Report of the 14th South-West Pacific Malaria Meeting

Madang, Papua New Guinea
9-11 October 2007
Report of the
14th South-West Pacific Malaria Meeting

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NOTE

The views expressed in this report are those of the participants in the 14th South-West Pacific Malaria Meeting and do not necessarily reflect the policies of the Organization.

This report has been prepared by the World Health Organization Western Pacific Region for governments of member States in the Region for those who participated in the 14th South-West Pacific Malaria Meeting, held in Madang, Papua New Guinea from 9 to 11 October 2007.
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<td>AAMI</td>
<td>Australian Army Malaria Institute</td>
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<tr>
<td>ACD</td>
<td>Active case detection</td>
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<td>ACT</td>
<td>Artemisinin-based combination therapy</td>
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<td>ACTMalaria</td>
<td>Asian Collaborative Training Network on Malaria</td>
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<td>ACPR</td>
<td>Adequate clinical and parasitological response</td>
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<td>ADB</td>
<td>Asian Development Bank</td>
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<td>ADR</td>
<td>Adverse drug reactions</td>
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<td>AIARC</td>
<td>ACTMalaria Information Resource Center</td>
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<td>ANC</td>
<td>Antenatal clinics</td>
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<td>AC</td>
<td>Amodiaquine</td>
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<td>AusAID</td>
<td>Australian Agency for International Development</td>
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<td>AQ</td>
<td>Amodiaquine</td>
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<td>AZ</td>
<td>Azithromycin</td>
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<td>CMBS</td>
<td>Cambodia Malaria Baseline Survey</td>
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<td>CNM</td>
<td>National Malaria Center, Cambodia</td>
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<td>CQ</td>
<td>Chloroquine</td>
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<td>DG</td>
<td>Director General</td>
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<td>DHS</td>
<td>Demographic and Health Survey</td>
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<td>DRA</td>
<td>Drug Regulatory Authority</td>
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<td>DWU</td>
<td>Divine Word University, Papua New Guinea</td>
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<td>EDAT</td>
<td>Early Diagnosis and Treatment</td>
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<td>GF</td>
<td>Global Fund to Fight AIDS, Tuberculosis and Malaria</td>
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<td>GMP</td>
<td>Good Manufacturing Practice</td>
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<td>GMP</td>
<td>WHO Global Malaria Programme</td>
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<td>GMS</td>
<td>Greater Mekong Subregion</td>
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<td>HIS</td>
<td>Health Information System</td>
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<td>HMIS</td>
<td>Health Management Information System</td>
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<td>HSSP</td>
<td>Health Sector Support Program</td>
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<td>HSS</td>
<td>Health system strengthening</td>
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<td>IRS</td>
<td>Indoor residual spraying</td>
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<td>IEC</td>
<td>Information, education and communication</td>
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<td>IMR</td>
<td>Institute of Medical Research</td>
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<tr>
<td>IPTp</td>
<td>Intermittent preventive treatment in pregnancy</td>
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<tr>
<td>ITN</td>
<td>Insecticide-treated nets</td>
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<td>IVM</td>
<td>Integrated vector management</td>
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<td>JICA</td>
<td>Japan International Cooperation Agency</td>
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<td>LLIN</td>
<td>Long lasting insecticide-treated nets</td>
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<td>MERG</td>
<td>Malaria Monitoring and Evaluation Reference Group</td>
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<td>MIP</td>
<td>Malaria in pregnancy</td>
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<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<td>MSH</td>
<td>Management Sciences for Health</td>
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<td>NAMRU</td>
<td>U.S. Naval Medical Research Unit</td>
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<tr>
<td>NGO</td>
<td>Non Governmental Organization</td>
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<tr>
<td>NIMPE</td>
<td>National Institute for Malaria, Parasitology and Entomology, Viet Nam</td>
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<td>NMCP</td>
<td>National Malaria Control Programme</td>
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<td>PacMISC</td>
<td>Pacific Malaria Initiative Support Centre</td>
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<td>PCD</td>
<td>Passive case detection</td>
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<td>PNG</td>
<td>Papua New Guinea</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>PSM</td>
<td>Procurement and supply management</td>
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<td>QA</td>
<td>Quality Assurance</td>
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<td>RAM</td>
<td>Rotary Against Malaria</td>
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<td>RBM</td>
<td>Roll Back Malaria</td>
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<td>RCT</td>
<td>Randomized control trial</td>
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<td>RDT</td>
<td>Rapid diagnostic test</td>
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<td>RITM</td>
<td>Research Institute for Tropical Medicine, Philippines</td>
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<tr>
<td>SIMTRI</td>
<td>Solomon Islands Malaria Training and Research Institute</td>
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<tr>
<td>SP</td>
<td>Sulfadoxine-pyrimethamine</td>
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<tr>
<td>SPC</td>
<td>Secretariat of the Pacific Community</td>
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<tr>
<td>STI</td>
<td>Sexually transmitted infections</td>
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<td>SWPMM</td>
<td>South West Pacific Malaria Meeting</td>
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<tr>
<td>TGA</td>
<td>Therapeutic Goods Administration, Australia</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>UPNG</td>
<td>University of PNG</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USP</td>
<td>United States Pharmacopeia</td>
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<tr>
<td>VBDCP</td>
<td>Vector Borne Disease Control Programme</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>WPR</td>
<td>WHO Western Pacific Region</td>
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<td>WPRO</td>
<td>WHO Western Pacific Regional Office</td>
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EXECUTIVE SUMMARY

Malaria remains a major public health problem in the three malaria-endemic Pacific Island countries: Papua New Guinea, Solomon Islands and Vanuatu. These countries are in the process of scaling up their malaria control programmes with the help of substantial grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GF), the Australian Agency for International Development (AusAID) and others. The recent announcement of the Pacific Malaria Initiative, a major initiative by AusAID to support and intensify malaria control in Solomon Islands and Vanuatu and later Papua New Guinea, has added up to the availability of more funds in the region. This in turn demands proper planning and coordination between National Malaria Control Programmes (NMCP), within and between countries, and with partner organizations, to achieve effective malaria control and elimination in selected areas.

From 9 to 11 October 2007, representatives from Papua New Guinea, Solomon Islands and Vanuatu, as well as partners, met in Madang, Papua New Guinea, to review the status of malaria in the south-west Pacific, to get updates on important technical issues and policies, to identify common problems related to scaling-up of malaria control and develop a framework for regional collaboration, and to look at the feasibility of eliminating malaria in selected countries and areas.

Updates on case management, antimalarial drug efficacy monitoring, quality assurance of rapid diagnostic tests (RDT) and microscopy, indoor residual spraying (IRS), long lasting insecticide-treated nets (LLIN), tools for surveillance, monitoring and evaluation, and the malaria elimination model of Aneityum Island, Vanuatu, were presented at the meeting. The identified major issues in the Region were: the lack of diagnostic facilities reaching the village level; increasing treatment failures to currently available treatment regimes; increasing possibility of substandard or counterfeit drugs being available; malaria in pregnancy being not adequately addressed; weak surveillance, monitoring and evaluation (M&E) systems; and inadequate human resources and capacity.

Major recommendations of the meeting were:

1. A regional RDT quality assurance system for after-procurement batch testing should be established.

2. A Pacific Malaria Drug Network should be established to deal with drug resistance and its monitoring, drug quality, procurement and supply management (PSM) and diagnostics issues.

3. The rollout of artemisinin-based combination therapy (ACT) should be started urgently.

4. Pregnant women should be a priority for NMCPs, and NMCPs should take effective action jointly with maternal and child health services (MCH) to provide early diagnosis and treatment (EDAT), free insecticide-treated bed nets/LLINs and information, education and communication (IEC); the effectiveness of intermittent preventive treatment in pregnancy (IPTp) should be assessed urgently.

5. National and regional capacity for entomology and vector control should be strengthened, and appropriate training resources should be identified in the Region.

6. Input into malaria elimination pilot projects in Solomon Islands and Vanuatu needs to be carefully monitored so they do not absorb resources necessary for the implementation of the NMCPs.
7. National malaria indicators/data should be reviewed and harmonized with global key indicators to provide information required for programme management, monitoring and evaluation.

8. A common malaria indicator survey tool based on existing surveys should be developed for monitoring country programmes.

The main areas identified for regional cooperation were strengthening of human resources, surveillance, monitoring and evaluation, regional reference laboratories and operational research.
1. INTRODUCTION

Malaria remains a major public health problem in the three Pacific Island countries: Papua New Guinea, Solomon Islands and Vanuatu. The disease is a major burden on the health services of all three countries and has a major impact on economic growth and development. These three countries account for more than 60% of cases reported in the Western Pacific Region. Solomon Islands has the highest level of documented malaria incidence in the Asia Pacific region and among the highest in the world.

All three countries have active malaria control programmes that have, in the cases of Solomon Islands and Vanuatu, substantially reduced the level of malaria transmission since 1993, when programmes throughout the Region underwent reorganization. All three countries are in the process of scaling up their malaria control programmes. They also share a number of significant technical and managerial issues that need to be solved, including problems surrounding drug efficacy and its monitoring, drug policy, quality assurance of diagnosis (RDTs and microscopy), programme monitoring and evaluation and capacity development. Other important issues are treatment of relapsing vivax malaria and providing better access to medical services for vulnerable populations, such as pregnant women and children. Solomon Islands and Vanuatu are considering elimination in some parts of the islands.

The malaria situation in these three countries of the Western Pacific Region cannot be seen in isolation. Australia and New Zealand regularly report malaria imported from Pacific island countries. Similarly, there are significant cross-border issues with nearby malaria endemic countries of the South-East Asia Region, brought about by population movements and close economic ties. This is particularly important for Papua New Guinea, which shares the island of New Guinea with Papua and West Papua provinces of Indonesia, and is close to Timor-Leste. Recognizing these regional linkages, the series of South-West Pacific Malaria Meetings (SWPMM) were initiated in 1959 in Papua New Guinea.

The South-West Pacific Malaria Meetings have served as a forum for the sharing of knowledge and experiences and for regional coordination of control activities. The outcome of these meetings has been closer coordination of malaria control among countries in the Pacific region. Since the most recent SWPMM, held in Brisbane in December 2002, control programmes have entered a phase of massive scaling-up of malaria prevention and control measures. This has presented common technical and managerial challenges to countries which can benefit from regional cooperation. All three countries (Papua New Guinea, Solomon Islands, and Vanuatu) are recipients of substantial grants from the Global Fund to scale up malaria control interventions. The recent announcement of the Pacific Malaria Initiative by AusAID, a major initiative to support intensified malaria control in Solomon Islands and Vanuatu and later Papua New Guinea, has increased the availability of more funds for scaling up of malaria control in the region. It is of primary importance to align national malaria treatment policies based on the use of artemisinin-based combination therapies (ACTs), to initiate active mechanisms to monitor and combat counterfeit drugs, to cooperate in training for capacity development on important issues such as programme management, quality assurance and procurement and supply management (PSM), and to support research studies to fine-tune and improve malaria control implementation. As all these issues can benefit from regional collaboration and cooperation, the 14th South West Pacific Malaria Meeting was convened with the following objectives:
1.1 **Objectives**

By the end of the meeting, participants would have

1. reviewed the current malaria situation in the South-West Pacific;

2. been updated on important technical issues and policies, especially relating to antimalarial drugs, indoor residual spraying and long-lasting insecticide treated mosquito nets;

3. identified common problems related to scaling-up of malaria control strategies and developed a framework for regional collaboration; and

4. looked at the feasibility of eliminating malaria in selected countries and areas.

1.2 **Participants and resource persons**

Nine participants from the three WHO Western Pacific Region countries Papua New Guinea, Solomon Islands and Vanuatu attended the meeting. The South-East Asia Region (Indonesia and Timor-Leste) did not take part in the meeting as originally planned. The governments of New Zealand and Australia were also invited to send participants but could not attend. In addition, there were four temporary advisors, eight observers and nine WHO secretariat members at the meeting.

The members elected Dr Timothy Pyakalyia (Papua New Guinea) as overall chairperson, and Mr Albino Bobogare (Solomon Islands), Mr George Taleo (Vanuatu) and Mr Leo Makita (Papua New Guinea) as co-chairpersons for the duration of the meeting. Dr Xia Gang was nominated as the main rapporteur and Dr Charuni Senanayake as the co-rapporteur. Dr Timothy Pyakalyia and Mr Bobogare chaired the first-day country review session and the malaria case management session respectively. Mr Makita chaired the second-day vector-control and malaria elimination sessions. Mr Taleo chaired the second- and third-day programme issues session, and Dr Pyakalyia chaired the last day group work session.

The agenda and list of participants are attached as Annexes 1 and 2.

1.3 **Organization**

The meeting was held in the Madang Resort in Madang, Papua New Guinea, from 9 to 11 October 2007. The three working days were divided into: country reviews and poster exhibitions; malaria case management; vector control; malaria elimination; an excursion to the Papua New Guinea Institute of Medical Research (Papua New Guinea IMR) and the Alexishafen Health Centre on the afternoon of the second day; programme issues; working groups to develop a framework for regional collaboration; and discussions on recommendations and the Regional Framework. Each main topic after presentations was followed by a small discussion on the next steps. The pace was rapid but there was allocated time for discussion, supported by discussion points as well as points raised by participants themselves.

