

Report on the

**Ninth intercountry meeting of national malaria
programme managers**

Marrakech, Morocco
22–24 September 2010

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1. INTRODUCTION

The ninth intercountry meeting of national malaria programme managers was organized by the WHO Regional Office for the Eastern Mediterranean and held in Marrakech, Morocco, from 22 to 24 September 2010. The objectives of the meeting were to:

- review the progress made and identify challenges and problems encountered in the implementation of malaria control and elimination strategies;
- update countries with new developments on malaria prevention, diagnosis and treatment;
- discuss regional and country strategies for malaria control and elimination for 2010–2016;
- discuss and monitor implementation of malaria Joint Programme Planning and Review Missions (JPRM) workplans for 2010–2011.

Dr Jaoud Mahjour, Director of Communicable Diseases Control, WHO Regional Office for the Eastern Mediterranean, delivered the message of Dr Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean. In his message, Dr Gezairy congratulated the Ministry of Health of Morocco for the remarkable success in the fight against malaria, and for certification of Morocco as malaria-free in May 2010. The solid record and experience of the country in maintaining the country free from *falciparum malaria* during those years, despite the huge influx of imported cases from neighbouring endemic African countries, would be of value to other countries.

In the Eastern Mediterranean Region there was urgent need to scale up efforts to achieve the WHO objectives as agreed upon in the Global Malaria Action Plan. He expressed satisfaction that universal coverage of diagnosis, treatment and prevention interventions had been adopted in the updated national 5-year malaria strategic plans of Somalia, Sudan and Yemen for 2011–2015, and targets had been set. With low reported incidence figures, the programmes should now put more emphasis on parasitological diagnosis. Every case of suspected malaria treatment should be confirmed before treatment. This would enable programmes to target treatment intervention to the population in real need, and would improve the quality of surveillance data. The role of operational and implementation research was of paramount importance. More collaboration with research institutes was needed, and innovative approaches to involve the community in inaccessible areas and private providers were to be piloted. He closed by urging programme managers to document their achievements and their stories of success or failure. This would provide lessons to the global community and would be of value to other countries.

The programme and list of participants are included as Annexes 1 and 2, respectively.

2. PROGRESS AND WAY FORWARD FOR MALARIA CONTROL AND ELIMINATION AT GLOBAL LEVEL

2.1 Progress and way forward for malaria control and elimination at global level

Dr Robert Newman, WHO headquarters

The World Malaria Report is a reference document for what happens in malaria in any given year. The World Malaria Report for 2010 will be launched in December 2010. Based on available data some progress is evident, but there are still major gains to be made. 53% of malaria deaths occur in 5 countries and 95% of deaths occur in 28 countries. Sudan and Somalia are among those 28 countries. Recent reports on the financing of malaria show that donors have increased their funding for malaria, however, it is important to note is that finances from countries themselves are not included. The contribution of malaria-endemic countries is important in sustaining malaria control and elimination in the future.

There is a need to move towards universal coverage. Progress has been made with different control measures, such as long-lasting insecticide-treated nets (LLINs), but these are not the only tools. There is also a need to focus on diagnosis and treatment. Diagnosis is just one example of how communities can understand what is happening in their communities and gives them the power to determine what is going on in their areas.

Resistance to artemisinin is emerging and a global plan for artemisinin-resistance containment has been produced. The overarching goal is to protect ACTs as an effective treatment for *P. falciparum* malaria. Pillars of activities to contain resistance include monitoring of resistance, improving diagnostics and investing in finding new drugs for malaria. One of the single biggest causes of the rise and spread of resistance are artemisinin-monotherapies (AMTs). If AMTs are being marketed in countries, steps should be taken with national regulatory authorities to stop this.

Resistance is also building to pyrethroids and there is also resistance to some other insecticides, such as organophosphates and carbamates. Much more research is needed in this area, for example, would a net treated with one insecticide and a wall hanging with different insecticides in the same house have a higher impact and reduce resistance.

There is a need to better capture the lessons that have been learned from elimination experiences and think carefully about what is required to eliminate malaria. New tools are being developed to allow programme managers to undertake malaria elimination targets. Eradication is the end goal. However, it is very far away and new tools are probably needed. The paradigm is changing. Previously, emphasis had been placed on reducing morbidity and mortality, but focus is now on reducing transmission. As a result, there is a greater need to think about the way that tools, such as diagnostics, treatment and community involvement, are used.

Discussion

Participants discussed the effects of climate change as a challenge for malaria control and the need for strengthened surveillance systems to detect climactic changes. They discussed the importance of microscopy for suspected treatment failures, severe malaria and for speciation and quantifying parasites.

The integration of community-based activities linked to other diseases is important in reducing transmission. Greater collaboration between all ministries, particularly the Ministry of Health and the Ministry of Tourism, and improved advocacy is needed for sustainability and increased funding. Showing where activities have had an impact is essential to convince policy-makers of the importance of investment in the national malaria programme. Available data already indicates where malaria is responsible for reducing gross domestic product and its elimination leads to increases in capital investment.

There is evidence that parasites are responding more slowly to ACTs than to artemisinin. Replacement medicines for artemisinins are still years away. The mechanisms of resistance to artemisinin are not yet understood and as of yet there is no molecular marker.

There are many different types of rapid diagnostic tests (RDTs) now available, some of which work well in hotter climates. Guidelines indicate which tests work best in which countries. Other mechanisms, such as basic cool boxes, can also be used. In areas in which RDTs are not suitable, quality control and microscopy are important.

Some countries want certification. Other countries are worried about raising the profile of malaria in their country. During the process of malaria eradication that led to certification in Morocco a key component was government commitment to maintaining the human and fiscal resources needed to sustain activities, such as malaria case surveillance, detecting and treating cases. Countries will not attain certification status unless there is adequate proof that adequate resources are being allocated to maintain malaria elimination. Greater focus on resources on the countries in which the burden of disease is highest.

