United Nations A/64/302

General Assembly

Distr.: General
17 August 2009

Original: English

Sixty-fourth session
Item 49 of the provisional agenda*
2001-2010: Decade to Roll Back Malaria in Developing Countries, particularly in Africa

2001-2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa

Note by the Secretary-General**

The Secretary-General hereby transmits the report prepared by the World Health Organization in accordance with General Assembly resolution 63/234.

* A/64/150.
** Submission of the report was delayed because of its late receipt.

09-48450 (E) 090909

Summary

The present report highlights the progress made in meeting the goals concerning malaria to be achieved by 2010 in the context of General Assembly resolution 62/180. The report is based primarily on data collected for the *World Malaria Report 2009*, which will be published by the World Health Organization (WHO) in late October 2009. Additional data from demographic and health surveys, malaria indicator surveys and multiple indicator cluster surveys were openly available from a variety of Roll Back Malaria partners. The report also presents conclusions and recommendations for the consideration of the General Assembly.

There is increasing evidence that aggressive malaria control is having a large impact on all-cause child mortality. Significant reductions in mortality are now being demonstrated in parts of Africa where target levels of intervention coverage have been achieved. In some cases these reductions are even greater than expected from prior data. Initial evidence from Sao Tome and Principe, Zambia and the islands of Zanzibar (United Republic of Tanzania) points to a substantially higher reduction in child mortality than previously estimated: a greater than 40 per cent reduction in all-cause inpatient child deaths if malaria inpatient child deaths are reduced by 90 per cent. This suggests that aggressive malaria control could be the leading edge for many African countries to reach, by 2015, the target of a two thirds reduction in child mortality as set forth in the Millennium Development Goals.

Nevertheless, malaria continues to kill approximately one million persons each year. Approximately one half of the world's population remains at risk of malaria, with 109 countries considered endemic for malaria, 42 within the WHO African region. Countries at the World Health Assembly and Roll Back Malaria partners have established the goal of reducing malaria morbidity and mortality by 50 per cent or more by the end of 2010 compared to 2000, and by 75 per cent or more by 2015. In September 2008, the Roll Back Malaria Partnership launched its Global Malaria Action Plan, in line with the best technical approaches recommended by WHO. The Plan defines the steps needed to accelerate progress towards achieving the Partnership's 2010 and 2015 targets for malaria control and elimination, sets the stage for the eventual eradication of malaria in the long-term and constitutes a single plan coordinating the efforts of Roll Back Malaria partners to achieve their shared goals.

Preliminary analysis suggests that the 2010 target was already being achieved or approached in 2008 by five African countries (Eritrea, Gambia, Rwanda, Sao Tome and Principe, Zambia) and by the islands of Zanzibar (United Republic of Tanzania). The Gambia, Rwanda and Zambia appear to have reached these targets, primarily with intermediate coverage of insecticide-treated nets and improved access to treatment with artemisinin-based combination therapies. Sao Tome and Principe and Zanzibar (United Republic of Tanzania) have already reached the 2015 World Health Assembly and Roll Back Malaria Partnership target of a greater than 75 per cent reduction in malaria mortality and morbidity using indoor residual spraying in addition to insecticide-treated nets and artemisinin-based combination therapies. However, in some West African countries (Togo, Niger) and the high-transmission areas of western Kenya, the mass distribution of treated nets targeted to children and pregnant women only has not been followed by the same expected health impact.

Funding and commodities for malaria control increased again in 2007 and 2008, compared to 2000-2006. For example, since 2006, there has been a large increase in the procurement and distribution of long-lasting insecticidal nets (60 million in 2008); there are well-developed plans for even more rapid scaling-up in the next 16 months. According to the Alliance for Malaria Prevention, 21 countries have now procured 50 per cent of the insecticide-treated nets required to meet universal coverage targets. However, few have reached the World Health Assembly and Roll Back Malaria Partnership coverage target for 2010 of at least 80 per cent use of treated nets for all persons at risk, including children under 5 years of age and pregnant women. From available survey data, four countries (Ethiopia, Gambia, Sao Tome and Principe, Zambia) had reached 60 per cent or greater household ownership of insecticide-treated nets ownership in 2007 or 2008. In a number of countries, more aggressive communication strategies are needed to help close the gap between household ownership and use of the nets. On World Malaria Day 2008, the Secretary-General pointed to the need to ensure that every person had access to a mosquito net. Approximately 250 million long-lasting insecticidal nets are still needed to achieve the goal of universal coverage goal by the end of 2010.

The procurement of antimalarial medicines for the public sector also increased in 2008 compared to 2006-2007. However, access to treatment, especially of artemisinin-based combination therapy, was generally poor in countries with survey data available for 2007-2008. In nearly all of the surveyed countries (except the United Republic of Tanzania), the percentage of children under 5 years of age with fever who received an artemisinin-based combination therapy was less than 12 per cent. There are multiple reasons for this low coverage, including: stock-outs of such therapies at the national and health facility levels due to weak procurement and distribution systems, limited access to public health services and the high cost of the therapies in the private sector.

