

## SYSTEMATIC REVIEW

# Challenges and Recommendations of Filariasis Elimination in Asia: A Systematic Review

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## ABSTRACT

**Introduction:** Filariasis, a parasitic disease caused by filarial worms, has posed a significant health burden in many countries in Asia. In response, various elimination programs have been implemented in the region to combat the transmission of this disease. While some countries in Asia have successfully implemented these strategies, others continue to face challenges in their elimination efforts. This study utilised a systematic review approach to identify the challenges encountered by Asian countries that have not yet achieved the status of elimination and to provide recommendation. **Methods:** A comprehensive search of databases, including PubMed, Scopus, and SpringerLink, was conducted based on PRISMA to gather relevant records from 2011 to 2021. The inclusion criteria were limited to Asian countries who that have not achieved elimination. JBI tools for cross-sectional and qualitative studies were used for quality assessment. **Results:** A total of 14 papers out of 372 papers were included in the review. The challenges identified in the filariasis elimination program in Asia can be categorised into five main themes: poor implementation strategy, poor political will, instability or crises, lack of research and surveillance, and lack of awareness, knowledge, perception among the community and geographical and demographic factors. **Conclusion:** Overall, this study highlights the importance of understanding and addressing the challenges faced by Asian countries and provide recommendations in their filariasis elimination programs. By acknowledging and actively working to overcome these challenges, health authorities can enhance their efforts to eliminate filariasis and improve the overall health outcomes of affected populations.

**Keywords:** Lymphatic Filariasis; Elimination Program Challenges; Asia; Systematic Review

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## INTRODUCTION

Lymphatic filariasis, also known as elephantiasis, is a tropical disease caused by filarial parasites which are transmitted to humans through mosquito bites (1). The most common parasite, *Wuchereria bancrofti*, is responsible for up to 90% of cases, followed by *Brugia malayi*, and *Brugia timori* (2). The parasites debilitate and disfigure the infected person by nesting in the lymphatic vessels, disrupting their normal function and leading to vessel dilatation (2). Although not fatal, the disease can cause painful and disfiguring visible manifestation such as lymphedema, elephantiasis and scrotal swelling, that can lead to permanent disability. These can have a disastrous impact on the patient's

mental health, income, and financial well-being (1).

The World Health Organisation (WHO) initiated the Global Program to Eliminate Lymphatic Filariasis (GPELF) in 2000 to tackle the global burden of lymphatic filariasis (1). This program utilises mass drug administration (MDA) for high-risk populations and morbidity management and disability prevention (MMDP) programs to alleviate suffering and improve the quality of life for affected individuals. Additionally, vector control measures such as insecticide-treated nets and indoor residual spraying are implemented in high-risk areas. The GPELF, in collaboration with various organisations, has achieved significant progress, leading to the elimination of lymphatic filariasis as a public health concern in several countries and reducing the need for MDA in millions of people (3).

Lymphatic filariasis poses a significant global health challenge, with 863 million people at risk and

51 million infected worldwide in 2018 (1). The implementation of the GPELF has resulted in a 74% reduction in infections since 2000, primarily through chemotherapy, morbidity management, and vector control efforts. The highest burden of the disease is found in the South-East Asia Region, where nine out of eleven countries are endemic, and approximately 844 million individuals are at risk (4). The Asia sub-region in the Western Pacific Region also faces high risk of lymphatic filariasis, although Cambodia and Vietnam have successfully eliminated it as a public health problem (5). In addition, although 80 countries worldwide are considered endemic for LF, Indonesia, India, Bangladesh in Asia and Nigeria (in Africa) collectively account for 70% of the global burden (4). Despite progress, many Asian countries continue to grapple with the disease's physical, social, and economic impacts, necessitating focused efforts to address the challenges they face. Hence, this systematic review aims to identify and address the elimination program challenges specific to Asian countries that have not yet achieved elimination status.