2.2 Progress and challenges of malaria control in the Region

Dr Hoda Atta, WHO Regional Office for the Eastern Mediterranean

Data from the routine health information systems show a 44% reduction in malaria burden compared to 2000. According to estimated data, the major morbidity burden is carried by two countries (Sudan 62% and Pakistan 18%), followed by Somalia (9%), Afghanistan (8%), and Yemen (3%). Prevalence data from a recent survey in 10 northern states in Sudan showed a 38% reduction of parasite prevalence in 2009 (2.3%), compared to 2005 (3.7%). The prevalence of malaria in the Tihama area, Yemen, is gradually decreasing from 21.9% in 2000 to 4.5% in 2009. In 2009, Iraq reported zero local transmission, Saudi Arabia only 58 local cases and Islamic Republic of Iran more than a 70% reduction of local cases, in comparison to 2000.

Nationwide malaria surveys in 2009 in Sudan showed that ownership of LLIN increased to 40.3% (78%) in comparison with 2005, and 43% of fever cases were treated with ACT, while only 43% of facilities had functional microscopy and 10.5% had RDT. In Yemen only 15% of households had at least one LLIN. These figures show that there is still huge gap to reach universal coverage in priority countries.

Several achievements in malaria elimination have been accomplished in the last decade. Two countries (United Arab Emirates 2007 and Morocco 2010) were certified by WHO as malaria free and added to WHO register of areas where malaria elimination has been achieved. Three countries (Egypt, Oman and Syrian Arab Republic) have reported cessation of local transmission. However, Oman reported occurrence of introduced cases as a result of importation. Malaria-free countries are facing several challenges, mainly due to decreased funding, shortage of supplies, loss of expertise in malaria and weak surveillance activities.

The strategy update for 2010–2011 is to: include universal coverage target for main interventions; support regional capacity-building activities in several areas, including elimination and surveillance, scaling up community-based projects in endemic areas, developing national strategies with full involvement of private providers through multi-country research projects, conducting programme review and documentation of country experience and success stories and providing continuous support to HANMAT and PIAM-net for coordination of monitoring parasites resistance. Border coordination activities and resource mobilization are the regional emphasis for 2011–2012.

Discussion

There is a need for a reporting framework to record areas in which countries are not reporting uniformly, and possibly, a separate reporting system for countries in complex emergencies. Participants discussed capacity-building in relation to entomology and vector control and the establishment of a training institute in Saudi Arabia to conduct international training on vector control.

2.3 Malaria vector control: progress and challenges of malaria vector control in the Region

Dr Abraham Mnzava, WHO Regional Office for the Eastern Mediterranean

The implementation of vector control for malaria and other vector-borne diseases is based on the framework of integrated vector management – a regional strategic approach for optimal use of resources. Progress to date includes translation of the strategy into national health policy in 10 countries of the Region; strengthened institutional arrangements and national coordination mechanisms for disease control and prevention; strengthened capacity for entomology and vector control (70 people trained using a robust curriculum at MSc and diploma levels); promotion of universal access to vector control interventions – especially on the use of LLINs (approximately 36 million people protected with this intervention); resource mobilization to support pesticide management; and operational research in assessing cost-effective interventions in managing vector resistance to insecticides.

Progress has not been without challenges and constraints. These include the development and spread of vector resistance to insecticides in local malaria vectors and more so with pyrethroids in Sudan, and possibly in Afghanistan and Somalia; lack of career paths and opportunities for trained entomologists/vector control experts; weak capacity in entomological surveillance vis-à-vis insecticide resistance on one hand and control and elimination on the other; and the general lack of capacity to manage public health pesticides in their life-cycle (manufacture, procurement to disposal).

Even with these challenges, support will continue to be provided to countries to ensure that set targets to implement vector control and prevention in the context of integrated vector management (IVM); promoting universal access to interventions; and strengthened entomological surveillance and operational research for evidence are achieved.

Discussion

It is important to monitor mosquito behaviour during different seasons and look at issues, such as aestivation and dates of emergence of the first generation of females after periods of adverse weather. This would allow the monitoring of emerging transmission, and possibly predict transmission. Also important are factors associated with emergence, as well as survival rates, during hibernation. These seasonal events affect not only mosquitoes but also other biological species.

Participants discussed the safety and expiry of long-lasting insecticide-treated bednets. During a recent meeting with industry nets were approved as safe. In regard to expired nets, safety was not considered an issue unless nets were used in certain activities, such as fishing, in which there may be environmental concerns.

There is a need to focus on programmes which lack capacity to measure basic indicators. Forecasting diseases using different variables is important not only for malaria but for other diseases, such as dengue.

2.4 Update on the World Malaria Report

Dr Ghasem Zamani, WHO Regional Office for the Eastern Mediterranean

The World Malaria Report is a real achievement and joint effort between WHO and Member States. In 2010, the two format for data collection, the Regional Office and headquarters were merged and resulted in one format for high-burden countries and one for malaria-free or malaria elimination countries. Formats were sent to countries. A workshop was held in May for priority countries to train focal points on the new format. Reports were received from targeted countries with the exception of Djibouti. We can also use this meeting to follow-up on queries from other countries. We will have a regional report covering all countries which will be a Regional Office report separate from the World Malaria Report (as it reports only on endemic countries).

Discussion

Participants discussed the World Malaria Report and the importance of assuring the quality of data inputted into the report. In countries where surveillance and reporting systems are not in place accurate information is difficult to collect. Specific definitions are needed for the population at risk. In terms of data on expenditure, partners not able to disclose their expenditures can report on commodities and costs can be estimated related to those commodities. The culture of data collection needs to be developed in each country, including at subnational and local levels, to improve national databases crucial for providing evidence to donors.