Eleven countries are implementing elimination programmes nationwide (Algeria, Azerbaijan, Egypt, Georgia, Iraq, Kyrgyzstan, Republic of Korea, Saudi Arabia, Tajikistan, Turkey, Uzbekistan), with eight of them having entered the elimination phase in 2008. Eight countries are in the pre-elimination stage (Argentina, Democratic People's Republic of Korea, El Salvador, Islamic Republic of Iran, Malaysia, Mexico, Paraguay, Sri Lanka) and making a programme reorientation towards a nationwide elimination approach. A further 8 countries have interrupted transmission (Armenia, Bahamas, Jamaica, Morocco, Oman, Syrian Arab Republic, Russian Federation, Turkmenistan) and are in the phase of preventing the reintroduction of malaria. If these countries can sustain zero cases for three consecutive years, they will be eligible for WHO certification as malaria free.

Both parasite resistance to antimalarial medicines and mosquito resistance to insecticides are major threats to achieving global malaria control targets. The first evidence of resistance to artemisinin-based combination therapies was found recently in western Cambodia and a rapid containment response is being coordinated by WHO with support from the Bill & Melinda Gates Foundation, the Global Fund to Fight AIDS, Tuberculosis and Malaria and the United States Agency for International Development (USAID). Routine monitoring of antimalarial drug efficacy has waned in recent years, particularly in Africa. Regional and country-level capacity for this critical monitoring activity should be rebuilt, and appropriate funds allocated to ensure its regular execution. The continued use of artemisinin monotherapy is a major contributing factor to parasite resistance. Despite the call by WHO to halt their

use, the production of artemisinin monotherapies continues and many countries have not yet withdrawn these medicines from their markets. To meet this goal, greater assistance will need to be provided to national drug regulatory authorities.

Although monitoring for insecticide resistance should be an integral part of scaling up insecticide-treated nets and indoor residual spraying, it is currently insufficient in most countries. Entomologic capacity-building at the regional, subregional and national levels will be critical to conducting this monitoring and mitigating the threat of insecticide resistance.

Over the past year, intervention coverage is increasing in Africa and globally, and an impact has been confirmed in those countries with prior low-moderate transmission of malaria and higher intervention coverage. To reach the World Health Assembly and Roll Back Malaria Partnership impact targets for 2010, malaria interventions need to target all persons (instead of just children and pregnant women), especially in high-transmission countries. Impact needs to be monitored closely to ensure that disease control targets are being met. Outside of Africa, significant progress has been seen in a number of countries but the number of cases has fallen least in countries with the highest incidence rates. Control efforts need to be intensified in countries and areas with the highest malaria burden before the Millennium Development Goals can be achieved.

Nearly all of the one million malaria deaths each year could be prevented with the universal application of existing tools.

Report of the World Health Organization entitled "2001-2010: Decade to Roll Back Malaria in Developing Countries, Particularly in Africa"

I. Background and context

1. A renewed effort to control malaria throughout the world and move towards its elimination in some countries is founded on the most recent generation of effective tools and methods for prevention and treatment. The massive scale-up of long-lasting insecticidal nets and artemisinin-based combination therapies and the continued expansion of indoor residual spraying of insecticide present an unprecedented opportunity to control, and in selected countries eliminate, malaria.

2. To accelerate progress in malaria control, the 2005 World Health Assembly, in support of the Roll Back Malaria targets defined in 2000 by the African Heads of State, set coverage targets of 80 per cent or more for four key interventions: insecticide-treated nets for people at risk; appropriate antimalarial drugs for patients with probable or confirmed malaria; indoor residual spraying for households at risk; and, in high transmission settings, intermittent preventive treatment in pregnancy. The Assembly further specified that, as a result of these interventions, malaria cases and deaths per capita should be reduced by 50 per cent or more between 2000 and 2010, and by 75 per cent or more between 2000 and 2015. These goals were affirmed in the Global Malaria Action Plan.

3. Following a resolution of the World Health Assembly, to establish a World Malaria Day as a yearly advocacy forum, global partners including international organizations, non-governmental organizations, multilateral organizations, donors, private sector partners and research institutions, commemorated the first World Malaria Day in 2008. The commemoration culminated in the Secretary-General's call for universal coverage with malaria control interventions.

4. The *World Malaria Report 2009*, to be published by the World Health Organization (WHO) in late October 2009, will provide a comprehensive updated information on financing for and coverage with malaria control interventions as well as health impact up to the end of 2008. The data in this report come primarily from national malaria programmes, the population surveys and special impact assessments done by ministries of health with the support of WHO, and from commodity suppliers. Additional data from demographic and health surveys, malaria indicator surveys and multiple indicator cluster surveys were openly available from a variety of Roll Back Malaria partners.

5. While the progress made in malaria control has been remarkable, there are potential threats that demand increased attention, including: (a) resistance to insecticides and antimalarial medicines and lack of alternatives; (b) insufficient funding to reach universal coverage; and (c) weakness in global and intranational purchasing and supply chains, resulting in stock-outs of key commodities at the national and health facility levels.