## MATERIALS AND METHODS

### Search Strategy

The research questions and objectives for this systematic review were formulated using the PICO (Population, Interest, Context, Outcome) framework, which is a common tool for developing clear and well-defined research questions (6). The search strategy for this study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards (7). Only Asian countries which have not achieved elimination status yet were included in the country list. The electronic search utilised the following search terms:

'Filaria' OR 'Brugia' OR 'Tropical eosinophilia' OR 'Wuchereria' OR 'lymphatic filariasis'  
 AND 'elimination progress' OR 'elimination challenges'  
 OR 'elimination barriers' OR 'elimination status' OR  
 'elimination difficulties' OR 'elimination problems' OR  
 'elimination obstacles'  
 AND 'Afghanistan' OR 'Armenia' OR 'Azerbaijan' OR  
 'Bahrain' OR 'Bangladesh' OR 'Bhutan' OR 'Brunei' OR  
 'Cyprus' OR 'East Timor' OR 'Georgia' OR 'India' OR  
 'Indonesia' OR 'Iran' OR 'Iraq' OR 'Israel' OR 'Jordan'  
 OR 'Kazakhstan' OR 'Kuwait' OR 'Kyrgyzstan' OR  
 'Laos' OR 'Lebanon' OR 'Malaysia' OR 'Mongolia' OR  
 'Myanmar' OR 'Nepal' OR 'North Korea' OR 'Oman'  
 OR 'Pakistan' OR 'Philippines' OR 'Qatar' OR 'Saudi  
 Arabia' OR 'Singapore' OR 'State of Palestine' OR  
 'Syria' OR 'Tajikistan' OR 'Turkey' OR 'Turkmenistan'  
 OR 'United Arab Emirates' OR 'Uzbekistan'  
 AND 'eliminate' OR 'incidence' OR 'prevalence' OR  
 'surveillance'

The search was initially conducted in PubMed and

then adapted for searches in Scopus and SpringerLink. When possible, the references were downloaded in Excel format and imported into Mendeley for further analysis.

### Inclusion and Exclusion Criteria:

For inclusion in this review, studies had to present the challenges of the filariasis elimination program in Asian countries in the results section or provide an overview of elimination progress related to filariasis. Only studies conducted in countries where lymphatic filariasis is endemic were included. The review only considered studies published in English between 2011 and 2021, with accessible full articles.

The review excluded articles conducted in non-Asian countries or in Asian countries that had already achieved elimination status. Studies that discussed neglected tropical diseases (NTDs) in general or focused solely on laboratory-based findings without relating them to the challenges of the elimination program were also excluded. Additionally, systematic reviews, narrative reviews, scoping reviews, and duplicated articles across the search engines were excluded. Editorials, reviews, and studies for which only abstract was available or the full text could not be retrieved were also excluded.

### Quality Assessment

The methodological quality of the articles were assessed using the Joanna Briggs Institute (JBI) Critical Appraisal tool for quantitative and qualitative studies (8,9). Each article was assessed using a pre-defined 10 items checklist, with each item assigned a score of "yes," "no," "unclear," or "not applicable". A score of 1 point was assigned for each criterion marked as "yes," while other scores were assigned a value of 0. The scores for each article were then calculated and summed. They are then categorised into "low", "moderate" and "high" quality based on an agreed score by the reviewers.

### Data Extraction and Analysis

Data extraction was performed by five authors (AN, AJ, AR, AC, and RT). After removing duplicates, two researchers (AR and AC) scanned titles and abstracts to identify studies for a full-text review. A random subsample of the studies was checked by the next researcher (AN) to ensure consistency in the screening process. Two authors (AA and RA) conducted the assessment of the selected studies and FR reduced any disagreement that arose during the assessment. The full texts of the identified studies were retrieved and reviewed by three researchers (AJ, AC and RT), with any disagreements resolved through discussion.

## RESULTS

In the systematic review, a total of 372 studies were

initially retrieved from the database search, with 40 from PubMed, 331 from SpringerLink, and one from Scopus. After screening the titles and abstracts, 348 studies were excluded for various reasons: 137 were conducted in non-Asian countries, 20 were from countries that had already achieved elimination, 143 were unrelated to the topic, 22 were review papers, and 17 were duplicates. Following this, attempts were made to retrieve the remaining 33 reports, but nine of them were not successfully obtained. Subsequently, the full text of the remaining 24 articles was reviewed, and 10 were deemed ineligible as they did not have the desired outcome of interest and were not available in English. Figure I shows the flow diagram of the search and review process.

