- There are several key information collected for vivax malaria surveillance including case detection, focus intervention, management on mobile population, drug resistance, annual parasite incidence (API), annual blood examination rate (ABER), annual vivax incidence (AVI) and slide positive rate (SPR), feeding and resting behavior, human biting rate, human blood index, vectorial capacity, rainfall, temperature, humidity, and surface water.

The limitation of present surveillance system to detect vivax malaria in the Solomon Islands

- In Solomon Islands, repeated cross sectional studies were conducted in sentinel sites (seven villages), from 1993 to 2006, in Tashinboko area in Northeastern Guadalcanal, where the total population were approximately 300.
- The aim was to validate the information between the current passive case detection and active case surveillance in sentinel sites.
- Active case detection strategy was applied to measure the change of malaria trend and to validate the tools for active surveillance. The methods used in field active case detection were fever, splenomegaly by both palpable and ultrasonographic methods, and blood slide for malaria parasite examination.
- Field experiences indicated that the clinical judgment based on fever has very low sensitivity. Its sensitivity reduced from 0.37 to 0.08 while the parasite rates in 2 to 9 years old aged group reduced from 70% to 36%. However, its specificity is slightly varied, but at higher level, e.g. ranged from 0.83 to 0.98, except at the beginning of the study, in 1993, in which its specificity was 0.59.
- There is poor correlation between palpable splenomegaly or splenomegaly detected by ultrasonography and parasite rate. The sensitivity of splenomegaly detected by ultrasonography is similar to clinical judgment, but very poor for splenomegaly detected by palpable method.
- It concluded that fever and/or splenomegaly were no longer valid indicators to detect or monitor the vivax malaria in condition where the proportion of vivax malaria and falciparum malaria had been reversed, e.g. vivax malaria is predominant.

The overview of vivax malaria in Eastern Mediterranean Region

- In the Eastern Mediterranean Region, only nine countries are malaria endemic and three countries are in Africa, predominant falciparum malaria and six in Middle-East countries, of which four countries are vivax malaria predominant, namely, Pakistan, Afghanistan, Iran, and Iraq.
- It was estimated that 248 millions (48%) of EMR live in areas at risk of malaria transmission. The area under falciparum and/or vivax malaria transmission is approximately 89% while that of vivax malaria transmission is approximately 11%.
- The total reported cases in 2005 from the four vivax malaria predominant countries, Pakistan, Afghanistan, Iran, and Iraq, were 4,128,103 cases, in which

213,636 were parasitological confirmed and vivax malaria consisted of 77% of confirmed cases.

- There were also observed that other countries in the region, such as Bahrain, Qatar, Kuwait, Oman, UAE, and Jordan, reported the imported malaria cases with the total reported cases of 2,715 cases, in which 73% of cases were vivax malaria.
- The region had experiences in vivax malaria control, in Iran and Iraq. In Iran, while the control measures were not intensified, the trend of vivax malaria was gradually, but significantly, reduced from about 100,000 cases annually in 1991 to less than 20,000 cases in 2004. In Iraq, the control measures, two cycles of IRS, were highly effective. Before 1990, the total malaria reported cases were less than 10,000 cases. Due to civil unrest in 1992, the total reported cases were sky rocked to nearly 100,000 cases in 1994 and 1995. In response to this alarm situation, two cycles of IRS were applied with highly coverage, the cases were dropped to less than 5,000 in 1998 and continued to be lower after that period, e.g. less than 200 vivax cases reported in 2005; the country considers the possible elimination of vivax malaria.
- Despite the success lesson from Iraq, provided high IRS coverage, the trend of malaria in Iran was gradually decreased in the similar effort, e.g. high IRS coverage.
- There are still limited effective tools for controlling vivax malaria including diagnosis, treatment, surveillance, and intervention.

Minutes on the discussion of group 1 (diagnosis and treatment)

1. Effectiveness of microscopy is a problem of concern. Poor quality of microscopy leads to misdiagnosis of malaria including vivax malaria. So it is suggested microscopy and RDT be strengthened through establishment of quality control and quality assurance system at regional and national level. Both the competency and performance of microscopy and RDT should be assured through monitoring system of efficacy and validity of competency. External review organized by WHO is suggested too.
2. Staining for microscopy is one of the issues due to that some countries use staining agents such as J.S.B which is different from Geimsa staining. Study on it is proposed.
3. Attention should be paid to timely clinical diagnosis of malaria in different areas or strains in order to achieve EDPT as much as possible
4. Study on techniques on detection of merizoites and gametocytes are proposed due to the need of detection malaria infection in blood transfusion.
5. Current RDT in use is only good for detection of P. falciparum. So it is suggested that study on RDT that good for diagnosis of vivax malaria be paid attention.
6. Network in training on diagnosis and treatment of vivax should be established.
7. Sentinel sites for regular monitoring of sensitivity of P. vivax to chloroquine and primaquine using WHO guideline should be established and data collected should be directed to WHO for analysis. At meantime, the resistance or sensitivity criteria for primaquine should be established.

8. Proper dosage of primaquine for anti-relapse and criteria of relapse should be standardized through multi-center study.
9. Each country appointed a person to collect the data and other information on treatment efficacy and send them to WHO for analysis. Those people in the following countries are
    a. Indonesia: Dr Bangkit Hutajulu
    b. ROK: Dr Lim Chae Seung
    c. EMRO: Dr Hoda Youssef Atta
    a. DPRK: Dr Pak Mi Hwa
    b. China: Dr. Wang Jianjun
10. Severe cases of vivax malaria infection may be an area to look at.
11. Economic impact of malaria in SERO is planned to be conducted and economic impact of vivax burden on pregnancy is a topic too.

Minutes on the discussion of group 2 and 3 (diagnosis and treatment)

1. Studies on specification of An. Vectors to vivax are proposed.
2. Studies are needed on the examination of the impact of use of ITN on incidence of malaria parasite species.
3. IRS is one of the technique on countries with endophilic mosquitoes
4. It is recommended that WHO takes the leadership in vivax malaria network to strengthen the partnership of countries, and establish guidelines or/ standard ITN an IRS.
5. Cost-effectiveness analysis on ITN vs. IRS is proposed to be conducted. EMRO has the existing data.
6. Network for surveillance should be established and standardization of handbook for surveillance is proposed. Training in monitoring and analysis is also proposed.
7. Guidelines for all kinds of survey are needed and it is necessary to make the guidelines understood and used by countries.
8. One of the content in setting up of the network is identify collaborating centers. The inventory of the institutes available is like the following (may not exhausted). And it is suggested Prof Tang's Institute responsible for the inventory.
    a. National Institute of Parasitic Diseases, China CDC (Shanghai)
    b. Jiangsu Institute of Parasitic Diseases, Jiangsu Province, P.R. China
    c. AFRIM, Bangkok, Thailand (It is suggested that in Thailand the contact institute be Dr. Jeeraphat sirichaisinthop's due to ARIRM is an army institute of USA or go through MOPH, AFRIM could be a training center)
    d. Mahidol University, Bangkok, Thailand
    e. KNIH, KCDC, Republic of Korea
    f. Australian Army Institute, Australia
    g. PNG Institute of Medical Research, Papua New Guinea
    h. National Institute of Malaria Research, New Delhi, India
    i. Institute of Pauster, India
    j. Research Institute of Tropical Medicine, The Philippines
9. Each institute of the above should appoint a person as contact person and it is suggested the director of each institute be the contact person.

