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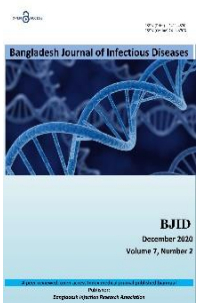

Epidemiological Insights and Current Perspectives of Leprosy in Sri Lanka: A Narrative Review

Ishani Aluthgamage[1], Maheshi Thilakarathna[2], Sakuni Sathsarani[3], Gayathri Pabodha[4], Nivedha Uthayarajan[5], Jananie Kottahachchi[6], Indira Kahawita[7], Bhagya Deepachandi[8]

[1]Undergraduate, Department of Life Sciences, Faculty of Science, NSBM Green University, Homagama, Sri Lanka; [2]Research Assistant, Department of Life Sciences, Faculty of Science, NSBM Green University, Homagama, Sri Lanka & Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda, Sri Lanka; [3]Undergraduate, Department of Life Sciences, Faculty of Science, NSBM Green University, Homagama, Sri Lanka; [4]Undergraduate, Department of Life Sciences, Faculty of Science, NSBM Green University, Homagama, Sri Lanka; [5]Lecturer (Probationary), Department of Life Sciences, Faculty of Science, NSBM Green University, Homagama, Sri Lanka; [6]Professor in Microbiology, Department of Microbiology, Faculty of Medical Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka; [7]Consultant Dermatologist, The National Hospital of Sri Lanka, Colombo, Sri Lanka; [8]Senior Lecturer, Department of Life Sciences, NSBM Green University, Homagama, Sri Lanka

Abstract

Sri Lanka eliminated leprosy as a public health problem in 1995. From 2001 onward, the caseload remained stable followed by a gradual decline between 2014 and 2019. Except for the COVID-19 pandemic years, approximately 2,000 new cases have been consistently reported each year. This review examines Sri Lanka's historical leprosy control strategies, including social marketing campaigns and the integration of leprosy care into the general healthcare system, which contributed to the elimination of the disease. It also highlights the support provided by the WHO and the country's renewed commitment to ongoing control efforts. Despite significant progress, Sri Lanka continues to face challenges in leprosy control, including a rise in child cases and potential drug resistance, revealing gaps in surveillance and control efforts. The current leprosy situation is affected by delayed diagnoses, incomplete treatments, and disruptions from the COVID-19 pandemic, emphasizing the importance of resilient healthcare systems and targeted interventions. Looking forward, priorities include early detection, treatment adherence, addressing socio-economic factors, and investigating environmental and genetic contributors to transmission. Achieving the goal of zero leprosy in Sri Lanka by 2030, which is a realistic and attainable goal, will require reliable diagnostics, vaccine development, sustained public awareness, and ongoing innovation, vigilance, and collaboration. [*Bangladesh Journal of Infectious Diseases, June 2025;12(1):159-166*]

Keywords: Anti-leprosy campaign; elimination; epidemiology; leprosy; socio-economic factors; Sri Lanka

Correspondence: Bhagya Deepachandi, Senior Lecturer, Department of Life Sciences, Faculty of Science, NSBM Green University, Sri Lanka & Ishani Aluthgamage and Maheshi Thilakarathna contributed equally to this work;
Email: bhagya.d@nsbm.ac.lk; **Cell No.:** +94711613966; **ORCID:** https://orcid.org/0000-0001-7601-4845

Introduction

Leprosy is a chronic infectious disease primarily caused by the bacterium *Mycobacterium leprae* which was traditionally considered the sole causative agent until the discovery of a new species *Mycobacterium lepromatosis* by Han et al[1]. It primarily affects the skin and peripheral nerves leading to progressive neurological impairment and permanent disability, if left untreated[2]. Sri Lanka is considered to be one of the 23 priority nations with the highest leprosy burden[3]. Sri Lanka, like many countries, has a long history with leprosy and its epidemiological trends provide valuable insights for global control efforts. Once considered highly endemic, Sri Lanka has made significant progress toward leprosy elimination[4].

Through the World Health Organization (WHO) program providing free multidrug therapy (MDT) to endemic countries[5], Sri Lanka successfully implemented MDT and achieved the organization's leprosy elimination target of less than one case per 10,000 population in 1995, contributing to the global decline in leprosy cases[4,6]. However, the disease remains a significant public health concern due to the overall number of cases continuing to decline at a slow pace, with nearly 2,000 new cases reported annually[7].

