



# **ANNUAL REPORT**

## **2023**

**Anti-Malaria Campaign**  
**Ministry of Health**

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## Contents

SECTION ONE - MALARIA CONTROL AND PREVENTION .....	10
<b>1. Introduction.....</b>	<b>10</b>
<b>2. Epidemiology .....</b>	<b>11</b>
2.1 Categorization of malaria cases by species since 2013 - 2023 .....	11
2.2 Categorization of malaria cases by country/region of origin.....	12
2.3 Categorization of malaria cases by the risk category and nationality in 2023.....	14
2.4 Distribution of malaria cases by districts 2023.....	15
2.5 Malaria cases by sex and age group in 2023 .....	15
2.6 Delay in diagnosis of malaria .....	17
2.7 Mortality from malaria .....	18
2.8 Status of drug resistance and drug policy .....	18
2.9 Chemoprophylaxis.....	18
<b>3. Parasitological Surveillance .....</b>	<b>19</b>
3.1 Activities related to quality assurance of malaria microscopy .....	21
3.2 Laboratory items and reagents distributed.....	22
3.3 Training and assessments: .....	23
3.4 Risk Group Surveillance.....	23
<b>4. Entomological Surveillance.....</b>	<b>24</b>
4.1 Larval surveys .....	26
4.2 Larval Habitat Preferences of malaria vectors.....	26
4.3 Larval densities of malaria vectors .....	27
4.4 Larval surveys for <i>Anopheles stephensi</i> .....	28
4.5 Breeding habitat preference of <i>Anopheles stephensi</i> .....	29
4.6 Cattle Baited Cadjan Hut Collections.....	30
4.7 Cattle Baited Net Trap Collections.....	31
4.8 Indoor Hand Collections.....	32
4.9 Human Landing Night Collections.....	33
4.10 Human biting preference of malaria vectors .....	34
4.11 Receptivity Assessments .....	35

4.12 Monitoring Insecticide resistance in malaria vectors .....	35
4.13 Training programs and meetings on Entomological Surveillance 2023.....	38
<b>5. Vector Control Activities.....</b>	<b>39</b>
5.1 Core vector control activities.....	39
5.2 Supplementary vector control methods .....	40
5.3 Use of space spraying .....	40
5.4 Vector control activities – Regional level .....	41
<b>6. Monitoring &amp; Evaluation.....</b>	<b>45</b>
6.1 Monthly Progress Review Meeting .....	45
6.2 Technical Support Group meeting.....	45
6.3 Case Review Committee .....	45
6.4 Information management.....	45
<b>7. Infrastructure and Human Resources .....</b>	<b>48</b>
7.1 Carder details.....	48
7.2 Vehicles .....	49
7.3 Buildings.....	49
<b>8. Funding.....</b>	<b>50</b>
8.1 Programs/Activities conducted through Provincial/Regional level funds 2023 .....	50
 SECTION TWO - CONTROL AND PREVENTION OF LEISHMANIASIS	
<b>9.0 Leishmaniasis control and prevention activities .....</b>	<b>51</b>
9.1 Introduction and Epidemiology .....	51
9.2 Leishmaniasis case notification .....	52

## LIST OF FIGURES

- Figure 1: Proportion of imported malaria cases by species in 2023
- Figure 2: Type of malaria cases by country of origin in 2023
- Figure 3: The map of malaria cases by country of origin in 2023
- Figure 4: The malaria cases by the nationality in 2023
- Figure 5: The malaria cases by risk category in 2023
- Figure 6: Distribution of Malaria cases by districts in 2023
- Figure 7: Percentage distribution of malaria cases by gender in 2023
- Figure 8: Number of cases according to age category in 2023
- Figure 9: Days of delay in diagnosis of malaria from the onset of symptoms in 2023
- Figure 10: Distribution of sentinel sites in Sri Lanka in 2023.
- Figure 11: Number of entomological surveillance days spent by each RMO region and AMCHQ in 2023
- Figure 12: Different types of entomology surveys by the regions and AMCHQ in 2023
- Figure 13: Total number of dips taken by the regional entomological teams in 2023
- Figure 14: Larval habitat preferences of primary and secondary malaria vectors in 2023
- Figure 15: Comparison of larval densities of malaria vectors by RMO regions in 2023
- Figure 16: Breeding site preference of *Anopheles stephensi* in Jaffna and Kalmunai regions in 2023
- Figure 17: Total number of Cattle Baited Cadjan Hut collections carried out by RMO regions in 2023
- Figure 18: Mean densities of malaria vector adults collected from Cattle Baited Cadjan Huts by RMO regions in 2023
- Figure 19: Total number of Cattle Baited Net Trap collections carried out by RMO regions in 2023
- Figure 20: Mean densities of malaria vector adult females collected from Cattle Baited Net Trap by RMO regions in 2023
- Figure 21: Total number of houses inspected, and man hours spent for indoor hand collections by RMO regions in 2023
- Figure 22: Mean density of *An. culicifacies* and *An. subpictus* indoor resting densities in 2023
- Figure 23: Total man hours spent in different regions in human landing catches in 2023
- Figure 24: Map showing entomological survey sites in respective MOH areas observed with high receptivity in 2023
- Figure 25: Number of Slit Skin Smear examined and number of positive cases by month in year 2023
- Figure 26: Percentage of case positivity and percentage of total SSS performed in year 2023
- Figure 27: Case distribution by RMO regions in 2023

## LIST OF TABLES:

- Table 1: Categorization of malaria cases by the type of species from 2013 – 2023
- Table 2: Type of species of malaria by country of origin in 2023
- Table 3: Malaria cases by the risk category and nationality in 2023
- Table 4: Malaria cases by sex and age group in 2023
- Table 5: Annual malaria chemoprophylaxis distribution in 2023
- Table 6: Total number of blood smears examined during the year 2023
- Table 7: Number of slides validated during the year 2023
- Table 8: Items distributed during to Regional Malaria Offices during the year 2023
- Table 9: The number of surveys conducted for *An. stephensi* in RMO regions in 2023
- Table 10: Numbers of different types of containers surveyed in *An. stephensi* reported regions  
2023
- Table 11: Percentage composition in human biting preference of *Anopheles* species in 2023
- Table 12: Adult susceptibility tests conducted for primary and secondary vectors in 2023
- Table 13: Susceptibility of *An. culicifacies* adults for tested insecticides in 2023
- Table 14: Susceptibility of *An. stephensi* to pyrethroids in 2023
- Table 15: Susceptibility of *An. subpictus* to insecticides in 2023
- Table 16: Larval susceptibility tests in 2023
- Table 17: Total number of premises/houses and the population protected by distribution of  
LLIN island wide in 2023
- Table 18: Reactive vector control activities carried out in regions in 2023
- Table 19: Summary of supervisions accomplished by RMOs in 2023.
- Table 20: The staff availability in each category as at the end of year 2023
- Table 21: Availability of vehicles in AMC/HQ during 2023
- Table 22: Key performance indicators identified in 2023
- Table 23: RMO regions supported by the regional level funds to carry out the activities in 2023
- Table 24: Number of positive cases and number of Slit Skin Smear (SSS) performed by month  
in 2023

## **ABBREVIATIONS**

ACD – Active Case Detection  
ACT – Artemisinin based Combination Therapy  
AMC – Anti Malaria Campaign  
AMCHQ – Anti Malaria Campaign Head Quarters  
APCD – Activated Passive Case Detection  
BB – Blood Bank  
BIA – Bandaranayake International Airport  
CCP – Consultant Community Physician  
CL – Cutaneous Leishmaniasis  
CRC – Case Review Committee  
DGHS – Director General of Health Services  
EIMS – Electronic Information Management System  
IoM – International Organization for Migration  
IRS – Indoor Residual Spraying  
LLIN Long Lasting Impregnated Nets  
LSM - Larval Source Management  
MCL – Mucocutaneous Leishmaniasis  
MLT – Medical Laboratory Technician  
MO – Medical Officer  
MOH – Medical Officer of Health  
MoH – Ministry of Health  
MSD – Medical Supplies Division  
NSP – National Strategic Plan  
PCD – Passive Case Detection  
PCR – Polymerase Chain Reaction  
PDHS – Provincial Director of Health Services  
PHFO – Public Health Field Officer  
PHI – Public Health Inspector  
PHLT – Public Health Laboratory Technician  
PoR - Prevention of Reintroduction phase  
QA/QC – Quality Assured/ Quality Controlled  
RDHS – Regional Director of Health Services  
RDT – Rapid Diagnostic Tests  
RMO – Regional Malaria Officer  
RRT – Rapid Response Team  
SDG – Sustainable Development Goals  
SL – Sri Lanka  
SSS – Slit Skin Smear  
The GF – The Global Fund  
TSG – Technical Supportive Group  
UNHCR – United Nations High Commission for Refugee  
VL – Visceral Leishmaniasis  
WHO - World Health Organization



## Foreword

It is with great pleasure and commitment that we present the Annual Report of the Anti-Malaria Campaign of Ministry of Health 2023, a comprehensive account of our collective efforts to combat one of the world's most persistent public health challenges. This year marks another pivotal chapter in our journey towards a malaria-free future, following World Health Organization (WHO) certification in 2016, showcasing significant achievements, strategic initiatives, and the unwavering dedication of all stakeholders involved.

The Anti-Malaria Campaign (AMC) is the focal point for prevention of re-establishment (PoR) of malaria ensuring malaria free Sri Lanka (SL). In 2023, our focus has been to reinforce community engagement, scale up preventive measures, and strengthen healthcare systems to ensure timely and effective responses to keep malaria free. Presently, two major strategies of the AMC include continuing case monitoring & surveillance for malaria cases and reactive, proactive parasitological, entomological & vector surveillance. The parasitological and entomological teams conduct regular entomological and parasitological surveys according to guidelines.

The AMC functions as the compulsory reporting hub for all the suspected cases of malaria, island wide. Therefore, it is mandatory to notify all the suspected malaria cases detected in the country to the AMC, which is the final assenting body for the confirmation of suspected malaria cases through laboratory investigations (Microscopy /Rapid Diagnostic Tests / PCR). Additionally, the drugs for the treatment of malaria & chemoprophylaxis are procured and distributed by the AMC. Each confirmed case of malaria is reviewed by an independent expert Case Review Committee (CRC) of the Technical Support Group (TSG) regarding rational management of malaria patient and diseases classification. Rapid Response Team (RRT) is responsible for taking urgent investigations when there is a warning of a suspected malaria outbreak.

This report highlights the steps made in early diagnosis of imported malaria cases and also underscores the ongoing need for vigilance, funding, and policy advocacy to sustain and build upon these achievements. Each statistic and section in this document reflect the resilience of communities, the dedication of frontline workers, and the impact of partnerships that bridge local and global efforts.

As we look ahead, let us continue to foster collaboration, embrace innovation, and work unwaveringly to sustain the malaria free status and zero mortality from malaria, that support SDG 3: "Ensure healthy lives and promote well-being for all at all ages," by combating malaria and improving health outcomes.

May this report serve not only as a testament to our progress but also as an inspiration to press on with renewed determination in the years to come to sustain the malaria free status of the country.

Dr. Champa Aluthweera  
Director  
Anti-Malaria Campaign

## **Acknowledgement**

The Anti-Malaria Campaign (AMC) extends its heartfelt gratitude to all stakeholders, particularly the international partners, for their invaluable support through the Ministry of Health (MoH), Sri Lanka. Over the past decade, this collaboration has significantly strengthened the country's health system, enabling remarkable progress in the fight against malaria.

We deeply appreciate the continuous technical guidance provided by the Technical Support Group (TSG), which has been instrumental in shaping our strategies and actions. A special acknowledgment is extended to the Director, Consultant Community Physicians (CCP), Medical Officers (MO), Parasitologist, Entomologists, and the dedicated staff of the Entomological and Parasitological units. The tireless efforts of the administrative and finance teams, Provincial and Regional Health Directors (PDHS, RDHS), Regional Malaria Officers (RMO), and their staff are also recognized with great gratitude.

Furthermore, we commend the public health staff and field workers across the nation for their unwavering commitment, which has been pivotal in achieving malaria-free status. The diligence of our information management, monitoring, and evaluation teams in maintaining accurate and reliable data has been vital to our success.

Lastly, the AMC expresses its profound thanks to the World Health Organization (WHO) for their continuous technical and financial assistance throughout 2023. This steadfast support has been a cornerstone in sustaining and advancing our efforts toward a malaria-free Sri Lanka.

# SECTION ONE - MALARIA CONTROL AND PREVENTION

## 1. Introduction

It has been seven years since Sri Lanka entered the Prevention of Reintroduction (PoR) phase of malaria, following the World Health Organization's (WHO) certification of malaria elimination in 2016. The last indigenous malaria case was reported in October 2012. Since then, the Anti-Malaria Campaign (AMC) has maintained zero Indigenous transmission for seven consecutive years, a success story that continued through 2020. Since 2012, all reported malaria cases have been imported, primarily through overseas returnees and travellers, with the sole exception of one introduced case recorded in December 2018.

Sri Lanka's environment is highly conducive to vector breeding, maintaining constant receptivity in most regions. The ongoing presence of imported cases poses a significant threat to the sustainability of the country's malaria-free status. Over the past seven years, imported malaria cases have primarily involved international travellers and Sri Lankan nationals returning from or transiting through malaria-endemic regions. With strengthened surveillance, the number of imported malaria cases rose to 62 in 2023, compared to 37 cases in 2022.

The AMC's activities align with the 2023–2027 National Malaria Strategic Plan (NSP), which outlines a renewed vision, mission, priorities, and strategies to safeguard Sri Lanka's malaria-free status and mitigate the risk of reintroduction and re-establishment of the disease.

### **Vision**

A malaria-free Sri Lanka

### **Mission**

Plan and implement a comprehensive programme to sustain intensive surveillance, comprehensive case management, outbreak preparedness, and rapid response for prevention of re-introduction and re-establishment of malaria in Sri Lanka.

### **Goal**

To maintain malaria-free status

### **Objectives**

1. To prevent re-establishment of malaria in Sri Lanka
2. To maintain zero mortality due to malaria in Sri Lanka

## 2. Epidemiology

Sri Lanka successfully sustained its malaria-free status for the seventh consecutive year following WHO certification. Over the past years, Sri Lanka has reported approximately fifty (50) imported malaria cases each year. The increase in imported malaria cases in 2023 compared to 2022 can be attributed to several factors; significant rise in international travel with the easing of global travel restrictions following the COVID-19 pandemic, the majority of travellers, including migrant workers, students, and tourists, visited malaria-endemic regions, and higher movement of migrant workers to the country.

### 2.1 Categorization of malaria cases by species since 2013 - 2023

Table 1 provides a categorization of reported imported cases by the type of species from 2013 to 2023. The total number of cases is being dropped till 2022 and the number increased in 2023 due to increased global travelling following lifting limitations in COVID-19 travel restrictions.

Table 1: Categorization of malaria cases by the type of species from 2013 – 2023

Year	Total cases	<i>P. vivax</i>		<i>P. falciparum</i>		<i>P. ovale</i>		<i>P. malariae</i>		<i>P. knowlesi</i>		<i>Mixed</i>	
	No	No	%	No	%	No	%	No	%	No	%	No	%
2013	95	52	54.70%	42	44.20%	1	1.00%	0	0.00%	0	0.00%	0	0.00%
2014	49	28	57.10%	20	40.80%	0	0.00%	1	2.00%	0	0.00%	0	0.00%
2015	36	17	47.20%	17	47.20%	2	5.50%	0	0.00%	0	0.00%	0	0.00%
2016	41	16	39.00%	18	43.90%	5	12.30%	1	2.40%	1	2.40%	0	0.00%
2017	57	27	47.40%	26	45.60%	3	5.30%	1	1.80%	0	0.00%	0	0.00%
2018	48	30	62.50%	15	31.30%	3	6.30%	0	0.00%	0	0.00%	0	0.00%
2019	53	24	45.30%	24	45.30%	3	5.70%	2	3.80%	0	0.00%	0	0.00%
2020	30	11	36.66%	8	26.66%	8	26.66%	2	6.66%	0	0.00%	1	0.00%
2021	26	4	15.38%	13	50.00%	8	30.76%	1	3.84%	0	0.00%	0	0.00%
2022	37	2	5.40%	27	72.97%	7	18.91%	1	2.70%	0	0.00%	0	0.00%
2023	62	4	6.45%	45	72.58%	11	17.74%	1	1.61%	0	0.00%	1	1.61%

In the year 2023, the reported highest percentage of malaria cases was *P. falciparum* at 72.58% (n=45), *P. ovale*, and *P. vivax* were 17.74%, and 6.45% (n=11,4) each respectively. One case of *P. malariae* and one case of mixed infection were among the total cases (62) reported. Among the *P. falciparum* cases, there was one death, three severe cases and one recrudescence. Figure 1 illustrates the distribution of imported malaria cases by species in Sri Lanka.

