

Annual Report of the Anti Malaria Campaign 2007.

Introduction

The number of malaria cases reported during the year 2007 continued to decline, maintaining the trend that has been established during the past several years. The total number of reported cases was 199 positives, which comprised of 192 vivax infections and 07 falciparum &/or mixed infections. The highest reported number of cases was from the district of Trincomalee. A high number of cases were also reported from the neighboring districts of Vavuniya and Anuradhapura.

Although the reported malaria incidence has markedly declined in comparison to the year 2006 there continues to exist a host of natural and social factors that could influence a resurgence of malaria in the island. The continuing conflict remains the main such factor which could seriously affect malaria control efforts in the country. Considering these factors and the able guidance provided by the Hon. Minister of Healthcare & Nutrition and the Department of Healthcare & Nutrition, the Anti Malaria Campaign continues with the implementation of a programme of action to further reduce the burden of malaria in the country.

The Campaign continues to develop and implement a programme of work that can be successfully implemented in both the cleared areas of the country, and the uncleared areas of the Northern Province. This programme has taken into account the difficulties faced in implementing a control programme in the conflict affected areas of the country and the recently cleared eastern districts and has succeeded in reducing the burden of the disease in these areas as well.

A matter of serious concern to the Campaign and the malaria control efforts in the country is the lack of interest shown by provincial health staff in some districts to continue carrying out the activities under the malaria control programme. The mistaken belief that malaria is no longer a cause for concern in these districts could result in jeopardizing the malaria control efforts not only in these particular districts but could affect the entire country as well. It is therefore important for all concerned to continue to contribute actively to the malaria control efforts in the country.

Considering the present favourable malaria situation in the country the Anti Malaria Campaign reorganized the objectives and strategies of the Campaign at the end of 2006. The revised objectives and strategies of the Anti Malaria Campaign are as follows;

Objectives of the Anti malaria Campaign

- To reduce the API among at risk populations in the country by the year 2009, to a level less than 25% of that in 2005 (0.4)
- To reduce the proportion of *P falciparum* infections to less than 3% of all reported malaria of infections by the year 2009(2005 -5.7%)
- To sustain zero mortality from malaria.
- To prevent outbreaks/epidemics of malaria in the country
- To eliminate the occurrence of malaria infections in pregnant women by the year 2009
- To reduce the proportion of malaria infections in children below 5 years to less than 5% of all reported infections by the year 2009 (2005-10%)

Strategies of the Anti Malaria Campaign

- To provide early diagnosis & prompt treatment of malaria patients and asymptomatic parasite carriers
- To plan & implement selective & sustainable vector control measures based on the principles of IVM
- Forecasting, early detection, prevention of outbreaks, and the rapid & effective containment of outbreaks

- To reassess regularly the country’s malaria situation, in particular the ecological, social & economic determinants of the disease and evaluation of malaria control activities.

- Enhance community participation and partnership building for effective and sustainable malaria control

- Promotion of human resource development and capacity building

- Promotion of operational research

Epidemiology

The district-wise morbidity pattern in Sri Lanka is undergoing changes with the reduction in disease burden recorded through out the country. Districts that recorded a high disease burden in the recent past have shown a marked decrease in the number of cases recorded. This reduction is more marked in some of the districts not affected directly by the ongoing conflict. The number of cases reported from conflict affected districts such as Jaffna in which civil administration has been restored has also declined markedly. Although the number of reported cases has declined even from the conflict-affected districts, there is considerable doubt if this is the true situation in these areas.

A total of 1,044,403 blood smears were examined by the departmental staff attached to medical institutions and the Anti Malaria Campaign including its regional offices during the year 2007. Following this screening 199 confirmed malaria cases were detected. This included 192 *P. vivax* infections and 07 *P. falciparum* or mixed infections (6- *Pf* and 1-mixed infection). Significantly of 7 *P. falciparum* or mixed infections, 4 infections were imported from other countries. In fact the number of confirmed malaria patients recorded during the year 2007 is lowest in 40 years since 1967.

During the year under review the highest recorded number of malaria infections was reported from an outbreak which occurred in the Trincomalee district. The civil unrest witnessed during the year in Trincomalee district including the displacement of a large number of persons may have contributed to this situation. A total of 90 vivax infections were reported from Trincomalee district, mainly during the months of March – July during the outbreak. Some of the patients contracting malaria during this outbreak also sought treatment from the neighboring districts of Vavuniya & Anuradhapura. The number of cases reported from Trincomalee district amounted to 45.2% of the cases reported countrywide during the year. Collectively the districts of Vavuniya, Anuradhapura and Ampara contributed 20.6% to the total country morbidity reported during the year 2007. The proportion of indigenous falciparum cases reported continued to decline from 4.5% in the year 2006 to 1.5% in year 2007. The Campaign started monitoring patients with imported malaria infections as an independent category during the year and 4 of the 7 falciparum/mixed infections reported during the year were found to have contracted the disease outside the country.

Table 1 : Parasite formula 2001-2007

Year	Proportion of <i>P. vivax</i> infections	Proportion of <i>P. falciparum</i> infections
2003	88	12
2004	85	15
2005	92	8
2006	95	5
2007	97	3

When compared with other South-East Asian countries mortality due to malaria in Sri Lanka is extremely low. There was one reported malaria death during the year 2007 from the Colombo South Teaching Hospital.

One hundred and forty seven (73.9%) of the 199 reported cases recorded in 2007 were detected in males and 52 cases were detected in females (26.1%). All the reported falciparum cases were detected among males. The most affected age group was patients over 15 years of age who comprised 162 of the 199 cases reported (81.4%), while patients between 10 - 14 years comprised 10 cases (5%), 6 – 9 years comprised 15 cases (7.5%) and 1 – 5 years comprised 12 cases (6.0%). Significantly there were no infant positives reported during the year.

