



U.S. Response to the Global Threat of Malaria: Basic Facts

Alexandra E. Kendall
Analyst in Global Health

June 15, 2012

Congressional Research Service

7-5700

www.crs.gov

R41644

Summary

In 2010, malaria infected an estimated 216 million people and killed 655,000 people, most of whom were children under the age of five in sub-Saharan Africa. Despite the current burden of disease, malaria is preventable and treatable. Congress has increasingly recognized malaria as an important foreign policy issue, and the United States has become a major player in the global response to the disease. In its second session, the 112th Congress will likely debate the appropriate funding levels and optimum strategy for addressing the continued challenge of global malaria.

Congress has enacted several key pieces of legislation related to global malaria control. These include the Assistance for International Malaria Control Act of 2000 (P.L. 106-570); the U.S. Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act of 2003 (P.L. 108-25); and the Tom Lantos and Henry J. Hyde United States Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008 (P.L. 110-293). These acts have authorized funds to be used in the fight against malaria and have shaped the ways in which U.S. malaria programs are coordinated and managed, including through the creation of the U.S. Global Malaria Coordinator at the United States Agency for International Development (USAID).

In 2005, in response to growing international calls for global malaria control and to the success of the President's Emergency Plan for AIDS Relief (PEPFAR), President George W. Bush launched the President's Malaria Initiative (PMI), which aims to halve the burden of malaria morbidity and mortality in 70% of at-risk populations in sub-Saharan Africa by 2014. PMI brought significant new attention and funding to U.S. malaria programs and made the United States one of the largest donors for malaria efforts. While U.S. funding for global malaria programs has increased each fiscal year since FY2004, support for malaria interventions increased most precipitously beginning in FY2007 as PMI has expanded into new countries. President Obama has continued to support PMI through the Global Health Initiative (GHI).

There is evidence that the growing international response to malaria has had some success in controlling the epidemic. Since 2000, global malaria incidence has decreased by 17% and malaria mortality by 26%. Since 2000, 43 countries have reported a reduction in reported malaria cases of more than 50%, including eight African countries that have experienced 50% reduction in either confirmed malaria cases or malaria admissions and deaths. The decreases in each of these African countries are associated with intense malaria control activities. Despite these successes, several key issues pose challenges to an effective scale-up of the response to malaria. First, increasing reports of drug-resistant malaria in Southeast Asia and insecticide-resistant mosquitoes, largely in Africa, threaten the success of malaria control programs. Second, weak health systems, including shortages in health care personnel and inadequate supply chain networks, have limited the delivery of essential commodities for malaria control. There is also debate within the global health community over whether malaria efforts should increasingly target areas where malaria elimination is possible or whether efforts should remain concentrated on malaria control.

This report outlines basic facts related to global malaria, including characteristics of the epidemic and U.S. legislation, programs, funding, and partnerships related to the global response to malaria. The report will be updated as events warrant.

Contents

Introduction.....	1
Description of Malaria.....	1
Global Malaria Statistics.....	1
Regional Distribution of Malaria.....	1
Malaria Prevention and Treatment.....	2
Key U.S. Legislation on Global Malaria.....	3
U.S. Global Malaria Programs.....	4
Implementing U.S. Agencies.....	5
U.S. Global Malaria Assistance Funds.....	6
Key Partners in the Response to Global Malaria.....	8
Key Issues in Global Malaria.....	9

Figures

Figure 1. Malaria, Countries or Areas at Risk of Transmission, 2010.....	2
Figure 2. U.S. Bilateral Funding for Malaria in Constant Dollars: FY2001-FY2012.....	7
Figure 3. Past and Projected International Funding for Malaria Control, 2000-2015.....	8

Tables

Table 1. PMI Focus Countries.....	4
Table 2. U.S. Bilateral Funding for Malaria: FY2004-FY2013.....	6
Table 3. U.S. Appropriations for the Global Fund: FY2004-FY2013.....	7

Contacts

Author Contact Information.....	10
---------------------------------	----

Introduction

The United States has supported anti-malaria programs since the 1950s. Global malaria received greater attention in 2005 when President Bush launched the President's Malaria Initiative (PMI), a five-year plan to expand U.S. malaria efforts. In FY2008, Congress significantly increased its funding for global malaria and authorized the creation of the U.S. Global Malaria Coordinator at the United States Agency for International Development (USAID) to oversee all U.S. malaria efforts. President Barack Obama has also emphasized combating malaria in his Global Health Initiative (GHI). This report provides background information on malaria and explains the key components of the U.S. response.