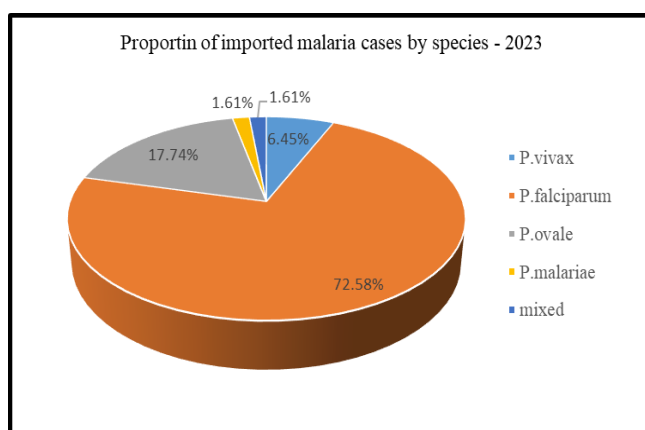


Figure 1: Proportion of imported malaria cases by species in 2023

## 2.2 Categorization of malaria cases by country/region of origin

In 2023, majority ninety percent (90.3%) of the cases were imported from the countries in the African continent. Among the cases, approximately 72.6% (n=45) cases were *P. falciparum*, and 17.7% (n=11) cases were *P. ovale*. The type of species and number of cases by the country of origin is given in detail in Table 2.

Table 2: Type of species of malaria by country of origin in 2023

Country of Origin	Species					Total	%
	Pf	Pv	Po	Pm	mix		
Guinea	1					1	1.6%
Sierra Leon	9	1	1			11	17.7%
Tongo	1					1	1.6%
Tanzania	4				1	5	8.1%
Uganda	2					2	3.2%
Central African Republic	2		2			4	6.4%
South Africa	1			1		2	3.2%
Pakistan	2					2	3.2%
South Sudan	7		7			14	22.6%
Rwanda	1					1	1.6%
Nigeria	6					6	9.7%
Kenya	1					1	1.6%
Benin	2					2	3.2%
Papua New Guinea		1				1	1.6%
Congo	1					1	1.6%
Madagascar	1					1	1.6%
Gahana			1			1	1.6%
India	1	2				3	4.8%
Liberia	1					1	1.6%
More Than on country	2					2	3.2%
<b>Total</b>	<b>45</b>	<b>4</b>	<b>11</b>	<b>1</b>	<b>1</b>	<b>62</b>	

The graph, figure 2 below shows the imported malaria cases by country of origin in 2023. Approximately one or two species were contracted from most countries except Sierra Leon of which three malaria species were reported during the period.

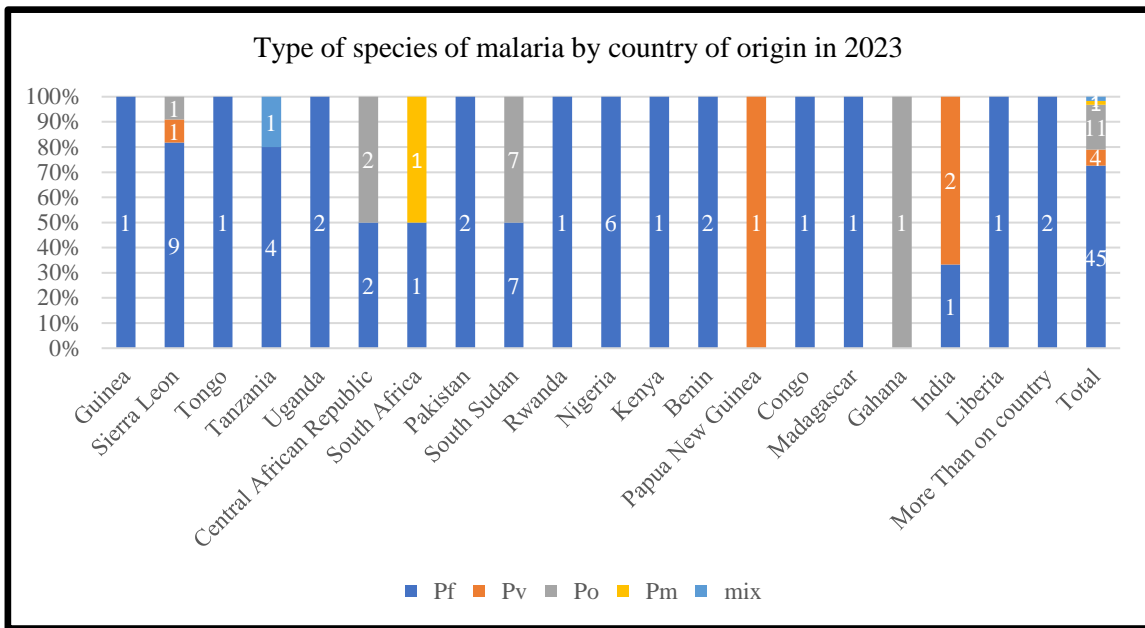


Figure 2: Type of species of malaria cases by country of origin in 2023

The map, figure 3 illustrates the countries where imported malaria cases originated in the year 2023. Thus, the majority of cases originated from South Sudan (n=14,22.6%) and the second highest was from Sierra Leon (n=11,17.7%).

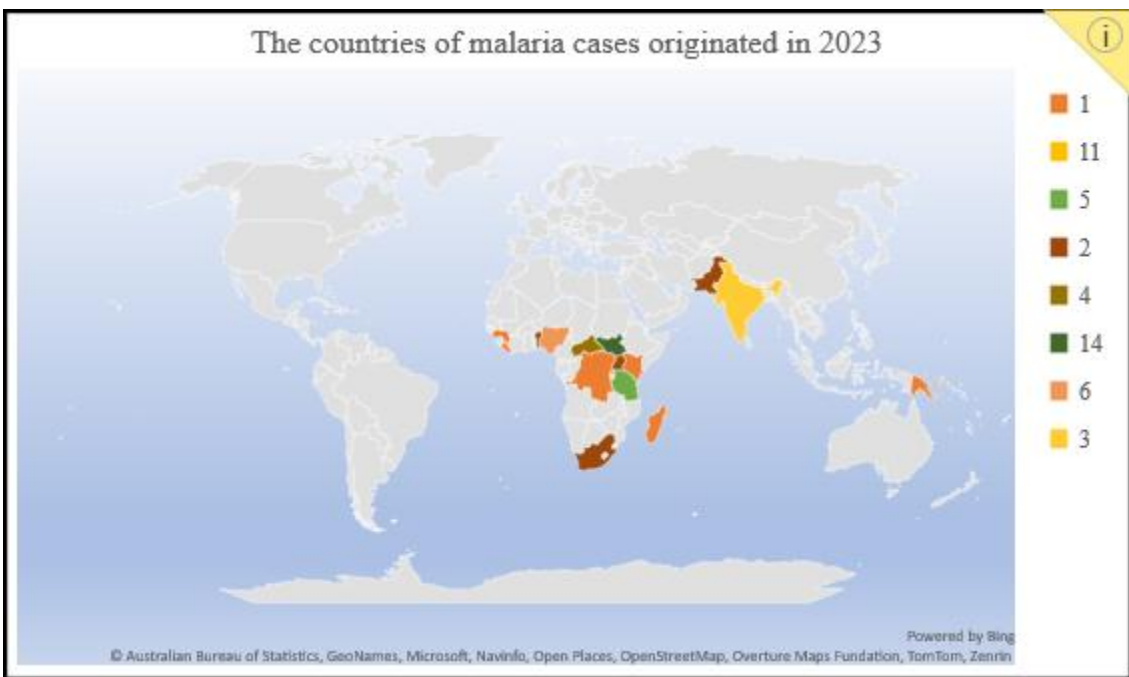


Figure 3: The map of malaria cases by country of origin in 2023

### 2.3 Categorization of malaria cases by the risk category and nationality in 2023

The majority of the cases fifty-one (n=51, 82.26%) were Sri Lankans who have travelled to malaria-endemic countries for service requirements, work purposes and businesses. Figure 4 illustrates the percentages of malaria cases according to nationality in 2023.

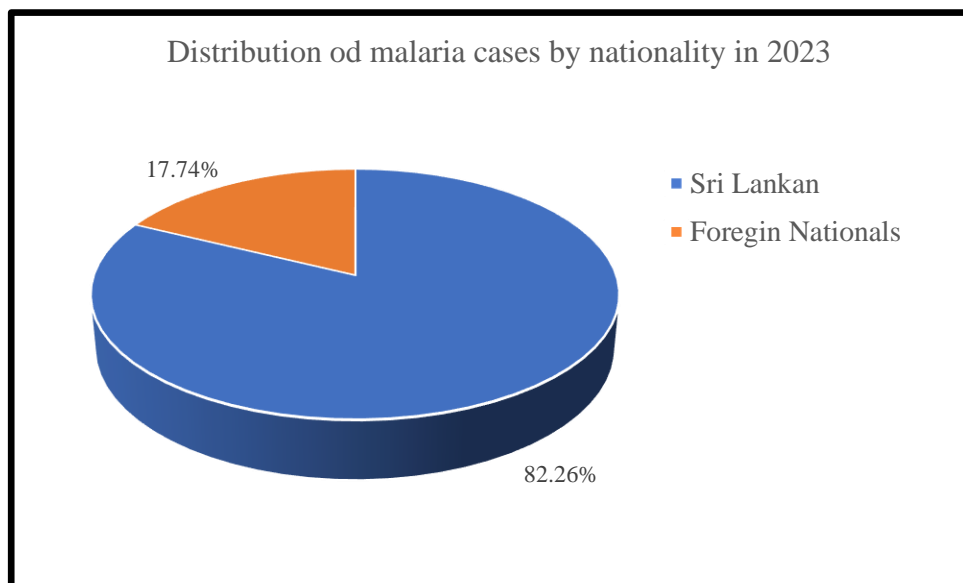


Figure 4: The malaria cases by nationality in 2023

AMC has identified several risk categories that have the possibility of getting the disease by travelling to malaria-endemic countries. The categories include pilgrims to India, vacationers who visit endemic countries, and travellers for educational purposes. Table 3 represents the numbers and percentages of imported malaria cases in 2023. Most malaria patients about fourteen (14) cases (22%) were reported by Tri forces, mainly from the Sri Lanka Army. Nine (n=9,14%) cases were reported as malaria was contracted while travelling for occupational purposes. Figure 5 shows the graphical presentation of the imported malaria cases by risk category in 2023.

Table 3: Malaria cases by the risk category and nationality in 2023

Nationality	Sri Lankan	Foreign nationals	Total	Percentage
Occupation	7	2	9	14 %
Business	1	1	2	3 %
Gem Trade	4	0	4	7 %
Tourist	0	5	5	8 %
Forces	14	0	14	22 %
Seaman	1	2	3	5 %
Other	24	2	26	41 %
Total	51	11	62	100%
Percentage (%)	82.26%	17.74%	100.00%	

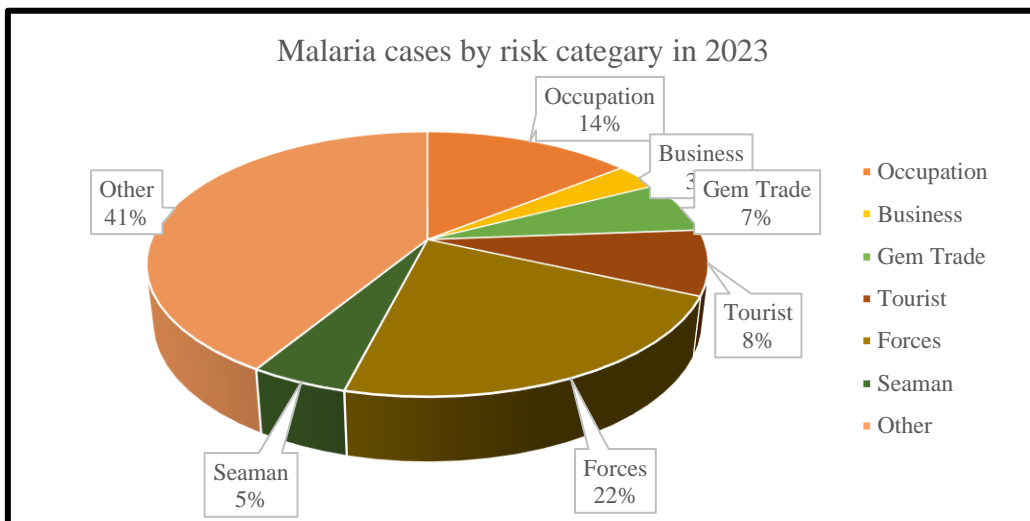


Figure 5: Malaria cases by risk category in 2023

#### 2.4 Distribution of malaria cases by districts 2023

Figure 6 provides the distribution of malaria cases by districts in 2023. During the year, most cases were reported from Colombo, followed by Gampaha and Galle district.

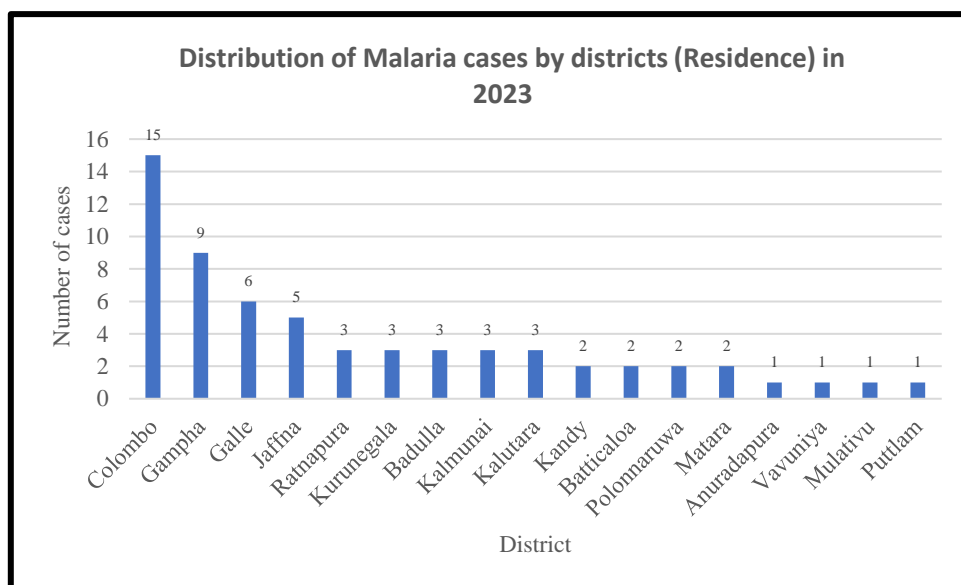


Figure 6: Distribution of Malaria cases by districts in 2023

#### 2.5 Malaria cases by sex and age group in 2023

The age distribution varies from 5 years to 64 years. Out of sixty-two (n=62) cases fifty-four cases (n=54, 87.09%) were males and eight (n=8, 12.9%) were females. Most of the cases (n=24, 38.71%) were reported among the age group of 35 – 44 years age group. Following table 4, figure 7 and 8 presents the data of imported malaria cases by age in groups and gender.



