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Regional Office for the Eastern Mediterranean  
**ORGANISATION MONDIALE DE LA SANTE**  
Bureau régional de la Méditerranée orientale



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**Progress report on  
Control and elimination of malaria**

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## 1. Introduction

The targets of Millennium Development Goal 6 (Combat HIV/AIDS, malaria and other diseases) call for the world by 2015 to have halted, and begun to reverse, the incidence of malaria and other major diseases. Further progress in malaria control will also be necessary to achieve Goals 1 (Eradicate extreme poverty and hunger), 4 (Reduce child mortality) and 5 (Improve maternal health). In 2005, the Health Assembly in resolution WHA58.2 on malaria control urged Member States to ensure that at least 80% of those at risk should have access to antimalarial interventions by 2010. In 2008, on the first commemoration of World Malaria Day, the United Nations Secretary-General called for universal coverage with antimalarial interventions.

The same year, the Fifty-fifth Session of the Regional Committee for the Eastern Mediterranean adopted resolution EM/RC55/R.9 Malaria elimination: vision, requirements and strategic outline. In the resolution, the Committee urged Member States with endemic malaria to develop a national multiyear strategic plan to eliminate malaria in areas where feasible, and to scale up efforts to intensify malaria control in high and stable transmission areas. It urged Member States that have achieved or are close to elimination to maintain vigilance and strong surveillance systems to prevent re-establishment of malaria transmission and to strengthen functional collaborative mechanisms to support elimination in countries where the burden of malaria is still high, including provision of financial and human resources. It also requested the Regional Director to report periodically to the Regional Committee on progress made in control and elimination of malaria.

## 2. Progress in control and elimination of malaria in the Region

### 2.1 Epidemiological situation in the Region

In 2009, an estimated 340 million people in the Eastern Mediterranean Region (53% of the population) were living in malaria risk areas. Of them, 132 million people (21% of the population) live in areas with a malaria incidence greater than 1 case per 1000 population. Malaria is endemic in nine countries of the Region (Figure 1). Six of these countries (Afghanistan, Djibouti, Pakistan, Somalia, Sudan and Yemen) have a high burden of malaria and are focusing on malaria control. In the other three (Islamic Republic of Iran, Iraq and Saudi Arabia), transmission is focal and elimination is being targeted. The remaining countries of the Region have eliminated malaria.



Figure 1. Epidemiological situation of malaria in the Region as of 2011

**Table 1. Household coverage and usage of LLINs in high burden countries (control group)**

| Country       | % of households having at least one LLIN | % of people sleeping under LLINs | % of children under 5 sleeping under LLINs | Source  |
|---------------|--|----------------------------------|--|---|
| Afghanistan   | 9.9                                      | 1.9                              | 2.0  | Malaria indicator survey (2009)                         |
| Djibouti      | 30.2                                     | 13                               | 19.9                                       | Malaria indicator survey (2009)                         |
| Pakistan      | 4.3                                      |                                  |  | Malariometric survey 2009 (19 districts)                |
| Sudan (north) | 40.3                                     | 10.8                             | 15.5                                       | Malaria indicator survey (2009)                         |
| Sudan (south) | 50.6                                     | 24.4                             | 25   | Malaria indicator survey (2009)                         |
| Somalia       |  | 15.3                             |  | Food Security and Nutrition Analysis Unit survey (2009) |
| Yemen         | 15.0                                     | 4.2                              | 7.8  | Malaria indicator survey (2008–2009)                    |