2.5 Progress in malaria elimination in European countries bordering countries of the Region

Dr Andre Beljaev, WHO Temporary Adviser

Malaria had mostly disappeared from the WHO European Region by 1962 except in central Azerbaijan, Tajikistan's border areas with Afghanistan and Turkey (southern Anatolia). This was mainly due to spontaneous evolution (northwestern and central Europe), global malaria eradication campaign (southern Europe) and an original eradication approach in the Russian Federation. However, importation of malaria was always a problem.

Analysis of the cases of imported malaria and outcomes shows that in the European Union and related countries, there are more than 10 000 cases per year (France, Germany, United Kingdom and Italy), that shows the rising proportion of *P. falciparum*. In the Russian Federation and former Soviet Union with about 1000 cases per year around the year 2000 that were mostly *P. vivax* with a declining trend. Importation of malaria in this Region has clinical outcomes: mortality concerns with *P. falciparum* only western and central Europe: more than 100 death cases per year and much less so for the former Soviet Union, although a few deaths occur every year and epidemiological outcomes: resumption of local transmission and re-establishment of malaria with concerns mostly *P. vivax* and mostly in former Soviet Union countries.

Soviet intervention in Afghanistan (1979–1989) led to the re-establishment of *P. vivax* in Tajikistan, and sporadically-introduced cases elsewhere in the Soviet Union. Dissolution of the Soviet Union in 1991 and the armed conflict that followed resulted in re-establishment of *vivax* malaria in Azerbaijan (conflict with Armenia), a huge epidemic of *vivax* malaria and the reintroduction of *falciparum* malaria in Tajikistan (civil war, refugees to Afghanistan), an epidemic of *vivax malaria* in Kyrgyzstan, and introduced cases and small outbreaks elsewhere in the former Soviet Union. At its peak in 1995, 90 712 cases of malaria were reported. In 2009, 285 cases were reported, including the last *falciparum* case in Tajikistan.

Nine malaria-affected countries of the WHO European Region at a meeting held in Tashkent, Uzbekistan, 18–20 October 2005, consented to the Tashkent Declaration “The Move from Malaria Control to Elimination”. The strategy that was adopted in 2005 was greatly inspired by the Eastern Mediterranean Region, especially the examples of Oman, the

North African Initiative and the meeting of the Eastern Mediterranean and Europe regions held in Rabat (2002). Two countries, Armenia and Turkmenistan, have embarked on pre-certification.

Discussion

Autochthonous malaria in areas of Russia results from the existence of a source, weak case detection and management in those areas and the movement of people from endemic areas to other areas. Experiments have shown that Afrotropical malaria cannot be carried by European vectors; there was *P. falciparum* malaria in Europe previously but was very different from Afrotropical *P. falciparum* malaria. Thus, somehow the *falciparum* malaria was at that time adapted to European vectors. However, after 2000 years that kind of malaria disappeared. In northern Afghanistan there is *P. falciparum* malaria which is probably transmitted by these European vectors. As there is migration from this area, this may be a source of the re-introduction of malaria in the near east. It is important to note, however, that the experiments undertaken in the 1930s and 1940s lacked current knowledge of the different species complex. It would be good to undertake those experiments again with the new knowledge on species complex. Thus, care must be taken in generalizing those early results. There is a need for greater enforcement of regulations in those countries that have been certified and those going through those processes to prevent reintroduction. Experience shows that the introduction of malaria into areas which are malaria-free in countries is rather unlikely. Elimination of malaria in specific parts of the country may be sustainable in countries, such as Iraq. But to prevent an area that is malaria free reverting back to being endemic may be sustainable in small areas but in a country requires large finances.

2. COUNTRY PRESENTATIONS

3.1 Afghanistan

In 2009, a total of 317 631 long-lasting insecticide-treated bednets were distributed mainly to pregnant women, children under 5 and internally displaced persons. There is a plan for free distribution of 17 million LLINs in 2010 for all residents in high-risk districts of 14 provinces and pregnant women and children under five years in 15 low-risk provinces.

There are also some issues with border malaria at different border areas – Afghanistan/Tajikistan. Border activities established through the Turkmenistan Agreement have not been implemented although Afghanistan conducted some side activities, such as establishing laboratories in basic health centres under USAID projects in border areas of Tajikistan (63), training community health workers (31) on RDT for malaria diagnosis and treatment, and distributing free LLINs.

The trend of malaria for *P.vivax* and *P. falciparum* from 2002 to 2009 show significant decreases in the reported confirmed cases. The achievements of the programme include: developing national strategic plans, revising treatment protocols, issuing data quality assurance guidelines, adhering to national malaria monitoring and evaluation plan,

establishing standard operating procedures for free distribution of LLINs and ensuring epidemic preparedness and response. Challenges include: insecurity, lack of human resources, lack of motivation, fragmented health care system, poor coordination among stakeholders and time-consuming bureaucracy.

3.2 Djibouti

The National Strategic Plan (2006–2010) was revised and re-oriented into two phases: control and consolidation and pre-elimination. Round 9 was elaborated within the vision of pre-elimination with the main objective of universal coverage for all interventions, i.e. LLINs.

3.5 Pakistan

Overall, 47 districts affected by floods are at risk of malaria outbreaks located mainly in Baluchistan, Sind, Khyber Pakhtunkhwa and Punjab provinces with a combined population of 56.5 million. The target population for rural interventions is only 36.6 million. Expected suspected malaria cases in next six months is 2.2 million reporting to public health facilities. Estimated confirm cases will be 80 000 (54 350 *falciparum* and 126 817 *vivax* cases) in the current six months from 1 August 2010 to 31 January 2011.

The floods started from the highly-endemic areas and moved down into lower endemic areas. It is not only the flooding that has affected the malaria situation. In addition, there has also been extremely heavy rain in the Baluchistan region (after years of drought). This has affected other districts.