10. It is suggested that the criteria for outbreak be the Mean±2SD of the data of > 5 year reported in the outbreak reported area.
11. ACTmalaria is suggested to be the organization for training in such as lab diagnosis and general control of vivax malaria
12. It is suggested that a meeting be held next year to review the progress and the venue could be NIPD, China. Japanese MOH of Japan is a source for continuing financial support.
13. For researches, Both WPRO and SERO have TDR regular grants of up to $ 6000 each (in total $ 15, 000).
14. AFRIM is conducting studies on validation of LAMP and drug resistance with 100 – 200 –patients enrolled. The proposal for validation of LAMP is ready for The Philippines, Indonesia, DPRK and ROK.
15. Prof. Tang's Institute's would like to compose the proceedings of this meeting and it is suggested by Prof. Tang that complete papers of the presentations in this meeting be submitted to the proceeding if the author likes. And a special issue of the Chinese Journal of Parasitology and Parasitic Diseases for the papers of this meeting is planned and WPRO and SERO would provide final edition for it.

International Conference on Vivax Malaria in Aisa and Pacific Area

Recommendations

A multi-country, multi-region network covering vivax endemic countries in Asia and the Pacifics has been established to: (1) share information and experinces related P. vivax wpidemiology, diagnosis, treatment, prevention and surveillance; and (2) carry out collaborative operational research on vivax malaria.

The first meeting of the network made the following recommendation:

1 To develop evidence based recommendations for the diagnosis and treatment of vivax malaria for all countries and areas.

1-1 To establish a network of sentinel sites for monitoring the efficacy of current drugs and treatment regomens for vivax malaria following the recommended WHO protocol.

1-2 Validate existing treatment regimens being used for vivax malaria including defining an optimum treatment schedule for promaquine treatment.

1-3 Compile and disseminate data on the effectiveness of new drugs and drugs combination for the treatment of vivax malaria.

1-4 Review and validate information from the DPRK on use of primaquine prophylaxis as a control strategy for long incubation vivax malaria.

1-5 Review current policies and practices related to the need for G6PD testing prior to the administration of primaquine for the treatment of vivax malaria in Asia and the Pacific.

1-6 Support the establishment of a QA/QC system for malaria microscopy including both *P. falciparum* and *P. vivax*.

1-7 Support the development /identification of rapid diagnostic tests that can

effectively detect even low density *P. vivax* infections under field conditions.

1-8 Support the further development of a LAMP methods for the detection of *P. vivax* in laboratory setting.

1-9 Develop improved algorithms for the clinical diagnosis of vivax malaria in different settings.

1-10 To analyze the economic burden/impact of vivax malaria in various countries.

1-11 To support the development of a test that can effectively detect patients harbouring hyonozoites.

1-12 To establish a case definition of severe vivax malaria.

2 To Determine the effectiveness of current vector strategies in areas where vivax is predominat.

2-1 Carry out multi-country studies to determine therelative susceptibility of vectors for the transmission of *P. vivax*.

2-2 Review existing data and identify additional research that will measure the effectives of ITN and LLIN for the control of vivax malaria in different settings.

2-3 Evaluate the effectiveness of indoor residual apraying in vivax malaria areas.

2-4 Measure the cost effectiveness of ITN/LLIN compared to IRS for malaria control in areas where vivax malaria is predominant.

3 To develop the necessary surveillance tools and create networks for monitoring vivax malaria including the establishment of early warning system.

3-1 Support the development of surveillance guidelines for vivax malaria including use of new diagnostic tools(RDT and LAMP).

3-2 Establish specific surveillance indicators for vivax malaria including those

that can be used as an early warming system for detection of outbreaks of vivax malaria.

4 General Recommendations

4-1 An inventory of institutions and other partner organizations working on vivax malaria should be compiled. This should include the identification of focal points and a description of existing research projects and possible areas of collaboration.

4-2 An inventory of training needs related to vivax malaria should be compiled.

4-3 A web site should be established with general information on vivax malaria and information on the network.

4-4 The next meeting of the network should be organized in late 2008 to review the status of the network and progress made towards achieving the goals.

4-5 Additional funding partners should be identified for sustaing/expanding activities of the network.

4-6 The following institutes should be considered for membership in the Network:

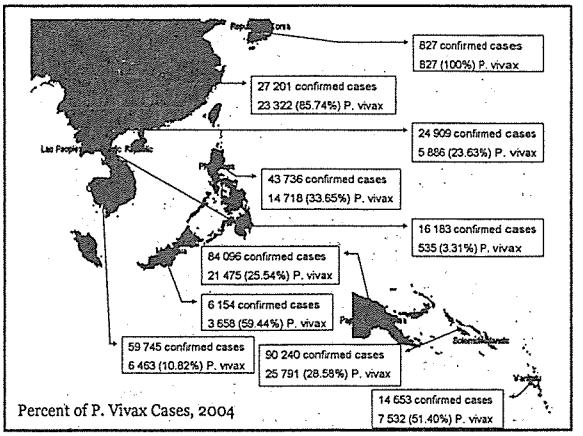
The National Institute of Parasitic Diseases , China CDC (China)
National Institute of Infectious Diseases (Japan)
Korea CDC / National Institute for Health (Republic of Korea)
Research Institute of Tropical Diseases (Philippines)
National Institute of Malaria Research (India)
and Other National Institutes in concerning countries

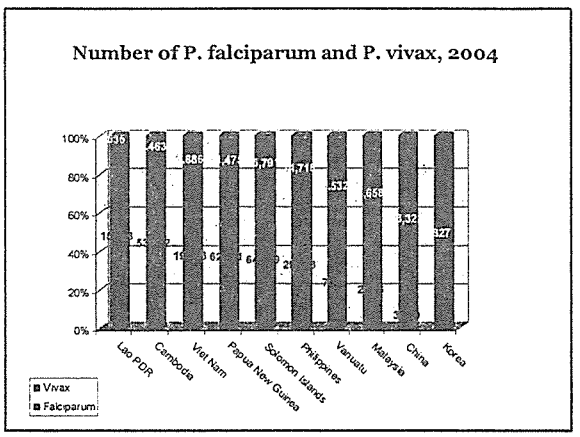
5 Other Partners

WHO / WPRO WHO / SEARO WHO / EMRO
ACT / Malaria and Other International Partners

Distribution of Vivax Malaria in Countries of the Western Pacific Region

Dr Kevin Palmer
Regional Adviser in Malaria, Other Vectorborne and Parasitic Diseases
Regional Office for the Western Pacific
Manila, Philippines