1.4 **Opening ceremony**

During the opening ceremony a welcome address was delivered by Dr Eigil Sorensen, WHO Representative in Papua New Guinea, on behalf of the Dr Shigeru Omi, Regional Director of the WHO Western Pacific Region. The remarks by Dr Clement Malau, Secretary of Health, were read by Dr Timothy Pyakalyia, Deputy Secretary Technical Health Services, of the Department of Health in Papua New Guinea. Dr Eva Christophel, Medical Officer of the Malaria and other Vectorborne and Parasitic Diseases Unit of the WHO Regional Office for the Western Pacific invited participants to
introduce themselves. The administrative remarks were delivered by Mr Ray Pangan of the WHO Office in Papua New Guinea.

The text of the WHO Regional Director’s speech is in Annex 3.

2. PROCEEDINGS

2.1 Outline of daily sessions

On the first day’s first session, Dr Eva Christophel overviewed the current malaria situation in the Western Pacific Region. It was followed by country presentations on the current status of malaria, achievements and challenges. The first day’s second session began with technical issues, with a malaria case management overview by Dr Gang Xia, and included sessions on (1) diagnosis; (2) malaria treatment (antimalarial drug resistance, treatment of falciparum and vivax malaria, malaria in pregnancy); (3) medicine-related issues (drug quality, procurement and supply management and adverse drug reaction monitoring).

The poster exhibit session, which was to be held in the evening of the first day, had to be rescheduled to the third day’s first tea break due to time constraints. Information varying from the national malaria control programme (NMCP) structure, malaria treatment policy, situations of RDT/microscopy, ITN and IRS, to issues and challenges faced by countries, appeared on the poster. All three countries participated in the poster exhibition. Australia, though it did not have a participant at the meeting, still contributed to the poster session. A responsible person from each country was available for answering and explaining the questions raised by the other participants. ACTMalaria also participated with two posters introducing the organisation and its Information Resource Centre.

The second day expanded the technical issues sessions further with (1) vector control (updates on WHO’s perspective on IRS and ITN, updates from each participating country on the current situation of ITN and IRS); (2) malaria elimination; and the first session of (3) programme issues (surveillance and programme monitoring and evaluation). The second day afternoon session was the planned excursion to the Papua New Guinea Institute of Medical Research (IMR) in Madang. Participants were given a broad overview of the available research facilities of the institute and the ongoing research projects by Dr Ivo Mueller, Scientific Head of the Vector Borne Disease Unit. After the visit to the Papua New Guinea IMR, the group visited the Alexishafen Health Centre, where they had a chance to talk with the health centre staff and see the IMR’s field station, where clinical trials were taking place.

On the third day, the second part of the programme issues session consisted of (1) partner contributions to malaria control in the region: GFATM, AusAID, Pacific Malaria Initiative Support Centre (PacMISC); (2) human resources and capacity building (ACTMalaria); and (3) health systems strengthening. The group work started after the first tea break and poster exhibit session, with participants divided into two groups, country participants and partner organizations. Country participants of Papua New Guinea, Solomon Islands and Vanuatu together identified the common problems related to scaling up of malaria control, while the partner organizations (AusAID, PacMISC, GFATM, WHO, ACTMalaria) identified areas of support they can offer. All countries presented their plans for the year 2008. This was followed by identifying areas of regional collaboration by both country participants and partner organizations together. Finally, all participants jointly reviewed and discussed the meeting recommendations, based on the conclusions of Day 1 and Day 2, and the proposed Framework of Regional Cooperation.
2.2 Regional and country reviews

2.2.1 Western Pacific Region

The Western Pacific Region includes 10 malaria-endemic countries with different levels of malaria endemicity. They are the Republic of Korea, Malaysia and the Philippines, the Mekong countries (Cambodia, China, the Lao People’s Democratic Republic and Viet Nam), and the Pacific island countries (Papua New Guinea, Solomon Islands, Vanuatu). A total of 94.9 million persons are at risk of malaria in the Region.

During the last decade, there has been a considerable decrease in the incidence rates of confirmed malaria and in malaria mortality rates in the Lao People’s Democratic Republic, Malaysia, the Philippines and Viet Nam. Among Pacific island countries, Papua New Guinea has the highest recorded malaria mortality rate (12.23 per 100,000 people in 2005).

Good malaria-control tools have been available throughout the Region, such as ACTs, artemesunate injectables and suppositories, better diagnostic tools with improved microscopy and rapid diagnostic tests (RDTs), insecticide treated nets (ITNs), long lasting insecticide-treated nets (LLIN), indoor residual spraying (IRS), basic surveillance systems like the "Kunming Indicator" framework, data management tools like the WHO malaria country database, as well as comprehensive guidelines and manuals.

For the first time since the 1970s, there is an abundance of funds for these countries to scale up malaria control, for example through the GF and the AusAID Pacific Malaria Initiative. The important stage has been reached where improved planning of strategies and appropriate monitoring is needed to use these funds efficiently and effectively.

Considerable achievement has been made in the Region since the 1990s in diagnosis. All countries have functioning microscopy services, but coverage has been low in Vanuatu and Papua New Guinea. Countries which have been using artemisinin monotherapy are moving towards ACTs as first line treatment. Current coverage of ITNs and LLINs varies from country to country, but there has been a clear increase of usage of ITNs in most countries during recent years. Indoor residual spraying together, with other vector-control methods, such as environmental modification, environmental manipulation and larval control, has been successfully used in the Solomon Islands.

However, there are still some problems which limit the effect of the malaria control programmes. These include: the lack of availability of adequate routine monitoring and evaluation systems at all levels; poor quality surveillance data from health information systems; a large proportion of cases treated based on clinical diagnosis; antimalarial drug resistance and slow adoption of ACT as first line treatment; lack of access to quality diagnosis and treatment in remote areas; poor procurement and supply management systems limiting the availability of effective drugs to some parts of the countries; low coverage of ITNs and LLINs; lack of policies on malaria in pregnancy; inability to work with the private sector effectively; and the lack of support for the safe management of insecticides.

Some of the current challenges in the Region are to take effective efforts to:

- Provide universal access to treatment with ACTs combined with quality parasite-based diagnosis in both the public and private sectors.
- Attain high coverage with a combination of effective vector-control interventions including ITN, LLIN, IRS and environmental modification.
- Improve collection and use of surveillance data, and programme monitoring and evaluation at all levels.
• Continue to provide high-quality training based on identified country needs.

• Comprehensively address the health needs of remote, poor and vulnerable populations and communities.

• Monitor emerging artemisinin drug resistance.

• Improve programme management in view of the massive ongoing scale up.

• Provide accountability, including good evidence of progress and achievements.

Malaria is associated with poverty and economic issues, so more cooperation is needed with sectors other than health dealing with poverty issues. Where feasible, it will be important to change from a malaria control goal to the elimination of malaria.\footnote{see References}

2.2.2 Papua New Guinea

In Papua New Guinea, more than 90% of the population of six million are at risk of malaria. It is a serious health problem in coastal and inland regions comprising 15 provinces. The epidemiology of malaria in Papua New Guinea is complex, with holo-endemic malaria in the islands and coastal areas, hyper-endemic malaria in the hilly areas and hypo-endemic/unstable epidemic malaria in the five highland provinces. Malaria is considered to be endemic up to an altitude of 1200–1500 metres above sea level, above which it becomes epidemic. In the endemic areas, transmission is high throughout the year. \textit{P. falciparum} causes an estimated 75\% of infections, especially in coastal areas, while \textit{P. vivax} accounts for 25\% of infections. \textit{P. vivax} is the predominant malaria species in the highlands; periodic \textit{P. falciparum} epidemics result in high mortality.

Malaria is the second cause of hospital admissions and deaths in Papua New Guinea. About 1.7 million clinical malaria cases have been reported annually from outpatient and inpatient departments, and 500–700 fatal malaria cases annually among inpatients. There are about nine known malaria vectors in Papua New Guinea transmitting the disease, with the main vectors being \textit{An. farauti} in coastal areas and \textit{An. punctulatus} and \textit{An. koliensis} in coastal and inland areas.

Prior to 2003, there was relatively little investment in malaria control in Papua New Guinea. With the support of the Global Fund since 2004, achievements have been made in free distribution of LLINs, expansion of laboratory-based diagnosis and improved treatment of \textit{falciparum} malaria cases with artemisinin and sulfadoxine-pyrimethamine.

Constraints for malaria control in Papua New Guinea have been the lack of sufficient technical and support staff, lack of widespread and well-functioning laboratory facilities, poor logistics for the delivery of nets, weak health education and monitoring and evaluation systems.

The objectives of the National Malaria Control Programme are to reduce confirmed malaria mortality from 12.9 to 6.5 per 100 000 population, and to reduce the malaria prevalence from 664 to 330 per 100,000 by 2010. In order to achieve these objectives, priorities of malaria control are given to revitalize and maintain the integrated vector-control programme, to improve diagnostic and treatment services, to ensure adequate medicine, treated mosquito nets and other supplies, to improve surveillance and reporting, to promote community awareness, education and involvement, and to develop guidelines and materials for training.

The strategic objectives of the malaria control plan for 2008 are to reduce malaria prevalence by 30\% in high malaria-endemic districts, to reduce the prevalence of outpatient morbidity from
malaria by 50% in districts with high-malaria prevalence, and to procure and distribute LLINs to every family unit and household in high malaria endemic districts.

2.2.3 Solomon Islands

Malaria is endemic in almost all areas of the Solomon Islands, with almost the entire population of approximately 500,000 at risk. *An. farauti* is the main vector of malaria in Solomon Islands.

There is already evidence that the scaling up of malaria control in Solomon Islands has had an impact. The annual malaria incidence rate has continuously decreased in the last three years, from 192/1000 in 2004 to 153/1000 in 2005 and to 152 in 2006, with a reduction of 4.3%, 17.7% and 4.2% respectively. The malaria mortality rate in Solomon Islands has been decreasing as well.

Currently the main external funders for malaria control in Solomon Islands are GF, World Bank, AusAID, WHO and Japan International Cooperation Agency (JICA). Since the civil conflict during the period 1999 to 2003, donors have started to return, with GF funding commencing in 2003, JICA beginning project support in 2007, and AusAID’s Pacific Malaria Initiative beginning in 2008.

The achievements in the years 2005/2006 were an increase of bed-net coverage by 22%, maintenance and increase of indoor residual spraying, adoption of ACT as part of the national treatment guidelines, introduction of RDTs to tsunami-affected areas, increased health education and community participation.

The main setbacks in programme implementation have been the lack of staff housing that has limited posting of staff to some rural areas, lack of enough well-trained workers, lack of funds for field operations, lack of maintenance of transport and infrastructure, inconsistent availability of supplies and equipment, poor management, insufficient supervision and lack of staff motivation.

The current strategies of the Vectorborne Disease Control Programme in Solomon Islands are to: 1) ensure prompt diagnosis and effective treatment; 2) reduce malaria transmission through the use of LLINs, regular insecticide treatment of existing conventional nets and appropriate vector control, including indoor residual spraying; 3) strengthen vectorborne disease control through improved coordination, partnership involvement, capacity development, operational research, monitoring and programme management.

The plans for 2008 are to expand malaria diagnosis so that all health facilities will be equipped with microscopy or RDTs, 100% population coverage with LLINs, completion of two cycles of IRS using pyrethroid in all endemic areas, introduction of malaria education in primary schools, budget impact analysis of RDTs, salination of selected coastal lagoons, and to pilot the elimination of malaria in Temotu province.

2.2.4 Vanuatu

Almost the entire population of Vanuatu of 233 270 is at risk of malaria. The annual parasite incidence rates over the past four years have been progressively decreasing, from 74/1000 in 2003 to 35/1000 in 2006. Out of the 8,055 positive malaria cases reported in 2006, 44% were due to *P. falciparum*. No confirmed malaria deaths were reported from 2005 onwards in Vanuatu, however there were ten and six probable malaria deaths respectively reported in 2005 and 2006.

The main component of the malaria budget is from external funding partners, while the Government of Vanuatu primarily covers staff salaries and some other operational costs.

The coverage with LLIN has progressively improved after having replaced the conventional ITNs in 2005. A total of 59 081 LLINs have been sold or delivered free since 2005. WHO, Rotarians against Malaria (RAM), JICA, AusAID and UNICEF have made significant contributions to the
bednet distribution programme. The major external funding sources have been from GF and very recently from AusAID. WHO continues to provide technical support to the country.

The remoteness of many of the islands, limited human resources, limited capacity of the health system and the lack of social system infrastructure have been some of the challenges faced by Vanuatu in implementing the malaria control strategies.

The plans for 2008 include further reduction of morbidity by 25% as compared to 2007, changing drug policy to include ACTs as first line treatment, increasing diagnostic coverage from 10% to 60% by using RDTs, increasing LLIN coverage to 80%, strengthening of the health system through human resource and infrastructure development together with piloting malaria elimination in Tafea province.

2.3 Case management

WHO has produced a manual\(^2\) on comprehensive malaria case management that is designed to provide guidance to national malaria control programmes on best ways of ensuring access to early diagnosis and appropriate, effective treatment. It also provides guidance on developing evidence-based policies on treatment, diagnosis, patient management, planning, monitoring and reporting. The main aspects of case management include: (1) sound epidemiology of malaria; (2) proper programme structure, planning and management to ensure efficient, effective treatment; (3) assessment of the available institutional capacity and human resources and identification of ways to support effective case management; (4) planning effective malaria case management and identifying technical and managerial elements that require revision or reorientation; (5) logistical organization to ensure regular supplies of medicines, diagnostics and other consumables; (6) conducting quality assurance; (7) planning training, health education and communication for behaviour change; (8) planning supervision, monitoring and evaluation, and revising malaria management information systems; and (9) coordinating and integrating with other public health programmes and the private sector.