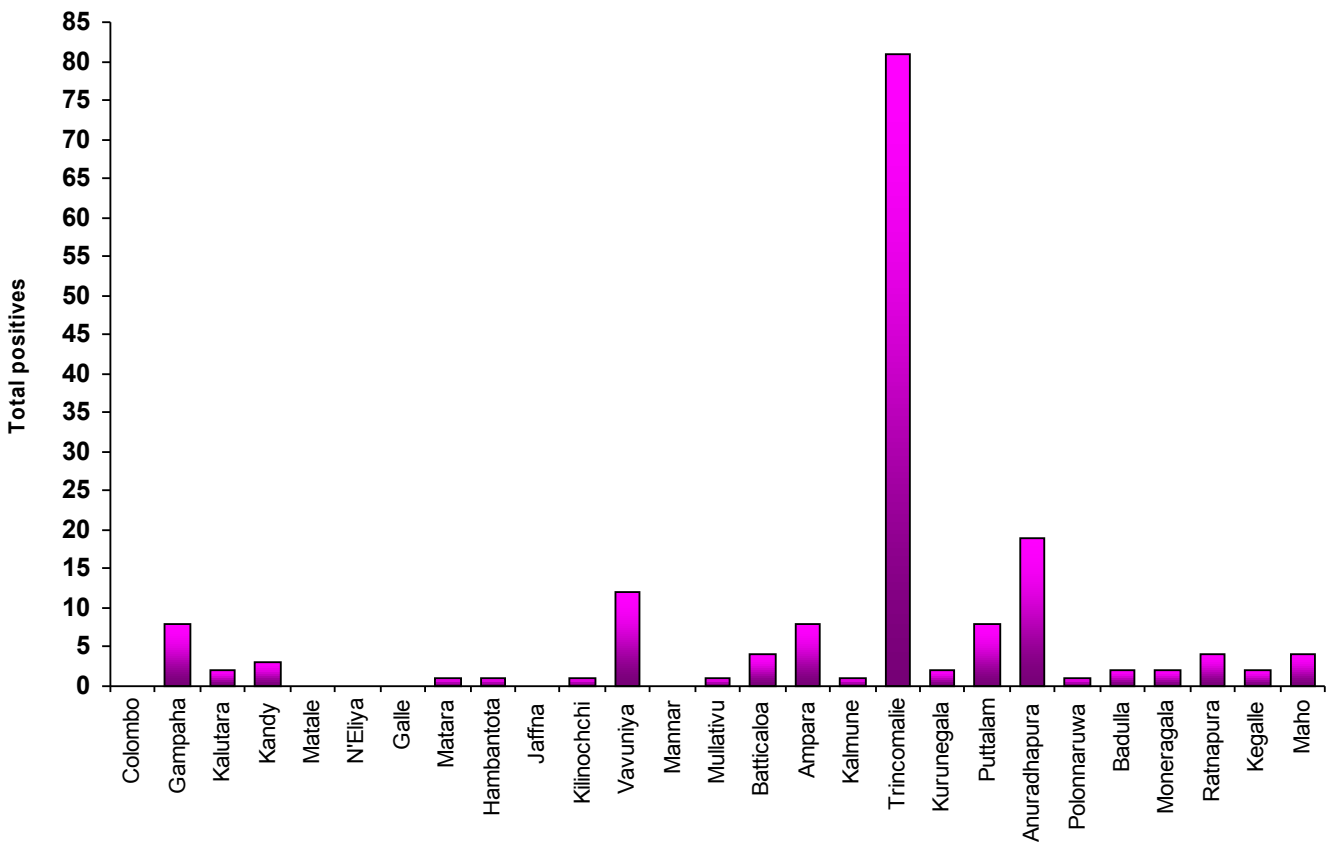


Figure 1. Microscopically confirmed malaria cases (district wise) - 2007

Factors influencing the morbidity and its distribution

Although several districts in the Northern & Eastern Provinces became hyper endemic for malaria during the 1990's as a result of the conflict situation which prevailed in these provinces, the past several years have seen a marked decline in malaria cases reported from these provinces. Many of the factors which contributed to this situation continue to exist in these areas even today and the restoration of normalcy is an important step towards addressing these problems. Main among these problems are the difficulty in implementing effective parasite surveillance and field-based malaria control activities, the presence of displaced populations who are highly vulnerable to malaria infections and logistical difficulties in reaching these populations. However, it is noteworthy that during the year 2007 there seems to be a significant reduction in

the proportion of malaria cases reported from the districts of Kilinochchi, Mullaitivu, Jaffna and Mannar.

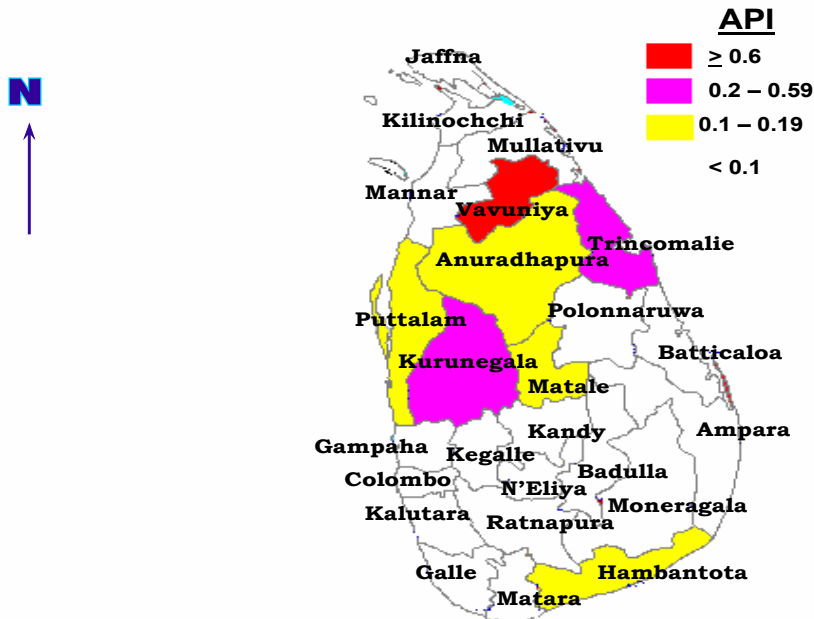


Figure 2: Population rates reflecting district wise reported malaria incidence in Sri Lanka 2007

Surveillance

Surveillance mechanism of the malaria control programme is implemented mainly through Activated Passive Case Detection (APCD). All fever patients attending State Medical Institutions located in malarious areas suspected of having a malaria infection are screened for malaria parasites by microscopical examination of a peripheral blood smear. In addition Passive Case Detection (PCD) is also carried out in the regional offices of the Anti Malaria Campaign by screening suspected malaria patients who seek treatment at these offices. Active Case Detection (ACD) is carried out through Mobile Malaria Clinics which are conducted in hard to access localities situated away from Medical Institutions. Detection of cases by home visits is done under special circumstances (egs. local outbreaks). The Anti Malaria Campaign recommends screening all fever patients suspected of having malaria, especially security forces personnel and patients with a history of recent fever seeking treatment from medical institutions in areas where

malaria outbreaks occur. However as the malaria disease burden has decreased so has the number of blood smears taken in medical institutions located in malarious and non-malarious districts. The Anti Malaria Campaign has initiated action to increase the screening of fever patients seeking treatment from medical institutions in malaria transmission areas. As in previous years, screening suspected malaria patients that came to activated medical institutions (APCD) was the most important method of detecting malaria cases and accounted for 77% of the cases detected. Active Case Detection (ACD) and Mobile Clinics (Other methods) were also conducted to detect malaria cases early with a view to preventing further transmission.

Information Management

Many of the Regional Malaria Offices have been equipped with computer facilities to enable the officers to utilise the gathered data (parasitological and entomological) in a meaningful manner. Monthly reports are received at the Anti Malaria Campaign Headquarters which regard to the following.

- (a) malaria morbidity and mortality (age-wise and sex-wise)
- (b) entomological data regarding adult vector and larval densities.
- (c) vector control activities carried out.
 - adulticiding (IRS, Impregnation of mosquito nets)
 - larviciding (Use of larvicides and larvivorous fish)

It is planned to provide and upgrade computer facilities in all the Regional Malaria Offices and subsequently to establish networking facilities (with the assistance of GFATM Project).

Epidemics/outbreaks

The following parameters are used to forecast epidemics.

- (a) Fever incidence / and malaria morbidity in Medical Institutions.
- (b) Changes in vector larval densities particularly in sentinel stations and other breeding sites.
- (c) Increases in adult vector densities in sentinel stations, and other areas.

There was an outbreak of malaria reported from the district of Trincomalee during the year 2007. The outbreak occurred following the displacement of a large number of people within the district and with the displacement of a large number of people from the neighbouring Batticaloa district in to the Trincomalee district. This outbreak was located in and a around a tsunami reconstruction village in the health area of Trincomalee district. The first cases of the outbreak were reported in the month of March 2007 and cases were reported till the month of August 2007. The Regional Medical Officer, Anti Malaria Campaign Trincomalee initiated early action to control the outbreak and the outbreak was successfully controlled.

Action taken to prevent and control the outbreak:

(a) Enhanced case detection and treatment

- By field surveys
- At Medical Institutions

(b) Vector Control Activities

- Chemical larviciding
- Indoor Residual Spraying of insecticides to dwellings.
- Health education programmes.

Status of Drug Resistance and Drug Policy

Drug resistance

P.vivax - no chloroquine-resistance reported.

P.falciparum - resistance to chloroquine reported since 1984. However, no resistance was reported among the three *P.falciparum* infected patients who had acquired the infection locally. The four patients who had acquired the infection overseas were treated with secondline antimalarials and quinine.

Drug Policy

Plasmodium vivax

Chloroquine 25mg/kg - over 3 days

Primaquine 0.25 mg/kg - daily for 14 days

Plasmodium falciparum

First-line treatment

Chloroquine 25mg/kg - over 3 days Primaquine 0.75 mg/kg - single dose

Second line treatment

Combination of (sulphadoxine + pyrimethamine) as a single dose treatment plus stat dose of primaquine as above (given only if no primaquine has been administered within the preceding week).

Programme Priorities.

Elimination of *P.falciparum* infections, prevention of the spread of chloroquine-resistant *P.falciparum* infections, management and reduction of vector resistance to some insecticides and elimination of malaria deaths have been identified as priorities. Accordingly case detection and treatment and the vector control activities have been augmented in areas where *P.falciparum* cases were detected. Clinicians have been alerted towards the problems of chloroquine-resistant *P. falciparum* malaria, with the objective of improved diagnosis and treatment. Drug sensitivity monitoring was carried out on a regular basis by following up all falciparum infected patients for up to four weeks. The Anti Malaria Campaign is considering the introduction of artemisinin based combination therapy for the management of all uncomplicated falciparum malaria infections as a means of preventing the introduction of resistant falciparum strains in keeping with guidelines issued by the WHO. Malaria control among displaced populations in the conflict-affected Northern Province and in the recently liberated Eastern Province, was also considered as a programme priority during the year.

Microscopy

For the year 2007 there were 199 microscopically confirmed inclusive of 12 RDT positive malaria cases in the country. Of these, there were only 07 *Plasmodium falciparum* cases including one mixed infection of *P. falciparum* and *P. vivax*.

Screening by microscopy based on different surveillance categories are given in table 1 while cases reported to the Anti Malaria Campaign for the year 2007 confirmed by microscopy and RDTs are given in table 2 and 3 respectively.

