Malaria Situation in Myanmar

NATIONAL MALARIA CONTROL PROGRAMME

19th - Feb - 2010

Programme Manager
NMCP - Myanmar

Background of Malaria Control Programme in Myanmar

1950- Malaria program in Myanmar has been started as pilot projects in Shan State

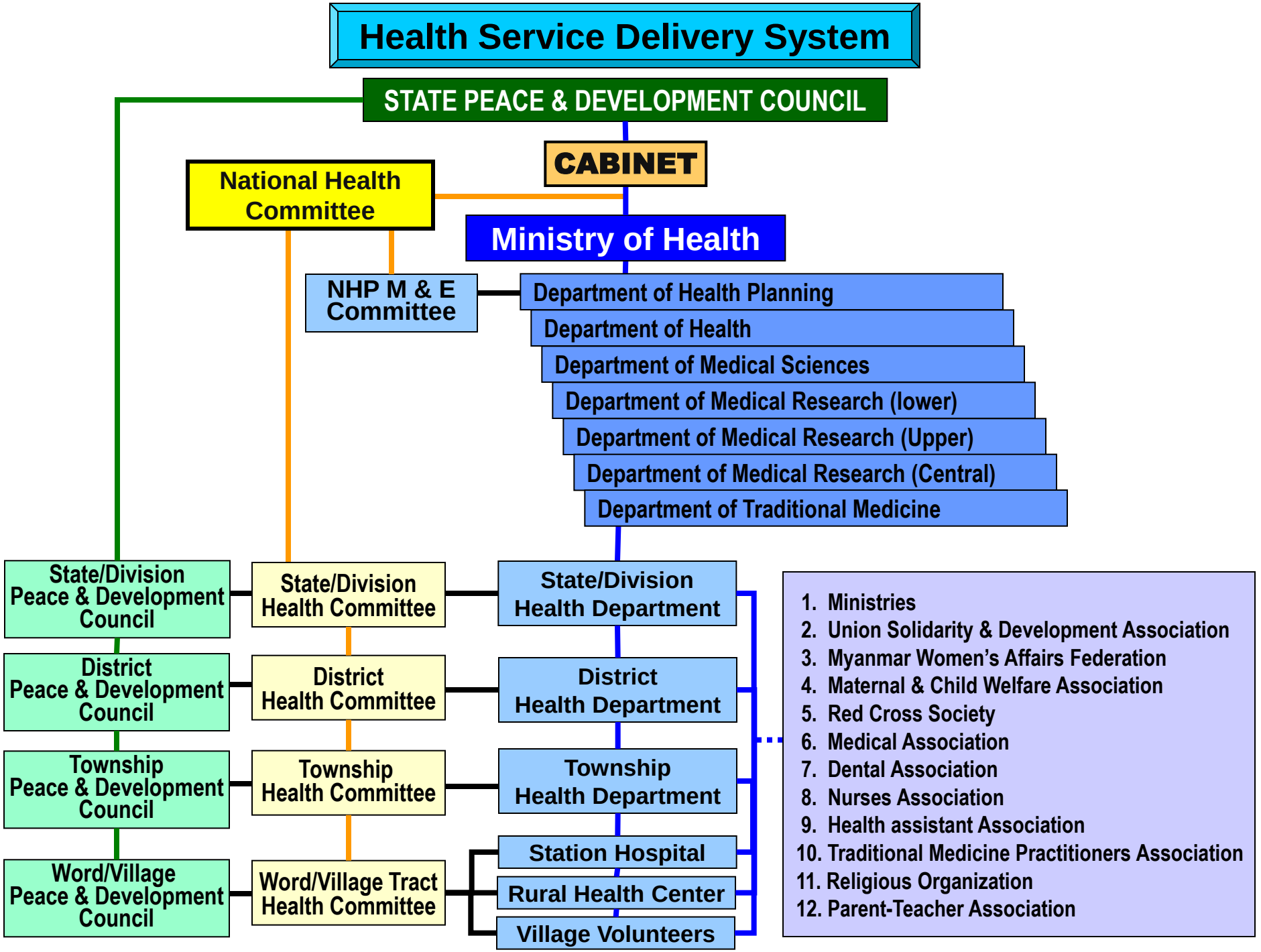
1957- Malaria Eradication Programme by using DDT indoor residual spray

1973- Malaria Eradication Programme, although techincally sound,has to be changed to Malaria Control Programme because of financial and operational constraints

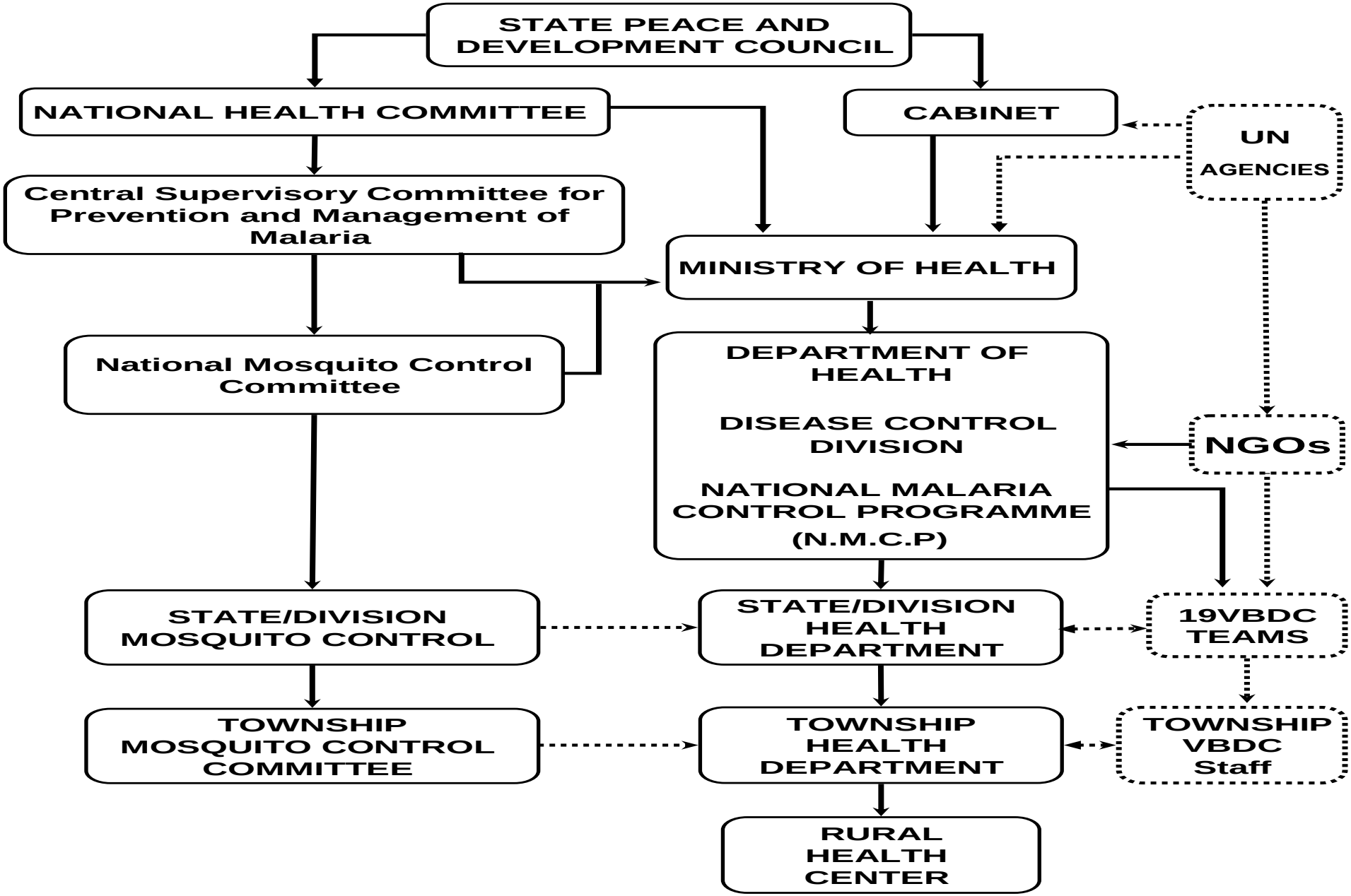
1978- It has to be integrated with other mosquito borne diseases such as Dengue Haemorrhagic Fever, Lymphatic Filariasis and Japanese Encephalitis

1993- Global Malaria Control Strategy was adopted
(Amsterdam Declaration in Oct;1992)

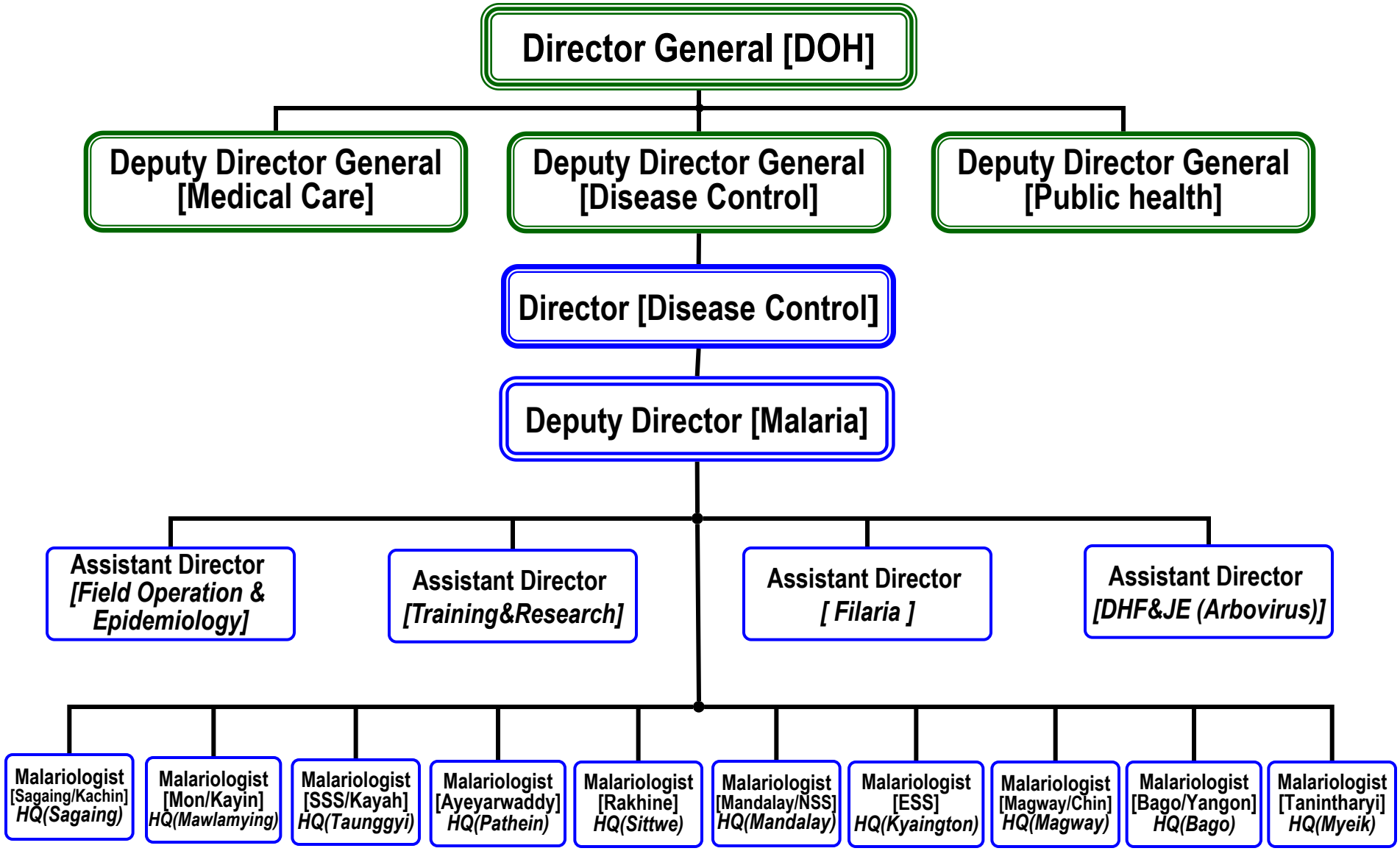
Now- Global Malaria Control concept was accepted by the programme in place of Roll Back Malaria


Health Service Delivery System
STATE PEACE & DEVELOPMENT COUNCIL
CABINET
National Health Committee
Ministry of Health
NHP M & E Committee
Department of Health Planning
Department of Health
Department of Medical Sciences
Department of Medical Research (lower)
Department of Medical Research (Upper)
Department of Medical Research (Central)
Department of Traditional Medicine
State/Division Peace & Development Council
State/Division Health Committee
State/Division Health Department
District Peace & Development Council
District Health Committee
District Health Department
Township Peace & Development Council
Township Health Committee
Township Health Department
Word/Village Peace & Development Council
Word/Village Tract Health Committee
Station Hospital
Rural Health Center
Village Volunteers
1. Ministries
2. Union Solidarity & Development Association
3. Myanmar Women's Affairs Federation
4. Maternal & Child Welfare Association
5. Red Cross Society
6. Medical Association
7. Dental Association
8. Nurses Association
9. Health assistant Association
10. Traditional Medicine Practitioners Association
11. Religious Organization
12. Parent-Teacher Association

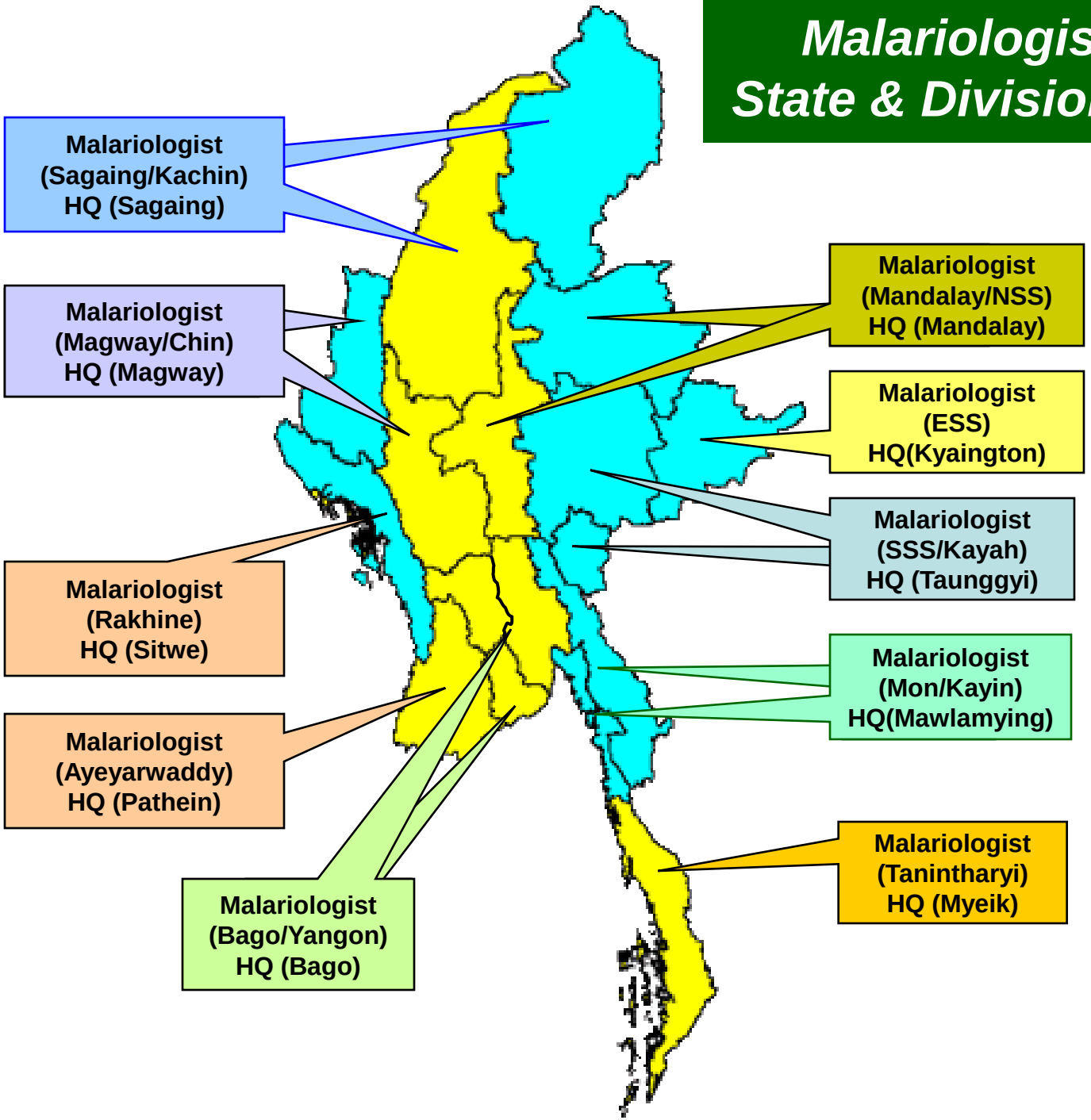
ADMINISTRATION OF NATIONAL MALARIA POLICY AND NATIONAL MALARIA CONTROL PROGRAMME



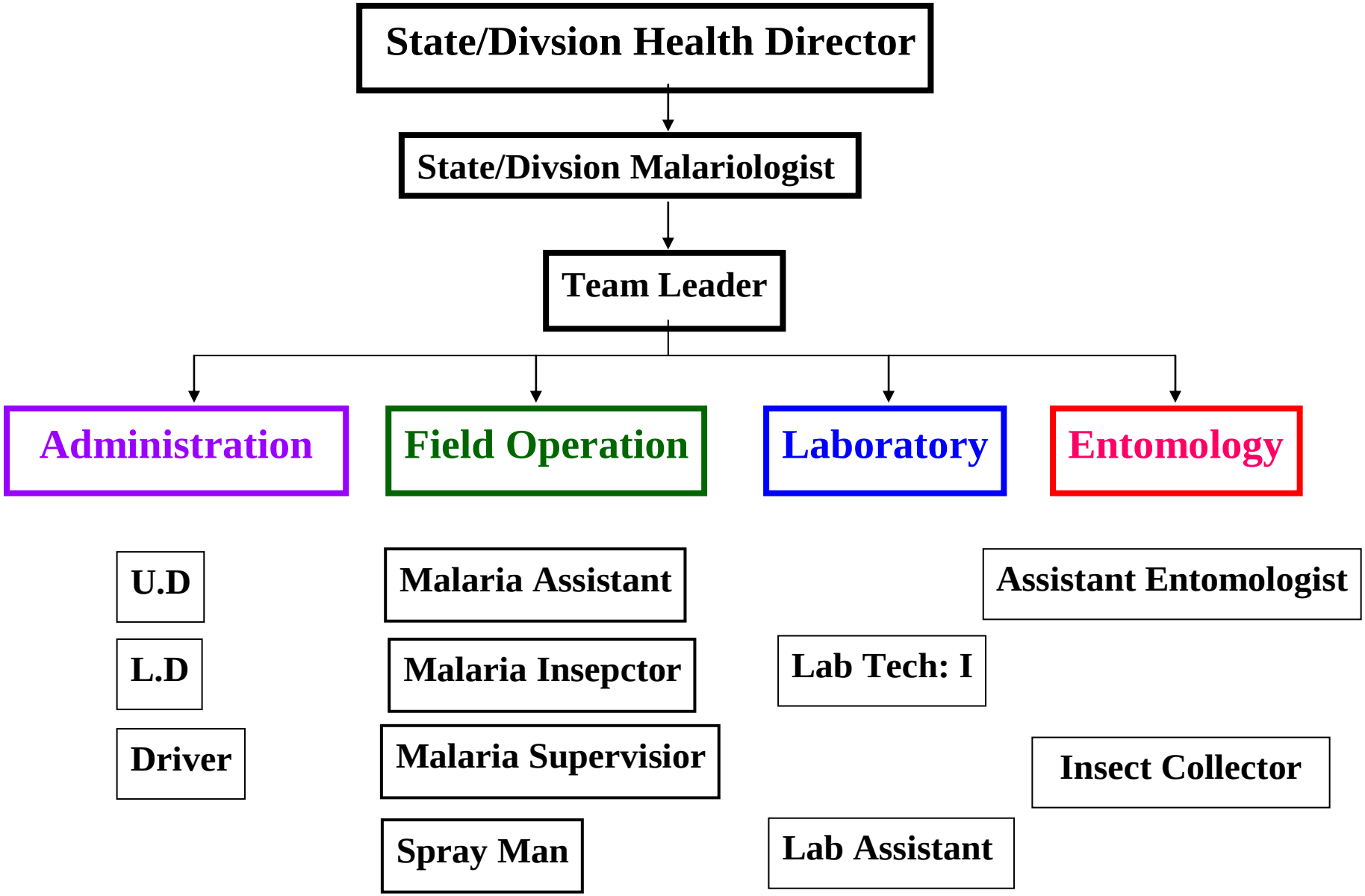
Central/State-Division level VBDC Organization