2.3.1 Malaria diagnosis (including quality assurance of RDT and microscopy)

WHO recommends parasite-based confirmation of malaria (either by microscopy or RDT) before starting treatment, with the exception of children under five years of age in high transmission areas and suspected severe malaria cases where parasitological confirmation is not immediately possible.

Rapid diagnostic tests (RDTs) are immunochromatographic tests, based on the detection of parasite antigens including histidine-rich protein 2 (HRP2), plasmodium lactate dehydrogenase (pLDH) and aldolase. They come in various formats including dipsticks, cassettes or cards. Results are usually available in 10–20 minutes; hence they can be used for rapid diagnosis in remote areas where microscopy is unavailable. Currently available RDTs detect either *P. falciparum* alone, or *P. falciparum* and “all other malaria species” using a pan-malaria antigen, and some are specific for vivax malaria. In "combo" tests, a non-falciparum positive is interpreted as a positive case for other malaria parasite species, usually *P. vivax*. In areas with a high prevalence of vivax malaria, introduction of the “combo” RDTs could provide an improved level of diagnosis over the single species *P. falciparum* tests.

The advantage of RDTs is that the technique can provide rapid, parasite-based diagnosis with minimum equipment, training and maintenance. Their sensitivity however is variable, and sensitivity can be affected by genetic variations in the HRP2 antigen. RDTs have limited shelf life and can

\(^2\) see References
deteriorate over time in tropical temperatures. Their accuracy is also dependent on user techniques and interpretation.

If RDTs are to be introduced, consideration should be given to choosing the appropriate RDTs based on the predominant malaria species in the area, proper transport conditions and storage facilities (cool chain). Criteria must be established for using RDTs and the management of results (treatment algorithm). There should also be a good quality control system with designated quality assurance coordinators. WHO recommends that countries undertake parasite-based RDT lot quality control testing after purchase, including monitoring of sensitivity every three months throughout shelf life. This lot quality testing is currently provided by several laboratories working in collaboration with the WHO Western Pacific Regional Office, including the Research Institute for Tropical Medicine (RITM) in the Philippines, and the Institute Pasteur in Cambodia. In peripheral areas, quality control of RDTs should be done through storage and temperature monitoring, sentinel site comparison with microscopy, and in the future by monitoring sensitivity using positive control wells. Proper end-user training with the use of locally-appropriate training materials and job aids is essential. The distribution of RDTs can be integrated into the national central medical stores distribution and monitoring systems.

Microscopy still remains the gold standard for malaria diagnosis, as it can give both the parasite species and density and therefore can be used to monitor response to treatment. To improve quality assurance of microscopy, a biregional accreditation programme for microscopists is ongoing, with ten countries in the WHO Western Pacific Region having participated in the national assessment of microscopists. A malaria slide bank is also under development to support quality assurance, training and assessment of microscopists.

In Papua New Guinea, early diagnosis has been difficult as most patients in endemic areas are asymptomatic, the peak number of infections occurs in children, other differential diagnosis (typhoid, dengue fever) complicates the clinical picture of malaria, and there is a lack of laboratory-based diagnostic capacity at peripheral and community level. Less than 30% of health facilities in the country currently have microscopy for malaria diagnosis. Malaria diagnosis is therefore mostly based on clinical signs and symptoms. However, evidence shows that 50%–70% of malaria-like fevers are not due to Plasmodium infection. Papua New Guinea is planning on improving rapid and accurate diagnosis by ensuring that malaria cases are microscopically confirmed and by making available RDTs where there are no microscopy services.

In Solomon Islands, 58% of health facilities have microscopy, in other facilities nurses rely on clinical diagnosis of malaria. Clinical diagnosis has lead to excessive prescription of antimalarial drugs. In 2006, malaria diagnosis by microscopy increased by 4%, as compared to 2005. In 2008, Solomon Islands plans on expanding parasitological diagnosis by providing microscopy or RDTs to every health facility. RDTs will be used in Nurse Aid Posts where microscopy is not sustainable. Additionally, all microscopists will be regularly tested and retrained to ensure quality diagnosis. While the implementation of RDTs in health facilities will be costly, support from GF and the Pacific Malaria Initiative will ensure this activity goes ahead in 2008.

In Vanuatu, only 10% of the health facilities can perform parasite-based testing. The expansion of microscopy services is limited due to health system constraints, however Vanuatu aims to increase diagnostic coverage from 10%–60% by 2008, using RDTs. RDTs will also be available in the existing laboratories for use in case of an emergency or outside of normal working hours.

2.3.2 Malaria treatment

2.3.2.1 Antimalarial drug resistance

Antimalarial drug resistance and multidrug resistance in the Western Pacific Region has since the 1970s been the most serious worldwide. It is now suspected that resistance to artesunate is
emerging on the Cambodia-Thailand border. If this is confirmed, it will pose a major threat to malaria treatment and malaria control and elimination globally.

The Pacific island malaria-endemic countries began replacing monotherapy of chloroquine (CQ) or amodiaquine (AQ) for treatment of falciparum malaria with chloroquine/amodiaquine combined with sulfadoxine-pyrimethamine (SP) in the mid-1990s. Vanuatu adopted the regimen in 1994, Papua New Guinea in 2000 and Solomon Islands in 2001. While studies done in Papua New Guinea in 2001 and 2002 reported CQ/AQ+SP cure rates of 92% in Madang province and 97% in East Sepik Province, there was a declining trend in 2003 and 2005 in three sentinel sites (East Sepic, Madang and Simbu) where adequate clinical and parasitological responses (ACPR) dropped to 70-88% to either CQ+SP or AQ+SP. In Solomon Islands, a declining trend could be seen for CQ+SP in a 2005 study which reported an ACPR of 88% (28-days follow-up, PCR-corrected); a current treatment efficacy study in Central Islands province and Malaita province indicates a continued evolution of drug resistance, with preliminary efficacy results for CQ, CQ+ SP and artemether-lumefantrine of 57%, 81% and 91% respectively (PCR-uncorrected data; it is anticipated that this study will be completed in 2008). In Vanuatu, however, a 2005 study showed an ACPR of 97% for CQ+SP, higher than the study in 2001 which showed an ACPR of 84%.

For treatment of vivax malaria, pooled data of studies from 2003 to 2005 in Papua New Guinea revealed ACPR of 100% to AQ/CQ+SP together with 14-days of primaquine in East Sepik province, but lower in Simbu province with ACPR of 93% and a significantly lower ACPR in Madang Province at 71%. Likewise, a 28-day study done on mixed P. vivax / P. falciparum infections using the same treatment regimen in the same sites in Simbu, East Sepik, and Madang provinces showed an ACPR of 92%, 91% and 78% respectively. This represents increasing treatment failures of CQ for vivax malaria, especially in Madang Province. In the Solomon Islands, results from Guadacanal province showed an ACPR of 70% to CQ+14-day primaquine in 2005; this high failure rate is consistent with earlier reports since 1995. In Vanuatu, a study done by NAMRU2 revealed an ACPR of 100% to CQ alone (28-day follow-up) for vivax malaria in Malo Island in 2005. These good results are consistent with a 28-day study done in 1991 that showed ACPR of 99% to chloroquine.

Strengthening and coordinating drug efficacy monitoring in the region is a priority. This requires standardizing methods for measuring antimalarial drug resistance in order to interpret and compare results across countries and over time. WHO has introduced a standard efficacy monitoring protocol "Assessment and Monitoring of Antimalarial Drug Efficacy for the Treatment of Uncomplicated Falciparum Malaria" (2003). WHO has supported national malaria control programmes for implementation of drug efficacy monitoring, including establishment of reference centres, has helped establish subregional networks (e.g. Mekong, Amazon and Africa), and facilitates information exchange through publication of reviews (for example "Review of the Malaria Drug Efficacy Situation in ten Countries of the Western Pacific Region 1987-2003"), reports and through websites.

The Greater Mekong Subregion (GMS) drug efficacy monitoring network, established in response to a serious antimalarial drug resistance problem, involves all six Mekong countries. The network has selected strategic sentinel sites where the efficacy of national first and second line malaria treatment regimens is monitored at least every two years, following a standard protocol with at least 28 days follow-up (mostly using the WHO spreadsheet for data analysis). National and regional reference laboratories conduct genotyping of P. falciparum to differentiate recrudescences from reinfections, and analyze CQ levels for vivax malaria studies. Annual meetings are organized for information exchange and planning.

As increased funding is available for drug efficacy monitoring, notably from GF, USAID (GMS countries) and Australia, there is a good opportunity to intensify antimalarial drug efficacy monitoring in the Pacific through the establishment of a Pacific network that will provide a mechanism for harmonization of protocols, implementation support including regional reference laboratories and information exchange.
2.3.2.2 Treatment of falciparum and vivax malaria

In order to provide global evidence-based guidance to help formulate national policies and protocols for the treatment of malaria, WHO published "Guidelines for the Treatment of Malaria" in 2006:

- For uncomplicated falciparum malaria, ACTs are recommended except in the first trimester of pregnancy. The artemisinin derivatives (oral, rectal, or parenteral formulations) and partner medicines of ACTs are not recommended as monotherapy for uncomplicated malaria. The rationale behind this is to enhance efficacy and delay resistance to the drug. The following ACTs are presently recommended: (1) artemether-lumefantrine; (2) artesunate + amodiaquine; (3) artesunate + mefloquine; (4) artesunate + sulfadoxine-pyrimethamine.

- For treatment of severe falciparum malaria the following are recommended: (1) artesunate (i.v. or i.m.) – as first choice; (2) artemether (i.m.); (3) artemotil (i.m) – for use when other alternatives are not available; (4) quinine (i.v. infusion or i.m. injection). As follow-on treatment when the patient can tolerate oral treatment it is advised to give a full course of an ACT or quinine + clindamycin or doxycycline. As pre-referral treatment in a suspected or a diagnosed case of severe falciparum malaria a single dose of (1) artesunate or artemisinin suppositories (rectal administration); (2) artesunate or artemether (i.m); or (3) quinine (i.m) is recommended.

- For treatment of vivax malaria the current recommendations are chloroquine + primaquine, while in places where ACT has been adopted for falciparum malaria the ACT it can also be used for vivax malaria in combination with primaquine. Artesunate + sulfadoxine-pyrimethamine should not be used for vivax malaria treatment. For mixed infections, ACTs are effective against all malaria species and are the treatment of choice. However, radical cure with primaquine should be added for patients with confirmed *P. vivax* and *P. ovale* malaria, except in high transmission settings where the risk of re-infection is high.

When cure rates with the current recommended regimen falls below 90% (as assessed through *in vivo* therapeutic efficacy monitoring), review and change of the antimalarial treatment policy should be initiated. A new recommended antimalarial medicine adopted as policy should have an average cure rate of more than 95% as assessed in clinical trials.

In Papua New Guinea, the current first line treatment of CQ + SP is failing. Several research studies have been conducted by Papua New Guinea IMR and the University of Western Australia. These include a study of artesunate suppositories versus intra-muscular artemether for treatment of severe paediatric malaria, which clearly showed that artesunate suppositories had nearly four times higher blood concentrations after two hours than the currently used artemether. A standard treatment trial is ongoing with the comparison of (1) CQ(3d)+SP; (2) artesunate (3d, 4mg/kg)+ SP; (3) Coartem™ (artemether-lumefantrine, 3d); (4) Duo Cotecxin™ (dihydroartemisinin-piperaquine, 2d) with a 42-day follow up among children 6-60 months of age, both for confirmed falciparum and vivax malaria. By mid 2008, key data from this study (efficacy, safety and pharmacokinetics) will become available and will form the basis for the revision of the Papua New Guinea national malaria treatment guidelines. A study on the pharmacokinetics of antimalarial treatments in pregnancy, involving chloroquine, SP and azithromycin is also ongoing.

In Solomon Islands, the current treatment policy is CQ+SP for falciparum and CQ+PQ for vivax. Quinine is used in treatment of pregnant mothers during the first trimester of pregnancy, and CQ+SP in second and third trimesters. A study in 2002 in Guadalcanal Province had shown a 12% treatment failure with CQ+ SP and two fixed mutations in the dfhr allele. After consultations with provincial health directors and hospital clinicians, ACT was first introduced as second-line treatment in 2006 and will be the first line treatment both for falciparum and vivax malaria from 2008.
In Vanuatu, for *P. falciparum* the current first-line treatment is CQ+SP. In a study conducted in 2001, 14% failure rates were observed. For *P. vivax*, CQ + primaquine are the first-line treatment. A study in 2005 indicated no failure of CQ, however, due to the prevalence of G6PD deficiency the use of primaquine has been very limited. As coverage of laboratory facilities is limited, a high proportion of treatments is given based on clinical diagnosis. A recent study in Malo/Santo concluded that overall gametocyte carriage was as high as 23% among individuals with *P. falciparum* and was 11% among *P. vivax* infections with an overall rate of 1% (0.7% for falciparum and 0.3% for vivax), thus maintaining the transmission in communities. Vanuatu has in the process of changing the national malaria treatment policy to ACT (Coartem™) as first line treatment, for falciparum and vivax malaria, artesunate suppositories for pre-referral treatment and artesunate injections for severe malaria; quinine would be included as second line treatment.

Table 1 gives an overview of the treatment guidelines of Papua New Guinea, Solomon Islands and Vanuatu.

2.3.3 Malaria in pregnancy (MIP)

Malaria in pregnancy (MIP) has been associated with maternal anaemia, infant anaemia, decreased infant birth weight, fetal wastage, still birth, premature delivery, and development of immune responses to vaccines and malaria. The effect of variable malaria transmission settings on peripheral and placental malaria and the resulting morbidity and mortality is reflected in the limited research available. Limited data from this Region indicate that primigravidae appear more affected compared to multigravidae.