Table 2. Microscopical screening conducted based on different surveillance categories

Surveillance method	Total number of blood smears	Proportion of the total screened	Total number of positives	Proportion of positives
ACD	120522	11.5	26	13
PCD	227224	21.8	0	0
APCD	467838	44.8	153	77
Other methods	228531	21.9	20	10

Table 3. Microscopically confirmed malaria cases detected at district/RMO region level

District or RMO area	TOTAL		TOTAL SPECIES			SEX		AGE GROUP				
	Exd.	Pos.	P.v.	P.f.	Mixed	Male	Female	Under 01 yr	1 - 5 yrs	6 - 9 yrs	10 - 14 yrs	Over 15 yrs
Kurunegala	77770	6	6	0	0	3	3	0	0	0	0	6
Maho	34371	6	4	1	1	4	2	0	0	0	1	5
Puttalam	36675	8	7	1	0	8	0	0	0	1	0	7
Badulla	20768	3	3	0	0	2	1	0	1	1	0	1
Moneragala	48785	6	6	0	0	4	2	0	1	1	1	3
Kegalle	5522	1	1	0	0	1	0	0	0	0	0	1
Embilipitiya	17754	7	6	1	0	7	0	0	0	0	0	7
Anuradhapura	115684	13	12	1	0	13	0	0	1	1	0	11
Polonnaruwa	61816	2	2	0	0	2	0	0	0	0	0	2
Galle	728	0	0	0	0	0	0	0	0	0	0	0
Matara	15439	1	1	0	0	1	0	0	0	0	0	1
Hambanthota	38001	2	2	0	0	1	1	0	0	0	0	2
Kandy	26443	4	4	0	0	4	0	0	0	0	0	4
Matale	11917	1	1	0	0	1	0	0	0	0	0	1
Nuwara-Eliya	379	0	0	0	0	0	0	0	0	0	0	0
Colombo	60943	0	0	0	0	0	0	0	0	0	0	0
Kaluthara	10389	2	2	0	0	2	0	0	0	0	0	2
Gampaha	36425	9	8	1	0	9	0	0	0	0	0	9
Ampara	32371	5	4	1	0	4	1	0	0	0	0	5
Kalmunai	46705	2	2	0	0	1	1	0	0	0	0	2
Batticaloa	63490	11	11	0	0	8	3	0	2	2	0	7
Trincomalee	74249	90	90	0	0	60	30	0	5	6	8	71
Vavuniya	38942	17	17	0	0	10	7	0	1	3	0	13
Mannar	12287	1	1	0	0	1	0	0	0	0	0	1
Kilinochchi	24105	1	1	0	0	1	0	0	0	0	0	1
Mullaitivu	19609	1	1	0	0	0	1	0	1	0	0	0
Jaffna	112548	0	0	0	0	0	0	0	0	0	0	0
Total	1044115	199	192	6	1	147	52	0	12	15	10	162

Table 4. Number of RDT tests done in each district/RMO area and results of RDT examination

District or RMO area	No. of RDT's used	Positive.	Non <i>P. falciparum</i> infections.	<i>P. falciparum</i> Infections
Kurunegala	811	0	0	0
Maho	218	3	0	3
Puttalam	443	0	0	0
Badulla	171	0	0	0
Moneragala	908	0	0	0
Kegalle	200	1	1	0
Embilipitiya	398	0	0	0
Anuradhapura	292	2	0	2
Polonnaruwa	270	0	0	0
Hambanthota	221	0	0	0
Matale	153	0	0	0
Ampara	456	0	0	0
Kalmunai	845	0	0	0
Batticaloa	1681	0	0	0
Trincomalee	760	6	5	1
Vavuniya	568	0	0	0
Mannar	752	0	0	0
Jaffna	929	0	0	0
Total	10076	12	6	6

Activated Medical Institutions

About 40% of all the medical institutions in the country are activated medical institutions where either a PHLT and/or a PHFO are present. To strengthen malaria diagnosis the distribution of Rapid Malaria Diagnostic Test Kits and contract recruitment of Health Assistants (who have been trained for malaria microscopy under the GFATM malaria control project) has been done. During the year 2007 a total of 21600 RDT Kits have been distributed to medical institutions. In the latter part of the year another batch of Health Assistants (13) were trained and appointed to medical institutions in the Northern & Eastern Provinces, bringing the total number of Health Assistants posted to hospitals in the Northern & Eastern Province to 25.

Provision of Laboratory Items

A total of 35 nos. New Binocular microscopes purchased utilizing GFATM funds were distributed to medical institutions in malaria endemic project districts. In addition, supply of

laboratory items and reagents required for malaria microscopy was also done by the AMC directorate, while maintaining buffer stocks to be used in an emergency.

Table 5. Some laboratory items (required for microscopy) issued to Regional Malaria Offices during the year.

Item	Amount supplied
Blood lancets	700,000
Glass slides	171,500
Anisole	46 L
Cotton wool	18 kg
Ethanol 70%	7.25 L
Giemsa stain (stock solution)	67 L

Quality Assurance of diagnostic services

One of the main functions of the central laboratory of the AMC directorate, which functions as the reference laboratory is the quality assurance of malaria microscopic diagnostic services in the country. This is carried out through a routine programme of cross checking of blood smears examined. All positive blood smears and up to 10% of randomly selected negative blood smears are cross checked to confirm the accuracy of results. Based on the cross checking results and the supervision of the PHLTT, if a PHLT is found to be performing poorly refresher training is given to that person. During the year 2007, 28539 negative slides, 104 *P. vivax* positive slides and 4 *P. falciparum* positive slides were received for cross checking. Of these 2 false negatives and 2 species errors (a *P. vivax* positive slide was found to be *P. falciparum* positive and one *P. falciparum* positive slide was found to be a *P. falciparum* and *P. vivax* mixed infection) were detected.

The low number of microscopically positive smears detected has increased the necessity to have in-service refresher training of Public Health Laboratory Technicians regularly to ensure a quality service is provided.

Anti Malaria Campaign Headquarters

At the end of year 2007, AMC Headquarters had following category of staff. The table shows the number of staff in each category as at end of year 2007.

Table 6. Staff position at Anti Malaria Campaign Headquarters 2007.

Category of Staff		Approved cadre	In position	
			Male	Female
1	Administrative Grade MOO	02	-	-
2	Community Physicians	03	1	1
3	Parasitologist	01	-	1
4	Entomologists	02	-	2
5	MOO Grade I	01	-	-
6	MOO Grade II	04	2	2
7	MOO Preliminary	-	-	-
8	Accountant	01	-	1
9	Development Assistant	-	2	3
10	Management Assistant	-	-	-
11	Data Entry Operator	02	-	1
12	Public Management Assistant Services	-	-	1
15	Store keepers	03	3	-
16	Public Health Inspectors	02	2	-
17	Entomological Assistant	05	4	1
18	Public Health Field Assistants	10	4	2
19	Public Health Laboratory Technicians	22	3	7
20	Cinema Operator	01	-	-
21	Driver	19	8	-
22	K.K.S.	01	1	-
23	Roneo Operator	01	1	-
24	Lab Orderly	03	-	1
25	Spray Machine Operators	19	15	-
26	Ordinary Labourers	-	9	2
27	Sanitary Labourers	-	32	1

28	Labourers (Casual)	-	5	1
29	Registered Medical Officer			1
30	Ward Clerk			2
	Total	102	101	30

Vehicles-

Effective malaria control activities can be implemented through out the country, including in the conflict-affected areas in Northern and Eastern Province of the country only through the availability of an adequate number of vehicles in good condition. At present AMC headquarters has the following number of vehicles. During the year 2007 there were no new addition to the fleet of vehicles.

Table 7. Vehicles available at Anti Malaria Campaign Headquarters 2007

Type	Road Worthy	Available at HQ
Mitsubishi Fuso Lorry		
i. 42-1607	Yes	Yes
ii 42-9399	Yes	Yes
iii LC-0249	Yes	Yes
Mitsubishi Pajero jeep		
32-6520	Yes	Yes
Mitsubishi L200		
i. 60-7023	Yes	Yes
ii GP-2558	Yes	Yes
iii GP-2556	Yes	Yes
Toyota D/Cab		
GQ- 2646	Yes	Yes
GQ-1959		Given to RMO Office Kilinochchi
Nissan Caravan		
NA-3117	Yes	Yes
Ford Ranger D/Cab		
PA-4589	Yes	Given to GFATM Project
Mitsubishi L200		
42-1615	To be repaired	Not in use
Toyota Corolla car		
17-7940	To be repaired	Not in use

Drugs-

AMC Headquarters always stores a buffer stock of anti malarial drugs in order to face any emergency situations. Following tables show types of anti malarial drugs and the quantities distributed among RMO regions during year 2007.