This review employs a descriptive approach to explore the historical epidemiology of leprosy in Sri Lanka. It aims to analyse current trends along with diagnostic methods, and treatment strategies, while also exploring the socio-economic factors and public attitudes that influence disease transmission and management. Additionally, this review highlights key knowledge gaps that warrant further research.

Historical overview of leprosy in Sri Lanka

Leprosy has a deep-rooted history in Sri Lanka where it was a significant public health concern during the colonial period. Due to the lack of effective treatment, the response was one of segregation[4,8]. Patients were isolated in leprosaria established by colonial authorities to control the spread, operating under harsh conditions and contributing to the social marginalization of those affected[9].

In the 19th century, medical advancements improved the understanding of leprosy, though treatments remained ineffective, and stigma persisted[10]. The mid-20th century saw a pivotal shift with the establishment of the Anti-Leprosy Campaign (ALC), transitioning efforts from isolation to treatment and control[5]. Bacillus Calmette-Guérin (BCG) vaccination was introduced in 1949 and with newborn vaccinations starting in 1963[4]. The discovery of dapsone in the 1940s provided the first effective treatment,[8] but drug resistance limited its long-term efficacy[5]. In 1982, the WHO introduced MDT, a curative and preventive treatment, which Sri Lanka adopted in 1983, becoming the first South Asian country to implement it for all registered patients[4,11]. Social marketing campaigns in the late 1980s helped reduce stigma and promote early case detection[12–14]. However, concerns remain about potential gaps in expertise among general healthcare providers in diagnosing and managing leprosy[15] and the socio-cultural stigma deterring timely treatment[11,16].

In 1995, Sri Lanka achieved the WHO's leprosy elimination target[3]. By 2001, the country had made significant progress by integrating leprosy control activities into the general healthcare system, improving access to treatment[8]. In 2013, leprosy was designated a notifiable disease in Sri Lanka, requiring all cases to be reported to health authorities to strengthen monitoring, contact tracing, and reduce treatment defaults[3].

Epidemiology of leprosy in Sri Lanka

Sri Lanka's efforts in leprosy elimination highlight a significant public health achievement. The discovery of dapsone led to the establishment of the ALC, which prioritized case detection, treatment, and public education[8,17]. The introduction of MDT helped improve treatment outcomes, while the social marketing campaign successfully raised awareness and reduced leprosy-related stigma[3].

By 1987, the leprosy prevalence in Sri Lanka had declined to 0.14 per 1,000 people, compared to 0.6 per 1,000 in 1986, with an active case incidence rate of 0.07 per 1,000[18]. By 2012, the prevalence was 0.07 per 1,000[19], demonstrating no increase in cases since 1987[4]. Similarly, the prevalence of leprosy in Sri Lanka has decreased over the years, reflecting the effectiveness of interventions aimed at reducing the burden of leprosy within the population.

Leprosy incidence in Sri Lanka has shown a declining trend in recent years[20]. Data from the ALC database[4] (1960–2020) highlight fluctuations in both the number of newly detected cases and the new case detection rate (NCDR), which measures

annual new cases per 100,000 people (Figure I)[4]. However, the COVID-19 pandemic significantly impacted case reporting. In 2019, 1,658 new cases were identified but this number dropped to 1,212 in 2020[21]. The sharp decline in both case numbers and the NCDR during 2020 and 2021 reflects disruptions in case-finding efforts, a challenge experienced worldwide, including in Sri Lanka[4].

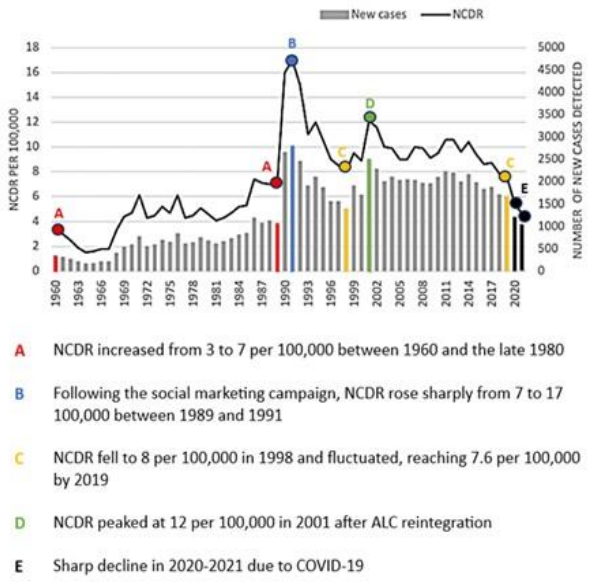

Figure I: Newly detected cases and the new case detection rate (NCDR) per 100,000 population (1960 - 2021)[4]