MIP has been highly prevalent in Pacific countries. In Solomon Islands, a few studies have been done on the prevalence of peripheral parasitaemia at delivery. One such study in 2003 showed a prevalence of peripheral parasitaemia during pregnancy of about 18%, with primigravidae (31%) more than twice as likely to be parasitaemic than multigravida (14%). Another study in 2005 showed that among pregnant mothers who visited a Honiara ante-natal clinic, 18.5% of primigravidae and 8.5% of multigravidae had positive blood smears during the first visit. In Papua New Guinea, a recent study in Alexishafen in 2002-2003 found that peripheral and placental parasitaemia at delivery in primigravidae were 24% and 26% respectively, and for multigravidae 13% and 11% respectively.

However, there is currently no comprehensive policy on malaria in pregnancy in the Region. In Papua New Guinea, Solomon Islands and Vanuatu, CQ chemoprophylaxis is recommended for malaria prevention in pregnancy. In Solomon Islands and Vanuatu, ITN/LLIN are being distributed free of charge to all pregnant women by the control programme.

Very limited research has been done on malaria in pregnancy in the Region, especially on the benefit of an intermittent preventive treatment during pregnancy (IPTp) using SP, which is currently a recommended policy mainly for high transmission areas in Africa. Issues in this Region are varying malaria transmission levels and SP resistance. Preliminary data of an ongoing IPTp study in Papua New Guinea showed that there was no significant difference in efficacy between pregnant women treated with SP or SP+AQ. This study also found that the main problems faced by pregnant women in accessing antenatal services are the long distance that they have to travel, difficult terrain and lack of mobile clinics.

Given the high transmission of malaria in the Pacific and the high proportion of pregnant women at risk for malaria, more research studies on the effect of different prevention measures for malaria in pregnancy, including LLINs, EDAT, IEC and IPTp, are needed. In Solomon Islands, a randomized clinical trial of IPTp with SP compared to weekly chloroquine prophylaxis will be conducted, supported by AusAID and WHO, with results expected to be available in 2009. Papua New Guinea IMR has started an extensive research programme on malaria in pregnancy during 2007-2012, aiming at both curative and preventive treatment of MIP: The MIP cohort at the Alexishafen Health Center will aim at describing the burden of MIP in mother and child, assessing the
contribution of maternal immunity and parasite virulence factors to MIP pathology, and assessing changes in absorption, volume distribution and metabolism of CQ and SP in pregnancy. Further IMR research will include: 1) pharmacokinetics of azithromycin (AZ), an antibiotic against most common bacterial sexually transmitted infections (STI), with the aims of assessing the volume distribution and metabolism of AZ in pregnancy, together with determination of optimal dosing of AZ for treatment and prevention of MIP; 2) a randomized placebo controlled trial of IPTp with AZ+SP for prevention of malaria in pregnancy which aims at assessing the efficacy of AZ+SP for prevention of MIP and efficacy of AZ for prevention of congenital transmission of common bacterial STIs; 3) contribution of non-falciparum malaria to the burden of MIP.

2.3.4 Other medicine-related issues

2.3.4.1 Drug quality

Recent evidence shows that poor quality medicines are widely available in the Region. In the 1990s, there were reports of fake mefloquine syrup in Cambodia. In 2001, a paper published in Lancet by Paul Newton from the Wellcome Trust showed that 38% of artesunate bought in shops in five countries of the Greater Mekong Subregion (GMS) were counterfeit.

There are two issues: counterfeit medicines and substandard medicines. A counterfeit drug is a deliberately and fraudulently mis-labeled medicine with respect to identity and/or source. A substandard drug is a genuine medicine produced by the legitimate manufacturer that does not meet the quality specifications (and may contain less or more of the active ingredient/s).

For quality maintenance of a drug, it should undergo the quality assurance loop which includes: product registration, post marketing quality monitoring, laboratory analysis, and licensing of the establishment. Improving quality control means abiding by standard procedures, proper supervision of storage and transportation, conducting post-purchase testing of samples, increasing human resource development, and establishing a reference laboratory or centre to serve as a regulatory body. Much effort needs to be made to strengthen the law enforcement and drug regulatory activities of countries. In addition, more inter-country and regional collaboration is needed for information sharing and joint action of drug regulatory agencies, country malaria programs and other stakeholders.

The experiences from the Greater Mekong Subregion on efforts undertaken to address issues of antimalarial drug quality were shared during the meeting. With financial support from the United States Agency for International Development (USAID) an antimalarial drug quality monitoring project has been implemented since 2002 with technical support from the United States Pharmacopeia (USP) Drug Quality and Information (DQI) programme, jointly with DRAs and NMCPs in five Mekong countries (Cambodia, the Lao People’s Democratic Republic, Thailand, Viet Nam and Yunnan, China). Regular monitoring in sentinel sites showed that out of a total sample of 1069 antimalarials tested, 5.3% failed quality testing; among the 42 failed samples, 30 were found to be fake, especially artesunate and quinine, most of which contained no active ingredients. An effort is now underway to expand the drug quality monitoring to other drug categories, including anti-tuberculosis medicines, antiretrovirals and antibiotics. Regional cooperation has been started with the International Police Organization (INTERPOL) to eliminate production and interrupt distribution of counterfeit medicines.

In Papua New Guinea, a drug quality survey was conducted after Oil Search (an oil exploration company) reported quality problems in two samples of antimalarial drugs tested overseas. It was conducted by the Department of Health with assistance from WHO during the time period from January to February 2007. Fifty-eight samples were randomly selected from the Base Medical Store, Port Moresby General Hospital, and other medical facilities in the Eastern Highlands province, Madang province and Morobe province. The laboratory testing was carried out at the Australian Therapeutic Goods Administration. The results showed more than 90% of the samples tested met internationally recognized standards and no counterfeit drugs were detected. Two samples failed to
comply with visual inspection, four samples had marginally low assay results and two samples failed to comply with dissolution specification. It was recommended that companies that produced drugs not fulfilling quality standards should be disqualified from future procurement. Furthermore, procurement of quality medicines should be from recognized companies with acceptable quality control systems in place, through UN agencies or from registered pharmaceutical companies from countries with stringent drug regulatory authorities. It was also recommended that a system for the regular and systematic quality testing of a selected set of drugs be established. Screening using existing mini-labs should be done at different time intervals, and suspected samples should be sent to internationally recognized reference laboratories for confirmation testing.

In Solomon Islands and Vanuatu, there is currently no drug quality testing mechanism in place. Due to the limited capacity of the health systems, it was not considered feasible to establish a national drugs regulatory authority in each country; however it was suggested to establish this authority at regional level for the Pacific.

In order to tackle the drug quality issues, it was suggested that a Pacific malaria drug network was needed to develop common criteria for licensing and registration, to establish a liaison between Pacific countries and international quality control organizations, and to strengthen post-marketing surveillance of antimalarial drugs.

2.3.4.2 Procurement and supply management (PSM)

Improvement of procurement and supply management is a crucial component of WHO’s goals for improving case management. It will help save lives and improve health by ensuring access to safe, efficacious, good-quality medicines and their rational use.

PSM is an important part in the drug management cycle of procurement, distribution, selection, and usage in the context of a policy and legal framework. Procurement of drugs should be through a responsible organization, from a health authority or a private company. The quantification of drug requirements should be done through morbidity method or consumption method, and calculation of the annual drug requirement to be done by adjusting for the amounts of damage, spoilage, expiration or theft or an emergency. A PSM system should be in place to monitor the suppliers' performance (delivery, labelling, packaging and expiration of drugs) and quality of the products (country certification and WHO certification such as prequalification). A drug regulatory authority should carry out the regulation and implementation of product evaluation and registration, ensure Good Manufacturing Practice (GMP) and cooperation among different medicine authorities.

It is important to have cool chains for ACTs and RDTs because both products are heat sensitive. The cool chain should consist of a controlled environment during every step of transportation and storage similar to cold chains used for vaccines.

In Vanuatu, the main supplier of drugs is the International Dispensary Association (IDA) in the Netherlands. The distribution and supply management is done by the Central Medical Stores. The in-country supply mechanism is through provincial order forms, delivery, health-facility orders, dispensing to patients and consumption reporting.

With the introduction of ACTs as first line antimalarial drugs, countrywide supply and distribution will be a major challenge, especially to the most peripheral areas. Procurement and supply management will need to be integrated into existing systems and strengthened for effective and efficient distribution of medicines and RDTs.

2.3.4.3 Adverse drug reaction (ADR) monitoring

Appropriate pharmacovigilance systems are needed to monitor the occurrence of unexpected adverse drug reactions of currently administered medications and especially after the introduction of
new drug combinations such as ACTs in the Pacific countries. A joint ADR monitoring system is recommended, with cooperation between hospitals and drug authorities in creating consumer awareness, development of common ADR reporting forms and system, strategic promotion of ADR reporting and exchange of ADR information and for policy implementation among Pacific island countries.

At present, no established pharmacovigilance systems are in place in the three countries. It is important to establish national committees, including professional societies that will be involved in designing and planning pharmacovigilance systems in all three countries.

2.4 Vector control

There are two effective control measures which are directed towards the malaria mosquito vectors: indoor residual spraying (IRS) and insecticide treated nets, either the conventionally treated (ITN) or the newer long lasting insecticide treated nets (LLIN).

2.4.1 Indoor residual spraying (IRS)

The main purpose of indoor residual spraying is to reduce transmission by reducing the survival time of malaria vectors entering houses or sleeping units.

The current WHO policy on IRS is that it remains a valuable intervention in malaria control when the following conditions are met:

- High percentage of the structures in an operational area have adequate sprayable surfaces, and can be expected to be well sprayed.
- Majority of the vector population is endophilic, i.e. rests indoors.
- Vector is susceptible to the insecticide in use.

In the WPR, the current policy on spraying is as follows:

- It is the best method for interrupting malaria transmission but should only be considered where good quality spraying can be done and where high levels of coverage can be attained.
- DDT remains the best choice for IRS, but due to problems with acceptance and other issues like agricultural exports, alternatives like lambda-cyhalothrin, alpha cypermethrin or deltamethrin are available which are equally effective.
- Generally two or more cycles of spraying per year are recommended but where two properly timed rounds with high coverage are not possible because of logistics or other problems, then every effort should be made to carry out one complete round with high levels of coverage just prior to the beginning of the main transmission season, using a long lasting residual insecticide.

IRS was used extensively in the Pacific during the 1970s, which was the era of malaria eradication. It was highly effective and levels of transmission reached all time lows but did not reach the level of malaria eradication. Since the 1970s the acceptance of IRS by the public has reduced over time. This has been combined with other factors including pressure by environmentalists to stop the use of DDT, reduction in the effectiveness of the insecticide and the withdrawal of government support, and IRS coverage significantly decreased in the three Pacific countries.

DDT spraying started as early as 1957 (eradication era) in Papua New Guinea. Sixty five per cent of the country was under DDT spraying in 1971. But by 1976, coverage had been reduced by
half. Subsequently DDT was withdrawn except in economic and high-risk areas, including the Highlands. Currently it is banned for use in agriculture and is restricted to public health use. The cessation of spraying has created a number of stockpiles of unusable DDT throughout the country that need to be cleared out. At the same time, IRS needs to be re-established in the Highlands where major epidemics have been occurring recently. Mapping has already been done to identify high-risk villages for spraying in the Highlands, but because of the lack of funds, no regular spraying has been carried out for more than ten years.

In the Solomon Islands, IRS (with DDT) was used in the 1970s but only in zones (villages) with high malaria cases, based on monthly case-detailed records in each province. The household coverage gradually increased from 2001 to 2004, with a slight dip in 2005, but it increased again in 2006 after the introduction of lambda cyhalothrin. In 2006, 16,849 houses were actually sprayed, providing protection to 93,487 people. Some of the constraints for IRS expansion are the restriction on importation of DDT as a result of the International Convention of Persistent Organic Pollutants, and the extra costs involved in procuring pyrethroid insecticides as replacements for DDT. The Vector Borne Disease Control Programme (VBDPC) in Solomon Islands has decided to carry out two cycles of IRS per year with emphasis on quality coverage and safe and judicious use of residual insecticides, as an integrated vector-control policy for 2008. The oil palm company has contributed immensely in maintaining IRS in Solomon Islands, by recruiting their own spray men and procuring their own chemicals for IRS.

Vanuatu started spraying in 1973 but stopped except for focal spraying in 1982, and since then spraying has stopped totally. The unused 40 tonnes of DDT was shipped to Papua New Guinea in 1994. The challenges faced by Vanuatu with IRS were difficult logistics, problems with housing structures, environmental issues and poor community participation. Vanuatu is now focusing on ITN/LLIN. No spraying has been done for more than ten years. Before defining and future return to the use of IRS, it will be important to understand local culture and community practices, establish an efficient monitoring and surveillance system for feedback, and consider the resources available.

The AusAID-supported Pacific Malaria Initiative considers IRS to be an effective malaria-control method and has suggested that it should be used as part of an integrated malaria control strategy in Solomon Islands and Vanuatu. It will be a key part of the strategy for the elimination of malaria in the two provinces initially identified for elimination.

2.4.2 Insecticide treated nets (ITN) / long lasting insecticide treated nets (LLIN)

Conventional insecticide treated nets (ITNs) and long lasting insecticide treated nets (LLINs) have been shown to be one of the most cost-effective interventions for reducing the burden of malaria, even in areas such as the Pacific, where the major vector mosquito bites primarily outdoors during the early evening hours. The most important mechanism of action of ITNs is the reduction of the longevity of the mosquito vectors to such an extent that they are unable to transmit malaria. This leads to a mass effect when coverage is high and the mosquitoes are susceptible to the insecticide used.