Table 4: Malaria cases by sex and age group in 2023

Age	Gender		Total (%)
	Female (%)	Male (%)	
0-12	0 (0.00%)	1 (1.61%)	1 (1.61%)
13-17	0 (0.00%)	1 (1.61%)	1 (1.61%)
18-24	2 (3.22%)	4 (6.45%)	6 (9.68%)
25-34	3 (4.83%)	17 (27.41%)	20 (32.26%)
35-44	3 (4.83%)	21 (33.87%)	24 (38.71%)
45-54	0 (0.00%)	6 (9.67%)	6 (9.68%)
55-64	0 (0.00%)	4 (6.45%)	4 (6.45%)
65-74	0 (0.00%)	0 (0.00%)	0 (0%)
Total	8 (12.90%)	54 (87.09%)	62 (100.00%)

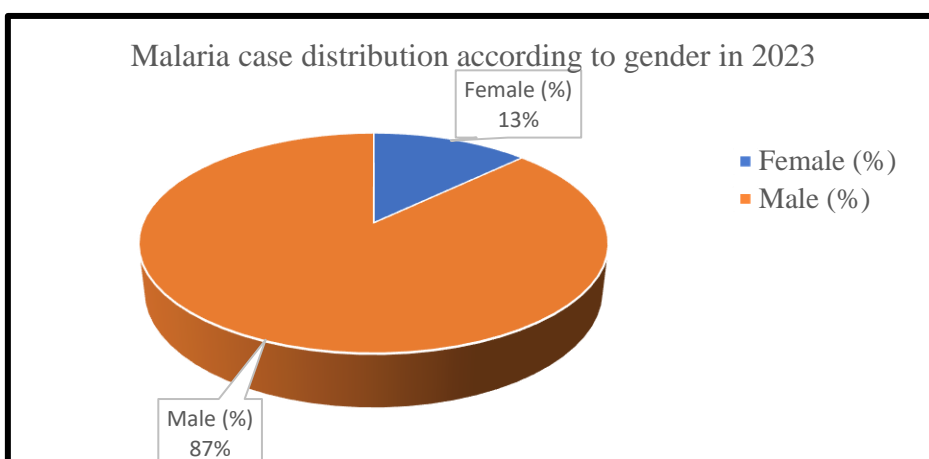


Figure 7: Percentage of malaria cases by gender in 2023

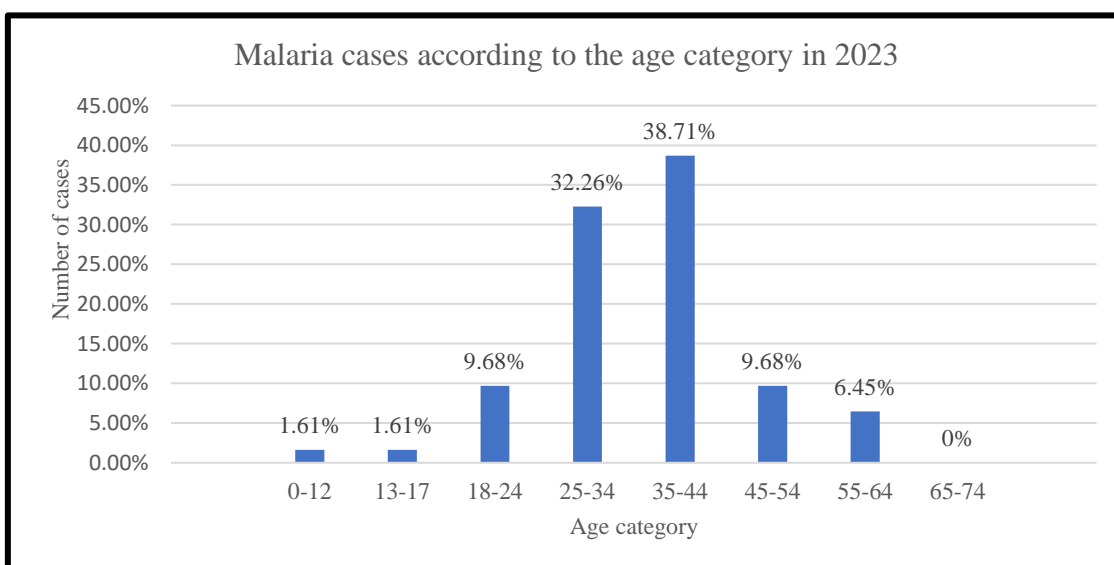


Figure 8: Number of cases according to age category in 2023

## 2.6 Delay in diagnosis of malaria

The diagnosis of delay is considered from the first onset of symptoms and or signs of malaria. Nearly thirty-eight cases (38,61.29%) out of total cases were diagnosed within 7 days of onset of symptoms of Malaria. The number of days in delay ranges from 0 to 35 days. Figure 10 shows the number of days delayed in diagnosis of each case in 2023.

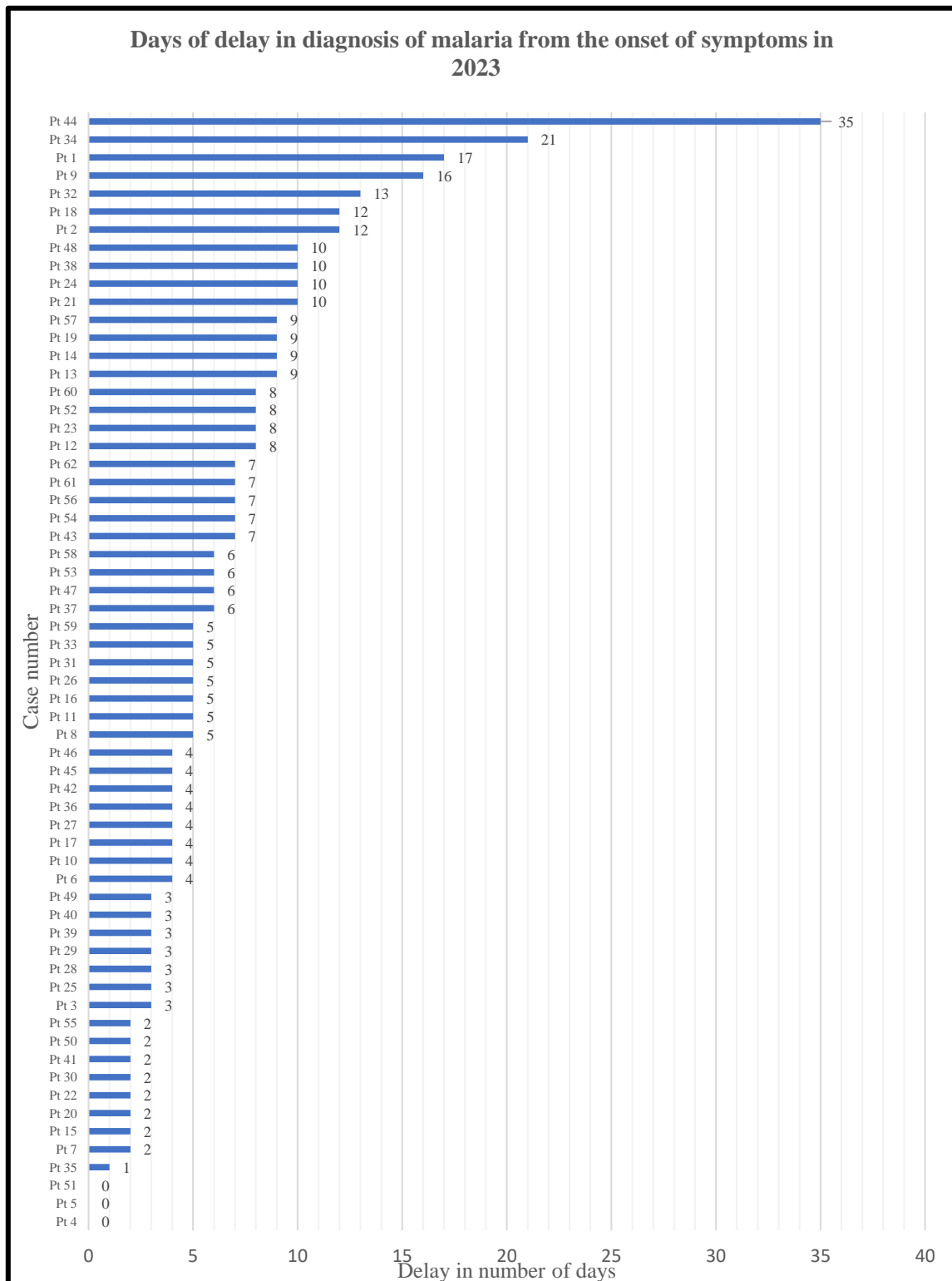


Figure 9: Days of delay in diagnosis of malaria from the onset of symptoms in 2023

## 2.7 Mortality from malaria

Zero mortality due to malaria was maintained till mid-2023. The first case of malaria death in PoR phase was reported from Kalutara district, a severe case of *p. falciparum* contracted from Tanzania.

## 2.8 Status of drug resistance and drug policy

Parasitaemia of diagnosed malaria patients were assessed daily to detect the efficacy of treatment. All *P. vivax* cases were treated with Chloroquine for three days followed by Primaquine for fourteen days, drug doses calculated on an individual basis, according to the body weight of each patient. All uncomplicated *P. falciparum* cases were treated with Artemisinin-based Combination Therapy (ACT) followed by a single stat dose of Primaquine. There were four (n=4) severe cases of malaria, treated with Inj. Artesunate, dose adjusted to body weight, a total of six doses and a single dose of tablet primaquine.

## 2.9 Chemoprophylaxis

Chemoprophylaxis is provided by AMC Headquarters, Regional Malaria Officers and certain identified Medical Officer of Health (MOH) in regions to facilitate client accessibility and availability. AMCHQ continuously offers chemoprophylactic medications to individuals participating in training and UN peacekeeping operations for the Sri Lanka Army and Sri Lanka Navy, tailored to the predominant species of Plasmodium and the known resistance patterns of that species at the traveller's destination. The table below represent the information on chemoprophylaxis distribution by AMCHQ.

Table 5: Annual malaria chemoprophylaxis distribution in 2023

Drug \ Amount	Travellers	RMO	TRI Forces		
			SL Army	SL Navy	SLAF
Tab. Mefloquine 250mg	18471	18750	9605	782	10156
Tab. Chloroquine 150mg	2343	127000	15002	6084	1517
Cap. Doxycycline 100mg	1265	0	1000	0	0

The chemoprophylaxis drug Mefloquine (250mg) distribution was remarkably increased due to increased travel to African countries for Safari visits, occupational purposes such as gem trading, textiles, various businesses, professional conferences and UN peace keeping missions.

### 3. Parasitological Surveillance

The parasitological surveillance in the country is implemented mainly through testing individuals attending to medical institutions and field level screening done based on the vulnerability and receptivity.

Malaria diagnosis done at medical institutions are categorized either as Passive Case Detection (PCD) or if it is done by a Public Health Laboratory Technician (PHLT)/ Public Health Field Officer (PHFO) as Activated Passive Case Detection (APCD). Active Case Detection (ACD) is carried either proactively or re-actively. In Proactive Case Detection (PACD), high risk groups such as frequent travellers to malaria endemic countries are screened. Reactive Case Detection is carried out as a response to a malaria case detected. Microscopy is the main diagnostic method while Rapid Diagnostic tests (RDTs) are also being used as a supplementary tool. In addition, the National Blood Transfusion Service screen all the blood donors for malaria by microscopy. Accordingly, a total of 835,655 blood smears have been examined during the year 2023. Table 6 gives the total number of blood smears examined during the year by district.

Table 6: Total number of blood smears examined during the year 2023

District/RMO region	APCD	PCD	BB*	PACD	RACD	Total
Ampara	8,572	0	12,532	2,471	0	23,575
Anuradhapura	10,532	53	29,340	1,584	790	42,299
Badulla	12,434	0	15,996	1,381	116	29,927
Batticaloa	38,051	0	9,953	5,450	2,697	56,151
Colombo	1,143	129	101,410	12,770	271	115,723
Embilipitiya	13,703	1,564	19,738	4,559	126	39,690
Galle	1,492	2,075	18,320	714	0	22,601
Gampaha	1,237	5	33,656	5,922	0	40,820
Hambantota	14,547	0	9,854	1,700	0	26,101
Jaffna	7,415	1,551	12,193	3,066	613	24,838
Kalmunai	27,296	0	3,664	2,427	138	33,525
Kalutara	1,079	1	6,953	34	0	8,067
Kandy	16,077	329	42,876	966	134	60,382
Kegalle	7,530	0	9,714	2,485	138	19,867
Kilinochchi	1,586	5,913	802	1,934	0	10,235
Kurunegala	21,411	0	42,484	2,721	350	66,966
Maho	12,099	0	3,535	29	0	15,663
Mannar	6,284	0	1,142	3,276	2	10,704
Matale	24,475	0	7,140	1,313	480	33,408
Matara	3,064	0	20,064	168	270	23,566
Monaragala	15,318	0	8,195	1,784	0	25,297
Mullaitivu	5,441	6,938	1,187	7,599	136	21,301
Nuwara-Eliya	3,808	0	4,947	256	0	9,011
Polonnaruwa	9,132	0	11,439	189	469	21,229
Puttalam	7,259	0	12,235	7,500	9	27,003
Trincomalee	7,577	0	4,197	848	129	12,751
Vavuniya	4,885	4,693	3,527	1,491	359	14,955
Sri Lanka	283,447	23,251	447,093	74,637	7,227	835,655

\* Note- BB denotes the number of blood donors screened

Even though microscopy is considered the traditional gold standard, malaria Rapid Diagnostic Test kits (RDTs) are important as a point-of-care diagnostic tool. Therefore, the Anti-Malaria Campaign takes measures to make available WHO pre-qualified malaria Rapid Diagnostic Test Kits through the Regional Malaria Officers in intensive care units in major hospitals and in medical institutions where microscopic facilities are not immediately available. In addition, RDTs are also used to screen high risk individuals in emergency situations. Table 7 gives the number of malaria Rapid Diagnostic Test Kits performed during the year 2023.

Table 7: Total number of malaria Rapid Diagnostic Test Kits performed during the year 2023

District/RMO region	APCD	PCD	PACD	RACD	Total
Ampara	315	0	210	0	525
Anuradhapura	489	0	265	78	832
Badulla	96	0	350	22	468
Batticaloa	713	11	26	0	750
Colombo	785	125	941	218	2,069
Embilipitiya	159	0	462	3	624
Galle	26	141	0	0	167
Gampaha	307	2	304	1	614
Hambantota	356	42	120	1	519
Jaffna	896	837	683	21	2437
Kalmunai	860	0	0	0	860
Kalutara	70	0	0	0	70
Kandy	449	0	525	1	975
Kegalle	526	0	114	0	640
Kilinochchi	57	215	279	35	586
Kurunegala	23	0	17	0	40
Maho	264	0	0	0	264
Mannar	519	0	277	0	796
Matale	644	292	43	14	993
Matara	621	0	94	0	715
Monaragala	180	0	240	0	420
Mullaitivu	216	219	221	35	691
Nuwara-Eliya	64	12	90	0	166
Polonnaruwa	267	12	126	15	420
Puttalam	324	0	23	30	377
Trincomalee	656	0	277	0	933
Vavuniya	199	228	142	0	569
Sri Lanka	10,081	2,136	5,829	474	18,520

### 3.1 Activities related to quality assurance of malaria microscopy

Validation of blood smears were carried out in Regional Malaria Laboratories and the Central Reference Laboratory. Table 8 gives the number of slides examined by QA/QC PHLTS in Regional Malaria Laboratories and sent to AMC HQ and the number of slides validated at AMC HQ.

Table 8: Number of slides validated during the year 2023

RMO	Number of slide validated by the Regional Laboratories and/or sent to the AMC reference laboratory	Number of slides validated at Central Reference Laboratory during the year 2023 *
Ampara	1172	640
Anuradhapura	3259	1547
Badulla	1412	858
Batticaloa	606	418
Colombo	656	493
Embilipitiya	1271	643
Galle	662	377
Gampaha	367	279
Hambantota	1792	985
Jaffna	1327	762
Kalmunai	1209	655
Kalutara	313	183
Kandy	1483	944
Kegalle	950	532
Kilinochchi	1612	1077
Kurunegala	2908	1691
Maho	790	523
Mannar	517	342
Matale	1850	1155
Matara	934	579
Monaragala	1484	911
Mulativu	1713	1085
NuwaraEliya	381	261
Polonnaruwa	1638	875
Puttalam	524	364
Trincomalee	964	578
Vavuniya	1010	684

\* Note - Slides examined by the Regional Laboratories during the year 2023 but sent to AMC reference laboratory during 2024 were not included.

### 3.2 Laboratory items and reagents distributed

The Anti-Malaria Campaign maintains buffer stocks of the items required for blood smear examination, and distribute the Regional Malaria Offices as needed and requested. Details of the main items required for microscopy and amounts of malaria Rapid Diagnostic Test Kits distributed during the year 2020 are given in Table 9.

Table 9: Items distributed to Regional Malaria Offices during the year 2023

Distribution	Glass slides	Blood lancets	Giemsa stain (L)	Ethanol (L)	Anisole (L)	RDT
Ampara	7000	6400	1	1	-	400
Anuradhapura	5000	-	-	-	2.5	275
Badulla	23600	5000	2.5	-	-	200
Batticaloa	5000	8000	4	-	-	800
Colombo	1144	400	3.35	4.25	3	427
Embilipitiya	20000	10000	3		1	300
Galle	-	-	2.5	0.5	-	150
Gampaha	5100	2000	5	7	-	425
Hambantota	25000	8000	1	0.5	5	510
Jaffna	-	-	1.5	1	-	2775
Kalmunai	10000	10000	2	-	-	200
Kalutara	2158	200	0.5	1	0.75	465
Kandy	60000	10000	2	6	2	1075
Kegalle	10000	-	2.5	2	-	275
Kilinochchi	2500	-	0.5	-	-	375
Kurunegala	7500	4000	4.5	2.5	-	350
Maho	5500	7000	1	-	-	180
Mannar	10000	5000	1	0	0.5	475
Matale	6000	4000	1.5	3.5	-	375
Matara	-	-	1.5	1	1	400
Monaragala	5000	-	2	2	-	1010
Mullaitivu	15000	6000	1	-	1	375
Polonnaruwa	5000	3000	2	2	-	275
Puttalam	7500	2000	1.5	1	2.5	100
Trincomalee	-	-	5.5	-	-	525
Vavuniya	-	-	1	1	-	625
For the use of AMC HQ	2500	2800	2.5	20.5	1.8	3073

### 3.3 Training and assessments:

A series of training programmes were conducted for private sector laboratory technicians. A total of 43 technicians were trained in malaria microscopy. Based on a request, 17 Medical Laboratory Technologists attached to Colombo Municipal Council were also trained on malaria microscopy. No External Competence Assessments for Malaria Microscopy or National Competence Assessment on Malaria Microscopy were conducted.