Chloroquine Tablets-

Amount in stores in January 2007	52000
Amount received in 2007	148000
Amount issued	153000

Table 8. Issues of Chloroquine tablets from Anti Malaria Campaign Headquarters 2007

RMO Region	Amount
Maho	5000
Polonnaruwa	1000
Embilipitiya	2000
Trincomalee	10000
Matale	55000
Puttalam	2000
Hambanthota	20000
Kurunegala	5000
Anuradhapura	21000
Kandy	5000
Mannar	1000
Kalmunei	5000
Vavuniya	5000
Badulla	3000
Kegalle	2000
Gampaha	3000
Ampara	5000
Headquarters	1000
Sri Lanka Navy	2000
Total issued	153000

Primaquine Tablets

Amount in stores January 2007	423,000
Amount received 2007	42,000
Amount issued	74,000

Table 9. Issues of Primaquine tablets from Anti Malaria Campaign Headquarters 2007

RMO Region	Amount
Maho	3000
Kurunegala	3000
Anuradhapura	15,000
Kandy	2000
Badulla	2000
Kegalle	2000
Headquarters	1000
S/L Army	2000
Monaragala	2000
Hambanthota	7000
Kandy	2000
Ampara	2000
Anuradhapura	15,000
Puttalam	3000
Vavuniya	2000
Trincomalee	3000
Matale	2000
Mannar	1000
Batticloa	1000
Badulla	2000
Gampaha	2000
Total issued	74,000

Sulphadoxime +Pyramethamine (Fansidar)

Amount in store in Jan 2007 319,150

Fansidar tablets were not issued during 2007. A proportion of these tablets were received as tsunami assistance in 2005, but are not being utilized due to the low incidence of falciparum malaria reported in the country. On the advice of the DGHS efforts were made to supply these tablets to another country through the WHO Country Office. However a positive response has not been received to date for this offer.

Quinine Tablets

Amount in store January 2007 29,950
Amount issued 2150

Table 10. Issues of Quinine Tablets and injection vials from Anti Malaria Campaign Headquarters 2007

RMO Region	Number of Quinine tablets issued	Number of Quinine vials issued
Headquarters	1750	400
Moneragala	200	50
Puttalam	200	20
Matale	-	20

Quinine Injection vials

Amount in store in January 2007 4640
Amount issued 490

Buildings –

The AMC Headquarters is located at the Public health Complex Building at 555/5, Elvitigala Mawatha, Colombo 05. The Director's room, Consultant Community Physicians room, the Medical Officers room, the Public Health Inspectors room, the Library, the Computer room, Telephone exchange and the Auditorium are located in the 3rd floor. The Administration branch, Finance branch, the Accountants room and Stores are located in the 5th floor. The Central Parasitology Laboratory and Parasitologist's room, the Entomology Laboratory and Entomologists rooms and Record room are located on the 6th Floor.

Name boards for each section on 3rd, 5th and 6th floors and a statement on mission and vision of the Anti Malaria Campaign were mounted at the entrance of the 3rd floor during the year. Colour washing of the Public Health Building Complex was done during this period. Partitioning of the Entomology division with a space for setting up of an Insectory was carried out and refurbishment of the lobby and 3rd floor area was done.

Vector control activities

In Sri Lanka, malaria vectors are mainly controlled by a strategy of integrated vector management. Integral components of this strategy are the rational use of insecticides in rotation for indoor residual spraying (IRS), distributing long lasting insecticide-treated nets (LLINs), breeding and introduction of larvivorous fish, environmental modulation and modification through the filling of abandoned gem pits, impregnation of mosquito nets with permethrin and space spraying for special occasions.

In the year 2007, Deltamethrin 5% wdp, Cyfluthrin 10% wdp, Fenitrothion 40% wdp, Lambda cyhalothrin 10% wdp, Etofenprox 20% wdp and Bifenthrin 10% wdp were used for indoor residual spraying in rotation in malarial districts (Table 1). Fenitrothion was used in Matale, Kurunegala, Kilinochchi and Mullaitivu districts and Etofenprox was used in Batticaloa, Kalmunai, Puttalam and Moneragala districts. In Moneragala, Mullaitivu, Ampara, Kalmunai, Puttalam, Trincomalee, Batticaloa, Mannar, Vavuniya, Jaffna and Hambanthota districts Deltamethrin was used. Cyfluthrin was used in Matale, Vavuniya, Mullaitivu, Trincomalee, Kurunegala, Puttalam, Badulla and Moneragala and Lambda cyhalothrin was used in Hambanthota, Kilinochchi, Batticaloa, Maho and Anuradhapura. About 254,501 houses were sprayed (fully and partially) and the total population covered under IRS programme was 1,004,704.

Eight thousand one hundred Permethrin impregnated long lasting insecticide impregnated nets, which were donated by World Health Organization, were distributed among malarious areas in Kilinochchi, Kalmunai, Anuradhapura, Kurunegala and Maho (Table 2). The protected population is about 32,400. A further 3,500 nets were impregnated using Permethrin 10% solution and 14,000 people were protected under this programme.

Larvivorous fish mainly “Guppi” (*Poecilia reticulata*) were introduced into wells and abandoned gem-pits as a biological method of vector control and environmental modulation and modifications was done by the filling of abandoned gem pits. Space spraying was done in special situations particularly around the camps of displaced persons and during festival seasons eg: Kataragama and Madu festival.

Table 11. Utilization of insecticides for malaria vector control operations in 2007

Insecticides	Quantity of insecticide used
Indoor Residual Spraying	
Deltamethrin 5% wdp (1 barrel = 11.25kg)	6645.018 kg
Cyfluthrin 10% wdp (1 barrel = 9 kg)	16750.52 kg
Fenitrothion 40% wdp (1 barrel = 20 kg)	8814.5 kg
Lambda cyhalothrin 10% wdp (1 barrel = 9.25 kg)	3910.175 kg
Etofenprox 20% wdp (1 box = 9 kg)	1018.42 kg
Bifenthrin 10% wdp (1 box = 8.48kg)	328.24 kg
Impregnation of mosquito nets	
Permethrin 10% EC (1 bottle = 1 liter)	361 liters
Larvicides	

Temephos	175 liters
Space spraying	
Technical Malathion	812 liters
Growth Hormone Regulators	
Pyroproxifen	Nil

Table 12. Distribution of Long Lasting Insecticidal Nets for malaria control in 2007

District/Institution	No. of LLINs distributed during 2007
1. Kalmunai	1000
2. Trincomalee	2500
3. Kilinochchi	1000
4. Mannar	500
5. Polonnaruwa	1000
6. Batticaloa	100
7. Mullaitivu	1000
8. Puttalam	300
9. Moneragala	200
10. Matale	100
11. Anti Malaria Campaign	300
12. Ministry of Health	100
Total	8100

Entomology

The entomology division contributed to national malaria control efforts during the year by conducting entomological investigations. Field investigations were carried out by the three entomological teams attached to Anti Malaria Campaign Directorate under the supervision of two Entomologists. The field staff consisted of five Entomological Assistants, four Public Health Field Officers and nine labourers. A total of 35 investigations were carried out during the year and the districts covered were Moneragala (five times), Kurunegala and Rathnapura (four times each), Polonnaruwa, Hambanthota, Puttalam, Matale and Anuradhapura (three times each), Ampara (two times), Gampaha, Kegalle, Kaluthara, Badulla and Kandy (once each).

The following entomological field techniques were used during the investigations.

1. Pyrethrum Spray Sheet Collection
2. Cattle Baited Net Trap Collection
3. Cattle Baited Cadjan Hut Collection
4. Window Trap Collection
5. Larval Survey
6. Human Baited Night Collection
7. Susceptibility Test
8. Bio Assay
9. Net Bio Assay

The data obtained from the entomological investigations carried out at central level by the three entomological teams as well as by the entomological teams attached to the regional level are summarized and shown below.