Health facilities have been mapped out in terms of which have been completely or partially destroyed along the flood areas. This will help to understand that how heavy rains and flooding water, as well as exposed populations, have enhanced the risk of increasing malaria transmission. In areas such as the Punjab province, which had reported low cases previously, rains and population movement has severely affected the transmission there and changed the epidemiological picture. Many health posts have been destroyed, so figures are coming from whatever health posts that have been made functional. The majority of reported cases from affected areas are *P. vivax*. Slide Positivity Rate in Khyber Pakhtunkhwa, Punjab and Sind were 11.8, 7.6 and 6 respectively.

Coordination of efforts is ongoing among various players such as WHO, UNICEF, Ministry of Health and nongovernmental organizations to mobilize resources for the procurement of 2 million nets to protect at least highly vulnerable groups (pregnant women and children <5 years) and to initiate an indoor residual spraying and thermal fogging campaign to protect 4.2 million people in southern Punjab and in areas where outbreaks have occurred, timely availability of logistics (medicines, RDTs, LLINs, insecticides and equipment). Efforts are also focused on reviving the achievements in flood-affected areas and controlling outbreaks in other districts not affected by flooding.

3.7 Somalia

In 2005, only 8% of children with fever received an antimalarial within 24 hours. Since then, focus has centred on maternal and child health centres. ACTs and RDTs were introduced at maternal and child health level (2006) and diagnosis capacity has been increased.

In 2005, only 2% of households reported owning at least one insecticide-treated net (ITN). Since then, the focus has been on distribution of LLINs mainly in the central and south zones with a mass campaign as the mechanism of distribution. In 2009, a total of 473 081 LLINs were distributed. The latest report from FSNAU surveys shows that the percentage of households with at least one ITN and the percentage use of ITNs by children under 5 are 47% and 35%, respectively.

The newly updated national strategic plan (2011–2015) consists of two phases. Phase one aims at scaling up for impact and phase two aims at moving towards sustainable control. The plan emphasizes the need to build the capacity of communities, strengthening structures and ensure uptake and sustainability of all interventions. Community engagement and mobilization will support four main components: case management (diagnosis and treatment), epidemic preparedness, detection and response and health strengthening system.

Main challenges for malaria control in Somalia are: security concerns, especially in the central/south zone, funding limitations, high staff turnover, logistical difficulties for coordination between all partners, operational feasibility of rolling out ACTs and RDTs in maternal and child health centres and health posts and private sector involvement.

3.8 Sudan

For strengthening malaria case management main activities in 2009 were improving microscopy, expanding RDT usage to 956 basic health units, increasing ACT coverage to >95% and expanding implementation of home management of malaria strategy to 425 villages. For prevention, the overall estimated operational coverage is 100% in 6 states and 60% in other 9 states. The programme has also been successful in expanding the malaria-free states to 4.

According the results of a 2009 malaria indicator survey there are significant improvements in comparison to the same survey in 2005. 40% of households have at least one LLIN, 44% of cases treated with standard treatment and national average of parasite prevalence dropped to 1.8%.

One of the main challenges of the programme is with resistance to different insecticides particularly pyrethroid which will affect IRS and LLINs efficacy. There is a new project to look at this issue to generate information about vector behaviour as well as resistance. There are also challenges with accessing commodities such as LLINs in a timely manner.

For capacity-building, Sudan continues to expand training down to locality levels.

There is good political and financial support for malaria activities. Budgets have increased and are increasing each year and when there is a delay in Global Fund funding, the government stepped in to fill the gap. There is increased involvement of the community including universities, communities, media and the press.

The other part of the presentation was on home-based management of malaria. This project was a pilot to look at the feasibility of implementation of this strategy in Sudan. Community volunteers were trained to diagnose malaria using RDTs and treat, to identify severe disease to refer and to exclude other fever cases for referral. This took place in areas where access was poor. The piloting took place in South Kordafan.

The results of the study on this pilot project show that adherence to guidelines and protocol is 100%, no significant differences between those volunteers with past experience and those without, financial gain is low but the spiritual outcome is satisfactory. Prevalence of fever reduced from 24 to 8%, treatment seeking behaviour improved from 83 to 100% and reported mortality reduced from 61 to 1. The activity has been expanded and other febrile illnesses included into the project with sole support from government. In addition, community satisfaction was high and requests made for more services.

3.9 Sudan (south)

The structure of the national malaria control programme for southern Sudan was reviewed. The national malaria control unit upgraded to full department, headed by a Director, two entomologists (MSc) and 2 malariologists trained and recruited and two national staff to be recruited, two prefabs, furniture, computers and one vehicle purchased. Currently, the programme has the Department of Malaria as well as four offices (case management, vector control, information, and monitoring and evaluation).

An overview of the administrative structure within each state was presented. There will be 10 coordinators at state level as well as three officers. It was emphasized that there is a plan for assessment of the programme under Round 7 phase 2 in order to determine how the state level malaria coordinators roles will be augmented.

The main challenges for establishment of a functional national and state department and programs are: limited trained health personnel and financial resources, poor coordination between the national malaria control programme, states and partners and delay in establishment of national reference public health laboratory.

3.10 Yemen

The slide positivity rate has reduced significantly since a peak of 40.7% in 1999 to 6.7% in 2009. Socotra Island remained malaria free for the 5th consecutive year. The main achievements of the national malaria control programme are: updating the national

antimalarial drug policy; conducting the first national malaria indicator survey (MIS 2009); developing the third multi-year national malaria strategic plan 2011–2015; starting the implementation of the GCC strategy for freeing the Arabian Peninsula from malaria by 2020; establishing 38 malaria units to consolidate the delivery services; developing standard malaria surveillance tools and their standard operating procedures; and re-activating the global malaria database.

In 2009, the malaria control programme had many achievements in malaria case management including update of national antimalarial medicines and distribution of ACTs and RDTs, establishment of case management department in headquarters and regional offices, training of eight laboratory technicians in the WHO regional course in Oman and training of about 83 participants in a quality assurance short course in collaboration with Liverpool School of Tropical Medicine. Vector control activities expanded with distribution of 551 000 LLINs during 2009 and 2010. The number of houses sprayed increased from 36 000 in 2004 to more than 241 000 in 2009.

