National Strategic Plan For Elimination Of Malaria 2010 – 2020

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Abbreviation

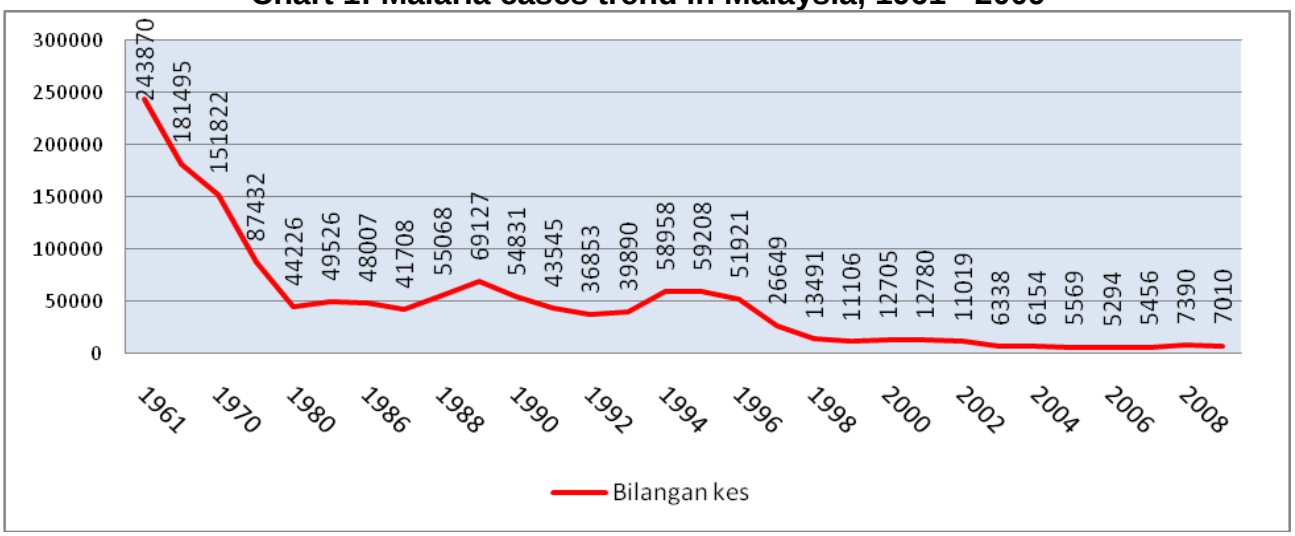
ACD	*Active Case Detection*
ACT	*Artemisinin Combination Therapy*
API	Annual Parasite Incidence
BFMP	*Blood Film for Malaria Parasite*
COMBI	*Communication for Behavioural Impact*
CPBV	Cawangan Penyakit Bawaan Vektor
CQ	*Chloroquine*
EQA	*External Quality Assessment*
FELCRA	Federal Land Consolidation and Rehabilitation Authority
FELDA	Federal Land Development Authority
INVEST	Investigation
IVM	Integrated Vector Management
JHEOA	Jabatan Hal Ehwal Orang Asli
JKN	Jabatan Kesihatan Negeri
JTMP	Juru Tenologi Makmal Perubatan
KEDA	Kedah Regional Development Authority
KKM	Kementerian Kesihatan Malaysia
MBS	Mass Blood Survey
MDG	Millineum Development Goal
PCD	*Passive Case Detection*
PCR	Polymerase Chain Reaction
PKA	Pembantu Kesihatan Awam
PKD	Pejabat Kesihatan Daerah
PKM	Pembantu Kesihatan Masyarakat
PORIM	Palm Oil Research Institute Of Malaysia
PPKP	Penolong Pegawai Kesihatan Persekitaran
PRA	Pekerja Rendah Awam
PSEMK	Pelan Strategik Eliminasi Malaria Kebangsaan
PSS	Pejabat Subsektor
RELA	Pasukan Sukarelawan Malaysia
RKPBV	Rancangan Kawalan Penyakit Bawaan Vektor
SALCRA	Sarawak Land Consolidation and Rehabilitation Authority

SPKA	Sukarelawan Penjagaan Kesihatan Asas
SPR	Slide Positivity Rate
WHO	*World Health Organisation*

1.0 Introduction

In Malaysia, the number of malaria cases has declined from 243,470 cases in 1961 to 7,010 in 2009. (Chart 1) Malaysia has successfully achieved its Millennium Development Goal (MDG). In 2009, there is a case reduction of 45% and the mortality has dropped by 26% as compared to the year 2000.

Chart 1: Malaria cases trend in Malaysia, 1961 - 2009



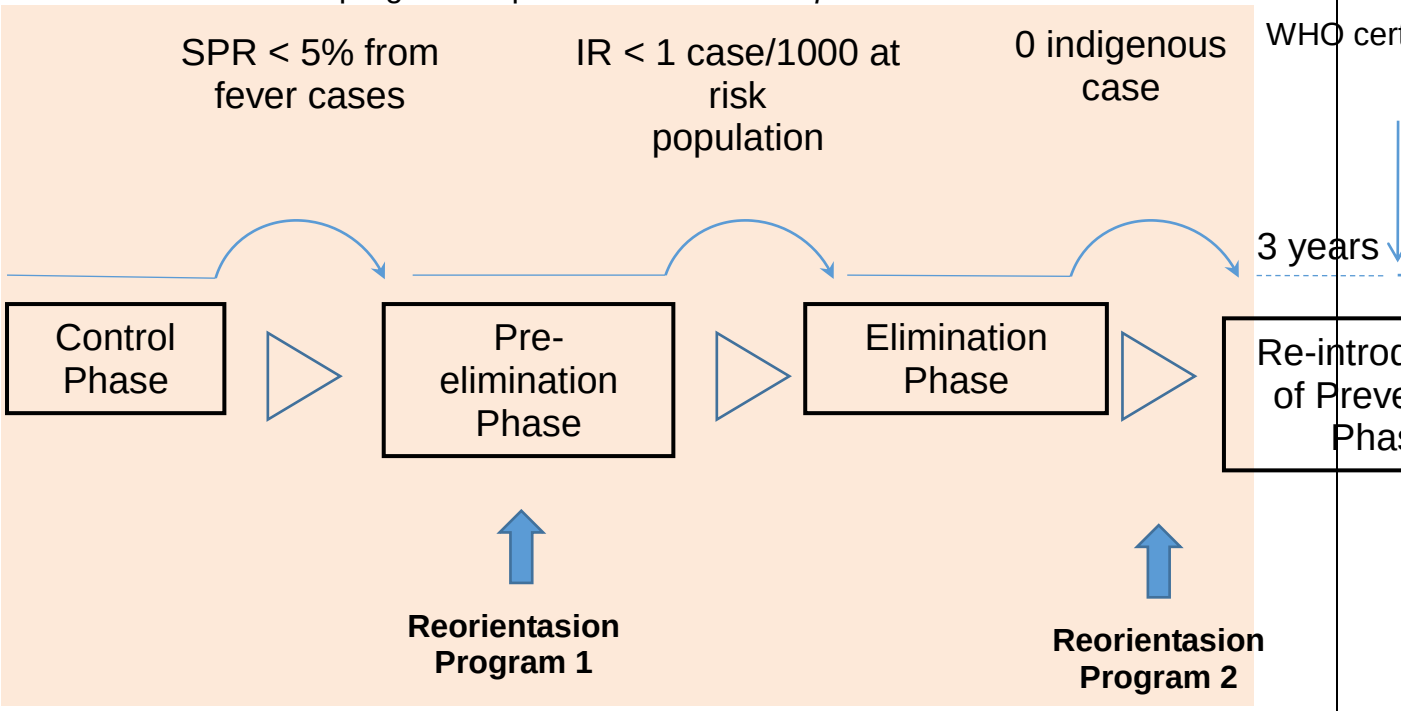
Based on the experience and knowledge in malaria control to minimise the impact of the disease morbidity and mortality, Malaysia consider eliminating malaria as the option to maximize the benefits of elimination such as the health sector operating cost reduction, reduction in school absenteeism, increased productivity and population education level and attraction of foreign investment . Elimination of malaria is also a policy that guarantees equality in line with the mission of the Ministry of Health as the activities of this program must be implemented at all levels, and includes those who are less capable, marginalized and hard to get treatment.

1.1 Elimination Definition

Elimination of malaria as recommended by the World Health Organization (WHO) is to reduce the incidence of local cases in any one geographical area to zero. The country may still have malaria vectors and still report cases of imported malaria due to international travel and migration.

To facilitate the understanding of Malaria Elimination Programme, WHO divides the phases and malaria status as summarized in Figure 2. Based on Figure 2, when the slide positivity rate reaches less than 5 %, the country will enter into the pre-elimination phase. When the malaria incidence rate is less than one (1) per 1000 population, the country can consider initiating elimination program to reach the status of zero local cases. When there is no local malaria transmission in a country for three consecutive years, the country can apply for WHO's recognition. To ensure smooth transition from current phase to the next one, two re-orientation programs have been proposed, which is during the initiation of program elimination and when the elimination of malaria has been achieved.