Description of Malaria

Malaria is an infectious disease that is transmitted to people through the bite of infected mosquitoes. The disease infects red blood cells, causing a range of symptoms that include fever, headache, and vomiting. Although malaria is preventable and curable, if left untreated, it can be fatal. Young children, pregnant women, and individuals with HIV/AIDS are particularly vulnerable to malaria due to their weakened immune systems.

Global Malaria Statistics¹

Malaria Cases: The World Health Organization (WHO) estimates that half of the world's population is at risk of malaria infection. Malaria is prevalent in 106 countries, referred to as malaria-endemic countries. In 2010, there were approximately 216 million cases of malaria worldwide, down from approximately 233 million cases in 2000. Since 2000, 43 countries have reported a reduction in reported malaria cases of more than 50%. Likewise, the estimated incidence—new cases of malaria—has decreased by 17% globally between 2000 and 2010.

Malaria Deaths: The malaria death toll declined from 985,000 in 2000 to 655,000 people in 2010. Roughly 86% of 2010 malaria-related deaths occurred among children younger than five. Since 2000, global malaria mortality has been reduced by 26%.

Regional Distribution of Malaria²

Malaria occurs worldwide, though it is heavily concentrated in what are categorized by WHO as the African, South-East Asian, and the Eastern Mediterranean regions (**Figure 1**).³

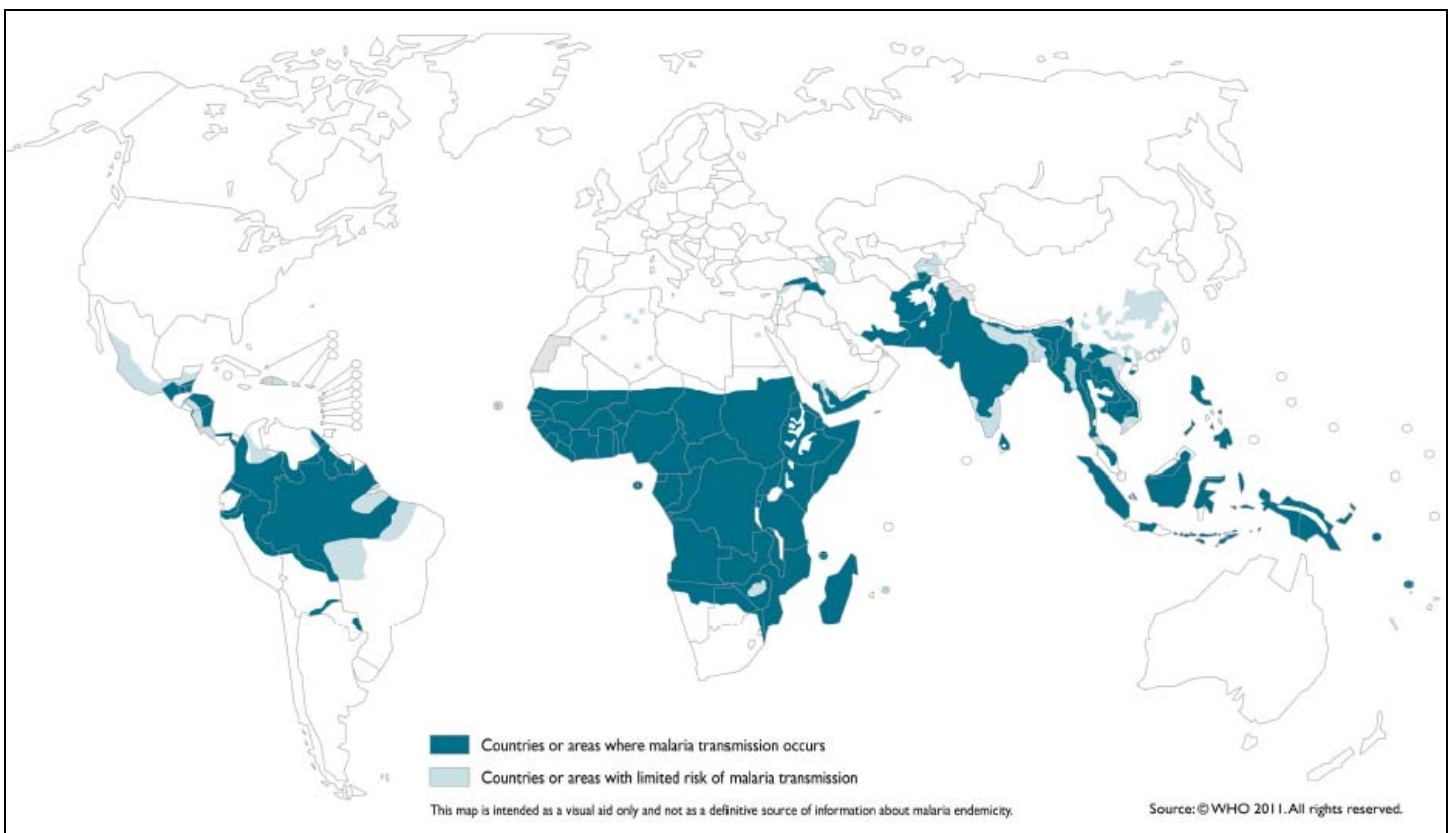
¹ All data in this section is from World Health Organization (WHO), Global Malaria Program, *World Malaria Report*, 2011, http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf.