## 2.2 Coverage of key antimalarial interventions

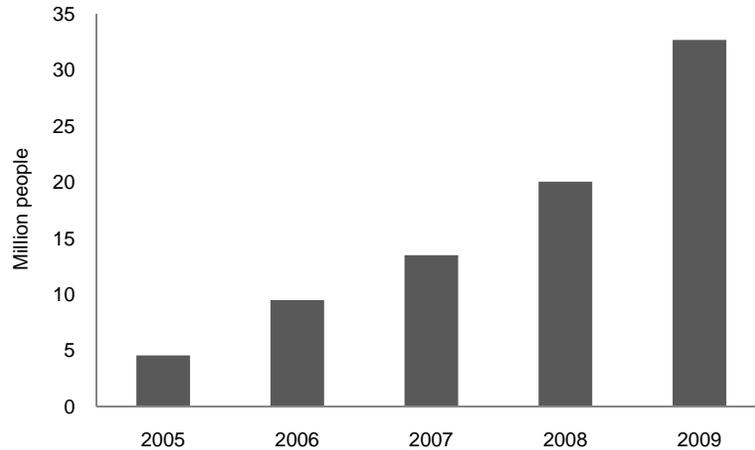
Population coverage with antimalarial interventions in the six high burden countries has risen as a result of increased investment. 2009 nationwide malaria surveys in Sudan showed that ownership of long-lasting insecticide-treated nets (LLINs) was 40.3% in northern states and 50.6% in southern states. In Afghanistan, Djibouti, Pakistan and Yemen, the percentage of households with at least one LLIN was 10%, 30%, 15%, and 4.3%, respectively. Ownership of insecticide-treated bednets is still far below the target of 80%. Usage of LLINs was low, but slightly higher in children under five years of age (Table 1).

The distribution of LLINs in the Region has increased in recent years. The number of LLINs distributed in 2009 (8.8 million) showed a significant rise compared to 2007 (2.7 million) (Table 2). It is expected to continue to increase in the coming years with the availability of more resources for malaria. Considering that the average lifespan of a LLIN is 3 years and that one net will protect 2 persons, about 33 million people were protected in 2009, which represents an increase compared to prior years (Figure 2). Not all populations at risk are targeted for protection by LLINs. Certain areas were targeted for total or focal indoor residual spraying (IRS).

The quality of data reported by countries on IRS operations is weak, and data are incomplete in many countries. The reported population protected by IRS in Yemen shows a significant increase from less than 120 000 to more than 1.4 million people. In Sudan, IRS is used mainly in Gezira state in agricultural schemes. During 2008–2009, data showed a decrease in the number of people protected, which is attributed to the shift to a more expensive class of insecticides as a result of insecticide resistance.

**Table 2. LLINs distributed in malaria endemic countries of the Region**

| Country                    | 2005      | 2007      | 2009      |
|----------------------------|-----------|-----------|-----------|
| Afghanistan                | 201 306   | 345 245   | 317 631   |
| Djibouti                   | 4 400     | 1 200     | 53 000    |
| Iran (Islamic Republic of) | 20 000    | 40 000    | 80 000    |
| Iraq                       |           |           | 200 000   |
| Pakistan                   | 130 000   | 90 000    | 396 341   |
| Saudi Arabia               |           |           | 250 000   |
| Somalia                    | 104 300   | 456 000   | 473 081   |
| Sudan (north)              | 712 600   | 830 000   | 3 470 931 |
| Sudan (south)              | 253 000   | 704 000   | 3 479 013 |
| Yemen                      | 150 000   | 244 560   | 66 545    |
| Total                      | 1 575 606 | 2 711 005 | 8 786 542 |



**Figure 2. Population covered (2 persons per LLIN)**

Access to diagnostic facilities for malaria is still limited. In 2009, a health facility survey in Sudan showed that 43% of facilities had functional microscopy and 15.8% had rapid diagnostic tests (RDTs). In 2009, a survey in Pakistan showed that 34% of health facilities had arrangements for diagnosis of malaria either through malaria microscopy or RDT.

Countries of the Region reported using more than 3.2 million RDTs for malaria diagnosis in 2009, reflecting a tremendous increase in comparison to 2007, when slightly more than 210 000 were used. In 2009 surveillance reports from high burden countries, most cases were treated on a clinical basis. The percentage of parasitologically confirmed cases ranged from 4% in Pakistan to 40% in Yemen.