Chart 2: Malaria programme phase and *milestone path* for malaria elimination



Source: *Informal consultation on malaria elimination: setting up the WHO agenda, WHO 2006.*

1.2 Current situation

Elimination program is a continuation of a successful control program. Malaysia has reported a slide positivity rate (SPR) of less than 5% and an incidence rate of less than 1 per 1000 population for over a decade. Thus,Malaysia may consider entering the elimination phase from current pre-elimination phase with the reported malaria incidence of less than 1 per 1000 residents in 1998 (data not included).

Table 1: Malaria incidence and slide positivity rate (SPR), 2000 - 2009

Year	Population	Total malaria cases	Indigenous malaria	Incidence rate (Total cases) per 1,000	Incidence rate (Indigenous) per 1,000	Slide positivity rate (SPR)
2000	23,274,690	12,705	9,273	0.5	0.4	0.69
2001	23,795,300	12,780	8,808	0.5	0.4	0.70
2002	24,526,500	11,016	7,652	0.4	0.3	0.62
2003	25,048,300	6,338	4,264	0.3	0.2	0.38
2004	25,580,900	6,154	3,989	0.2	0.2	0.39
2005	26,127,500	5,569	3,329	0.2	0.1	0.39
2006	26,640,100	5,294	3,917	0.2	0.1	0.38
2007	27,173,700	5,456	4,048	0.2	0.1	0.35
2008	27,728,800	7,390	6,071	0.3	0.2	0.47
2009	28,306,600	7,010	5,955	0.2	0.2	0.45

Source: CPBV Annual Report, 2000 to 2009

However, analysis of malaria incidence rates by state shows that Sabah still has the incidence of more than 1 per 1000 population for the period of year 2007 to 2009. (Table 2)

Table 2: Malaria incidence (total cases) by states, 2007 – 2009

Year	2007	2008	2009
Perlis	0.02	0.02	0.01
Kedah	0.05	0.07	0.04
Pulau Pinang	0.04	0.13	0.06
Perak	0.10	0.04	0.03
Selangor	0.07	0.04	0.04
WPKL	0.01	0.02	0.03
Negeri Sembilan	0.03	0.12	0.09
Melaka	0.02	0.02	0.01
Johor	0.03	0.03	0.03
Pahang	0.08	0.1	0.11
Terengganu	0.03	0.02	0.03
Kelantan	0.05	0.17	0.17
Sarawak	0.48	0.78	0.73

Sabah	1.04	1.32	1.25
WP Labuan	0.02	0.05	0.03
Malaysia	**0.20**	**0.27**	**0.25**

Source: Annual Report Year 2007, 2008, 2009 CPBV MOH

Specifically, the malaria situation in Malaysia based on the results for the period 2006 to 2008 are as follows.

1.2.1 Epidemiology

For year 2006 to 2008, malaria cases increased from 5,254 (2006) to 5,456 (2007) and then, increased again by 45 % to 7,930 in 2008. The increments of cases in 2009 were reported in the state of Sabah (30%), Sarawak (65%), Pulau Pinang (259%), Negeri Sembilan (350%) and Kelantan (249%). From 2006 to 2008, more than half of the cases reported from Sabah and about 25% reported from Sarawak.

For the age group, the age group 20 to 29 years contributing to around 27 % of the total cases. Risk groups of children < 5 years, only about 5 % of the total cases. For 2006 to 2008, there was a decrease in the percentage of cases among children < 5 years in Peninsular Malaysia and Sabah. However, there is an increase in cases of the same age group in Sarawak, from 3.0% of total cases in 2006 to 6.8% in 2008.

Almost 80% of malaria cases in Malaysia are among men. In Peninsular Malaysia, more than half of the cases were foreigners, while for Sabah, about 40% and for Sarawak, the percentage is much lower at around 10%. Occupational groups of high risk of malaria infection are agriculture and farming sector workers (18%), followed by work related to forestry such as logging (15%).

1.2.2 Types of infection (Species)

Half of the cases of malaria in Malaysia are due to *Plasmodium vivax*, one third due to *Plasmodium falciparum* and the rest, *Plasmodium malariae* (around 9%) and mixed infection (4%).

1.2.3 Case detection and slides examination

Around 90% of cases are detected by PCD in Sarawak whereas the percentage is lower in Peninsular Malaysia (average 58%) and Sabah (average 75%). Percentage of error in overall slide examination is not satisfactory, namely 3% in 2007 and 7% in 2008.

1.3 Feasibility of Malaria Elimination Programme in Malaysia

To assess whether a country is ready to enter into the elimination phase, Malaria Elimination Group (MEG) recommenda a feasibility assessment based on the technical, operational and financial aspects before starting an elimination program.

The technical feasibility assessment helps to determine whether elimination can be achieved. Elimination phase can be achieved if the incidence is less than 1 case per 1000 population. Specifically for Malaysia , malaria elimination was achieved in 815 (71%) sub-districts across the country where there is no local infection reported for the period 2006-2008 , while 218 (19%) sub-districts have the incidence rate of less than 1 per 1000 population (pre-elimination). Meanwhile, 115 (10%) sub-districts in seven (7) states have the incidence rate > 1 per 1000 population and of this number , there are 87 (76%) sub-districts in Sabah and 21 (18 %) in Sarawak .

Operational feasibility of a country is measured by the ability to implement all activities towards the attainment of elimination. Malaysia has several important components such as the health system that is capable of diagnosing early and start treatment for all cases of malaria, the ability to ensure high coverage of vector control activities, political stability and government support as well as close multi-sector collaboration.

Long-term financial planning for the elimination and retention programs perlaksaanan malaria-free status is important because without financial support, the incidence of malaria cases will increase and the investment and effort that has been initiated will be wasted. .

Table 3 gives an explicit picture of the differences between the control and elimination programs. In short, the management of elimination program management needs to be more efficient and complete than the control program.

Table 3: Comparisons between control and elimination programme

Matter	Control Programme	Elimination Programme
Objective	Reduction of malaria burden	Cessation and absence of local case
Operating area	Depends on endemicity, relationship and interest of social, politics or economy.	All malaria foci
Minimum standard of activity	Good: reduction of transmission to the level where disease is no longer regarded as public health problem	Perfect/best: Transmission chain has been terminated in one area. If new case occur, source of infection need to be identified and isolated
Activity duration	No limit	One country is regarded as malria free if no transmission for three years
Economy aspect	Continuous	Continue after elimination but focus will be on efficient health service delivery
Integration with other health programme	Better to be integrated with other programme	Not advisable as elimination is specific and has its time period
Case detection	Mostly by PCD	Case detection very important including ACD
Imported case	Less attention given	Very important to give attention especially after elimination is achieved
Case investigation	Less attention given except for *P.falciparum* case in area of low incidence	Become more important and wil be the priority once elimination achieved
Epidemiology assessment	Reduction of parasite index and malaria incidence	Absence of local case (with proof)
Monitoring of achievement	Assessment of achievement	Assessment of what is not achived yet
Intervetion level	Residents, patients	Focus/locality
Programme management	Not perfect but sufficient	Must be very quick and efficient. If not, there is a possibility if failure

Adapted from WHO Expert Committee on Malaria. Sixth report

1.4 Benchmarks and SWOT analysis

The countries that have succeeded in eliminating malaria share the following factors:

i. political stability
ii. commitment from the government to eliminate malaria through the continuous fund channelinh
iii. good technical infrastructure and program management
iv. quality training and competent workforce
v. health service that is well developed and functioning
vi. no internal and external conflict

vii. no large movement of population from neighboring countries that are malaria endemic

viii. unstable malaria situation

Based on the above factors as well as the SWOT analysis (Table 4), Malaysia could achieve elimination status by strengthening management of existing programs and improve the weaknesses that have been identified. In addition, the elimination of malaria should be seen as part of a larger development that will improve the socio-economic of the population, comprehensive health coverage and a high standard of living. Malaria-free status will accelerate the country development by attracting foreign investment and tourism.