The second part of presentation was on dual strategy for malaria confirmation by RDT and microscopy with aim of confirmation of all suspected malaria cases. This strategy will promote the newly developed national malaria treatment policy and substantially enhance its cost effectiveness, assist in monitoring the effectiveness and impact of malaria control interventions and pave the ground for a solid and efficient implementation of the GCC strategy to free the Arabian Peninsula from malaria by 2020.

In the current situation, an uncontrolled private sector runs around 47% of the health services nationwide, microscopy services in the public health sector are delivered only at hospital and health centre levels (total of 1030 facilities). Clinical diagnosis of malaria is the most utilized method, although the percentage of cases confirmed by microscopy is increasing (from 22% in 2005 to 40% in 2008). Malaria microscopy is performed at poor standard with a low level of accuracy and there is no national standard or effective national quality assurance programme. Malaria RDT testing was introduced as a pilot study in 2007. It is rapidly expanding to provide accurate confirmation of malaria diagnosis in health facilities where microscopy is absent

3.3 Islamic Republic of Iran

In 2010, in line with MDGs and national development plan, a national strategic plan for malaria elimination was approved by the High Council for Health. In 2009, 6122 malaria cases were reported. All reported cases are confirmed with at least one blood smear, which shows a 45% decrease compared to 2008. 73% were autochthonous cases and 87% of malaria cases were reported from three southeast provinces. The majority of imported cases are from borders in southeast.

3.4 Iraq

Active case detection is undertaken in areas where imported cases have been detected. Vector control activities include larval control and fogging. The areas of larviciding increased from 37.5 million m² in 2008 to 127 million in 2009, mainly due to lack of insecticide for indoor residual spraying and the decision to implement larval control as replacement.

Main challenges for malaria elimination and prevention of reintroduction are: availability of antimalarial drugs in the private sector, security problems, poor intersectoral coordination and staff turnover. Planned activities include enhancement of surveillance system by improvement of reporting and recording of data through computerized network, strengthening of applied field researches, capacity building in different areas including vector control.

3.6 Saudi Arabia

The number of locally-transmitted malaria cases decreased from a peak of more than 36 000 in 1998 to just 58 in 2009. There is also significant decrease in the number of locally transmitted cases in the first six months of 2010 in comparison to the same period of 2009, from 36 to only 5. Local malaria transmission is limited to a few foci in Jazan, Aseer and Qunfuda. The main sources of imported cases are Yemen, mainly *falciparum*, and India and Pakistan, mainly *vivax*.

The main identified challenges are: huge influx of imported cases from all over the world especially neighbouring, Indian subcontinent and Horn of Africa countries, efficient malaria vector (*An. arabiensis*) and shortage in qualified and experienced professionals in some key areas, e.g. vector control, entomology and malaria case management.

The main planned activities include strengthening of surveillance and case detection by mobile teams to trace illegal immigrants for case investigation and treatment in the field, strengthening integrated vector management, monitoring the susceptibility of the vector to insecticides, development of the national centre for vector-borne diseases, health education and strengthening community participation, development of standard operating procedures, guidelines and refresher courses, and collaboration and cooperation with Yemen to achieve a “malaria-free Arabian peninsula”.

4. COUNTRY REPORTS ON PROGRESS, CHALLENGES AND LESSONS LEARNT FOR MALARIA ELIMINATION, CERTIFICATION AND PREVENTION OF REINTRODUCTION

4.1 Morocco: process of malaria-free status certification

The last locally transmitted case in Morocco was in 2004. The number of imported cases in 2009 was 145. In 2008, the Minister of Health sent a request to the WHO Director-General to certify Morocco as a free country from malaria. The response was received from WHO which agreed to start going through the certification process in September 2008. Key documentation was prepared prior to the first WHO mission. The first mission of a WHO team was in November 2008 with the objectives to assess the status of progress towards elimination and review and provide technical advice for preparation of documentation, to assess the current programme for prevention of the reintroduction of malaria, including a field visit to the latest foci of infection and to develop a plan of action for certification. After first mission all documentation was prepared and the province in which the last foci of malaria were detected was visited. The second mission was undertaken in June 2009 as an external evaluation to assess the progress in eliminating indigenous malaria in Morocco, evaluate the surveillance system in preventing the reintroduction of imported malaria, review the certification documentation, develop a final report to submit to expert committee on malaria. Finally Morocco was certified as malaria-free in May 2010.

4.2 Bahrain

Bahrain consists of 5 governorates: the capital, Central, Muharraq, Northern and Southern. The northern governorate is one where the situation is most suitable for malaria transmission. However, there are no locally transmitted cases and all cases are imported. The goals of the malaria control programme are prompt detection and treatment of all imported cases, and prevention of local transmission. In 2009, there were 103 imported cases (99 vivax and 4 falciparum). Imported cases are mainly from India and Pakistan and most of them above the age of 44 years.

The main challenges for malaria control in Bahrain are the increased numbers of expatriates from malarious countries, such as India, Pakistan and Sudan, that have increased the number of hidden breeding places in new residential areas, shortage of staff, lack of insecticide resistance monitoring and lack of quality assurance for malaria diagnosis.

4.3 Egypt

In 2009, 94 imported malaria cases from 41 250 examined slides and zero local cases were reported. The number of reported deaths from malaria was 2.

4.4 Jordan

Malaria was endemic throughout the country (except the desert area) before 1959. The malaria eradication programme began in 1959. Malaria transmission was interrupted in 1970 and Jordan was declared malaria-free. Over the past 40 years (1970–2009) an annual average of 187 malaria cases were reported (mainly imported from Asian and African countries). The last introduced incident of local transmission occurred during May and June 2010 with 2 *vivax* cases in Alzzara, located at the eastern Dead Sea coast.