Artemisinin-based combination therapy (ACT) is recommended for treating falciparum malaria, and has been adopted as the first-line treatment in all countries where falciparum malaria is endemic. 2009 surveys in Sudan showed that in northern states, 53% of under-5 fever cases that were treated for malaria received ACT. In southern states of Sudan, 18.1% of under-5 fever cases were treated with ACT.

Access to ACT is still low in endemic countries and many patients are still being treated with choroquine or artemisinin monotherapies, particularly in the private sector. This situation is exacerbated by poor access to diagnostic testing, resulting in unnecessary use of ACT for patients without malaria.

Access to malaria diagnostics and ACT at community level, especially in remote rural areas, is crucial. Guided by a pilot project in south Kordofan, Sudan developed a national strategy of community-based management of malaria and other fevers using the services of trained volunteers. Afghanistan developed a national community-based strategy for malaria in late 2010. In 2009, with support from Kuwait Patient Helping Fund, pilot projects were supported in Yemen and Somalia in some areas implementing community-based initiatives, with encouraging results. The implementation of the community-based management of malaria strategy still remains very limited in many areas that need such services.

### **2.3 Reduction of malaria burden**

Based on data estimated using routine health information systems, the malaria burden in 2009 shows a 44% reduction compared to 2000. According to the estimated data (World Malaria

Report 2009), the major morbidity burden is carried by two countries (Sudan 62% and Pakistan 18%), followed by Somalia 9%, Afghanistan 8% and Yemen 3%.

The reported incidence of malaria cases (clinical and confirmed) in 2005, 2007 and 2009 is shown in Table 3. In 2009, about 7.5 million cases were reported in the Region; of them only 13.5% (1.03 million) were confirmed as malaria cases. Incompleteness of reporting and reporting fever cases as malaria are the major challenges in high burden countries and are attributable to weaknesses in the surveillance and diagnostic systems.

Prevalence data from control countries show a gradual reduction in malaria prevalence. A recent prevalence survey in 15 northern states in Sudan using RDT showed a low prevalence of parasitaemia (1.8%) among all ages. All states except two reported prevalence of less than 3%. Prevalence of malaria among febrile individuals was 4%. Blue Nile and West Darfur states reported relatively high rates, 12.5% and 7.1% respectively, among all ages and 20.3% and 9.2% among febrile individuals. Results from the eight northern states surveyed in both 2005 and 2009 showed a 38% reduction in parasite prevalence in 2009 (2.3%) compared to 2005 (3.7%).

In 2009, a malaria indicator survey in southern states of Sudan showed the malaria prevalence was 14.2% using microscopy among children under 5 years, with a maximum in Equatoria region (29.3%) and minimum in Upper Nile region (2.9%). The same survey found higher rates of parasite prevalence using RDTs: 24.5% among children under 5, with a maximum of 47.7% and minimum of 7.8%.

The results of a malaria survey conducted in the 18 highly endemic districts Pakistan in 2009 showed an average parasite rate of 5.5%. The parasite rate varied greatly among the provinces, with highest rates observed in the Federally Administered Tribal Areas and Balochistan followed by Khyber Pakhtunkhwa and Sindh. These figures should be interpreted with caution since the survey was not nationally representative and was conducted in the districts with highest malaria burden.

The 2008–2009 Djibouti malaria indicator survey was the first nationally representative survey to measure coverage of malaria interventions and prevalence of parasitaemia. Of the 6707 individuals examined for malaria parasite infection using RDT, only 42 (0.6%) were found to be positive for the falciparum parasite.

In Yemen, the prevalence of malaria in a 2009 national household survey was 1.5%. The Tihama area, which shoulders about 60% of malaria burden, had a higher prevalence of malaria (4.5%). Yet these data showed a marked reduction compared to data from school surveys conducted in 2001 and 2008 in the Tihama area (21.9% to 7.6%).