Table 4: SWOT Analysis (Strength, Weakness, Opportunity and Threat) for Malaria Control Programme, 2006 - 2008

STRENGTH		
1.	Commitment	The Government is committed to implement the National Malaria Elimination Strategic Programme 2011-2020 through the continuous financial support.
2.	CDC Act[1] 1998	Malaria is an infectious disease that must be notified within seven (7) days under this Act. This allows all reported malaria cases be treated in any health facilities including private clinics.
3.	Case detection	Almost all health facilities across the country have the facility to conduct the test of Blood Film for Malaria Parasite (BFMP). This allows early detection and prompt treatment.
4.	Case investigation	Around 98% of malaria cases are investigated within 7 days from the date of notification. This ensures control activities can be started immediately.
5.	Diagnosis and treatment	Diagnosis and treatment for free in all government health facilities and hospitals make healthcare more affordable to public.
6.	DDBIA Act[2] 1975	This Act is to enforce the destruction of vectors.
WEAKNESS		
1.	Case	• A total of 168 health clinics in Sarawak are without

[1] CDC Act - Control of Communicable Diseases Act

[2] DDBIA – Destruction of Disease Bearing Insects Act

	detection	microscope. • The screening activity, especially among foreign workers from malaria endemic areas has not been substantial resultiing in frequent malaria outbreaks in this group.
2.	Slide examination	• Errors in positive slide examination is still high at 3-7%. • Late slide examination in Sarawak because of the shortage of microscopy service at the clinics.
3.	Malaria case investigation	Incomplete investigation form results in failure in identification of the source and transmission of the infection.
4.	Treatment	Physicians using a variety of treatment regimes, particularly for *P. falciparum*. Guidelines on the treatment regime version year 2000 needs to be updated by including the latest and better treatment regime.
5.	Follow-up	Follow-up, especially among foreign workers is not complete. Among the problems are incompetent management at the district level and also the frequent shifting of foreign workers.
6.	Drug resistence surveillance	Was stopped by the IMR in 2006.
7.	Residual spray coverage	Residual spray coverage of the locality that should be done regularly is still unsatisfactory. For example: in 2008, residual spray coverage in Sarawak (22.3%), Kelantan (12.2%) and Pahang (22.6%).
8.	Special spray	High-risk areas (especially where the foreign workers work) that require special spray were not identified. For example: Selangor and Penang.
9.	Insectide Treated Nets	• Low (<80%) insectide treated nets coverage in some states due to lack of staff and logistical problems. • The Penan that refuse the use of nets supplied by MOH. • Study on the effectiveness of impregnated bed nets is not conducted in the field.
10.	Preparedness and response	• There is no malaria outbreak management guidelines. • Lack of skilled health personnel to control malaria outbreak. • The district and the state are less sensitive to potential outbreaks area such as the workplace of foreign workers.
11.	Surveillance system	• Vekpro data is not updated and not fully analyzed. • There is a discrepency between data and reten Vekpro monthly.
	OPPORTUNITY	
1.	Slide preparation and	Medical assistants and staff of private clinics, workers in estate or logging camp can be trained to collect and examine BFMP sample including making follow up for malaria cases.

	examination	
2.	Health Corp and ACD slide	Malaysian Army Medical Corps can carry out ACD activities among their members who recently returned from the operation.
3.	COMBI program	COMBI program can be established in the high-risk communities.
4.	Volunteer	Volunteers in high-risk localities can monitor treatment and take BFMP slide from fever patient or those involved in high-risk activities besides helping in vector control activities.
6.	Collaboration with other agencies	Inter-agency collaboration is encouraged.
7.	International cooperation	Cooperation with neighboring countries such as Thailand and Indonesia via Goodwill Meeting between Malaysia - Thailand and SOSEK MALINDO.
	THREAT	
1.	Foreign worker	• Influx of illegal migrants from malaria endemic countries allow the reintroduction of malaria receptive areas. • Migrant workers who are changing workplace frequently made it difficult for follow-up action.
2.	Incooperative employer	Employers did not provide insecticide treated nets to their workers.
3.	Attitude	Delay seeking treatment due to logistical problems, social, self-treatment practice and traditional treatment.
4.	Logistical problem	Difficulty to perform case detection and control activities in rural areas.
5.	Resistance	• The presence of parasites resistant to anti-malarial drugs. • The presence of vector insects resistant to pesticides.

1.5 Elimination Status Assessment

When a country has recorded local transmission zero for three (3) consecutive years, the country can apply for recognition of malaria-free status of the WHO. This recognition requires proof beyond reasonable doubt which includes:

a) An effective surveillance mechanism and covers all areas.

b) The national registry of malaria cases, notification of all facilities including

the private sector.

c) Health services are able to detect cases early, provide treatment and conduct follow up on the imported cases.

d) Laboratory capable of diagnosing cases by microscopy.

e) Epidemiological investigation done for all cases.

f) National Action Plan that shows continuous commitment.

g) System to raise the awareness of tourists on infection prevention.

h) Database for cases and foci.

i) Surveillance entomology and monitoring of insectide resistance of vector.

j) Coordination system in the borders.

k) The ability to detect and control outbreaks.

l) Sero-Epidemiological Study to understand the status of immunity against malaria.

All the elements mentioned above are included in this malaria elimination strategy plan to ensure early planning and preparation of a comprehensive documentation for the program assessment. Monitoring framework for pre-elimination and elimination programmes recommended by WHO are as in Appendix 1.

2.0 National Strategic Plan for Elimination of Malaria (NSPEM)

There are seven (7) strategies in NSPEM :

- Surveillance of malaria,
- Control of malaria vectors using the concept of IVM (Integrated Vector Management),
- Early detection and prompt treatment of malaria cases,
- Preparedness and response to outbreaks of malaria,
- Communication and social mobilization,
- Capacity building and
- Malaria Research

To ensure the success of this program, Malaria Elimination Programme Monitoring Committee will be formed at ministry level to monitor the progress of the implementation of activities by the outlined Key Performance Indicators (KPI).

2.1 Objective

The formulated NSPEM aims to achieve the following objectives:

2.1.1 Main objective

To make Malaysia free from locally acquired malaria infection (Indigenous) by 2020.

2.1.2 Specific objectives

i. To make Peninsular Malaysia is free from local malaria infection (Indigenous) by 2015.

ii. To make the states of Sabah and Sarawak free from local malaria infection (Indigenous) by 2020.

To achieve this status, local case reduction will be targeted at 20% reduction per year for all states based on the number of cases in 2009.

2.2 Stratification of Malarious Area

For the purpose of implementation of the National Strategic Plan for Malaria Elimination (PSEMK), localities are divided into three (3) types as shown in Table 5.

Table 5: Criteria by area

LOCALITY	CRYTERIA
RED LOCALITY	Incidence ≥ 1 / 1000 population
YELLOW LOCALITY	Incidence < 1 / 1000 population
GREEN LOCALITY	No locally acquired infection

Out of a total of 656 sub-districts (mukim) in Sabah, Sarawak, Pahang, Perak, Kelantan, Selangor and Penang, 115 sub-districts are red zones which cover 5,216 localities, 180,599 houses and 1,266,729 population at risk (Table 6). Out of 115 red sub-distrcits, 87 (76%) in Sabah and 21 (18%) in Sarawak. There are 218 (19%) sud-distrcits in eleven (11) states that has already in the pre-elimination phase. Meanwhile, 815 (71%) sub-districts across the country, including the entire state of Perlis, Melaka, Labuan aand Kuala Lumpur do no have local infection in the period of the year 2006-2008.

Table 6: Strafication for red area based on 2006 – 2008 data

No	States	No of districts	No of sub-districts/ sectors	Red			
				No of sub-districts/ sectors	No of localities	No of houses	Population
1	Sabah	23	214	87	3,204	125,775	784,985
2	Sarawak	31	85	21	2210	44489	492947
3	Pahang	11	71	6	135	3,970	18,017
4	Perak	9	80	3	107	6,681	32,788
5	Kelantan	10	66	1	91	9,169	39,084
6	Selangor	9	56	1	2		
7	PPinang	5	84	1	1	20	100
	Total	**98**	**656**	**115**	**5,216**	**180,599**	**1,266,729**

Apart from the stratification as shown in Table 5, receptive and vulnerable localities have also been identified to ensure the necessary interventions to be implemented for the area. When the parasite reservoir decreases, surveillance needs to be improved to obtain evidence whether new transmission continues to occur and to detect imported cases so that the follow-up action can be initiated immediately.

2.3 Strategy 1: Surveillance system

2.3.1 Database

Efficient and comprehensive surveillance system is very important to ensure the success of any program related to the disease. Existing database of *e-notis* and *e-Vekpro* provides important information of malaria patient such as socio-demographic data, laboratory results, treatments and vector control activities. This data been used for analysis and synthesis of epidemiological information and the trend. However, the performance of database management is still not satisfactory (Table 7) in which there are data dicrepencies between the two database data and delay in data entry. Efforts to

ensure timely data entry and proper data verification will be implemented to ensure an effective surveillance system.

2.3.2 *Foci* registry

In addition to this database, Ministry of Health will update the foci registry which provides data on foci case prevalence, entomological surveillance and intervention activities including mapping of breeding areas, foci investigation and control activities for each foci (locality). Existing foci registry has been used for the malaria area stratification. However, it requires additional information, it should be regularly updated and accessible at all levels. This is consistent with the approach of elimination programs that focus base on foci and not only to the population within malarious area as in malaria control program. Informations in foci registry also useful for the outbreak warning system.