² All data in this section is from WHO, Global Malaria Program, *World Malaria Report*, 2011.

³ For an explanation of the countries included in each WHO Region, see "WHO Regional Offices," <http://www.who.int/about/regions/en/index.html>.

- In 2010, about 81% of all malaria cases and 91% of all malaria-related deaths occurred in the WHO Africa region. There are 43 malaria-endemic countries in the Africa region.
- The WHO Southeast Asia region was home to 13% of all malaria cases and 6% of malaria-related deaths in 2010. Of the 10 malaria-endemic countries in the South-East Asia region, India, Myanmar (Burma), and Indonesia make up 94% of all confirmed malaria cases.
- The WHO Eastern Mediterranean region was home to 5% of all malaria cases and 3% of malaria-related deaths in 2010. In the region, Sudan, Pakistan, Yemen, and Afghanistan make up 97% of confirmed malaria cases.

Figure I. Malaria, Countries or Areas at Risk of Transmission, 2010



Source: WHO, *Global Health Observatory*, Map Gallery, <http://gamapserver.who.int/mapLibrary/>.

Notes: Countries or areas in dark blue are where malaria transmission occurs. Countries or areas in light blue are those with limited risk of malaria transmission.

Malaria Prevention and Treatment

The international community generally applies four strategies for combating malaria:

Treatment: Anti-malarial treatments include chloroquine, primaquine, and artemisinin-based combination therapy (ACT). ACT is the preferred treatment in areas with particularly deadly

forms of malaria or with drug resistance to earlier generations of anti-malarials. Multi-drug resistant malaria is found worldwide, and there is evidence that ACT resistance is occurring in Asia.

Intermittent Preventive Treatment in Pregnancy (IPTp): In areas with high concentrations of malaria, physicians give pregnant women an anti-malarial drug to prevent them from transmitting the disease to their infants.

Insecticide-Treated Bed Nets (ITNs): Insecticides used to treat bed nets kill and repel mosquitoes. ITNs are used as personal protection against mosquito bites, but evidence suggests that high community coverage of ITNs can lower the number of mosquitoes in a general area and reduce the life span of mosquitoes that remain. ITNs retain effective levels of insecticide for up to six months. Newly developed long-lasting insecticide-treated nets (LLINs) last for at least three years.