II. Policies and strategies for malaria control

6. Early and effective treatment of malaria reduces morbidity, prevents death and reduces the reservoir of infection, leading to successful malaria control. Consistent with the 2009 WHO guidelines for the treatment of malaria, all cases of malaria must be diagnosed promptly (within 24 hours) by microscopy or a rapid diagnostic test, and confirmed malaria must be treated with an artemisinin-based combination therapy. When laboratory diagnosis is not possible, treatment should be given on the basis of a clinical diagnosis. Severe malaria must initially be treated with parenteral artemisinins or quinine, followed by a complete course of an artemisinin-based combination therapy. When patients with severe malaria present at facilities where parenteral treatment is not feasible, for example, in some peripheral health posts, they must receive pre-referral treatment with artesunate suppositories (or intramuscular antimalarials) and transferred to a higher level of health care for full treatment and further care.

7. A delay in treatment for malaria can result in rapid progression to severe malaria death, especially in those with limited immunity, such as children under 5 years of age in Africa. Since a high proportion of the population most at risk of malaria live in rural areas in which the nearest health facility may be too distant for them to receive prompt care, diagnosis and treatment of malaria must be made available at the community level. Community health workers should be trained to diagnose malaria (either clinically or confirmed by a rapid diagnostic test), dispense artemisinin-based combination therapies, and administer artesunate suppositories as pre-referral treatment to those with suspected severe malaria.

8. The presence of oral artemisinin-based monotherapies in the market continues to represent a threat to the useful programmatic life of these medicines by encouraging the development of parasite resistance. WHO recommends the withdrawal of oral artemisinin-based monotherapies from the market and the use of artemisinin-based combination therapies instead. These recommendations have been endorsed by all WHO member States and are part of resolution 60.18, adopted by the sixtieth World Health Assembly in May 2007. While to date 39 malaria endemic countries either comply with WHO recommendations or have announced their intention to take regulatory measures in order to withdraw marketing authorizations for these medicines, 37 countries still allow the marketing of these products. Most of them are located in the African region, followed by the Americas and South-East Asia.

9. The Roll Back Malaria Partnership has developed the Affordable Medicines Facility for malaria, a financing mechanism to increase access to artemisinin-based combination therapies and to force out the cheaper but ineffective medicines and monotherapies that promote drug resistance. Managed by the Global Fund to Fight AIDS, Tuberculosis and Malaria, this programme is currently being piloted in 11 countries.

10. Parasite resistance has rendered previous antimalarial medicines ineffective and led to their being abandoned, impeding major malaria control efforts. The current highly effective medicines, the artemisinin derivatives and their partner drugs, are prone to the same risks. *Plasmodium falciparum* resistance to artemisinins has already developed at the Cambodia-Thailand border where efforts, coordinated by WHO with support from the Bill & Melinda Gates Foundation, the

Global Fund and the United States Agency for International Development (USAID), are under way to eliminate the focus of artemisinin-resistant malaria. WHO recommends the following strategies as a means of preventing or delaying the onset of drug resistance: (a) use of at least two medicines in combination, and halting the use of monotherapies for the treatment of uncomplicated malaria; (b) dispensing of treatment on the basis of a confirmed (parasite-based) diagnosis to diminish the excessive and indiscriminate use of medicines; (c) correct use of medicines of good quality, since medicines of substandard quality or standard medicines when taken at subcurative doses enhance the likelihood of parasite resistance; (d) stringent monitoring of drug resistance by therapeutic efficacy studies conducted on a regular basis in countries so that the earliest signs of drug failure are detected and the medicines policy changed to one that is effective; (e) a sustained pipeline of drug development to ensure the registration of a new, safe and effective medicine for malaria at least every five years to replace those that are being lost to resistance.

11. Intermittent preventive treatment (IPT) is recommended for population groups in areas of high transmission who are particularly vulnerable to either contracting malaria and/or suffering its consequences, namely, pregnant women (IPTp), and more recently, infants (IPTi). IPTp is the single dose treatment with sulfadoxine-pyrimethamine given 2-3 times during the second and third trimesters of pregnancy and delivered in the context of antenatal care visits. IPTi, using a single dose of sulfadoxine-pyrimethamine administered three times in the first year of life during routine expanded programme on immunization visits, has more recently been recommended by WHO for areas of high transmission where sulfadoxine-pyrimethamine still remains effective as a preventive medicine. Where sulfadoxine-pyrimethamine is still effective against the parasite, IPTp reduces the likelihood of anaemia in the mother, and low birthweight in the newborn, while IPTi reduces clinical malaria episodes, anaemia, and malaria-related hospitalizations in the first year of life.