Table 7: Comparison between data in e-VEKPRO and e-notis with the monthly reported data in 2009

States	No of cases *e-VEKPRO*	Reported data	No of cases *e- Notis*
Perlis	2	2	2
Kedah	69	69	48
P Pinang	86	86	107
Perak	70	70	72
Selangor	231	209	200
WPKL	49	49	28
N Sembilan	89	90	91
Melaka	10	10	10
Johor	108	108	74
Pahang	176	176	175
Terengganu	30	30	24
Kelantan	276	276	276
Sarawak	1,795	1,823	1,231
Sabah	4,009	4,009	2,704
WP Labuan	3	3	0
TOTAL	7,003	7,010	5,042

2.3.3 Laboratory surveillance

Parasite isolates bank and genotyping facilities will also be established. This service will be used to differentiate between local and imported cases for *P. vivax* infection, and also between the relapse cases and new infection.

2.3.4 Surveillance system management

Database management will be improved including the monitoring of data entry into *e-notis* and *e-Vekpro*, standardization of existing forms and periodic data (epidemiology and vector control) analysis.

2.3.5 Financial implication

Existing management of *e-Notis* and *e-Vekpro* must be improved and it involve financial requirements for the replacement of equipment of procurement of new equipment such as computers, GPS devices and digital cameras are as follows:

i. Computer : 124 units ~ RM630, 000.00 [New: 102, Replacement: 22]
ii. GPS : 230 units ~ RM460, 000.00 [New: 197, Replacement: 33]
iii. Digital camera : 38 units ~ RM 76, 000.00 [New: 38]

Meanwhile for the parasite isolate bank, RM40, 000.00 is needed for the purchase of Liquid Nitrogen storage and accessories. Distribution of items (i) to (iii) is in Appendix 4.

2.4 Strategy 2: Control of malaria vectors using the concept of IVM (Integrated Vector Management)

Vector control activities will be continued in the elimination program as in the control program but differ in term of coverage target to be achieved. In the control program, coverage of 85% and 80% for bed-nets and spraying activities respectively are sufficient but for elimination program, 100% coverage needs to be achieved. In addition, the program will also introduce the concept of Intergrated Vector Management (IVM), a rational decision-making process for the use of resources to improve the effectiveness of vector-borne disease control.

2.4.1 Insecticide residual spraying activity

Regular residual spray coverage is still unsatisfactory. Problems identified include lack of human resource that effects the district's control activities plan, lack of activity monitoring and inaccurate dosage of insecticide sprays which not follow the guidelines. There is also the some districts that does not identify high-risk areas, particularly in the presence of foreign workers who require special residual spraying activities.

In Elimination Programme, residual spraying activities is based on the locality stratification as in Table 8 with TOCOSURE coverage which is total, complete, sufficient and regular.

For the receptive and vulnerable localities, a special spray will be implemented with 100% coverage and is performed every six (6) months for a residential building with complete wall, while for the residential building without complete wall will be sprayed every three (3) months. Special sprays should be continued until the localities is no longer at risk of malaria.

Table 8: Spraying activities criteria by localities

LOCALITY	SPRAYING ACTIVITIES
RED	▪ Regular residual spray coverage : 100% ▪ Every Six (6) months ▪ Eight (8) cycles ▪ Insecticide dosage ≥ 0.02g/m^2 for deltamethrin and 0.03g/m^2 for *lambda cyhalothrin*
YELLOW	▪ Focal residual spray coverage : 100% ▪ Every six (6) months ▪ Minimum of two (2) cycles until no more malaria cases reported for 1 year period from the last reported cases ▪ Insecticide dosage ≥ 0.02g/m^2 for d*eltamethrin* and 0.03g/m^2 for *lambda cyhalothrin*.
GREEN (receptive and vulnerable)	

Monitoring of residual spray coverage will also be conducted regularly include the insecticide susceptibility testing and bioassay testing.

2.4.2 Insecticide impregnated bed net

In year 2008, the coverage for second round of bed-nets impregnation was 89% with the average of one net covers for two (2) people. Issues related to the impregnated

bednets includes no efficacy studies, low quality of non-durable nets, poor compliance issue among Penan tribe in Sarawak and ineffective practice issue as the impregnated bed nets are not used during peak hours Anopheles mosquito bites.

Table 9: Bed net impregnation activities by localities

LOCALITY	BED NET IMPREGNATION ACTIVITIES
RED	▪ Impregnated bed net coverage : 100% ▪ Bed net impregnation every six (6) months ▪ Eight (8) cycles ▪ Bed net and population ratio : not less than 1 for every 2 people
YELLOW	▪ Impregnated bed net coverage : 100% for locality with malaria case ▪ Every six (6) months ▪ Minimum two (2) cycles until no more malaria case reported for 1 year period from the last case reported ▪ Bed net and population ratio : less than 1 for every 2 people
GREEN (receptive and vulnerable)	

Use of pesticides for bed net impregnation will be diversified to reduce the risk of vector resistance. Bioassay tests will be conducted to assess the effectiveness of the insectiside used. Ethnic of Penan in Sarawak will be provided with special nets to increase their compliant and the use of Long Lasting Insecticidal Net (LLIN) will be considered for the community in rural area with poor accessibility.

2.4.3 Other control activities

Anti-larval activities includes drain control maintenance and larvasid spraying activity are only practiced in several towns in Perak, Pahang and Penang. Besides, these anti-larval activities are only performed during the outbreak.

In elimination programs, maintenance of existing manipulation projects such as the automatic manipulation siphon, subsoil drainage and drainage control will continue. State should identify new area for the environmental manipulation and modification projects, particularly in receptive urban area, the vulnerable settlements on the outskirts of the forest and hillside and the areas with frequent outbreaks. Other activities include larvaciding using chemical control, biological control and use of repellent.

2.4.4 Malaria vector surveillance

Malaria vector surveillance is not carried out routinely and entomological studies is conducted only in epidemic areas due to lack of equipment and trained staffs. Malaria vector surveillance will be enhanced through the establishment of three (3) of the sentinel stations in Peninsular Malaysia, Sabah and Sarawak. Activities to be undertaken include the bioassay test. Malaria vector surveillance in residential areas of high risk groups such as migrant workers and indigenous peoples will also be carried out periodically.

2.4.5 Inter-sector and international collaboration

Vector control with the concept of IVM approach requires cooperation from various sectors, especially in border areas, plantations and logging camps. Cooperation with other agencies involved in farming and logging sector will be developed and nurtured. Information about the mass opening of new land will be obtained from the State Action Committee in order to plan surveillance activity and control activities can be initiated.

Collaboration with neighboring countries such as Thailand, Indonesia and the Philippines will also be enhanced to discuss the issue of malaria control in the border areas. Existing meetings such as Goodwill Meeting of the Malaysia-Thailand-MALINDO and BIMPS SOSEK-EAGA will be optimized for discussions on the formation of the Joint Action Plan, information sharing and coordination of border control activities.

2.4.6 Activity monitoring

District Health Office and the State Department of Health shall hold meetings at district and state level every three (3) months to review and discuss the performance of control activities and monitor all outbreak locality and high risk locality.

2.4.7 Financial implication

To achieve coverage of bed-nets to all people at risk and residual spray coverage in the red area, the estimated requirements are shown in Table 10. In addition, there is also a need for the replacement and purchase of new equipment related to vector control activities as listed:

i. Spray cans : 406 units ~ RM609, 000.00 [Replacement: 192, New: 214]
ii. Mist blower : 82 units ~ RM656, 000.00 [Replacement: 31, New: 51]
iii. Stereo Microscope : 20 units ~ RM140, 000.00 [Replacement: 20]

Table 10: Insecticide and nets estimation to achieve 100% coverage of the population at risk (red localities)

For insecticide treated net coverage	
Population at risk (red locality):	1,266,729 people
Population covered with ITN:	528,837 people
Population not covered with ITN:	737,892 people
Number of ITN needed (one net is estimated for two people) for population at risk that not covered with ITN:	368,946 units
Estimated costs for net: RM9.00 X 368,946 units	RM3,320,514.00
Insecticide requirement: 30 ml X 2 cycles X 368,946	22,137 L
Estimated costs for insecticide: RM 140.00/liter X 22,137 L	RM3,099,180
For indoor residual spraying (IRS)	
Number of house in red area:	180,599 houses
Number of house covered with IRS:	81,029 houses
Number of house not covered with IRS:	99,570 houses
Insecticide requirement: 75 g X 2 cycles X 99,570	14,936 kg
Estimated costs for insecticide: RM 260.00 /kg X 14,936 kg	RM3,883,600.00

2.5 Strategy 3: Early detection and treatment for malaria case

One of the strength of Malaria Contorl Programme is the easy availability of diagnostic tools and treatment for the public via the health services provided in all government health centers.