Larval surveys

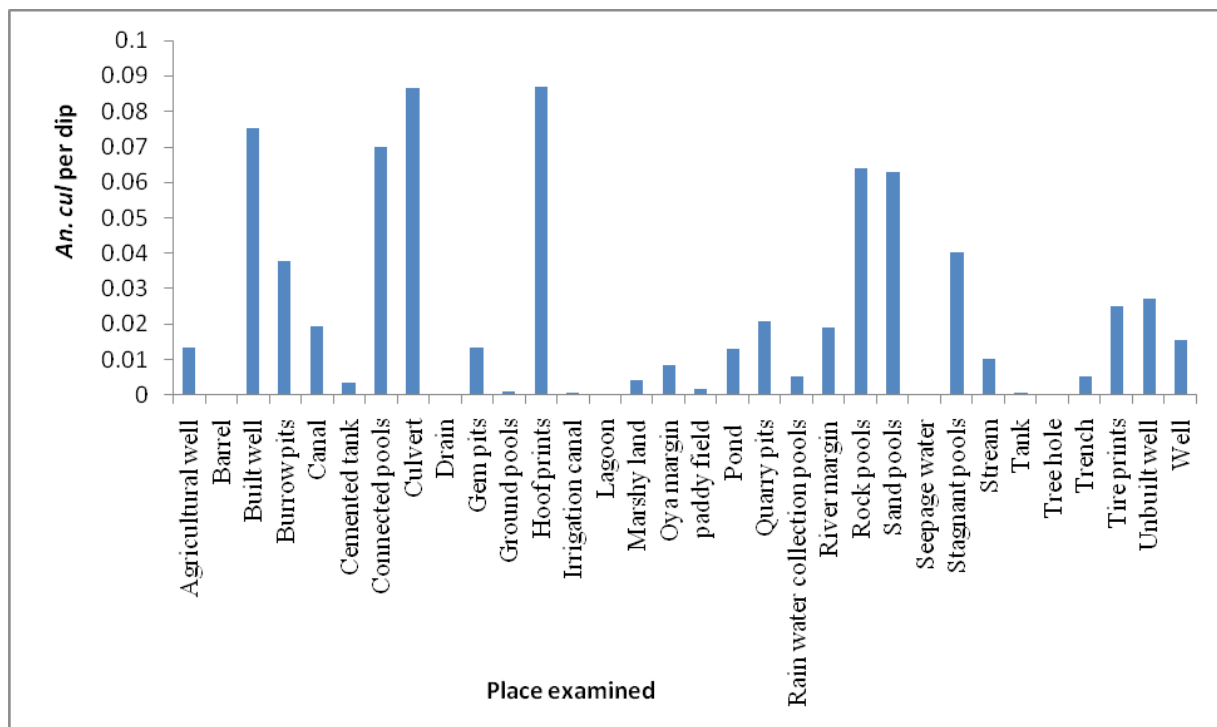
Larval surveys were the main type of entomological investigations carried out in the Northern & Eastern provinces due to the prevailing situation that has rendered night collections impossible. The data obtained from larval surveys are summarized in table 1 and Figure 1.

Table 13 : Results of Larval Surveys carried out during 2007

Type of breeding place	No. of dips	No. of I & II instar larvae	No. of III & IV instar larvae	An. culicifacies per dip	An. culicifacies	An. subpictus	An. annularis	An. varuna
Agricultural well	3760	635	678	0.0136	51	108	0	118
Barrel	4	0	0	0	0	0	0	0
Built well	23349	4139	4630	0.0752	1756	2836	0	277
Burrow pits	17905	3875	2586	0.0377	675	902	3	55
Canal	16788	2147	2109	0.0195	328	623	8	395
Cemented tank	1405	58	119	0.0036	5	90	0	9
Connected pools	6829	2434	1451	0.07	478	104	18	528
Culvert	289	25	289	0.0865	25	120	0	11
Drain	130	37	22	0	0	0	0	0
Gem pits	8426	3515	1723	0.0135	114	283	0	453
Ground pools	80408	9319	5182	0.0012	100	1241	21	111
Hoof prints	2377	620	730	0.0871	207	173	6	22
Irrigation canal	35151	1206	955	0.0008	27	205	0	155
Lagoon	1475	20	8	0	0	3	0	0
Marshy land	455	74	99	0.0044	2	9	5	2
Oya margin	92322	11305	6667	0.0085	784	257	2	3561
paddy field	35489	4383	3291	0.0017	60	851	1	135
Pond	57516	5718	3149	0.0131	753	1096	118	405
Quarry pits	10868	4444	2062	0.0209	227	488	62	55
Rain water collection pools	10305	3165	1290	0.0053	55	238	3	185
River margin	21840	9019	3652	0.0192	420	499	0	2066

Rock pools	41153	14290	8215	0.0639	2628	1050	28	1650
Sand pools	43243	14077	9597	0.063	2724	2201	33	1699
Seepage water	5	0	1	0	0	0	0	0
Stagnant pools	1465	450	463	0.0403	59	35	0	243
Stream	13605	4530	2696	0.0102	139	169	24	1315
Tank	23815	3176	2697	0.0008	19	626	229	75
Tree hole	3	0	0	0	0	0	0	0
Trench	367	73	110	0.0054	2	0	0	0
Tire prints	438	207	161	0.0251	11	44	0	0
Unbuilt well	7796	2236	1446	0.0271	211	637	2	163
Well	125241	11681	7049	0.0156	1948	3046	0	1010

Figure 1 : Breeding places of *An. Culicifacies*



The principal vector *Anopheles culicifacies* was found to be breeding most productively in built wells, culverts, rock pools, sand pools and hoof prints. Several atypical breeding places sampled for *Anopheles culicifacies* were found to be negative.

Pyrethrum Spray Sheet Collections were carried out to determine the indoor resting densities of major vector *Anopheles culicifacies* and other minor vectors of malaria in residual insecticide sprayed and unsprayed houses. The results are summarized in table 2.

Table 14 : Results of Pyrethrum Spray Sheet Collections carried out during 2007

Insecticide	Days after spraying	No. of houses examined	Species	Total No. of		No. of Females				No. per house		
				Male	Female	UF	BF	SG	G	Male	Female	
Bifenthrin	01-30	40	Neg									
	61-90	50	<i>An.cul</i>	1	2		1	1		0.02	0.04	
			<i>An.sub</i>	1	7		1	5	1	0.02	0.14	
Cyfluthrin	91-120	10	<i>An.sub</i>		1				1		0.10	
	01-30	100	<i>An.cul</i>		6		3	3			0.06	
			<i>An.sub</i>	10	31		7	14	10	0.1	0.31	
	31-60	138	<i>An.cul</i>	4	8		8			0.03	0.06	
			<i>An.sub</i>	36	66	7	1	29	29	0.26	0.48	
	61-90	40	<i>An.sub</i>	40	57	3		21	33	1	1.43	
	91-120	114	<i>An.cul</i>		13		8	1	4			0.11
			<i>An.sub</i>	22	73	10		39	24	0.19	0.64	
	121-150	53	<i>An.sub</i>	5	14			9	5	0.09	0.26	
	151-180	30	<i>An.sub</i>	6						0.2		
Deltamethrin	01-30	52	<i>An.sub</i>		21			9	12		0.40	
	31-60	150	<i>An.cul</i>		5			3	2	0	0.03	
			<i>An.sub</i>	8	109		3	50	56	0.05	0.73	
	61-90	55	<i>An.cul</i>		9			5	4		0.16	
Etofenprox	01-30	116	<i>An.sub</i>		19			8	11		0.35	
			<i>An.sub</i>		7			4	3		0.23	
			<i>An.cul</i>		46			17	29		0.40	
	31-60	20	<i>An.sub</i>		100			30	70		0.86	
			<i>An.cul</i>		3			3			0.15	
	91-120	4	<i>An.sub</i>		5				5		0.25	
			<i>An.sub</i>		6			3	3		1.5	
	121-150	20	<i>An.cul</i>	1	22		6	4	12	0.05	1.1	
			<i>An.sub</i>		14				14	0	0.7	
	151-180	70	<i>An.cul</i>		60	1	2	16	41		0.86	
<i>An.sub</i>				55	1		9	45		0.79		
Fenitrothion	01-30	40	<i>An.cul</i>	2	4		3		1	0.05	0.1	
	31-60	20	<i>An.cul</i>	1	5		3	1	1	0.05	0.25	
			<i>An.sub</i>		1				1		0.05	
61-90	20	<i>An.cul</i>	1	2		2			0.05	0.1		
Lambda-cyhalothrin	91-120	40	Neg									
	31-60	40	<i>An.sub</i>	1	3	1	1		1	0.025	0.075	
	61-90	10	Neg									
LLIN	91-120	10	Neg									
		300	<i>An.sub</i>	2	3				3	0.01	0.01	
Unsprayed		9701	<i>An.varun</i>		1		1			0	0.00	
	<i>An.cul</i>		26	474	11	103	134	226	0.00	0.05		
	<i>An.sub</i>		21987	51515	595	224	43571	7125	2.27	5.31		
			<i>An.varun</i>	2	74	2	3	0	69	0.00	0.01	

The human biting rate of the principal vector *An. culicifacies* was determined through the Human Biting Night Collections carried out in sprayed and unsprayed areas and summarized in Table 15. Outdoor biting rate of *An. culicifacies* was observed to be high during the partial night collections carried out in many locations after the application of insecticides. Vector densities were also found to be high outdoors after the effective period of insecticides had lapsed; indicating possible continued repellent action of the pyrethroids.