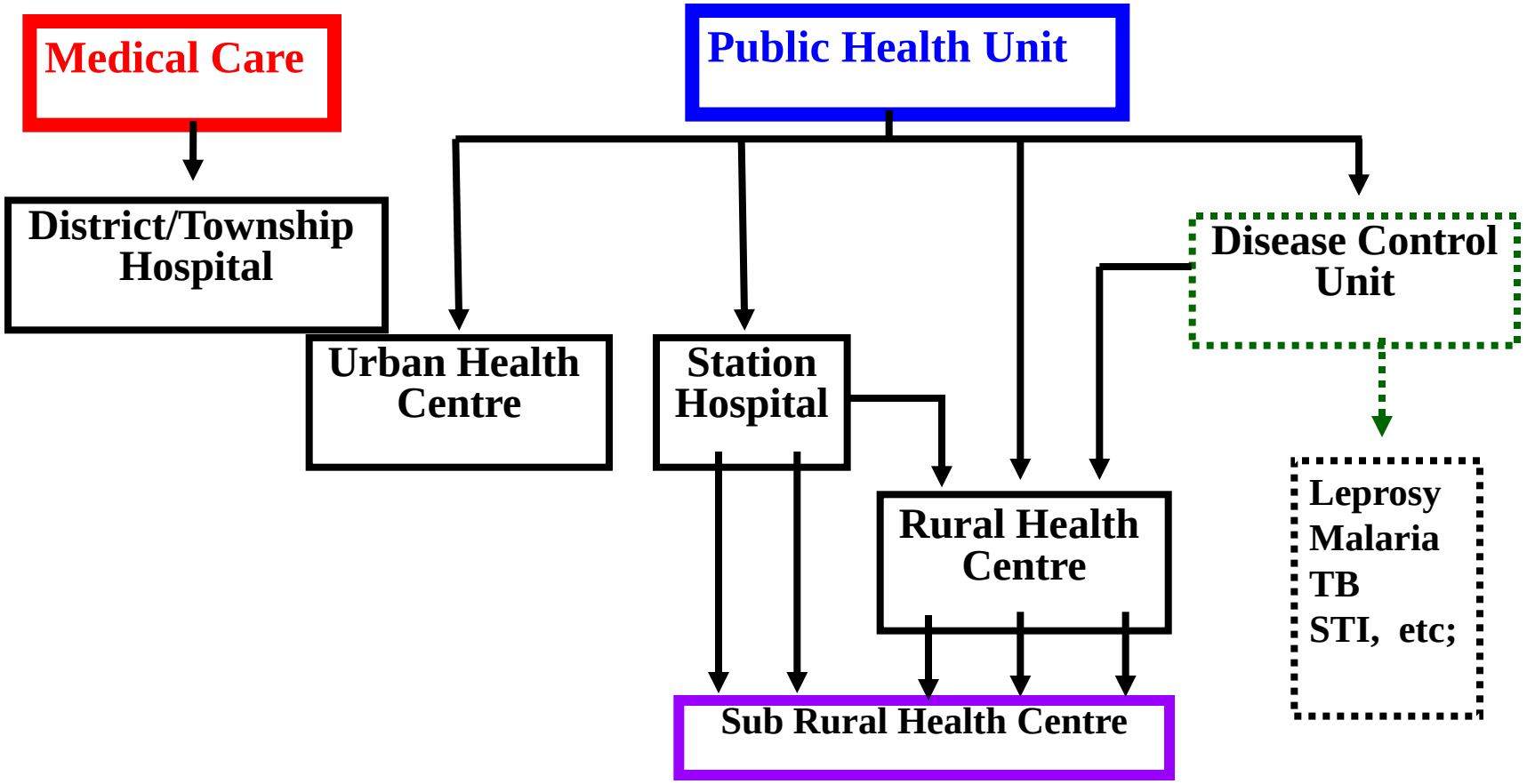
Malariologists Set Up of State & Division VBDC Teams



Organization Set Up of State & Division VBDC



District/Township Health Unit



Public Health Activities

- Primary Health Care
- MCH
- Nutrition
- Water& Sanitation
- School Health

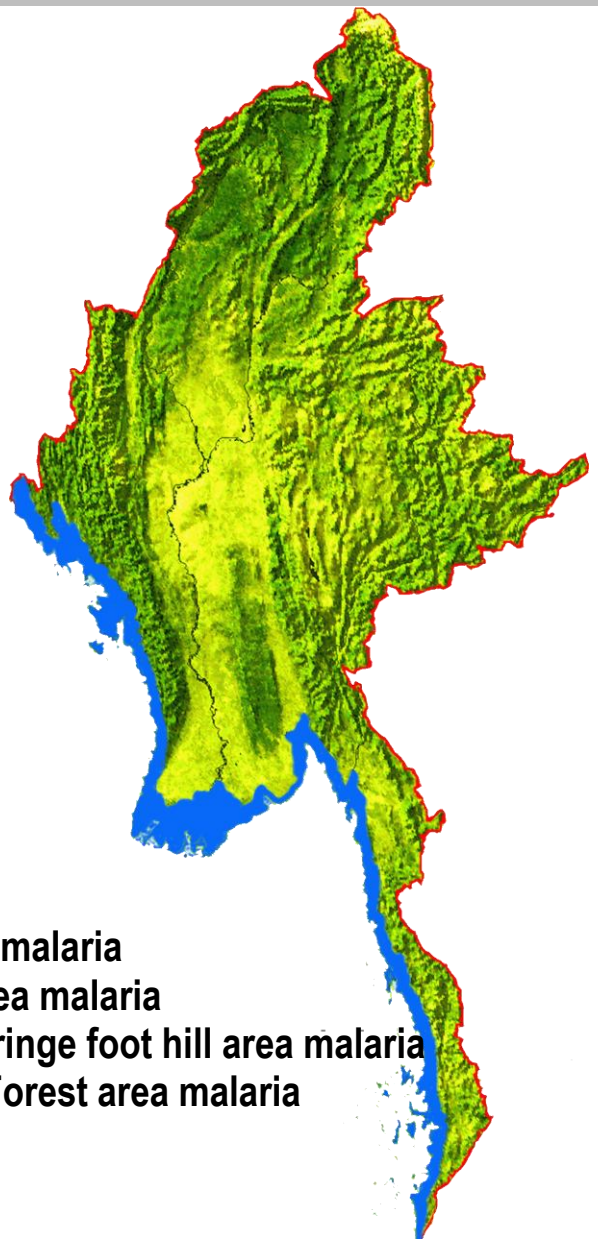
Disease Control Activities

- Disease Surveillance
- Leprosy
- Malaria
- TB
- HIV/AIDS/STI
- Immunization

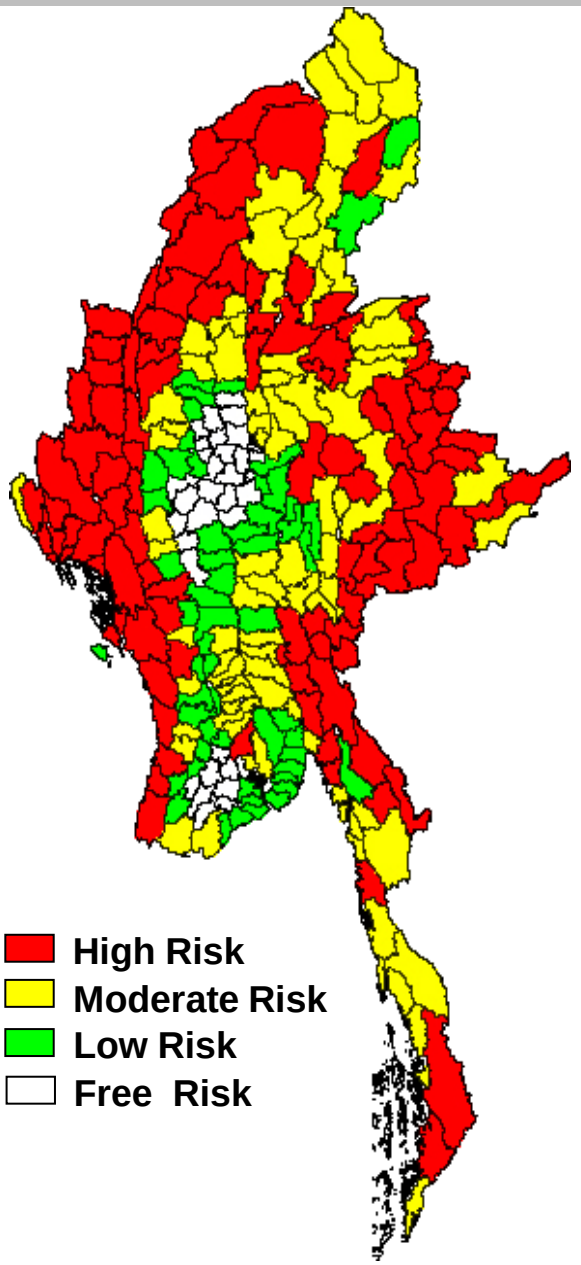
VBDC MANPOWER

Designation	Central	State & Division	District/ Township	Total
PM & Malariologist	5	8	-	12
SE&Entomologist	5	3		8
SMO/ MO/FO	6	15	3	24
A O&Statistician	2	-	-	2
Med-Tech/ Lab-Tech	23	34	-	57
Ento: Technician	13	20	-	33
Insect Collector	12	35	-	47
M-Assist/M-Inspect	6	44	107	157
M-Supervisor/PS	18	130	867	1015
Clerk/Assist-Statistician	23	27	-	50
Others	108	102	777	987
Total	221	417	1754	2392

Malarious Area according to Ecology & Malaria Risk Areas in Myanmar

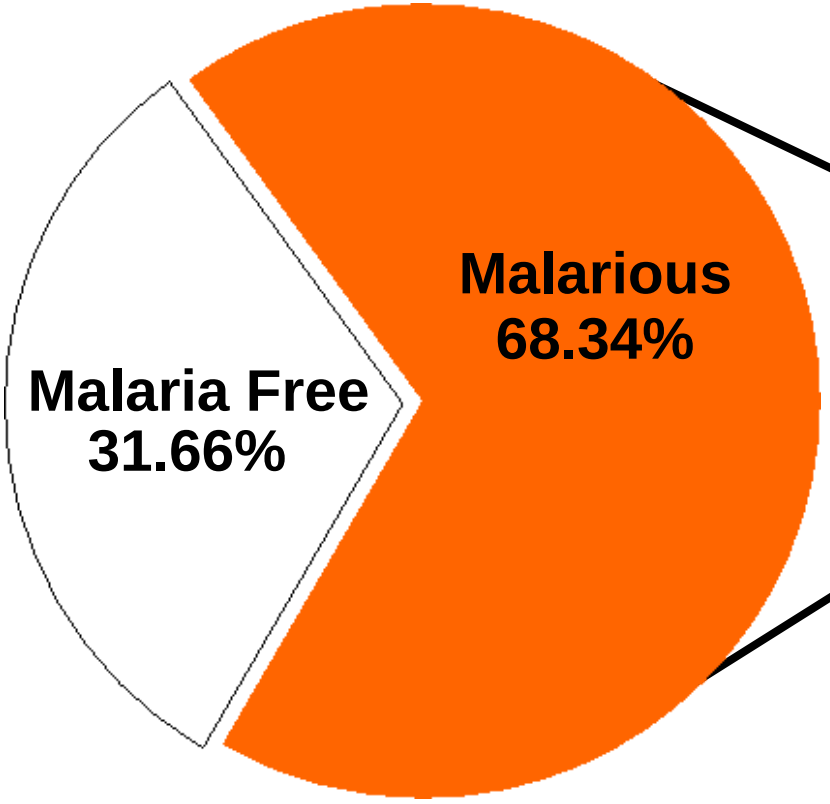


- Coastal malaria
- Plain area malaria
- Forest fringe foot hill area malaria
- Hilly & Forest area malaria



- High Risk
- Moderate Risk
- Low Risk
- Free Risk

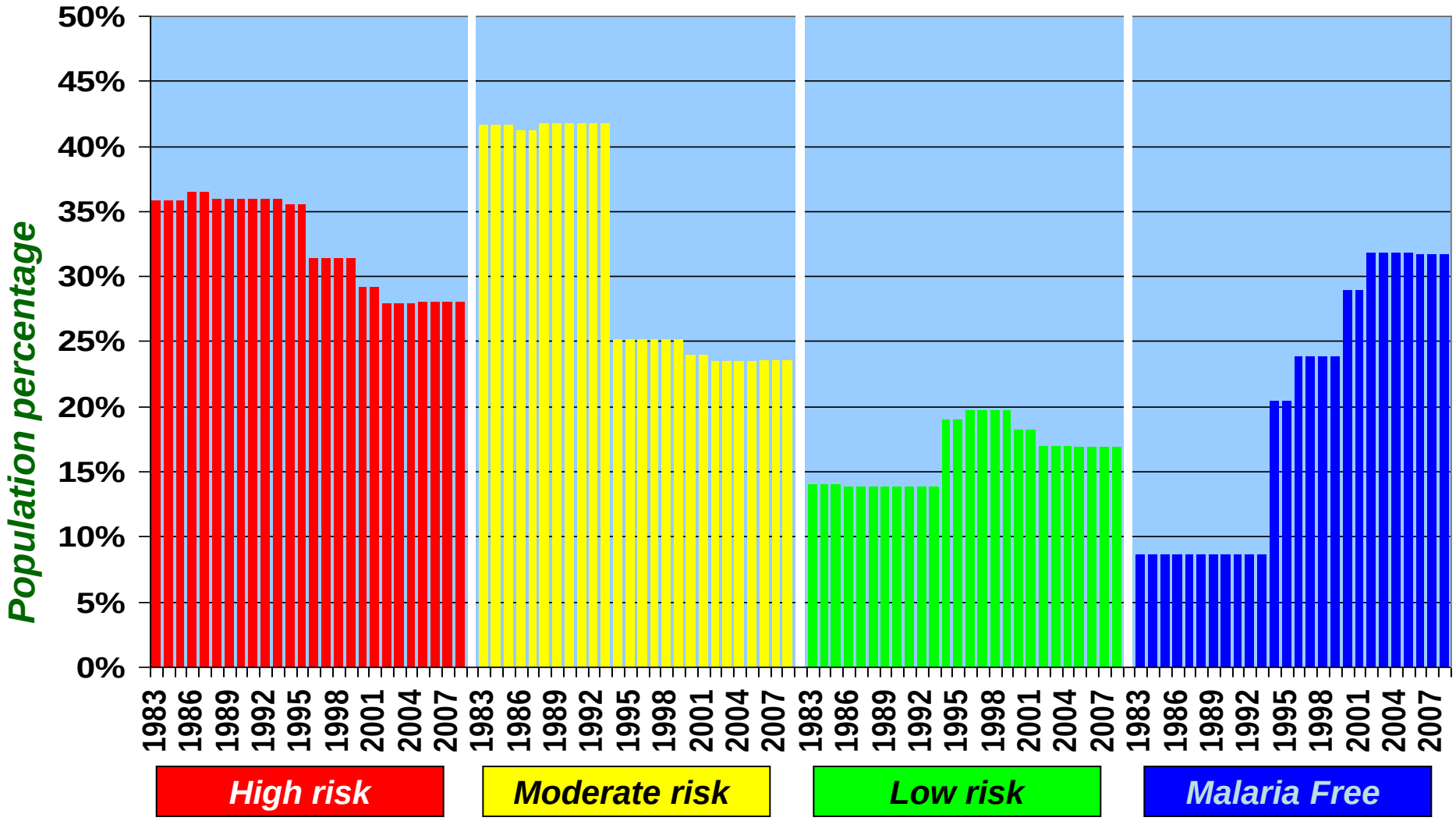
Population living under malarious and malaria free areas in Myanmar



Year	1988	2008
High risk	38.9%	27.98%
Moderate risk	41.7%	23.55%
Low risk	13.8%	16.81%
Free risk	8.6%	31.66%

Year 2008 **- Total Population 59 Millions**

Yearly Population living under malarious and malaria free areas in Myanmar



High Risk Population

- People living in high risk areas
- Internal migrants – laborers in development projects such as dams, irrigations, road, mining, logging, rubber plantation, sugar cane plantation etc.
- People who resettled in endemic areas
- Subsistence farmers in the forest and forest fringes, wood and bamboo cutters & other forest related workers.
- National races
- Pregnant mother & under 5 children.

High risk groups include:

Pregnant Women & <5 yr Children

National Races

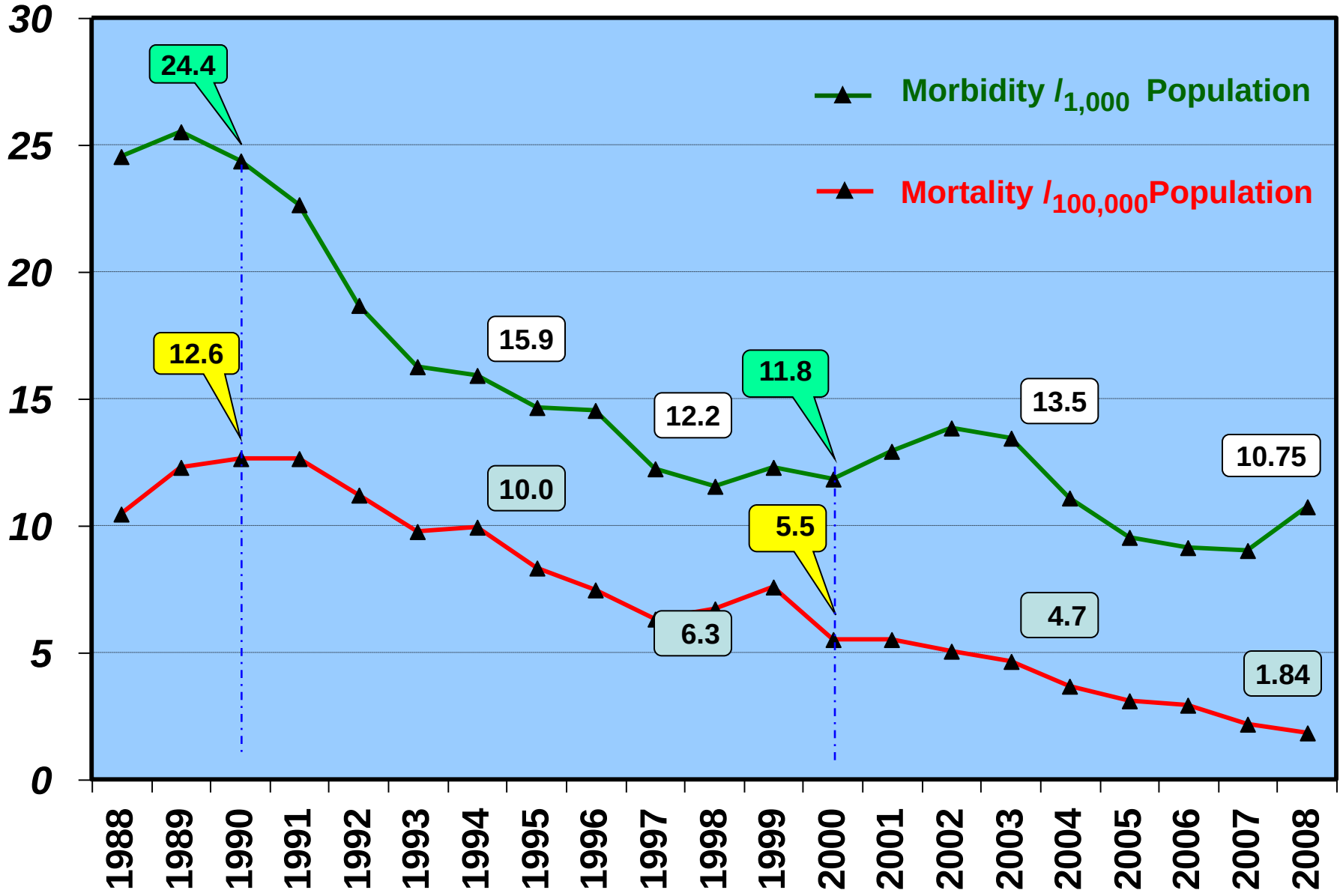
Children

Seasonal Migrant Workers/ Farmers

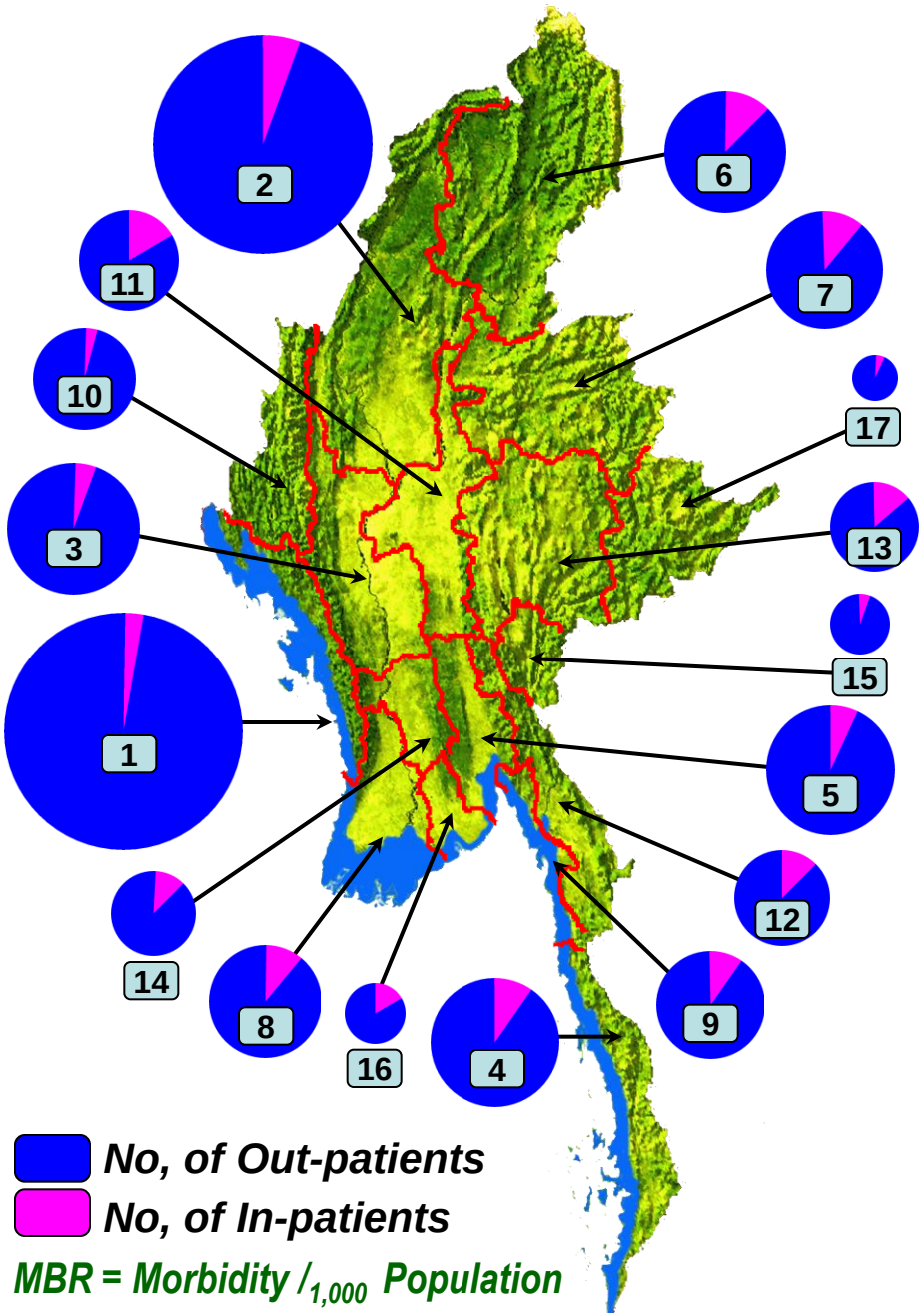
Miners

Forest-related workers

To achieve MDG Goal 6 Target 8 have halted by 2015, and began to reverse the incidence of malaria and other major diseases