Indoor Residual Spraying (IRS): IRS involves covering household walls with an insecticide to kill any mosquito that comes into contact with the surfaces for several months. To be effective, IRS must be applied to a high percentage (80%) of household surfaces. Resistance to insecticides is a growing concern.

While there is presently no malaria vaccine, research is ongoing. There are currently over a dozen vaccine candidates in clinical development, and one, produced by GlaxoSmithKline, is in clinical trials.

Key U.S. Legislation on Global Malaria

- On December 27, 2000, President Bill Clinton signed into law the Assistance for International Malaria Control Act (P.L. 106-570). The act authorized \$50 million per year for FY2001 and FY2002 for anti-malaria activities in countries with high malaria prevalence.
- On May 27, 2003, President George W. Bush signed into law the United States Leadership Against HIV/AIDS, Tuberculosis, and Malaria Act of 2003 (Leadership Act, P.L. 108-25). The act authorized \$15 billion for global HIV/AIDS, TB, and malaria programs from FY2004 through FY2008. The act recognized malaria control as a major foreign policy objective, though it did not specify an amount for bilateral malaria programs.

The act also prohibited U.S. contributions to the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) (see “Key Partners in the Response to Global Malaria”) from exceeding 33% of funds contributed from all sources.

- On July 24, 2008, President Bush signed into law the Tom Lantos and Henry J. Hyde U.S. Global Leadership Against HIV/AIDS, Tuberculosis, and Malaria Reauthorization Act of 2008 (Lantos-Hyde Act, P.L. 110-293). The act authorized \$48 billion for global HIV/AIDS, TB, and malaria programs from FY2008 through FY2013, including \$5 billion for malaria programs over five years.

The act also created the position of U.S. Global Malaria Coordinator at USAID. The Malaria Coordinator is charged with overseeing all U.S. anti-malaria efforts,

submitting an annual report to Congress describing U.S. malaria programs, and developing a five-year strategic plan for U.S. efforts to combat malaria.

This legislation will be up for reauthorization in FY2013.

U.S. Global Malaria Programs

The United States has supported global malaria control efforts since the 1950s. Efforts to expand U.S. malaria programs and improve their coordination increased following the announcement of the President's Malaria Initiative (PMI) in 2005. PMI represented a growing acknowledgement of the efficacy of malaria prevention and treatment strategies and built on the success of the President's Emergency Plan for AIDS Relief (PEPFAR) in harnessing resources to combat a disease. PMI was initially created as a five-year, \$1.2 billion effort to increase U.S. engagement in global malaria control and reduce malaria-related deaths by 50% in 15 high-burden focus countries. Focus countries were selected according to several criteria, including high malaria burden, capacity to implement anti-malaria programs, and willingness to partner with the United States. PMI has since expanded into four other malaria-endemic countries in Africa (**Table 1**).

Table 1. PMI Focus Countries

The PMI Focus Countries have been added over the course of several fiscal years:

FY2006: Angola, Tanzania, Uganda

FY2007: Malawi, Mozambique, Rwanda, Senegal

FY2008: Benin, Ethiopia, Ghana, Kenya, Liberia, Madagascar, Mali, Zambia

FY2011: Nigeria, Democratic Republic of the Congo

FY2012: Guinea and Zimbabwe

Note: PMI countries selected in FY2006, FY2007, and FY2008 represent the original 15 PMI focus countries.

PMI is an interagency initiative run by USAID and jointly implemented by USAID and the Centers for Disease Control and Prevention (CDC). The U.S. Global Malaria Coordinator at USAID coordinates malaria efforts across a number of agencies and departments, including CDC, the Department of Defense (DOD), and the National Institutes of Health (NIH). Oversight duties are shared with an Interagency Steering Group composed of representatives from USAID, CDC/the Department of Health and Human Services (HHS), the Department of State, DOD, the National Security Council, and the Office of Management and Budget. USAID and CDC also provide bilateral malaria assistance to a handful of countries not designated as PMI focus countries.

