The Experience of Oman	Low	Low	Moderate	Low	Moderate
Sustaining progress towards malaria elimination by 2025: Lessons from Bhutan & Timor-Leste	Low	Low	Moderate	Moderate	Moderate

In terms of the ROBIS risk of bias assessment, two (02) studies had a low risk and fifteen (15) had a moderate risk (**Table 3**).

4. Discussion

This review identified seven (7) good practices for eliminating malaria: strengthening surveillance systems, Integrated Vector Management (IVM), universal access to healthcare, community empowerment and participation, strong political

commitment and sustainable funding, cross-border collaboration, and management of imported cases. This section will examine the impact of each of these interventions and propose recommendations to endemic countries for effective control.

Strengthening surveillance systems

A robust surveillance system is the most crucial element in the effective fight against malaria. The system enables rapid detection of cases, monitoring of transmission, and guidance for interventions. This includes active surveillance conducted for the entire population regardless of the presence of malaria symptoms, passive surveillance for patients seeking treatment and proactive case surveillance to prevent reintroduction and ensure sustainable eradication. All malaria-free countries have strengthened their surveillance systems in order to contain the disease [4]. These findings are supported by Ohrt *et al.* (2015) and Lourenço *et al.* (2019), who stated that strengthening surveillance and response systems is crucial and essential for eliminating malaria, as poor-quality surveillance data prevents countries from tracking progress towards elimination and targeting interventions at the last remaining areas at risk [28] [29]. Therefore, endemic countries must improve and strengthen their surveillance systems and surveillance infrastructure in line with the realities of each country in order to combat the disease effectively.

Integrated Vector Management (IVM)

Vector management has played a role in the elimination of malaria. This strategy is generally a combination of interventions such as the use of long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS) and environmental interventions such as the destruction of larval habitats. This strategy has been successful in almost malaria-free countries such as China, Paraguay, Egypt, Morocco, Uzbekistan, etc. [4] [5]. According to Zhao *et al.* (2024), this strategy is of paramount importance for malaria elimination, but it requires long-term vector surveillance to understand distribution, population density and the development of resistance in mosquito vectors in order to prevent local epidemics caused by imported malaria cases [30]. Endemic countries must therefore adapt IVM to local mosquito behaviour by integrating it into national health policies and implementing clear indicators to measure the impact of the intervention in order to adjust this strategy based on the data collected and emerging challenges.

Universal access to healthcare

Universal access to healthcare has played a major role in the elimination of malaria. Some countries, such as Cape Verde, China, Sri Lanka and Algeria, have introduced a policy of free care in order to achieve the objective of this strategy [4] [5]. The results achieved by this policy have significantly boosted efforts to eradicate the disease [4]. Access to care includes, among other things, access to mass drug administration (MDA), diagnostics, artemisinin-based combination therapy (ACT) treatments, and preventive interventions such as SMC and IPT, which have helped to limit malaria transmission while gradually eliminating it and containing its reintroduction [4] [5]. The importance of this strategy in eliminating malaria

is illustrated by the work of Li *et al.*, who observed an 87.2% reduction in parasitaemia and an 89% reduction in malaria cases after MDA [31]; Cairns *et al.* (2021) and Manga *et al.* (2022), who found a protective efficacy of SMC against malaria of 88% and 89% respectively [32] [33]. Shibeshi *et al.* (2021) observed the efficacy of ACT, with cure rates ranging from 92.2% to 97.4% between days 28 and 63 post-intervention in pregnant women [34]. Finally, Kamau *et al.* (2022) noted a 21% reduction in stillbirths after IPTg [35].

Although the RTS, S vaccine is relatively new, it could complement universal access to healthcare. Studies by Cairns *et al.* (2022) highlighted the overall protective efficacy of RTS,S of at least 60% over 6 months in children under 5 years of age [36]. It is important for endemic countries to strengthen their universal access to healthcare policies through sustainable funding supported by international collaborations or the community in order to effectively combat this disease.

Community empowerment and participation

Community empowerment and participation have played a crucial role in eliminating malaria in malaria-free countries such as Sri Lanka, El Salvador, Egypt, etc. This strategy requires rigorous and in-depth training of community workers as well as awareness-raising activities among local populations to ensure adoption of and participation in various interventions, such as the use of LLINs, IPTs, SMC, and early recognition of symptoms. Sri Lanka has mobilised communities to quickly report suspected cases [37]. Health education campaigns in countries such as El Salvador have helped to combat misconceptions about malaria prevention and treatment [15]. According to Abamecha *et al.* (2021), community support is crucial to facilitating the implementation of interventions in malaria elimination efforts [38]. Endemic countries need to strengthen awareness-raising and training at the community level for effective control.