### 3.4 Risk Group Surveillance

Risk group surveillance is a very important aspect during the PoR (Prevention of Re-establishment) phase. Since there are no indigenous cases and the risk of re-establishment is imposed only by the imported cases, identifying the risk groups, conducting awareness programs, screening and follow-up of at-risk populations play a significant role in the PoR phase. There are several categories of risk groups identified. They are,

- Tri forces going to African countries for peacekeeping missions
- Illegal migrants trying to get into Europe through Africa
- Sri Lankan businessmen frequently travel to malaria-endemic countries.
- Sri Lankans working in malaria-endemic countries – Gem traders, Textile factories
- Sri Lankan pilgrims mainly to India and Nepal
- Sri Lankan leisure travellers going to malaria-endemic countries
- Foreign nationals working in Sri Lanka. (Factories/ construction sites)
- Foreign students
- Tourists coming from malaria-endemic countries
- Foreign refugees & Indian fishermen arrested in Sri Lankan waters.

Similarly, there are identified stakeholders working directly with risk categories. AMC conducts advocacy and awareness programs to support in keeping Sri Lanka malaria-free. Identified such stakeholders are,

- Ministry of Defence, Sri Lanka Tri Forces, Sri Lanka Police
- Ministry of Buddha Sasana
- Ministry of Tourism
- Ministry of labour and foreign Employment
- Ministry of Sports
- Sri Lanka Tourism Development Authority
- Sri Lanka Bureau of Foreign Employment
- Board of Investment
- International Organization of Migration
- Travel Agents' Association of Sri Lanka
- IATA Agents' Association of Sri Lanka
- Jemiahthul Ulama Association
- Ceylon Association of Shipping Lines

Two risk group awareness programs and two stake holder meetings were held by the AMC headquarters in 2023. Apart from these, Risk group awareness and stake holder meetings are conducted regularly at the district level by the Regional Malaria Officers.

It's the responsibility of the regional malaria officer to find out the risk groups and risk foci in the region and carryout awareness and screening programs timely.



#### 4. Entomological Surveillance

Entomological surveillance plays a key role in efforts to prevent the re-establishment of malaria in Sri Lanka. In 2023, entomological surveillance activities have been carried out according to the revised guidelines for entomological surveillance (2019) and in accordance with the National Strategic Plan 2023-2028. The objective of entomological surveillance was to determine the malaria receptivity in the country to generate entomological evidence to implement vector control interventions based on the susceptibility to insecticides and biological efficacy of vector control tools.

The entomological surveys were classified into two major categories: spot surveys and sentinel surveys. Spot surveys were carried out as reactive spots when a malaria patient was reported and as proactive spots when the malaria importation risk of a certain area was increased. Proactive spots were conducted as either adult and larval surveys or larval surveys alone. Special entomological surveys were carried out in areas where the invasive container breeding potential malaria vector *An. stephensi*, was found and in areas with a potential of invasion, especially highly urbanized areas with high population transition, transportation hubs and ports of entries.

In sentinel surveys, fixed-site entomological monitoring has been conducted monthly in seventeen (17) MOH areas where both receptivity and importation risk were high or receptivity alone is high. Figure 10. shows the distribution of locations of the sentinel sites in Sri Lanka in 2023.

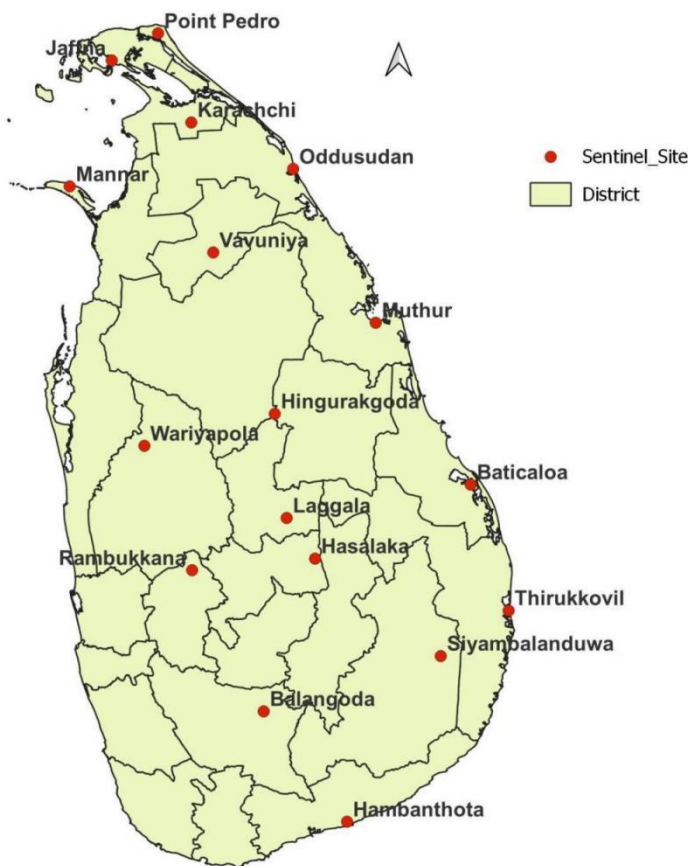


Figure 10: Distribution of sentinel sites in Sri Lanka in 2023.

Forty-three (43) entomological teams have been engaged in the entomological surveillance activities in twenty-seven (27) RMO regions. A total of 5166 entomological days were spent by the central and regional entomological teams. Figure 11 depicts the total number of entomology days conducted by RMO regions and AMC HQ.

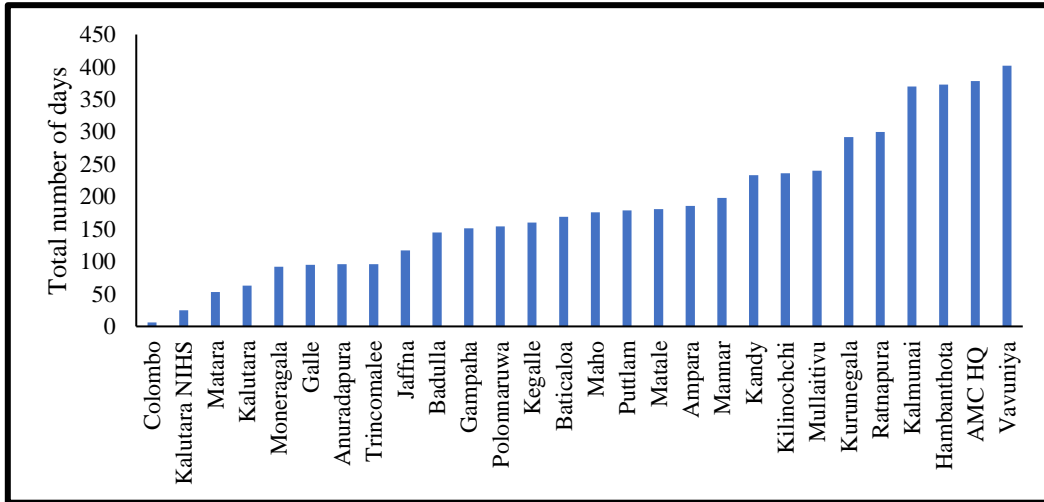


Figure 11: Number of entomological surveillance days spent by each RMO region and AMCHQ in 2023

A total of 2524 surveys were completed as 187 sentinel surveys (SS), 421 proactive spot surveys with both adult and larval collections (PSSAL), 1812 proactive larval surveys (PSSL) and 91 reactive surveys (ReSS) in 2023. Nineteen RMO regions and AMC HQ has been involved in reactive entomological surveillance during 2023. The number and types of different entomological surveys carried out by the regions according to the entomological surveillance guidelines are shown in Figure 12.

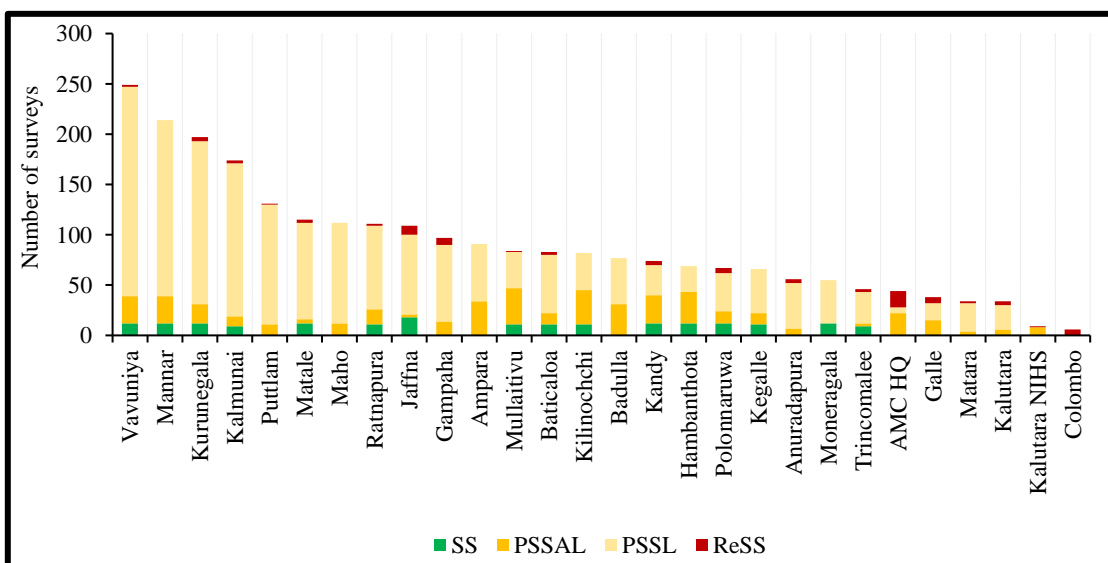


Figure 12: Different types of entomology surveys by the regions and AMCHQ in 2023

## 4.1 Larval surveys

Larval surveys were conducted in all sentinel sites, proactive and reactive spot survey sites to monitor larval densities and breeding site preferences of malaria vector mosquitoes. The frequency of dips taken in each RMO region / District varies based on the presence of anopheline breeding habitats in a specific geographical area. Figure 13 shows the work output of the larval surveys as total number of dips taken by each RMO region.

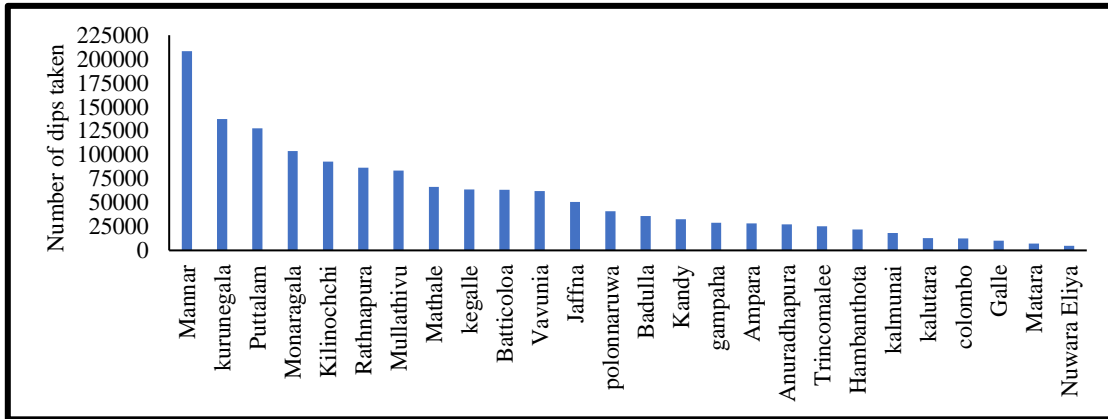


Figure 13: Total number of dips taken by the regional entomological teams in 2023

## 4.2 Larval Habitat Preferences of malaria vectors

In 2023, larval surveys indicated the highest densities of primary malaria vector, *Anopheles culicifacies* larvae in riverbed pools. Other prominent breeding habitats of *An. culicifacies* were animal foot prints, tank margins, river and stream margins, wells, tank bed pools, water storage containers, gem pits, burrow pits, and tank margins (Figure 14). Of the secondary malaria vectors, the highest density of *An. subpictus* larvae was observed at lagoon margins and in animal foot prints, while *An. varuna* displayed the highest densities in riverbed pools and river/stream margins and gem pits, respectively. *An. tessellatus* and *An. vagus* were prevalent in gem pits and burrow pits respectively. Figure 14 shows larval habitat preferences of malaria vectors.

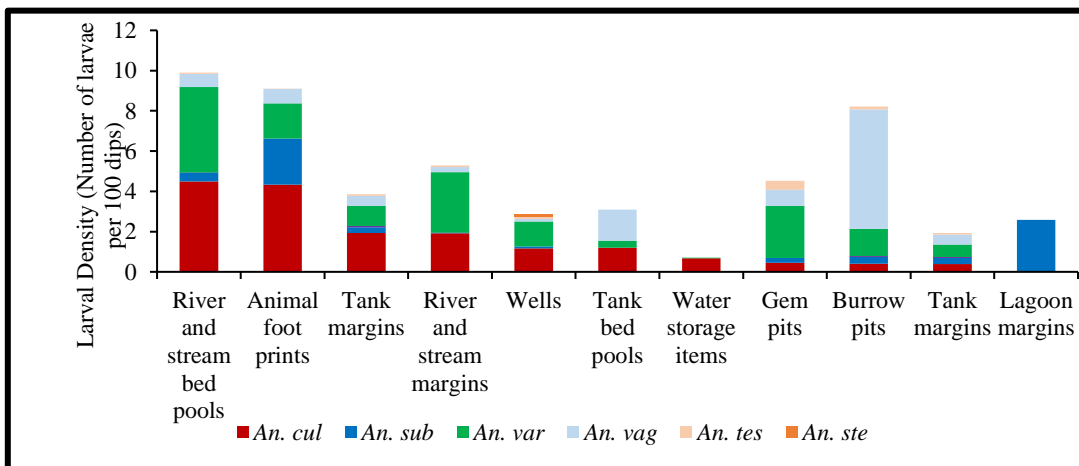


Figure 14: Larval habitat preferences of primary and secondary malaria vectors in 2023

### 4.3 Larval densities of malaria vectors

The highest density of *An. culicifacies* was reported from the larval collection sites of Nuwara-Eliya District followed by Trincomalee and Kurunegala Districts. The high density in Nuwara-Eliya District might be due to the high seasonal abundance of *An. culicifacies* in Rikillagaskada MOH area. Highest densities of *An. subpictus*, *An. annularis*, *An. varuna* larvae were found in Trincomalee, Maho and Monaragala Districts respectively. *An. vagus* highest density was from Maho and *An. tessellatus* highest density was from Monaragala. *An. stephensi* highest density was recorded from Jaffna. Malaria vector larval densities in RMO regions are shown in figure 15.

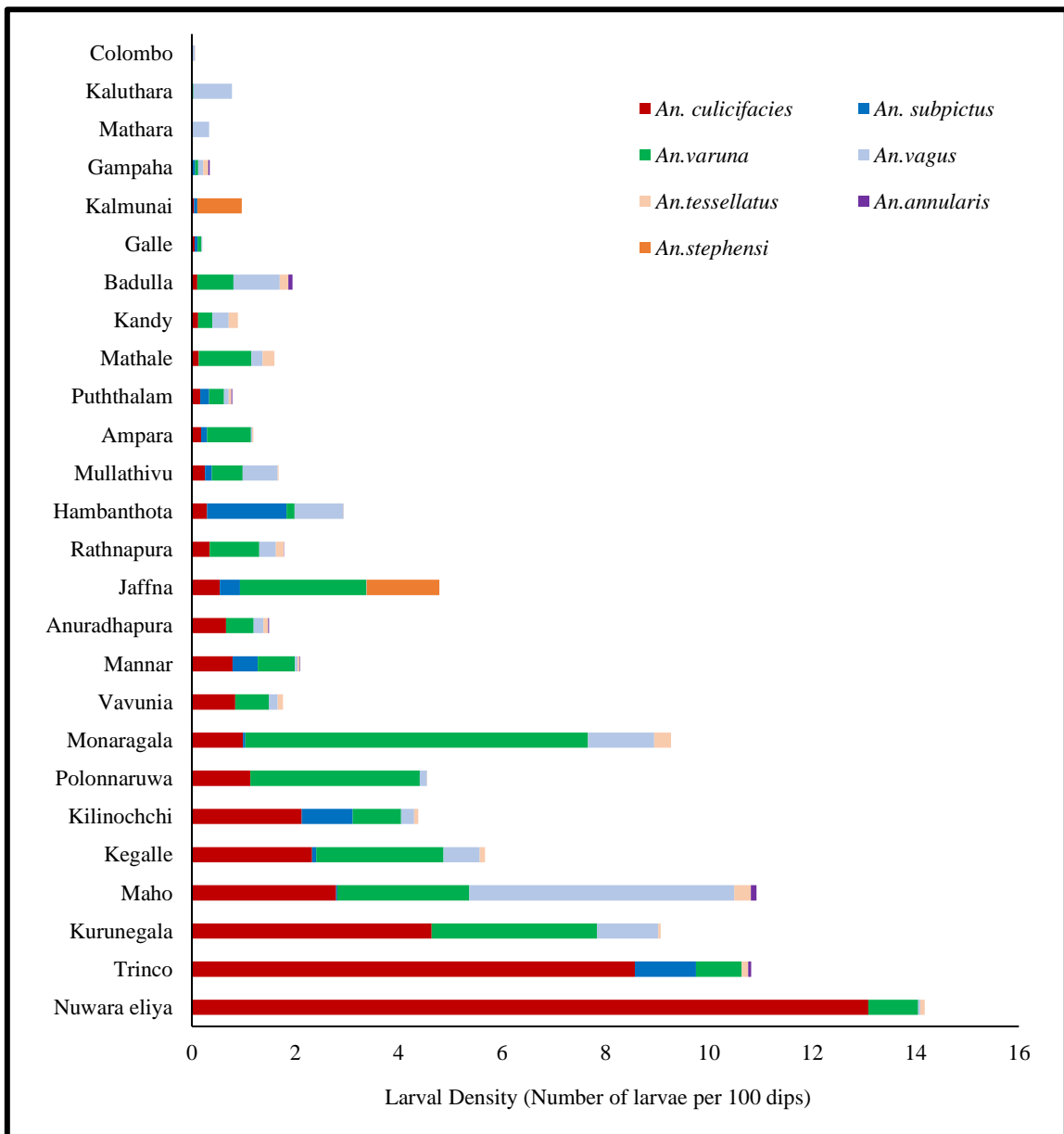


Figure 15: Comparison of larval densities of malaria vectors by RMO regions in 2023

#### 4.4 Larval surveys for *Anopheles stephensi*

Special container surveys were conducted to investigate the presence of the urban vector *Anopheles stephensi* within the country. The number of surveys conducted for *An. stephensi* in different regions is shown in Table 9.