2.5.1 Passive case detection (PCD)

Currently, case detection for malaria is conducted through PCD, ACD, MBS, contact tracing and special screening. In control programme, not all outpatient fever cases will have BFMP done. For malarious and malaria prone area, at least 10% of all outpatient fever cases are required for screening whereas for malaria free area, only 5% are required. In view of the main objective of elimination programme is to eliminate the

source of infection, BFMP is required for all suspected outpatient cases. In order to achieve this objective, criterion for outpatient screening in all health clinics has been modified as below. (Table 11)

Table 11: Target group for slide sampling as PCD based on locality

Clinic	Target group
RED	▪ outpatient fever case, including foreigner ▪ foreigner from malaria endemic countries[#] - All illegal immigrants ▪ all pregnant mother during first visit (100%), and if fever develops during follow-up or during home visit
YELLOW GREEN	▪ outpatient fever case with signs and symptoms of malaria (including foreigner and all illegal immigrant from malaria endemic countries) ▪ outpatient fever case with high risk[*] ▪ pregnant mother with signs and symptoms of malaria and high risk[*]

[#] foreigners from malaria endemic countries such as Thailand, Phillipines, Cambodia, Vietnam, Myanmar, Pakistan dan Bangladesh.
* high risk group refer to people with recent travel to malaria endemic area, loggers, natives and people that carry out activity in the forrest for 1 month duration such as rangers and hunters

In order to identify the target group for BFMP screening, each government health facility nationwide has been given color coding based on the locality color code in the operating area. The clinic staff needs to ensure that BFMP is taken for all outpatient cases that fulfill the criterion

2.5.2 Active Case Detection

In malaria control programme, ACD is routinely carried out in malaria prone dan malarious areas such as malaria foci, logging camps, plantation establishment schemes and villages with high malaria incidents. The frequency of visit depends on the epidemiological situation of each locality whereby the visit can be done 2-weekly in the active locality. ACD canvasser should inspect more that 90% of the houses and interviews more than 60% of the residents in the locality during each visit.

In malaria elimination programme, as the malaria cases continouosly decline in few states in Peninsular Malaysia, ACD will become very important especially in problematic areas such as land development area and construction sites where the

workers mainly are foreigner from malaria endemic countries. In view of the high operational cost, criterion for ACD exercise is stipulated as below. (Table 12)

Table 12: ACD types and process

ACD types	When to initiate	Process
Weekly ACD	• one malaria case is reported in one locality AND • at least one case is detected after contact tracing AND • at least once case is detected after first MBS done • positive case with slide confirming the presence of gametocyte	• to be conducted twice, and if there is any new case detected afterwards, second MBS needs to be conducted • if no new case detected during ACD, activitiy will be conducted weekly for one month duration, and discontinue if still no case • If no new case detected during second MBS, activity will be discontinued
Monthly ACD	• imported case among the mobile foreigners or placements with frequent shifting of high risk group	• monthly ACD will be initiated and continued for 12 months, and will be discontinued after no new case detected for 12 months

Note: ACD coverage must be more than 90% of the houses and more than 60% of the residents

2.5.3 Mass Blood Survey (MBS)

MBS is carried out during outbreak before the activity to dye the mosquito nets with insecticides in red locality dan if investigation for suspected local transmission case has been done. MBS also will be conducted for students during the first week after the semester break in all boarding schools located in both red and yellow localities. In order to ascertain the effectiveness of MBS activity, at least 80% of residents will be examined and slide sample reading must be done within 24 hours.

2.5.4 Screening for high risk group

High risk group includes foreigners from malaria endemic countries, Malaysian who visits or works in malaria endemic countries and those involved in forestry and plantation activities including rangers. Screening examination (100%) towards all foreign workers from malaria endemic country can either be done at entry point or at workplace. Surveillance activity will also be scheduled every three (3) months among the high risk group such as foreign workers and natives. Health volunteers from rural areas, native settlements, among the plantation workers and foreign workers will be

trained in taking BFMP slides. The district office needs to establish smart partnership with the employers of plantation union, construction company dan logging camp to facilitate the screening activity.

2.5.5 Laboratory service

Diagnostic service will be available in all health facility and also in subsector office (Sabah) dan PCD post (Sarawak) to ensure treatment will be given promptly once malaria case is detected. BFMP slides examination in hospital and health clinic will follow the time as stipulated in table below. (Table 13)

Table 13: Turnaround time for slide examination

Detection method	Turnaround time
PCD (hospital and health clinic)	8 hours
ACD	24 hours
MBS	24 hours

**Target: MLT (Vector laboratory): 50-60 slides/day. MLT (hospital/ health clinic): 10-20 slides/day

Quality checking of BFMP slides will also be reinforced to minimize examination error.[3] Rejection rate for BFMP slides must be less than 0.5% for sample taken by health personnel, and less than 5% for sample taken by volunteers. All positive slides and 10% of negative slides need to be sent to the state vector laboratory / National Public Health Laboratory for re-examination. Slide examination error by medical laboratory technician (MLT) should be less than 1%. National Public Health Laboratory will also conduct External Quality Assurance (EQA) for all state vector laboratories.

Besides, slides for all mortality cases or slides reported as *P.malariae* need to be sent to National Public Health Laboratory for PCR test confirmation. Use of Rapid Diagnostic Tests (RDTs) is only restricted to its usage during outbreak in remote area and still needs to be confirmed with BFMP slide examination.

[3]

False positive	:	slide reported as positive but confirmed as negative after re-examination.
False negative	:	slide reported as negative but confirmed as positive after re-examination.
Missed species	:	slides reported as positive for one species but confirmed as mixed species (mixed infection) after re-examination
Wrong species	:	slide reported as positive but with incorrect species indetified

2.5.6 Case investigation and follow-up

Case investigation will be conducted for all malaria cases and all contacts will be examined. Besides, all case follow-up will be done at regular basis, which is weekly visit for one month for all parasite types, followed by monthly visit for six months for *P.knowlesi* and *P.malariae,* or monthly visit for one year for *P.vivax*. Nevertheless, cases with suspected drug resistance will have follow up for longer period of time.

2.5.7 Treatment

Service offered in government health facility for malaria diagnosis and treatment is free of charge. Generally, achievement for malaria treatment is satisfactory whereby more than 90% of the cases are given complete treatment except for the group of illegal immigrants.

2.5.8 Financial implication

Currently, there are only 589 (73%) health clinics and 41 (40%) mother & children health clinics (KKIA) are equipped with laboratory service. In order to ensure all health facility to be able to provide BFMP examination, the fund required to acquire a total of 292 units of microscopes for all health clinics and district health office laboratories is approximately RM 2.044 million. [121 units will be used as replacements and 171 new units]

Besides, a total of 32 subsector offices (PSS) or PCD posts, consisting of 23 in Sarawak, 7 in Sabah and 2 in Kelantan will be constructed. All PSS in Sabah and 6 PCD posts in Sarawak have been built under the Economy Stimulation Project in year 2010. Estimated costs for construction of the 19 units are RM 5.7 million.

Badget is required for purchase and replacement of vehicles for Vector Control Unit to ensure activities for case detection, investigation, follow-up and vector control are conducted smoothly. The financial requirements are as below:

i. Vehicles : 150 units ~ RM 14.25 million [new- 126 units, replacements – 24 units, 75% for Sabah & Sarawak]
ii. Motorcycles : 131 units ~ RM 917,000.00 [new – 129 units, 52% for Sabah and Sarawak]
iii. Fiberglass boats with engine : 7 units ~ RM 210,000.00 [new – 4 units, replacements – 3 units, 58% for Sabah and Sarawak)
iv. Wooden boats with engine : 39 units ~ RM 390,000.00 [new – 30 units, replacements – 9 units, 93% for Sabah and Sarawak]

The adoption of ACT therapy requires additional costs for purcharse as the ACT therapy is more expensive that existing treatment regime. The estimated cost for chloroquine+primaquine is RM 8 per patient whereas for ACT is RM 80 per patient.[4] Thus, the annual increment in budget after taking into consideration of the price difference for 3,000 patients would be RM 216,000.

[4] *Artemether–lumefantrine (Riamet*): RM60/patient, ASMQ: RM77.60/patient. Source: Hospital Sg. Buloh]

2.6 Strategy 4: Preparedness and response to malaria outbreak

Management of outbreak needs to be strengthened in terms of immediate execution of investigation and control activity to minimize the impact as well as to control the outbreak within 6 weeks from the declaration date, and also prompt reporting to the state office and ministry within 24 hours. There is no direct financial implication on the fulfillment of vacant posts and asset for activities for surveillance, investigation and control as it is included in strategy one to three.