Country	Confirmed cases	P. Vivax	% of Vivax
Korea	827	827	100.00
China	27,201	23,322	85.74
Malaysia	3,153	1,858	58.94
Vanuatu	14,353	7,532	51.40
Philippines	43,736	14,718	33.65
Solomon Islands	90,240	25,791	28.58
Papua New Guinea	84,096	21,475	25.54
Viet Nam	24,909	5,886	23.63
Cambodia	59,745	6,463	10.82
Lao PDR	16,184	535	3.31

Vivax in East Asia

- define and better understand vivax in DPRK, ROK and China.
- define the unique way that East Asia vivax "hibernates" resulting in extremely long incubation intervals;
- efficacy of chloroquine, primaquine and artemisinin to treat cases,
- efficacy of mass treatment with chloroquine/primaquine,

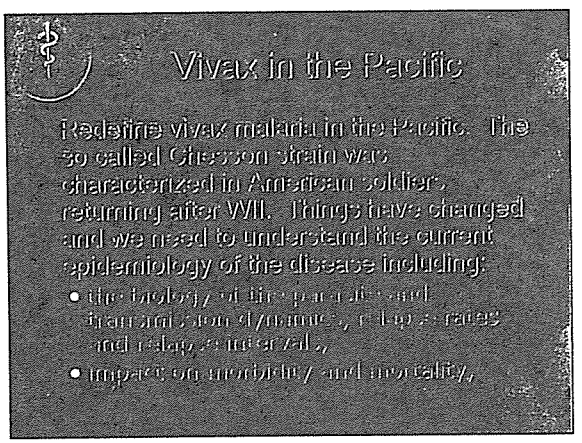
Vivax in East Asia

- G6PD distribution and characterization,
- modification of existing interventions to address the short transmission season,
- utility of rapid diagnostic tests,
- indicators for vivax control, sampling/survey methods,
- identification of vectors, efficacy of ITN and LLIN, possible role of indoor residual spraying, other vector control methods

Vivax in the Pacific

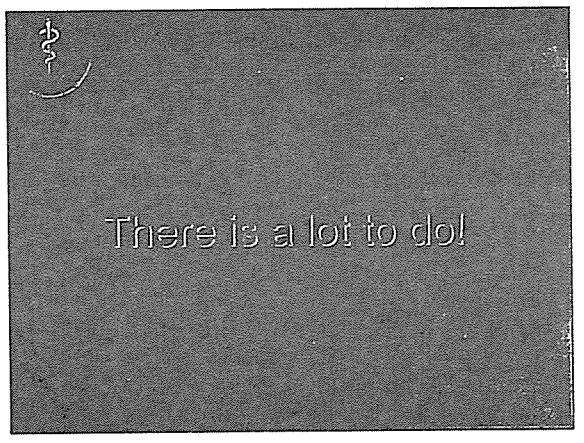
Redefine vivax malaria in the Pacific. The so called Chesson strain was characterized in American soldiers returning after WII. Things have changed and we need to understand the current epidemiology of the disease including:

- the biology of the parasite and transmission dynamics, relapse rates and relapse intervals,
- impact on morbidity and mortality,



Vivax in the Pacific

- efficacy of chloroquine and alternative antimalarials,
- safety of antimalarial treatments, especially in pregnancy, children and those with G6PD deficiency,
- ways to improve adherence,
- [illegible] and newer new G6PD screening tests,
- quality of rapid diagnostic tests,
- new algorithms for improved clinical diagnosis,
- improve treatment of severe cases,
- dynamic of factors, such as recurrences of CM and LBM.



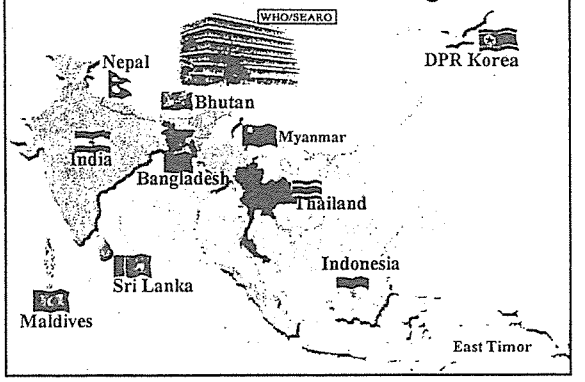
There is a lot to do!

Vivax malaria in SEA Region

Krongthong Thimasarn
Regional Adviser Malaria, WHO SEARO

Prepared for Interregional workshop on the control of vivax malaria in East Asia
16-18 January 2007
Shanghai PR China

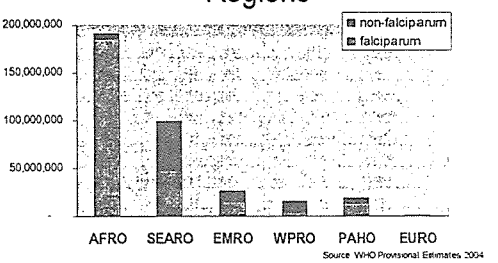
WHO South East Asia Region



Malaria burden in SEA Region

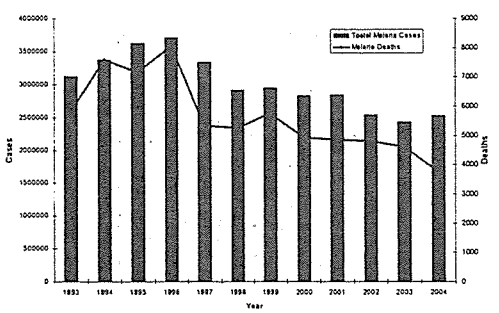
- All countries affected except Maldives
- Reported annually
  Cases : ~ 2.5 million
  Deaths : 4,500
- Estimations:
  Cases : 20 million
  Deaths : 100,000

Distribution of malaria cases by WHO Regions

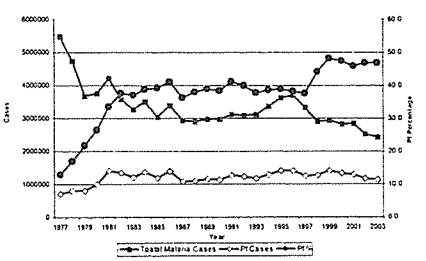


Source WHO Provisional Estimates 2004

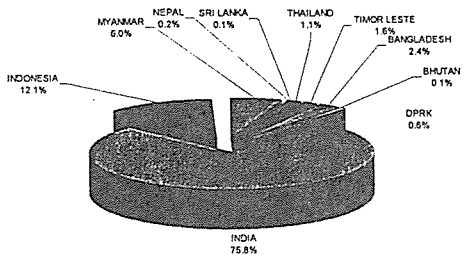
Trends of Reported Malaria Cases and Deaths in SEA Region, 1993-2004