Table 15: Results of Human Baited Night Collections carried out during 2007

Insecticide sprayed	Days after spray	No. of Health areas	No. of baits		Anopheline species	Indoor					Outdoor				
			In door	Out door		No. of mosquitoes				hourNo. of A.c. per bait per	No. of mosquitoes				hourNo. of A.c. per bait per
						6-7p.m.	7-8p.m.	8-9p.m.	Total		6-7p.m.	7-8p.m.	8-9p.m.	Total	
Deltamethrin	0-30	2	10	21	<i>An.var</i>										
	Overdue	2	5	6	<i>An.ann</i>							1	1	2	
Bifenthrin	0-30	1	6	6	Neg										
	61-90	2	9	9	Neg										
Cyfluthrin	0-30	3	11	13	<i>An.cul</i>						1	1	1	3	0.08
	31-60	3	6	7	<i>An.cul</i>	1			1	0.06	3	4	3	10	0.48
					<i>An.var</i>						1			1	
	61-90	3	8	9	<i>An.cul</i>	1	1		2	0.08	4	8	11	23	0.85
					<i>An.var</i>							2		2	
	91-120	3	11	15	<i>An.ann</i>						2	2	1	5	
					<i>An.cul</i>		1		1	0.03	6	14	10	30	0.67
					<i>An.var</i>	1			1						
	121-150	3	10	11	<i>An.cul</i>		1		1	0.03	4	4	2	10	0.30
	Overdue	10	161	172	<i>An.ann</i>						12	18	14	44	
					<i>An.cul</i>	10	31	13	54	0.11	88	155	148	391	0.76
					<i>An. sub</i>	2			2		1			1	
Fenitrothion	0-30	3	8	12	<i>An.cul</i>						5	5	3	13	0.36
					<i>An. sub</i>						3	1		4	
	31-60	2	8	14	<i>An. sub</i>						5	5		10	
	61-90	2	6	6	Neg										
	Overdue	5	36	50	<i>An.cul</i>						8	14	9	31	0.21
					<i>An. sub</i>	2			2		8	1		9	
					<i>An.var</i>						1			1	
Etofenprox	31-60	1	3	3	<i>An.cul</i>							1		1	0.11
	91-120	1	4	6	Neg										
	121-150	1	2	3	<i>An.cul</i>	1	0	1	2	0.33	6	11	27	44	4.89
	Overdue	1	35	36	<i>An. sub</i>						1	2		3	
Lambda	61-90	1	4	6	<i>An. sub</i>						24	4	3	31	
cyhalothrin	151-180	1	2	4	Neg						12			12	

Unsprayed	Overdue	1	10	11	<i>An.cul</i>		2	2	4	0.13	9	18	30	57	1.73
		41	327	433	<i>An.ann</i>						9	7	3	19	
					<i>An.cul</i>	3	9	3	15	0.02	48	70	79	197	0.15
					<i>An. sub</i>	5	4	2	11		11	9	4	24	
					<i>An.var</i>						6	4		10	

Susceptibility level of major vector *An. culicifacies* and minor vectors to insecticides was determined using standard WHO procedures. Results are given in Table 16. Decreased susceptibility was observed to Malathion, DDT and Permethrin, however the number of mosquitoes tested was not adequate to draw significant conclusions regarding the emergence of resistance. Susceptibility tests were also carried out using the carbomates; Bendiocarb and Propoxur.

Table 16: Results of Susceptibility testing carried out in 2007

Helath Area	No of Tests	No. of. Mosquitoes Tested (% 24 Hour Mortality)										
		Cyfluthrin 0.15%	Deltamethrin 0.05%	Deltamethrin 0.025%	Lamda cyhalothrin 0.1%	Permethrin 0.75%	Bifenthrin 0.2%	Fenitrothion 1%	0.1% Alpha cypermethrin	Etofenprox 0.5%	Malathion 5%	D.D.T. 4%
An.culicifacies												
Anamaduwa	2						11(100%)					
Arachjchikattuwa	2									33(100%)		
Buttala	10	187(100%)										
Buttala	4									80(100%)		
Buttala	8				144(100%)							
Lunugamwehera	1	10(100%)			08(100%)							
Maho	5				47(100%)							
Nikaweratiya	6				103(100%)							
Nikaweratiya	5						100(100%)					
Rikillagaskada	2	40(97.5%)		40(100%)	40(100%)	40(100%)				40(100%)		
Thanamalwila	5	97(100%)										
Thanamalwila	3									60(100%)	56(23%)	
Thanamalwila	1				20(100%)							
Tissamaharama	2			20(100%)								
Tissamaharama	4								31(100%)			
Tissamaharama	2					17(100%)						
Tissamaharama	1				10(100%)							
Wariyapola	2											
An.subpictus												
Addalachchenai	1			10(100%)	05(100%)					05(100%)		
Arachchikattuwa	1						10(100%)					
Buttala	4	68(92.6%)			72(100%)							
Buttala	3			55(100%)								
Damana	4		22(100%)									
Karuwalagaswewa	1							10(70%)				
Kinniya	1			15(100%)		15(100%)						15(26.6%)
Laggala												
pallegama	1											15(86.6%)

Lunugamwehera	1		15(100%)					20(90%)			
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Table 16 contd : Results of susceptibility test

Helath Area	No of Tests	No. of Mosquitoes Tested (% 24 Hour Mortality)										
		Cyfluthrin 0.15%	Deltamethr in 0.05%	Deltamethr in 0.025%	Lamdacyh elothrin 0.1%	Permethrin 0.75%	Bifenthrin 0.2%	Fenitrothio n 1%	Alphacy permethrin 0.1%	Etofenprox 0.5%	Malathion 5%	D.D.T. 4%
An.subpictus												
Lunugamwehera	2				30(95%)	30(87.5%)						
Talawa	2					23(65.2%)						
Thambuththegama	2					25(68%)			35(85.7%)			
Thambuththegama	3				38(84.2%)							
Tissamaharama	2			10(100%)				13(100%)				
Trincomalee	1	30(100%)	15(100%)									
Trincomalee	2									30(63.3%)		
Uhana	1		10(100%)									
An.annularis												
Lunugamwehera	1			10(100%)								
Tissamaharama	1			20(100%)								
An.varuna												
Buttala	5	100(100%)										
Damana	1		06(100%)									
Dehiattakandiya	4									80(100%)		
Diwlapitiya	3									29(100%)		
Elahera	2				27(100%)							
Elahera	6						120(120%)					
Galgamuwa	2							30(100%)				
Ipalogama	1											
Kataragama	4		70(100%)									
Laggala												
pallegama	2			32(100%)					14(100%)			
Laggala												
pallegama	5				90(100%)							
Mawanella	4									75(100%)		
Siyambanduwa	3	42(100%)										
Thanamalwila	2	40(100%)										
Uhana	1		08(100%)									

Wellawaya	2	40(100%)										
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The persistence of insecticide residues on various surfaces of treated and the bio efficacy of Long Lasting Insecticidal Nets were investigated by the standard WHO bio assay test procedures using *Anopheles culicifacies* and minor vector species found to be susceptible to the relevant insecticide. Results of investigations carried out are summarized in Table 17 and 18.

Table 17: Results of the Bio Assay tests on sprayed surfaces

Wild caught blood fed mosquitoes (30 minutes exposure period)

Anopheles subpictus

Heath area	Insecticide sprayed	Days after spray	Type of surface	Location on surface	No. tested	Corrected mortality
Kuchchaweli	Deltamethrin	17	Door	Wooden	20	100
		17	Roof	Cadjan	20	100
		39	Wall	Upper	30	100
		17	Mud Wall	Lower	10	100
		17	Mud Wall	Middle	10	100
		17	Mud Wall	Upper	10	100
Trincomalee	Deltamethrin	6	Wall Cemented		10	100
		6	Door	Wooden	10	100
		6	Roof		10	100
		6	Wall mud	Upper	10	20
		6	Wall mud	Middle	10	0
		6	Wall mud	Lower	10	80

Anopheles varuna

Heath area	Insecticide sprayed	Days after spray	Type of surface	Location on surface	No. tested	Corrected mortality
Polpithigama	Fenitrothion	84	Roof	Tin	10	0
		84	Wall	Colour washed	10	0
		84	Wall mud	Upper	10	60
		84	Wall mud	Middle	10	50
		84	Roof	Cadjan	10	10

Table 18: Results of the Bio Assay tests carried out on LLINs

Wild caught blood fed mosquitoes (3 minutes exposure period)

An. varuna

Health Area	Insecticide	Days after last wash	No. of washes	Location on surface	No. of replicates	No. of mosquitoes	No. dead after 24 hrs.	Corrected Mortality
Buttala	Permethrin	31	4	Upper	13	65	39	60
		31	4	Middle	16	80	47	58.75
		31	4	Upper	16	80	46	57.5
		59	4	Middle	14	70	52	74.29
		59	4	Upper	15	75	56	74.67
		59	8	Lower	10	50	36	72
		95	4	Lower	5	25	22	88
		95	4	Middle	5	25	21	84
		95	4	Upper	5	25	22	88
		95	6	Upper	6	30	12	40
		95	6	Middle	6	30	12	40
		95	6	Lower	5	25	9	36

An. culicifacies

Health Area	Insecticide	Days after last wash	No. of washes	Location on surface	No. of replicates	No. of mosquitoes	No. dead after 24 hrs.	Corrected Mortality
Buttala	Permethrin	95	5	Lower	5	25	11	44
Ipologama	Deltamethrin			Middle	1	2	2	100

The summarized results of Cattle Baited Net Trap Collections, Cattle Baited Cadjan Hut Collections and Window Trap Collections are given in Table 19, 20 and 21 respectively.