**Table 3. Total and confirmed reported malaria cases in high burden countries (control group)**

| Country       | 2005      |           | 2007      |           | 2009      |           |
|---------------|-----------|-----------|-----------|-----------|-----------|-----------|
|               | Total     | Confirmed | Total     | Confirmed | Total     | Confirmed |
| Afghanistan   | 326 694   | 116 444   | 456 490   | 92 202    | 386 929   | 64 880    |
| Djibouti      | 2 469     | 413       | 4 694     | 210       | 7 120     | 2 686     |
| Pakistan      | 4 022 823 | 127 825   | 4 553 732 | 128 570   | 4 242 032 | 167 579   |
| Somalia       | 28 404    | 12 516    | 50 444    | 16 675    | 56 153    | 10 002    |
| Sudan (North) | 2 515 693 | 628 417   | 3 040 181 | 686 908   | 2 361 188 | 711 462   |
| Sudan (South) | 337 582   | NA        | 101 008   | NA        | 325 634   | NA        |
| Yemen         | 200 560   | 44 150    | 223 299   | 67 607    | 138 579   | 55 446    |
| Total         | 7 434 225 | 929 765   | 8 429 848 | 992 172   | 7 517 635 | 1 012 055 |

## 2.4 Malaria elimination

### 2.3.1 Malaria-free group

The initiative towards elimination of malaria in countries of the Region is steadily documenting real success. Two countries of the Region were granted certification of malaria elimination (United Arab Emirates in 2007 and Morocco in 2010). The malaria programme in the Syrian Arab Republic was reviewed in 2010 with no evidence of local transmission and the last local case in 2004, yet more efforts are needed in strengthening surveillance in order to achieve certification of malaria elimination. An ELISA sero-prevalence survey was conducted in the last endemic malaria foci in Fayoum governorate in Egypt in 2009, in collaboration with the Naval Medical Research Unit No. 3, London School of Hygiene and Tropical Medicine and the Ministry of Health, involving children born after 2005 in high-risk villages. No malaria antibodies were detected, reflecting no exposure to malaria. However, this is a suggestive tool and does not provide conclusive evidence for confirmation of interruption of malaria transmission.

Other countries that have eliminated malaria have been able to maintain malaria-free status, yet the risk of introduction of malaria as a result of importation cannot be excluded. Jordan reported two introduced cases (secondary to imported cases) in 2010. Oman reported a local outbreak of several cases in 2007 in Dakhliya region, and about 20 local cases in several areas in north Sharqiya region in 2010. These incidents highlight the urgent need to strengthen the programme with more emphasis on monitoring of population movements, early detection of imported cases and entomological and epidemiological surveillance.

### 2.3.2 Malaria elimination group

There is significant progress in the three countries currently implementing elimination programmes (Islamic Republic of Iran, Iraq, Saudi Arabia) (Table 4).

The number of locally transmitted cases in Saudi Arabia decreased to 58 cases in 2009, representing an 87% reduction compared to 2007. A further reduction to only 29 cases was reported in 2010, making Saudi Arabia very close to elimination. Overcoming the remaining challenges to elimination will require a very strong and robust surveillance system and border coordination with Yemen.

The Islamic Republic of Iran reported 4609 local malaria cases in 2009, representing a 65% reduction compared to 2007. A significant reduction of *Plasmodium falciparum* cases was reported, with only 347 local cases in 2009. With planned intensification of elimination efforts it is expected that falciparum malaria will be eliminated in the very near future.

**Table 4. Reported cases in countries with focal transmission (elimination group)**

| Country                   | Malaria cases            | 2000      | 2005   | 2007   | 2009  |
|---------------------------|--------------------------|-----------|--------|--------|-------|
| Iran, Islamic Republic of | Total                    | 19 716    | 18 966 | 15 712 | 6 122 |
|                           | Local                    | 12 294    | 12 792 | 13 278 | 4 609 |
|                           | Total falciparum + mixed | 2 546     | 2 219  | 1 390  | 637   |
|                           | Total vivax              | NA        | 16 747 | 14 322 | 5 485 |
| Iraq                      | Total                    | 1 860     | 47     | 3      | 1     |
|                           | Local                    | NA (most) | 44     | 2      | 0     |
| Saudi Arabia              | Total                    | 6 608     | 1 059  | 2 864  | 2 333 |
|                           | Local                    | 4 736     | 204    | 467    | 58    |