President Obama has indicated support for an expanded U.S. malaria program. On May 5, 2009, the President announced Global Health Initiative (GHI), a new effort to develop a comprehensive U.S. global health strategy over the course of six years. Malaria is one of the GHI's six priority areas, and PMI is considered a key component of the GHI, reflecting the Administration's belief that scaled-up malaria interventions can help maximize health impact per dollar spent. The GHI calls for a more integrated U.S. response to global health issues, including better coordination between malaria and maternal and child health programs. The GHI also calls for a shift in U.S. global health strategy from one focused on specific diseases to a more comprehensive approach to health, including a focus on health system strengthening.

In April 2010, in response to congressional reporting requirements to develop a coordinated approach to global malaria, USAID, HHS (including CDC), and the Department of State released a joint “Lantos-Hyde United States Government Malaria Strategy.”⁴ The strategy explains how U.S. malaria programs will advance the goals of the GHI and outlines key targets for the U.S. malaria program from 2009 to 2014. Key goals include the following:

- halve the burden of malaria (morbidity and mortality) in 70% of at-risk populations in sub-Saharan Africa;
- limit the spread of anti-malarial multi-drug resistance in Southeast Asia and the Americas;
- assist host countries to revise and update their National Malaria Control Strategies and Plans to reflect the declining burden of malaria; and
- link U.S. malaria efforts with host country malaria plans.

Implementing U.S. Agencies

U.S. agencies supporting global malaria control efforts include the following:

- **United States Agency for International Development:** USAID manages PMI programs in the PMI focus countries. USAID also supports malaria control programs in several other countries and facilitates efforts to identify and contain anti-malarial drug resistance through two regional programs in the Amazon Basin and the Mekong Delta. USAID’s malaria programs focus on five key areas: IRS, ITNs, IPTp, diagnosis and treatment, and pesticide management.
- **Centers for Disease Control and Prevention:** CDC jointly implements PMI with USAID. CDC’s malaria efforts focus on monitoring and evaluation, disease surveillance, and capacity development for national malaria control programs. CDC also undertakes global malaria research to improve prevention and treatment efforts with an emphasis on LLINs, IRS, and IPTp, and the elimination of malaria.
- **Department of Defense:** DOD supports malaria research, including anti-malaria treatment and vaccine development. Research is conducted at the U.S. Military Malaria Vaccine Program at the Walter Reed Army Institute of Research and the Malaria Research Department at the Navy Medical Research Center.
- **National Institutes of Health:** The National Institute of Allergy and Infectious Diseases (NIAID) of the NIH is the lead U.S. agency supporting malaria research. NIAID works on developing tools for malaria prevention, treatment, and control, and enhancing research infrastructure in malaria-endemic countries.

⁴ USAID, HHS, CDC, and Department of State, *Lantos-Hyde United States Government Malaria Strategy: 2009-2014*, April 25, 2010, http://www.fightingmalaria.gov/resources/reports/usg_strategy2009-2014.pdf.

U.S. Global Malaria Assistance Funds

Congress designates funds for malaria to USAID, through State-Foreign Operations appropriations, and to CDC, through Labor, Health and Human Services, and Education appropriations. Congress also provides resources to the DOD and NIH for malaria research efforts. Congressional appropriations for malaria have consistently increased since FY2004. In response to growing calls within the international community for global malaria control, funding for malaria interventions has increased most precipitously since FY2007 (**Table 2** and **Figure 2**) in support of PMI expansion into new countries.