Trends of Malaria in SEA Region, 1977-2003



Distribution of reported malaria cases in SEA Region, 2004



Total Reported Malaria Cases = 2,525,715

Malaria Situation in South-East Region, 2004

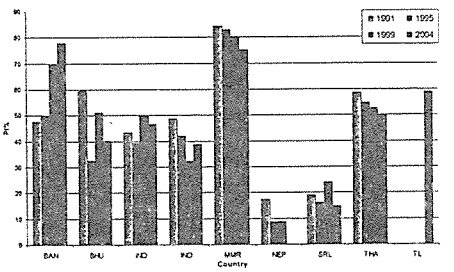
Country	Population (2004) million	Population at Risk of Malaria (million)	Confirmed malaria cases	No. probable malaria cases	No. of P vivax	Confirmed malaria deaths	% P. vivax
BANGLADESH	134.6	108.1	59,653	218,678	13,216	505	22.09
BHUTAN	0.71	0.64	2,870	7,500	1,588	5	55.05
DPRK	22.8	12.0	15,627	33,603	15,827	0	100
INDIA	1085.9	1044.7	1,916,258	15,000,000	1,024,504	949	53.38
INDONESIA	227.5	84.3	509,172	2,481,580	187,688	508	67.30
MYANMAR	54.3	38.5	152,070	602,693	37,647	1,902	24.69
NEPAL	25.9	16.5	4,637	46,087	3,892	0	83.93
SRI LANKA	19.4	4.2	3,720	5,000	2,721	1	73.15
THAILAND	63.5	43.7	20,690	35,000	13,319	230	49.90
TIMOR LESTE	0.84	0.8	39,163	218,342	16,158	66	41.26
SEAR	1585.81	1363.8	2,525,715	18,625,873	1,317,177	4246	52.16

* Estimated

MALARIA PROFILE OF SEA REGION, 2005

BANGLADESH	109031000	741638	0.69	48096	6.49	0.43	37754	5.09	78.50	481
BHUTAN	468000	60133	12.85	1823	3.03	3.9	833	1.42	46.74	5
DPRK	11901000	11315	0.1	6728	59.46	0.57	0	0	0	0
INDIA	1007189000	10336907	9.98	1808217	1.72	1.80	798346	0.08	44.16	940
INDONESIA	107785182	1215294	1.13	433326	35.66	4.02	127290	10.47	29.38	n.a
MYANMAR	39015349	424652	1.09	151508	35.68	3.88	114671	27	75.69	1707
NEPAL	19430000	185372	0.93	4962	2.68	0.25	879	0.47	17.71	10
SRI LANKA	4217377	973693	23.09	1640	0.17	0.39	133	0.01	8.11	0
THAILAND	64091550	2524788	3.93	27381	1.08	0.42	13311	0.53	48.61	71
TIMOR LESTE	833500	98994	11.88	42351	49.84	47.33	27318	3.29	64.50	71
SEAR	1,342,972,458	111,604,935	8.31	2,525,234	1.88	2.26	1120755	0.08	44.36	3285

Dynamics of P. falciparum in the SEA Region, 1991-2004



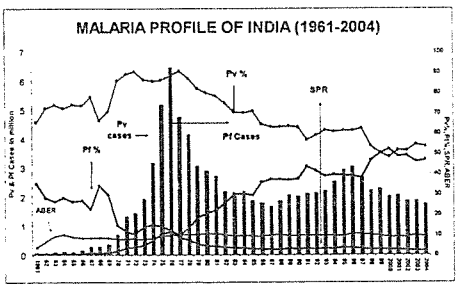
Vivax in SEAR countries

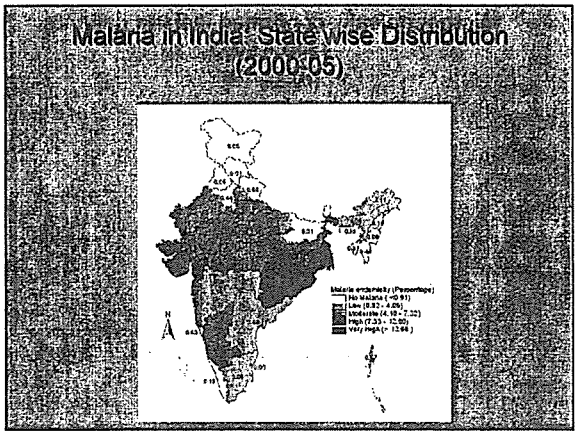
- India- highest burden of vivax in the Region
- Indonesia – resistance to Chloroquine
- Sri Lanka
  - no resistance reported
  - aims for malaria elimination
- DPR Korea- 100% vivax, long incubation period
- Nepal – border malaria

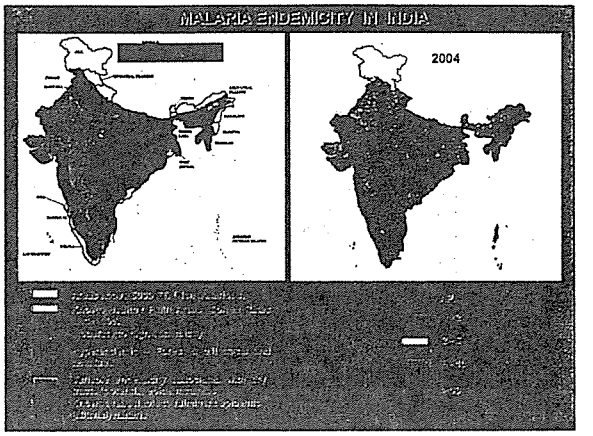
- Thailand – reversed ratios Pf/Pv following successful implementation of ACT

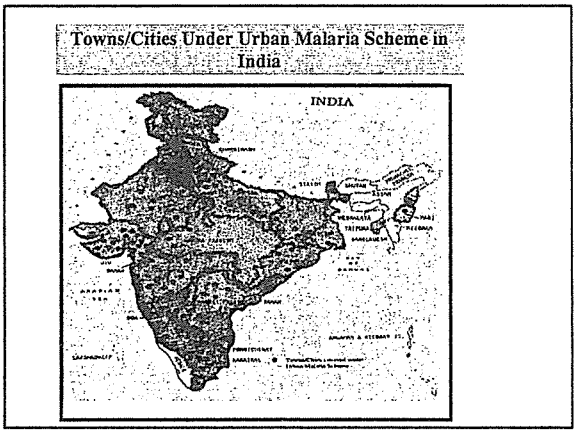
INDIA

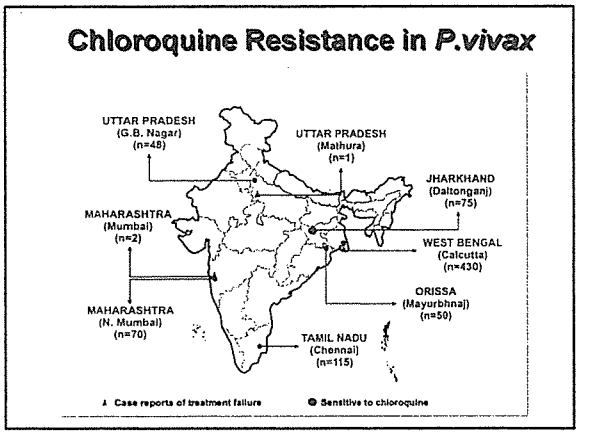
MALARIA PROFILE OF INDIA (1961-2004)