The WHO policy on ITN is not to charge for new nets or for re-treatment of old nets where it is taking place. The distribution of nets can be directly to individual households, or through fixed distribution posts in specified locations where households collect nets at a specified time. The direct method requires a census to determine actual individual household needs in order to tailor the number and size of nets to the needs of each household. Though it requires strict supervision, this method ensures that nets reach each household and an exact figure on coverage can be generated. Direct distribution should make use of all available partners including churches, military, etc. The distribution through fixed points is the fastest and the cheapest method. It has been used extensively in Africa, but it often results in abuse, whereby nets end up for sale in markets and not in houses where they are needed. The actual coverage of net distribution using this method cannot immediately
be measured and there is no control over where nets go and no knowledge of the number of persons per net.

A standardized household survey methodology should be developed with validated indicators of at least one net per household by physical inspection, for evaluation of completeness of coverage, problems with acceptance or usage and to determine the condition of nets. The longevity of insecticides should be assessed by bioassays.

The replacement of nets can be done either through an exchange of one old net for a new net or as a total replacement of all nets at specified intervals. The disadvantage of the first method is that with its continuous process it would be almost impossible to ensure high coverage. The advantage of the second method is, though the costs involved would be high, that it is possible to plan and replace in stages, which may ensure high coverage rates. Countries would need to adapt a method suitable for their infrastructure and available resources.

Papua New Guinea was one of the first countries to use treated mosquito nets as a control strategy, back in 1988. However Papua New Guinea is behind with its net distribution due to problems with procurement and distribution. The government has encouraged maintaining the lowest cost possible for bed nets by allowing for duty-free/VAT-free importation by Rotary Against Malaria (RAM). Over the years, RAM has been the sole importer of nets, which it has distributed in a kind of social marketing approach to churches, missions, NGOs, mines and plantations; during the past six years, RAM in this way has distributed nearly 500 000 nets all over the country for cost-price only. In addition, RAM has been in charge of importing the nets under the GFATM project, which it delivers in containers to districts for further distribution, which then is under the responsibility of the NMCP. By mid-2009, Papua New Guinea plans have procured and distributed LLIN to every family unit and household all over the country.

In the Solomon Islands, the entire country should be covered by free LLINs by the end of 2008.

In Vanuatu, the distribution of LLINs has progressively improved after replacing the conventional ITNs with LLINs, starting in 2005. A total of 59 081 LLINs were sold through social marketing or freely delivered between 2005 and 2007. WHO, Rotary Against Malaria (RAM), JICA, AusAID and UNICEF have made significant contributions to the bed-net distribution programme. Pregnant women, children under five years of age, and the elderly and disabled have been provided with free bed nets. Vanuatu has recognized ITN/LLIN as the main mode of prevention of the transmission of malaria and intends to increase the bed-net coverage up to 80% by the end of 2008 and continue with its current free net policy for vulnerable populations.

The common constraints for attaining high coverage with ITN in Pacific island countries have been the lack of resources at provincial and district levels; poor management of funds generated by social marketing; lack of infrastructure, such as sheds for storing nets at the provincial and district levels. Countries also lack capacity for monitoring and evaluation, including poor feedback from provinces on stock balances, actual coverage, and re-treatment rates. To some extent, problems are further complicated by the lack of coordination between the partners involved.

2.4.3 Malaria outbreaks and GIS mapping in Papua New Guinea

There have been major outbreaks reported in the Highlands since Papua New Guinea stopped spraying DDT nearly ten years ago. The high risk areas are the large low-lying valleys and river systems. Outbreaks affect small areas, usually a few villages, but can affect whole districts, and are usually seasonal, associated with increased rainfall or periods of higher than normal temperatures. The populations affected are usually non-immunes, so when an outbreak occurs there are many severe cases and deaths. Some factors that contribute to the increasing number of outbreaks seen in the Highlands may include: 1) increasing population movements, facilitated through improved roads, to the Highlands by people from the lowlands and coastal areas seeking work in the coffee plantations,
mining, sugar cane industry and other economic activities, and from the Highlands to coastal areas e.g. for the betel nut trade; 2) climate change, with prolonged periods of rain which results in a proliferation of places for vectors to breed; 3) high prevalence of drug resistance, especially with the available common chloroquine monotherapy, can result in fatal outcomes in Highlanders with little or no immunity; 4) lack of diagnostic facilities and a lack of antimalarial drugs in many rural health centres; 5) inefficiency of the health information system that often results in a delay in reporting malaria epidemics; most epidemics are first reported by newspapers as increased number of deaths.

The GIS mapping project in the Papua New Guinea Highlands, carried out by Papua New Guinea IMR, conducted rapid malaria assessment surveys in all major Highland areas, produced risk maps of malaria transmission areas and made recommendations for controlling malaria in Papua New Guinea Highland areas. A simple altitudinal model of GIS was used to stratify the risk of malaria into different strata: high-endemic malaria area, epidemic-prone areas and malaria-free areas. Different malaria control strategies were recommended for the different strata identified: (1) ITN should be distributed in stable, endemic and remote areas with a high-epidemic risk. (2) IRS should be used in densely populated areas with high epidemic risk; (3) education and awareness and access to prompt diagnosis and treatment should be aimed at risk associated with travel to low lying, malarious areas.

2.5 Malaria elimination

Despite nearly 50 years of malaria control efforts, malaria still remains one of the main global public health problems. The elimination of malaria should be considered to be the end goal in the fight against this disease, and is a process which starts with good malaria control. Malaria elimination has gained a lot of support recently from world leaders and important partner organizations, such as the Bill and Melinda Gates Foundation, WHO, AusAID, etc. The Aneityum project in Vanuatu (since 1991) showed that elimination could be achieved in a remote Pacific island, where there was a high degree of community participation. The WHO Regional Director for the Western Pacific has been urging and supporting the expansion of the Aneityum model to other islands with the eventual goal of eliminating malaria from the Pacific island countries. This is also the stated goal of the AusAID-supported Pacific Malaria Initiative.

The methodology developed in the 1950s by WHO for global malaria eradication was designed to cover malaria eradication operations beginning with a preparatory phase, followed by the attack, consolidation and a maintenance phase. Since then the term eradication has been replaced by elimination and a few countries where there were already effective malaria control programmes have been successful in eliminating the disease.

WHO has recently revised its elimination strategy and terminology. There are still four phases, but they have been given new names: 1) malaria control phase; 2) pre-elimination phase; 3) elimination phase; 4) prevention of reintroduction (Figure 1).

Figure 1: Malaria programme phases and milestones on the path to malaria elimination.

* SPR is slide positivity rate or malaria blood test positivity rate among fever cases (by microscopy or rapid diagnostic test)
The first milestones for programme transition from the current malaria control mode would be when health facility data that have been representative of the entire target area/country indicate that the monthly slide or RDT positivity rate among febrile patients with suspected malaria is consistently less than 5% throughout the year. Hence, malaria case loads are becoming manageable. Programme reorientation has been achieved when cases are limited to clearly defined foci only.

The elimination phase would be in areas where the first programme reorientation has been achieved, and where health facility data show a malaria incidence rate of less than one infection per 1000 people at risk per year, equal to less than 100 new cases per year in a district with a population of 100 000 people. The objective of the elimination phase has been achieved when locally-transmitted malaria cases have been reduced to zero; and the health services and surveillance operations are fully capable of detecting and extinguishing malaria transmission should it occur.

The second programme reorientation, from elimination to prevention of reintroduction of transmission, would be in areas where: 1) adequate surveillance showing complete or nearly complete interruption of local transmission; 2) there have been no or only very few sporadic cases of local transmission in recent years; 3) the overwhelming majority of malaria cases can be positively identified as of imported origin. The orientation of general health service personnel in vigilance activities should be completed during this phase. An independent assessment by the malaria elimination monitoring committee should be undertaken to determine if the areas would be ready to enter the next programme phase.

When there would be clear and convincing proof of an absence of locally acquired cases for at least three consecutive years, WHO certification of malaria elimination can be requested.

The Aneityum project explicitly proved that malaria can be eliminated on an isolated island with well-adapted short-term mass drug administration (MDA), sustained vector control, and a high degree of community participation. The elimination strategy used in the model was an integrated version of the malaria control programme with mass drug administration for nine weeks (before the onset of the rainy season), continuous usage of impregnated bed nets, usage of larvivorous fish into several identified breeding sites of An farauti, proper surveillance system with a community microscopist and maintenance of active community commitment. During the Aneityum project, the compliance of people taking the MDA was as high as 88%. The maintenance strategy used to sustain the malaria-free status on Aneityum for more than ten years has consisted of continued active surveillance, including blood filming of all arriving passengers on the bi-weekly flights from Port Vila and the neighbouring island of Tanna and continuous bed-net usage with re-impregnation once a year. By far the key to sustaining its malaria-free status has been the continued commitment by the community, which has been driven by economics: they know that if malaria cases are reported, the ocean liners full of tourists that regularly stop over, as well as tourists coming from Port Vila that constitute the single source of income for the community, will bypass Aneityum and their livelihood will be wiped out.

In 2002, a few cases of P. vivax reappeared among children on Aneityum but not in adults, suggesting persistent protective immunity, even after a decade of being malaria free. Age-specific (under 20 years old) mass administration of a 14-day course of primaquine was implemented after the P. vivax resurgence on Aneityum in October 2002. In the evaluation, based on hemoglobin (Hb) and body mass index (BMI), the results for Aneityum showed higher levels of Hb and BMI, compared with mesoendemic Ambae island, although differences were not significant between Aneityum and hypoendemic Tanna island. During the last 15 years, there has been a significant development of community-based tourism on Aneityum. The challenge for the 21st century is to sustain the malaria-free environment, together with the expected increased population mobility brought about by tourism.
In the 1970s, during the Malaria Eradication Program, some islands in the Northern and Western parts of Solomon Islands reached the consolidation phase through high coverage of IRS with DDT.

Progress during the past decade, and especially during the past few years, has indicated that the trend of malaria in both countries is decreasing significantly and malaria incidence could continue to reach levels approaching elimination in parts of Vanuatu and Solomon Islands, but not in Papua New Guinea, at least in the near future. It encourages all three countries to revise their programme goals towards elimination, despite current annual parasites incidence rates that are the highest in the Western Pacific Region. Solomon Islands and Vanuatu, however, have already set their vision to eliminate malaria in the future and started preparing pilot projects for elimination in selected provinces: Tafea in Vanuatu and Temotu in Solomon Islands.

The factors favouring future elimination of malaria, in addition to adequate funding for Solomon Islands and Vanuatu, are the availability of effective tools for vector control (IRS and LLIN), effective drugs such as ACTs, limited population movement between islands and island groups where there are controllable entry points, the increasing political commitment to health systems and social development, together with the renewed interest and support from the international community at all levels.

2.6 Programme issues

2.6.1 Surveillance and programme monitoring and evaluation

With the increased scale of investment for malaria control in the Pacific region, there is a significant need for improved regular monitoring of progress and periodic evaluation of impact of the interventions.

The main objectives of malaria programme monitoring and evaluation are to: 1) monitor the impact of the programme, 2) monitor the performance of the programme, especially access to early diagnosis and treatment (EDAT) and coverage and usage rates of bed nets/ITN/LLIN, and 3) assess the programme management (reporting, supervision etc). Different levels of M&E (input, output, outcome and impact) have different indicators. All these can be generated by routine collection of data (HIS, MIS, and other) and periodic surveys (household and health facility surveys; prevalence, drug use, malaria indicator surveys; countrywide surveys like the Demographic and Health Survey DHS or subnational surveys). Some survey tools are available, such as the malaria module for the DHS and the malaria indicator survey tool from RBM/MEASURE/WHO (which was distributed during the meeting).

Documents from the WHO Global Malaria Programme (GMP) related to malaria indicator description and data collection and management were introduced these include: (1) Global Malaria Indicators and their Measurements Guide (September 2007); (2) standard reporting forms: integrated register and reporting forms, malaria patient card and monthly stock management form for medicines and laboratory supplies (from the WHO Case Management: Operations Manual, 2007); and (3) Country Database for Malaria Control (First Edition, November 2006).

In total there are 15 global indicators recommended by WHO, out of which ten are indicators generated through routine data collection, and the remaining five are coverage indicators measured through household surveys (Tables 2 and 3). The programmatic indicators are to be measured at least annually. They (1) measure the extent to which inputs meet the need for programme interventions, at prescribed levels of quality, and (2) assess the impact of the programme; they are generated as regularly-collected programme and surveillance data. The coverage indicators measure the extent to which the interventions delivered are actually reaching the population in need and are used by the population. They are normally measured by household surveys.
In most countries, there is lack of consistent quality routine Health Management Information System (HMIS) data for decision making and planning; since there are no standardized data collection forms for programme performance indicators, tracking progress and programme performance is difficult. Standard reporting forms developed by WHO were presented, and countries may pilot the use of these data collection tools and summary forms. The Country Database for Malaria Control is a comprehensive management tool with the purpose to: (1) have all malaria programme-related data in one database, (2) track the malaria programme performance, (3) support the institutionalization of effective programme monitoring and evaluation (M&E) in the countries, (4) facilitate the regular reporting and exchange of country data with regional and global levels. It includes country information (administrative regions, demography, maps), epidemiological data (including case reporting), malaria control programme structure, staff and financing, national policies and strategies, programme monitoring and performance indicators, including coverage of major antimalarial interventions, and data from antimalarial drug efficacy and insecticide resistance monitoring.