Table 2. U.S. Bilateral Funding for Malaria: FY2004-FY2013

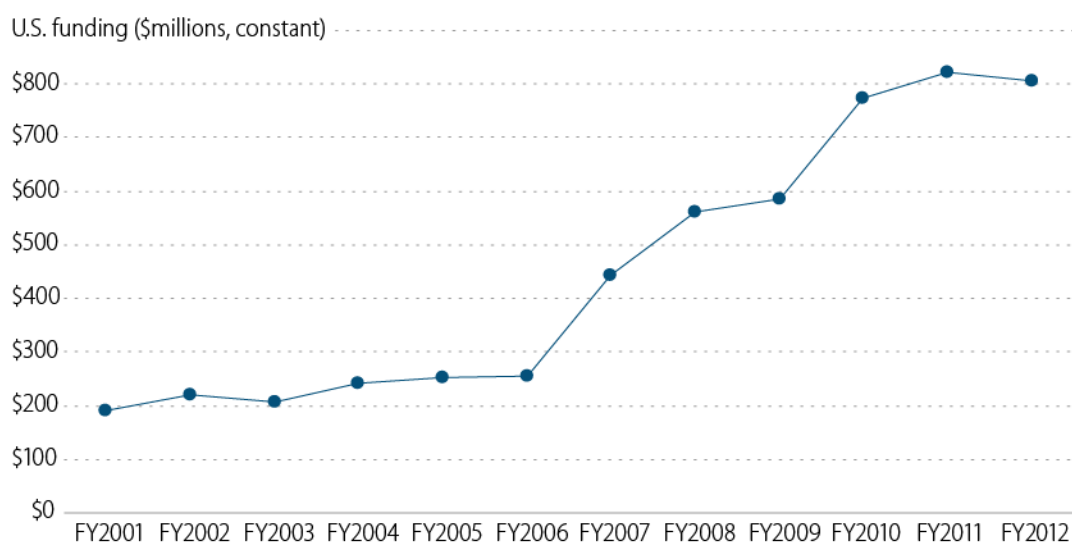
(\$ millions, current)

Program/Agency	FY2004 Actual	FY2005 Actual	FY2006 Actual	FY2007 Actual	FY2008 Actual	FY2009 Actual	FY2010 Actual	FY2011 Actual	FY2012 Estimate	FY2013 Request
USAID GHP ^a	79.6	79.4	98.9	248.0	347.2	382.5	585.0	618.8	650.0	619.0
USAID Other ^b	0.0	0.0	0.0	0.0	2.4	2.5	0.0	0.0	0.0	0.0
CDC	9.2	9.1	9.0	8.9	8.7	9.4	9.4	9.2	9.2	9.4
NIH	88.6	103.8	98.0	111.8	132.5	121.0	112.0	145.0	147.0	147.0
DOD	21.0	22.0	18.0	29.0	31.0	30.6	26.4	27.4	0.0	0.0
TOTAL Malaria Bilateral	198.4	214.3	223.9	397.7	521.8	546.8	732.8	800.3	806.2	775.4

Source: Compiled by CRS from Congressional Budget Justifications, appropriations legislation, and PMI reports.

- a. Global Health Programs (GHP) Account.
- b. This includes funding from the Development Assistance Account (DA), the Economic Support Fund Account (ESF), and the Assistance for Europe, Eurasia, and Central Asia Account (AEECA).

Figure 2. U.S. Bilateral Funding for Malaria in Constant Dollars: FY2001-FY2012
(\$ millions, constant)



Source: Compiled by CRS from Congressional Budget Justifications and appropriations legislation.

The United States also supports global malaria programs through contributions to the Global Fund, an international financing mechanism for the response to HIV/AIDS, TB, and malaria. U.S. contributions to the Global Fund support grants for HIV/AIDS, TB, and malaria. The United States is the single largest donor to the Global Fund. **Table 3** details U.S. contributions to the Global Fund from FY2004 to FY2013.