In partnership with WHO, Sri Lanka's Health Ministry has implemented strategies such as active case detection through contact examination and house-to-house surveys, early diagnosis, MDT treatment, health education campaigns, and the integration of leprosy services into primary care[11]. Some detected cases involve the multi-bacillary (MB) type signifying a higher risk of transmission compared to the less infectious paucibacillary (PB) type[17]. Between 2010 and 2019 there has been a significant increase in both MB cases and cases among children[22]. Alarmingly, around 10% of new cases are among children, signalling ongoing community transmission and potential gaps in early detection efforts[3].

Socio-economic factors affecting leprosy in Sri Lanka

Socio-economic factors significantly influence the prevalence and control of leprosy in Sri Lanka. Poverty, malnutrition, and poor living conditions, particularly in overcrowded and unsanitary urban slums, heighten the risk of leprosy transmission[23]. These conditions impair cell-mediated immunity making individuals more susceptible to infection through droplets or direct contact[24]. Leprosy is predominantly found in certain urban slum areas within low socio-economic communities[25]. Limited access to healthcare in rural and remote areas further complicates early detection and treatment which are critical for controlling transmission[19].

Social stigma surrounding leprosy delays diagnosis and treatment as fear of discrimination and ostracism discourages individuals from seeking medical help[26]. This stigma also perpetuates social and economic marginalization, reinforcing the cycle of poverty and vulnerability to the disease[11]. Overcrowded and unsanitary living conditions particularly in low-income communities facilitate the spread of the *M. leprae* bacteria that causes leprosy[27]. In general, limited awareness of leprosy symptoms, stigma and transmission hinders prevention efforts[28].

Healthcare and leprosy control programmes in Sri Lanka

Sri Lanka has advanced leprosy control through dedicated healthcare efforts. A key milestone was the 1989 social marketing campaign led by the ALC in collaboration with the Ministry of Health, Emmaus Switzerland for Leprosy Relief, and the Ciba-Geigy Leprosy Fund[29]. This campaign aimed to reduce stigma, dispel fears, and encourage treatment seeking behaviour. Concurrently, the government strengthened leprosy control by establishing 225 clinics staffed with trained healthcare workers and Public Health Inspectors (PHIs), providing them with pocket calendars detailing clinic locations and schedules to facilitate referrals[4,11].

By 1991, 25 more clinics were added to meet rising demand[29]. In 1999, leprosy services were integrated into the general healthcare system for better accessibility and sustainability[15]. District health teams, led by regional epidemiologists, managed cases and reporting, supported by re-orientation programs, awareness campaigns, and a robust record-keeping system. The community was informed of service changes and new service delivery locations through TV and radio campaigns, while a record-keeping system was implemented for effective leprosy case management[4,15]. Free MDT and expanded treatment centers reduced patient costs, further aiding control efforts[4].

Leprosy became notifiable in 2013, and contact tracing began in 2014 with PHIs conducting house-to-house surveys in high-prevalence areas, supported by government funding and the FAIRMED foundation[25]. In 2016, Sri Lanka launched a national leprosy strategy, focusing on early detection, stigma reduction, and government involvement. In 2017, participation in the Leprosy Post-Exposure Prophylaxis (LPEP) program strengthened contact tracing. Before this, contact tracing was disorganized and mainly conducted in dermatology clinics with little focus on district-level coordination[4].

In 2017, Sri Lanka introduced a web-based reporting system with Geographic Information Systems (GIS) mapping to enhance coordination between dermatologists and field staff[4]. The ALC also implemented Individual Patient Forms (IPFs) and notification forms to improve reporting and treatment adherence[20]. Medical Officers of Health (MOH) oversee preventive services, addressing transmission, delayed presentations, care quality, and staff training[25].