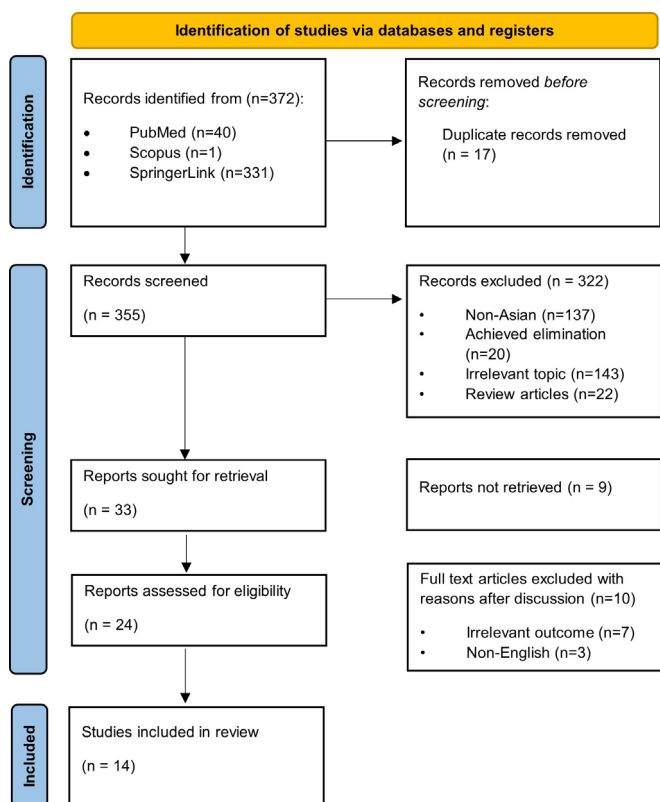
A total of 14 papers from six countries were included in this review. Five papers were from India, three from Myanmar and Indonesia, and one each from Malaysia, Bangladesh, and Nepal. Among these, 11

papers were cross-sectional studies, while three were qualitative studies. The quality of the papers ranged from moderate to high, with eight of them being of high quality and six of moderate quality. All the papers that met the inclusion criteria were included in the systematic review.

Table I provided information on the author(s), year of publication, country or region studied, study source, study design, and JBI critical appraisal. This table helped summarise the characteristics of the included studies. The challenges faced by each country, as described by the authors in the respective papers, were extracted and re-categorised into appropriate themes. These themes were used to present the information in Table II, which highlighted the specific challenges encountered by the countries included in the review. Lastly, a summary of the recommendations for each theme were presented in Table III.

**Table I : Study characteristics of the reviewed literature**

No.	Author (Year)	Database Source	Country	Study design	JBI critical appraisal	Quality
1	Dickson et al. (2021) (18)	PubMed	Myanmar	Cross-sectional study	Comply all criteria	High
2	Win KM et al. (2018) (19)	PubMed	Myanmar	Cross-sectional study	Comply all criteria	High
3	Aye NN et al. (2018) (20)	PubMed	Myanmar	Cross-sectional study	Comply all criteria	High
4	Karim et al. (2019) (25)	PubMed	Bangladesh	Cross-sectional study	Comply all criteria	High
5	Nandha et al. (2013) (10)	PubMed	India	Cross-sectional study	Unclear strategy for confounding factors, but met all other review criteria.	High
6	Widjanarko et al. (2018) (17)	PubMed	Indonesia	Cross-sectional study	Criteria, confounding factors, and outcome measurement briefly explained.	Moderate
7	Al-Abd et al. (2014) (21)	PubMed	Malaysia	Cross-sectional study	Unclear strategy for confounding factors.	Moderate
8	Krentel A & Wellings K. (2018) (15)	SpringerLink	Indonesia	Qualitative study	Comply all criteria	High
9	Modi A et al. (2021) (11)	SpringerLink	India	Cross-sectional study	Unclear strategy for confounding factors, but met all other review criteria.	Moderate
10	Titaley et al. (2018) (16)	SpringerLink	Indonesia	Cross-sectional study	Unclear strategy for confounding factors, but met all other review criteria.	Moderate
11	Hussain et al. (2014) (12)	SpringerLink	India	Qualitative study	Comply all criteria	High
12	Mehta et al. (2018) (13)	SpringerLink	India	Cross-sectional study	Unclear strategy for confounding factors, but met all other review criteria.	Moderate
13	Pryce et al. (2018) (22)	SpringerLink	Nepal	Cross-sectional study	Unclear sample size calculation for obtaining 105 samples, but met all other review criteria.	Moderate
14	Means et al. (2021) (14)	SpringerLink	India	Qualitative study	Comply all criteria	High