Table 3. U.S. Appropriations for the Global Fund: FY2004-FY2013
(\$ millions, current)

Program/Agency	FY2004 Actual	FY2005 Actual	FY2006 Actual	FY2007 Actual	FY2008 Actual	FY2009 Actual	FY2010 Actual	FY2011 Actual	FY2012 Estimate	FY2013 Request
USAID	397.6	248.0	247.5	247.5	0.0	100.0	0.0	0.0	0.0	0.0
State	0.0	0.0	198.0	377.5	545.5	600.0	750.0	748.5	1,300.0	1,650.0
HHS	149.1	99.2	99.0	99.0	294.8	300.0	300.0	297.3	0.0	0.0
Total	546.6	347.2	544.5	724.0	840.3	1,000.0	1,050.0	1,045.8	1,300.0	1,650.0

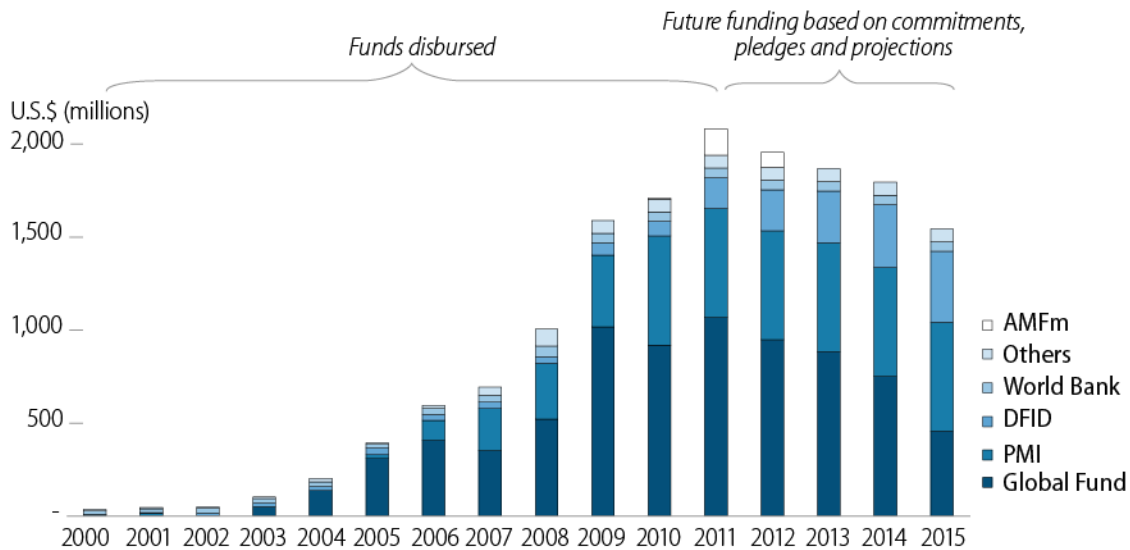
Source: Compiled by CRS from Congressional Budget Justifications and appropriations legislation.

The majority of total global funding for malaria control comes from three sources: external donor assistance, national government spending, and household expenditures. According to WHO, of the total malaria spending in 2007, donor assistance accounted for 47%, national government spending accounted for 34%, and household expenditures accounted for 19%.⁵ The Global Fund is the single largest donor for global malaria efforts. WHO estimates that in 2010, the Global Fund accounted for approximately 50% of malaria funds from international sources, while PMI,

⁵ WHO, *World Malaria Report*, 2009, p. 57, http://whqlibdoc.who.int/publications/2009/9789241563901_eng.pdf.

DFID, and the World Bank accounted for approximately 49% of international funding (**Figure 3**). International disbursements for global malaria appear to have peaked in 2011.⁶

Figure 3. Past and Projected International Funding for Malaria Control, 2000-2015



Source: Data from WHO, *World Malaria Report*, 2011, p. 15.

Key Partners in the Response to Global Malaria

The United States works with a range of partners to combat malaria, including other national governments, multilateral organizations, non-governmental organizations (NGOs), and the private sector. Key partners include the following:

- The Global Fund:** The Global Fund was established in 2002 as a public-private partnership to provide significant financial support for the global response to HIV/AIDS, TB, and malaria. The United States contributes more to the Global Fund than any other donor. The Global Fund has committed over \$22.6 billion in grants in 150 countries since it was established and provides over half of all international funding for malaria control in endemic countries.⁷ In November 2011, the Global Fund announced that due to limited resources available, it would postpone its 11th round of funding.⁸

⁶ WHO, *World Malaria Report*, 2011, p. 15, http://www.who.int/malaria/world_malaria_report_2011/9789241564403_eng.pdf.