2.7 Strategy 5: Communication and social mobilization for malaria control

Health education activity regarding the importance of using insectice treated nets (ITN) and other vector control activities will be enhanced for the high risk groups, employers and employees of plantations, logging camps and construction sites. The contents for health promotion material will be suited to different risk groups such as brochure in various language (based on native language of the foreign workers) and prevention methods for each high risk activity.

The community will also be actively involved in activity for malaria infection prevention via COMBI activity. Research on the usage of insectide treated nets among the children

is an annual activity with the target of at least one red locality coverage in each state every year.

2.8 Strategy 6: Capacity building

Capacity building is an agenda that will be given a continouos attention. The emplacement of existing vacancy such as PPKP U29, PKA U17 and PRA needs to be accelerated, especially for Sarawak where 74% (34/46) of PPKP and only 50% (101/203) of PKA U17 are filled. Although the post for PRA is 100% filled up, there are only 16 placements. Status for the posts emplacement for PPKP, PKA and PRA is summarized as below. (Table 13)

In order to cater the needs for the posts especially in Sarawak, some of the job vacancies for PPKP U29, PKA U17 and PRA R1 will be transferred accordingly as below:

- PPKP U 29 : 10 posts [Kedah (4), WPKL (2), Terengganu (2), Johor (2)]
- PKA U17 : 50 posts [Kedah]
- PRA R1 : 35 posts [Kedah (15), Penang (10), Negeri Sembilan (10)]

While awating emplacement for PRA R1, job contracts for existing 203 temporary workers from Sabah (110), Sarawak (70) and Kelantan (23) would need to be extended.

Table 14: Number of job vacancy and emplacement for the posts of PPKP U29, PKA U17 and PRA R1 in all states

STATE	No. of district	PPKP U29			PKA U17			PRA R1		
		Posts	Filled	Vacant	Posts	Filled	Vacant	Posts	Filled	Vacant
Perlis	1	5	3	2	16	10	6	13	13	0
Kedah	11	24	20	4	155	74	81	100	72	28
P Pinang	5	12	11	1	86	48	38	139	126	13
Perak	9	28	17	11	163	117	46	169	166	3
Selangor	9	29	26	3	109	88	21	96	87	9
WPKL	1	11	7	4	5	3	2	2	0	2
N Sembilan	7	20	15	5	83	57	26	87	72	15
Melaka	3	8	8	0	32	21	11	23	22	1
Johor	8	26	17	9	94	75	19	91	91	0
Pahang	11	45	44	1	195	151	44	134	134	0
Terengganu	7	29	23	6	109	72	37	25	22	3
Kelantan	10	28	15	13	181	155	26	57	43	14
Sarawak	31	46	34	12	203	101	102	16	11	5
Sabah	23	50	38	12	202	155	47	146	131	15

WP Labuan	1	2	0	2	5	4	1	5	5	0
M'SIA	**137**	**363**	**278**	**85**	**1638**	**1131**	**507**	**1103**	**995**	**108**

Requirements for vehicles, microscopes, spraycan and others will also be given attention at the same time. Besides, training is an important component to enhace knowledge, skill and competency among staff in malaria detection and treatment. Training relavent to vector control activities such spraying, making insecticide impregnated nets, and larvaciding will also be offered to volunteer and estate workers.

As mentioned earlier in issue 1.1, orientation programme is required to place more focus on the new approach of malaria elimination programme, such as transition from control programme to elimination. For the states without any local case, the focus will be on the activity to prevent re-introduction.

Financial needs to conduct course periodically in Sabah and Sarawak are approximately RM 376,000:

- Medical laboratory technician (MLT) intensive course: 3 weeks duration, 3 times/year, RM 65,000.00
- Revision course for MLT: 1 week duration, 2 times/year, RM 56,000.00
- Vector control course (spraying, insecticide impregnated nets): 1 week duration, 2 times/year, RM 67,000.00

2.9 Strategy 7: Malaria research

Operational research will be identified so that issues arise during implementation phase can be sorted out.

3.0 Indicators and targets

A total of 47 indicators will be monitored (Annex 5) and out of which 10 indicators have been chosen as the key performance indicators (KPI). (Table 15)

Table 15: Strategies and Indicators for Malaria Elimination Programme

No.	Indicators	Target
1	Reduction of local case each year	20%

2	Case fatality rate	0
3	Coverage of insecticide treated nets (ITN) among residents in malarious area	100%
4	Coverage of indoor residual spraying (IRS) in malarious area	100%
5	Percentage of malaria case investigation	100%
6	Percentage of case with radical treatment completed	100%
7	Error rate for slide examination	< 1%
8	BFMP slide examination in health facility on the same day as sample collection	≥95%
9	Control of malaria outbreak within 6 weeks from the declaration date	85%
10	Increment of activities that involve local community in malarious area	10%

4.0 Budget

A total of RM 46.73 million was spent in year 2009 for malaria control activity. The budget requirements for elimination programme for the 10th Malaysia Plan are as below. (Table 16)

Table 16: Budget for Malaria Elimination Programme in the 10th Malaysia plan

ACTIVITY	Budget 2009	Budget requirement (RM)/ year (SUPPLEMENT ONLY)##				
		1	2	3	4	5
1.Development (PSS)		**2.7 million**	**3.0 million**	**-**	**-**	**-**
2.Training during sevice		**376,000**	**376,000**	**376,000**	**376,000**	**376,000**
3.Asset (vehicles, tools)*		**6.72 million**	**6.00 million**	**4.65 million**	**2.46 million**	**1.75 million**
4.Allocation for management of: (a) insecticide treated nets (b) insectides (for nets and spray) (c) fuel + maintenance	**38.03 million**** **3.5 million**# **5.2 million**#	**3.3 million** **6.9 million** **1.02 million**	**3.3 million** **6.9 million** **1.91 million**	**3.3 million** **6.9 million** **2.59 million**	**3.3 million** **6.9 million** **3.02 million**	**3.3 million** **6.9 million** **3.05 million**

TOTAL	**46.73 million**	**21.02 million**	**21.49 million**	**17.82 million**	**16.06 million**	**15.38 million**

* *Refers to Annex 2, 3 and 4*
** *Budget for all states for malaria control activity only (OA 10000 & 20000)*
# *Purchase by MOH (tender)*
Refers to annual supplement sum compared to thr previous year

5.0 Conclusion

Malaria Elimination Programme will be the continuation of Malaria Control Programme that has been implemented all this while. This programme requires all parties involved to play their repective roles effectively to ensure the supervision of malaria elimination is well-rounded and even better than the existing control programme. This document contents will be modified accordingly base on the current development such as the marketing of long lasting insectides for vector control and incidents of vector or parasite resistance. Member of PSEMK 2011-2013 Technical Committee.

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Annex 1

Monitoring framework for pre-elimination and elimination programmes

COMPONENT	ACTIVITY	INDICATOR	COMMENTS (as of 2010)
Enabling environment	Political commitment	a. Official endorsement b. Legal/regulatory network c. Specific domestic funding earmarked	• PSEMK not endorsed yet. • Malaria is notifiable under the CDC Act 1988. • Application for funds in RMK10 submitted.
	Regional/subregional cooperation	a. Regional/subregional elimination strategy in place b. Cross-border agreement in place c.Evidence of collaboration (cross-border/regional/subregional)	• All states has prepared action plan based on PSEMK. • Yes, Malaysia-Thai border meeting and SOSEK MALINDO • Regular meetings and exchange of information.
	Adoption of enabling health policies	a. Updated treatment policies b. Malaria diagnosis and treatment available at no charge to patient c. Regulation of anti-malaria medicines	• Existing guideline due for review. • Yes, at government facilities only. • Yes.
Epidemiology (geographical information)	Stratification		• Yes.
	Foci investigation	a. Number of active foci reported per year b. Proportion of reported foci fully investigated c. Proportion of reported foci correctly classified d. Number of cases within focus e. Total population at risk within focus	• Data available at district level.
Surveillance	National malaria surveillance system	a. Timeliness: time between diagnosis, reporting and investigation b. Completeness: proportion of cases reported to surveillance system	• Data available. To be strengthen.
	Inclusion of private sector	a. Protocol for private clinics b. Proportion of private facilities reporting to surveillance system	• Existing treatment guideline available to all practitioners. • Malaria is a notifiable disease.

COMPONENT	ACTIVITY	INDICATOR	COMMENTS (as of 2010)
	Tracking of malaria burden	a. Total number of cases reported per year b. Proportion of reported cases that are fully investigated c. Number of cases by classification	• Data available.
	Evaluation of population at risk	Total population at risk within country	• Data available.
Case management	Diagnosis	a. Proportion of cases confirmed by microscopy b. Microscopy QA/QC in place	• All. • Yes. Re-examination of slides; all positives and 10% of negatives.
	Treatment	Proportion of cases treated according to guidelines	• Data available.
Vector control	IRS	a. Number and proportion of at-risk households that have been sprayed b. Number and proportion of reported active foci that were sprayed	• Data available.
	Larval control	Proportion of known/potential breeding sites treated with chemicals/fish	• Data available.
Entomological surveillance	Larvaciding	Proportion of breeding sites positive for mosquito larvae	•Data available.