Currently, in Vanuatu and other countries that have shown interest in the database, it is being adapted to harmonize with the existing country HIS. Two local staff from Vanuatu attended the training in Myanmar and are currently involved with the structuring of the information. The orientation of health workers on information collection has taken place. Challenges are that the case-management database requires individual data, while the cases reported through the HIS collected at different levels of health facilities are aggregated data; establishing an appropriate synchronized network between organisations/units involved in collecting malaria related information and in managing information systems; maintaining and upgrading the software; and increasing the availability of human resources.

2.6.1.1 Routine data collection indicators in the Pacific island countries

In Papua New Guinea, there is no separate malaria information system; the NMCP receives malaria indicator information through the monthly HIS reports, for which the National Department of Health Monitoring and Research Branch is in charge. Health centres provide the information on paper to the provinces, where data are entered into an electronic database and transmitted to the central level. The data is analysed at provincial and national levels. Information on number of malaria cases and incidence by sex, age, provinces, districts and health facility catchment area can be obtained through computerized analysis. Bednet distribution data are provided directly to the programme by the provinces (as part of the Global Fund reporting).

In Solomon Islands and Vanuatu, malaria information is collected though two systems, the routine HIS and the Malaria Information System (SOLMIS and VANMIS). In Solomon Islands, currently there is no plan to integrate these systems. Microscopy information is only collected through the MIS. The HIS collects clinically-diagnosed cases and unconfirmed malaria deaths. In Vanuatu, the number of malaria cases treated and the number of deaths related to malaria is collected through different levels of health services (aid post, dispensary, health centre and hospital), and is passed on to the national health information system office through the provincial health offices. However, the blood test results from malaria microscopy services are sent directly to the national malaria office. The HIS is being revised and harmonized and will in the future integrate the malaria blood test results.

Experiences with collection of national data for use at the global level were made in 2007, when WHO collected data for the WHO World Malaria Report 2007. For the national level, all three countries reported the annual number of confirmed malaria cases and malaria-related deaths, but only two countries had a breakdown by uncomplicated and severe cases; no age breakdown was available. For the provincial level, only two countries reported uncomplicated and severe malaria cases, but none had data on confirmed malaria cases. Among the operational indicators, the annual number of ITNs distributed, data on IRS and numbers of RDTs distributed were available in all three countries, but the number of treatment doses distributed was not available in one.
2.6.1.2 Survey indicators in the Pacific island countries

Five global malaria indicators can only be obtained by household surveys; (1) percentage of malaria cases receiving prompt and effective treatment; (2) percentage of at-risk households with at least one net, (3) percentage of at-risk population sleeping under an ITN the previous night, (4) percentage of households sprayed; and (5) percentage of population protected by IRS.

In the Pacific, only Solomon Islands reported the availability of surveys in the 2007 World Malaria Report: a GF-supported household survey and the health module of the Household and Expenditure Survey in 2005-2006.

Papua New Guinea has planned a malaria indicator household survey for 2008, to be carried out by the Papua New Guinea IMR; a few malaria indicators have also been included in the 2006 DHS. Vanuatu is in the process of conducting a population-based survey to collect the coverage indicators for the program; this data collection will be integrated in the Multiple Indicator Cluster Survey (MICS), but specific questions had to be added to generate this information as it had not been part of the existing MICS survey instrument. The Vanuatu government is implementing the MICS with financial support from UNICEF and GF, and technical support from UNICEF and WHO.

Since surveys are major undertakings, surveys regarding malaria indicators (household and health facility) should be integrated into other national surveys. To obtain better routine malaria data, the cooperation with the HIS is mandatory. Funding for malaria also should contribute to substantial strengthening of HIS at all levels to have better coordination of data collection and integration.

2.6.2 Human resources and capacity building

2.6.2.1 ACTMalaria

Human resources are of invaluable importance for the success of the malaria control programmes in the countries, especially at a time where financial resources are in abundance. A common problem faced by the Pacific Island countries is the lack of human resources in many areas of curative and preventive health services. The limited laboratory capacities and limited number of trained microscopists in all three countries (only around 10% of the health facilities in Papua New Guinea and Vanuatu can currently perform parasite-based diagnosis) lead to over-diagnosis of malaria and over-prescription of antimalarial drugs. There is a lack of trained health staff dealing with programme management, monitoring and evaluation and malaria vector-control measures (such as treated bed-net promotion, distribution of nets, collection and distribution of retreated nets, carrying out IRS etc). Procurement and supply management also lacks human resources, as sometimes there are only very few pharmacists available within countries. The NGO sector and faith-based organizations play a major role in service delivery and community mobilization in this part of the world.

The Asian Collaborative Training Network for Malaria (ACTMalaria) was established more than ten years ago to promote and strengthen regional and national technical and management capacities in malaria control in member countries, and to enhance the relationship among member countries and partners through continuous knowledge and experience sharing. The present members are the national malaria control programmes of Bangladesh, Cambodia, China, Indonesia, the Lao People’s Democratic Republic, Malaysia, Myanmar, Philippines, Thailand and Viet Nam. Since its inception in 1996, ACTMalaria has organized various training sessions and workshops, as defined by members’ needs and priorities including: 1) Management of Malaria Field Operations (MMFO); 2) Broadening Involvement Team Training Workshop (BITTW); 3) Drug Policy Development (DPD) and Implementation Review; 4) Transfer of Training Technology (TTT); 5) Operations Research Training (ORT); 6) Severe Malaria Management; 7) Training of Trainers (TOT) on Judicious Use of Pesticides; 8) Drug Quality Monitoring; 9) Malaria Epidemic Management & Surveillance Workshop 10) In vitro drug resistance testing for Plasmodium falciparum;
11) External Assessment of Malaria Microscopy. ACTMalaria also effectively shares and exchanges information with member countries and partners through its website (www.actmalaria.net), ACTMalaria News (every two months) and the ACTMalaria Information Resource Center (http://resource.actmalaria.net).

The activities of ACTMalaria for 2007/2008 include: 1) slide bank establishment (in collaboration with WHO, Research Institute for Tropical Medicine (RITM) and National Malaria Centre Cambodia (CNM) for quality assurance of microscopy; 2) Pharmaceutical Management for Malaria (in collaboration with Management Sciences for Health (MSH) and the National Institute for Malariology, Parasitology and Entomology Viet Nam (NIMPE)); 3) Vector Control Management (in collaboration with CNM and WHO); 4) Instructional Skills Development for Malaria Microscopy Trainers (in collaboration with Department of Health, Philippines); 5) Management of Malaria Field Operations (in collaboration with Ministry of Health, Thailand); and 6) development of online training for the ACTMalaria Information Resource Center (AIRC). Papua New Guinea has applied to become an ACTMalaria member and is currently in the process of reviewing and acceptance.

2.6.3 Health systems strengthening

A health system consists of all organizations, people and actions whose primary intent is to promote or maintain health. The key functions of a health system are: 1) provision of health services; 2) develop health workers and other key resources; 3) mobilize and allocate health finances; and 4) ensure good leadership. It will be impossible to achieve the national and international goals, including the Millennium Development Goals, without greater and more effective investment in health systems and services. In the past six decades, a lot has been accomplished, but there have been some key health system challenges in sustaining health outcomes, such as low capacity, fragmentation and duplication of health systems, extreme shortage of health staff in some countries, rising and unsustainable health care costs, low usage of medical equipment in developing countries, missed information in vital registration systems etc., which obviously become the main obstacles to scaling up efforts to achieve health outcomes.

Attention has been drawn and consensus has been made among donors and international societies. The Rome and Paris Declaration on Aid Effectiveness (2003/3005) was adopted, and the Pacific Principles of Aid Effectiveness was agreed upon in July 2007. This would focus more on: 1) country needs, priorities and building country capacity and systems, and 2) enabling country ownership of their national development agenda, with support of development partners. The Global Fund, GAVI Alliance Board and World Bank have pledged support in encouraging missions contributing to strengthening of health systems.

The Strengthening Health Systems to improve Health Outcomes - WHO Framework for Action (2007) concentrates on how the WHO Secretariat can provide more effective support to Member States. The framework has four pillars:

1) A single health systems framework with six building blocks:
   a. Financing
   b. Health workforce
   c. Information
   d. Medical products, technologies
   e. Service delivery
   f. Leadership / governance
2) Health systems and health outcome programmes (Working Together): getting results:
   a. Extending existing interactions
   b. Systematic thinking about health systems constraints and actions
   c. Greater consistency, quality and efficiency in methods, tools and data

3) A more effective role for WHO at country level to:
   a. Improve capacity to diagnose HSS constraints
   b. More involvement in overall sector policy and strategy processes
   c. Build national capacity for policy analysis and management
   d. Monitor HS performance towards national decision making

4) The role of WHO in the international health systems agenda:
   a) Produce global standards and guidance
   b) Shaping international systems that impact on health
   c) Reinforce international partnerships

   A health system is a set of inter-connected parts that have to function together to be effective. HSS at country level is a priority for WHO and a holistic approach needs to be taken. The next step is to make the HSS strategy operational and continue with capacity building and resource mobilization towards the process.

2.7 Partner contributions to malaria control in the Region

   Several partners have been actively working in the Pacific countries, with the noble purpose to assist and scale up the fight against Malaria. These include:

* The health system in Papua New Guinea includes health administration organizations i.e., the Department of Health, provincial health offices, district health offices, with one malaria adviser/coordinator in a few provinces and zero in others. It also includes curative/public health facilities i.e. base hospitals, provincial hospitals, health centers, sub-health centers and aid posts. Limited number of private hospitals and clinics are distributed mainly in cities. There was a vertical malaria control network in 1970s and it and its human resources were integrated into general health system when decentralization happened in Papua New Guinea. Microscopy services are provided mostly in the health facilities in cities. The current number and capacity of malaria human resources do not meet the request of implementation of a nationwide programme.

* Currently Solomon Islands is going through a health system reform and adopting a sector-side approach to health through a HSS program.
2.7.1 The Global Fund to Fight AIDS, Tuberculosis and Malaria

The GF is currently the biggest investor in malaria control in Pacific countries with four major projects being implemented. Vanuatu and Solomon Islands were part of the multi-country Global Fund grants in Rounds 2 and 5, amounting to a total of US$ 11,153,860, and will be submitting another proposal through the Rolling Continuation Channel (RCC) in 2007. Papua New Guinea was successful with its malaria proposal in Round 3, by which it received US$ 20,105,690, and may be submitting a new proposal in 2008. With such large-scale investments, the paradigm shifted from not having enough money for an effective response to malaria control to a struggle to use the available funds in an effective way. There have been delays, such as in placing orders, receiving materials, and distributing materials within the countries, all of which have delayed programme implementation. Other challenges, such as poor coordination among stakeholders, ineffective operational and human resource planning, poor assessment of productivity, inability to maintain a constant flow of funds as well as other programme management issues need urgent attention in order to maximize the funding currently available in all three Pacific countries.

2.7.2 AusAID

AusAID is another big investor in malaria control in Pacific countries. In May 2007 AusAID announced funding of 26 million Australian dollars over four years for Vanuatu and Solomon Islands as part of the Pacific Malaria Initiative, to support partner governments in strengthening their health systems, to improve malaria surveillance and control programmes, and to fund research contributing to malaria prevention and control/elimination. Those most at-risk in the community, such as pregnant women and children in zones of high malaria incidence, would be the main target population. The initiative sits within broader health sector support programmes that are currently under development in Pacific countries, and would closely coordinate with existing support mechanisms. This funding is additional to the existing support for malaria control in the Region, through contributions from international partners such as the GF, the Secretariat of the Pacific Community (SPC) and WHO.

From July 2007, AusAID has committed to funding up to a 15 million Australian dollars to Solomon Islands, up to six million Australian dollars to Vanuatu; and up to a five million Australian dollars for malaria research within the Region. It is expected that Papua New Guinea will be added to the initiative, starting in 2008. AusAID support to the Solomon Islands malaria programme will be in line with the strategic directions outlined in the Solomon Islands Health Sector Support Program (HSSP) Implementation Plan. Support to the Vanuatu malaria programme will be in line with the National Strategy on Malaria, as defined by the Ministry of Health.

AusAID has established a Malaria Reference Group (MRG) to provide high-level technical advice on the planning, implementation and evaluation of the Pacific Malaria Initiative. The MRG is chaired by Professor Sir Richard Feachem, former Executive Director of the GF.

The Pacific Malaria Initiative Support Centre (PacMISC) has been established with the aim to provide technical assistance to Vanuatu and Solomon Islands; engage in training and capacity building; support operational research, monitoring and evaluation, logistics; provide assistance with procurement, programme management and support malaria-elimination in pilot areas. The University of Queensland (in a consortium with the Queensland Institute of Medical Research and the Australian Army Malaria Institute) has been engaged to develop a concept note and design for PacMISC, in consultation with partner governments and other key stakeholders, in October/November 2007.

2.8 Framework for Regional Cooperation

One of the major objectives of the 14th SWPMM was to identify similar problems faced by the Pacific malaria-endemic countries related to scaling up of malaria control, and to develop ways to address them regionally through a framework for regional cooperation. This framework may guide
the support from major partners and regional initiatives for malaria control now available in the Pacific region.