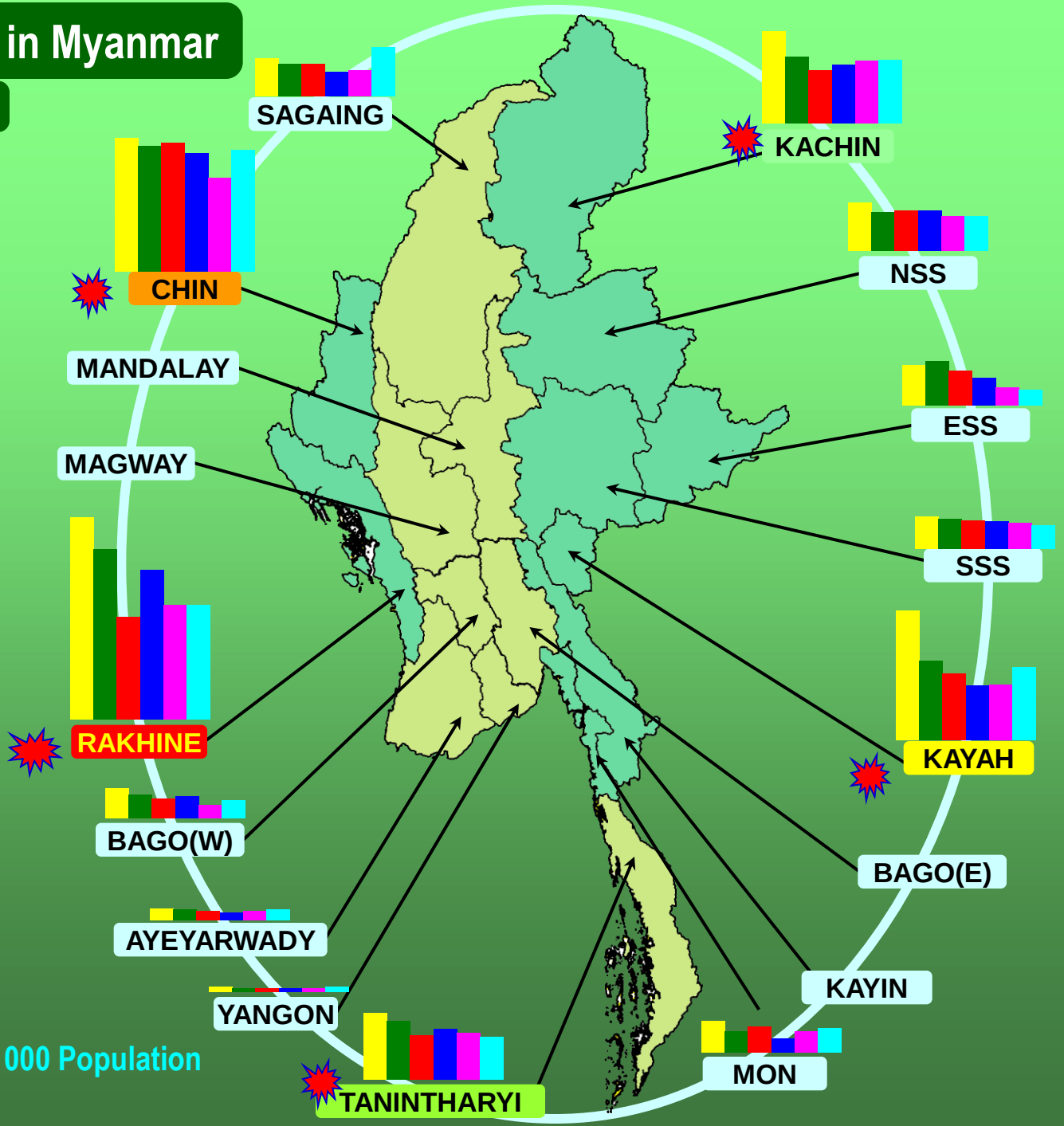
Malaria Morbidity in Myanmar [2008]



Sr	S/D	Malaria Cases	Country %	Morbidity Rate
1	Rakhine	138377	21.8%	42.04
2	Sagaing	116080	18.3%	18.12
3	Magway	42886	6.8%	7.77
4	Tanintharyi	40141	6.3%	15.86
5	Bago (E)	39649	6.3%	11.62
6	Kachin	35811	5.6%	23.18
7	NSS	33245	5.2%	12.96
8	Ayeyarwady	30209	4.8%	3.72
9	Mon	27729	4.4%	9.14
10	Chin	24921	3.9%	44.72
11	Mandalay	24205	3.8%	2.95
12	Kayin	22053	3.5%	12.37
13	SSS	19247	3.0%	8.60
14	Bago (W)	17261	2.7%	6.64
15	Kayah	8896	1.4%	26.64
16	Yangon	8590	1.4%	1.25
17	ESS	4980	0.8%	5.55
Others S/D total		495903	78.2%	8.90
Grand Total		634280	100.0%	10.75

Malaria Morbidity Rate in Myanmar

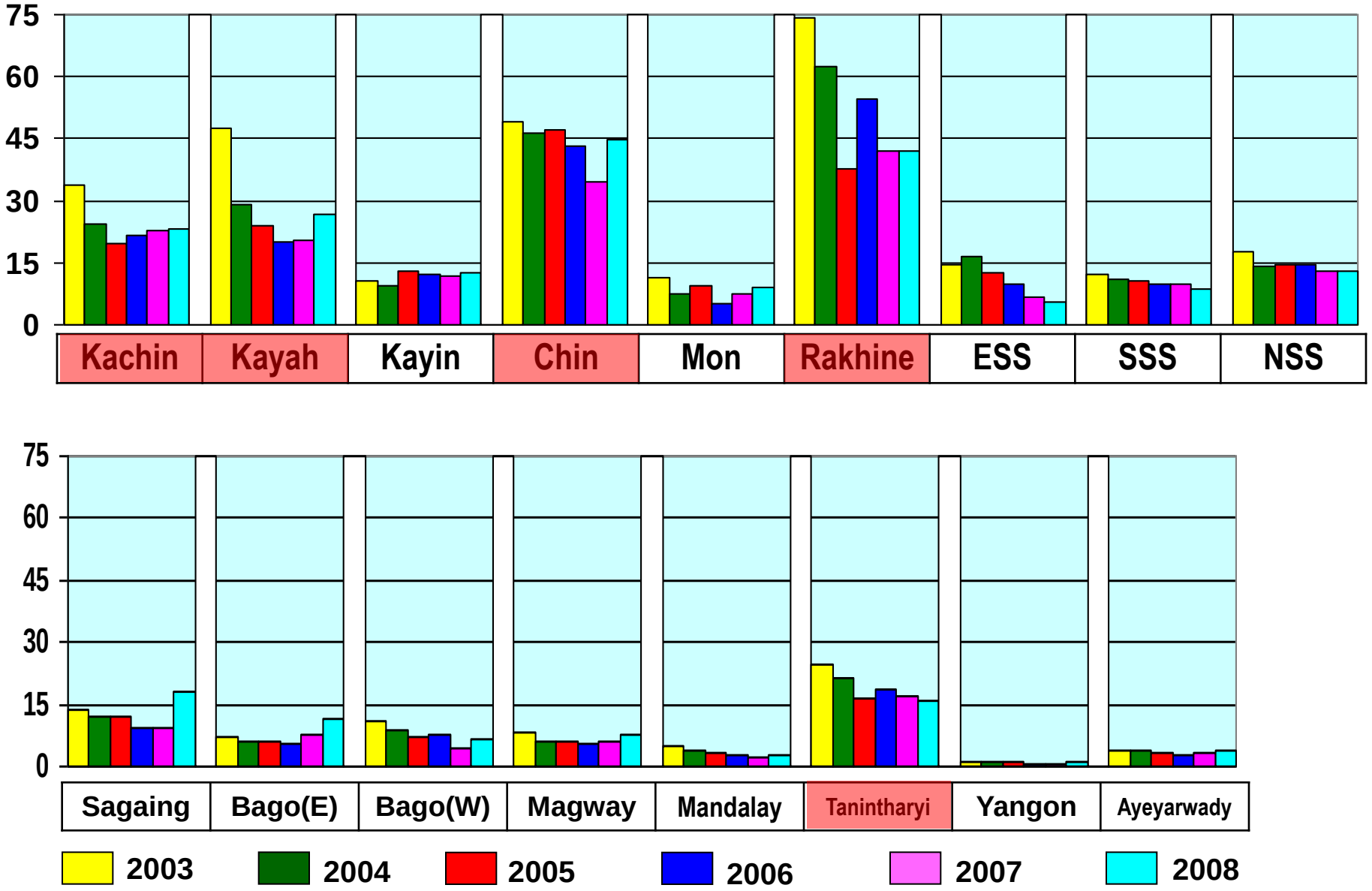
2003-2008



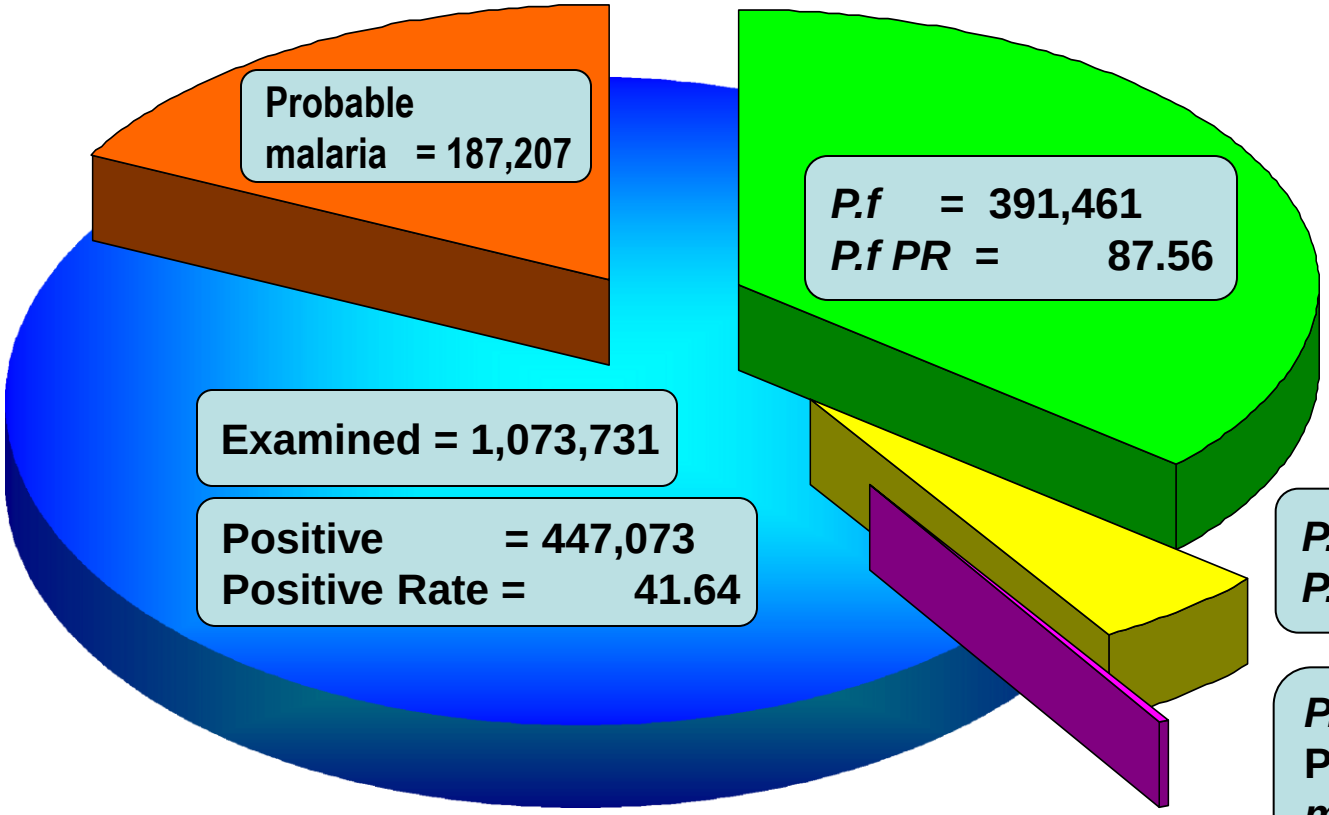
Malaria Morbidity Rate /1000 Population

Yearly Malaria Morbidity Rate in Myanmar *[2003-2008]*

Malaria Morbidity Rate /1000 Population

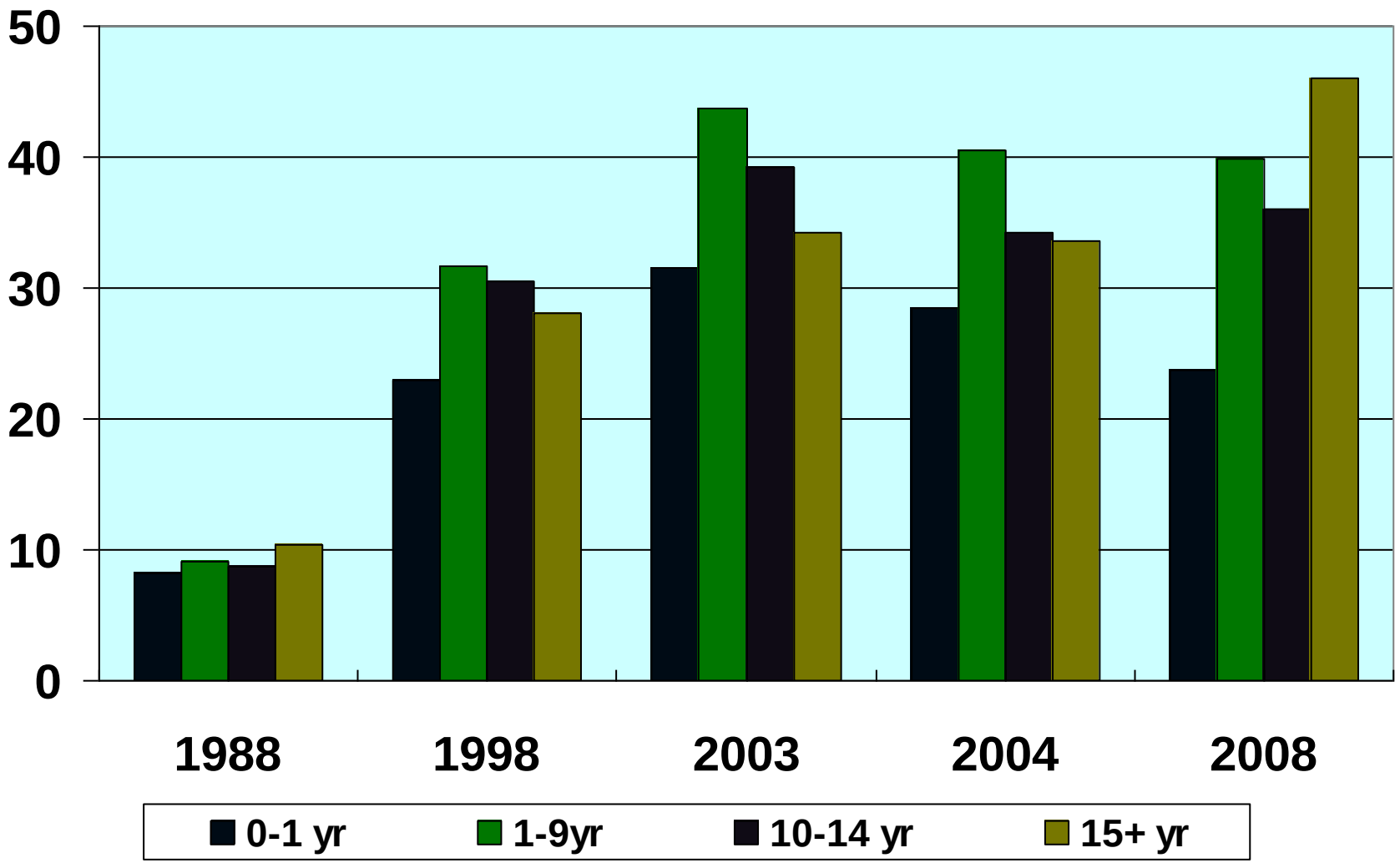


Malaria Species Classification in Myanmar *[2008]*

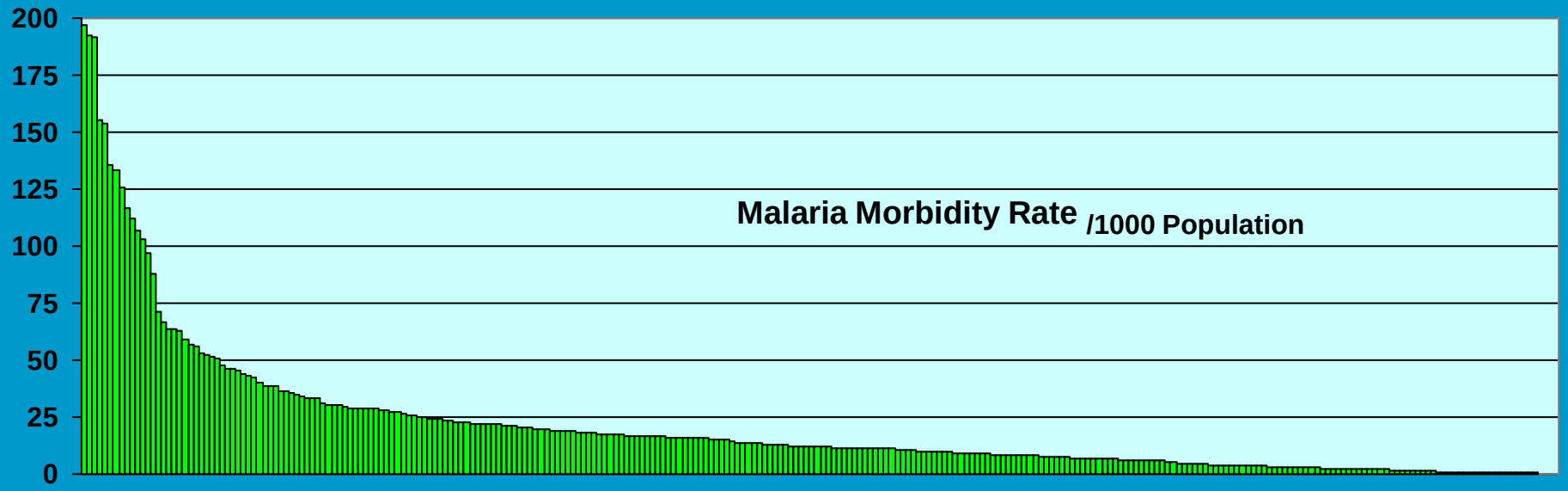


Examined	Positive	P.falciparum	P. vivax	P. malariae	P.ovale	mixed	Probable Malaria	API
1073731	447073	391461	52256	283	5	3068	187207	7.58