12. Since the publication of the WHO position statement on long-lasting insecticidal nets in 2007, most countries in Africa and high-burden countries elsewhere have adopted the WHO policy recommendation to expand from targeted coverage of high-risk groups to the universal coverage of all persons living in local malaria transmission areas. All 45 countries in the African region had adopted, by the end of 2008, policies of free distribution of insecticide-treated nets to children and pregnant women. However, owing to limited resources, many countries are still conducting mass distribution of long-lasting insecticidal nets to a subset of the population (children and pregnant women) instead of targeting all households and all persons. Inequity, especially failure to reach the poorest members of society and the most remote parts of the country, remains a threat to achieving universal coverage and is of particular concern to WHO and other Roll Back Malaria partners.

13. Indoor residual spraying with WHO-approved chemicals (including DDT) remains one of the primary vector control interventions for reducing and interrupting malaria transmission in all epidemiological settings. However, the impact is likely to be disappointing unless its application is continued for a number of years and quality is rigorously maintained. Significant investments of time and resources are required to build the institutional capacity needed to maintain quality. While some countries are in the process of doing this, particularly with support from the United States President’s Malaria Initiative, more technical support is needed. The choice between indoor residual spraying and insecticide-treated nets depends

largely on transmission patterns, entomological parameters and local capacity. There are some data to suggest that the combination of the two does confer additional protection, but the evidence is not conclusive and further studies are needed and planned. For such a combination, the choice of insecticide is a critical issue. A recent technical consultation has concluded that it is probably good practice to use different insecticide classes on the wall and the net; adopting this recommendation into policy guidance is under consideration, and will have major implications for the use of pyrethroids for spraying.

14. For Africa, insecticide resistance is a major threat to malaria control, most particularly in West and Central Africa. Insecticide resistance has been reported in South Asia from India, Sri Lanka and Nepal. Resistance mitigation strategies, such as rotation of insecticide classes in indoor residual spraying and avoiding the use of the same insecticide class for spraying and nets in a given geographical area, should be considered. There is also an urgent need to improve monitoring. Any project, organization or agency which deploys a vector control intervention should ensure that resistance monitoring is conducted, preferably before the intervention as well as during and after. It should also be noted that the evidence on the importance of agricultural insecticides in selecting for resistance in human malaria vectors is mixed, and additional studies are needed.

III. Implementation status and challenges

A. Curative treatment

15. All countries in Africa have now adopted artemisinin-based combination therapies as first-line medicines for the treatment of malaria and are scaling up the provision of these life-saving medicines to all malaria patients. Based on national household surveys, none of the 21 countries surveyed in 2006-2008 had adequate access to antimalarial drugs. Only in Benin, Cameroon, the Central African Republic, Chad, the Gambia, Ghana, Liberia, the United Republic of Tanzania and Uganda were more than 50 per cent of children with fever treated with an antimalarial drug. The use of artemisinin-based combination therapies was much lower, averaging 3 per cent and ranging from less than 1 per cent to 21 per cent (United Republic of Tanzania). Although rapid diagnostic tests are being deployed increasingly in areas in which microscopy services are not available, recent data indicate that a confirmatory diagnosis of malaria was available to less than 10 per cent of patients in Africa. There are multiple reasons for the low coverage with artemisinin-based combination therapies, including stock-outs at the national and health facility levels due to weak procurement and distribution systems, limited access to public health services and the high cost of the therapies in the private sector. There are ongoing efforts to remedy these deficiencies and improve access to diagnosis and treatment, including expansion of the areas covered by the community management of malaria, in which most countries are now engaged.

16. India contributes the largest proportion of the malaria burden in the South-East Asian region. The country adopted artemisinin-based combination therapies in 2007 as first-line medicines and they are currently being deployed in high-burden districts of the country. Plans for a nationwide scale up are now under way.

17. As access to diagnosis and treatment is being scaled up in countries, the quality of medicines and rapid diagnostic tests remains a grave concern, particularly in the private sector. In order to ensure the quality of these commodities, WHO has established standards. Antimalarial medicines eligible for procurement should be listed in both the WHO guidelines for the treatment of malaria and national treatment guidelines in order to guarantee safety and efficacy. Priority in procurement should be given to medicines either prequalified by the WHO prequalification programme or approved by a stringent drug regulatory authority. Both mechanisms ensure that the manufacturing facilities have been inspected and certified for good manufacturing practices and the product subjected to other standard quality reviews on such aspects as bioequivalence and stability. In additional, adequate quality control testing of pharmaceutical products during the entire supply chain should be done on a regular basis at the pre-shipment, post-shipment, and retailer and consumer levels.

18. Several brands of rapid diagnostic tests are available on the market and they differ in performance. The performance of such tests is also affected by extremes of heat and humidity, conditions that frequently prevail in the field. In order to ensure quality diagnosis, countries are advised to procure from manufacturers which provide a product dossier, a thermostability protocol and ISO 13485:2003 certification. The WHO product testing programme was launched in 2006, in partnership with the Foundation for Innovative New Diagnostics and the United States Centers for Disease Control and Prevention. This programme assesses and reports on the performance for rapid diagnostic test products and serves as a guide to countries and procurement agencies in the selection of quality tests. This performance testing also aims to help manufacturers to improve the quality of their products. The programme also provides a service of lot testing in one of the three regional lot testing centres in the world for procured rapid diagnostic tests.