NA: Not available

Iraq adopted the goal of malaria elimination in 2005. The number of cases decreased from 47 local cases in 2005 to zero cases in 2009 and 2010. As part of programme review, the Regional Office trained a team of 12 nationals from the programme and universities in June 2010, using standard guidelines developed for assessment of malaria elimination programme. Data were collected and analysis is under way. Results will be used to update the strategy for elimination and prevention of reintroduction, expected to be finalized and launched on World Malaria Day 2011. The experience of Iraq is a successful example of vivax elimination in a complex emergency situation.

### *2.3.3 Malaria control group*

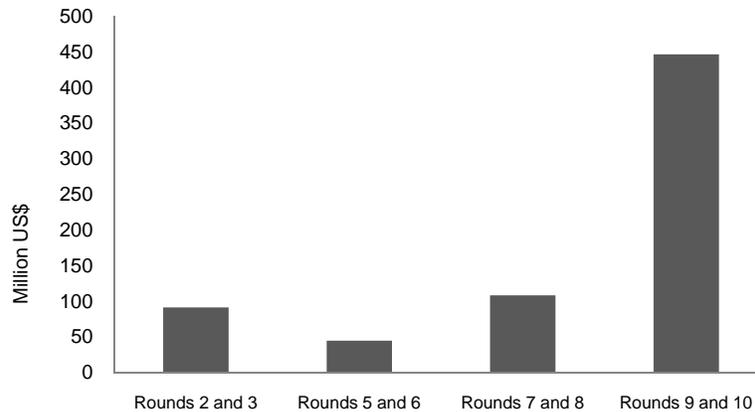
In Yemen, a strategy for malaria elimination in Socotra was developed in 2009. No cases have been reported by the public sector since 2006. WHO developed a proposal for Malaria-Free Hadramout 2010–2015, focusing on Hadramout, Shabwah and Al-Muhrah governorates, seeking US\$ 3.5 million from the Al Awn Foundation. Initial feasibility and planning assessment is anticipated in near future. Implementation of the Malaria-Free Arabian Peninsula Initiative started in 2010. Countries of the Gulf Cooperation Council (GCC) committed a total of US\$ 47.2 million for 10 years. The GCC established a malaria fund for the project. Approved resources for the 2010–2011 plan of action totalled US\$ 16.8 million.

WHO and partners are collaborating to support endemic countries to embark on pre-elimination or elimination projects at subnational level wherever feasible. WHO in collaboration with the United States Agency for International Development has been supporting a falciparum elimination project in 3 provinces of Afghanistan on the border of Tajikistan aimed at strengthening confirmation of malaria cases.

In Somalia, the strategic plan 2011–2015 included a pilot project for near zero malaria transmission in northeast and northwest zones. Resources for implementation were made available by the Global Fund to Fight AIDS, Tuberculosis and Malaria (round 10). Djibouti received support from the Global Fund (round 9) for pre-elimination of malaria. The programme will undergo in-depth review in 2011 to develop a strategic plan up to 2015. Sudan in its 2011–2015 plan expanded the malaria free-area to include more states beside Khartoum, with financial support from the Global Fund (round 10).

A number of activities and initiatives were supported in 2009–2010 for coordination of cross-border malaria activities including meetings of: the Horn of Africa malaria network (HANMAT); Pakistan-Iran-Afghanistan malaria network (PIAMnet); the “G5” initiative (Afghanistan, Islamic Republic of Iran, Iraq and Pakistan and WHO), GCC countries under the umbrella of the malaria-free Arabian peninsula initiative; and between Afghanistan, Tajikistan and Turkmenistan on malaria control. The strong Saudi/Yemeni cross-border collaboration established in 2004 witnessed disruption during 2010 due to conflict on both sides of the border and consequent population displacement, leaving vast areas unattended.