Diagnosis of leprosy in Sri Lanka

Sri Lanka prioritizes clinical examination for leprosy diagnosis[30], focusing on key symptoms such as skin discoloration, nerve thickening with sensory loss, and muscle weakness, due to its accessibility and efficiency[31]. Additional tests, including skin smears, histopathology of skin lesions, and nerve conduction studies, are used to assist in diagnosing challenging cases[30]. Suspected cases are referred from outpatient departments (OPDs), school medical inspections, general practitioners, Medical Officers of Health (MOHs), and PHIs[25].

Leprosy care is available nationwide, with the Central Leprosy Clinic (CLC) at the National Hospital of Sri Lanka (NHSL) serving as a hub for diagnosis, treatment, physiotherapy, counselling, and wound care[20]. Specialized clinics also operate at NHSL, the Prison Hospital in Welikada for incarcerated patients, and the Lady Ridgeway Hospital for paediatric cases[25]. Additionally, treatment is provided at dermatology clinics in base hospitals and higher-level facilities, under the care of Consultant Dermatologists[32]. In rural areas, "skin camps" offer free detection and treatment, while awareness initiatives led by young adults and schoolchildren help shape community attitudes[4]. The diagnosis and management of leprosy have been decentralized, with medical officers across the country receiving training to manage leprosy independently[30].

The Slit Skin Smear (SSS) test is performed in hospital laboratories[33], where a sample from a suspected lesion is microscopically examined for leprosy bacteria. However, a negative result does not exclude the possibility of leprosy[34]. Leprosy cases are categorized into PB and MB types for treatment. PB cases are characterized by 1 to 5 skin lesions with no detectable bacilli, while MB cases involve more than five lesions, nerve involvement, or the presence of detectable bacilli[35]. Molecular techniques like polymerase chain reaction (PCR) are sparingly used to confirm negative cases and detect drug-resistant strains, while serological tests are not widely utilized in Sri Lanka[33,36].

Clinical manifestations and treatment outcomes

Leprosy is a chronic infectious disease affecting the skin, nerves, and mucous membranes, resulting in a spectrum of clinical manifestations, including sensory loss in skin lesions, which may appear as single or multiple patches, sometimes with nodules or raised areas[37]. Facial involvement is frequent with "leonine facies" being a hallmark of lepromatous leprosy (LL)[38]. This condition features thickened skin on the forehead, nose, ears, and chin, leading to a waxy, lion-like appearance, along with nodules, earlobe thickening, nasal blockages, and madarosis[38].

Advanced leprosy causes nerve damage, numbness, muscle weakness, and paralysis. Facial nerve involvement may lead to blindness, while mucous membrane damage can cause nasal congestion and nosebleeds. Loss of sensation increases the risk of unnoticed injuries. Without treatment, complications such as ulcers, paralysis, bone resorption, and facial disfigurement can occur[39].

MDT, combining antibiotics like dapsone, rifampicin, and clofazimine, is the cornerstone of treatment. PB cases require six months of therapy, while MB cases need 12 months with adjustments based on bacterial load determined by SSS tests[8,40].

Current situation of leprosy in Sri Lanka

Sri Lanka is one of the few countries to implement the Leprosy Elimination Monitoring Tool (LEMT) under real programmatic conditions, offering structured insights into sub-national progress[41]. While some areas have achieved elimination, others, such as Colombo, continue to experience

ongoing transmission among children and adults. In this district, nearly all divisions (12 out of 13) still report active cases with only the Padukka division successfully interrupting child transmission although adult cases persist there (Figure II)[8,33].