Table 7: Results of Cattle Baited Net Trap Collection

Anopheline species	Bifenthrin			Cyfluthrin			Etofenprox		
	No. of Females	Number per bait	% of total catch	No. of Females	Number per bait	% of total catch	No. of Females	Number per bait	% of total catch
<i>An. annularis</i>	0	0.00	0.00	445	6.54	2.20	1	0.03	0.01
<i>An. culicifacies</i>	11	0.5	1.97	191	2.81	0.95	167	5.39	2.43
<i>An. subpictus</i>	19	0.86	3.40	604	8.88	2.99	96	3.10	1.40
<i>An. varuna</i>	61	2.77	10.91	5458	80.26	27.02	803	25.90	11.68
No. of Traps(Baits)		22			68			31	

Table 7 contd.

Anopheline species	Fenitrothion			Unsprayed		
	No. of Females	Number per bait	% of total catch	No. of Females	Number per bait	% of total catch
<i>An. annularis</i>	0	0.00	0.00	2553	2.50	2.21
<i>An. culicifacies</i>	5	0.16	0.16	335	0.33	0.29
<i>An. subpictus</i>	41	1.32	1.31	3220	3.15	2.79
<i>An. varuna</i>	334	10.77	10.67	5506	5.39	4.77
No. of Traps(Baits)		31			1021	

Table 8: Results of Cattle Baited Cadjan Hut Collection

Anopheline species	Bifenthrin			Cyfluthrin			Etofenprox			Fenitrothion		
	No. of females	Number per bait	% of total catch	No. of females	Number per bait	% of total catch	No. of females	baitNumber per	% of total catch	No. of females	baitNumber per	% of total catch
<i>An. annularis</i>	0	0	0	125	0.48	2.67	20	5	15.15	0	0	0
<i>An. culicifacies</i>	99	7.61	83.19	1562	26.03	33.43	24	6	18.18	7	3.5	18.92
<i>An. subpictus</i>	19	1.46	15.97	1308	21.8	27.99	64	16	48.48	0	0	0
<i>An. varuna</i>	1	0.077	0.84	1240	20.66	26.54	0	0	0	17	8.5	45.95
No. of Huts		13			60			4			2	

Table 8 contd.

Anopheline species	Lambdacyhalothrin			Unsprayed			Over due		
	No. of females	Number per bait	% of total catch	No. of females	baitNumber per	% of total catch	No. of females	baitNumber per	% of total catch
<i>An. annularis</i>	0	0	0	0	0	0	26	1.86	6.28
<i>An. culicifacies</i>	0	0	0	48	1.65	14.41	88	6.29	21.26
<i>An. subpictus</i>	0	0	0	170	5.86	51.05	57	4.07	13.77
<i>An. varuna</i>	0	0	0	36	1.24	10.81	114	8.14	27.54
No. of Huts		4			29			14	

Table 21: Results of Window trap collections

Insecticide	Days after spraying	No. of Traps	Species	Total		No. of females (%)				No. per trap	
				Male	Female	UF	BF	SG	G	Male	Female
Bifenthrin	61-90	8	<i>An.cul</i>	4	7	3(43)	4(57)			0.5	0.88
			<i>An.sub</i>		1		1(100)				0.13
Cyfluthrin	01-30	12	Neg								
	31-60	12	<i>An.cul</i>		5	4(80)	1(20)				0.42
			<i>An.sub</i>	2	10	3(30)		3(30)	4(40)	0.17	0.83
	61-90	13	<i>An.sub</i>		1			1(100)			0.08
	91-120	10	Neg								
	121-150	16	<i>An.cul</i>		5		5(100)				
<i>An.sub</i>			2	3			2(66.6)	1(33.3)	0.13	0.19	
Etofenprox	31-60	4	Neg								
	61-90	4	Neg								
	151-180	4	<i>An.cul</i>		1	1(100)					0.25
Fenitrothion	01-30	12	<i>An.cul</i>		2		2(100)				0.17
	31-60	8	Neg								
Lamda - cyhalothrin	31-60	25	Neg								
	61-90	20	Neg								
	91-120	20	Neg								
	151-180	35	Neg								
Unsprayed		296	<i>An.cul</i>	1	21	8(38)	5(23.8)		8(38)	0.00	0.07
			<i>An.sub</i>	53	133	37(27.8)		25(18.8)	71(53.3)	0.18	0.45

In addition to field entomological surveillance activities, initial steps were taken to start a laboratory colony of *Anopheles tessellates* in the Entomology Laboratory. Entomological equipments necessary for district programmes were distributed from the entomology stores of the headquarters to the regional entomological teams.

Foreign funded malaria control activities in the year of 2007

During the year 2007 GFATM and WHO assisted malaria control activities in Sri Lanka.

WHO technical assistance to the malaria control programme in 2007 was under the 2006/2007 biennium programme of the Country Budget and consisted of the following activities.

- Developing knowledge and skills of middle level malaria managers in management of malaria control activities by conducting in-service training programmes.

Three in service training programme were conducted at Anti Malaria Campaign Headquarters for Medical Officers of Health in malaria endemic districts on malaria control activities and treatment of malaria patients. The first programme was held in March with the participation of thirty one MOOH , the second programme was held in October with the participation of thirty one MOOH and third programme was held in November with the participation of twenty MOOH. Eighty one newly appointed Medical Officers of Health were provided training under this activity.

- Reviewing and revising the existing tools for monitoring and evaluation of malaria control activities and developing new tools to monitor and evaluate the malaria control programme through conducting Consultative workshops for district level malaria control officers to review and revise existing M&E tools.

1st Programme - 19th & 20th February 2007 with the participation of 32 participants.

2nd Programme - 25th April 2007 with the participation of 32 participants

3rd Programme - 1st & 2nd August 2007 with the participation of 44 participants

4th Programme - 19.November.2007 with the participation of 23 participants

5th Programme - 27 November 2007 with the participation of 13 participants

6th Programme - 6th December 2007 with the participation of 18 participants

- Developing the knowledge and skills of malaria control officers on basic malariology and management of malaria control programme through the training of one central level and three district level full time malaria control officers on basic malariology

One officer from Anti Malaria Campaign Directorate (Dr K. K. W. H. P. de Silva) and three Regional Malaria Officers (Dr M. R. S. Bandara RMO Kurunegala, Dr. P. H. D. Kusumawathie RMO, Kandy and Dr. M. D. B. Perera RMO, Kurunegala) underwent a three-week training at NICD – India.

- Dr. R. R. Abeyasinghe, Acting Director/AMC and Dr. U. J. Kaluarachchi, Medical Officer/AMC headquarters attended the National Programme Managers meeting for SEAR in Chaing Mai, Thailand from 12th – 14th March 2007.
- Dr. K. K. W. H. P. de Silva attended a training on Monitoring & Evaluation of Malaria Control Programmes & establishment of a regional data base in July 2007 in Myanmar.

Assistance from the Global Fund to fight AIDS, Tuberculosis and Malaria (GFATM)

During the year 2007, National Malaria Control Programme continued to receive support from the GFATM in the form of two grants for malaria control under the Round 1 and Round 4. Both assistance projects are jointly implemented through a partnership between the Ministry of Healthcare & Nutrition and Lanka Jathika Sarvodaya Shramadana Sangamaya of Sri Lanka. The GFATM Round 1 Malaria Control Project was started in 2003 and the Round 4 project in 2005.