**Figure 1 :** Flow diagram of study search for challenges of filariasis elimination in Asia based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (7).

The challenges identified in this review were categorised into five main themes. The first theme pertains to poor implementation strategy, which refers to the ineffective or inadequate strategies employed in implementing the elimination program. The second theme focuses on poor political will, instability, or crises, encompassing challenges arising from a lack of political commitment, unstable political situations, or ongoing crises that hinder the progress of the elimination program. The third theme relates to the lack of research and surveillance, highlighting challenges associated with insufficient research and surveillance efforts, which in turn impact the understanding and monitoring of the disease. The fourth theme addresses the lack of awareness, knowledge, and perception among the community, encompassing challenges stemming from a lack of awareness and knowledge about the disease among affected communities. It also includes obstacles related to misconceptions or negative perceptions that hinder the success of the elimination efforts. Finally, the fifth theme encompasses geographical and demographic factors, including challenges posed by remote or hard-to-reach areas, gender relation dynamics and specific environmental conditions that create difficulties in effectively addressing the disease.

## DISCUSSION

The discussion section of this review is organized into three distinct segments. The initial part provides insights into the LF background and elimination programs within the countries under review. Subsequently, the second part offers a condensed overview of the challenges related to LF elimination categorised by identified themes. Lastly, the third part furnishes recommendations tailored to address the challenges associated with each thematic category.

### I. Background of LF and elimination programs India

Five papers from India were included in this review (10–14). In India, LF posed a significant public health challenge, with the country accounting for 40% of the global LF burden (10). India’s LF control program began in 1955 and merged into the National Vector-Borne Disease Control Program (NVBDCP) in 2003–2004 (11). It launched a national program in 2002 with the goal of eliminating LF by 2015 (10,12). This program focused on MDA using DEC and albendazole, combined with care for affected individuals.

It aimed to treat 590 million people at risk of LF, requiring annual DEC treatment for four to six years to interrupt transmission (10). However, challenges arose due to varying coverage levels (55% to 90%) and low compliance in some areas, hindering transmission interruption (10). India’s efforts are critical because it contributes significantly to the global LF burden, and addressing challenges related to coverage and compliance is essential to achieving LF elimination.

### Indonesia

Three studies conducted in Indonesia were included in the review (15–17). In Indonesia, LF remains a significant public health concern. It has been endemic in the country since 1975, with three types of LF parasites present (15). By 2016, 29 provinces and 239 cities/districts in Indonesia were considered LF endemic, putting over 102 million people at risk of infection (16). Indonesia has actively participated in the Global Programme to Eliminate LF (GPELF) since 2002 (15,16). This program combines MDA with assistance for LF sufferers. MDA aims to achieve high drug coverage and compliance to eliminate LF.

Key to Indonesia’s MDA program are community drug distributors, known as cadres, who work alongside health personnel in villages (16). Cadres play a vital role in disseminating information, drug distribution, and reporting. Despite these efforts, achieving consistent and sufficient coverage and compliance with LF drugs remains a challenge across many Indonesian provinces.