Source: Malaria Elimination – A field manual for low and moderate endemic countries, WHO 2007.

Annex 2

SENARAI KEPERLUAN MIKROSKOP, GENERATOR, SPRAY-CAN DAN PENYEMBUR WAP MENGIKUT NEGERI & TAHUN

NEGERI	Bil daerah	Bil Klinik Kesihatan	Mikroskop Compound	T1	T2	T3	T4	T5	Mikroskop Stereo	T1	Generator Mudah alih	T1	T2	T3	T4	T5	Spray-can	T1	T2	T3	T4	T5	Penyembur wap (mist blower)	T1	T2	T3	T4	T5
Perlis	1	9	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kedah	11	53	15	5	5	5	0	0	2	2	1	1	0	0	0	0	2	2	0	0	0	0	1	1	0	0	0	0
P Pinang	5	26	10	3	3	2	2	0	0	0	1	1	0	0	0	0	2	2	0	0	0	0	1	1	0	0	0	0
Perak	9	72	6	3	3	0	0	0	0	0	13	4	4	5	0	0	45	10	10	10	15	0	5	2	3	0	0	0
Selangor	9	56	18	6	6	6	0	0	9	9	6	3	3	0	0	0	30	15	15	0	0	0	9	3	3	3	0	0
WPKL	1	14	10	3	3	2	2	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	1	1	0	0	0	0
N Sembilan	7	38	15	4	4	4	3	0	1	1	5	2	3	0	0	0	5	5	0	0	0	0	7	3	2	2	0	0
Melaka	3	26	10	3	3	4	0	0	0	0	0	0	0	0	0	0	3	3	0	0	0	0	3	2	1	0	0	0
Johor	8	87	20	8	8	4	0	0	0	0	1	1	0	0	0	0	4	4	0	0	0	0	8	3	3	2	0	0
Pahang	11	61	20	6	6	6	2	0	0	0	6	3	3	0	0	0	40	10	10	10	10	0	11	3	3	3	2	0
Terengganu	7	39	8	4	4	0	0	0	0	0	0	0	0	0	0	0	10	10	0	0	0	0	0	0	0	0	0	0
Kelantan	10	53	20	6	6	6	2	0	1	1	0	0	0	0	0	0	11	11	0	0	0	0	6	3	3	0	0	0
Sarawak	31	194	-	30	30	30	0	0	2	2	31	6	6	8	8	3	150	30	30	30	30	30	20	5	5	5	5	0
Sabah	23	77	45	20	20	5	0	0	4	4	25	5	5	5	5	5	100	30	30	40	0	0	10	5	5	0	0	0
WP Labuan	1	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
MSIA	**137**	**806**	**292**	**103**	**104**	**74**	**11**	**0**	**20**	**20**	**89**	**26**	**24**	**18**	**13**	**8**	**406**	**136**	**95**	**90**	**55**	**30**	**82**	**32**	**28**	**15**	**7**	**0**

Annex 3

SENARAI KEPERLUAN KENDERAAN DAN BOT MENGIKUT NEGERI DAN TAHUN

NEGERI	Bil daerah	**Kenderaan**	T1	T2	T3	T4	T5	**Motorsikal**	T1	T2	T3	T4	T5	**Bot Fiberglass & Enjin**	T1	T2	T3	**Bot Kayu* & enjin**	T1	T2	T3
Perlis	1	1	0	0	1	0	0	2	2	0	0	0	0	1	1	0	0	0	0	0	0
Kedah	11	3	0	1	1	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
P Pinang	5	2	0	1	1	0	0	5	2	3	0	0	0	0	0	0	0	0	0	0	0
Perak	9	5	2	2	1	0	0	10	3	3	2	2	0	1	1	0	0	0	0	0	0
Selangor	9	5	2	2	1	0	0	4	2	2	0	0	0	0	0	0	0	0	0	0	0
WPKL	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
N Sembilan	7	4	1	2	1	0	0	8	3	3	2	0	0	0	0	0	0	0	0	0	0
Melaka	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Johor	8	4	1	1	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
Pahang	11	5	1	2	2	0	0	3	3	0	0	0	0	0	0	0	0	3	3	0	0
Terengganu	7	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kelantan	10	5	2	2	1	0	0	30	8	8	8	6	0	0	0	0	0	0	0	0	0
Sarawak	31	62	15	15	12	10	10	18	4	4	5	5	0	1	1	0	0	28	10	10	8
Sabah	23	49	15	12	8	8	6	49	10	10	10	10	9	3	1	1	1	8	4	4	0
WP Labuan	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MSIA	**137**	**150**	**41**	**41**	**33**	**19**	**16**	**131**	**39**	**33**	**27**	**23**	**9**	**7**	**5**	**1**	**1**	**39**	**17**	**14**	**8**

Annex 4

SENARAI KEPERLUAN KOMPUTER, KAMERA DIGITAL, GPS DAN LCD PROJECTOR MENGIKUT NEGERI DAN TAHUN

NEGERI	Bil daerah	**Komputer**	Thn 1	Thn 2	Thn 3	Thn 4	Thn 5	**kamera digital**	Thn 1	Thn 2	Thn 3	Thn 4	Thn 5	**GPS**	Thn 1	Thn 2	Thn 3	Thn 4	Thn 5	**LCD Projector**	Thn 1	Thn 2	Thn 3	Thn 4	Thn 5
Perlis	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0	0	0	0
Kedah	11	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0
P Pinang	5	5	5	0	0	0	0	0	0	0	0	0	0	10	6	4	0	0	0	5	2	2	1	0	0
Perak	9	9	4	5	0	0	0	0	0	0	0	0	0	18	6	6	6	0	0	9	3	3	3	0	0
Selangor	9	9	4	5	0	0	0	0	0	0	0	0	0	14	6	4	4	0	0	3	2	1	0	0	0
WPKL	1	1	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
N Sembilan	7	7	4	3	0	0	0	0	0	0	0	0	0	14	6	4	4	0	0	7	2	3	3	0	0
Melaka	3	3	3	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0
Johor	8	8	4	4	0	0	0	0	0	0	0	0	0	16	6	6	4	0	0	8	3	3	2	0	0
Pahang	11	11	5	6	0	0	0	0	0	0	0	0	0	22	6	6	6	4	0	6	3	3	0	0	0
Terengganu	7	4	4	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0
Kelantan	10	5	5	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	5	3	2	0	0	0
Sarawak	31	10	10	0	0	0	0	10	5	5	0	0	0	60	16	16	16	12	0	10	3	3	2	2	0
Sabah	23	48	10	10	10	10	8	24	6	6	6	6	0	60	16	16	16	12	0	12	3	3	3	3	0
WP Labuan	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
MSIA	**137**	**124**	**63**	**33**	**10**	**10**	**8**	**38**	**15**	**11**	**6**	**6**	**0**	**230**	**84**	**62**	**56**	**28**	**0**	**66**	**25**	**23**	**14**	**5**	**0**

Annex 5

INDIKATOR BAGI PROGRAM ELIMINASI MALARIA

Strategi	Indikator	Target	Tanggungjawab			Sumber data	Cara Pengiraan
			Daerah	Negeri	KKM		
Strategi 1: Sistem Survelan Malaria	▪ Bilangan dan kadar kematian akibat malaria		√	√	√	e-Vekpro	Kadar kematian akibat malaria: Bilangan kematian X 100 Jumlah kes
	▪ Bilangan dan insiden malaria		√	√	√	e-Vekpro	Kadar kes malaria: Bilangan kes X 1000 penduduk Jumlah penduduk
	▪ Bilangan dan peratus kes mengikut jenis jangkitan		√	√	√	e-Vekpro	Peratus kes mengikut jenis jangkitan: Bil kes mengikut jenis jangkitan X 100 Jumlah kes
	▪ Bilangan dan peratus kes mengikut spesis parasit		√	√	√	e-Vekpro	Peratus kes mengikut jenis spesis: Bil kes mengikut jenis spesis X 100 Jumlah kes
	▪ Bilangan dan kadar kes dimasukkan ke hospital		√	√	√	e-Vekpro	Kadar kes dimasukkan ke hospital: Bilangan kes msk hosp X 100 Jumlah kes
	▪ *Slide positivity rate*		√	√	√	Laporan makmal / laporan bulanan	*Slide positivity rate:* Bilangan slaid positif X 100 Jumlah slaid diambil
	▪ Peratus laporan bulanan lengkap diterima			√	√	Laporan bulanan	Peratus laporan bulanan lengkap diterima Bilangan lap diterima X 100 Jum lap sepatutnya diterima
	▪ Stratifikasi kawasan dilaksanakan dan dikemaskini sekurang-kurangnya 3 tahun sekali berdasarkan data survelan				√		2006 – 2008, 2008 – 2010, 2011 – 2013, 2014 - 2016
	▪ Peratus lokaliti dengan API < 1 kes per 1000 penduduk berisiko		√	√	√	▪ laporan bulanan ▪ e-Vekpro ▪ Foci Registry	*Annual Parasite Incidence (API)* Bilangan slaid positif X 1000 Jumlah penduduk