Table 9: The number of surveys conducted for *An. stephensi* in RMO regions in 2023

Region	Number surveys conducted	MOH covered during the survey
Ampara	8	Lahugala, Mahaoya
Anuradhapura	9	Nochchiyagama, Medawachchiya, Kahatagasdigiliya, Rambewa, MNP, Nachchaduwa, Thirappane, Thambuttegama
Badulla	6	Bandarawela, Mahiyangana, Haputhale
Batticaloa	19	Batticaloa, KPC, Valachchenai, Vakarai, Kattankudy, KWK, Oddamavady, Eraur
Colombo	5	Colombo MC
Galle	6	MC Galle, Rathgama, Hikkaduwa
Hambantota	12	Ambalantota, Beliatta, Hambanthota, Tangalle, Katuwana
Jaffna	79	Jaffna, Point pedro, Nallur, Unduvil, Kopay, Thelipalai, Maruthankerny, Sandilipay, Chavakacheri, Karainagar, Velanai
Kalmunai	75	Sainthamaruthu, Karaithivu, Akkarapattu, Alyadivembu, Thirukkivil, Kalmunai, Kalmunai North, South, Ninttavur, AddalachchenaiNavithanveli, Samanthurai, Irakkamam, Potuvil
Kandy	10	KMC & Yatinuwara
Kegalle	6	Mawanella, Dehiowita, Galigamuwa, Ruwanwalla, Warakapola, Yatiyanthota
Kilinochchi	4	Pallai
Kurunegala	64	Kurunegala, Polgahawela, Alawwa, Ganewatte, Wallawa,
Maho	12	Maho, Abanpola, Galgamuwa, Algamuwa
Mannar	184	Mannar, Musali, Nanadan, Madhu, Adampan
Matale	11	Dambulla MC, Matale MC, Galewela
Matara	8	Dickwella, Matara MC, Matara PS, Dondra
Monaragala	11	Magandanamulla, Viharamulla
Mullativu	46	Mallavi, Oddusudan, Puthukudirippu, Mullaitivu, Manthai east, Pandiyankulam
Puttalam	25	Puttalam, Kalpitiya, Mundel, Arachchikattuwa
Rathnapura	13	Embilipitiya, Godakawela, Udawalawa, Ratnapura, Pemadulla, Kahawatta, Udawalawa
Trincomalee	9	Kanthale, Kinniya, Kuchchaweli, Uppuweli, Trincomalee, Muthur
Trincomalee	9	Kanthale, Kinniya, Kuchchaweli, Uppuweli, Muthur, Trincomalee
Vavuniya	35	Vavuniya North, Vavuniya South, Vavuniya, Cheddikulam,

The breakdown of different types of breeding sites surveyed in *An. stephensi* reporting regions is given in Table 10.

Table 10: Numbers of different types of containers surveyed in *An. stephensi* reported regions 2023

Region	Wells	Cemented tanks	Barrels	Small size containers	Overhead tanks
Jaffna	4463	1439	298	6278	0
Kalmunai	5975	185	323	7958	105

#### 4.5 Breeding habitat preference of *Anopheles stephensi*

*An. stephensi* was observed breeding in domestic wells, cemented tanks, water storage barrels and small containers. Domestic wells were continuing to be the most preferred breeding site during past years. Figure 16 shows the breeding site preference of *An. stephensi* in Jaffna and Kalmunai. In 2023, it was found that *An. stephensi* was predominantly breeding in wells (94%) in Jaffna region and exclusively breeding in wells in Kalmunai region.

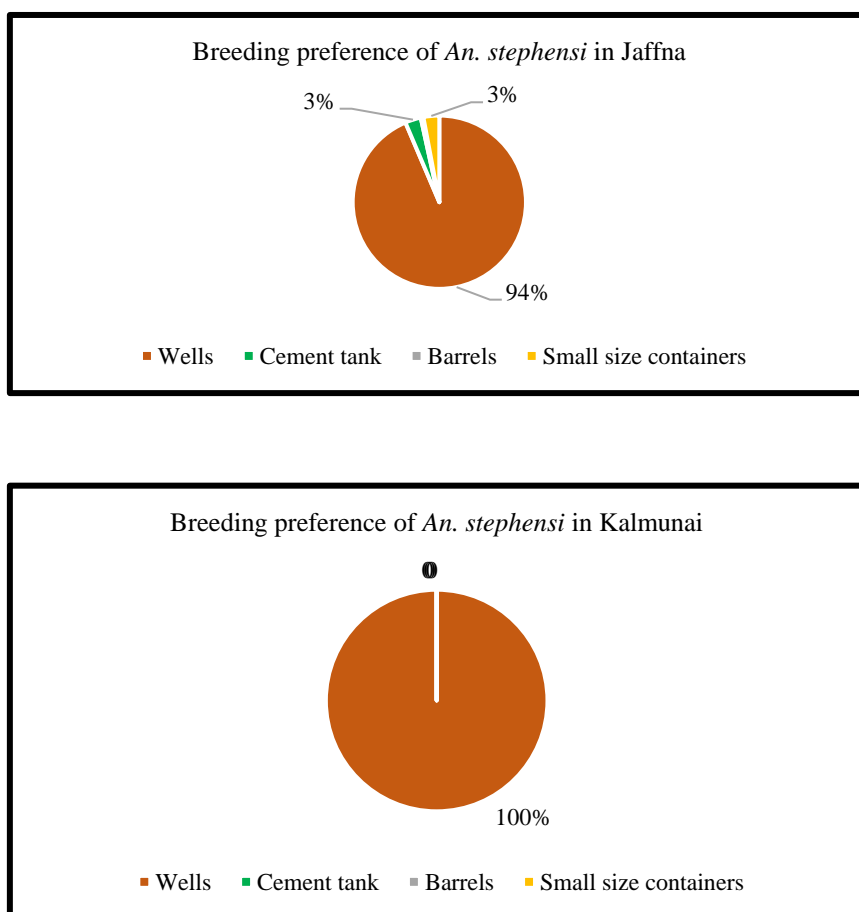


Figure 16: Breeding site preference of *Anopheles stephensi* in Jaffna and Kalmunai regions in 2023

#### 4.6 Cattle Baited Cadjan Hut Collections

Results of Cattle Baited Cadjan Hut (CBCH) technique is often used as an indicator for prevalence of indoor biting and resting vector populations. The highest number of Cattle Baited Cadjan Hut collections were carried out in district followed by Kilinochchi and Vavuniya districts. Figure 17 shows the total work output of cattle baited hut collections in 17 RMO regions of Sri Lanka in 2023.

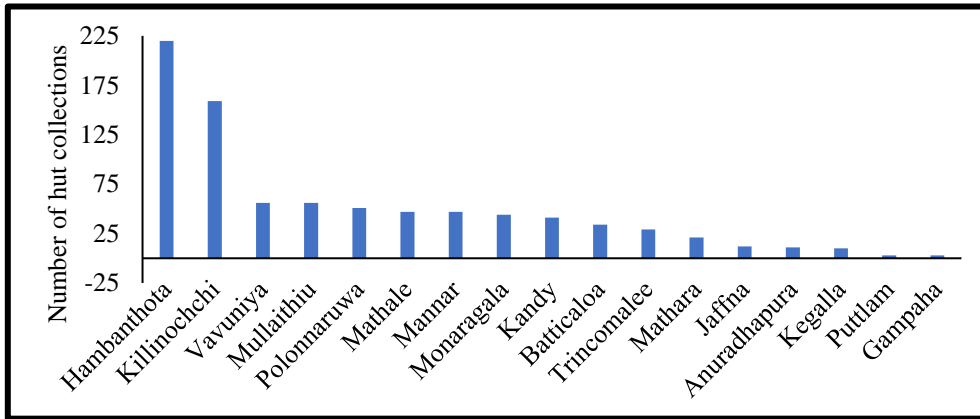


Figure 17: Total number of Cattle Baited Cadjan Hut collections carried out by RMO regions in 2023

Highest densities of *An. culcifacies* was found in Monaragala followed by Puttalam and Kegalle regions. Highest densities of *An. subpictus* was found in Puttalam followed by Monaragala. *An. annularis* was found from Hambanthota, Trincomalee, Polonnaruwa and Monaragala. Monaragala recorded highest densities of *An. varuna*, *An. tessellatus* and *An. vagus* highest from cattle baited Cadjan huts. Figure 18 shows the malaria vector densities in Cattle Baited Cadjan Hut collections reported by different RMO regions in 2023.

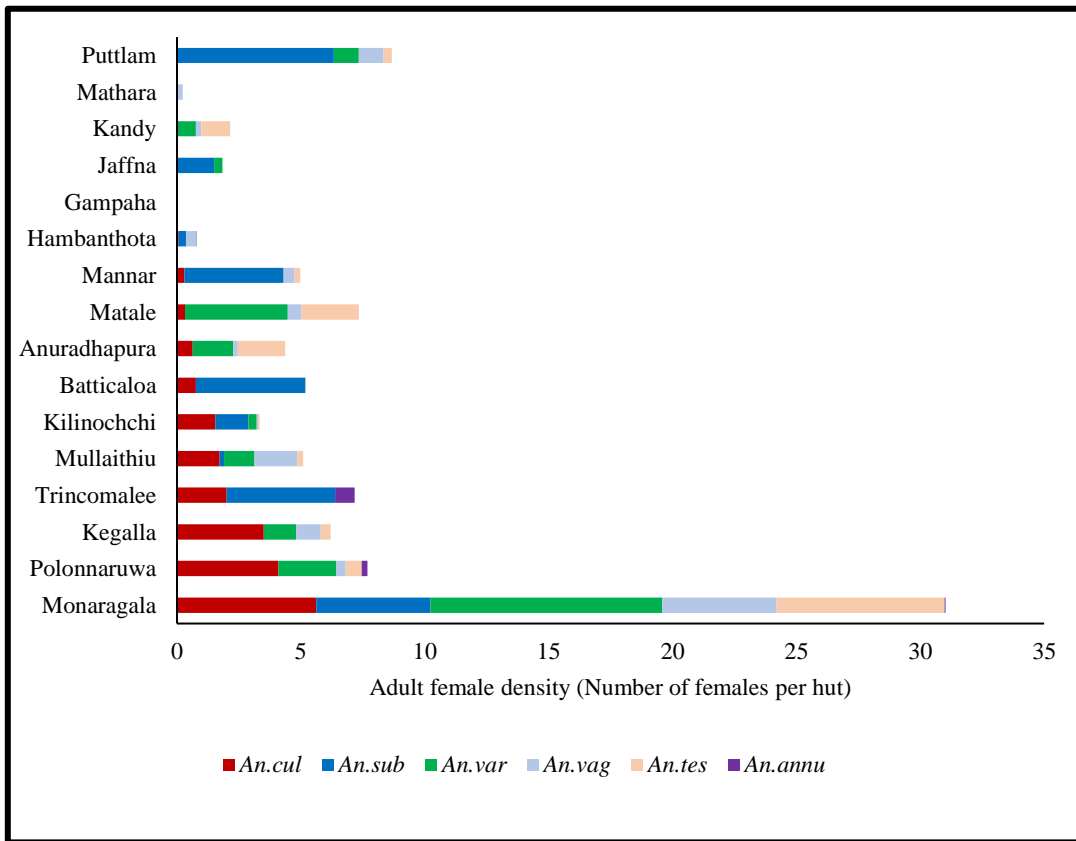


Figure 18: Mean densities of malaria vector adults collected from Cattle Baited Cadjan Huts by RMO regions in 2023

#### 4.7 Cattle Baited Net Trap Collections

Results of Cattle Baited Net Trap (CBNT) technique is often used as an indicator for prevalence of outdoor biting and resting vector populations. The highest number of Cattle Baited Net Trap collections were carried out in Hambantota district followed by Mullativu and Kilinochchi districts. Figure 19 shows the total work output of Cattle Baited Net Trap collections in different regions of Sri Lanka in 2023.

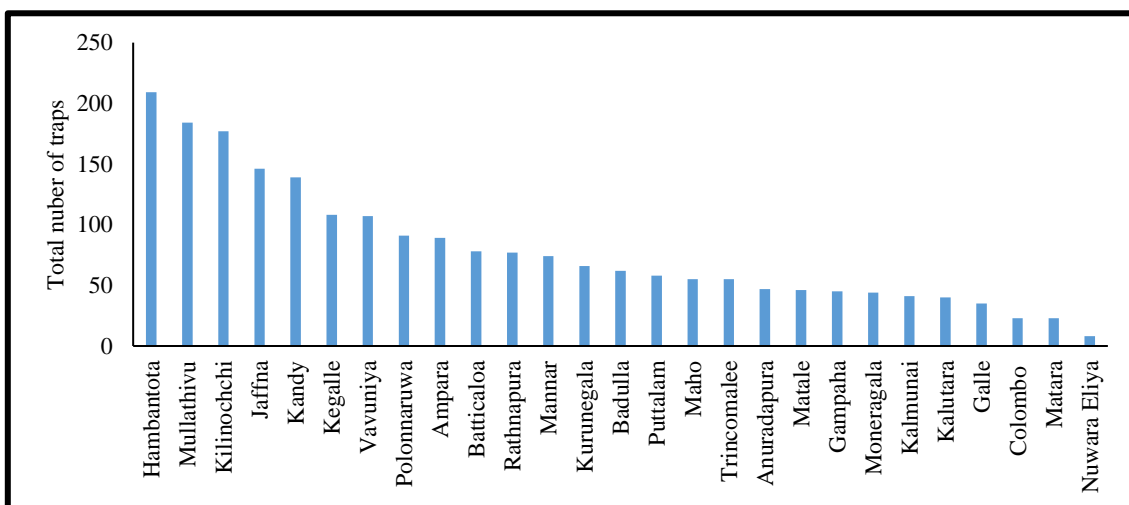


Figure 19: Total number of Cattle baited net trap collections carried out by RMO regions in 2023



The highest densities of *An. culcificies* was found in Kegalle District followed by Trincomalee District. Highest densities of *An. subpictus* was found in Trincomalee District followed by Batticaloa. *An. annularis* highest density was Mullaitivu and *An. varuna* highest density was from Anuradhapura and Monaragala. Jaffna District reported very low densities of *An. stephensi* from Cattle Baited Net Trap collections.

Figure 20 shows the malaria vector densities in Cattle Baited Net Trap collections reported in the RMO regions in 2023.