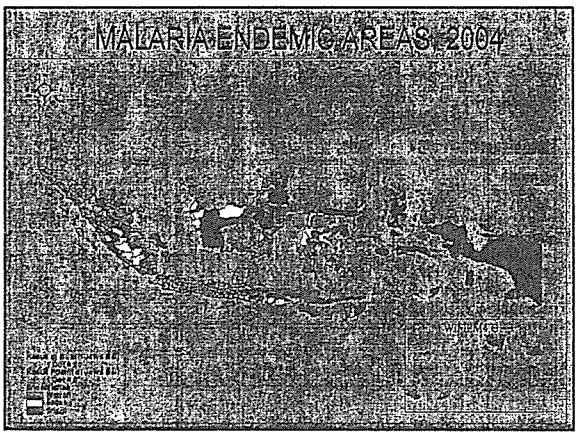


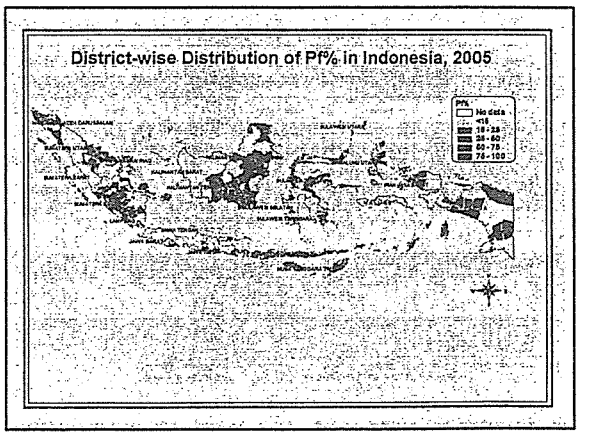

Malaria in India: State wise Distribution (2000-05)


MALARIA ENDEMICITY IN INDIA
2004

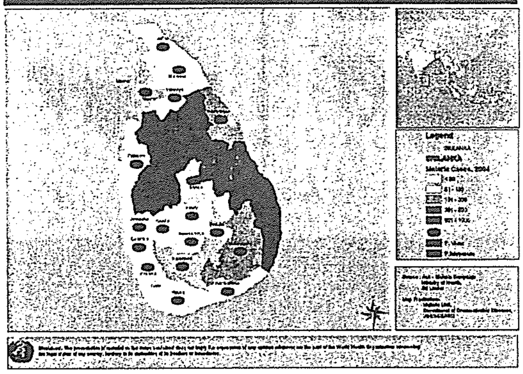

Towns/Cities Under Urban Malaria Scheme in India
INDIA


Chloroquine Resistance in P.vivax
UTTAR PRADESH (G.B. Nagar) (n=48)
UTTAR PRADESH (Mathura) (n=1)
JHARKHAND (Daltonganj) (n=75)
MAHARASHTRA (Mumbai) (n=2)
WEST BENGAL (Calcutta) (n=430)
ORISSA (Mayurbhnaj) (n=50)
MAHARASHTRA (N. Mumbai) (n=70)
TAMIL NADU (Chennai) (n=115)
Case reports of treatment failure
Sensitive to chloroquine

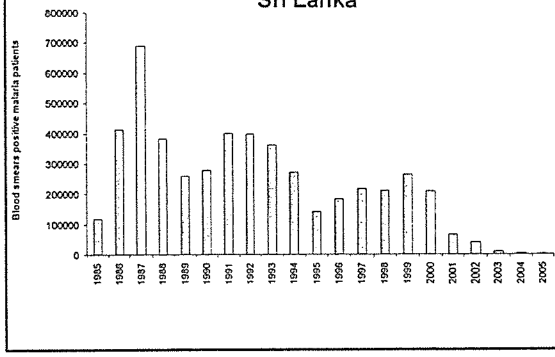

MALARIA ENDEMIC AREAS, 2004


District-wise Distribution of Pf% in Indonesia, 2005
Pf%
No data
<10
10 - 29
30 - 49
50 - 69
70 - 100

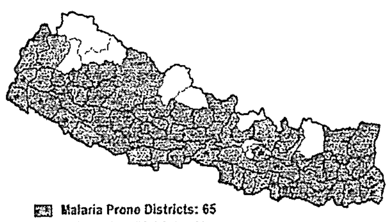
District-wise Distribution of Reported Malaria Cases and Malaria Species in Sri Lanka, 2004



Microscopically confirmed malaria patients 1985 – 2005 Sri Lanka

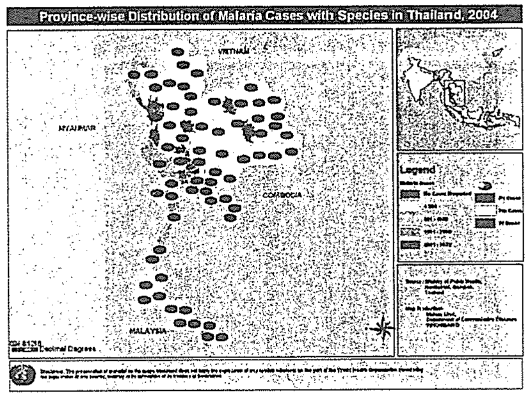


Malaria Endemic Districts of Nepal



Malaria Prone Districts: 65
Malaria Free Districts: 10
Districts with Major Malaria Transmission: 12

Province-wise Distribution of Malaria Cases with Species in Thailand, 2004



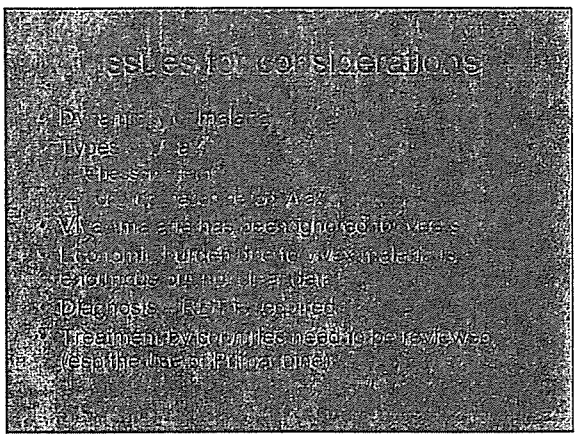
DRUG REGIMEN SEA REGION, 2004 (dosage for adults)