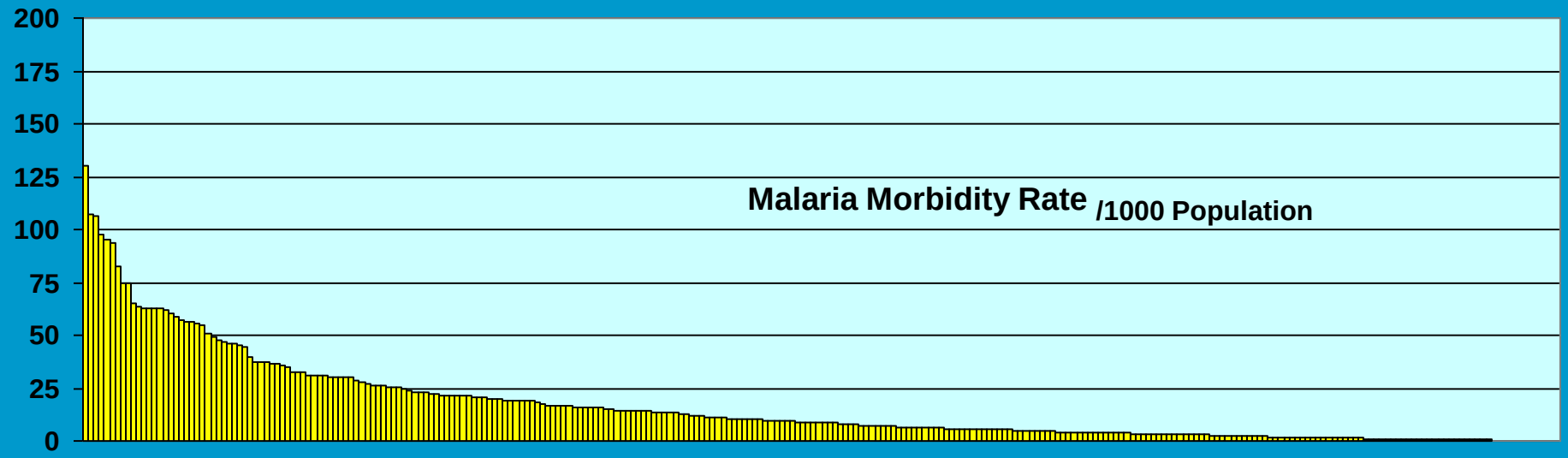
Yearly age group wise malaria slide positivity rate



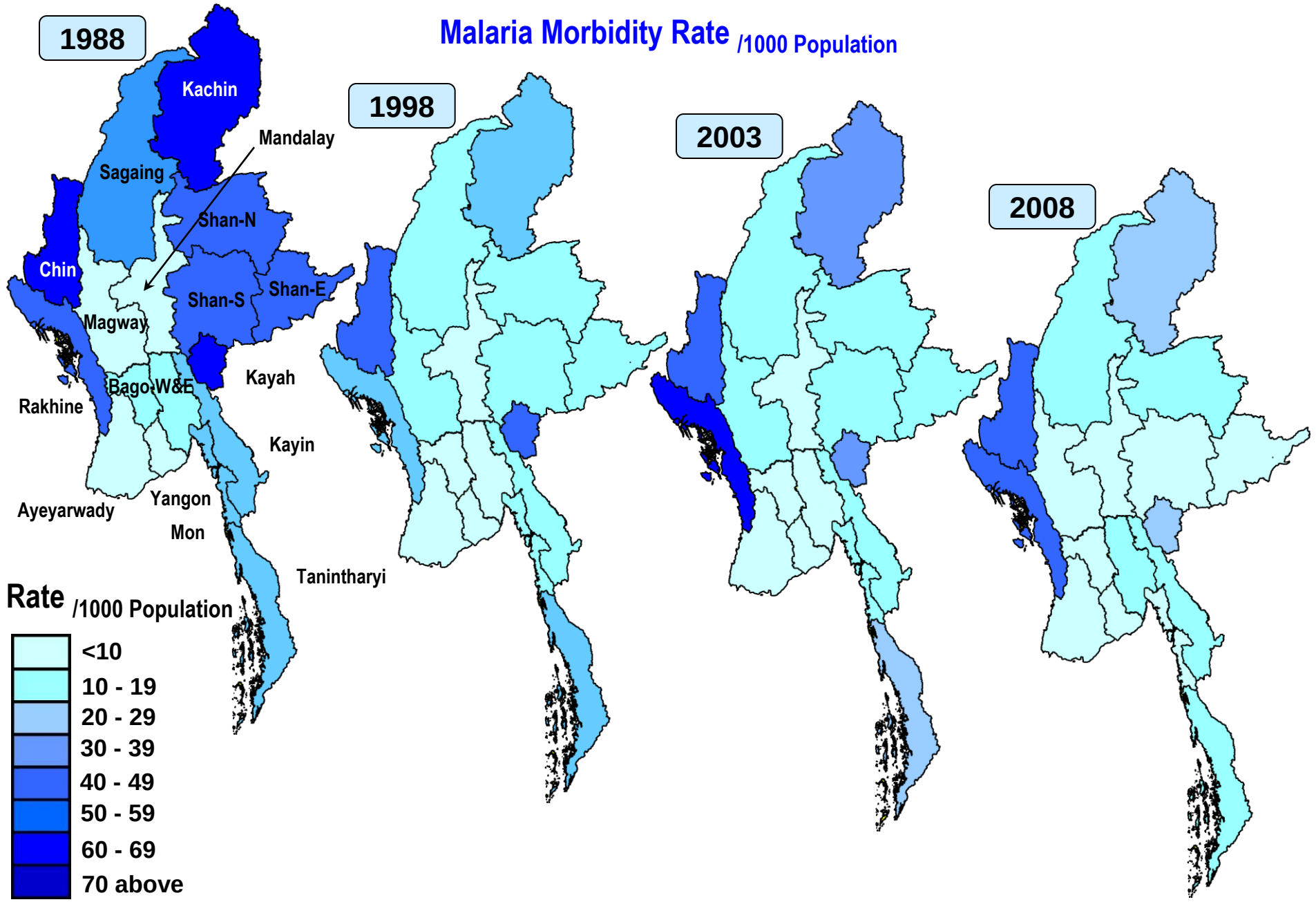
Townships Wise Malaria Morbidity in Myanmar [2003]



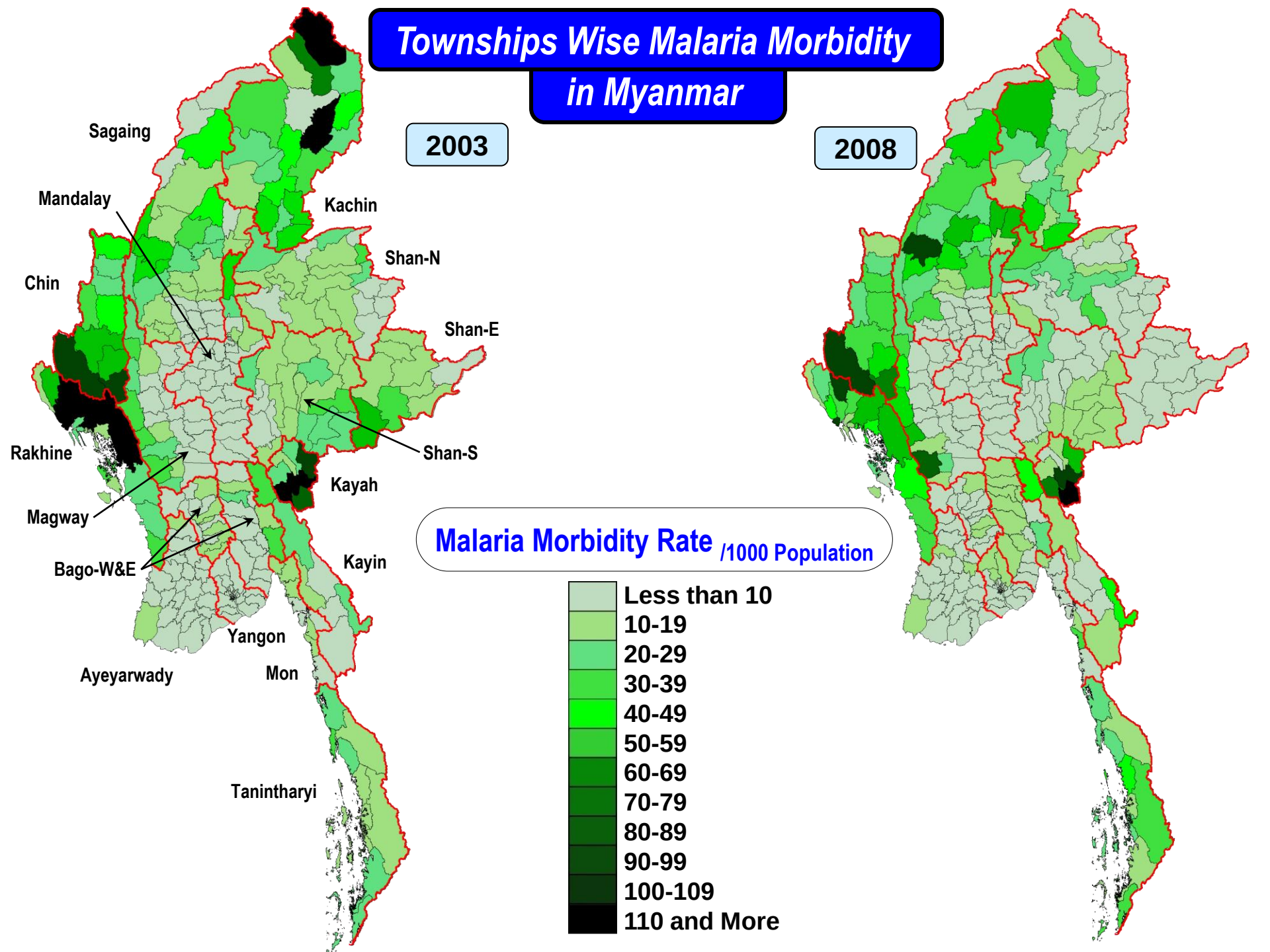
Townships Wise Malaria Morbidity in Myanmar [2008]



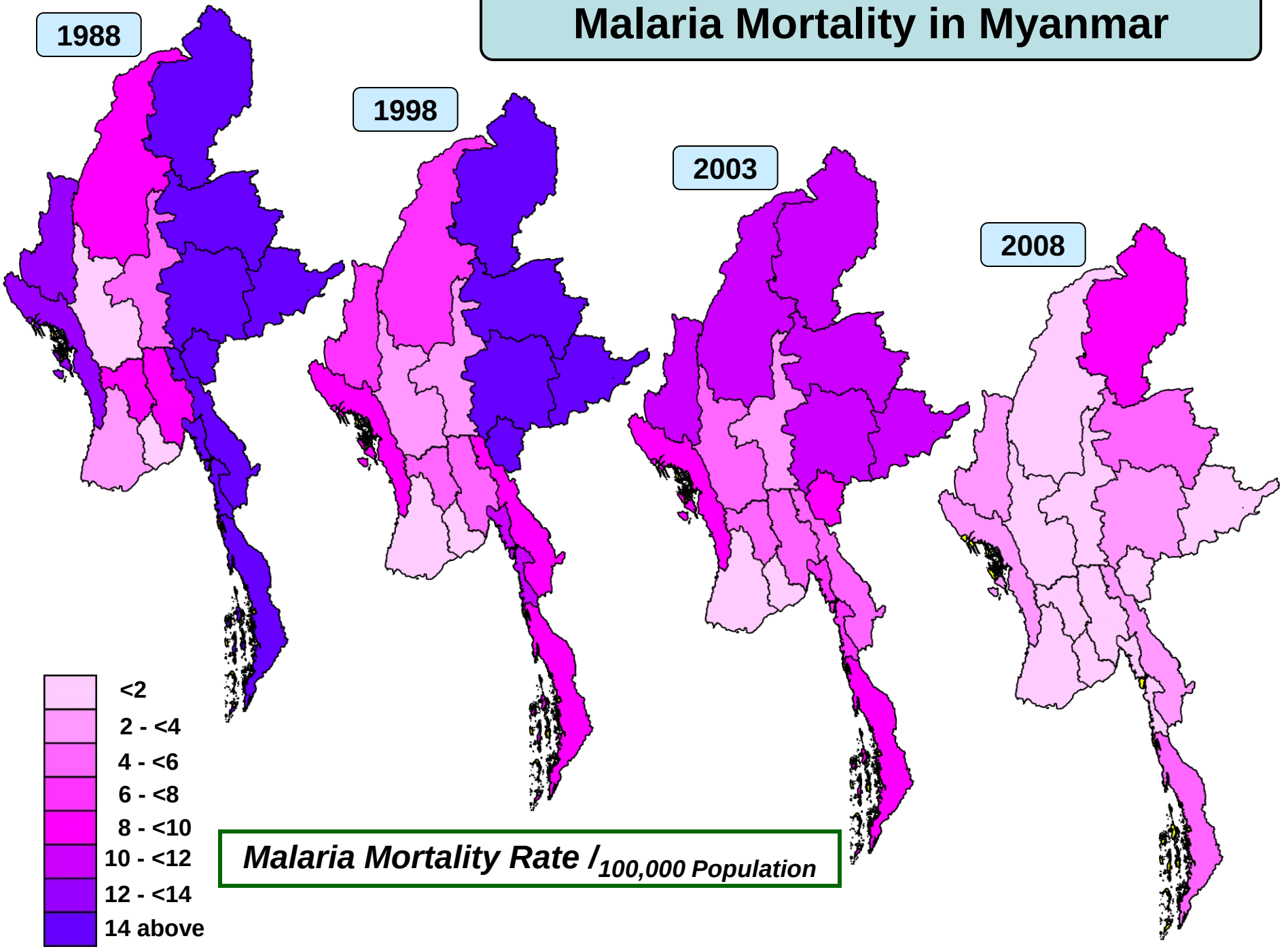
Malaria Morbidity in Myanmar



Townships Wise Malaria Morbidity in Myanmar



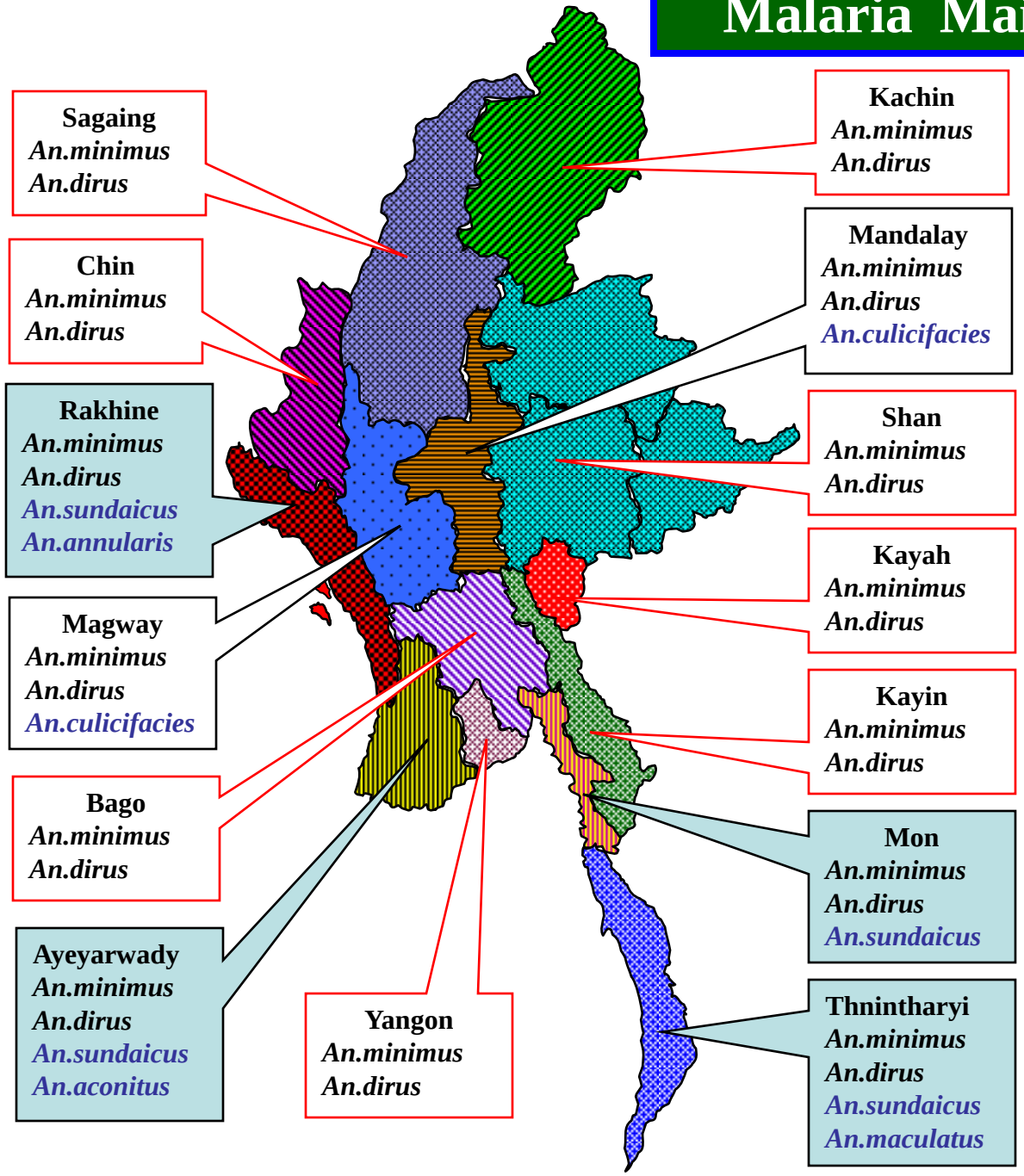
Malaria Mortality in Myanmar

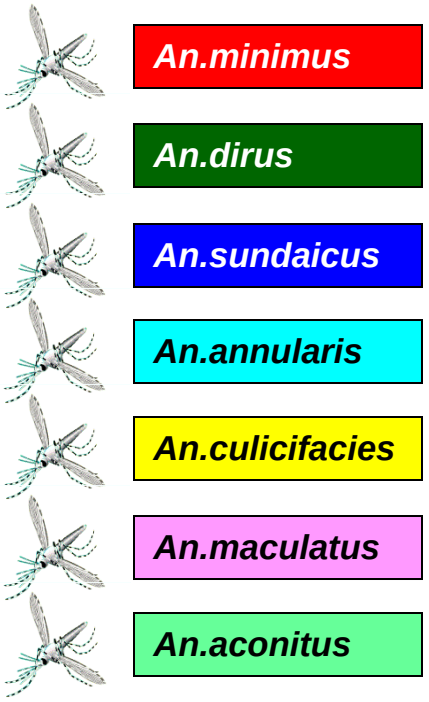


VECTOR HABITATS IN MYANMAR

COASTAL	PLAIN	FOREST FRINGE	FOREST
An.sundaicus			
			An.dirus
	An.minimus		
			An.maculatus
		An.annularis	
		An.culicifacies	
		An.philippinensis	
		An.sinensis	

Malaria Main Vectors in Myanmar





Strategies

1. Information, Education & Communication regarding malaria up to grass root level
2. Prevention - mainly emphasize on personal protection & environmental measures
3. Prevention, early detection and control of epidemics.
4. Early diagnosis and appropriate treatment.
5. Intersectoral collaboration.
6. Community involvement
7. Capability strengthening of Health staff
8. Operational research

Aims & Objectives of NMCP

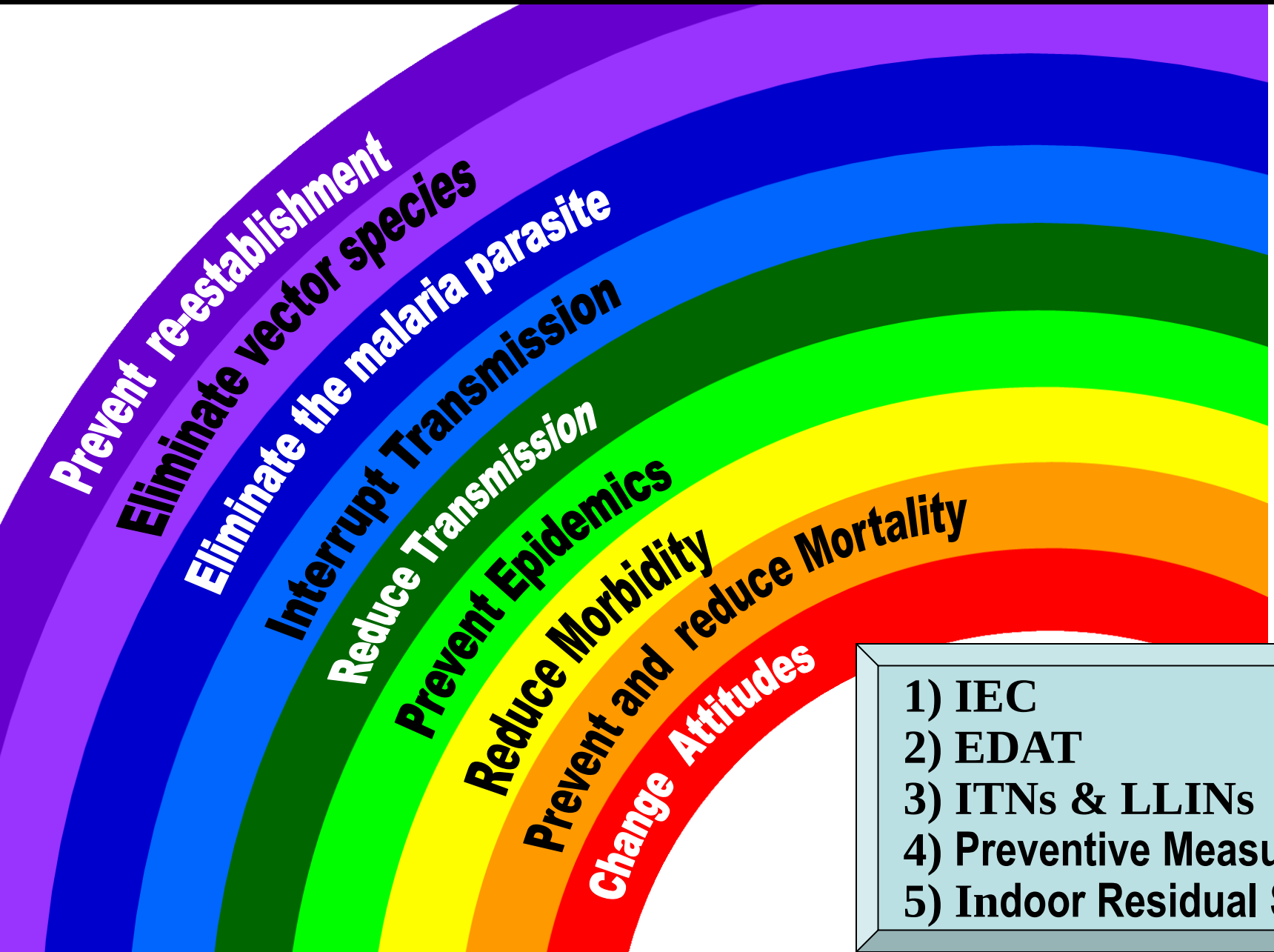
- **Reduction of malaria morbidity and mortality by 50% of the level in 2000 by 2010 and**
- **To achieve MDG by 2015**