Strategi	Indikator	Target	Tanggungjawab			Sumber data	Cara Pengiraan
			Daerah	Negeri	KKM		
	▪ Bilangan *foci* aktif dilaporkan setiap tahun		√	√	√	▪ Foci Registry	
	▪ Annual Blood Examination Rate (ABER)		√	√	√	▪ laporan bulanan ▪ Foci Registry	*Annual Blood Examination Rate (ABER)*: Bil Slaid Darah Diambil X 100 Jumlah Penduduk
	▪ Peratus fasiliti swasta yang membuat notifikasi malaria kepada sistem survelans negara		√	√	√	▪ e-Vekpro	Bilangan fasiliti swasta melaporkan kes X 100 Jumlah fasiliti swasta
Strategi 2: Kawalan vektor malaria menggunakan konsep IVM (Integrated Vector Management)	▪ Peratus liputan kelambu berubat di kalangan penduduk yang berisiko.		√	√	√	▪ laporan bulanan	Penduduk berisiko: penduduk di lokaliti merah, kuning dan RV (Receptive & vulnerable) Bil pend dilindungi kelambu berubat X 100 Jumlah penduduk berisiko
	▪ Peratus liputan kelambu berubat yang dicelup semula (re-treated)		√	√	√	▪ laporan bulanan	Bil kelambu berubat dicelup semula X 100 Jumlah kelambu diedar
	▪ Liputan kelambu berubat di kalangan penduduk lokaliti merah	100%				▪ laporan bulanan	Bil pend dilindungi kelambu berubat X 100 Jum pend berisiko lokaliti merah
	▪ Liputan kelambu berubat di lokaliti kuning, hijau dan RV (receptive and vulnerable)	100%	√	√	√	▪ laporan bulanan	Bil pend dilindungi kelambu berubat X 100 Jum pend berisiko lokaliti kuning, hijau & RV
	▪ Nisbah kelambu dengan penduduk adalah kurang daripada 1:2	1:2	√	√	√	▪ laporan bulanan	Bilangan kelambu diedar:Bilangan penerima
	▪ Survei / pemantauan penggunaan kelambu berubat – 1 lokaliti merah bagi setiap daerah	90%		√	√	▪ Format khas	Bil lokaliti merah dibuat survei X100 Bil lokaliti merah dirancang utk buat survey merah
	▪ Peratus rumah berisiko malaria dengan sekurang-kurangnya satu (1) kelambu berubat dan/atau disembur dalam tempoh masa 12 bulan yang lalu.	100%	√	√	√	▪ laporan bulanan	Bil rumah di kaw berisiko malaria dgn sekurang-kurangnya KB/disembur X 100 Jum rumah dlm kaw berisiko

Strategi	Indikator	Target	Tanggungjawab			Sumber data	Cara Pengiraan
			Daerah	Negeri	KKM		
	▪ Peratus liputan semburan residu di kalangan penduduk berisiko.	100%	√	√	√	▪ laporan bulanan	Bil rumah di kaw berisiko disembur X 100 Jum rumah dlm kaw berisiko
	▪ Liputan semburan residu di lokaliti merah	100%				▪ laporan bulanan	Bil rumah di lokaliti merah disembur X 100 Jum rumah dlm lokaliti merah
	▪ Liputan semburan residu di lokaliti kuning, hijau dan RV	100%	√	√	√	▪ laporan bulanan	Bil rumah di lokaliti kuning, hijau dan RV X 100 Jum rumah lokaliti kuning, hijau dan RV
	▪ Pemantauan resistan vektor kepada racun serangga				√	▪ laporan bulanan	
Strategi 3: Pengesanan awal dan rawatan kes malaria	▪ Peratus kes malaria yang disiasat	100%	√	√	√	▪ e-Vekpro ▪ laporan bulanan	Peratus kes malaria yang disiasat: Bilangan kes disiasat X 100 Jumlah kes
	▪ Peratus kes yang diberi rawatan radikal dan lengkap	100%	√	√	√	▪ e-Vekpro ▪ laporan bulanan	Peratus kes diberi rawatan radikal &lengkap Bil kes diberi rwtn radikal & lengkap X 100 Jumlah kes
	▪ Peratus fasiliti kesihatan yang ada stok untuk ubat anti-malarial dan keperluan diagnostik dalam tempoh masa 12 bulan yang lalu.	100%	√	√	√	▪Borang maklumbalas 2X setahun	
	▪ Pemantauan secara sistematik efikasi ubat malaria sekurang-kurang sekali dalam 2 – 3 tahun berdasarkan protocol WHO				√	▪Format khas	
	▪ Bilangan daerah/negeri yang mempunyai sempadan antarabangsa yang telah mempunyai Pelan Tindakan Bersama Mengawal Malaria.	100%	√	√	√		Sem. Malaysia: Daerah di negeri Perlis, Kedah, Perak dan Kelantan Sabah dan Sarawak
	Peratus kes mula disiasat dalam tempoh 48 jam selepas notifikasi	90%	√	√	√	▪ e-Vekpro	Bil kes mula disiasat dalam tempoh 48 jam selepas notifikasi X 100 Jumlah kes

Strategi	Indikator	Target	Tanggungjawab			Sumber data	Cara Pengiraan
			Daerah	Negeri	KKM		
	Semua kes malaria perlu dirawat dalam tempoh:-	100%					
	• pesakit dalam - 1 jam		√	√	√	▪ Audit	
	• di lapangan - 24 jam		√	√	√	▪ Audit	
	• Klinik Kesihatan – hari yang sama		√	√	√	▪ Audit	
	Semua kes malaria perlu dilakukan tindak susul yang lengkap mengikut jenis parasit. - Warganegara - Bukan Warganegara	100% 70%				▪ e-Vekpro	Bil kes dibuat tindak susul (ikut spesis & ikut tempoh) X 100 Jumlah kes (mengikut spesis)
	• Semua *plasmodium* setiap minggu selama 1 bulan		√	√			
	• *P. malariae* sebulan sekali selama 6 bulan		√	√			
	• *P. vivax* sebulan sekali selama 1 tahun		√	√			
	Pemeriksaan slaid di kemudahan kesihatan pada hari yang sama	100%	√	√	√	▪ Audit Makmal (untuk kes: e-Vekpro)	Bil pesakit dengan BFMP dibaca pada hari yang sama X 100 Jumlah kes
	Kadar kesilapan (slaid positif dan slaid negatif)	< 1%	√	√	√	▪ MKAK	Bilangan slaid positif salah baca Bilangan slaid positif diterima utk baca semula
	Notifikasi kes malaria ke Pejabat Kesihatan Daerah yang berdekatan [Sem M'sia: 24 jam, Sabah dan Sarawak: 3 hari].	100%	√	√		▪ e-Vekpro	
Strategi 4: Kesiapsiagaan dan respon kepada wabak malaria	Wabak malaria perlu dikawal dalam masa 6 minggu	85%	√	√	√	▪ Laporan wabak	Bil lokaliti dapat kawal wabak dlm masa 6 minggu X 100 Bil lokaliti wabak

Strategi	Indikator	Target	Tanggungjawab			Sumber data	Cara Pengiraan
			Daerah	Negeri	KKM		
Strategi 5: Komunikasi dan mobilisasi sosial untuk kawalan malaria	▪ Peratus penduduk berisiko yang mengetahui sebab, simptom, rawatan dan kawalan malaria. (Kajian isi rumah)			√	√	▪ Kajian	
	▪ Peratus penduduk atau kanak-kanak di bawah 5 tahun atau ibu mengandung yang tidur di dalam kelambu. (Kajian isi rumah)			√	√	▪ Kajian – ada format khas	
	▪ Peratus penduduk di kawasan berisiko yang mengalami demam dalam tempoh masa 2 minggu sebelum kajian yang mendapatkan rawatan di kemudahan kesihatan dalam tempoh 48 jam selepas onset demam. ((Kajian isi rumah)			√	√	▪ Kajian	
Strategi 6: Pembangunan Modal Insan dan sumber	▪Bilangan latihan dijalankan		√	√	√	▪ Laporan berkala setiap 6 bulan	
Strategi 7: Penyelidikan malaria	▪ Bilangan kajian dijalankan				√	▪ Laporan berkala setiap 6 bulan	