	WHO region	Country / area	Species	*P. falciparum* Uncomplicated unconfirmed	Uncomplicated lab-confirmed	Treatment failure	Severe malaria	Pregnancy treatment	Pregnancy prevention	*P. vivax* Chloroquine	Treatment failure	Primaquine
1	SEAR	Bangladesh	P, V	CQ or AQ	ASU+LUM	Q7	Q7	CQ or Q	-	CQ 25 mg/kg	CQ+SP or Q7	PQ for 5 days
2	SEAR	Bhutan	P, V	-	ASU+DOXY	Q7	ATM inj (3D)/Q7	Q/ASU (2nd & 3rd Trimester)	CQ	CQ 25 mg/kg		PQ 14 days
3	SEAR	DPR Korea	Vivax only	-	-	-	-	NA	NA	CQ 25 mg/kg		PQ 14 days
4	SEAR	Timor Leste	P, V	CQ+SP	SP	Q7	Q7			CQ 25 mg/kg		PQ 14 days
5	SEAR	India	P, V	CQ 10 mg/kg	CQ 25 mg/kg + PQ 45 mg (Stat)	SP+PQ 45 mg (stat)	Inj. Q 10 mg/kg, 7d or inj. ATM derivatives	CQ 10 mg/kg	CQ 5 mg/kg/wk	CQ 10 mg/kg + PQ 0.25 mg/kg for 5 days	CQ 25 mg/kg	PQ 5 days
6	SEAR	Indonesia	P, V	CQ+PQ	ASU+AQ	SP	Q7	CQ	CQ	CQ 25 mg/kg	Q7	PQ 5 days
7	SEAR	Maldives	P, V	CQ	CQ 25 mg/kg + PQ for 5 days	M, SP		-	-	CQ 25 mg/kg	M, SP	PQ 14 days
8	SEAR	Myanmar	P, V	ASU+MEF	ASU+MEF or ATM+LUM	ASU+DOXY7/T7 or Q7	Inj. ATM/ASU 7 days +DOXY7/T7/CLIN7	Q7+CLIN7 1st trimester ASU+CLIN7 2-3 trimester	CQ but routinely not recommended	CQ 25 mg/kg		PQ 14 days
9	SEAR	Nepal	P, V	CQ+PQ	SP+PQ	Q7	Inj. Q 10 mg/kg, I.V. infusion 8 hrly T7	CQ		CQ 25 mg/kg	-	PQ 5 days
10	SEAR	Sri Lanka	P, V	CQ+PQ	CQ+PQ (stat)	SP 1500 mg + PQ 45 mg (stat)	Inj Q 10 mg/kg I.V. infusion 8 hrly switch to oral Q when appropriate	CQ or Q [illegible] CQ is used as prophylaxis	CQ 5 mg/kg/wk	CQ 25 mg/kg	-	PQ 5 days or 75 mg
11	SEAR	Thailand	P, V	-	MEF+ASU (2d)	Q7 T7	Q or ASU	Q7	-	CQ 1500 mg base over 3 days	-	PQ 14 days

Note: M=Mefloquine Q=Quinine CQ=Chloroquine PQ=primaquine T=Tetracycline ASU=Artesunate ATM=Artemether ATM=Artesther
(25 mg/kg over 3 days) (45 mg, single dose) (or 15 mg/kg/day) T7=Tetracycline 7 days SP=Sulfadoxine + pyrimethamine

First Report of Drug Resistant Malaria in SEAR

Countries	*P. falciparum* CQ	SP	MEF	QN	*P. vivax* CQ
Bangladesh	1970	1985			
Bhutan		1985	1990		
India	1973	1979	1986		1991
Indonesia	1973	1979			1991
Nepal	1972	1997			
Myanmar	1969	1986	1997		1993
Sri Lanka	1984				
Thailand	1962	1984	1990		


Issues for considerations


THANK YOU!

International Workshop on Vivax Malaria in Asia and Pacific Area – 16-18 January 2007

Overview of Vivax Malaria in EMR

Dr Hoda Atta
WHO/EMRO

World Health Organization

Malaria burden in the Eastern Mediterranean Region

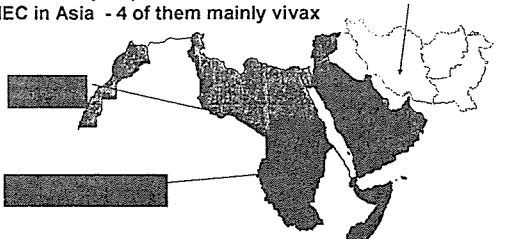
Malaria is still a PUBLIC HEALTH THREAT

- 2.7 million reported cases (clinical and confirmed) in 2005
- **10.5 million** estimated malaria cases/year in 2005
- 2.5 million estimated vivax cases
- 59 000 total malaria deaths (WHR 04)

World Health Organization

Malaria in EMR countries

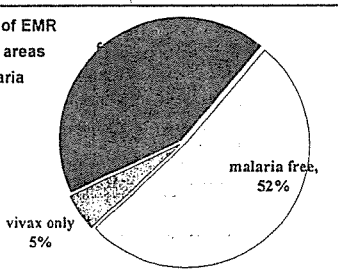
22 countries in EMR
7 countries in Africa -15 in Asia
9 malaria endemic countries
3 in Africa – mainly falciparum
6 MEC in Asia - 4 of them mainly vivax



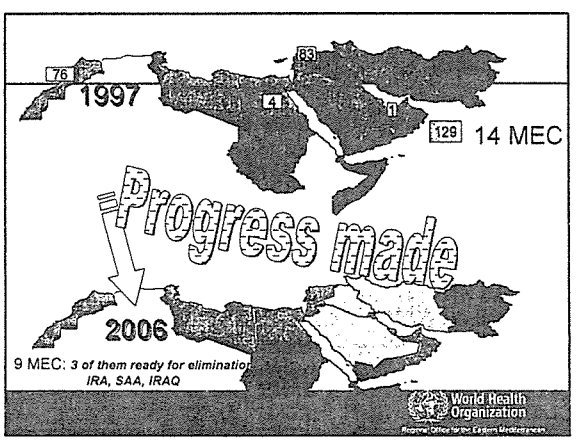
World Health Organization

Risk of malaria in the population of EMR

248 million (48%) of EMR population live in areas under risk of malaria transmission



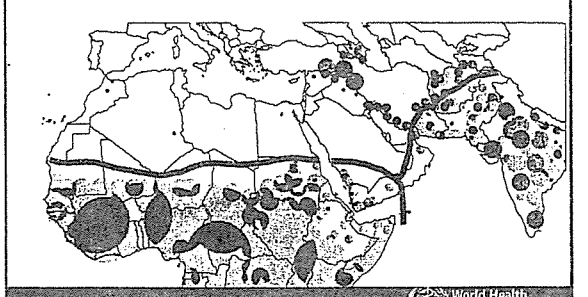
World Health Organization



World Health Organization

Distribution of malaria species in EMR (1998)