(To achieve MDG Goal 6 Target 8 - have halted by 2015, and began to reverse the incidence of malaria and other major diseases)

Strategies

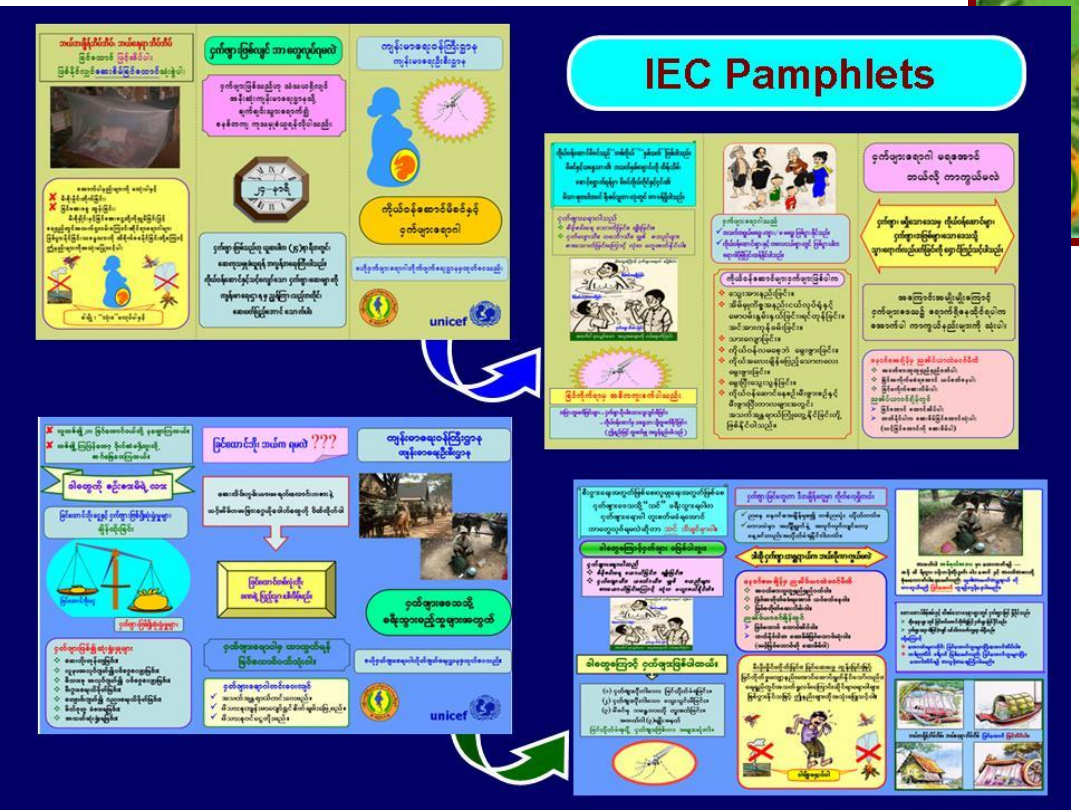
1. **Information, Education & Communication regarding malaria up to grass root level**
2. **Prevention - mainly emphasize on personal protection & environmental measures including selective spray**
3. **Prevention, early detection and control of epidemics.**
4. **Early diagnosis and appropriate treatment.**
5. **Intersectoral collaboration.**
6. **Community involvement**
7. **Capability strengthening of Health staff**
8. **Operational research**

Spectrum of Objectives for Malaria Prevention & Control



1) IEC
2) EDAT
3) ITNs & LLINs
4) Preventive Measures
5) Indoor Residual Spray

Activities on Malaria Control Programme



IEC Posters

ငှက်ဖျားရောဂါကို စောစီးထိရောက်စွာ ကုသပါ

ငှက်ဖျားရောဂါဖြစ်သည်ဟု သံသယရှိလျှင် ဈေးကြီး(၂၄)နာရီအတွင်း
အနီးဆုံးကျန်းမာရေးဌာနတွင် သွားရောက်ပြသပါ။

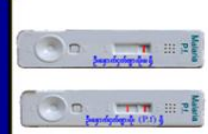
သင့်တွင် ငှက်ဖျားပိုးရှိ / မရှိ
သွေးဖောက် စစ်ဆေးပေးပါမည်။

ငှက်ဖျားပိုးစွဲလျှင်
ဆွဲနှိုးသောဆေးတို့ ဆေးပမာဏသည်အောင်သောက်ပါ။
သို့မှသာ ရောဂါစဖျောက်တင်းမည်။

ငှက်ဖျားဆေးများတို့ မိမိသဘောအတိုင်း ဝယ်စသောက်ပါနှင့်

- ❖ ဆေးစသောက်နည်း စနစ်မတျ၍ ရောဂါမစဖျောက်နိုင်ပါ။
- ❖ ဆေးဓါတ်ဆိုးတို့အန္တရာယ်များရှိနိုင်သည်။
- ❖ အရည်အစသွေး မစောင်းသောဆေးများတို့ ဝယ်၍ စသောက်သုံးမိပါတ
  ရောဂါမစဖျောက် သည့်အပြင် အသက်အန္တရာယ်ရှိနိုင်ပါသည်။

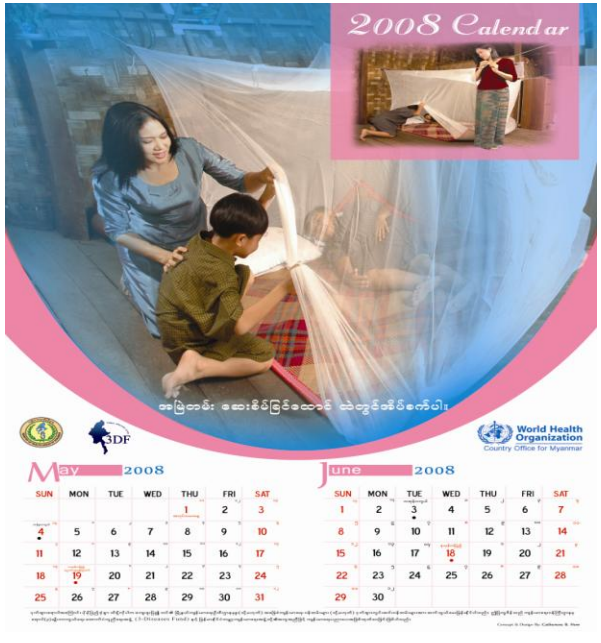
ဆေးစီးထိရောက်စွာ ကုသခြင်းဖြင့် သင့်မိသားစု၏ ဝင်ငွေနှင့်စီးပွားရေးထိခိုက်မှုကိုလည်း လျော့နည်းစေပါမည်။

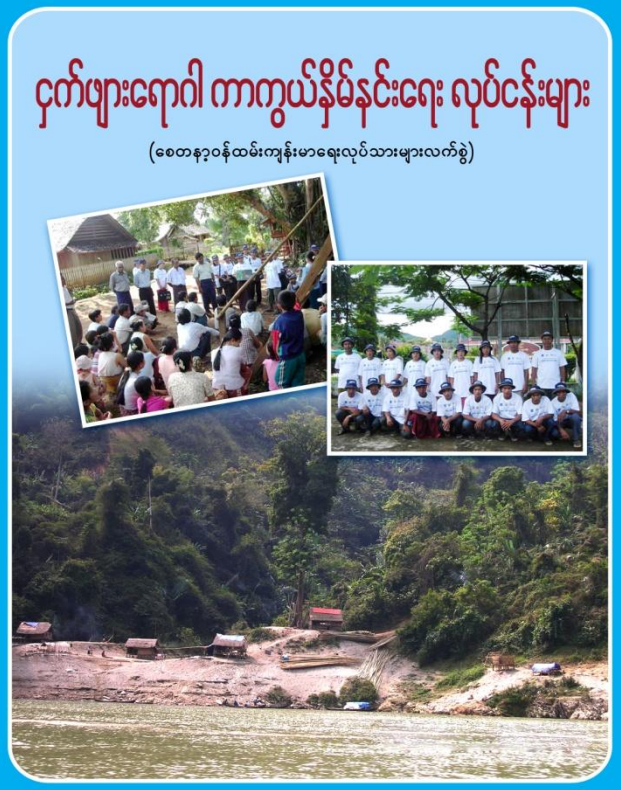


ငှက်ဖျားရောဂါပြစ်သည်ဟု သံသယရှိလျှင်
အနီးဆုံး ဆေးရုံ/ကျေးလက်ကျန်းမာရေးဌာနနှင့်
ကျေးလက်ကျန်းမာရေးဌာနခွဲများတွင်
သွေးဖောက်စစ်ဆေး ရှိ ဓနိတကျ ထိရောက်သော
ငှက်ဖျားဆေးများဖြင့် အခမဲ့ ကုသပေးပါသည်။

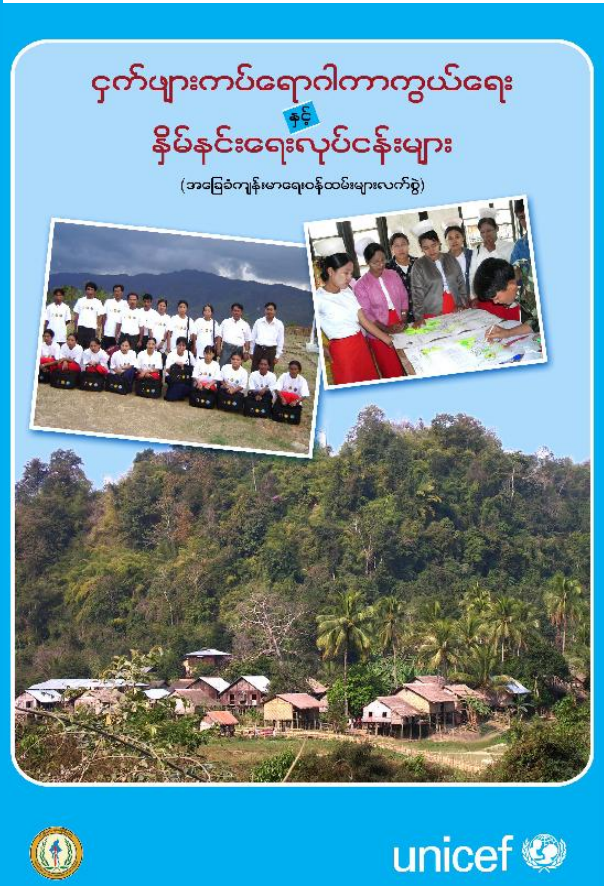
ကျန်းမာရေးဝန်ကြီးဌာနနှင့် တမ္ဘရန်ဝံစဥအဖွဲ့ တို့ပူးပေါင်း၍ အစမဲ့ဖြန့်ဝေသည်။

IEC Materials





BHS, Guideline



Epidemic Guideline

ITNs Guideline

Health education on malaria by village volunteers with flip chart, Tarcheleik Tsp, Eastern Shan State , 2005-2006

Doctor explaining about antimalarial drugs at mobile clinic of development project

Patients taking antimalarial drugs at mobile clinic of development project

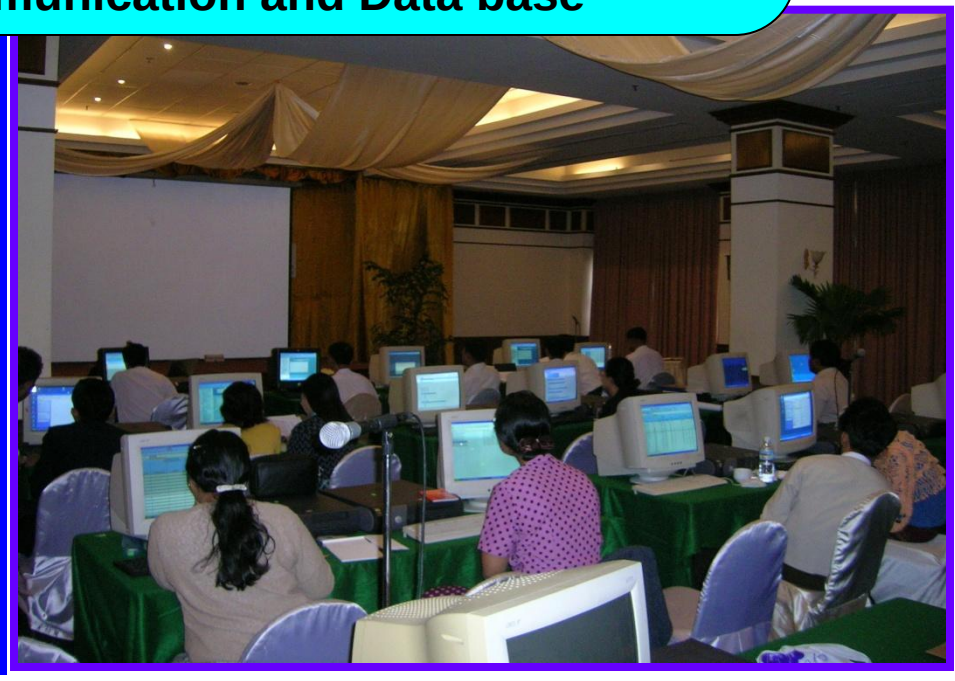
Early Diagnosis & Appropriate Treatment

Health Education Activities

Community Based Environmental Measures

Remote Area Activities

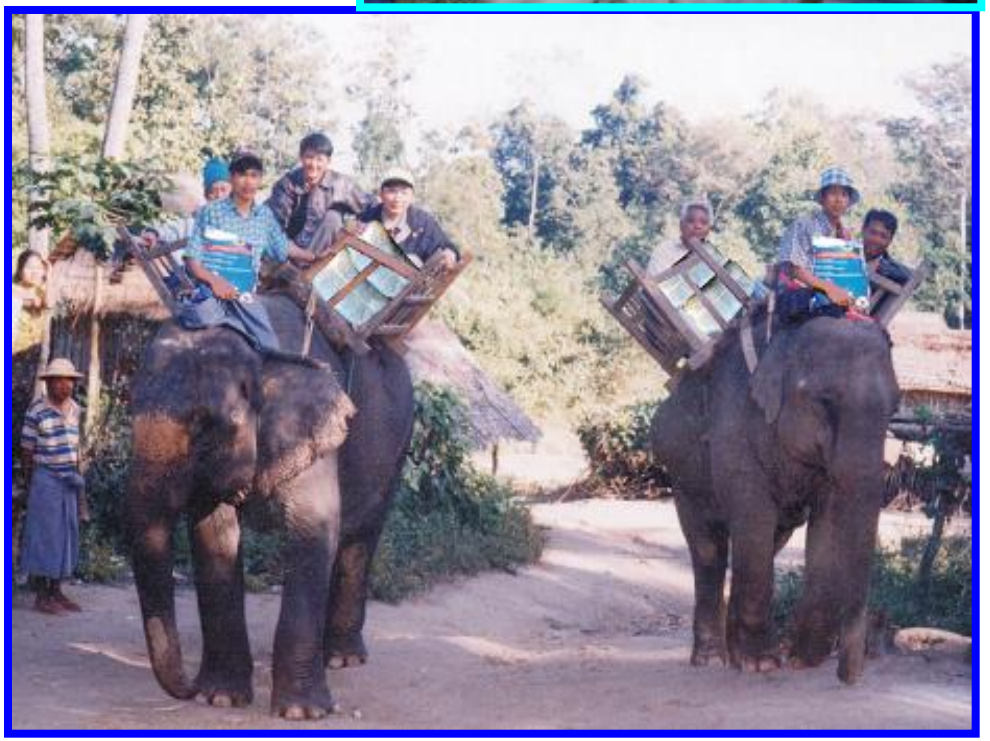
International training on Malaria field Operation,
Behavioral Change Communication and Data base



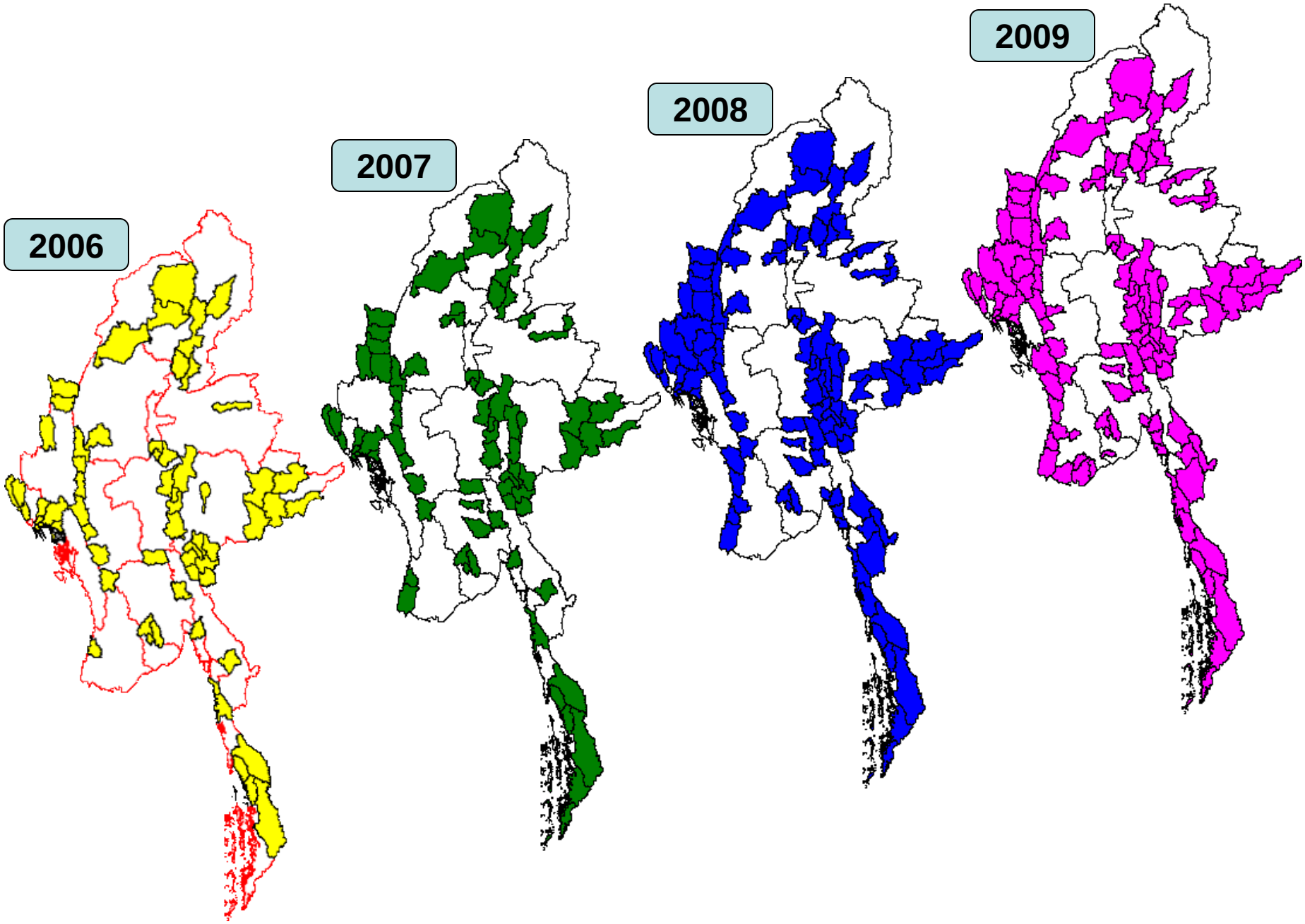
ITN PROGRAM

2 components

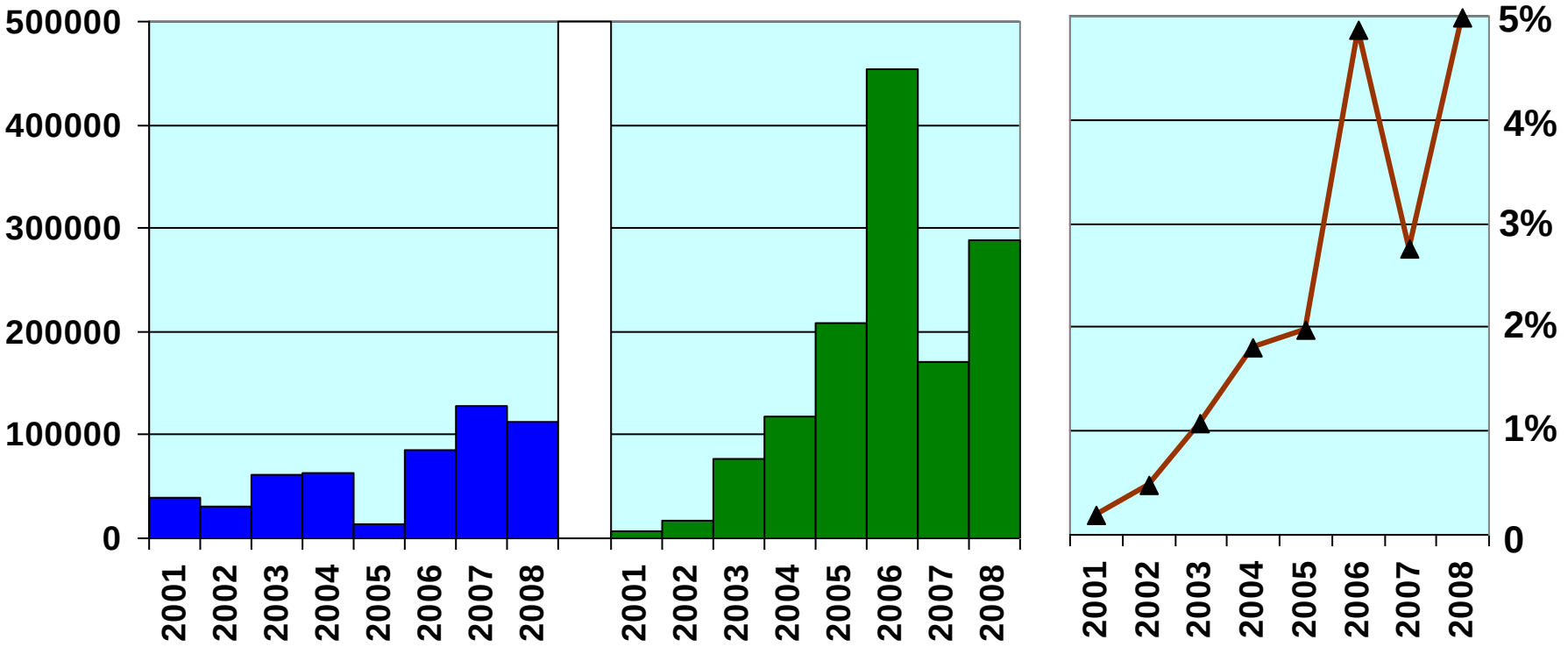
- ✓ Treatment of existing nets
- ✓ Distribution of LLIN