In order to discuss and develop this, the meeting attendees split into two working groups: country participants (Papua New Guinea, Solomon Islands and Vanuatu) in one group and partner organizations in the other (ACTMalaria, AusAID, GF, PacMISC, WHO). The groups identified common problems related to scaling up of malaria programmes and possibilities for regional synergies and cooperation, and the partners identified areas of support they could offer to the countries in their efforts to scale up malaria control or pilot malaria elimination. The outcomes of intense discussions were the following:

2.8.1 Common problems in scaling up malaria control in the Pacific island countries

The common weaknesses and areas which need further development were identified as:

1) Human resources
2) Infrastructure/health system
3) Monitoring and evaluation
4) Diagnostic capacities (coverage and quality)
5) Drug quality monitoring and adverse drug reaction monitoring
6) Community mobilization
7) Operational research – especially malaria in pregnancy, antimalarial drug efficacy, vivax malaria, ITN issues, behavioural changes of vectors and humans
8) Malaria elimination on islands

2.8.2 Areas of partner support

The six main areas of possible support as identified by the partner organizations were:

1) Programme management: management training, technical assistance, procurement, logistics and supply management
2) Surveillance/reporting and M&E: situation analysis, indicator review, support and training in data analysis, sentinel sites, support to conduct periodic household surveys and DHS (malaria module)
3) Human resources development: in-country training and training abroad, support of regional training centres, ACTMalaria's MMFO for the Pacific
4) A Pacific Regional Antimalarial Drug Network: regular antimalarial drug efficacy monitoring in sentinel sites, antimalarial drug quality monitoring, quality assurance of malaria rapid diagnostic tests, designation of regional reference laboratories
5) Operational research:
   - malaria in pregnancy
   - \textit{P. vivax}: a range of operational research questions need to be addressed, e.g. G6PD deficiency mapping
- insecticide resistance monitoring
- models for cost-effective ITN distribution and replacement
- behavioural studies of vectors, alternative methods of vector control

6) Malaria elimination: on the ground support to elimination teams such as for planning, project management, logistics, M&E.

In addition, organizations were identified that could contribute at each level of the support needed. It was also decided that detailed technical planning meetings would be required in the areas of a) support for malaria elimination, and b) operational research, as well as coordination meetings.

Both groups presented the summaries of their discussions. It was very encouraging to note that both groups nearly discussed and presented the same burning issues. Finally in plenary, through broad dialogue on issues that countries could manage, and areas they desire support, and partners’ willingness to support those areas within their capabilities, the Framework for Regional Cooperation was created.

2.8.3 Framework for Regional Cooperation

1. STRENGTHENING HUMAN RESOURCES

Based on human resource development plans:

- Training abroad - scholarships:
  postgraduate, Diploma in Applied Parasitology and Entomology, generic management, etc.

- In-country training (esp. for district level):
  MMFO course adapted (ACTMalaria), implemented regionally at SIMTRI

*Available resources: DWU, MOH, SIMTRI, UPNG*
*Partners: ACTMalaria, AusAID (PacMISC), GF, WHO*

2. SURVEILLANCE, M&E

- Strengthening health information systems (integrated)
- Strengthening programme monitoring (routine monitoring and surveys, country database)

*Available resources: MOH, PNGIMR*
*Partners: AusAID (PacMISC), GF, SPC, WHO*

3. RESEARCH

- Supporting and strengthening (including capacity building) operational research, including:
  - malaria in pregnancy
  - malaria treatment issues
  - vivax malaria including G6PD deficiency, Pacific vivax research meeting
  - cost effectiveness of net distribution and replacement strategies
• insecticide resistance
• alternative vector-control measures
• behaviour change of vectors and humans
• and others as they evolve

Available resources: DWU, MOH, PNGIMR, UPNG,
Partners: AAMI, AusAID (PacMISC), JCU, SPC, WHO and others

4. REGIONAL REFERENCE LABORATORIES

Identify and support laboratories for
- Drug efficacy monitoring: molecular analyses (eg PNG-IMR, SIMTRI), drug plasma levels (eg PathWest)
- Drug quality (eg TGA)
- Rapid diagnostic test batch testing (eg. AAMI, IMR, RITM)

5. NETWORKING

- Improved regional coordination through annual meetings between the three national malaria control programme managers and partners
- Increased information sharing, e.g. through ACTMalaria Resource Centre, moderated email forums
- Share experiences and participate in activities of ACTMalaria through membership in this network

6. HEALTH SECTOR SUPPORT

Strengthening, as part of health sector support:
- Procurement, distribution and supply management of medicines/RDTs/nets through existing systems
- Adverse drug reaction monitoring
- Drug quality monitoring

Available resources: DRAs, MOH
Partners: AusAID (PacMISC), GF, SPC, TGA, WHO

7. DIAGNOSTIC QUALITY

Strengthening establishment and implementation of
- Microscopist training
- Quality assurance of microscopy (including microscopist certification)
- Quality assurance of RDTs

**Available resources:** MOH, PNGIMR  
**Partners:** AAMI, GF, WHO

8. **ELIMINATION IN SMALL ISLANDS**

- Is part of the national plans of Vanuatu and Solomon Islands
- Technical meeting to plan details of implementation and monitoring (jointly with Papua New Guinea)

**Partners:** AusAID, Karolinska Institute, SPC, WHO.

3. **RECOMMENDATIONS**

3.1 **Malaria case management**

3.1.1 Malaria diagnosis

- Quality assurance for microscopy and rapid diagnostic tests (RDTs) should be established in all three countries
- Due to the high percentage of vivax malaria, combined RDTs should be used
- A regional RDT quality assurance system for after-procurement batch testing should be established

3.1.2 Antimalarial drug resistance

- A Pacific Antimalarial Drug Network should be established (possibly including Indonesia and East Timor) to deal with drug resistance, drug quality, procurement and supply management and diagnostics issues
- Sentinel sites should be set up for antimalarial drug efficacy monitoring, as part of national malaria control programmes
  
  Proposed sites in each country:
  - Papua New Guinea: 3 (coastal, highlands, islands)
  - Solomon Islands: 2-3 (south, central, north)
  - Vanuatu: 1 (north)

- Regional reference laboratories should be identified and supported for
  - genotyping and molecular markers of *P. falciparum*
  - chloroquine plasma levels for *P. vivax*
  - quality assurance of microscopy in antimalarial drug efficacy studies

- National malaria control programmes should cooperate with professional associations in antimalarial drug efficacy monitoring.
3.1.3 Malaria treatment

- National malaria treatment guidelines should be reviewed, based on available national antimalarial drug efficacy data

- Artemisinin-based combination therapy (ACT) treatment should be prescribed based on the result of a parasite-based diagnostic test. In cases of suspected severe malaria, or in children less than five years old, or where patients are at risk of death, treatment should not be withheld because of the absence of diagnostic facilities

- The rollout of artemisinin-based combination therapy (ACT) should not be delayed

- Distribution of antimalarial medicines (including ACTs) and rapid diagnostic tests (RDTs) should be integrated into the existing pharmaceutical-distribution systems so that even the most peripheral levels of the health systems receive regular and adequate quantities

- Pre-referral treatment with artesunate suppositories for suspected severe malaria should be introduced

3.1.4 Malaria in Pregnancy

- Introduction of intermittent preventive treatment during pregnancy (IPTp) should be based on scientific evidence of its effectiveness in Pacific countries

- Coordinated high quality operational research on IPTp should be conducted to support development of national policies

- Targeting most vulnerable populations, especially pregnant women and children, should be a priority for national malaria control programmes (NMCPs). NMCPs should take effective action jointly with maternal and child health programmes to provide early diagnosis and treatment of malaria, free insecticide-treated bed nets and information, education and communication (IEC)

3.1.5 Monitoring Drug Quality

- Malaria programmes should cooperate with the drug regulatory authorities in each country to implement monitoring of the quality of medicines, including antimalarials, especially those being used in the private sector

- A regional support system for confirmatory testing and technical support for country quality monitoring of antimalarial medicines should be established

3.1.6 Pharmacovigilance

- National adverse drug reaction monitoring systems should be introduced and strengthened.

3.2 Vector control – ITN/LLIN and IRS

- All NMCPs should accelerate ITN/LLIN implementation to achieve a universal coverage of all population at risk

- Indoor residual spraying (IRS) is an effective method for reducing malaria transmission in Pacific countries but it requires a major investment in personnel, insecticides, equipment and logistics. Countries should take this into account when making a decision on whether to scale-up or re-introduce IRS
- Capacity should be developed at national level for monitoring mosquito behaviour and resistance relative to insecticide pressure due to ITNs/LLINs and IRS

- National and regional capacity for entomology and vector control should be strengthened, and appropriate training resources should be identified in the Region

3.3 Malaria elimination

- Elimination pilot projects in Solomon Islands and Vanuatu should be carefully planned based on the Aneityum model but incorporating changes based on local situations, changes in treatment regimens since the Aneityum project and the incorporation of IRS

- A standard method for monitoring and evaluating the malaria elimination pilot projects should be established that can be used by both Solomon Islands and Vanuatu

- Inputs into elimination projects need to be carefully monitored so they do not absorb funds and other resources necessary for the implementation of the overall national malaria control programmes

3.4 Malaria control programme issues

- Available malaria indicators/data should be reviewed and harmonized with global key indicators (taking into account the cost effectiveness of the selected indicators), to provide information required for programme management, monitoring and evaluation. This requires coordination and linkages with national health information systems and donors

- National malaria surveillance systems should be strengthened, through training at all levels and through changing the staff’s mindset so they understand the importance of data for monitoring programmes and for demonstrating achievements

- A common malaria indicator survey tool (based on existing tools) should be developed for improving the monitoring of country programmes

- National programmes should consider adopting the WHO comprehensive malaria country database as a programme management tool

3.5 Regional cooperation

- The Framework for Regional Cooperation developed during this meeting should be supported by partners and implemented (especially in areas of monitoring and evaluation, human resources and operational research) in order to accelerate malaria control and elimination in target areas in the Pacific Region

- Coordination among partners should be strengthened to maximize regional cooperation.
## Table 1: Current national malaria treatment guidelines in malaria-endemic Pacific island countries

<table>
<thead>
<tr>
<th>COUNTRIES</th>
<th><strong>P. falciparum</strong></th>
<th><strong>P. vivax</strong></th>
<th>Prophylaxis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Uncomplicated</td>
<td>Treatment failure</td>
<td>Severe malaria</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>CQ3d / AQ3d* + SP (day 1 25mg/kg BW)</td>
<td>AM (i.m., day 1 3.6 mg/kg BW, day 2-7 1.6mg/kg BW) + SP (day 3, 25mg/kg BW) or If patients can swallow: AS (tab., day 1 4 mg/kg BW, day 2-7 2mg/kg BW) + SP (day 3, 25mg/kg BW) In 1st trimester of pregnancy: QN7d + SP(day 3, 25mg/kg BW)</td>
<td>CQ3d + SP1d</td>
</tr>
<tr>
<td></td>
<td>CQ3d + SP1d</td>
<td>QN7d + SP1d in 2nd and 3rd trimester</td>
<td>CQ3d + PQ14d</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>CQ3d + SP1d</td>
<td>QN7d + SP1d in 2nd and 3rd trimester</td>
<td>CQ3d + PQ14d</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>CQ3d + SP1d</td>
<td>QN7d</td>
<td>CQ3d + SP1d</td>
</tr>
</tbody>
</table>