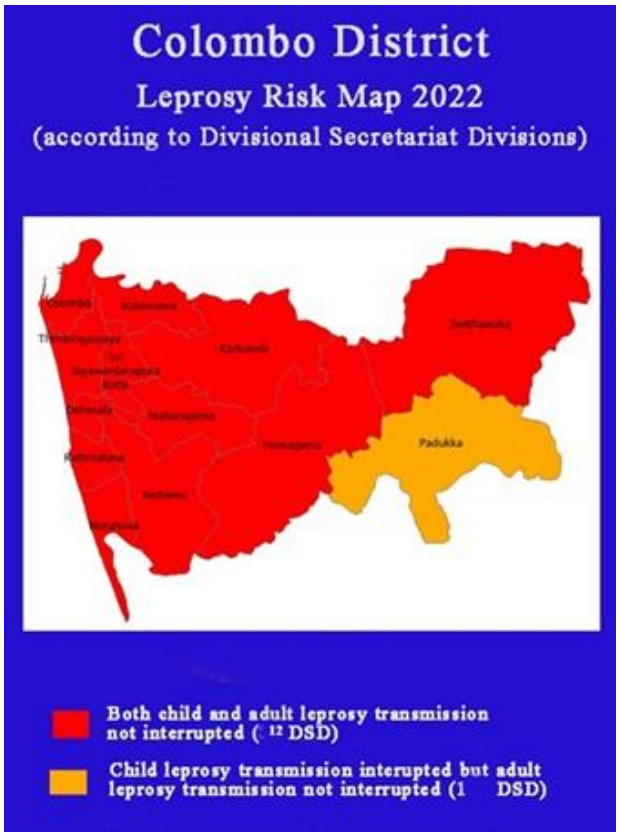

Figure II: Spread of leprosy within Colombo district according to Divisional Secretariate divisions (DSDs)[8].

Colombo remains a high-risk district, reporting over 300 new cases annually[8], with Moratuwa DS area alone accounting for one-third of the cases (Figure III)[42].

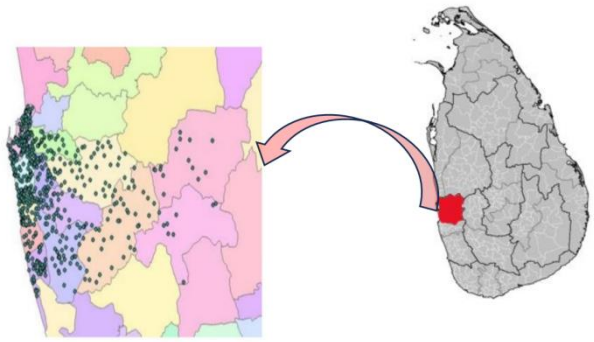

Figure III: Leprosy cases in Regional Directorate of Health Services (RDHS), Colombo from 2001 to 2022[42]

Despite achieving elimination targets in the past, around 1,000 new cases are reported annually, with 10% occurring in children. The prevalence of leprosy among children in Sri Lanka rose to 11.06% in 2022 (Figure IV)[4], contrasting with a global decline since 2012. This steady increase indicates ongoing community transmission, though the rate remained stable until 2021[4].

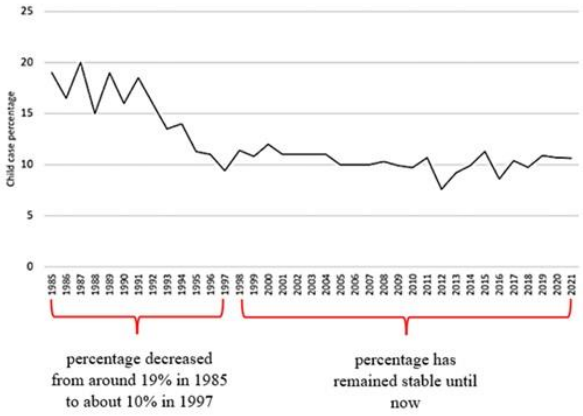

Figure IV: Percentage of reported child leprosy cases in Sri Lanka, 1985-2021[4].

WHO indicators show child leprosy elimination in all districts of Central and Uva provinces and interruption in the Northern province including Mannar, Mullaitivu, and Kilinochchi districts. Among 330 DSDs, 55 achieved leprosy elimination, 14 are nearing targets, and 177 halted child transmission. However, 83 divisions still report both child and adult leprosy transmission in Sri Lanka[43].

The COVID-19 pandemic and Sri Lanka's economic crisis disrupted leprosy control, reducing case detection and limiting contact examinations during house-to-house surveys. This decline emphasizes the need for targeted interventions to identify undiagnosed cases[44]. Poverty worsened by the economic downturn intensifies leprosy's impact, as the disease is tied to socio-economic conditions. Limited contact examinations by male PHIs during surveys lead to referrals for female contacts to a medical officer or dermatology clinic. Additionally, PHIs' broad public health duties may hinder their ability to accurately diagnose leprosy due to a lack of specialized clinical skills[25].