Insecticide Treated Bed-nets activity in Myanmar



Distribution of LLINs and Impregnation Bednets Activity



	2001	2002	2003	2004	2005	2006	2007	2008
LLIN	39802	31029	60895	62631	14295	84546	127384	112865
Pop; coverage	0.15	0.31	0.45	0.75	0.13	0.73	1.07	0.95
ITNs	7101	16300	76802	118441	208591	453890	171195	287757
Pop; coverage	0.03	0.16	0.62	1.06	1.84	4.13	1.69	4.03
Total	46903	47329	137697	181072	222886	538436	298579	400622
Pop; coverage	0.18	0.47	1.07	1.81	1.97	4.86	2.76	4.98

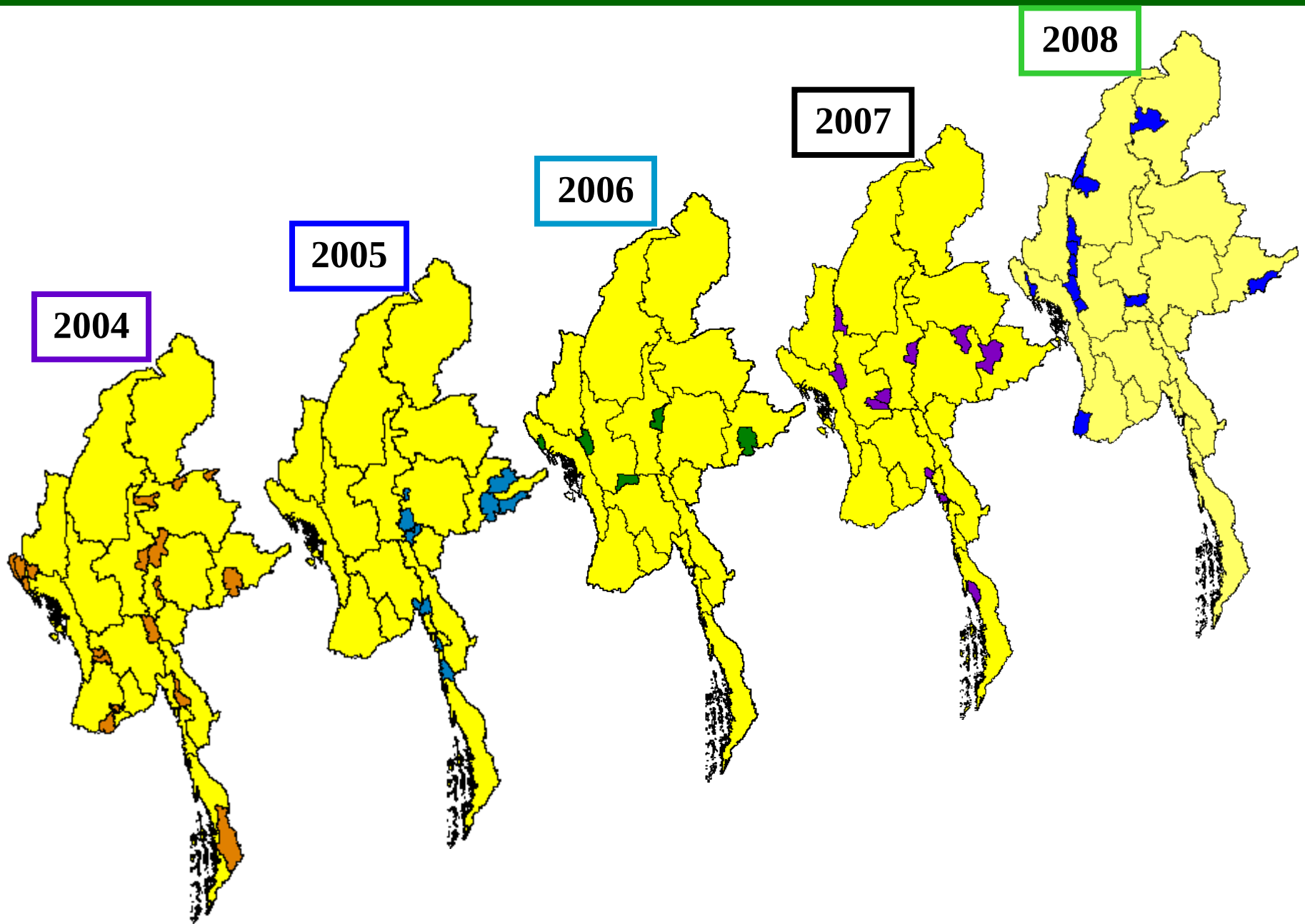
IRS Policy

- **Stop regular IRS in 1993; only selective spray**
- **Indications – Epidemic/epidemic prone, development projects & new settlements in high endemic area.**

Indoor Residual Spray Activity in Myanmar

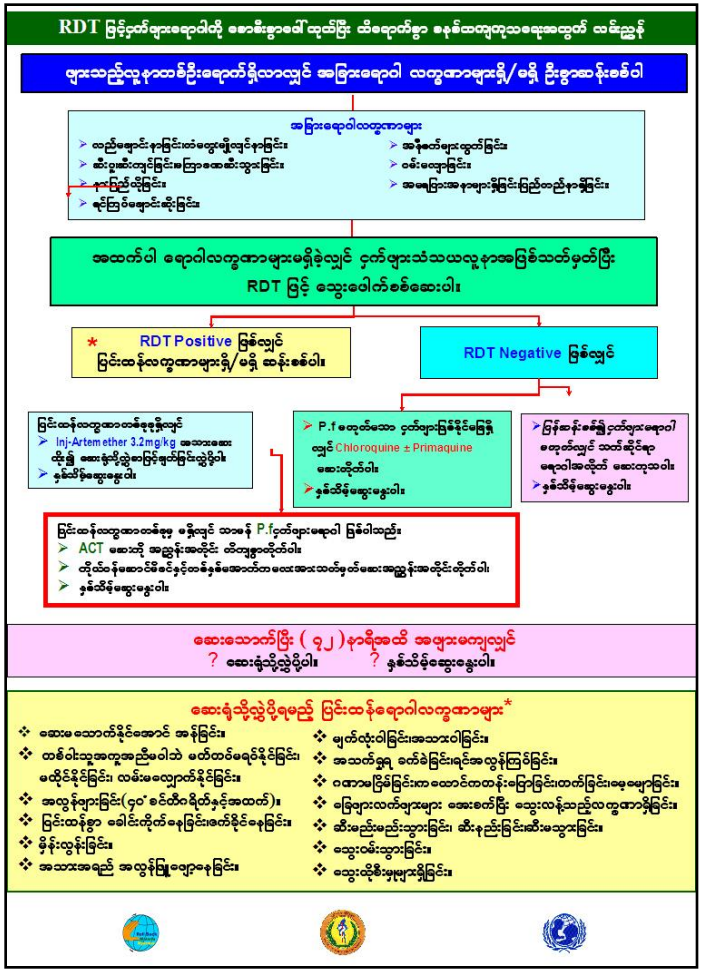
Year	S/D	Tsp	Villages	Camp	House & Structures	Population Covered	Used of DDT75% [kg]	Used of Malathion 50%EC[L]
2002	8	25	42	94	12445	63015	6477	-
2003	8	20	53	17	7932	44075	2772	209
2004	7	19	19	29	4165	19764	1945	-
2005	4	13	48	17	4934	32840	2472	-
2006	4	6	32	4	6116	33391	1119	247
2007	5	10	9	9	3098	10479	696	-
2008	5	8	10	13	2962	11284	960	365

Yearly IRS activity Township wise in Myanmar *[2004-2008]*



- **New treatment policy including use of Malaria Rapid Diagnostic Test (RDT) and ACTs**
- **Adopted in 2002**
- **Revised in 2008**

Algorithm



(P.f)ပိုးတွေ့ သာမန်ဌက်ပျားရောဂါကုသခြင်း ဆေးအညွှန်း

Artemether + Lumefantrine = (Coartem)

အသက် အပိုင်းအခြား	ပထမနေ့		ဒုတိယနေ့		တတိယနေ့	
	ပထမ အကြိမ်	ဒုတိယ အကြိမ်	တတိယ အကြိမ်	စတုတ္ထ အကြိမ်	ပဉ္စမ အကြိမ်	ဆဋ္ဌမ အကြိမ်
၁–၄နှစ်	●	●	●	●	●	●
၅–၉နှစ်	●●	●●	●●	●●	●●	●●
၁၀–၁၄နှစ်	●●	●●	●●	●●	●●	●●
၁၅နှစ်နှင့်အထက်	●●	●●	●●	●●	●●	●●

(Coartem) ဆေးတစ်ပြားတွင် Artemether&Lumefantrine 20mg/120mg ပါဝင်ပါသည်။

မှတ်ချက်။ ။ ကိုယ်ဝန်ဆောင်နှင့် တစ်နှစ်အောက်ကလေး မတိုက်ရပါ။
။ အစာကျွေးပြီးမှတိုက်ပါ။

(သို့မဟုတ်)

(Artesunate) နှင့် (Mefloquine) ကို ပေါင်းစပ်သုံးရပါမည်။

အသက် အပိုင်းအခြား	ပထမနေ့		ဒုတိယနေ့		တတိယနေ့	
	Artesunat e	Mefloquin e	Artesunat e	Mefloquin e	Artesunat e	Mefloquin e
၁–နှစ်အောက်	◗	◗	◗	◗	◗	◗
၁–၄နှစ်	●	◐	●	◐	●	
၅–၉နှစ်	●●	◐	●●	◐	●●	◐
၁၀–၁၄နှစ်	●●●	●●	●●●	●●	●●●	
၁၅နှစ်နှင့်အထက်	●●●	●●	●●●	●●	●●●	●

Artesunateဆေးတစ်ပြားတွင် 50mg နှင့် Mefloquineဆေးတစ်ပြားတွင် 250mg ပါဝင်ပါသည်။

★ မှတ်ချက်။ ။ ၁၅နှစ်နှင့်အထက် လူကြီးများတွင် ကိုယ်အလေးချိန်(၆၀)ကီလိုကျော်လျှင် Mefloquineဆေးတိုတစ်ထုတ်(၂)ပြား(၃)ထုတ်ဆက်တိုက်ပါ။
(Mefloquine) ဆေးကို ကိုယ်ဝန်ဆောင်အား မသေးရပါ။

ကိုယ်ဝန်ဆောင်းအတွက် ကြီးနင်း(Quinine) နှင့်ကလင်ဒါမိုင်စင်(Clindamycin) ဆေးဆေးကို ပေါင်းစပ်ပေးရပါမည်။

ဆေးအမျိုးအစား	(၁)ရက် တိုက်ကျွေးရပါမည့် ဆေးပမာဏ		
	နံနက်	နေ့လည်	ည
Quinine	●●	●●	●●
Clindamycin	▮▮		▮▮

နုနပေါင်း(၇)ရက်တိုက်ကျွေးရပါမည်။
Quinine ဆေးတစ်ကြားတွင် 300mgနှင့် Clindamycinဆေးတစ်ကောင့်တွင် 300mg ပါဝင်ပါသည်။

အထက်ပါ(Meflounine+Artesunate)သို့မဟုတ်(Coartem) ဆေးဆေးသောက်မှီ
(၁)လအတွင်း*P.f* အဖျား(Treatment Failure)ဖြစ်ပေါ်လျှင်ပေါင်းစပ်ပေးရပါမည့်ဆေးအညွှန်း။

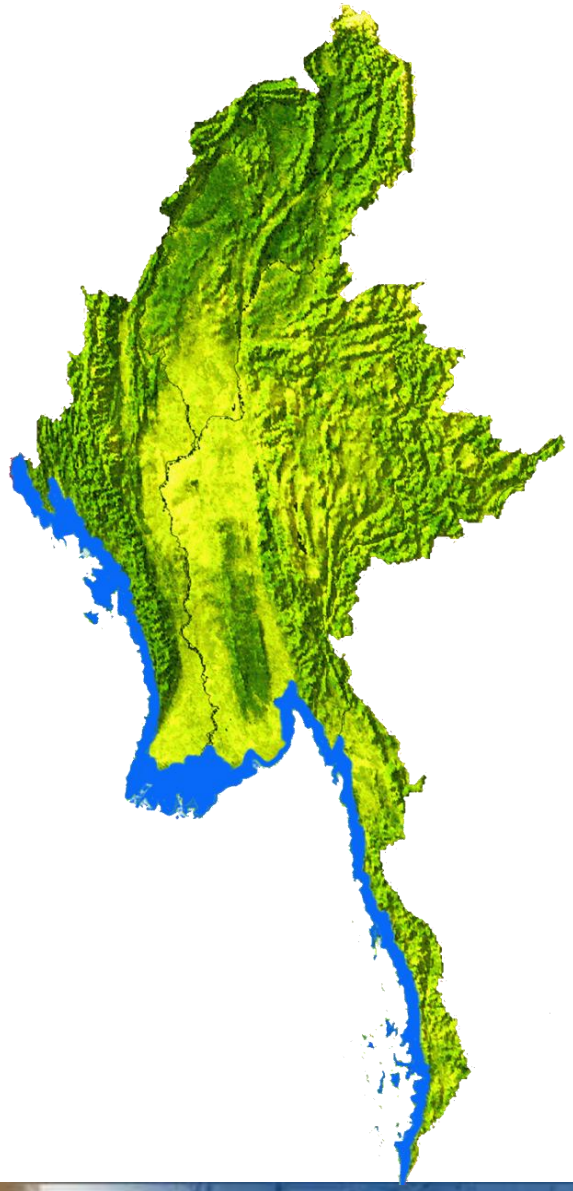
အသက် အပိုင်းအခြား	ပထမနေ့			ဒုတိယနေ့မှသတ္တမနေ့အထိ		
	Artesunate		Doxycyclin	Artesunate		Doxycyclin
	နံနက်	ည	တစ်နေ့(၁)ကြိမ်	နံနက်	ည	တစ်နေ့(၁)ကြိမ်
၈–၉နှစ်	○	○	◔	◗	◗	◔
၁၀–၁၄နှစ်	○◗	○◗	○	◔	◔	○
၁၅နှစ်နှင့်အထက်	○○	○○	○◗	○	○	○◗

Artesunate ဆေးတစ်ပြားတွင် 50mg နှင့် Doxycyclinဆေးတစ်ပြားတွင် 100mgပါဝင်ပါသည်။

မှတ်ချက်။ ။ စနစ်ဆောက်နှင့်ကိုယ်ဝန်ဆောင်အား Doxycyclin မတိုက်ရပါ။
ငှင်းဆေးအစား (Clindamycin) ပေးရပါမည်။

(P.f) ပြင်းထန်ဌက်ပျားရောဂါလူနာအား ဆေးရုံသို့လွှဲပို့ ခြင်း ဆေးအညွှန်း

ပြင်းထန်ဌက်ပျားလူနာကို IM Inj-Artemether 3.2mg/kg နှုန်းဖြင့် တွက်ချက်၍ ဆေးထိုးပေးပြီး ဆေးရုံသို့ ချက်ချင်းလွှဲပို့ပါ။



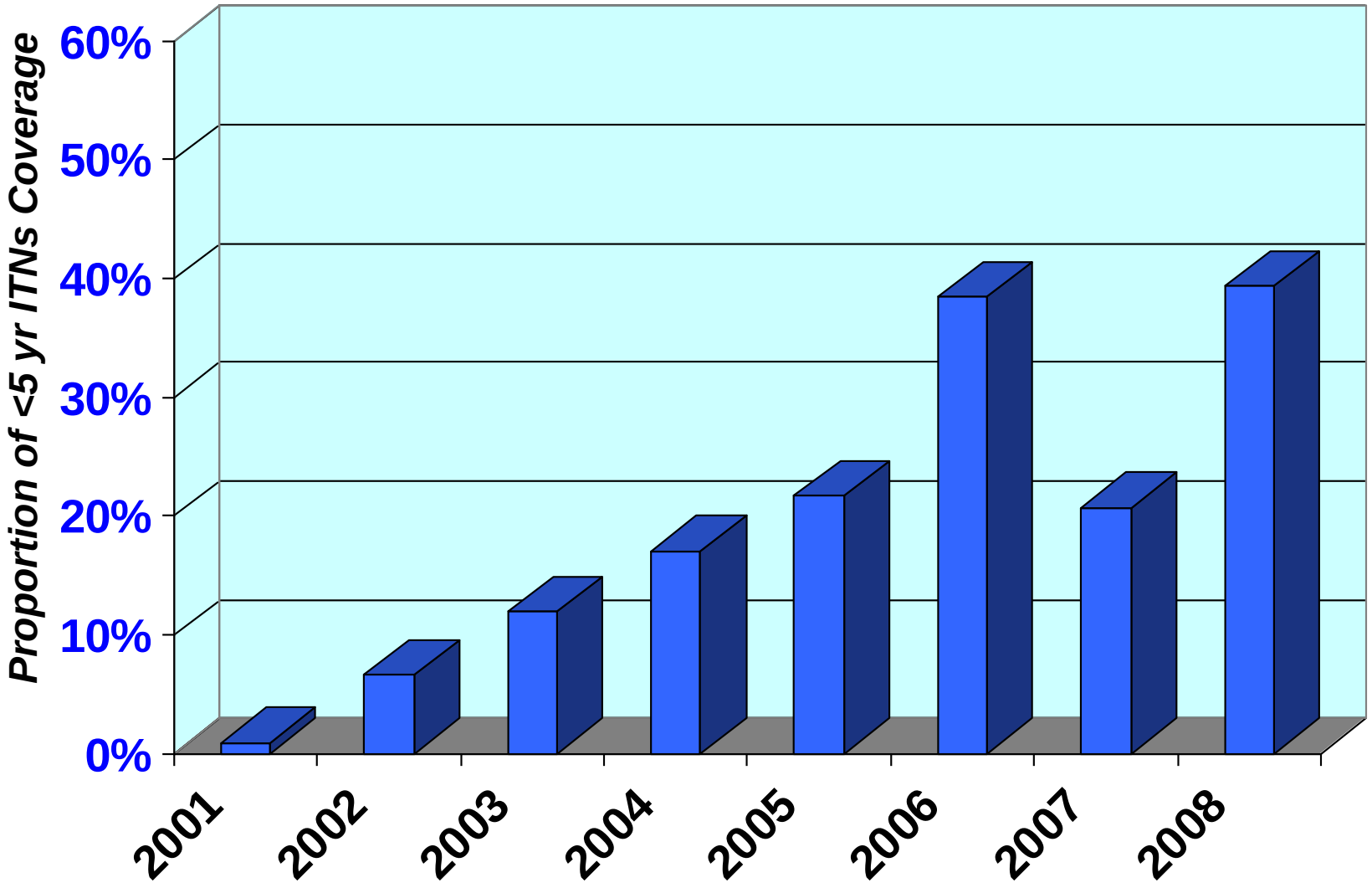
RDT Application in Myanmar

- Introduced in 2000 *(small amount)*
- Started application in 2003 up to rural health centers & sub centers in 284 endemic townships
- About 400,000- 500,000 tests distributed annually since 2006