Among the most important challenges for prevention of reintroduction of malaria in Jordan are: inadequate internal and external technical and financial support; continuous loss and retirement of trained technicians and workers without adequate replacement; lack of logistics; continuous influx from malaria endemic countries; imported malaria cases among Jordanian military members and United Nations peacekeeping missions resident in receptive areas; lack of adequate and equipped vector control units; increased the number of mosquito breeding places in the lowlands because of increased irrigation projects and farms; and weak intersectoral cooperation and coordination for vector control.

4.5 Libyan Arab Jamahiriya

The Libyan Arab Jamahiriya was declared malaria-free in 1973. In 2009, 27 imported malaria cases were reported. The majority of cases were *falciparum*, Libyan nationals and originated from sub-Saharan African countries.

4.5 Oman

The national malaria eradication programme was launched in 1991 with the objectives of reaching an API of 0.1 per 1000 by 2000 and to end local transmission by 2005. The main strategies have included integrated vector control and early case detection and prompt treatment. Oman reached an API of less than 0.1 per 1000 by 2007 and zero indigenous cases by 2000. No local transmission was detected in 2004, 2006 and 2009. However, there have been introduced cases in 2000, 2003, 2007 and 2008.

Certification of malaria-free status is mainly a political achievement rather than technical. The actual technical achievement is to stop local transmission within a sustainable approach. Sustainable interruption of local transmission in countries with high burden of imported cases is questionable without the reduction of malaria burden in the source countries. Three years is a short time to judge the sustainability of interruption of local transmission. Certification could discourage transparency and may result in the end of national malaria control through a reduction of resources.

4.6 Qatar

Qatar is free from local malaria transmission. In 2009, the number of imported malaria cases was 239. From 2000 there has been an increase in the number of imported cases due to

increased population movement. There is currently no national malaria drug policy; physicians mainly undertake treatment according to their judgement. Vector control and entomological surveillance is undertaken but there is a need to register pesticides in country. Fragmentation of activities within ministries, lack of a malaria-specific unit and weak malaria diagnosis and lack of knowledge about malaria vectors are the main challenges.

4.7 Syrian Arab Republic

Until the 1950s, malaria was endemic throughout the country, except in desert and mountain areas above 1100 metres. The malaria eradication programme started in 1956, which led to interruption of the local transmission of *P. falciparum* during the 1960s. However, transmission of *P. vivax* continued at varying degrees, mostly along the Turkey and Iraq borders.

During the 1990s, the maximum incidence of local malaria was recorded in 1993 (966 cases). These cases were recorded in two governorates (Aleppo and Al Hasakah). From 1995 malaria cases decreased from 582 cases to 6 cases in 2000. The last local malaria case was in 2004 in Al Hasaka governorate. In 2009, 31 imported cases of malaria were reported, all of which were from sub-Saharan African countries.

4.8 Tunisia

Malaria has been present in Tunisia since the 19th and 20th century. The country experienced epidemics in 1911 and also in 1933 in some parts of the country. The national malaria eradication programme started in 1967. In 2010, 36 imported malaria cases were reported, the majority of which were among students from sub-Saharan African countries.

Strengthening surveillance, health education, particularly for travellers, strengthening diagnosis and prompt treatment of all cases are main priorities of the programme to prevent the reintroduction of malaria.

4.9 United Arab Emirates

Before 1970, malaria was a public health concern mainly in the east coast and the middle region, where natural water reservoirs are formed seasonally. Incidence rates of 30%–60% were recorded, particularly in infants and children. Malaria control activities started in some areas in 1970. Since 1971, all malaria control activities were allocated to the Ministry of Health, Preventive Medicine Department, in coordination with district health authorities. In 1977, the Central Malaria Control Department was created in line with WHO recommendations and a comprehensive strategy for malaria control was implemented. In 1997, the last case of indigenous malaria was reported in Masfoot, central plateau region. In 2002, the United Arab Emirates requested to be certified malaria-free. WHO sent three review missions to undertake a comprehensive assessment and evaluation of the malaria programme. The United Arab Emirates was certified malaria-free in 2007.

The main challenges are the huge influx of workers from malaria-endemic countries resulting in a continuous increase in the number of imported malaria cases, mainly from India, Pakistan and sub-Saharan Africa. In 2009, 3108 malaria cases were reported and epidemiological investigation was conducted for 97.7% of them.

5. UPDATE ON TECHNICAL ISSUES

5.1 New development in case management: diagnosis and treatment

Dr Robert Newman, WHO headquarters

In the new *WHO guidelines for the treatment of malaria, 2nd edition, 2010*, there are five recommended ACTs.

- artemether–lumefantrine (AL)
- artesunate–amodiaquine (AS+AQ)
- artesunate+mefloquine(AS+MQ)
- artesunate+sulfadoxine-pyrimethamine (AS+SP)
- dihydroartemisinin–piperaquine (DHA-PPQ)

A single dose (0.75mg/kg) used as gametocidal medicine in the treatment of falciparum malaria, especially in pre-elimination and elimination programmes, is a new recommendation in the guidelines. However, there are issues with G6PD deficiency and haemolysis, although a single dose is probably safe in most G6PD patients.

Since 2005, very large orders of ACTs delivered for public sector use in 78 malaria-endemic countries, i.e. 501 million ACT treatment courses through public sector in 2005–2009. There is limited pharmaceutical and regulatory experience with artemisinin and its derivatives, although 166 companies known to WHO manufacture artemisinin-based antimalarial medicines, mostly of substandard quality for use in the private sector. There is increasing funding for ACT procurement in upcoming years through different mechanisms.

The process of drug selection with reviewing interagency harmonized selection criteria which include either one of the two following clinical selection criteria:

- Inclusion in the WHO guidelines for treatment of malaria and in the national treatment guidelines;

or

- Inclusion in the national treatment guidelines, but not in WHO treatment guidelines, after approval by technical committee, plus the following quality selection criteria: WHO-prequalified or SRA-registered products.