**Table II : The challenges and its theme for filariasis elimination in Asia**

No.	Author (Year)	Challenges	Challenge's theme
1	Dickson et al. (2021) (18)	Medication supply Financial issue	Poor implementation strategy Political will / instability
2	Win KM et al. (2018) (19)	Lack published research on the impact of MDA on filariasis control in Myanmar No entomological surveillance activity Decades of political and economic turbulence Disease's peculiar geography and migratory patterns Lack of solid epidemiological data and a stretched public health system	Lack of research and surveillance Lack of research and surveillance Political will / instability Geography/demography Lack of research and surveillance
3	Aye NN et al. (2018) (20)	Drug supply issues Local unrest	Poor implementation strategy Political will / instability
4	Karim et al. (2019) (25)	Poor guideline on MDA Poverty, urbanisation, Lower coverage rates Lack of health staff training and patient searching activities	Poor implementation strategy Geography/demography Poor implementation strategy Poor implementation strategy
5	Nandha et al. (2013) (10)	Non-compliance of MDA	Awareness / knowledge / perception of community
6	Widjanarko et al. (2018) (17)	Belief and perception of the community towards the disease	Awareness / knowledge / perception of community
7	Al-Abd et al. (2014) (21)	Lack of awareness and knowledge towards filariasis among community in endemic area	Awareness / knowledge / perception of community
8	Krentel A & Wellings K. (2018) (15)	Differences in gender roles	Geography/demography
9	Modi A et al. (2021) (11)	Need for guidelines on monitoring migration, intending to increase migrants' treatment coverage	Lack of research and surveillance
10	Titaley et al. (2018) (16)	Different level of knowledge among drug deliverers (cadre, health workers and community representatives)	Poor implementation strategy
11	Hussain et al. (2014) (12)	Poor implementation of MDA strategy	Poor implementation strategy
12	Mehta et al. (2018) (13)	Lack of the monitoring of post-MDA activities	Poor implementation strategy
13	Pryce et al. (2018) (22)	Less focus towards proposed WHO strategies of filariasis elimination	Poor implementation strategy
14	Means et al. (2021) (14)	Poor administrative support for implementation of elimination plans	Political will / instability

**Myanmar**

Three studies conducted in Myanmar were included in the review (18–20). Myanmar, formerly Burma, has a long-standing problem with LF, primarily caused by *Wuchereria bancrofti* and transmitted by *Culex quinquefasciatus* mosquitoes (18,20). The country has been highly endemic, especially in its central and western dry zones, with roughly 41 million people, constituting about 80% of the population, at risk in 45 districts (18–20).

In response to this health challenge, Myanmar established the National Programme to Eliminate Lymphatic Filariasis (NPELF) in 2000 (20). This program was grounded in historical evidence and data from the late 1990s that identified LF hotspots. The primary strategy adopted by NPELF was MDA using DEC and albendazole (18,20). Over the years, the program expanded its scope, initiated surveillance activities, and introduced surveys following WHO guidelines to assess LF's impact and prevalence reduction (20).

**Table III : Summary of Recommendations for Challenges' Theme**

No.	Challenges' Theme	Recommendations
1	Poor Implementation Strategy	<p>Improve MDA quality by identifying and addressing low-coverage areas.</p> <p>Involve traditional healers as community mobilisers for better engagement.</p> <p>Ensure program optimisation with updated guidelines, leader training, and health communication campaigns.</p>
2	Poor Political Will, Instability, or Crises	<p>Seek UN peacekeeping involvement for political stability.</p> <p>Secure NGO support to bridge funding gaps during crises.</p> <p>Foster political commitment, emphasising economic and public health impacts.</p>
3	Lack of Research and Surveillance	<p>Prioritise research for better diagnostics and interventions.</p> <p>Collaborate with international organisations and universities for research and funding.</p> <p>Involve community leaders and stakeholders in research efforts to strengthen LF elimination programmes.</p>
4	Lack of Awareness, Knowledge, and Perception among the Community	<p>Intensify awareness campaigns through various media and community engagement.</p> <p>Incorporate LF education into routine healthcare and house visits.</p> <p>Review and improve educational materials for better information dissemination.</p>
5	Geographical and Demographical Factors	<p>Address poverty through targeted initiatives and poverty alleviation programmes.</p> <p>Provide hygiene resources like soap and clean water to improve personal hygiene.</p> <p>Tailor educational campaigns for local contexts, considering social and gender dynamics for specific groups.</p>

Despite substantial progress, persistent transmission remains a concern in some districts (18,19).