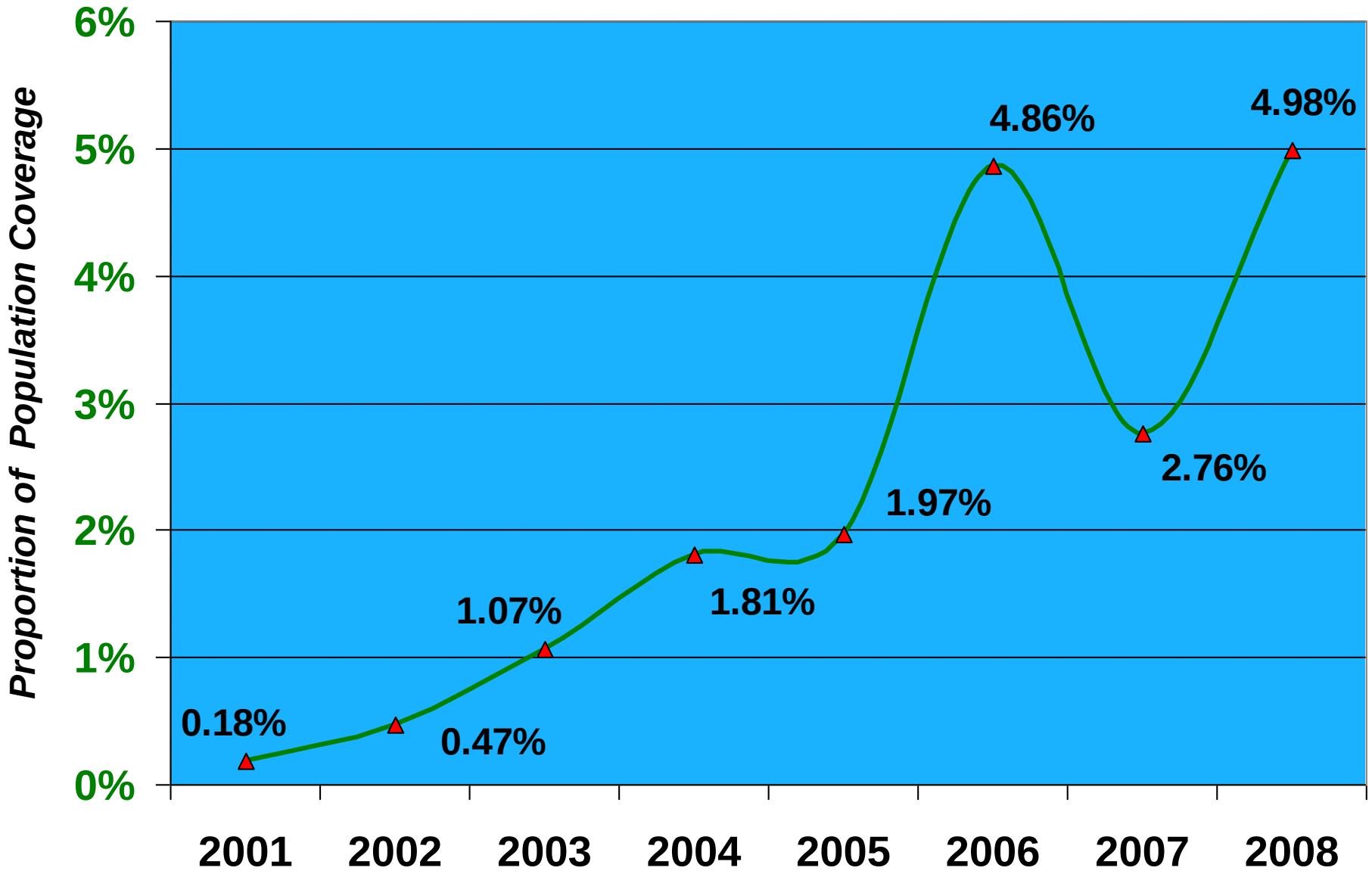
Issues & Challenges

- **Sustainability of countrywide coverage with New Treatment Policy**
- **Adherence of New Treatment Policy**
- **Scaling up ITN Program**
- **KAP of local community**
- **Multi-drug resistance of *P. falciparum***
- **Faked & substandard anti-malarial drugs**

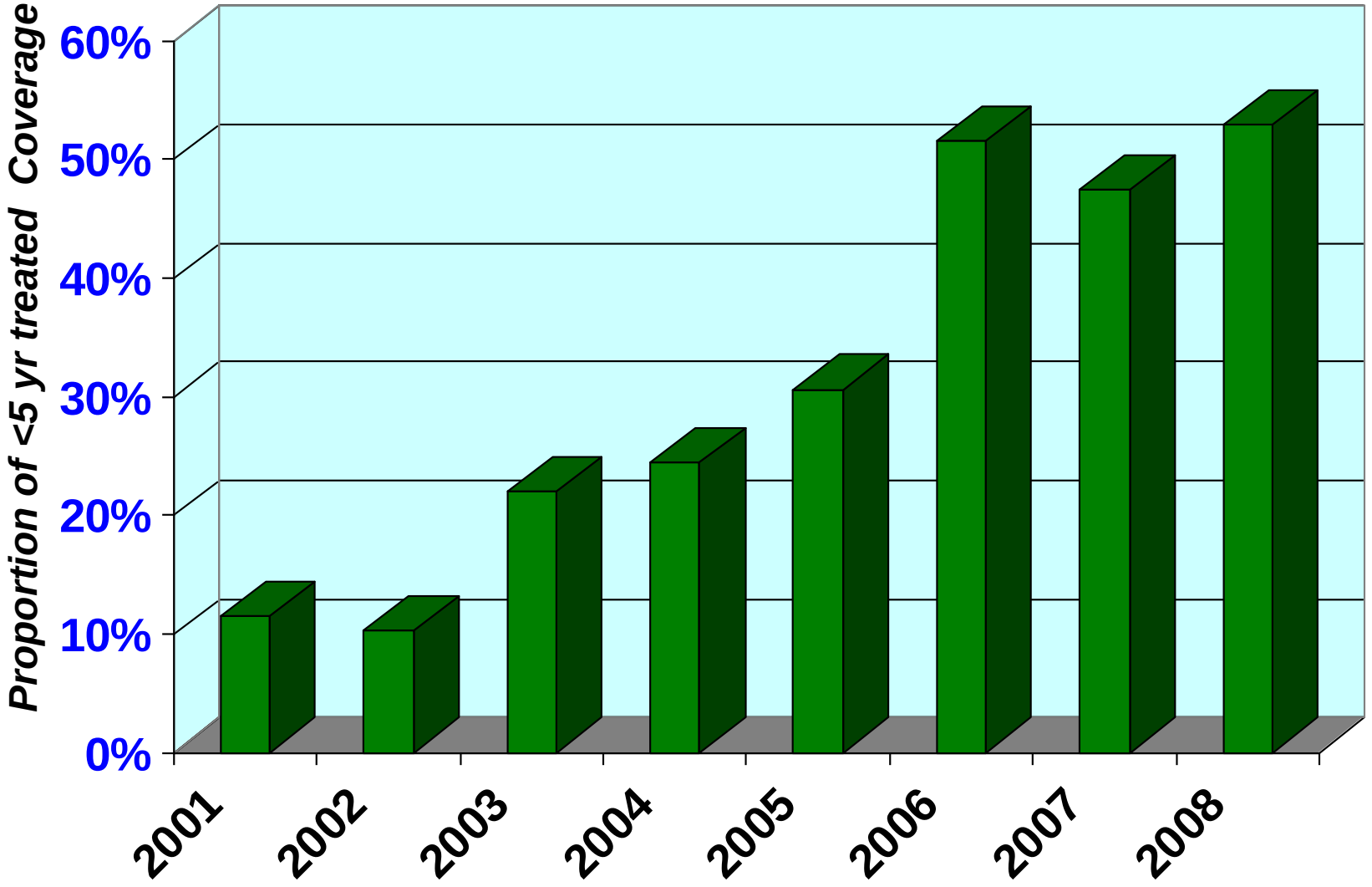
Proportion of <5yr Child with Insecticide Treated Nets Coverage in High Risk Area in Myanmar



Population Coverage with Insecticide Treated Nets in Myanmar



Proportion of <5yr Child with [Anti malarial Drugs] Effective Treated Coverage in Myanmar



Current Situation of QA on Malaria Microscopy in Myanmar

Objectives

1. To improve the overall performance of microscopists at each level of the laboratory services.
2. To obtain and substain the highest level of accuracy (in sensitivity & specificity) in comfirming the presence of parasites and
3. To monitor systematically laboratory procedures, slides, stain and microscope.

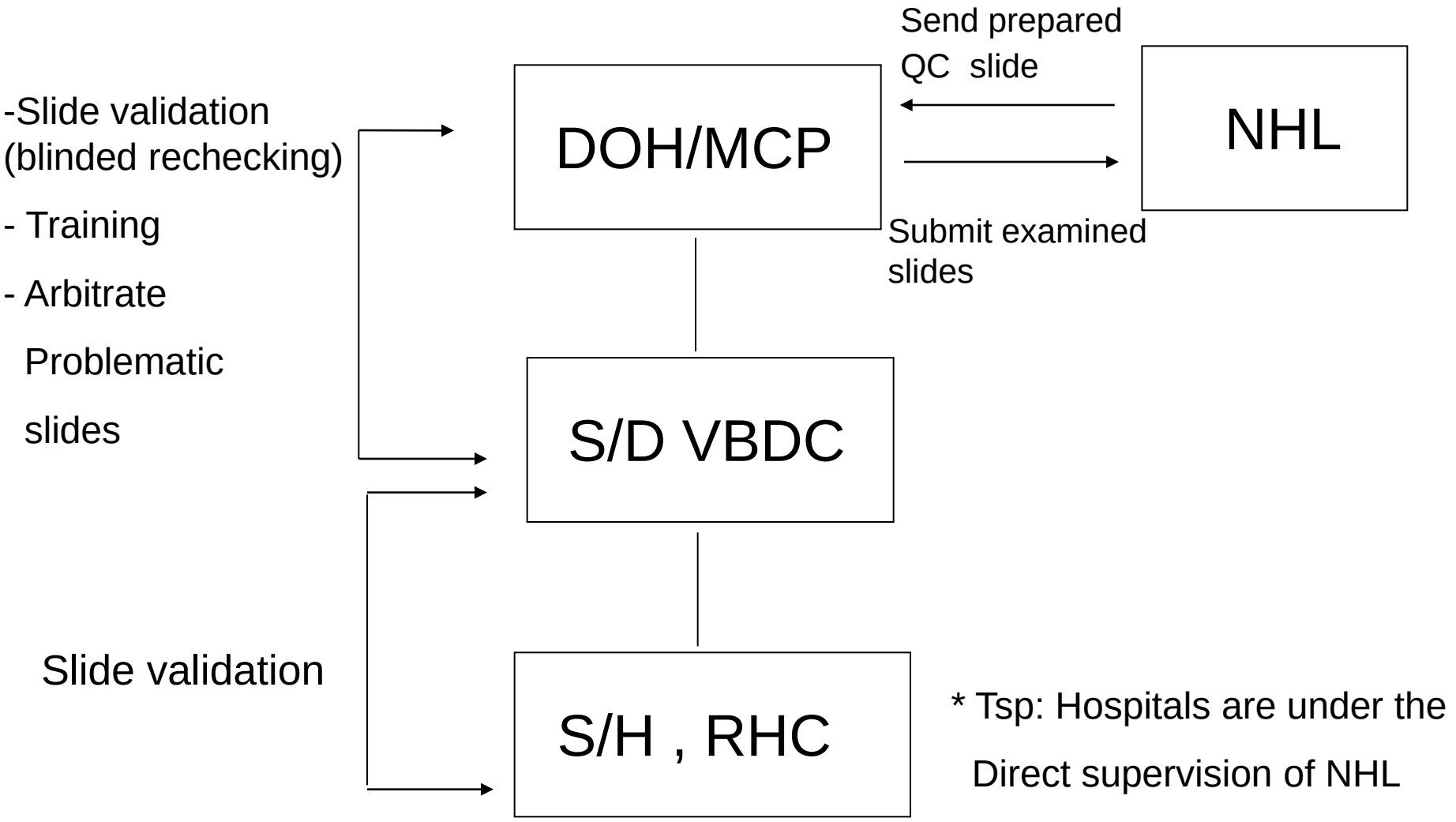
Activities

The activities are,

I. Consultative visit (Supervision)
II. Cross-checking of slides

Both methods have advantages & disadvantages respectively, therefore, combined activies are required.

Contents of QA Programmes



I.Supervision of QC of Malaria Microscopy

- Supervisors---lab; technicians from VBDC(Central VBDC, S/D VBDC)
- Different levels of BHS trained on M/M were assessed.
- Status of Malaria Microscopy (2009)

  -38 M/Cs in 15 Tsps; were visited

  -34 Micropists ---------- 7 Lab tech,22 BHS,5 VBDC staffs

  -Malaria microscopy-Functioning =22M/Cs(57.9%)

  -NF =16M/Cs(42.1%)

  -Microscopists were vacant in 7 M/Cs

  -38 Microscopes-------Good condition =34

  Unsatisfactory =4(10.5%)

II.Cross-checking of slides

- Traditional method of checking all positive and 5% negative result have become unsustaintable due to the number of slides involved.
- Therefore, a sustainable form of slide validation was prepared in Dec,2008.
- Central VBDC requested15 slides/month (Random sampling) from S/D VBDC
- Discrepancies of Cross-check slides(Jan-Aug,2009)

-total no. of cross-check slides	=970 slides
-total discrepancies	= 18
-false positive	= 2
-false negative	= 6
-species discrepancies	= 5

QA Plan (2010)

- Validation of slides from S/D VBDC.
- Arbitration of problematic slides (b/t S/D VBDC and peripheral microscopists).
- Supervision and monitoring activies to maintain the quality of peripheral microscopists.(1 time/6 month, special >20% error in 2 continuous assessment)

  Competency Assessment to get potential validators(External assessment)
- Refresher training to strengthen the skill of malaria microscopists.
- Previously, township hospital laboratories are under the supervision of NHL. During Dec,2009--- 46 townships hospitals were selected and 2 batches(Lab techs) of refresher training had been done. In 2010,this 46 tsps hospitals will be enrolled in QC system of Central VBDC and strengthen the QA on malaria microscopy of Central VBDC in co-orperation with NHL.

  The following procedure was prepared for QC of this selected township hospitals.

  -Sample size--------In situation where fewer than 10 slides are examined per month, all slides must be cross-checked. If case load is >10 slides, the interval is taken by dividing total examined slides with 10

  -Prefer to collaborate with S/D VBDC team

Monitoring efficacy of 1st line anti-malarial drugs against *P. falciparum* and *P. vivax* infections in Myanmar

Principal investigators	**Co-investigators**		
	Control Program VBDC	DOH	DMR (Lower Myanmar)
Dr. Khin Lin DMR UM	Dr. Than Win	Dr. Saw Lwin	Dr. Ye Htut
Dr. Myat Phone Kyaw	Dr. Chanthar		Dr. Nwe Nwe Oo
DMR LM	Dr. Nyan Sint		
	Dr. Tin Tun Oo		
	Dr. Kyaw Swar Myint		
	Dr. Ni Ni Aye		
	Dr. Tun Min		
	Dr. Kyi Lwin		
	Dr. Myat Min Tun		
	Dr. Sai Norngin		
	Dr. Myat Kyaw		

Informal consultation on therapeutic efficacy studies of antimalarial drugs in Greater Mekong Subregion , 30-9-09 to 2-10-09, Mandalay, Myanmar

Drug policy changes for treatment of uncomplicated falciparum malaria

Up to 2005 in selected areas
3-days ASU-MQ.

D0: ARS 4 mg/kg + MQ 15 mg/kg
D1: ARS 4 mg/kg + MQ 10 mg/kg
D2: ARS 4mg/kg

From 2005 countrywide
3-days A-L.

According to body weight

2008
3-days

1. **A-L (Coartem)**
2. **DHA & Pip**
3. **ASU-MQ**

Sentinel sites for monitoring of drug resistant malaria

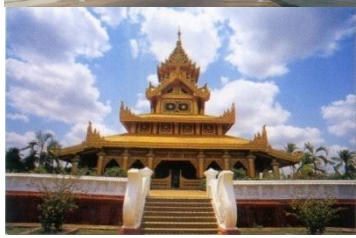
- 9 sites along the borders (2001)
- 6 sites (2008)
- Myanmar-Thailand 3 sites
- Myanmar-India 1 site
- Myanmar- China 1 site
- Myanmar- Bangladesh 1 site

Tentative sentinel sites for therapeutic efficacy surveillance (based on 2007 GMR Technical Consultation Meeting):

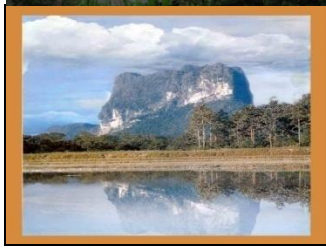
- (1) Thai-Myanmar border
- Tachileik (Shan east) – east
- Myeik (Tanintharyi division) - southeast
- Kawthaung (Tanintharyi division) – southeast
- Myawaddy (Kayin state) – east
  - *Tanphyuzayat (Mon State)*
- *(2) Myanmar-China border*
- Myit Kyina (Kachin state) – northeast
- Muse (Shan north) – east border
- (3) Mynamar-India border
- Tamu (Sagaing division) - northwest
- Kalay (Chin state) – west
- (4) Myanmar-Bangladesh border
- Butheedaung (Rakhine state) – west
- (5) Bago division
- (6) Chaung Gyee (Ta Beik Kyin township, Mandalay Division)

Sentinel sites are selected taking into consideration of the following factors:

- Distribution of malaria treatment failures reported by the health information system
- Epidemiology of malaria, especially intensity and seasonality of transmission
- Population mobility and migration (especially in border areas)
- The logistics for drug distribution






Methods

- **Standard WHO Drug Sensitivity Tests (7 days, 28 days tests) were done by assessing parasite count on Day 0, 2,7,14,21 and 28 days (Up to 2001)**

- **Therapeutic Efficacy Test (14 days)**

  By assessing parasite count , body temperature, Hb level and other clinical parameters)

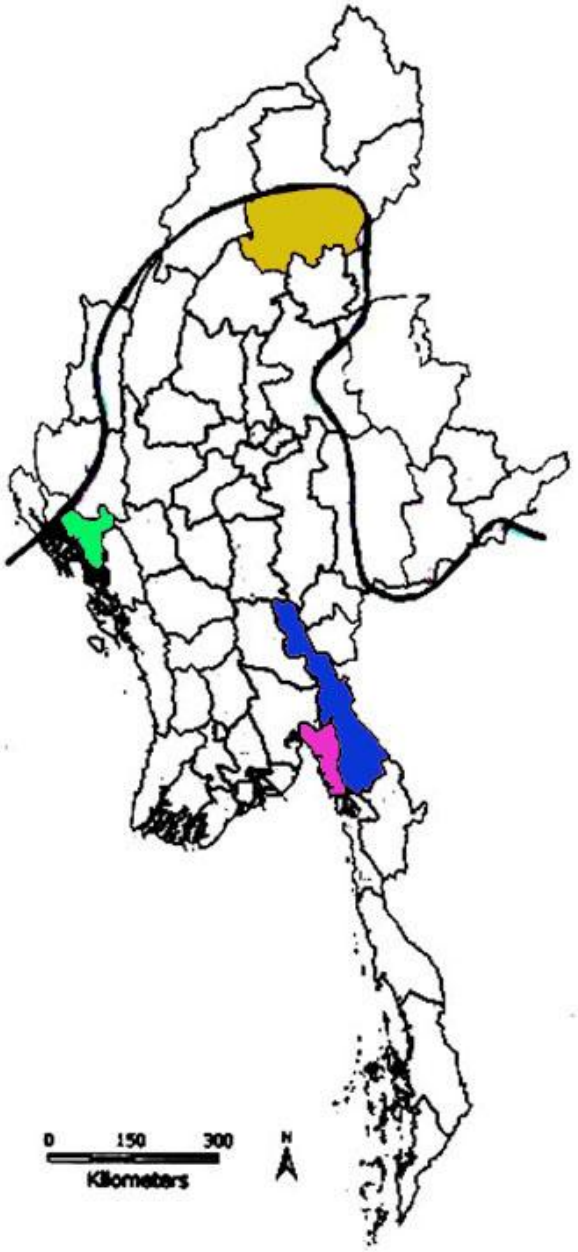
- **Therapeutic Efficacy Test (28 days)**

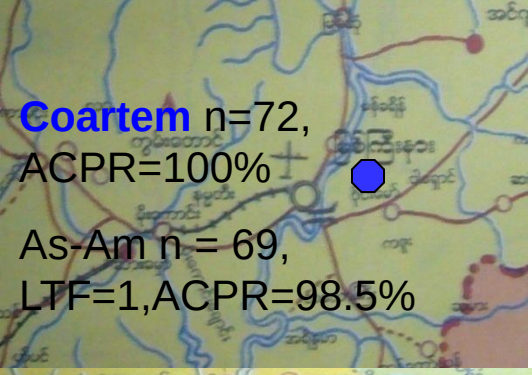
  Since 2004 when Inter-country WHO Training on Therapeutic Efficacy Studies was held in Yangon