Strong political commitment and sustainable funding

To achieve complete eradication of malaria, governments of malaria-free countries such as China, Sri Lanka, Algeria, Argentina, Armenia, and Oman have maintained strong political commitment and sustained funding for elimination goals, which must be integrated into national strategies with a dedicated budget for prevention, treatment, and monitoring. Funding based on local and international resources can help sustain elimination efforts [5]. This observation supports Ren's (2019) assertion that achieving malaria elimination targets requires strong political commitment and a significant increase in international and national financial resources [39]. Endemic countries must reinforce this strategy by integrating malaria elimination into national development strategies, making it a political priority and ensuring sustainable financial mobilisation from the community and international partners.

Cross-border collaboration

Migration is a source of spread for the malaria vector. In order to prevent the reintroduction of the disease into their territory, countries such as Sri Lanka, Paraguay, Argentina, Algeria and Egypt have implemented measures to monitor and

contain the vector by screening migrants and travellers from malaria-endemic countries through collaboration with neighbouring countries. According to Fambirai *et al.* (2022), this strategy is crucial for significantly reducing the burden of morbidity and mortality due to malaria [40]. The aim of cross-border collaborations is to facilitate joint surveillance and resource sharing. However, Xu *et al.* (2021) observed that the success of this strategy is attributable to multiple factors, including political commitment, effective interventions, socio-economic development and changes in the ecological environment, as well as the complex interactions between these factors [41]. Endemic countries must therefore learn from the cross-border collaborations of non-endemic countries, while strengthening surveillance systems in line with local contexts, and then integrate these strategies into coordinated and sustainable approaches.

Management of imported cases

Poor management of imported cases influences the reintroduction of malaria. This strategy is very important and poses a major challenge for malaria-free countries in order to prevent its reintroduction through rigorous surveillance to detect, treat and effectively control imported cases. This strategy is addressed in all exempted countries based on the context of each locality. The study by Galapaththy *et al.* (2013) emphasised that continued strengthening of surveillance, particularly for the rapid detection and treatment of imported malaria, is essential if the country is to prevent the re-establishment of transmission within its territory [37]. We have the example of Sri Lanka, which has strengthened border controls through passive and active screening, as well as interventions by the SMC, the IPT and the ACT, for travellers before they leave Sri Lanka [42]. However, certain factors may limit this strategy. Wang *et al.* (2019) observed in their study that the management of imported cases may be limited by insufficient use of medical care by imported patients with malaria, as well as insufficient capacity in lower-level healthcare facilities [43]. Endemic countries must also improve the detection, management and prevention of imported cases through continuous strengthening of the health system and border management to minimise the risk of resurgence.

This review shows that malaria elimination in malaria-free countries is not solely the result of technical interventions, but depends on an integrated set of systematic actions, combined with strong political commitment, sustainable financing and a constant willingness to engage in intersectoral and international collaboration. By drawing on these successful experiences, endemic countries can gain valuable insights to guide, adapt and strengthen their national strategies with a view to achieving the goal of sustainable elimination of the disease.

Study limitations

The exclusion of publications in languages other than French and English may have resulted in the loss of potentially relevant information, particularly with regard to innovative or context-specific interventions that could enrich our understanding of the good practices implemented. Although this restriction was neces-

sary to ensure the rigour of the analysis, it constitutes a significant limitation that must be taken into account when interpreting the results.

Furthermore, the majority of the studies included are observational in nature, which increases the risk of publication bias and limits the ability to draw generalisable conclusions. In addition, the available documentation on the good practices that have led to the successful elimination of malaria remains insufficient, which represents another notable limitation of this review. Finally, the absence of controlled studies, such as clinical trials, limits the possibility of establishing strong causal links between the interventions identified and the results observed.

5. Conclusion

This review identified good practices implemented by malaria-free countries. This information provides endemic countries with inspiration and benchmarks for strengthening and optimising their own control strategies. It is essential that national programmes take ownership of these approaches and adapt them pragmatically, taking into account local realities.

Contribution to Authors

All authors cited in this article contributed to the conduct of this study and the drafting of the manuscript.

Availability of Data and Equipment:

All data is accessible to the public. They can be consulted via databases (PubMed, Cochrane, WHO database, Google Scholar and Hinari).

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Supplementary Material

Supplementary material for this article is available.

Use of Artificial Intelligence Tools

In this review, ChatGPT was used to improve the reformulation of certain sentences to ensure better readability and editorial consistency. No scientific, methodological or analytical content was generated or modified by this tool. All analyses, data interpretations and conclusions were made exclusively by the authors. The use of ChatGPT was strictly limited to linguistic reformulation, with no impact on the scientific content or the results presented.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviation

LLINs	Long-Lasting Insecticidal Nets
IRS	Indoor Residual Spraying
SMC	Seasonal Malaria Chemoprevention
IPT	Intermittent Preventive Treatment
ACT	Artemisinin-Based Combination Therapy
MDA	Mass Drug Administration
RDT	Rapid Diagnostic Test
IVM	Integrated Vector Management
ROBIS	Risk of Bias in Systematic Reviews