#### Malaysia

Only one study from Malaysia, conducted by Al-abd et al., was included in the systematic review (21). In Malaysia, LF is caused by two parasites transmitted by mosquitoes, primarily affecting specific regions like Sabah, Sarawak, and parts of Peninsular Malaysia. Malaysia aimed to eliminate LF by 2015 through a program involving five rounds of MDA between 2004 and 2008 (21). Although MDA achieved over 80% coverage and followed WHO guidelines, LF transmission persisted. Transmission-Assessment Surveys (TAS) were conducted in two phases in 2010–2011, revealing that LF cases still exceeded critical levels. MDA continued, but despite efforts, LF incidence increased, indicating ongoing challenges in elimination (21).

#### Nepal

One study from Nepal was included in the systematic review (22). LF has been a longstanding public health concern in Nepal. In the early 2000s, the country initiated LF mapping surveys to assess the prevalence of the disease (22,23). These surveys revealed that, between 2001 and 2005, an estimated 61 out of 75

districts in Nepal were considered endemic for LF, posing a significant risk to approximately 25 million people residing in these regions (23). Recognising the urgency of this health issue, the Government of Nepal, in alignment with global commitments, embarked on a comprehensive program to eliminate LF by 2020 (23). In 2001, Nepal initiated MDA campaigns in the Parsa district, marking the beginning of a concerted effort to combat LF.

Over the years, Nepal has made significant progress in its LF elimination program. By 2013, the country had achieved 100% geographical coverage of all districts with MDA campaigns (24). Moreover, by 2016, 16 out of the 61 endemic districts had conducted six rounds of MDA, as part of a plan to complete six rounds in all endemic districts by 2018. To ensure the effectiveness of these interventions, Nepal also conducted population-based cluster surveys and monitoring of drug coverage (24). While significant progress has been made, LF remains a problem in several districts.

#### Bangladesh

The Bangladesh LF Elimination Programme has made significant progress towards eliminating LF as a public health problem. Initiated in 2001 as part of the

WHO GPELF, it began by focusing on interrupting transmission through MDA (25). At the program's outset, an estimated 70 million people were at risk of LF infection caused by *Wuchereria bancrofti*, transmitted by *Culex* sp. Mosquitoes (25). Over the years, the program has effectively scaled up MDA in 19 endemic districts, with transmission interruption confirmed through TAS (25). Additionally, 15 low-endemic districts have been identified, not requiring MDA due to mf prevalence rates below 1%. This remarkable progress aligns with the GPELF's first aim of transmission interruption.

However, to fulfil all GPELF elimination requirements, the program needed to address the second aim: alleviating patient suffering MMDP (26). This involves documenting the number of patients, geographical coverage of care availability, and the quality of services. The program has integrated disability prevention into its activities, revitalizing community clinics to provide care and support for LF patients (25). With these efforts, Bangladesh's LF Programme is now on track to achieve LF elimination, marking a significant step towards improving public health.

## II. Challenges of LF Elimination

### Poor Implementation Strategy

The first theme revolves around the issue of poor implementation strategy. It encompasses the ineffective or inadequate strategies employed in implementing the LF elimination program. This includes failures in executing activities such as LF patient identification, mapping high-risk areas, conducting mass drug administration (MDA) programs, and carrying out post-MDA surveillance activities (13,16,18,20,25,27). The lack of a well-defined and efficiently executed implementation strategy has hindered the successful interruption of LF transmission in several countries. For example, studies have observed that MDA programs in India often prioritise drug distribution while neglecting critical aspects like compliance, health education, side effect management, and logistics (12). Furthermore, financial and material resources, as well as community delivery infrastructure, were found to be low priorities for LF elimination program success (14). Non-compliance was influenced by the timing of drug distribution, as many individuals were absent for work during the distribution period. The method of drug distribution, using loose tablets instead of blister-packed drugs, and limited understanding of the purpose of MDA and its potential side effects have also contributed to program failures in certain areas (10).