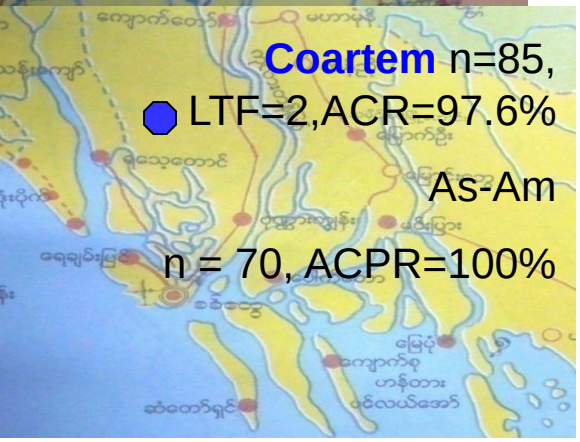
Drug efficacy monitoring in 2007

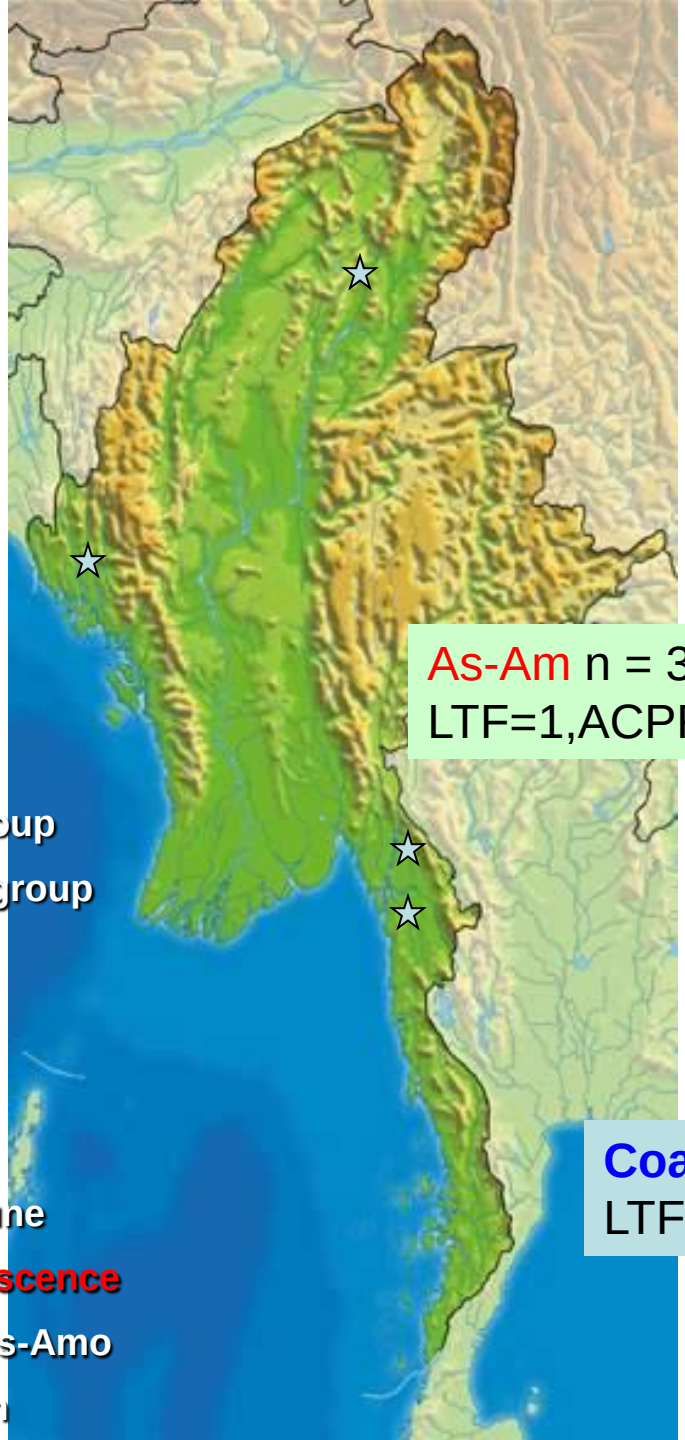
Therapeutic efficacy and safety studies of a Artemether-lumefantrinere and artesunate-amodiaquine regimens for the treatment of uncomplicated falciparum malaria have been carried out in 4 sentinel sites: Yakhine,Kachin,Kayin, and Mon States in Myanmar

4 Sentinel sites in 2007







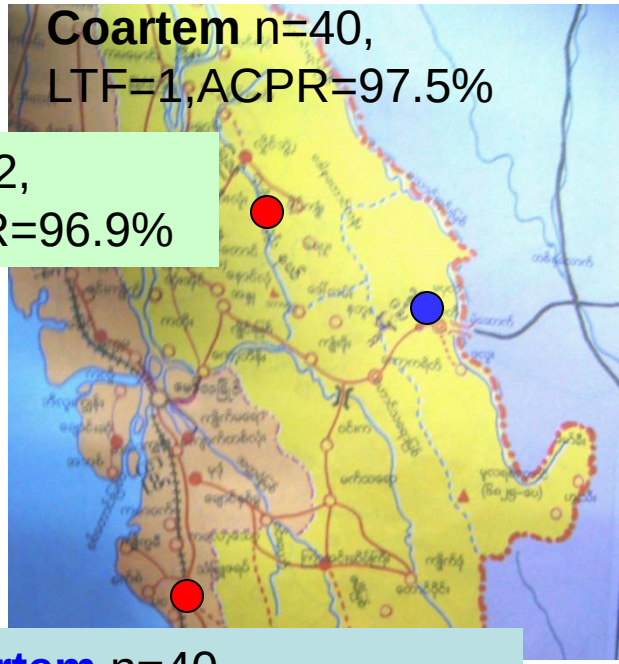


Kachin State

Yakhine State

Kayin State

Mon State



As-Am n = 32,
LTF=1,ACPR=96.9%

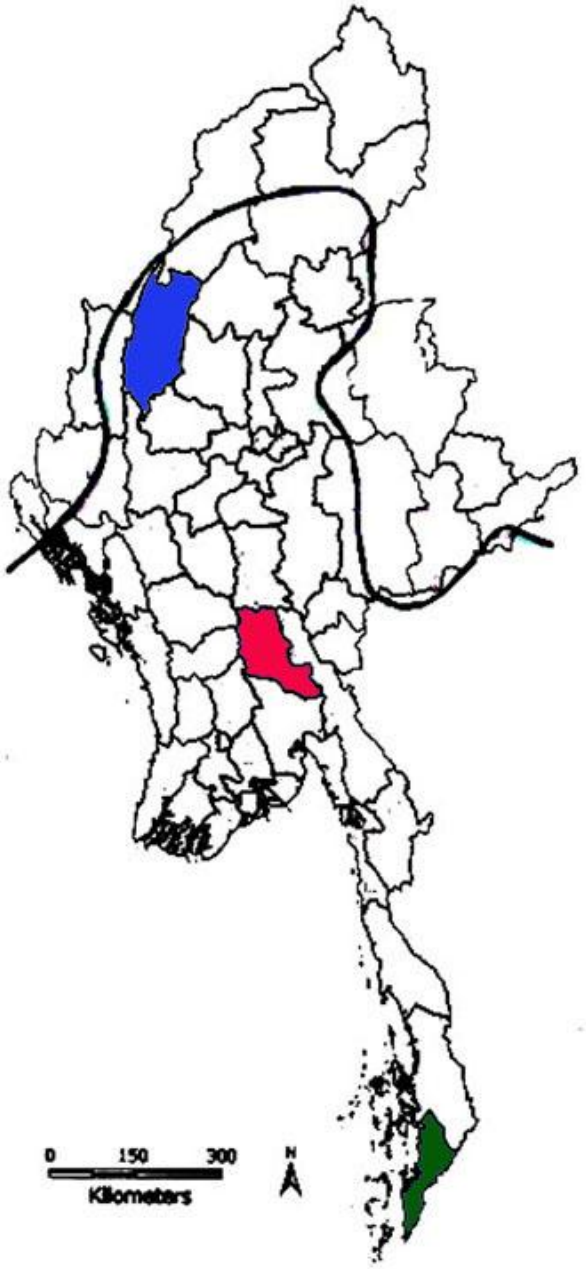
Coartem n=40,
LTF=2,ACPR=95.0%

As-Am n = 45,

LTF=1, ACPR=97.8%

- Totally 282 cases in Coartem group
- 227 in artesunate-amodiaquine group
- no ETF case.
- well tolerated
- no side effect
- 5 recurrence cases in Coartem
- 3 cases in Artesunate-amodiaqune
- molecular analysis true **recrudescence**
- 1 each from Kayin and Mon to As-Amo
- 2 from Tanphyuzayat to Coartem

On going TES in 2009



National Malaria Workshop 11-12 March 09

Refresher course on malaria microscopy 18-22, May 09

P. falciparum	Coartem			Duo-Cotecxin		
	Recruit	28days finished	Clinical failure	Recruit	28days finished	Clinical failure
Shwe Kyin	88	80	3	72	72	0
Kawthaung	85	80	7	81	81	5

P. vivax	Recruit	28days finished	Clinical failure
Shwe Kyin	67	66	0
Kawthaung	60	60	10

Table2. Summary of efficacy results 2009

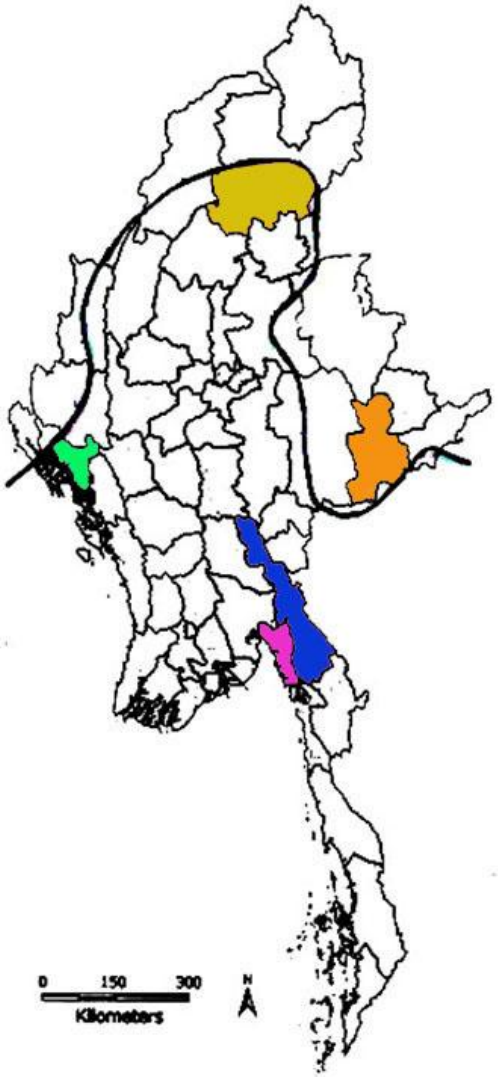
	Coartem		Duocotexin	
	Shwe Kyin	Kawthaung	Shwe Kyin	Kawthaung
[redacted]			72	81
			0	0
			48.6	67.9
			8.3	34.5
			2.7	13.5
			100	93.8
			0	0
			0	2
			0	2

Challenges linked to TES protocol implementation

- Many malaria patients have already taken artesunate tablets as self medication
- Malaria incidence is decreasing generally (deforestation)
- Late coming of monsoon season and low rain fall in Upper Myanmar causes few malaria patients eligible for TES
- Need to start early (in May) in Lower Myanmar

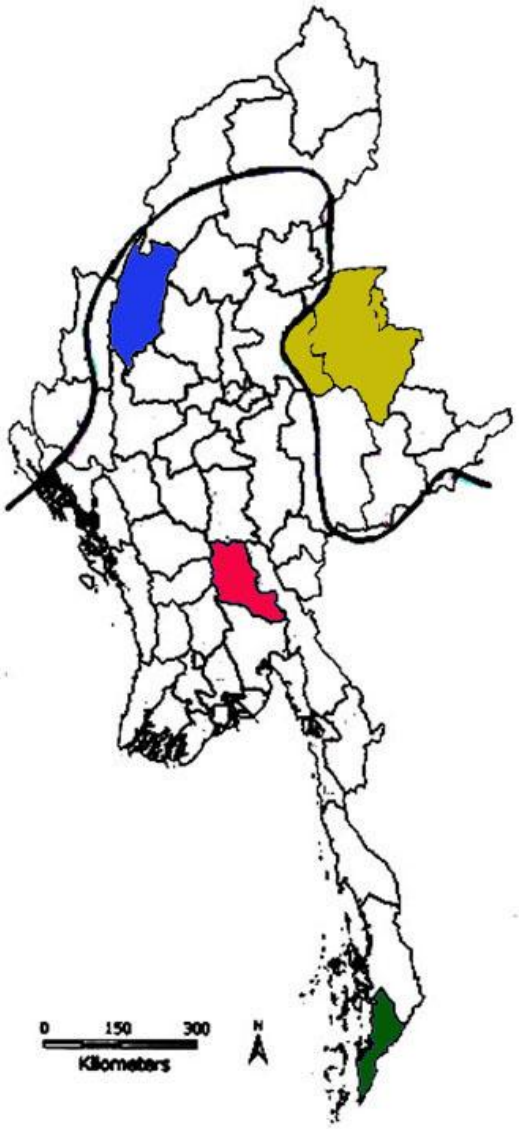
- **Need to strengthen laboratory diagnosis.- training of lab. tech.**
- **Adherence of new antimalarial treatment policy.- training, guideline, provision of adequate supply of drugs.**

POA for 2010



- **Sentinel sites 6**
- **a. Myit Kyi Nar (Myanmar-China)**
- **b. Punna Kyun (Myanmar-Bangladesh)**
- **c. Mya Wady (Myanmar-Thailand)**
- **d. Than Phyu Zayat (Myanmar-Thailand)**
- **e. Kyaing Tone (Myanmar-Thailand)**
- **f. Kawthaung (Myanmar – Thailand)**
- **Antimalarials to be tested**
- **A-L , DHA& PPQ for P.f. and CQ for P.v**

POA for 2011



- **Sentinel sites 4**
- **a. Kalay-Tamu (Myanmar- India)**
- **b. Shwe Kyin (Central Myanmar)**
- **c. Kawthaung (Myanmar-Thailand)**
- **d. Mu-se district (Myanmar-China)**

- **Antimalarials to be tested**
- **A-L , DHA & PPQ for P.f. and CQ for P.v.**

CONCLUSIONS

Coartem is still effective for treatment of uncomplicated falciparum malaria while DHA & Pip combination should also be reserved as a second line

Insecticides Resistance Monitoring in Myanmar

Current Insecticides used in Myanmar

Insecticide	Chemical Type	Dosage of a.i (g/m^2)	Duration of effective action (months)	Insecticide action	Toxicity:oral LD_{50} of a.i for rates (mg / kg body weight)
Alpha-cyper methrin (Fendona)	PY	0.02-0.03	4-6	Contact	79
DDT	OC	1-2	6 or more	Contact	113
Deltamethrin	PY	0.01-0.025	2-3	Contact	135
Etofenprox (Vectron) (Residex)	PY	0.1-0.3	3-6 or more	Contact	> 10,000
Malathion	OP	2	2-3	Contact	2100
Permethrin	PY	0.5	2-3	Contact	500
Lambda - cyhalothrin (ICON)	PY	0.02-0.03	3-6	Contact	56

Insecticide Used in Susceptibility Test

- DDT 4%

-Malathion 5 %

-Deltamethrin 0.05 %

-Permethrin 0.025 %, 0.25 %, 0.75%

Vector Species in Myanmar

- *A.minimus*] - primary vectors
- *A.dirus*] - Associated with Hyper endemic
- *A.annularis* - Local vector –only in Rakhine
- *A.sundaicus* - Cause sporadic epidemic
- *A.philippinenesis*]
- *A.culicifacies*].
- *A.sinensis*] suspected
- *A.jeyporiensis*] (When abundant capable transmitting
- *A.aconitus*] malaria)
- *A.maculatus*]

Resistance Management

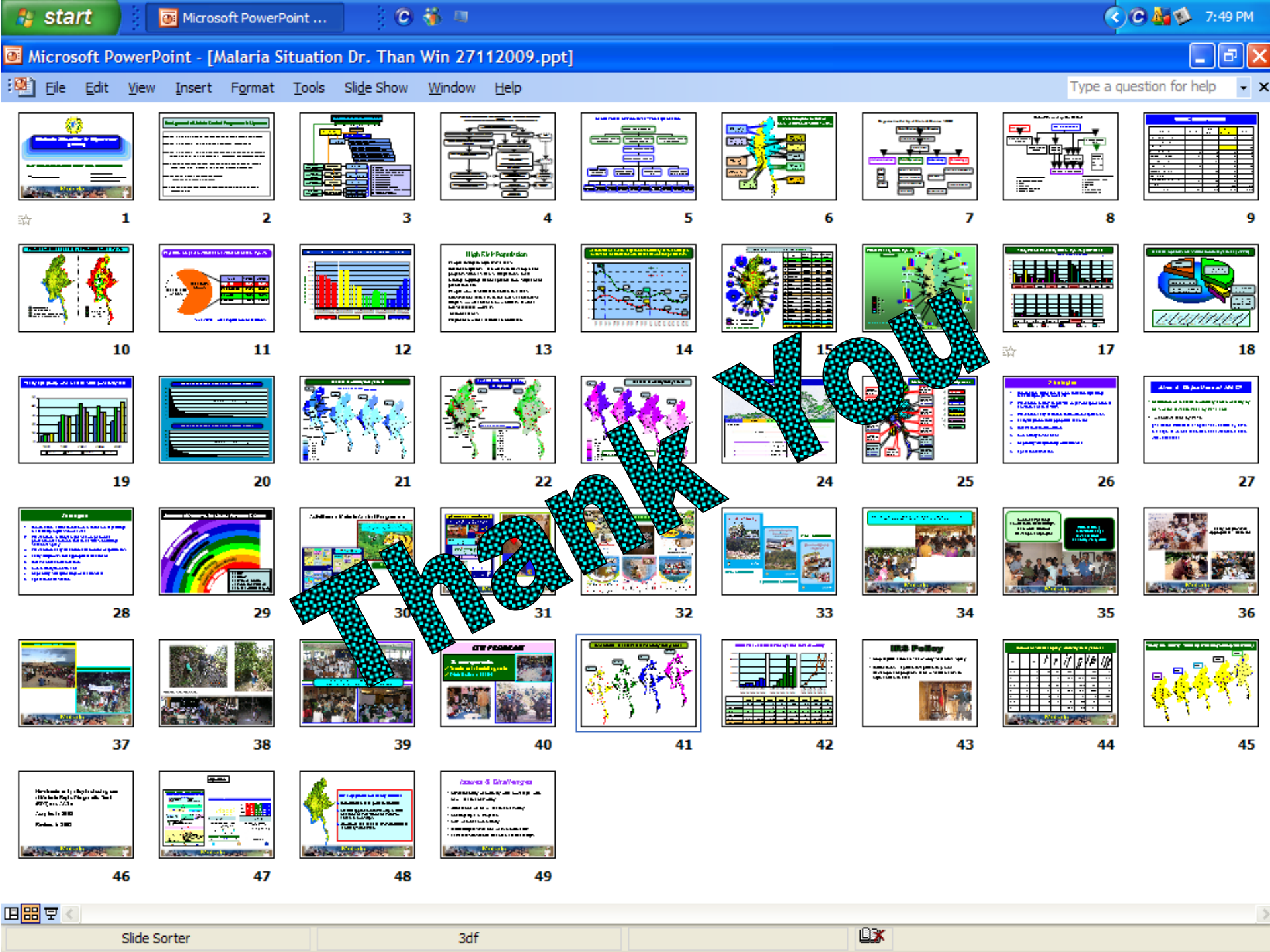
- Insecticide usage in selected area priority (high endemic, outbreak)
- Monitoring and evaluation during application
- Rotation insecticide use periodically
- Detection of susceptibility status of vectors was done by WHO standard.
- Monitoring resistance status of applied insecticides was done in several locations.

Review of existing data on Insecticide Resistance in Myamar,2009

Locality	Insecticide	Species	Motality	Susceptibility Status
Ywa-gone Village, Sittwe Township, Rakhine State	**DDT 4%**	**An. annulais** **An. sundaicus** **An. barbirostris**	**0.0%** **90.9%** **50%**	**R** **S** **R**
	Permethrin 0.75 %	**An. annularis** **An. barbirostris**	**100%** **98.85 %**	**S** **S**
	Permethrin 0.25 %	**An. sundaicus** **An. barbirostris**	**80.6 %** **91.04 %**	**V** **S**
	Permethrin 0.25 %	**An. barbirostris**	**0.0%**	**R**
	Malathion 5%	**An. barbirostris**	**100%**	**S**
	Deltanethrin 0.05 %	**An. barbirostris**	**100%**	**S**
Kwan-taung village, **Ponnar Gyun Township Rakhine State**	**DDT 4%** **Malathion 5%** **Permethrin 0.025 %** **Permethrin 0.75 %** **Deltamethrin**	**An. sundaicus** **An. sundaicus** **An. sundaicus** **An. sundaicus** **An. sundaicus**	**100%** **100%** **100%** **100%** **100%**	**S** **S** **S** **S** **S**

Bio - assay Test (2009)

Locality	ITN	Species	Motality
Ywa-gone Village, Sittwe Township, Rakhine State	CYC Bed - net (KO-TAB) Deltamethrin	An. barbirostris An. vagus	84.0 % 77.27 %
Kwan-taung village, Ponnar Gyun Township Rakhine State	CYC Bed-net (KO-TAB) (deltamethrin) (Dec. 2008)	An. sundaicus	100%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