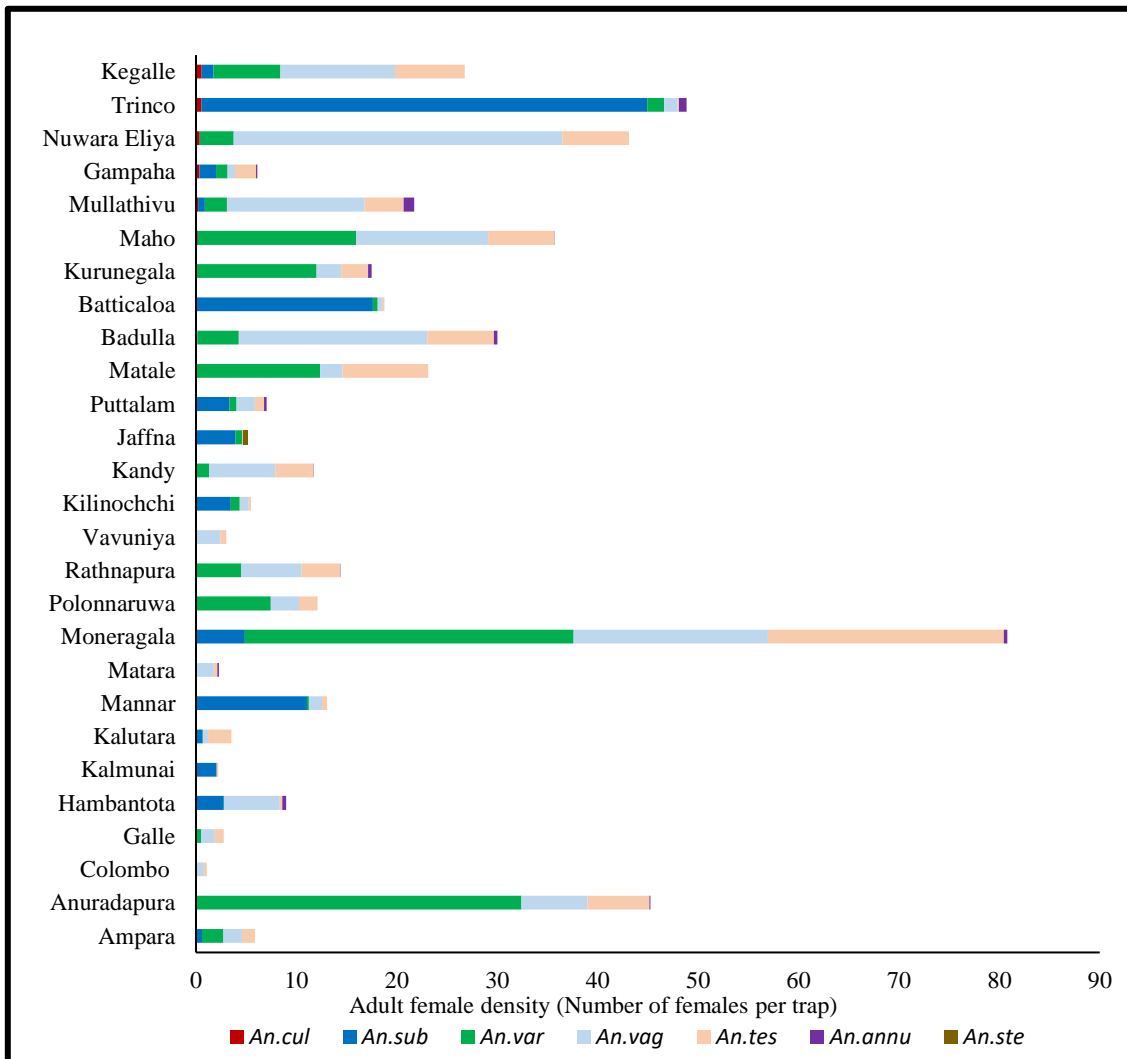


Figure 20: Mean densities of malaria vector adult females collected from Cattle Baited Net Trap by RMO regions in 2023

#### 4.8 Indoor Hand Collections

Hand collection of indoor resting *Anopheles* mosquitoes was performed in many of the RMO regions. This technique provides information on indoor resting *Anopheles* species and their seasonality of indoor resting of vectors and their resting sites inside human dwellings.

The highest number of houses inspected for indoor resting mosquitoes was done in the Batticaloa region followed by the Mullaitivu, and Hambantota regions.

Figure 21 shows the Total number of houses inspected, and man hours spent for indoor hand collections by RMO regions in 2023.

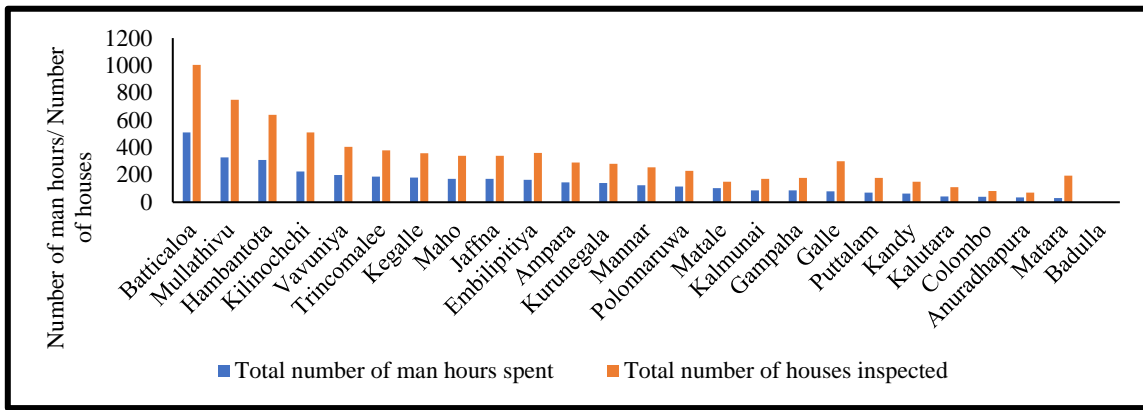


Figure 21: Total number of houses inspected, and man hours spent for indoor hand collections by RMO regions in 2023

Primary malaria vector *An. culicifacies* was recorded in very low densities in Batticaloa and Mho. Highest indoor resting habit of *An. subpictus* were found in Batticaloa followed by Trincomalee in 2023 (Figure 22).

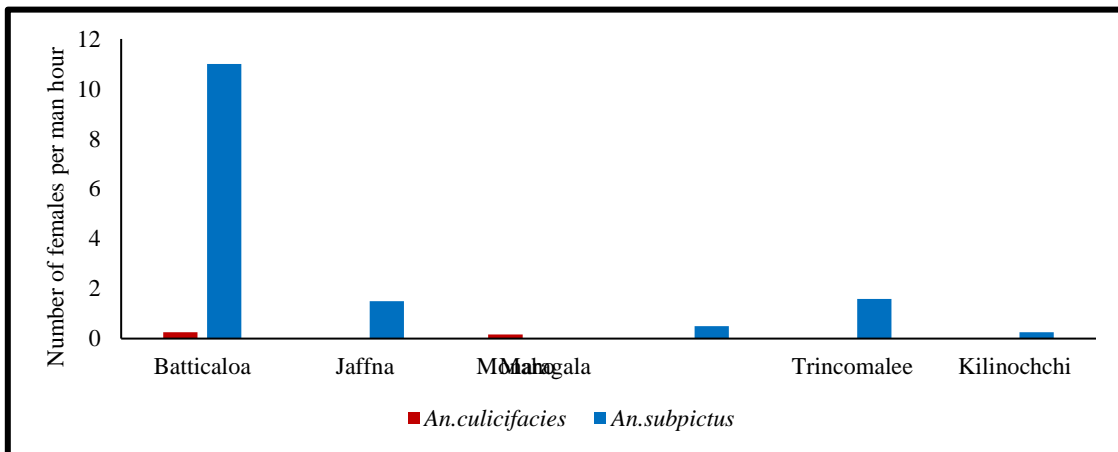


Figure 22. Mean density of *An. culicifacies* and *An. subpictus* indoor resting densities in 2023

#### 4.9 Human Landing Night Collections

Human Landing Night Collections (HLNC) served as an indicator for assessing the risk of malaria transmission after malaria elimination in the absence indigenous transmission. Full night collection of human biting anophelins was from 18:00 to 06:00 hours and partial night collection of human biting anophelins were from 18:00 to 21:00 hours. Polonnaruwa accomplished the highest number of man hours for full night collections and Hambantota contributed the highest number of man hours for partial night collections.

Figure 23 shows the total numbers of man hours spent for human landing night collection by RMO region.

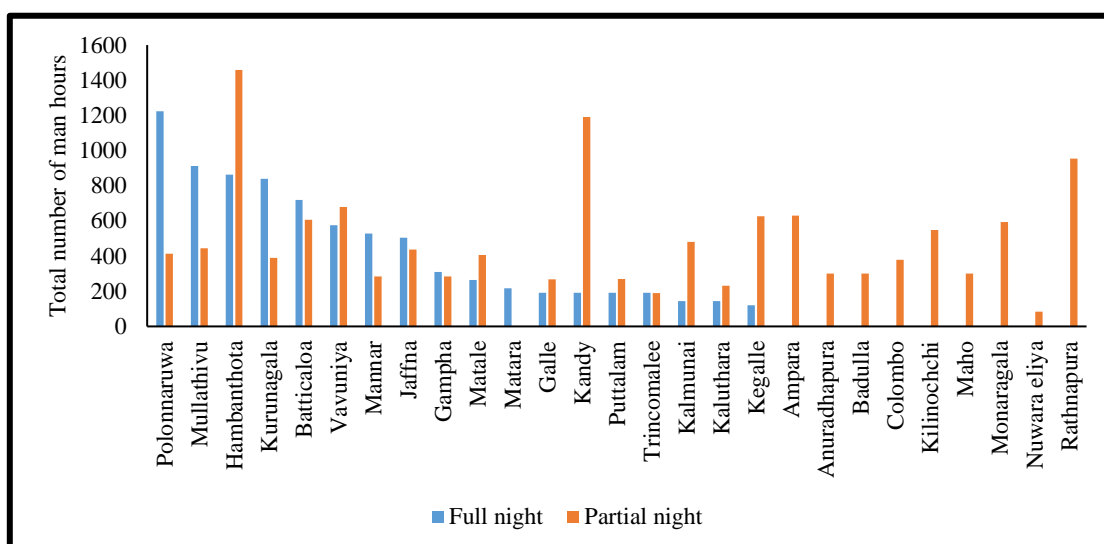


Figure 23: Total man hours spent in different regions in human landing catches in 2023

#### 4.10 Human biting preference of malaria vectors

In the receptivity assessment, the human biting preference of anophelines was of utmost importance (Table 11). *An. culicifacies*, the primary malaria vector was found more abundantly (20.18%), followed by *An. jamesii* (17.63%), *An. subpictus* (13.76%) and *An. tessellatus* (12.84%).

Table 11: Percentage composition in human biting preference of *Anopheles* species

Anopheles species	Percentage composition in human biting preference		
	Indoor	Outdoor	Total
<i>An.culicifacies</i>	21.17	20.03	20.18
<i>An.jemsai</i>	18.89	17.45	17.63
<i>An.subpictus</i>	17.26	13.24	13.76
<i>An.tessallates</i>	17.26	12.19	12.84
<i>An.peditaeniatus</i>	9.77	14.44	13.84
<i>An.varuna</i>	4.23	7.93	7.46
<i>An.aconitus</i>	3.91	1.00	1.38
<i>An.vagus</i>	3.91	9.42	8.71
<i>An.nigerimus</i>	3.26	2.58	2.67
<i>An.barbirostris</i>	0.33	0.53	0.50
<i>An.annularis</i>	0.00	0.33	0.29
<i>An.kawari</i>	0.00	0.05	0.04
<i>An.pallidus</i>	0.00	0.14	0.13
<i>An.pseudojamsesi</i>	0.00	0.38	0.33
<i>An.stephensi</i>	0.00	0.29	0.25

#### 4.11 Receptivity Assessments

Receptivity scores were obtained for the surveys that included both adult and larval collections in 2023 according to the existing receptivity assessment system. The entomological teams have entered the necessary data into the Google Dashboard (<https://lookerstudio.google.com/u/0/reporting/4689d6dc-bf41-4f3b-8e9b-461f9194cd05/page/IJhaC>). Out of all the entomological surveys recorded in the receptivity google dashboard, 20% indicated a high level of receptivity, 27% displayed moderate receptivity, and 53% indicated low receptivity. The MOH areas found with high receptivity assessments during 2023 are given in Figure 24.

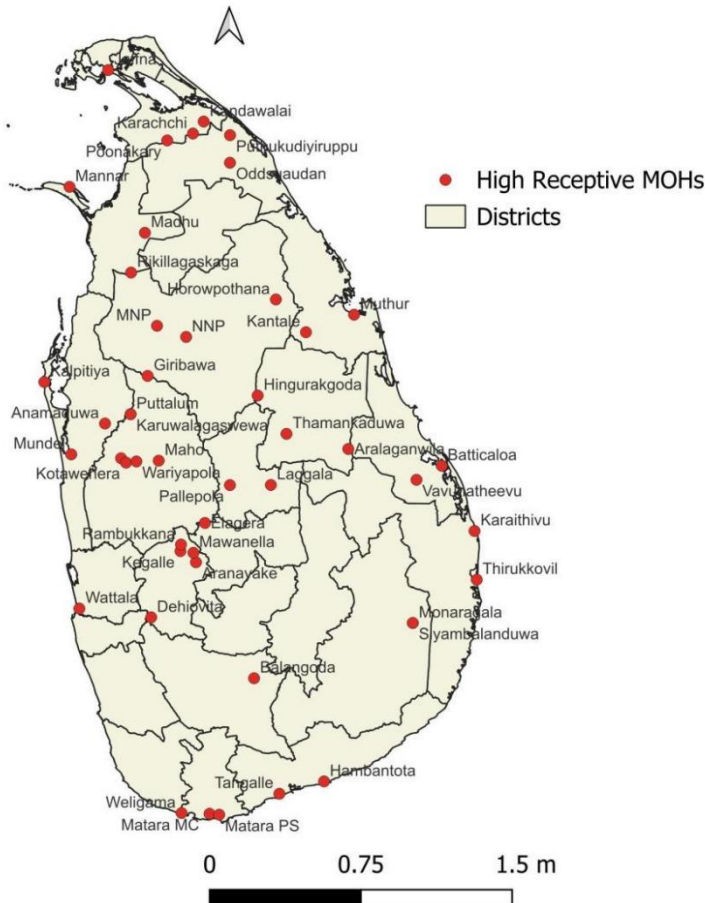


Figure 24: Map showing entomological survey sites in respective MOH areas observed with high receptivity in 2023

#### 4.12 Monitoring Insecticide resistance in malaria vectors

During the year 2023 insecticide susceptibility test supplies were provided to the RMO regions with entomology laboratories. A total of 47 insecticide susceptibility tests have been conducted for primary and secondary malaria vectors in 20 MOH areas in 14 districts during the year. The test method was the WHO tube tests for discriminating concentrations and the tests were conducted for insecticides that are currently in use and with a potential for use in future. Four classes of insecticides were tested and the priority was given for pyrethroids. Table 12 gives the number of insecticide susceptibility tests for adults conducted in different RMO regions.

Table 12: Adult susceptibility tests conducted for primary and secondary vectors

(OC- Organochlorines, OP- Organophosphates, C-Carbamates, Py- Pyrethroids)

RMO Region	Number of tests			
	OC	OP	C	PY
Batticaloa	1	1		2
Hambantota		2	2	1
Jaffna				2
Kandy & NuwaraEliya		2		
Kegalle		1		3
Kilinochchi				1
Kurunegala		1	1	5
Mannar				1
Matale			2	3
Monaragala	3	2		2
Mullativu				1
Polonnaruwa				1
Puttalam				1
Rathnapura			1	
Trincomalee				5
<b>Total</b>	<b>4</b>	<b>9</b>	<b>6</b>	<b>28</b>

A total of 08 adult susceptibility tests were conducted for *An. culicifacies* during year 2023 in 5 MOH areas in 05 RMO regions (Table 13). *An. culicifacies* showed susceptibility to the tested insecticides in all the areas.

Table 13: Susceptibility of *An. culicifacies* adults for tested insecticides in 2023

RMO Region	MOH	Insecticide class	Insecticide	Corrected mortality	Status
Kegalle	Rambukkana	PY	Deltamethrin 0.05%	100%	Susceptible
Kurunegala	Wariyapola	OP	Primingphos-methyl 0.25%	100%	Susceptible
Kurunegala	Wariyapola	C	Propoxur 0.1%	100%	Susceptible
Kurunegala	Wariyapola	PY	Deltamethrin 0.05%	100%	Susceptible
Monaragala	Medagama	PY	Lambda-cyhalothrin 0.05%	100%	Susceptible
Polonnaruwa	Thamankaduwa		Deltamethrin 0.05%	100%	Susceptible
Puttalam	Karuwalagaswewa		Deltamethrin 0.05%	100%	Susceptible

One susceptibility test for *An. stephensi* adult has been conducted in 2023 for Deltamethrin 0.05% in Jaffna MOH area and the results showed confirmed resistance (Table 14).

Table 14: Susceptibility of *An. stephensi* to pyrethroids in 2023

RMO Region	MOH	Insecticide class	Insecticide	Corrected mortality	Status
Jaffna	Jaffna	PY	Deltamethrin 0.05%	84%	Confirmed Resistance

Eleven tests were conducted for *An. subpictus* in 6 MOH areas in 6 districts and the results are summarized in table 15. In Batticaloa confirmed resistance to DDT 4.0% was reported and possible resistance to pyrethroid insecticides were recorded in Hambanthota, Jaffna and Muthur MOH areas.

Table 15: Susceptibility of *An. subpictus* to insecticides in 2023

RMO Region	MOH	Insecticide class	Insecticide	Corrected mortality	Status
Batticaloa	Batticaloa	OC	DDT 4.0%	70%	Confirmed Resistance
Batticaloa	Batticaloa	OP	Malathion 5.0%	100%	Susceptible
Batticaloa	Batticaloa	PY	Deltamethrin 0.05%	100%	Susceptible
Batticaloa	Batticaloa	PY	Lambda-cyhalothrin 0.05%	100%	Susceptible
Hambanthota	Hambanthota	PY	Lambda-cyhalothrin 0.05%	94%	Possible resistance
Jaffna	Jaffna	PY	Lambda-cyhalothrin 0.05%	95%	Possible resistance
Kilinochchi	Karachchi	PY	Lambda-cyhalothrin 0.05%	100	Susceptible
Mannar	Mannar	PY	Lambda-cyhalothrin 0.05%	100	Susceptible
Trincomalee	Muthur	PY	Deltamethrin 0.05%	97.5%	Possible resistance
Trincomalee	Muthur	PY	Deltamethrin 0.05%	100%	Susceptible
Trincomalee	Muthur	PY	Lambda-cyhalothrin 0.05%	100%	Susceptible

Adults of secondary malaria vectors *An. vagus* and *An. varuna* showed susceptibility in all the tests, however *An. tessellatus* showed confirmed resistance to OC, OP and C in few locations.