### Poor Political Will, Instability or Crises

The second theme highlights the challenges arising from poor political will, instability, or ongoing crises. Political commitment plays a crucial role in sustaining and advancing LF elimination efforts. However, a

lack of political will, unstable political situations, or ongoing crises have impeded progress. These factors have resulted in interruptions in funding, resource allocation, and program continuity (14,18–20). For instance, the continuous spread of LF in Myanmar, as well as the slowing down of elimination programs and preventive efforts, can be attributed to the political and economic turbulence experienced over the decades (19,28).

### Lack of Research and Surveillance

The third theme emphasizes the critical role of research and surveillance in addressing LF. Insufficient efforts in these areas hinder our understanding and monitoring of the disease, making it challenging to develop effective intervention strategies. Research is pivotal in disease elimination, aiding in the development and validation of diagnostic tools and intervention strategies, essential components of this phase (29). In addition to serological and parasitological indices, entomological surveillance is crucial for monitoring the impact of MDA on LF transmission. However, a review of anti-filarial programs in some countries found no evidence of entomological surveillance activities (11,19). Additionally, a study focusing on urban settings with high in-migration rates highlighted the need for guidelines on monitoring migration to enhance treatment coverage for migrants (11). Monitoring activities after MDA, which are crucial until the ultimate endpoint of elimination is achieved, were also found to be lacking (13).

### Lack of Awareness, Knowledge, and Perception among the Community

The fourth theme emphasizes the lack of awareness, knowledge, and perception among the community. Low levels of awareness and knowledge about LF among affected communities pose significant challenges. This includes limited understanding of transmission, prevention, and treatment options. Additionally, misconceptions and negative perceptions about LF can hinder community engagement and participation in elimination efforts. One of the challenges in eliminating LF in Asia is the limited awareness, knowledge, and perception among communities residing in endemic areas (10,17,21). A contributing factor to this is the long duration of the MDA program, which has led to a decrease in community knowledge and awareness due to a lack of regular information dissemination (21). The success of the MDA program relies on the knowledge of its intended recipients and the effectiveness of the program delivery system. For example, a study in Indonesia noted that variations in knowledge among different groups involved in drug delivery affected the coverage and compliance of the MDA program, with cadres and community representatives having lower knowledge compared to health workers (16).

On the other hand, a study by Al-abd et al. revealed that while participants had heard of LF, they were largely unaware of the endemic status and the MDA program in their district (21). Only a small percentage received treatment, and some did not perceive LF as a problem. While participants had good knowledge about the disease itself, their awareness of the MDA program and LF severity was lacking. Knowledge plays a crucial role in LF prevention, as awareness about LF is essential for disease avoidance and maintaining good health. Misunderstandings about the illness and health-seeking behaviours can either enhance or hinder the effectiveness of control measures (30).

### **Geographical and Demographical Factors**

The fifth theme encompasses geographical and demographic factors. Certain geographical and demographic factors create unique challenges in addressing LF. Remote or hard-to-reach areas, densely populated regions, and specific cultural interactions can complicate the implementation of interventions and access to affected populations. Our review identified several challenges related to geographical and demographical factors, including high levels of poverty, poorly planned urbanization, gender dynamics, and logistic barriers (15,19,25). For example, gender roles were identified as a challenge in Indonesia, with husbands' perception as heads of households influencing health priorities and decision-making, including the consumption of LF medication among family members (15). Additionally, persistent LF infection in some districts in Bangladesh until 2013 was influenced by local factors such as poverty and peri-urbanisation (25).

### **III. Recommendations for each Challenges**

#### **Poor Implementation Strategy**

To address this issue, several recommendations can be made. Firstly, conducting a thorough review of sub-district level coverage data would help identify areas with low coverage and quality issues in MDA and post-MDA surveillance (26). Additionally, implementing outreach programs to sensitize and involve traditional healers as community mobilizers can improve the overall process and strategy of MDA and other programs (25).