The amount of Global Fund resources approved for malaria control and elimination in countries during 2002–2010 is more than US\$ 689 million. The amount of grants has increased from US\$ 90 million in rounds 2 and 3 to more than US\$ 446 million in rounds 9 and 10 (2009–2010) (Figure 3).



**Figure 3. Approved Global Fund grants for malaria in countries of the Region**

### 3. Challenges

- Substantial support is still needed to scale up the key malaria interventions. Recent malaria indicator surveys showed some increase in the coverage with ACT and LLINs. However, a huge gap still exists between the current level of coverage and the target of 80%. This gap can be attributed to insufficient funding from donors and inadequate financing from the national budget, as part of the low allocations for the health sector as a whole, and to the limited capacity in planning and implementation at country level.
- Coverage of parasite-based diagnosis, which is essential to distinguish malaria from other causes of fever, is very low. Achieving the goal of universal access to parasite-based diagnosis of malaria requires a major expansion of microscopy and RDTs (wherever microscopy is not possible), along with robust quality assurance systems. Diagnosis with RDTs can now be undertaken at the community level. Quality diagnostic and treatment services should be expanded into the private sector with strong supervision.
- A shortage of skilled vector control personnel, including entomologists, limits the expansion and sustainability of malaria prevention efforts. Quality and timely implementation of IRS needs improvement. Reports of pyrethroid resistance in some areas, mainly Gezira state in Sudan, limit its use in IRS and require the introduction of bendiocarb, which is more expensive. A comprehensive plan for monitoring, prevention and management of insecticide resistance is needed.
- Malaria surveillance is weak among countries in the control group. It cannot be improved without major investment at all levels, including expansion of access to diagnostic testing for malaria. As malaria transmission decreases in most areas of endemic countries, timely surveillance of confirmed malaria cases becomes crucial to guide intensified control efforts.
- Considerable and increasing population movement (legal and illegal) and political and civil unrest in some areas in the Region are posing increasing risks of reintroduction of malaria in countries that eliminated it in the past. There is urgent need to strengthen surveillance systems in both the public and private sectors and to establish rapid response systems for malaria outbreaks and resurgence.
- Climate change and natural disasters are an additional challenge for malaria control. The malaria situation in Pakistan has worsened since the heavy flooding in 2010. The experience showed that delays in responding to such emergency situations (particularly in the swift

procurement of required commodities such as LLINs, insecticides and medicines) are mainly due to the long supply routes. Such experience calls for the establishment of regional hubs whereby stocks of needed supplies and equipment can be shipped quickly for timely response to malaria emergent situations.

- There is a need to address the key health system challenges for reaching universal coverage namely: weak human capacity at the district and national levels; weak laboratory systems for confirmation of malaria; lack of viable and timely surveillance systems; inefficient procurement and supply management systems; lack of or weak community-based programmes and unregulated private sector.
- The achievement of malaria elimination will require increased and sustained political commitment and full financial support. Efforts should be made to avoid shortfalls in the donor funds allocated for malaria control and elimination programmes during the next decade, to maintain the gains and avoid setbacks. Resurgence and reintroduction of malaria among populations that have no or only partial immunity can have disastrous impacts on health and development and hinder achievement of the MDGs.

#### **4. Next steps**

From 2011 to 2015, the Regional Office will continue its support to the Member States to reach universal coverage of quality and effective interventions for the prevention, diagnosis and treatment of malaria by all means, including involvement of the private sector and the community. Efforts to strengthen capacity for malaria control and elimination will continue with emphasis on planning and management of malaria control and elimination programmes, malaria surveillance and monitoring and evaluation, and malaria confirmation by microscopic diagnosis and RDT. Targeted countries will be supported to conduct comprehensive malaria programme performance reviews and update their national strategies. Assessment of the feasibility of malaria elimination at subnational level in high burden countries will continue, with support for resource mobilization, planning and implementation of these initiatives.