B. Preventive treatment

19. By June 2009, all 35 countries covered by the WHO African Regional Office in which IPTp is recommended had adopted and were implementing the policy, although use exceeded 30 per cent in only 5 of the 17 countries reporting. Many countries have had difficulties with nationwide implementation, partly due to late attendance at first antenatal care visits and an insufficient number of visits. Stock-outs of sulfadoxine-pyrimethamine are also a problem that has worsened in some countries after the discontinuation of the drug for first-line treatment of clinical malaria. As of June 2009, six countries in Africa are piloting IPTi. No countries have yet scaled up IPTi nationally, although that is likely to change over the next few years.

C. Prevention with vector control

20. Among 21 national household surveys conducted in 2006-2008, the percentage of households that owned an insecticide-treated net was 40 per cent or greater in 12 countries (Ethiopia, Gambia, Guinea-Bissau, Kenya, Mali, Niger, Rwanda, Senegal, Sierra Leone, United Republic of Tanzania, Togo, Zambia). On average, 34 per cent of households in these countries owned at least one such net, and 23 per cent of children under five years of age and 27 per cent of pregnant women had used

an insecticide-treated net the previous night. These figures fall far below the target of 80 per cent coverage. It should be noted that there have been numerous large-scale distributions of insecticide-treated nets in Africa in the past two years, and that many surveys are not recent enough to reflect these efforts.

21. New methods of mass distribution are needed to reach universal coverage targets. Zambia and Ethiopia were the first large countries to attempt nationwide mass insecticide-treated net distribution targeting all persons and all households. Evidence indicates an immediate and dramatic impact. Zambia distributed the nets over two years, province by province. Likewise, Ethiopia distributed the nets over three years, with responsibility decentralized to the district level at a ratio of one net for two people. These two distribution methods achieved household ownership of approximately 60-65 per cent. Innovative distribution methods will be needed to achieve and sustain household ownership of more than 90 per cent and to therefore achieve the 2015 target of a greater than 75 per cent reduction in malaria burden.

22. In both Togo and Sierra Leone, household ownership of insecticide-treated nets declined unexpectedly quickly within 24-36 months after mass distribution. In Togo, ownership declined from 60 to 35 per cent after 36 months and, in Sierra Leone, from 59 to 37 per cent after 18 months. These observations need attention and further study. These data also highlight the critical importance of the routine insecticide-treated net distribution of nets during antenatal care and expanded programme on immunization contacts and through other channels in order to reach those born after mass campaigns and ultimately to maintain high coverage.

23. A study of the durability of insecticide-treated nets by the Ministry of Health of Togo and the United States Centers for Disease Control and Prevention showed that more than 30 per cent of the nets collected 36 months after the mass insecticide-treated net campaign in December 2004 did not pass a WHO test of efficacy against mosquito vectors or had at least one hole that was at least 10 cm in diameter. This net deterioration may be contributing to the less-than-expected impact in some countries. Basic monitoring of the durability of the nets and the longevity of the insecticide should be made a routine part of country insecticide-treated nets programmes.

24. By the end of 2008, 25 of the 42 malaria endemic countries in the WHO African region had included indoor residual spraying in their national strategy for malaria control. Of these, 17 routinely implement the spraying as a major malaria control intervention, 6 are piloting the spraying in a few districts, while two are planning pilot implementation with a view to scaling up.

25. In South-East Asia, indoor residual spraying remains a mainstay for malaria control in two specific situations: in intense malaria transmission areas and in the prevention and control of malaria epidemics. By 2007, 3 per cent of the total population at risk and 11 per cent of the total population at high and moderate malaria risk were covered by insecticide-treated nets and 40 per cent of the population at high risk were covered by indoor residual spraying in this region. In countries in the Eastern Mediterranean and European regions in which malaria transmission is now low and which are proceeding towards elimination, indoor residual spraying is being targeted to points of residual and potential transmission and to stop reintroduction in malaria-free areas.

IV. Elimination of malaria

26. The World Health Organization encourages countries in areas of low, unstable transmission to proceed to malaria elimination (interrupting transmission), provided that a number of conditions conducive to achieving and sustaining malaria elimination are met, including the strength of the health system. The decision point to embark on a malaria elimination programme is when the malaria incidence in the country is low or considered manageable. Most countries that have moved to an elimination approach in recent years did so at an advanced stage of malaria control, when annually reported cases at the national level were 1,000 or less.

27. In areas of high, stable transmission with unrelentingly high vectorial capacities, as in many parts of tropical Africa, achieving and sustaining a malaria-free status is improbable with the currently available arsenal of tools. Therefore, in high transmission countries which have achieved a marked reduction in malaria transmission through intensive malaria control, a new consolidation period should precede a decision to move to malaria elimination. During this phase, the control achievements are sustained even in the face of limited disease, the health services are adapted to the new clinical and epidemiological situation, and the surveillance systems are strengthened to be able to respond rapidly to new cases, all of which an elimination programme would eventually require.