Ensuring the availability of up-to-date Standard Operating Procedures, guidelines, protocols, and updates is crucial to keep MDA and other programs optimized. Providing training for community leaders to raise awareness about LF and educate them on how to organize MDA activities is also essential (13). Furthermore, organizing training sessions on health communication within each community, focusing on key messages related to LF treatment, transmission, prevention, and clinical manifestations, can enhance knowledge and understanding (31). Lastly, a social mobilization campaign utilizing various media

channels such as banners, posters, local radio spots, and megaphones can effectively inform and encourage the population to participate in MDA (12).

#### **Poor Political Will, Instability or Crises**

To address this issue, several recommendations can be proposed. First, the involvement of the United Nations peacekeeping force could help stabilize the political situation and create a conducive environment for program implementation (32). Non-governmental organizations can also contribute by providing financial support to compensate for the lack of funding during political crises. It is crucial for politicians and country leaders to assume responsibility and take ownership of the LF elimination program, ensuring its continuity even in challenging situations (14). Furthermore, there is a need to strengthen advocacy and awareness through targeted campaigns, emphasizing the economic and public health impacts of LF (33). Engaging high-level decision-makers, such as government officials and ministers of health, is crucial in fostering partnerships and presenting evidence-based information.

#### **Lack of Research and Surveillance**

To address this issue, several recommendations can be proposed. Firstly, there is a need for further research to assess and refine new diagnostic tools and intervention strategies for LF elimination. Research on community-directed interventions (CDI) should be prioritized to effectively interrupt LF transmission (34). Collaboration with international organizations such as UNICEF, UNDP, the World Bank, and the World Health Organization's Special Program of Research and Training in Tropical Diseases can enhance strategic skills and secure funding for MDA programs (11). It is also important for community leaders and healthcare system stakeholders to identify participatory mechanisms, such as community-based organizations, to establish a foundation for financial support, local organization, and community participation in research efforts. In addition, collaboration with universities and adequate financial resources are essential for conducting research and strengthening the Elimination of Lymphatic Filariasis Program (35).

#### **Lack of Awareness, Knowledge, and Perception among the Community**

To address this issue, awareness campaigns on LF and MDA programs should be intensified and conducted regularly, particularly in endemic areas. Intersectoral collaboration should be fostered, involving community leaders and representatives, and utilizing various media platforms, town hall discussions, and house-to-house visits (34). Additionally, existing educational materials on LF should be reviewed and assessed for comprehensibility, ensuring the effectiveness of information dissemination methods. Education on LF



should also be incorporated into routine clinic visits and house visits, taking advantage of every available opportunity to raise awareness (34).

### Geographical and Demographical Factors

As LF is often linked to poverty and inadequate hygiene and sanitation, targeted efforts should be made to address these factors. This includes poverty alleviation initiatives, providing access to soap and clean water to improve personal hygiene and reduce morbidity, as well as enhancing sanitation measures for effective vector control (31,36).

Furthermore, it is crucial for countries to consider the social and gender dynamics when developing and implementing educational campaigns and MDA programs. These initiatives should be tailored to the local context, taking into account the specific needs and perspectives of different social groups (34). Access to medication and healthcare services should also be addressed through a multi-actor approach, involving trained community volunteers and fostering collaboration between different agencies to share resources such as manpower and vehicles (32,34).

### Strengths and Limitations

The review has limitations such as restricted access to certain records, language constraints, and exclusion of studies before 2011. Additionally, it focused on only six countries due to limited publications from other Asian countries. However, the review employed a systematic approach, included multiple sources, and provided practical recommendations to tackle the identified challenges. While interpreting the review's findings, it is important to consider its limitations and the possibility of missing recent studies. Future research should account for these limitations and include countries that have achieved elimination, allowing for the sharing of success stories and lessons learned.

### CONCLUSION

This review sheds light on the challenges of eliminating LF in Asian countries. By addressing these challenges and implementing recommended strategies, policymakers, healthcare professionals, and researchers can improve LF elimination programs, leading to better health outcomes and reduced LF burden in the region.

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