Table 16 shows the results of larval susceptibility test conducted for discriminating concentration of Temephose. None of tests showed resistance.

Table 16: Larval susceptibility

RMO Region	MOH	<i>Anopheles spp.</i>	Corrected mortality%	Status
Hambantota	Ambalantota	<i>An.subpictus</i>	100%	Susceptible
Hambantota	Tissamaharama	<i>An.culicifacies</i>	100%	Susceptible
Jaffna	Jaffna	<i>An.stephensi</i>	100%	Susceptible
Mannar	Mannar	<i>An.subpictus</i>	100%	Susceptible
Matale	Dambulla	<i>An.varuna</i>	100%	Susceptible
Matale	Pallepola	<i>An.varuna</i>	100%	Susceptible
Monaragala	Siyabalanduwa	<i>An.culicifacies</i>	100%	Susceptible
Monaragala	Siyabalanduwa	<i>An.varuna</i>	100%	Susceptible
Monaragala	Monaragala	<i>An.culicifacies</i>	100%	Susceptible

#### 4.13 Training programs and meetings on Entomological Surveillance 2023

Two in-service training programs for Health Entomology Officers were completed on malaria entomological surveillance for PoR and two semi-annual entomological review programs were conducted evaluating entomological activities in the RMO regions in 2023.

## 5. Vector Control Activities

### 5.1 Core vector control activities

Vector control activities in the PoR phase are conducted considering vulnerability and receptivity in the region. Indoor Residual Spraying (IRS) application and distribution of Long-Lasting Insecticidal Nets (LLIN) are the core vector control methods carried out in Sri Lanka. IRS is generally carried out for reactive vector control and LLIN s are distributed for reactive vector control among vulnerable population.

Approximately 150 kg of Lamda Cyhalothrin 10% WP of pyrethroid class was distributed for IRS island wide year 2023.

Long Lasting Insecticidal Nets (LLIN) used in the Anti-Malaria Campaign is PermaNet 2.0 in 2023. The insecticide contained in PermaNet 2.0 is deltamethrin. The Table 17 describes the distribution of LLIN by regions and population protected in 2023. About 17,000 LLIN have been distributed in 2023 in the entire country. LLIN is used as a core vector control method in reactive vector control activities if primary vector is present in the entomological surveys. In addition, LLIN is also distributed among vulnerable population in receptive areas. Table 17 summarises the total number of premises/houses and the population protected by LLIN in 2023.

Table 17: Total number of premises/houses and the population protected by distribution of LLIN island wide in 2023



RMO Region	Number of Premises/ Houses	Number of Population protected	Number of LLIN distributed by AMCHQ
Ampara	156	453	-
Anuradhapura	2800	5008	1008
Badulla	NIL	NIL	-
Batticaloa	1640	6446	1000
Colombo	NA		-
Galle	51	51	100
Gampaha	Not done		900
Hambantota	513	1850	
Jaffna	1949	3761	900
Kalmunai	NA		750
Kalutara	NA		50
Kalutara - NIHS	44	100	-
Kandy	515	1495	900
Kegalle	2237/1504	3625	900
Kilinochchi	447	1353	900
Kurunegala	444	923	900
Maho	47	171	900
Mannar	120	88	900
Matale	334	589	900
Matara	31	18	50
Monaragala	643	2132	500
Mulativu	255	676	900
Nuwara Eliya	62	212	0
Polonnaruwa	861	2864	1000
Puttalam	687	825	-
Rathnapura	1183	4500	1100
Trincomalee	625	2780	1050
Vavuniya	39	152	900
SL Air Force	NA	NA	110
SL Army	NA	NA	525
AMCHQ			525

## 5.2 Supplementary vector control methods

Larval Source Management (LSM) is carried out as a reactive and a proactive vector control method. Two common LSM conducted are the use of Temephos as larvicidal and the introduction of larvivores fish. Larvivores fish were introduced into wells and abandoned pits as a biological method of vector control. Both methods are used in *An. Stephensi* control and elimination activities as well.

## 5.3 Use of space spraying

Space spraying is not advocated by AMCHQ as a main vector control method. It has a limited role in reactive vector control. Whenever, space spraying is applied, the decision to apply, extent and the timing of space spraying is decided through discussions between RMO and the AMCHQ.

#### 5.4 Vector control activities – Regional level

Both reactive and proactive vector control activities are been carried out to sustain the malaria free status. The type of vector control activity conducted in each region are given in the Table 18 below.

Table 18: Reactive vector control activities carried out in regions in 2023

RMO region	MOH area	Vector control activities conducted				
		IRS	LLIN	Temp.	Fish introduction	Space spraying
Ampara	NIL					
Anuradhapura	NPE Thalawa	NO NO	YES YES	NO NO	YES YES	NO NO
Badulla	NIL					
Batticaloa	Batticaloa, Vaharai	YES	YES	YES	YES	YES
Colombo	NA					
Galle	Not done					
Gampaha	Not done					
Hambantota	Hambantota	YES	YES	YES	YES	-
	Thissamaharama	YES	-	YES	YES	-
	Lunugamvehera	YES	YES	-	YES	-
	Sooriyawewa	-	-	-	YES	-
	Ambalanthota	-	-	-	YES	-
	Angunakolapalassa	-	-	-	YES	-
	Weeraketiya	-	-	-	YES	-
	Tangalle	-	-	-	YES	-
	Beliatta	-	-	-	YES	-
	Okewita	-	-	-	-	-
	Katuwana	-	-	-	-	-
	Walasmulla	-	YES	-	-	-
Jaffna	Jaffna	-	-	-	-	-
	Nallur	-	YES	YES	-	-
	Kopay	-	-	YES	-	-
	Chavakachcheri	-	-	-	-	-
	Udivil	YES	YES	YES	-	-
	Chankanai	-	-	-	-	-
	Sandilipay	YES	YES	YES	-	-
	Tellipalai	-	-	YES	-	-
	Pointpedro	-	-	-	-	-
	Marthankerney	-	-	-	-	-
	Karaveddy	-	-	-	-	-
	Kayts	-	-	-	-	-
	Vellanai	-	-	-	-	-
	Karainagar	-	-	-	-	-
Kalmunai	NA					
Kalutara - RDHS	NA					
Kalutara - NIHS	-					
Kandy	MOH Akurana	-	YES	-	-	-

	MOH	-	-	-	-	-
	Bambaradeniya	-	YES	-	-	-
	MOH Doluwa	-	-	-	-	-
	MOH Galaha	-	YES	-	-	-
	MOH Galagedara	-	YES	-	-	-
	MOH Gangalhala	-	YES	-	-	-
	MOH	-	YES	-	-	-
	Gangawatakorale	-	YES	-	-	-
	MOH Harispattuwa	-	YES	-	-	-
	MOH	-	YES	-	-	-
	Hatharaliyadda	-	YES	-	-	-
	MOH Kundasale	-	YES	-	-	-
	MOH Manikhinna	-	YES	-	-	-
	MOH Minipe	-	YES	-	-	-
	MOH Medadumbara	-	YES	-	-	-
	MOH Pasbage	-	YES	-	-	-
	MOH Panwila	-	YES	-	-	-
	MOH Poojapitiya	-	YES	-	-	-
	MOH Pathadumbara	-	-	-	-	-
	MOH Thalathioya	-	YES	-	-	-
	MOH Udapalatha	-	YES	-	YES	-
	MOH Udunuwara					
	MOH Yatinuwara					
	MOH KMC					
Kegalle	Warakapola	NO	YES	NO	YES	YES
Kilinochchi	Karachchi	NO	YES	NO	YES	NO
	Kandawalai					
	Pallai					
	Poonakary					
Kurunegala	Ibbagamuwa	-	YES		YES	-
	Mallawapitiya	-	YES		YES	-
	Weerambagedara	-	YES		YES	-
Maho	Ambanpola	NO	YES	YES	NO	NO
	Maho					
	Kobeigane					
	Giribawa					
	Nikaweratiya					
Mannar	Mannar	-	YES	-	YES	-
	Manthai West	-	YES	-	YES	-
	Madhu	-	YES	-	YES	-
	Nanattan	-	YES	-	YES	-
	Musali	-	YES	-	YES	-
Matale (551)	Dambulla	-	YES	-	YES	YES
Matara	Akuressa	-	YES	-	-	-
	Athuralia	-	YES	-	-	-
	Devinuwara	-	-	-	-	-
	Dickwella	-	YES	-	-	-
	Hakmana	-	YES	-	-	-
	Kamburupitiya	-	YES	-	-	-

	Kirinda-Puhuwella	-	-	-	-	-
	Katapola	-	-	-	-	-
	Malimbada	-	-	-	-	-
	Mulatiyana	-	-	-	-	-
	Matara Four Gravets	-	YES	-	-	-
	Pasgoda	-	-	-	-	-
	Pitabeddara	-	-	-	-	-
	Thihagoda	-	YES	-	-	-
	Weligama	-	YES	-	-	-
	Welipitiya	-	YES	-	-	-
Monaragala	SEwanagala	-	YES	-	-	-
	Thanamalwila	-	YES	-	-	-
	Katharagama	-	YES	YES	-	-
	Wellawaya	-	YES	-	-	-
	Buttala	-	YES	-	-	-
	Badalkumbura	-	YES	-	-	-
	Medagama	-	YES	-	-	-
	Bibile	-	YES	-	-	-
	Medulla	-	YES	-	-	-
	Siyanbalaanduwa	YES	YES	YES	-	-
	Monaragala	-	YES	-	-	-
Mullaitivu	-					
Nuwara Eliya	-					
Polonnaruwa	Yes – Details not available					
Puttalam	Puttalam	-	YES	-	YES	-
	Anamaduwa	-	YES	-	YES	-
	Karuwalagaswewa	-	YES	-	YES	-
	Mundel	-	YES	-	YES	-
	Kalpitiya	-	YES	-	YES	-
	Arachchikattuwa	-	YES	-	YES	-
	Madampe	-	YES	-	YES	-
	Naththandiya	-	YES	-	YES	-
	Mahawewa	-	YES	-	YES	-
	Dankotuwa	-	YES	-	YES	-
	Pallama	-	YES	-	YES	-
	Chilaw	-	YES	-	YES	-
Rathnapura	Weligepola	-	YES	-	-	-
	Kalawana	-	YES	-	-	-
Trincomalee	Trincomalee	-	YES	-	YES	-
	Uppuvely	-	YES	-	YES	-
	Kuchchavely	-	YES	-	YES	-
	Kinnya	-	-	-	YES	-
	Muthur	-	-	-	YES	-
	Seruwila	-	-	-	YES	-
	Eachilamapattu	-	YES	-	YES	-
	Kanthale	-	-	-	YES	-
	Kurichchakerny	-	-	-	YES	-
	Gomarangadewela	-	-	-	YES	-
	Padavisiripura	-	-	-	YES	-

	Thampalagamam	-	YES	-	YES	-
Vavuniya	Vavuniya	-	YES	-	YES	YES
	Vavuniya N	-	-	-	YES	-
	Vavuniya S	-	-	-	YES	-
	Cheddikkulam	-	YES	-	-	-

A total of 62 imported cases were detected in 2023. Based on the night stay of the individual (as per the guidelines), 91 reactive spot surveys were done in 91 locations in 2023. Following the entomological surveillance findings, 62 Sites did not require vector control. In the remaining 29 sites, vector control activities were conducted. IRS was applied in 3 sites and LLIN was distributed in 8 sites. Fish introduction and space spraying were done in 15 & 13 Sites respectively. In certain instances, more than one vector control methods were conducted & in 29 sites vector control activities were done.

## **6. Monitoring & Evaluation**

### **6.1 Monthly Progress Review Meeting**

The monthly progress review meeting was initiated in 2009 and continued with the participation of Regional Malaria Officers, stakeholders for Tri Forces, Sri Lankan Police, TSG members and the AMC Technical Officers. The RMOO present the previous month regional status of malaria surveillance activities, logistics management and case management (if any) in the district. The details are discussed and analysed for further recommendations on sustainable malaria prevention activities. Further, the recommendations and critical points are considered for formation of strategies and policies.

### **6.2 Technical Support Group meeting**

The Technical Support Group (TSG) is a consultancy body, appointed by the Director General of Health Services (DGHS), to provide expertise evidence-based strategic and technical guidance and recommendations to sustain malaria free Sri Lanka. Members do not represent associations or groups but act in their individual capacity to provide guidance and recommendations. The TSG meeting is chaired by the Director General of Health Services. Current TSG comprises 19 members with a wide range of expertise in the fields of malaria control and elimination, including parasitology, epidemiology of malariology, pharmacology, internal medicine, vector control and biology, sociology and disease control. In addition, comprises members from the Ministry of Health and AMC headquarters. Further, experts may be invited to attend the TSG meetings as temporary advisers or as co-opted members to counter unique problems as it arises. The TSG functions as a mere consultancy body to advise and guide the DGHS and AMC Director. The Ministry of Health facilitates and supports the TSG's meetings and events. Also, the Ministry of Health provides the necessary financial aids to carry out these activities. The membership of the TSG members is reviewed and updated according to requirements annually. The representatives of TSG provided the support and strategic advice to the AMC to successful maintenance of the Prevention of Reintroduction of malaria process throughout year 2023. Two meetings were held on 04<sup>th</sup> May and 15<sup>th</sup> November in 2023.

### **6.3 Case Review Committee**

The Case Review Committee (CRC) is a subcommittee of the TSG which reviews the actions performed in case identification and classification; of both imported and indigenous cases. The CRC meets once a month to discuss the basic information of the case and the resolution. The Committee shall recognize any lapses in the response and shall advise accordingly.

### **6.4 Information management**

The AMC headquarters has been supplied with information on suspected cases via the hotline which is available 24/7 across the country. Anyone from the public or any health worker can call this number that is answered by a medical officer at AMC head office with the guidance of Consultant Community Physicians. All the case data are entered into the Electronic Information Management System (EIMS). This system can be accessed by the Regional Malaria Officers (RMOs) and staff who are involved with AMC activities.

GIS mapping created at the national and regional level on EIMS dashboard, can be viewed at the regional and national levels. E-mails are used to connect with the RMOs, which therefore reduces paper consumption and speeds up data dissemination.

### **6.5 Supervisions carried out by RMOs at regional level**

As per AMCHQ guidelines and circulars RMO has to perform field and institutional supervisions ensuring that malaria control efforts are contextually relevant, resource-efficient, and well-coordinated, contributing to the overall success of malaria program.

Regional Malaria Officer is the unit head and team include field level officers - Public Health Inspectors, Health Entomology Officer, Public Health Laboratory Technician, Public Health Field Officer, Spray Machine Operators and assisting staff and administrative staff including Development Officers, Management Assistants, and office assistants. Table 19 depicts the summary of regional level institutional and field supervisions executed by RMOs in 2023.

Table 19: Summary of supervisions accomplished by RMOs in 2023.

RMO Region	Supervision of entomological surveys in field	Malaria Lab supervision/ private lab	Supervision of Health Institutions	LLIN distribution supervision	PHLT supervision for Malaria
Ampara	28	15	21	10	15
Anuradhapura	05	13	11	12	10
Badulla	12	12	38	06	60
Batticaloa	18	16	26	12	06
Colombo	NA				
Galle	12	12	10	0	04
Gampaha	34	14/57	61	47	10
Hambantota	06	01	04	-	-
Jaffna	72	24	25	14	26
Kalmunai	NA				
Kalutara	NA				
Kalutara - NIHS	06	10	08	10	10
Kandy	NA				
Kegalle	32	18	26	08	18
Kilinochchi	30	27	33	06	12
Kurunegala	08	11	14	08	04
Maho	12	21	00	06	00
Mannar	24	05	25	0	12
Matale	32	19	15	15	11
Matara	04	02	04	0	02
Monaragala	24	14	14	07	14
Mulativu	23	35	32	05	29
Nuwara Eliya	0	0	0	0	0
Polonnaruwa	01	03	0	0	0
Puttalam	02	01	0	01	0
Ratnapura	26	34	24	02	26
Trincomalee	15	02	28	03	0
Vavuniya	18	12	21	0	12



## 7. Infrastructure and Human Resources

### 7.1 Carder details

At the end of year 2020, AMC Headquarters had the following categories of staff. The number of staff in each category as at the end of year 2020 is shown below.