28. Globally, the present state of elimination efforts is as follows:

(a) Eleven countries are implementing elimination programmes nationwide (Algeria, Azerbaijan, Egypt, Georgia, Iraq, Kyrgyzstan, Republic of Korea, Saudi Arabia, Tajikistan, Turkey, Uzbekistan), with eight of them having entered the elimination phase in 2008. Saudi Arabia and Tajikistan are the only countries in the elimination phase that still have active *falciparum* transmission. Of these 11 countries, 5 report fewer than 10 local cases each year nationwide (Algeria, Egypt, Iraq, Georgia, Uzbekistan) and a further 2 countries report fewer than 100 cases annually;

(b) Eight countries are in the pre-elimination stage (Argentina, Democratic People's Republic of Korea, El Salvador, Islamic Republic of Iran, Malaysia, Mexico, Paraguay, Sri Lanka) and reorienting programmes towards a nationwide elimination approach;

(c) A further eight countries have interrupted transmission (Armenia, Bahamas, Jamaica, Morocco, Oman, Syrian Arab Republic, Russian Federation, Turkmenistan) and are in the phase of preventing the reintroduction of malaria. If these countries can sustain zero cases for three consecutive years, they will be eligible for WHO certification as malaria free.

29. Outbreaks of new local transmission have occurred in recent years in the Bahamas, Jamaica and the Russian Federation, and recurred in Oman after a three-year absence. Together with Morocco and the Syrian Arab Republic (last local cases in 2004) and Armenia and Turkmenistan (last local cases in 2005), these countries make up the group of countries aiming to prevent reintroduction of transmission, for which strong surveillance systems are essential.

30. The development of a global research agenda for the eradication of malaria, the Malaria Eradication Research Agenda (MalERA) project, is being currently funded by the Bill & Melinda Gates Foundation in response to an assessment by

WHO in which it concluded that the elimination of malaria from high transmission situations would require more potent tools than are available today. MalERA is expected to publish a white paper on the priority research and development needs for malaria eradication by the end of 2010. The global effort to eliminate malaria from countries received a boost in 2008 from the advocacy work done by the Malaria Elimination Group, the activities of which are supported by the Bill & Melinda Gates Foundation and which included several meetings with countries that could potentially eliminate malaria.

V. Financing malaria control

31. There have been substantial increases in the amount of funds made available for malaria from international sources, from less than US$ 0.2 billion in 2000 to US$ 0.8 billion in 2007 and $2 billion at the end of 2008. The massive increase is due primarily to the Global Fund to Fight AIDS, Tuberculosis and Malaria, the United States President's Malaria Initiative and the World Bank. Increased funding has also stemmed from the Bill & Melinda Gates Foundation, the International Drug Purchase Facility (UNITAID), bilateral agencies and the United Nations. Approximately two thirds of funds are targeted to Africa, which accounts for approximately 90 per cent of global cases and deaths.

32. Contributions from national governments are more difficult to quantify but are reported to have increased in the Eastern Mediterranean region and still account for more than 90 per cent of financing in the American region. In the African region, the pledge by Heads of State to increase health budgets to 15 per cent of expenditure has been reached by only a very few countries. While increases in funds have undoubtedly had a substantial and positive impact on the ability of countries to control malaria, the current level of financing does not meet the levels required to achieve the Millennium Development Goals. The Roll Back Malaria Global Malaria Action Plan estimates that over US$ 5 billion per year will be required to meet the Roll Back Malaria Partnership goals and the Millennium Development Goals. There are also considerable challenges to making the most effective use of available funding:

(a) The limited funds for malaria control tend to be focused on countries in which it is believed that success can be achieved. Those countries with higher standards of governance and stronger health systems receive multiple sources of external financing, while those with unstable governments or civil unrest receive very little. The populations which suffer most from malaria may therefore be denied access to basic malaria prevention and treatment programmes;

(b) There is some evidence that the large external contributions for malaria control are displacing national government financing for malaria as governments divert their limited resources to other health and development priorities. Malaria programmes may also receive less priority from some bilateral agencies and regional development banks as substantial sums are provided by the Global Fund to Fight AIDS, Tuberculosis and Malaria. As greater reliance is placed on external funding from a single source, a country's programme may be put at risk if funding is discontinued or there are delays in disbursement, which can result in critical commodity stock-outs and jeopardize the progress made. Efforts should be made to

ensure that a diverse portfolio of funding for malaria, including host government funding, is available in each endemic country;

(c) In many countries, external funds for international technical collaboration have not increased in line with the amounts provided to endemic countries, limiting the ability to undertake disease surveillance, conduct drug and insecticide resistance monitoring, resolve implementation bottlenecks, and address continuing challenges along border areas and among mobile populations;

(d) Countries which substantially reduce the burden of malaria cases often face difficulties in justifying continued investment in malaria control. However, continued or increased support is key to protecting current achievements and moving towards elimination. Financing of malaria programmes is also put at risk by the global financial crisis. A prolonged recession could force elimination plans to be shelved and reverse recent gains in malaria control. Given the compelling data linking malaria to reductions in gross domestic product, there is a strong argument for continued investment in malaria control despite the current economic crisis.