*AQ3d for children <5 yrs
Table 2: Summary of the annually monitored Global Malaria Performance Indicators (Source: WHO 2007)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Indicator</th>
<th>Calculation</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Residual Spraying</td>
<td>1. Percentage of households sprayed</td>
<td>Numerator: Number of household sprayed x 100</td>
<td>Monitor operational coverage of IRS and magnitude of operational inputs.</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total number of households targeted for IRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Percentage of at targeted populations protected by IRS</td>
<td>Numerator: Total no. of people protected by IRS x 100</td>
<td>Monitor coverage of IRS in population at risk</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total no. of people targeted to be protected by IRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insecticide Treated Nets</td>
<td>3. Percentage of ITNs delivered to targeted (at-risk) pop</td>
<td>Numerator: Number of ITN sold or distributed x 100</td>
<td>Monitor input or logistic supply of ITN against total needs or population at risk without ITN</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total no. ITNs required by population at risk that do not already have a net.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Management</td>
<td>4. Percentage of malaria cases tested</td>
<td>Numerator: Number of tested malaria cases (by microscopy or RDT)</td>
<td>Monitor progress in providing diagnostic services to guide malaria treatment</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total no. of reported malaria cases (uncomplicated and severe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Percentage of confirmed malaria cases reported annually</td>
<td>Numerator: Number of malaria cases (uncomplicated and severe) confirmed (by rapid diagnostic test or microscopy) desegregated by &lt;5 and ≥5 years</td>
<td>Monitor rational use of antimalarial medicine to treat confirmed cases</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total no. of reported malaria cases (uncomplicated and severe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Percentage of potential malaria cases covered by effective treatment courses delivered</td>
<td>Numerator: No. of ACTs as first-line treatment courses delivered x 100</td>
<td>Monitor operational coverage of access to effective treatment using ACT or nationally recommended 1st-line treatment.</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total number of reported malaria cases (uncomplicated and severe)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7. Rate of malaria admission (%) in under 5 and above 5 years of age</td>
<td>Numerator: No. of malaria admissions (severe malaria cases in under 5 and above 5 years of age) x 100</td>
<td>Monitor impact of interventions in reducing admission due to malaria in the vulnerable age groups depending on epid. setting</td>
</tr>
<tr>
<td></td>
<td>Denominator: Total number of all-cause admissions (probable and confirmed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All antimalarial interventions</td>
<td>8. Reported malaria cases per 1,000 population per year</td>
<td>Numerator: Number of uncomplicated and severe malaria cases x 1,000</td>
<td>Measure impact of interventions on the morbidity or incidence of malaria in the general population at risk</td>
</tr>
<tr>
<td></td>
<td>Denominator: Mid-year resident population</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9. Rate of reported severe malaria cases per 100,000 population per year</td>
<td>Numerator: Number of severe malaria cases x 100,000</td>
<td>Measure impact of interventions on the incidence of severe malaria in the general population at risk</td>
</tr>
<tr>
<td></td>
<td>Denominator: Mid-year resident population</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10. Malaria attributed deaths per 100,000 population per year</td>
<td>Numerator: Number of malaria-related deaths x 100,000</td>
<td>Measure impact of interventions on the malaria attributed deaths in the general population at risk</td>
</tr>
<tr>
<td></td>
<td>Denominator: Mid-year resident population</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Summary of the coverage indicators measured using household surveys (Source: WHO 2007)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Indicator</th>
<th>Calculation</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Residual</td>
<td>1. Percentage of households sprayed</td>
<td><em>Numerator:</em> Number of at risk surveyed households sprayed x 100</td>
<td>Evaluate household coverage of IRS (assessment independent of the programme reports.)</td>
</tr>
<tr>
<td>Spraying</td>
<td></td>
<td><em>Denominator:</em> Total number of households at risk of malaria surveyed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Percentage of populations protected by IRS</td>
<td><em>Numerator:</em> At-risk surveyed population protected by IRS x 100</td>
<td>Evaluate coverage of IRS in population at risk (assessment independent of the programme reports.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Denominator:</em> Total population at risk of malaria surveyed</td>
<td></td>
</tr>
<tr>
<td>Insecticide Treated</td>
<td>Percentage of at-risk households with at least one net</td>
<td><em>Numerator:</em> Number of at-risk households surveyed with at least one ITN x 100</td>
<td>Evaluate coverage of ITN ownership at household level (supply originating from different sources)</td>
</tr>
<tr>
<td>Nets</td>
<td></td>
<td><em>Denominator:</em> Total number of at-risk households surveyed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of at-risk population sleeping under ITN the previous night</td>
<td><em>Numerator:</em> Number of at-risk people in the sample sleeping under ITN X 100</td>
<td>Evaluate coverage of ITN use by vulnerable population at household or community level (independent of programme report)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Denominator:</em> Total number of at people at risk surveyed</td>
<td></td>
</tr>
<tr>
<td>Case Management</td>
<td>Percentage of malaria cases receiving prompt and effective treatment</td>
<td><em>Numerator:</em> Number of children under five years of age with fever or malaria during the previous two weeks who received efficacious antimalarial medicines within 24 hours of onset of fever x 100</td>
<td>Evaluate coverage of access to effective treatment in under 5 years of age at household or community level (independent of programme report)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Denominator:</em> Total number of children under five years of age with fever or malaria during the previous two weeks in the population surveyed</td>
<td></td>
</tr>
</tbody>
</table>
PROGRAMME OF ACTIVITIES

Tuesday, 9 October 2007

08:00  Registration

08:10  Setting up of country posters

08:30  Opening ceremony
Welcome address – Dr E. Sorensen, WR, Papua New Guinea
Short remarks – Dr Clement Malau, Secretary of Health
Designation of Chairman, co-Chairman and Rapporteurs
Group photograph

09:30  Tea/Coffee break

10:00  Review of the current malaria situation in WPR – E.M. Christophel

Country presentations: (15 min/presentation + 5 min discussion)
10:10  Papua New Guinea – L. Makita
10:30  Solomon Islands – A. Bobogare
10:50  Vanuatu – G. Taleo

11:10  Overview of case management – Dr Xia Gang

11:20  Update on malaria diagnosis, malaria microscopy, RDTs-QA and field implementation – J. Luchavez

11:40  Discussion: Next steps for RDTs and microscopy in the Pacific

12:00  Lunch break

13:00  Overview of antimalarial drug efficacy in the WPRO and Standardization of antimalarial drug efficacy monitoring – E.M. Christophel
Discussion – 5 mins.

13:20  Updates of antimalarial drug efficacy in SOL – L. Wini

13:30  Current knowledge of antimalarial drug resistance of P. falciparum and P. vivax in PNG, including at the molecular level – I. Mueller

13:40  Discussion: Next steps for building a Pacific antimalarial drug efficacy monitoring sentinel site network

13:50  WHO recommended treatment policy – Dr Xia Gang

14:00  Treatment policy change to ACT/ ACT implementation in SOL – D. Ghabu
14:15 Malaria treatment in VAN (Vivax Malaria & G6PD Deficiency) –
H. Garae

14:25 Curative and Preventive malaria drug research study results in PNG –
I. Mueller

14:35 Discussion: Next steps for malaria treatment in PNG, SOL and VAN

14:45 Coffee/Tea break

15:10 Updates on situation and ongoing IPTp trial from SOL – L. Wini /
B. Appleyard

15:20 Research on malaria in pregnancy in PNG – I. Mueller

15:25 Preliminary Data on the ongoing IPTp study in PNG - F. Hombhanje

15:35 Discussion: Next steps for malaria interventions in pregnancy in
Pacific countries

15:45 PNG antimalarial drug quality survey – E. Sorensen

16:00 Mekong region antimalarial drug quality experiences – E.M. Christophel

16:10 The minilab: What else we need for drug quality monitoring? –
Y. Sano

16:25 Discussion: Building a Pacific drug quality network?

16:35 Procurement and supply management in Vanuatu – A. Mathias

16:45 PSM of malaria ACTs (including RDTs) and adverse drug reaction
(ADR) monitoring – Y. Sano

16:55 Discussion: Next steps for PSM and ADR

17:00-17:30 Poster exhibit

SOCIAL EVENT

Wednesday, 10 October 2007

08:00 Update on IRS and ITN, WHO perspective – K. Palmer

Country experiences: Use of DDT, major bottlenecks and role of partners

08:20 Papua New Guinea – L. Makita

08:30 Solomon Islands – A. Bobogare

08:40 Vanuatu – G. Taleo

08:50 Discussion

09:00 Malaria outbreaks in the PNG highlands – Role of mapping and IRS,
plans for 2008 – T. Pyakalyiar
09:10   Mapping of malaria in PNG Highlands and its role in IRS – *I. Mueller*

09:20   *Discussion*: Conclusions on ITN and IRS

09:30   Malaria elimination in Aneityum Island: What made it work? What makes it sustainable – *A. Kaneko*

09:50   Experiences with malaria elimination in SOL and VAN is countrywide malaria elimination feasible? – *R. Seyha*

10:05   *Discussion*: Next steps for PNG, Sol and VAN in malaria elimination

10:15   *Coffee/Tea break*

10:45   Update on WHO recommended indicators, reporting forms and WHO malaria country database – *Z. Zaixing*

11:00   Introduction of malaria country database in VAN – *G. Taleo*

11:05   Measuring malaria indicators through health information system and surveys – *E.M. Christophel*

11:15   *Discussion*: Next steps how to improve malaria reporting and programme M&E

11:30   *Lunch break*

13:00   Excursion to the IMR and public health facility nearby

**Thursday, 11 October 2007**

08:00   GFATM contribution to malaria control in the Pacific; Opportunities and challenges, including bottlenecks for country implementation- *B. Parr*

08:10   AusAID: Pacific Malaria Programme – *G. Moore*

08:20   Rotarian Against Malaria (RAM) – *R. Seddon*

08:30   Asian Collaborative Training Network for Malaria (ACTMalaria) – *C. Hugo*

08:40   A new framework for action-Health Systems Strengthening – *A. Reiffer*

09:00-10:00   *Discussion*

Group work: Identify common problems related to scaling up malaria control - Develop a framework for regional collaboration

(For example)

1. Programme Management issues
   * Human resources & capacity building/ Organizational / structural issues/
   Finance issues, funding partners
2. Programme Implementation issues
   * Technical issues and TA needs/ Policy issues/ PSM- Logistics

3. Programme M&E
   * Issues with measuring malaria indicators or surveys / Information storage
     Issues/ Information sharing issues/ Health systems issues/ Regional support centers, etc.

10:00  Coffee/Tea break
10:30  Group work continued
12:00  Lunch break

Presentation of National Malaria Control Country Plans 2008
13:00  Papua New Guinea – **L. Makita**
13:10  Solomon Islands – **A. Bobogare**
13:20  Vanuatu – **G. Taleo**
13:30  Discussion
13:45  Plenary: Presentations of working group results
14:45  Discussion
15:00  Coffee/break
15:30  Framework for Regional Collaboration
16:00  Meeting Conclusions and Recommendations
16:45  Closing ceremony
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ANNEX 3

SPEECH OF THE REGIONAL DIRECTOR

WELCOME REMARKS BY THE WHO REGIONAL DIRECTOR FOR THE WESTERN PACIFIC
AT THE OPENING OF THE
14th SOUTH-WEST PACIFIC MALARIA MEETING
(delivered by WHO Representative in Papua New Guinea, WHO/WPRO)

THE HONOURABLE SECRETARY FOR HEALTH, FRIENDS AND COLLEAGUES,
LADIES AND GENTLEMEN,

On behalf of Dr Shigeru Omi, WHO Regional Director for the Western Pacific, I am pleased to welcome you to Madang and the 14th South-West Pacific Malaria Meeting. Our sincere thanks to the Government of Papua New Guinea for hosting this meeting.

I also would like to welcome our partners, AusAID; the Global Fund to fight AIDS, Tuberculosis and Malaria; Rotarians Against Malaria; the Secretariat of the Pacific Community; University of Queensland / Australia; the Asian Collaborative Training Network for Malaria and others.

This series of meetings started in the 1970s as the South-West Pacific Malaria Meeting. Held roughly every four years, the meetings provided a forum for malaria-control workers and other health professionals from the Pacific region to share experiences and exchange information. The meetings also presented a chance for other countries, including Australia and New Zealand, that encounter a significant number of important malaria cases among tourists and other travellers to meet with their neighbours and better understand the regional malaria situation. I hope this meeting continues that strong tradition.

This meeting comes at a very important time for malaria-control programmes in the Pacific region. More resources are currently available for malaria control than at any time since the eradication era of the 1970s.

Papua New Guinea, Solomon Islands and Vanuatu are recipients of one or more large grants from the Global Fund. In addition, Solomon Islands and Vanuatu will receive AUD 20 million over three years from AusAID, starting this year. AusAID will also provide AUD 9 million over three years to Papua New Guinea, starting in 2008.

At present, malaria is still a major public health problem in three Pacific island countries: Papua New Guinea, Solomon Islands and Vanuatu. It is a major burden on the health services of all three countries and has a major impact on the economic growth and development. These three countries account for more than 60% of cases reported in WHO’s Western Pacific Region.

However, due to the hard work of these countries and support from international partners, the situation has markedly improved in the past few years. The reported annual malaria incidence rate in Solomon Islands is 158 per 1000 population, a 17% reduction from the 2004 rate and 65% less than the reported incidence of 451 per 1000 population in 1992. A similar reduction has been seen in Vanuatu. The scaling up of the malaria programme has started.

I would like to congratulate Solomon Islands and Vanuatu on having received an “A” rating for implementation of their round two Global Fund grants. They should be proud of that achievement.
I also understand that because of the “A” rating, Solomon Islands and Vanuatu were invited to submit a joint Global Fund proposal under the new rolling continuation channel, which if successful will provide US$ 52 million in funding over six years. That proposal was recently submitted. I am confident that you will be successful.

In Papua New Guinea, the malaria programme is at the halfway point of its round three Global Fund grant that will result in scaling up of malaria control throughout the country. I understand that there have been some problems with implementation, but with a strong push most of the important activities will be completed on time. I encourage Papua New Guinea to take the success of your neighbours as an example of what can be done.

The availability of major funding poses a major challenge to Papua New Guinea, Solomon Islands and Vanuatu national control programmes to produce results. You have a unique chance, which is not likely to come again, to scale up control measures to the point where the goal of eliminating malaria, something that ten years ago was just a dream, may be attainable.

In this regard, I wish to acknowledge the generosity and vision of AusAID in providing important funding to malaria control in the Region and in doing so, re-igniting the vision of malaria elimination for the Pacific.

Ten years ago, WHO supported the successful elimination of malaria from Aneityum Island in Vanuatu. Together with the Vanuatu malaria control programme, we showed that not only was elimination attainable, but it could be sustained. I understand that there has been no local transmission of malaria on Aneityum for ten years. That is a remarkable achievement.

I support the expansion of the Aneityum model to other islands with the eventual goal of eliminating malaria from both Solomon Islands and Vanuatu. In doing so, I call on other partners to join in supporting this major effort. The resources are there to make it possible, but it will only become reality if we all work together.

Elimination will only be one of the important topics to be discussed during this meeting. Papua New Guinea, Solomon Islands and Vanuatu are ready to change their malaria treatment policies putting artemisinin combination therapy as first-line treatment for the first time. This change will require a major effort on the part of not only the malaria control programmes, but also on all health workers and health structures. It is going to be important that health staff is well trained to use the new treatment and whenever possible do parasite-based diagnosis. It also is important that the new combination therapy reaches all health facilities as quickly and reliably possible.

You will also be discussing malaria diagnosis, indoor residual spraying and insecticide-treated nets, all of which are important elements of an effective control strategy. It is going to be a very busy three days.

The Sixtieth World Health Assembly earlier this year passed a new resolution on malaria (WHA60.18), which includes the establishment of World Malaria Day on 24 April of each year. The resolution urges Member States to make greater efforts to control malaria by both adopting effective strategies and providing sufficient resources. WHO is committed to continuously work closely with the Member States and partners to win the battle.

I wish all of you success, and look forward to learning of your conclusions.

Thank you.
REFERENCES

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