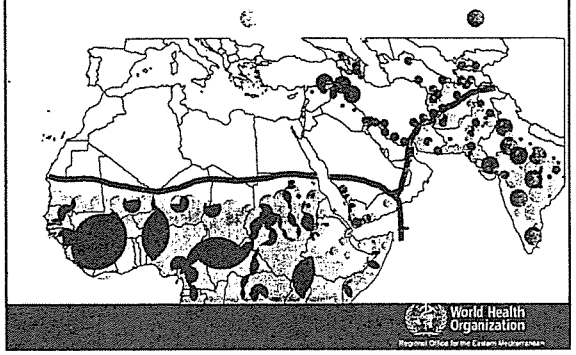
P.falciparum *P.vivax*



World Health Organization

Distribution of malaria species in EMR -2002

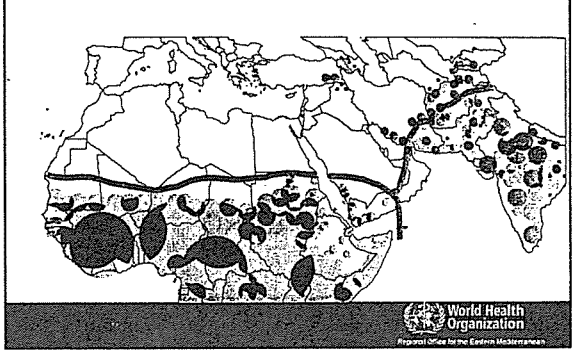
P.falciparum *P. vivax*



World Health Organization

Distribution of malaria species in EMR - (2005)

P.falciparum *P. vivax*



World Health Organization

Reported vivax cases in Asian countries with local transmission in EMR- 2005

	Total reported	Total confirmed	total vivax	%vivax
Afghanistan	215090	66798	61788	93
Pakistan	3894000	127825	85643	67
Iran	18966	18966	16690	88
Iraq	47	47	47	100
total	4128103	213636	164168	77

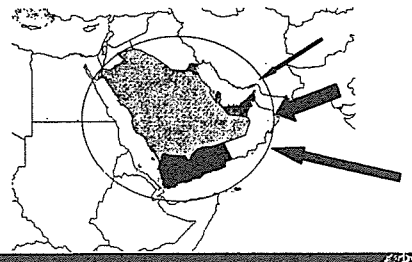
World Health Organization

Reported imported vivax cases (2005) in Asian countries which eliminated malaria

	Total imported	vivax	%
Bahrain	71	57	80
Qatar	168	72	43
Kuwait	302	165	55
Oman	544	391	72
UAE	1544	1220	79
Jordan	86	75	87
Total	2715	1980	73

World Health Organization

Imported malaria to Arabian Peninsula (mainly vivax)



World Health Organization

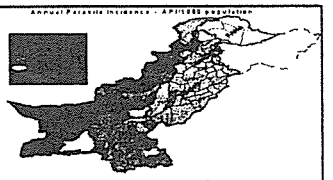
Vivax malaria in Pakistan

Province	Total confirmed	Vivax	%
Punjab	2,438	1,867	76.6
Sind	29,899	18,931	63.3
NWFP	20,102	17,988	89.5
FATA	16,221	13,803	85.1
Baluchistan	58,597	32,374	55.2
AJK	569	545	95.8
PAKISTAN	127,826	85,508	66.9

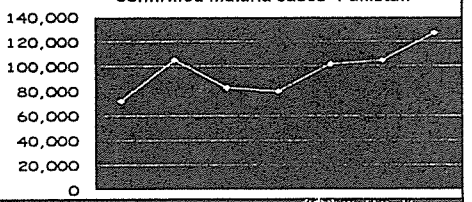
World Health Organization

Pakistan

Estimated cases 1.6 million
No progress
GFATM R2 grant cancellation

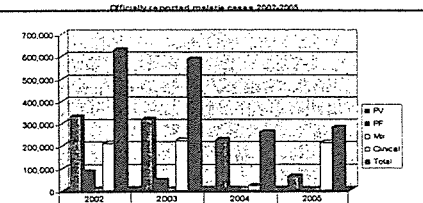


confirmed malaria cases -Pakistan



World Health Organization
Regional Office for the Eastern Mediterranean

Malaria cases in Afghanistan over 2002-2005



	2002	2003	2004	2005
PV	330,063	316,097	227,663	61,781
PF	63,783	44,243	9,212	5,017
Mx	745	0	3,513	0
Clinical	212,228	224,662	21,048	215,090
Total	626,839	585,002	261,456	281,888

% PV	80%	88%	95%	92%

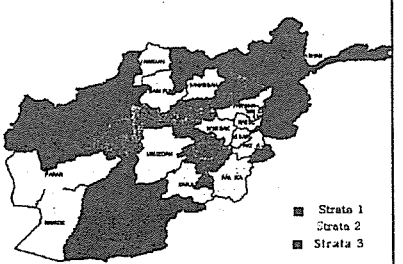
World Health Organization
Regional Office for the Eastern Mediterranean

Prevalence of parasitaemia RDTs - 7% (survey 2002)
Estimated 1.5 million malaria infections /year

National strategic plan 2005

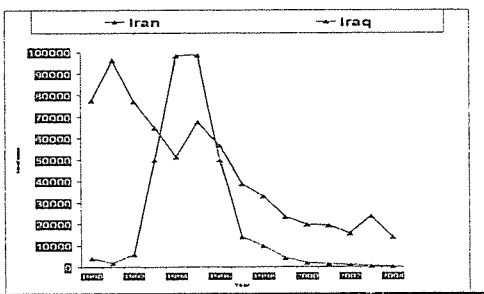
stratum 1 : 11m –highest priority for malaria control

Stratum 3 no malaria



World Health Organization
Regional Office for the Eastern Mediterranean

Reduction of malaria burden in Iran and Iraq



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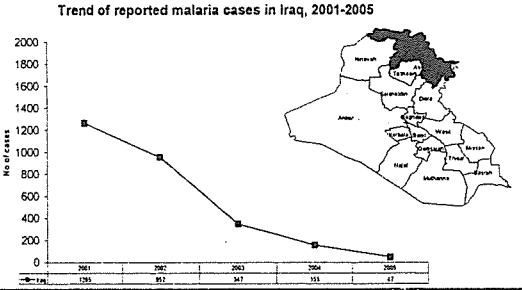
Regional Office for the Eastern Mediterranean

Approaching malaria elimination in Iraq (only vivax)

Trend of reported malaria cases in Iraq, 2001-2005



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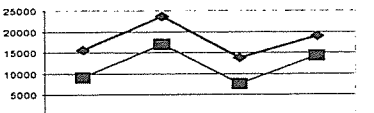
Malaria cases in Iran 2002-2005
88% vivax



	2002	2003	2004	2005
Total	15558	23562	13821	18966
Autochthonous	9122	17060	7602	14396

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Regional Office for the Eastern Mediterranean

Malaria elimination in Iran – preparatory phase - 3 600 000 pop at risk (5.3%)

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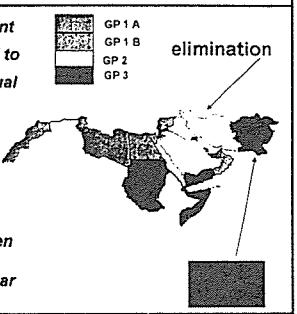
Regional malaria programme objectives