VI. Impact of malaria control

33. Important new information from several African countries indicates that steep declines in malaria are yielding greater reductions in post-neonatal child mortality than previously anticipated. It is likely that several countries have already achieved the World Health Assembly and Roll Back Malaria Partnership target for 2015 of a greater than 75 per cent reduction by using indoor residual spraying, insecticide-treated nets, and artemisinin-based combination therapy. Preliminary evidence suggests less-than-hoped-for impact of targeted (children under 5 years of age and pregnant women) mass insecticide-treated net distribution in some countries. All countries should proceed to universal coverage with insecticide-treated net and other interventions to achieve the World Health Assembly and Roll Back Malaria Partnership targets for 2010 and 2015.

34. In Eritrea, despite a 44 per cent increase in all-cause inpatient cases and a 31 cent increase in all-cause inpatient deaths between 2001 and 2008, inpatient malaria cases and deaths declined by 68 per cent and 86 per cent, respectively, over the same time period. In Rwanda, reported malaria deaths in children under 5 years of age declined by more than 50 per cent in 2007 and 2008 compared to the average in the pre-intervention period (2001-2005). In Zambia, inpatient malaria cases and death rates declined by 61 per cent and 65 per cent, respectively, by mid-2008 compared to 2000-2002. During 2006-2007, 3.6 million additional long-lasting insecticidal nets were distributed and the percentage of population protected by indoor residual spraying increased from 20 per cent in 2006-2007 to 48 per cent during the 2008 malaria season. In Sao Tome and Principe and the islands of Zanzibar (United Republic of Tanzania), health facility malaria cases and deaths have declined by more than 80 per cent.

35. In most of these settings, the link with malaria control efforts is clear. For example, in Rwanda, mass distribution of insecticide-treated nets to children 9-59 months of age and pregnant women and distribution of artemisinin-based combination therapies to health facilities took place during September and October 2006. During the 2007-2008 demographic and health survey, household ownership of insecticide-treated nets possession was 56 per cent and use by children was

55 per cent. In Zambia, household ownership of the nets as of 2008 was 62 per cent and use was 41 per cent.

36. There is increasing evidence that aggressive malaria control is having an enormous and greater than expected impact on all-cause child mortality. Published evidence from Bioko island (Equatorial Guinea) showed aggressive malaria control was associated with a decline of 66 per cent in all-cause child mortality. In Zanzibar (United Republic of Tanzania), inpatient all-cause deaths of children under 5 years of age declined by 57 per cent when inpatient malaria deaths declined by 90 per cent. The dramatic decline was supported by similar declines in inpatient all-cause and malaria cases, inpatient malaria deaths in those 5 years of age or older, inpatient anaemia cases and deaths, and nationwide outpatient laboratory-confirmed cases. If one assumes that trends in inpatient deaths of children under 5 years of age represent trends in post-neonatal child deaths in the general population, then child mortality may have declined by approximately 40-45 per cent in Zanzibar (United Republic of Tanzania) due to malaria control. In five districts in Zambia with the highest declines in malaria, inpatient all-cause deaths declined 61 per cent, while inpatient malaria deaths declined 95 per cent. Again, assuming these inpatient trends represent post-neonatal child mortality trends, then all-cause child deaths declined by 46 per cent in these five districts. In Zanzibar (United Republic of Tanzania) and Zambia, most of the declines in all-cause child deaths could be accounted for by malaria and anaemia diagnoses. These data are the first recent indication that enormous gains in child mortality can be made if high-level malaria control can be achieved.

37. In the Americas, 557,493 confirmed malaria cases were reported in 2008, a 51 per cent reduction compared to 2000. In addition, 130 malaria deaths were reported in 2008, a 62 per cent decrease relative to 2000. Seven of the 19 malarious countries in the region recorded reductions in the number of cases of more than 50 per cent.

38. In the Eastern Mediterranean region, there was a 46 per cent reduction in the number of reported cases of malaria during 2000-2008. Sizeable reductions were observed in Iraq (from 1,860 cases in 2000 to 6 cases in 2008, 2 of which were imported) and Saudi Arabia (from 4,736 cases in 2000 to 467 in 2007). The Islamic Republic of Iran is also heading towards elimination. The last locally contracted cases in Morocco and the Syrian Arab Republic were recorded in 2004. Certification of Morocco as malaria free is under way and the Syrian Arab Republic is eligible for certification. The United Arab Emirates was certified as malaria free by WHO in January 2007. Local outbreaks of malaria occurred in Oman (2007/08) after the interruption of transmission for some years as a result of importation and increased population movement.

39. In the European region, there has been a substantial reduction in the number of reported malaria cases, from 90,712 cases in 1995 to 589 in 2008. Locally acquired malaria cases are currently reported in 6 of the 53 member States of the region (Azerbaijan, Georgia, Kyrgyzstan, Tajikistan, Turkey, Uzbekistan) but these countries have all moved into the elimination phase. Turkmenistan has initiated the process for certification of malaria elimination and Armenia, in which malaria transmission was interrupted in 2006, is likely to join. The only two cases of locally acquired *falciparum* malaria were reported in Tajikistan in 2008, and its

transmission is likely to be interrupted in the country in 2009, thereby eliminating this type of malaria from the region as a whole.