In case there are less than two WHO-prequalified or SDRA-registered products, or if the products which meet these standards are unavailable, then products complying with partial quality criteria can be selected. Partial quality assurance criteria are as follows.

- Global malaria programme compliance certified after inspection by WHO or by a SRA for the dosage form concerned
- Submission of the “product dossier” to the WHO prequalification programme and acceptance by WHO prequalification programme to review the dossier
- Acceptance of the product after technical review by an external review panel
- In 2011 the global malaria programme will be focusing on the production of an updated treatment of severe malaria handbook.

The procurement of different drugs by the Global Fund goes through various processes and additional steps that are required for drugs which are not pre-qualified or SRA-approved. In case principal recipient requires medicines which are not approved by the WHO prequalification programme, SRA, or by ERP, the medicine should have:

- compliance to good manufacturing practices certified by the prequalification programme or SNRA, and
- compliance to pre-shipment quality control in an accredited laboratory
- WHO statement on clinical needs in recipient country
- letter of acceptance from the Ministry of Health of recipient country.

In this group there are artemether vials, artesunate vials, artesunate suppositories and DHA-PPQ.

The production of artemisinin is dependent on agricultural production. Semi-synthetic artemisinin, from yeast in-vitro cultivation is not expected on the market before 2012 and chemical analogues of artemisinin and its derivatives, i.e. next generation ozonides are still in early clinical development. There is evidence of the slowing efficacy of artesunate. There are antimalarials under development. However, drugs that are close to the end of the development process are all artemisinin-based. The non-artemisinin-based drugs are far from being marketed.

Prompt parasitological confirmation by microscopy or alternatively by RDTs is recommended in all patients suspected of malaria before treatment is started. Treatment solely on the basis of clinical suspicion should only be considered when a parasitological diagnosis is not accessible within 2 hours of the patient presenting.

Parasitological confirmation is increasingly important in recent years as the malaria burden has decreased in many countries following the successful impact of high coverage interventions with LLINs, indoor residual spraying and ACTs; improved fever case management and the confirmed need for treatment in parasite-positive patients. This allows the identification of parasite-negative patients for whom other management is required. Parasitological confirmation prevents the unnecessary use of antimalarials, reduces the

frequency of adverse effects, especially in those who do need the medicines, and drug pressure selecting for resistant parasites ensures more accurate targeting of ACTs to only malaria patients in the context of limited agricultural supply of artemisinin and strengthens the malaria surveillance system, enabling a better targeting of malaria interventions based on the real burden instead of “incidence of fevers treated as malaria”.

Malaria RDTs have similar problems to ACT problems. There are many manufacturers on the market with different products. The quality is highly variable. A lack of oversight has resulted in a situation in which selection of quality-assured RDTs with high diagnostic performance for procurement is often challenging. The WHO malaria RDT product testing programme started in 2008. This programme established a mechanism that allows comparative laboratory-based evaluation of RDT diagnostic performance in a standardized way to distinguish between well- and poorly-performing tests to guide procurement. WHO/FIND has a very good interactive guide on the internet which help programmes to find what types of RDT they should procure.

5.2 Measuring prevalence of malaria in low-endemic areas

Dr Abdisalam M. Noor, WHO Temporary Adviser

Many low transmission countries are now aiming for sustained low stable malaria control or elimination. Each stage on the control–elimination continuum requires accurate epidemiological assessment of infection risk to adapt operational strategies. The most commonly used measure of malaria transmission is the parasite rate defined as the proportion of surveyed sample of individuals at one time-point in a community that harbour malaria infection. In areas with relatively high transmission intensity the *P. falciparum* parasite rate (PfPR) remains a robust metric to quantify infection risks. As prevalence declines, however, the reliability of PfPR is diminished. This is because malariometric surveys of adequate precision at low transmission intensity are beyond the budgets of most national programmes. The operational PfPR thresholds at which malariometric surveys are no longer advisable have been defined as around 3%. PfPR of 1% is currently considered the benchmark for deciding when countries should consider sustaining conditions of low-endemic control or move toward an agenda that includes elimination. Many countries in the Region are experiencing these conditions, either because of historically low transmission intensity due to dry environments or unsuitable ambient temperatures or as a result of declining infection rates. New approaches to modelling community-level risks are therefore required in these countries. An alternative metric for measuring malaria risk in areas of extremely low community-level parasite rates is the prevalence of infections among febrile individuals. In low-transmission countries, the main source of such information is passively detected cases at health facilities.

The strengths of these health facility data are:

- higher chance of detecting infections – test among symptomatic individuals
- suitable for tracking changes geographically and over time
- better information on trend and seasonality
- more representative – many clusters in one catchment

- relative (PCD) or direct (API) metric of malaria risk
- ability to combine with existing community parasite rate to model transmission.

The weaknesses are:

- main input is PCD from countries with low reporting rates
- data are collected from public health facilities only; unrepresentative of other sectors
- API data are attributed often to large geographic areas and facility-specific information is rarely available
- quality of diagnostics needs improving
- a strategy is needed to improve health facility data
- all health facilities (especially public health facilities) need to be mapped for statistical modelling of risk and defining catchment areas.
- reporting rates need to be increased geographically and temporally – either through the routine systems or through sentinels
- reporting from non-public health sector – private facilities, community health workers, etc. – needs improving for better representation
- diagnostic quality and case data reliability need improving
- facilities should report independently – e.g. health post data not to be aggregated with health centre or hospital data
- high-resolution population maps are needed to estimate the populations at risk.

6. GROUP WORK: KEY AREAS FOR OPERATIONAL RESEARCH

During group work, participants identified the following key areas in which operational research is needed.