Group 1
- *To prevent re-establishment of malaria transmission in malaria-free countries and to eliminate residual foci of malaria in countries residual foci*

Group 2
- *To eliminate malaria and prevent its reintroduction*

Group 3
- *To halve the malaria burden (incidence, severity and mortality) by the end of year 2010*



World Health Organization

Challenges - management of vivax cases

- no information on CQ resistance / efficacy for vivax malaria –
- Diagnosis
  - Poor and limited services for malaria microscopy in AFG, PAK
  - No pre-qualified RDTs in vivax areas

World Health Organization

Challenges- radical treatment -Primaquine

Primaquine is recommended for Antirelapse treatment (14 day course) in confirmed infection with *P.vivax*

Challenges
- Compliance with 14 day course is poor
  (Pakistan is recommending PQ for 5days)

-Not to be used for children < 4 years and pregnant women

- Limited use of 14 day course in G6PD deficiency areas: use of primaquine 0.75mg/kg weekly for 8 weeks to patients with G6PD deficiency is recommended instead in some countries

World Health Organization

Challenges – detection of vivax cases

- Timely Detection of vivax cases in malaria free countries is a concern
  - –Mostly asymptomatic
  - –Occurrence of clinical relapses
  - –Poor epidemiological classification

World Health Organization

IRS in Countries in Asian countries with vivax malaria

Country	Targeted H/structures	Sprayed H/structures	Coverage (%)
Iran	441 709 388 653	413 912 362 024	94 93
Pakistan	52 1449 50 000	34 0358 48 000	65 36
Iraq	91 154 91 154	84 983 21 438	93 24
AFG	No IRS		

World Health Organization

Use of IRS –challenges

- Coverage below 80%
- wrong formulation of insecticides
- Poor performance
  - incorrect entomological profile
  - Lack of trained teams, scarcity of entomologists
  - spraying equipments are not up to specifications, Not properly maintained and stored
  - Weak malaria surveillance to guide timely application

World Health Organization

Future needs for Expansion of IRS.....

- Innovative approach of implementing IRS in a decentralized system – Pakistan
- Introduce IRS in complex emergency country- Afghanistan
- Support the activities for monitoring insecticide resistance
- developing entomological profile, risk mapping using GIS tools

World Health Organization

No. of ITNs/LLINs Distributed in 2005 in Malaria endemic countries

Country	Pop. Targeted	No. Distributed	Pop. Covered
Afghanistan	603 918????	201 306	?????
Pakistan	???????	2 000	????

Coverage in AFG 16% ??

World Health Organization

The main issues in the implementation of ITNs/LLINs.....

- Need to scale up
- Data on coverage not available in many countries
- Countries are unable to estimate population targeted

World Health Organization

Information Gap / Research needs

- Efficacy of ACTs in vivax malaria
- New drugs/regimen for radical treatment for better compliance
- information on prevalence of G6PD
- screening tools for G6PD deficiency
- Sensitive approaches for screening/ early detection of imported vivax cases (majority are asymptomatic)
- Reliable , RDTs suitable to field conditions
- Impact of vivax malaria in pregnancy
- Developing entomological profile and risk stratification for AFG, PAK

World Health Organization

Thank you

World Health Organization

Overview of vectors of *vivax* malaria in Asia and South Pacific area

Dr Jeffrey Hii,
Malaria Scientist
WHO/CLO Solomon Islands

International Workshop on Vivax Malaria in Asia and Pacific Area
Shanghai, 16-18 January 2007

World Health Organization

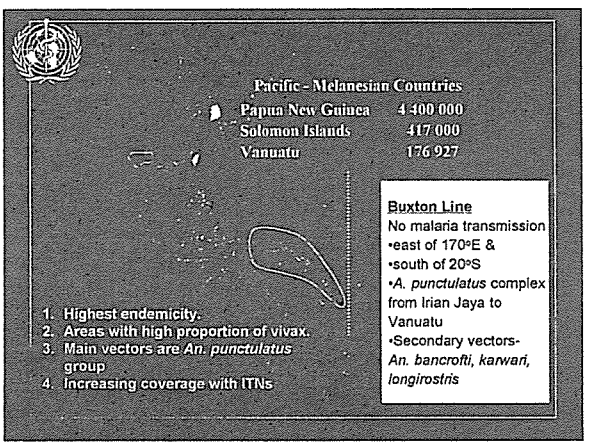
Major geographic regions

Regions	Zoogeographic region
Southwest Pacific & Australia	Australasian
Tropical East Asia	Oriental
Northeast Asia	Palearctic

Major zones of malaria & their vectors, after Service 1993

Zone	Area covered	Primary vectors	Secondary vectors
Indo-Chinese Hills	A triangular area including the Indo-Chinese peninsular, the north western fringe beyond the Tropic of Cancer	*An. dirus* *An. minimus* *An. fluviatilis*	*An. culicifacies* *An. annularis* *An. nigerrimus* *An. jeyporiensis* *An. maculates*
Malaysian	Most of Indonesia, Malaysian peninsula, Philippines & Timor	*An. campestris* *An letifer* *An. nigerrimus* *An. aconitus* *An. donaldi* *An. balabacensis* *An. dirus* *An. minimus* *An. flavirostris* *An. leucosphyrus* *An. maculatus* *An. subpictus* *An. sundaicus* *An. ludlowae*	*An. whartoni* *An. jeyporiensis* *An. mangyanus* *An. philippinensis*

Zone	Area covered	Primary vectors	Secondary vectors
Chinese	Largely the coast of China, Republic of Korea, Taiwan and Japan	*An. anthropophagus* *An. sinensis*	***An. dirus*** *An. jeyporiensis* *An. pattoni*
Australasian	Northern Australia, Papua New Guinea & the islands east of it to about 175° E of Greenwich except for the malaria-free zones of the south-central Pacific	*An. farauti* *An. koliensis* *An. punctulatus*	*An. bancrofti* *An. karwari* *An. subpictus*



Biology & behavior of *An. farauti* (after Meek 1999)

Anopheles species	Resting location	Feeding time / location	Host preference	Flight range	Breeding sites	Longevity
Coastal areas						
farauti complex (8 sibling species; 7 spp in PNG)	Mainly outdoors	All night, peak 7-9 pm h, out & in	Man & Domestic animals	1-2 km	SP ground pools, but sometimes containers, brackish-water tolerant	Variable

Transmission characteristics:
1. Vanuatu, 1993: 0.06% Pf sporozoite rate (1696 Af ss) – Fanafo (167° 6'E 15° 24' S); no vivax sporozoites detected (Williams et al 1995)
2. Solomon Is: sporozoite rates in permethrin ITN (0.07% Pf; 1.7% Pv); DDT sprayed area (0.21% Pf; 0.11% Pv); untreated area (0.6% Pf, 0.32% Pv) n=50,020 (Hii et al., 1988)
3. PNG: 0-5.5% (68,458 Af sl) – Madang area (Burkot et al 1998)
4. Vivax CS phenotypes: Pv210 and Pv247 variant