Efforts to combat leprosy in Sri Lanka persist despite challenges. The WHO provides crucial support through awareness campaigns, enhanced surveillance systems, and the National Strategic Plan (NSP) for 2021 to 2025, which focuses on

active case detection, improved data management, and access to quality care training programs enhance healthcare workers' diagnostic and treatment abilities, while public awareness campaigns such as street dramas, leaflet distribution, and media broadcasts seek to reduce stigma and encourage timely treatment[45]. Technological advancements are also underway, with WHO partnering with a Centre of Excellence in Japan to develop a sentinel surveillance system for monitoring drug resistance in leprosy[3]. Although not yet implemented in Sri Lanka, this system is expected to strengthen laboratory diagnostics. Supported by WHO's initiatives and a comprehensive national strategy, Sri Lanka is progressing toward the goal of zero leprosy transmission by 2030.

Future directions

Delayed diagnosis remains a significant challenge in controlling leprosy in Sri Lanka, contributing to ongoing transmission. Strengthening healthcare systems, training healthcare workers, and raising community awareness are essential to facilitate early detection, prompt treatment, and prevention of complications. Adherence to WHO-recommended MDT regimens is critical for successful treatment and transmission interruption. Additionally, exploring shorter treatment durations could enhance patient compliance and help reduce healthcare costs[11].

Future research aims to investigate environmental and genetic factors influencing leprosy transmission and to develop reliable diagnostic tools[46]. Identifying the specific causative organism of leprosy in Sri Lanka through genetic testing is a key priority, as molecular diagnostic research in the country is limited. The prevalence of *Mycobacterium leprae* and the potential presence of *Mycobacterium lepromatosis* or other endemic strains remain unknown. Cases of dual infections with both *Mycobacterium leprae* and *Mycobacterium lepromatosis* have been mainly observed in Asia[47]. Given that leprosy symptoms can take over a decade to manifest, advanced diagnostic tools capable of detecting infections in asymptomatic individuals are crucial. Such tools would enable earlier intervention, improved patient monitoring, and better management of the disease[48].

Conclusion

Leprosy in Sri Lanka reflects a complex interplay of historical, epidemiological, socio-economic, and healthcare factors. Despite achieving the WHO's elimination target in 1995, the rise in child cases highlights gaps in surveillance and control strategies. Efforts to combat the disease continue through integrated healthcare systems, public awareness campaigns, and international collaboration. However, the COVID-19 pandemic has disrupted diagnosis and control efforts emphasizing the need for resilient healthcare systems and crisis-specific interventions. Future research should prioritize early detection methods, improving treatment adherence, addressing socio-economic drivers of transmission, and developing effective vaccines. Investigating environmental and genetic factors influencing leprosy transmission could further refine prevention and intervention strategies. While Sri Lanka has made notable strides in controlling leprosy, persistent challenges underscore the need for sustained vigilance, innovation, and collaboration to achieve the goal of zero leprosy cases.

List of abbreviations

WHO	World Health Organization
MDT	Multi Drug Therapy
ALC	Anti-Leprosy Campaign
BCG	Bacillus Calmette-Guérin
NCDR	New Case Detection Rate
MB	Multi-Bacillary
PB	Paucibacillary
LPEP	Leprosy Post-Exposure Prophylaxis
GIS	Geographic Information Systems
MOH	Medical Officers of Health
OPDs	Outpatient Departments
PHIs	Public Health Inspectors
CLC	Central Leprosy Clinic
NHSL	National Hospital of Sri Lanka
SSS	Slit Skin Smear
PCR	Polymerase Chain Reaction
LL	Lepromatous Leprosy
LEMT	Leprosy Elimination Monitoring Tool
DSDs	Divisional Secretariat divisions
RDHS	Regional Director of Health Services
NSP	National Strategic Plan

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Conflict of Interest
The authors report no conflict of interest

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Conceptualization and writing original draft: IA, MT, SS, GP; Project administration: NU, JK, IK, BD; Supervision: NU, JK, IK, BD; Writing-reviewing & editing: NU, JK, IK, BD; All authors read and approved the final manuscript.

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ORCID
Ishani Aluthgamage: https://orcid.org/0009-0007-7960-5596
Maheshi Thilakarathna: https://orcid.org/0009-0005-1643-1942
Sakuni Sathsarani: https://orcid.org/0009-0009-8441-0296
Gayathri Pabodha: https://orcid.org/0009-0001-7765-151X
Nivedha Uthayarajan: https://orcid.org/0009-0004-8925-058X
Jananie Kottahachchi: https://orcid.org/0000-0002-0321-3250
Indira Kahawita: https://orcid.org/0000-0003-3702-8093
Bhagya Deepachandi: https://orcid.org/0000-0001-7601-4845

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