40. In the South-East Asian region, downward trends in the number of malaria cases have been reported in several countries, especially Bhutan (from 3,806 cases in 2003 to 329 in 2008), India (from 2.0 million cases in 2000 to 1.5 million in 2008), Sri Lanka (from 210,036 cases in 2000 to 670 in 2008) and Thailand (from 63,528 cases in 2000 to 26,150 in 2008). The Democratic People's Republic of Korea and Sri Lanka are now in the pre-elimination stage. The remaining five malaria endemic countries in the region report no change or an increase in burden.

41. In the Western Pacific region, approximately 80 per cent of cases occur in two countries: Papua New Guinea (67 per cent) and Cambodia (12 per cent). Several countries have reported decreases in the number of cases, notably Cambodia (from 62,439 cases in 2000 to 20,347 cases in 2008), The Lao People's Democratic Republic (from 40,006 cases to 18,753), Malaysia (from 12,705 cases to 7,390), the Philippines (from 36,596 cases to 23,654), the Republic of Korea (from 4,142 cases to 1,023) and Viet Nam (from 74,316 cases to 11,355). The number of cases has fallen least in countries with the highest incidence rates.

VII. Conclusions and recommendations

42. **Funding and commodities for malaria control increased again in 2007 and 2008, compared to 2000-2006, thanks to coordinated global advocacy efforts. However, most countries are likely to need universal coverage with insecticide-treated nets and other malaria control interventions in order to reach the World Health Assembly and Roll Back Malaria Partnership impact targets; significant funding gaps therefore remain in some countries.**

43. **As of 2008, it appears that five African countries (Eritrea, Gambia, Rwanda, Sao Tome and Principe, Zambia) and the islands of Zanzibar (United Republic of Tanzania) are approaching or have reached the 2010 World Health Assembly and Roll Back Malaria Partnership morbidity and mortality reduction impact targets of 50 per cent or greater; however, this needs further verification.**

44. **Major potential threats to malaria control and elimination are parasite resistance to medicines (artemisinin-based combination therapies) and mosquito resistance to pyrethroid insecticides (the only insecticide currently being used on insecticide-treated and long-lasting insecticidal nets). The regular monitoring of the efficacy of medicines and insecticides should be a routine component of endemic country malaria programmes.**

45. **Diagnostic facilities for malaria need to be rapidly scaled up in countries and integrated into the management of the sick child. This includes microscopy, where feasible, as well as quality rapid diagnostic tests. Health-care worker skills in differential diagnosis need to be strengthened to ensure appropriate treatment of non-malarial causes of fever.**

46. **The quality of commodities (diagnostics, medicines, insecticide-treated and long-lasting insecticidal nets) and services is an increasingly critical issue as scale-up intensifies. Medicines and insecticide-treated nets of sub-standard quality, counterfeit medicines, and poorly performing rapid diagnostic tests are**

widely prevalent in markets, resulting in avoidable morbidity and mortality and increasing the risk of antimalarial drug resistance. Regulatory mechanisms and enforcement capacity need to be strengthened in countries, especially in relation to the commodities distributed by the informal private sector. Manufacturers also need to be provided with technical information and expertise to ensure that they meet quality manufacturing standards.

47. **Access to malaria treatment with artemisinin-based combination therapies remains poor. Investment by national governments and partners at the country level in strengthening the management of the supply chain system and the health system as a whole is needed. Because access to malaria diagnosis and treatment is primarily limited by poor geographical access to health facilities, especially for the poor and most vulnerable populations living in rural areas, extending the health system to the community level is critical.**

48. **Timely malaria surveillance systems are urgently required to track progress, provide data for programme management, and detect and ensure a prompt response to confirmed malaria cases, especially in settings in which malaria transmission has been dramatically reduced.**

49. **Overall, in the past year, intervention coverage has been increasing in Africa and globally, and impact has been confirmed in those countries with prior low-moderate transmission of malaria and higher intervention coverage. To reach the World Health Assembly and Roll Back Malaria Partnership impact targets for 2010, malaria interventions need to target all persons (instead of just children and pregnant women), especially in high-transmission countries. Impact needs to be monitored closely to ensure that disease control targets are being met.**

50. **Initial evidence from Sao Tome and Principe, Zambia and the islands of Zanzibar (United Republic of Tanzania) points to a substantially higher reduction in child mortality than previously estimated: a greater than 40 per cent reduction in all-cause inpatient child deaths if malaria inpatient child deaths are reduced by 90 per cent. This suggests that aggressive malaria control could be the leading edge for many African countries to reach, by 2015, the target of a two thirds reduction in child mortality as set forth in Millennium Development Goals.**

51. **Nearly all of the 1 million malaria deaths each year could be prevented with the universal application of existing tools.**