Table 20: The staff availability in each category as at 31.12.2023

Designation	Approved cadre	In position,
Director	1	01
Deputy Director	1	01
Consultant Community Physician	3	03
Medical Officer	8	07
Accountant	1	-
Entomologist	4	04
Parasitologist	1	01
Registered Medical Officer	1	-
Special Grade Health Entomological Officer	1	01
Special Grade PHLT	2	01
Special Grade PHI	1	-
Health Entomology Officer	6	04
Medical Laboratory Technologist	3	01
Public Health Inspector	4	02
Public Health Laboratory Technician	13	10
ICT Assistant	2	01
Development Assistant	3	-
Medical Record Assistant	1	-
Public Health Field Officer	10	08
Public Management Assistant	15	07
Medical Supplies Assistant	3	01
Telephone Operator	1	01
Cinema Operator	1	01
Health Driver	15	08
Health Laboratory Aide	2	01
KKS	1	01
Lift Operator	2	02
Saukya Karya Sahayaka (Junior)	20	11
Saukya Karya Sahayaka (Ordinary)	25	20
Spray Machine Operator	10	03
Development Officer	5	04
Saukya Karya Sahayaka Casual	0	-
Pharmacist	1	01
Plumber/ Pump Machine Operator	1	-
Management Assistant	-	-
Temporary staff	-	-
PGIM Trainee MO	-	-
Total	169	106

## 7.2 Vehicles

Adequate number of vehicles in good condition is an important factor in an effective programme to prevent re-establishment of malaria. The table 21 shows the available number of vehicles in AMC headquarters in 2023.

Table 21: Availability of vehicles in AMC/HQ during 2023

Serial No	Vehicle No	Type of Vehicle	Working Condition
1	WP PE 8966	CAB	Running
2	WP PE 8974	CAB	Running
3	WP PE 8975	CAB	Running
4	WP PE 8972	CAB	Running
5	WP PF 2025	CAB	Running
6	WP GP 2558	VAN	Running
7	WP GP 2556	VAN	Running
8	WP NB 4567	VAN	Running
9	WP NB 4568	VAN	Running
10	WP NA 3117	VAN	Running
11	42 - 9399	LORRY	Running
12	LC 0249	LORRY	To be repaired
13	JL 8129	LORRY	To be repaired
14	AAD 0185	T - Wheel	To be repaired

## 7.3 Buildings

The Anti-Malaria Campaign Headquarters is located at the Public Health Complex at 555/5, Elvitigala Mawatha, Colombo 5. The Director's room, Deputy Director's room, Consultant Community Physicians' room, Medical Officers' room, library, computer room, telephone exchange and auditorium are in the 3rd floor. The Administration branch, finance branch, record room and stores are located in the 5<sup>th</sup> floor. The Central Parasitology Laboratory and Entomology Laboratory are located in the 6th floor.

## 8. Funding

The government of Sri Lanka (GoSL) allocates funds for the Anti-Malaria Campaign through the Ministry of Health. In 2023, the GoSL allocated LKR 25,000,000.00 and LKR 158,619,931.26 as capital and recurrent expenditure respectively. The recurrent expenditure of the Regional Malaria Office staff is borne by the respective nine ministries of Provincial Councils.

Table 22: Key performance indicators identified

Indicator	Target Expected %	Expenditure target %
Proportion of confirmed malaria cases that received first line antimalarial treatment at public health sector facilities	100%	100%
Proportion of malaria cases that received first line treatment at private sector facilities	100%	100%
Percentage of confirmed cases fully investigated and classified	100%	100%

**The World Health organization (WHO)** is a technical and funding partner for AMC. The WHO supported the activities of AMC in 2023 by providing a capital allocation of LKR 9,118,729.69 in financial assistance to continue with the malaria control and prevention activities in PoR phase.

### 8.1 Programs/Activities conducted through Provincial/Regional level funds 2023

The regions stated below were supported by the provincial ministries of health through regional directorate to carry out programs such as PHLT/PHFO training, awareness programs for General Practitioners, health education programs and repair of Cadjan huts at regional level. Most programs conducted at regional level were financially supported by the AMCHQ allocations.

Table 23: RMO regions supported by the regional level funds to carry out the activities in 2023

RMO Region	GoSL	RMO Region	GoSL
Anuradhapura	261,071.89	Matale	60,000
Batticaloa	89,400	Monaragala	48,400
Hambantota	16,200	Polonnaruwa	85,500
Kandy	99,710	Vavuniya	47,160
Kegalle	23,050		
Kurunegala	44,000		

## SECTION TWO

### 9.0 Leishmaniasis control and prevention activities

#### 9.1 Introduction and Epidemiology

The Epidemiology Unit of the Ministry of Health was coordination leishmaniasis control activities at ministry level, as per the general circular dated November 2019 by Director General of Health Services, and control activities were implemented by public health field staff. Anti-Malaria Campaign was designated as focal point for leishmaniasis control since August 2022.

Leishmaniasis is an endemic disease in the South-East Asian Region which is increasing trend globally with a wider geographical distribution. Sri Lanka (SL) identifies a leishmaniasis as an emerging public health problem, as the latest focus of leishmaniasis in the Asian subcontinent and reported endemic to Cutaneous Leishmaniasis (CL).

Leishmaniasis is a vector-borne parasitic disease, transmitted through a bite of an infected female sand fly of subfamily Phlebotominae. *Phlebotomus argentipes* is the most likely vector of *L. donovani* in Sri Lanka. Sand flies are widely prevalent in some parts of the country are locally known as “weli massa” or “hohaputuwa” in different parts of the country. Leishmaniasis is caused by several different species of genus *Leishmania*. The causative organism of leishmaniasis prevailing in Sri Lanka was identified as *Leishmania donovani* MON 17. Three main clinical manifestations of leishmaniasis are Visceral Leishmaniasis (VL), Muco Cutaneous Leishmaniasis (MCL) and Cutaneous Leishmaniasis (CL). Cutaneous leishmaniasis (CL) is the most common form of leishmaniasis which causes skin lesions, mainly ulcers, on exposed parts of the body, leaving life-long scars and disability which may cause stigma.

Both CL and VL were reported till 1953, and it is assumed that mass scale indoor residual spraying with DDT by AMC in 1951 had controlled the vector and spread of leishmaniasis. After the decades, CL has been established as an endemic disease within a short period of time in the country despite the first local case reported from the Ambalanthota MOH area in Hambantota District in 1992. Number of reported leishmaniasis cases have increased gradually after the disease became notifiable in 2008.

Leishmaniasis control and prevention key activities are been ensued at Medical Officer of Health, Institutional, district and central level according to the guidelines on Prevention and Control. The major areas of leishmaniasis control and prevention measures include parasitological end entomological surveillances, case diagnosis, case treatment, and vector control activities.

At central level Anti-Malaria Campaign being the formal leishmaniasis control program, is operated with Director, Consultant Community Physician and designated Medical Officer, entomologist and parasitologist. The technical, administrative and financial units work along with malaria control, activities to achieve targets. The AMC is responsible for technical guidance, training of human resources, parasitological and entomological surveillance, logistic supply of medicines and consumables, monitoring and evaluation.

District level team, under the purview of Provincial and Regional Directors of Health services, is technically led by the Regional Epidemiologist. All the regional staff is responsible for timely

notification, investigation, follow up of cases and conducting regular review meetings to update the service provision.

State health institutions, staffed with specialist in dermatology and/or operating dermatology clinic are accountable for case diagnosis, case management, follow up, health education and necessary notifications to relevant authorities. Identification of suspected leishmaniasis cases, prompt referral to dermatology clinic, health education and notification are carried out at all other health institutes.

At Medical Officer of Health level, relevant documentation of notifications, field investigations, disclose of appropriate history and contact tracing, follow up of cases and weekly notification through “e-surveillance” (Weekly Return of Communicable Diseases - H 399) to the Epidemiology unit and to the respective Regional Epidemiologist are carried out. Additionally, implementation of entomological surveillance, operating vector control measures, public awareness and encouraging personal protection measures are also done by the public health field staff. However, at present there are human resource, technical and financial constraints to operationalize the key procedures at all levels.

A review of leishmaniasis and its control was conducted by the academic experts of parasitology, entomology and dermatology in 2024, and the National Strategic Plan (NSP) for prevention and control of leishmaniasis in Sri Lanka 2024 – 2028 was developed based on the review and published.

Goal: To control cutaneous leishmaniasis for possible elimination as a public health problem in the future and prevention of visceral and mucocutaneous leishmaniasis.

Objectives: To reduce the annual incidence of cutaneous leishmaniasis <5 per 10,000 population by 2028 (Approximately 6600 cases).

: To ensure zero mortality due to visceral leishmaniasis

An increasing trend in the spread of cutaneous leishmaniasis from endemic to non-endemic areas was identified and the disease was being reported from all districts. Anuradhapura, Hambantota, Polonnaruwa, Kurunegala and Matara were the districts identified with more than 100 new patients annually and reported cases of CL are 3107 and 4300 in 2022 and 2023 respectively.

## **9.2 Leishmaniasis case notification**

The parasitological surveillance is executed mainly through testing suspected individuals at health institutions functioning dermatology clinics.

Slit Skin Smear (SSS) is the main diagnostic method, mostly in suspected patient with skin lesions. A total number of 9078 skin smears have been examined and 4279 were reported as positive for leishmaniasis in 2023. Nearly 300 – 400 cases are being reported to AMCHQ through RMOs in each month. According to the Weekly Returns of Communicable Diseases ([esurveillance.epid.gov.lk](http://esurveillance.epid.gov.lk)), total number of reported cases were 3721. The discrepancy for the values in two units were due to deficiencies in prevailing notification system. AMCHQ receive notifications through RMO office and the e notification system is operated at Epidemiology unit. The total SSS performed and slide positivity by district as per the data available at AMCHQ in the year 2023 is presented in the table 24 below.

Table 24: Number of positive cases and number of Slit Skin Smear (SSS) performed by month in 2023

Month	Number of slides examined	Number of positive cases
January	717	388
February	725	375
March	741	370
April	573	293
May	683	372
June	712	324
July	804	363
August	869	453
September	717	334
October	896	361
November	875	339
December	766	307
<b>Total</b>	<b>9078</b>	<b>4279</b>

The monthly case notification by district is shown in the figure below. Maximum number of cases were reported in the month of July (453) while nearly 350 cases were reported each month indication static nature of the case notification.

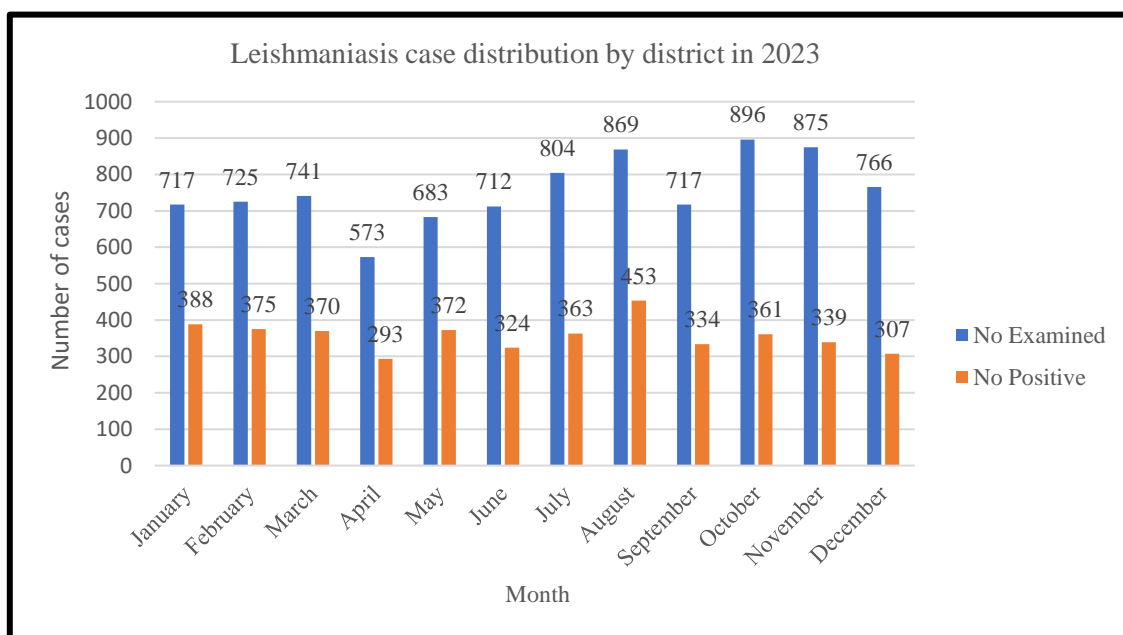


Figure 25: Figure xx illustrates the number of Slit Skin Smear examined and number of positive cases by month in year 2023

According to the data available, nearly 32% of cases out of smears examined were positive for leishmaniasis. The figure 26, depicts the percentages of case positivity.

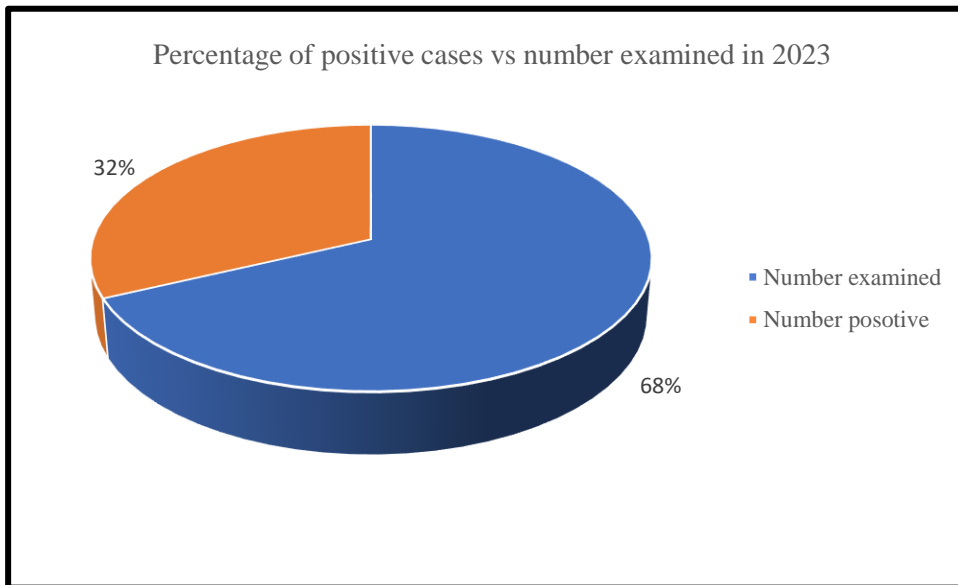


Figure 26: percentage of case positivity and percentage of total SSS performed in year 2023

The district distribution of cutaneous leishmaniasis cases is presented in the figure 27. The highest number of cases were reported from the Kurunegala district, (data represented as Kurunegala and Maho areas separately) while Anuradhapura, Polonnaruwa and Hambantota districts are lined up for the subsequent highest positive case notification accordingly. Zero cases were reported from Jaffna, Kilinochchi, Mannar, Ampara, Batticaloa regions.

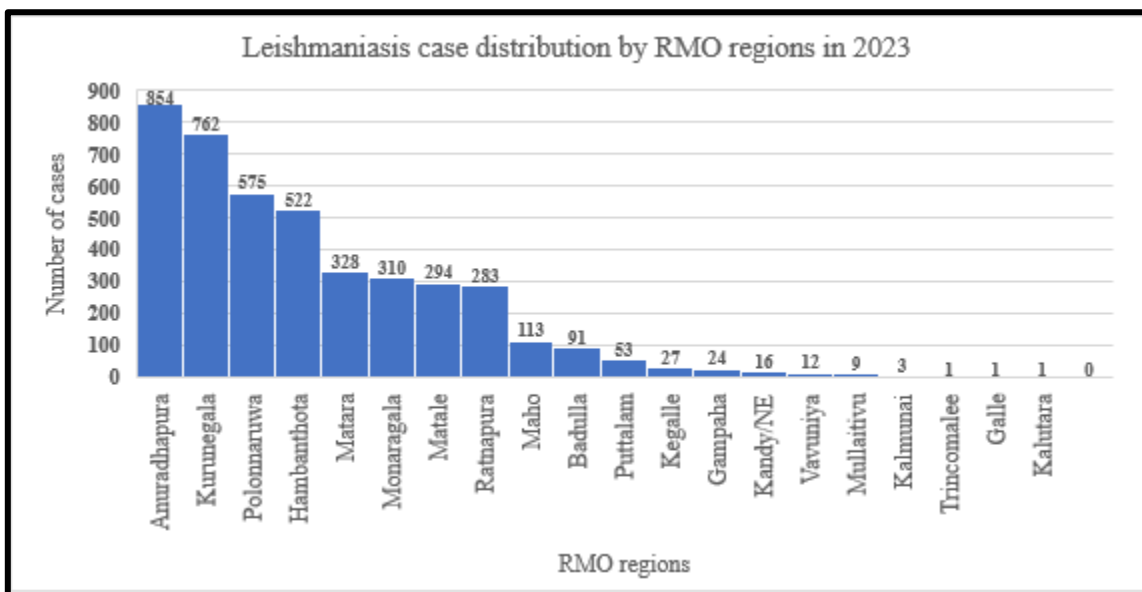


Figure 27: Case distribution by RMO regions in 2023

Funding for leishmaniasis control and prevention activities is allocated through Government of Sri Lanka and World Health Organization.