GFATM Round 1 Malaria Control Project

This project funds malaria control activities in 12 conflict-affected districts in Northern, Eastern, North Central & Uva provinces. The project mainly focuses on marginalized populations in the districts of Anuradhapura, Polonnaruwa, Jaffna, Kilinochchi, Mullaitivu, Mannar, Vavuniya, Trincomalee, Ampara, Kalmunai, Batticaloa and Moneragala.

The following activities were carried out during the year 2007

- Conducting malaria mobile clinics in high risk areas.

Under the GFATM project, malaria mobile clinics were conducted in all the project districts for early detection & prompt treatment of malaria patients and asymptomatic carriers. A total of 1674 malaria mobile clinics were conducted (93% of target achieved) at which 142,622 blood smears were examined during 2007 from the 12 project districts. These mobile clinics contributed to detecting 26 malaria positive patients (25 *P. vivax* smears & 1 *P. falciparum* smear). This amounted to 12.5% of malaria cases reported from the country in 2007.

- Distribution of Rapid Diagnostic Test-kits (RDTs) to improve diagnostic facilities.

A total of 10,000 RDTs were purchased and distributed among project districts. These RDTs were mainly distributed to Medical Institutions without a Public Health Laboratory Technician to carry out malaria microscopy. In addition other Government Medical Institutions in project districts were also provided with RDTs to enhance diagnosis and improve case management.

- Enhanced entomological surveillance.

Four additional days were funded through the project to augment the entomology component of the Provincial Malaria Control Programmes with a view to forecasting and preventing malaria outbreaks and epidemics in the districts. Overall a total of 611 additional entomological days of surveillance were carried out using project funds.

- Maintenance of vehicles used for malaria control in project districts.

A total of Rs. 70000/= was provided to each district to carry out essential vehicles repairs. Vehicles used for malaria control activities in the districts of Mullaitivu, Vavuniya, Kilinochchi, Kalmunai, Trincomalee and headquarters were repaired and made roadworthy.

- District level in-service training programmes.

Forty two in-service training programmes were conducted during the year for Public Health Inspectors, Public health Laboratory Technicians, Public Health Field Officers and Spray machine Operators. A total of 80 PHIs, 64 PHLTTs, 89 PHFOOs and 591 SMOOs from project districts were provided in-service training under this programme.

- Overseas training for central and district level malaria control officers and field staff.

Three Regional Medical Officers & two medical officers attached to Anti Malaria Campaign Head office (Dr. S. T. A. P. Serasinghe – RMO Ampara, Dr. S. Sivamohan – RMO Vavuniya, Dr. A. Thileeban – RMO Kilinochchi, Dr. U. J. Kaluarachchi – Medical Officer, AMC Headquarters and Dr. J. K. M. N. Jayakody – Medical Officer, AMC Headquarters) participated in the International Training Course on Management of Malaria at the Faculty of Tropical Medicine, University of Mahidol, Thailand in September 2007.

The following public health officers participated in a study programme at the Vector Control Research Centre, India in July 2007 – Mr. DMSK Dissanayake, PHI Anuradhapura, Mr. IRHM Abeyratne, PHI Ampara, Mr. Vernakulasingham, PHI Trincomalee, Mr. VM Premasiri, PHLT Anuradhapura, Ms. Sinthuja EA Batticaloa, Mr T. Gobinath PHFO Vavuniya, Ms. HWCP Somaratne, EA AMCHQ, Ms. MTCN Perera EA AMCHQ, Ms. RD Swarnalatha, PHLT AMCHQ.

- Procurement of essential laboratory equipment and reagents

Twenty Binocular Microscopes were purchased and distributed to medical institutions in project districts. Reagents necessary for strengthening of laboratory activities were also purchased under this activity.

- Two laptop-type computers and one photocopy machine necessary for strengthening monitoring and evaluation of project activities and one multi media projector necessary to conduct in-service training programmes were purchased.

- Twelve monthly reviews on GFATM activities in project districts with the participation of Regional Malaria Officers, Technical Staff of AMC Headquarters and representatives of Sarvodaya / Lions' were conducted at Anti Malaria Campaign Headquarters to assess the progress of work qualitatively and quantitatively. These meetings were chaired by the Deputy Director General of Public Health Services Dr. P. G. Mahipala.

- Five District Review Meetings with Regional Malaria Officers, Medical Officers of Health and other provincial level health authorities were conducted in Anuradhapura, Trincomalee, Polonnaruwa, Vavuniya and Ampara for the purpose of assessing the progress of activities in the

project districts, and also to encourage the participation of key district level officers in project implementation.

GFATM Round 4 Malaria Control Project

This project aims at scaling up efforts of the National Malaria Control Programme and focuses on poor, vulnerable populations living in six epidemic-prone districts which are at increased risk for malaria due to occupational factors. The districts are Moneragala, Matale, Rathnapura, Kurunegala, Puttalam and Hambanthota. The project is jointly implemented through a partnership between the Ministry of Healthcare & Nutrition and the Lanka Jathika Sarvodaya Shramadana Sangamaya of Sri Lanka.

The following activities were carried out during the year 2007 under this project;

- Conducting malaria mobile clinics in remote areas.

Six hundred and twenty five mobile malaria clinics were conducted (100% of target achieved) to reduce malaria transmission among vulnerable and mobile populations through early detection and treatment. A total of 39,842 blood smears were examined from all 6 project districts and two cases of *P. vivax* were detected. These were from mobile clinics conducted in Puttalam & Moneragala districts.

- Distribution of Rapid Diagnostic Test-kits (RDTs) to improve diagnostic facilities.

A total of 15,000 Rapid Diagnostic Test kits were purchased & distributed among project districts in May 2007 to enhance malaria diagnosis. These RDTs were mainly distributed to medical institutions without a Public Health Laboratory Technician to carry out microscopy. In addition other government medical institutions in project districts were also provided with RDTs to strengthen diagnosis and management of malaria patients.

- Conducting training programmes for clinicians on management of malaria patients.

Training programmes on management of malaria patients were conducted for clinicians attached to GH Anuradhapura, BH Matale and TH Kurunegala. In addition one programme was

conducted for Medical Officers of Health in Kurunegala district. A total of 60 clinicians were trained under these programmes.

- Enhanced entomological surveillance.

Four additional days of entomological surveillance were funded through the project to augment the entomology component of the Provincial Malaria Control Programmes with a view to forecasting and preventing malaria outbreaks and epidemics. Accordingly 448 additional entomological surveillance days were funded by the project.

- Strengthening of entomological & parasitological laboratories at district level by providing necessary equipment & consumables

Hand lenses, digital hygrometers, dissecting sets, forceps, larval tubes and chemicals for entomological investigations were purchased during 2007 for strengthening of regional entomological laboratories.

- District level in-service training programmes.

Thirty two district level in-service training programmes were conducted for PHII, PHFOO, PHLTs & SMOO. A total of 147 PHII, 150 PHFOO & 147 SMOO received refresher training for updating knowledge and skills in environment friendly malaria control methods. A total of 102 PHLTs serving in medical institutions of the six project districts received in-service training on malaria diagnosis. One training programme was conducted for all the Entomological Assistants working in the six project districts and attached to AMC headquarters. A total of 65 EAAs were provided in-service training under this activity.

- Overseas training for district level malaria control officers and field officers.

Three Regional Malaria Officers from project districts received overseas training. Dr (Mrs.) M.D.B. Perera received a two week training on malaria research at The University of Tokyo, Japan. Two Regional Malaria Officers (Dr. M. R. S. S. Bandara & Dr. (Mrs.) P. H. D. Kusumawathi) went for a two week training course on Prediction of malaria epidemics based on weather and climate at the International Research Institute for Climate and Society, Columbia University, USA.

Eight Entomological Assistants participated in a study programme at the Vector Control Research Centre, India in July 2007.

One Public Health Laboratory Technician Mr. A. W. P. De Silva attached to Central Laboratory AMC received training on Servicing and Repair of binocular microscopes at the Olympus Facility in Singapore.

- Two operational research studies were funded by the project.

A research project to evaluate the relative efficacy of two larvicides (Temephos & Pyriproxifen) was carried out in Kurunegala and Puttalam districts.

Another research study to study Anopheline vector bionomics in Sri Lanka was carried out in Matale district.

- Twelve monthly reviews on GFATM activities in project districts with the participation of Regional Malaria Officers, Technical Staff of AMC Headquarters and representatives of Sarvodaya / Lions' club were conducted at Anti Malaria Campaign Headquarters to assess the project performance. These meetings were chaired by the Deputy Director General of Public Health Services Dr. P. G. Mahipala.

- Four District Level Review Meetings with Regional Malaria Officers and other provincial level health authorities were conducted in Hambanthota, Matale, Moneragala and Puttalam for the purpose of assessing the progress of activities in the project districts, and also to discuss various matters with the intention of improving the project implementations.