Case management

- Private sector involvement in case management and data reporting
- Assessment of health worker case management practices through quality of care surveys, especially adherence diagnostics and general prevention and treatment guidelines
- Factors contributing to poor quality of malaria diagnosis specific to the country and developing an effective mechanism for quality assurance
- Feasibility studies of home management of malaria
- Assessment of the effectiveness of malaria pre-referral and referral systems
- Relapse for re-infection of vivax
- Determining the long incubation period of vivax

Vector control

- Susceptibility of vectors to insecticides
- Spatial and temporal distribution and behaviour of vector
- Assessment of effective procedures for implementing IRS at the household level
- Retention of ITNs and gap between ownership and use

Surveillance

- Investigating the bottlenecks in routine health information systems, i.e. timely reporting, completeness of reporting and quality of reporting
- Investigating efficient HMIS and surveillance for complex emergencies
- Assessment of the effectiveness of epidemic preparedness and detection systems
- Developing empirical malaria risk maps
- Observation studies comparing the community level parasitaemia with matched health facility positivity rates
- Efficacy of all first-line and second-line drugs

Malaria programme management

- Effective mechanisms for efficient distribution of malaria interventions (nets, drugs, etc.), including detailed analysis of supply chain
- Programme reviews
- Developing effective mechanisms for coordinating and regulating malaria partners and stakeholders at the national level
- Impact and effectiveness of training for malaria control

7. RECOMMENDATIONS*To Member States*

1. Establish a collaborative mechanism (committee) with neighbouring malaria-endemic countries to strengthen malaria activities, including cross-border collaboration.
2. Strengthen activities for proper diagnosis, treatment and epidemiological investigation of imported malaria cases and allocate the resources necessary to build country capacity in different aspects of malaria control.
3. Ensure that national criteria for selection of individuals to attend malaria training requires that individuals are, or will be, involved with the national malaria programme upon their return.
4. Expand community participation and involvement through strengthening advocacy, communication and social mobilization activities.
5. Allocate and focus national and regional resources related to malaria operational research in the key areas identified during the meeting.

To WHO

6. Continue to support regional courses and collaborate with training institutes to provide feedback to national malaria control programmes about the performance of their candidates, including information on past candidates.
7. Continue to hold the malaria programme managers' meeting regularly and include representatives from malaria-free countries.
8. Make available key documents in French for French-speaking countries.

Annex 1**PROGRAMME****Wednesday, 22 September 2010**

08:00–08:30	Registration	
08:30–09:00	Opening session	
	Message from Dr Hussein A. Gezairy, Regional Director, WHO/EMRO	<i>Dr J. Mahjour, DCD</i>
	Message from the Ministry of Health by Dr Omar El Menzhi, Director of Epidemiology and Disease Control	<i>Dr J. Mahjour, DCD</i>
	Nomination of Officers	
	Objectives of the meeting and methods of work	
09:00–09:30	Progress and challenges of malaria control in the Region	<i>Dr H. Atta</i>
09:30–10:00	Resource mobilization for malaria elimination in Region	<i>Dr M. Fikry</i>
10:30–12:00	Malaria vector control: progress and challenges of malaria vector control in the Region	<i>Dr A. Mnzava</i>
10:30–12:00	Country reports on progress, challenges and lessons learnt for malaria control and elimination and case studies from selected countries.	<i>Country representatives</i>
	Afghanistan: toward falciparum elimination in Afghanistan	
	Djibouti: pre-elimination of malaria and R9 GFATM	
	Pakistan: preparedness plan for malaria epidemic after floods	
	Somalia: process of updating malaria control strategy	
12:00–12:30	Discussion	
13:30–15:30	Country reports on progress, challenges and lessons learnt for malaria control and elimination	<i>Country representatives</i>
	Sudan (north): report on implementations/scaling up of HMM	
	Sudan (south): the plan for establishing malaria control programme	
	Yemen: dual strategy for malaria parasitological confirmation	
16:00–16:30	Discussion	
16:30–17:00	World Malaria Report 2010	<i>Dr G. Zamani</i>
17:00–17:30	Discussion	

Thursday, 23 September 2010

08:30–09:00	Progress in malaria elimination in European countries bordering countries of the Region	<i>Dr A. Beljaev</i>
09:00–09:30	Discussion	

09:30–10:00	Country reports on progress, challenges and lessons learnt for malaria control and elimination: Islamic Republic of Iran: role of socioeconomic development in malaria elimination Iraq: process of programme assessment Saudi Arabia: role of socioeconomic development in malaria elimination	<i>Country representatives</i>
10:30–11:00	Discussion	
11:00–12:00	Country reports on progress, challenges and lessons learnt for malaria elimination, certification, prevention of reintroduction: Morocco: Process of malaria-free status certification Bahrain, Egypt, Jordan, Kuwait	<i>Country representatives</i>
12:00–12:30	Discussion	
13:30–15:00	Country reports on progress, challenges and lessons learnt for malaria elimination, certification, prevention of reintroduction Lebanon, Libya, Oman, Qatar, Syrian Arab Republic, Tunisia and United Arab Emirates	<i>Country representatives</i>
15:00–15:30	Discussion	
16:00–16:30	Progress and way forward for malaria control and elimination at global level	<i>Dr R. Newman</i>
16:30–17:00	Discussions	
17:00– 7:30	Strategy update in countries of the Region Drug policy update in countries of the Region: review of implementation of malaria JPRM workplans 2010–2011	<i>Dr H. Atta</i> <i>Dr G. Zamani</i>

Friday, 24 September 2010

08:30–09:00	New development in case management: diagnosis and treatment	<i>Dr R. Newman</i>
09:00–09:30	Discussion	
09:30–10:00	Operational research in malaria control and elimination priority in various epidemiological settings	<i>Dr C. Lynch</i>
10:30–11:00	Operational research in malaria control and elimination priority in various epidemiological settings	<i>Dr C. Lynch</i>
11:00–12:00	Technical presentation, plenary discussion on measuring prevalence of malaria in low-endemic areas	<i>Dr A. Noor</i>
13:30–14:30	Plenary on planned regional courses (planning, microscopy, surveillance, elimination)	
14:30–15:30	Group work on recommendations	
16:00–17:00	Conclusions and recommendations	

Annex 2

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