⁷ Global Fund to Fight AIDS, Tuberculosis, and Malaria, *Making a Difference – Global Fund Results Report 2011*, 2011, p. 42.

⁸ The Global Fund to Fight AIDS, Tuberculosis, and Malaria, “The Global Fund is Alive and Well, but Global Health Progress is in Peril,” December 2011, http://www.theglobalfund.org/en/mediacenter/announcements/2011-12-01_The_Global_Fund_is_alive/.

- **The World Bank:** In 2005, the World Bank launched the World Bank Booster Program for Malaria Control in Africa. The Booster Program is implemented in 18 countries and supports the rapid scale-up of preexisting malaria control interventions and works to strengthen in-country procurement and supply-chain capacity, monitoring, and evaluation, and health planning.
- **World Health Organization:** WHO is the authority for health within the United Nations system. It is responsible for shaping the global health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries, and monitoring global health trends. WHO's Global Malaria Program (GMP) promotes global malaria policies and intervention guidelines, provides technical assistance to malaria programs, and supports research and development of anti-malarial drugs and insecticides.
- **Roll Back Malaria (RBM) Partnership:** The RBM Partnership was created in 1998 by WHO, United Nations Children's Fund (UNICEF), United Nations Development Program (UNDP), and the World Bank to facilitate coordination of malaria activities and optimal use of resources. The RBM Partnership has 500 partners, including malaria-endemic countries, Organization for Economic Co-operation and Development (OECD) donor governments, multilateral organizations, the private sector, NGOs, foundations, research institutions, and ex-officio members. The Coordinator of PMI currently sits on the RBM Partnership Board.
- **United Nations Children's Fund (UNICEF):** UNICEF supports malaria programs through its work on child survival and development. UNICEF assists in developing national malaria plans and policies; monitoring and evaluation; and supplying, procuring, and distributing malaria commodities. According to UNICEF, it is the world's largest procurer and deliverer of ITNs.⁹ UNICEF and USAID have a "Malaria Control Partnership" to support malaria programming and commodity procurement, supply, and distribution.
- **American Red Cross:** The American Red Cross malaria programs support distribution of ITNs, community education on the threat of malaria and the proper use of ITNs, and operational research on the effectiveness of ITNs.
- **Bill and Melinda Gates Foundation:** The Gates Foundation advocates increased support for malaria and funds the development of new tools to treat, diagnose, and prevent malaria. The foundation hopes to have supported the development of a malaria vaccine by 2025.¹⁰

Key Issues in Global Malaria

The 112th Congress will likely be faced with a number of issues regarding the U.S. response to global malaria, including how much assistance to provide and how to best apportion global malaria funds. Over the past decade, significant progress has been made in combating global

⁹ UNICEF website, "UNICEF in Action: Malaria," http://www.unicef.org/health/index_malaria.html.

¹⁰ Bill and Melinda Gates Foundation website, "Malaria: Our Approach," <http://www.gatesfoundation.org/topics/Pages/malaria.aspx#>.

malaria. International assistance has helped to lower the number of malaria cases and deaths around the world. At the same time, several key challenges threaten the progress achieved to date. As Congress continues to debate the role of the United States in global malaria control, it might consider the following issues:

- **Insecticide and drug resistance:** Growing instances of drug-resistant malaria and insecticide-resistant mosquitoes threaten global malaria control, particularly in Southeast Asia and Africa. There are currently no alternatives to available forms of insecticides and treatments. Some health experts argue that anti-malaria resources should prioritize drug and insecticide resistance, including efforts to improve drug quality control, resistance monitoring and surveillance, and research and development of new forms of malaria drugs.
- **Health System Strengthening:** Weak health systems have been a major impediment to successful malaria prevention and treatment. In particular, shortages in health care personnel and weak supply chain networks have limited the delivery of essential commodities for malaria control. There is some disagreement within the global health community about whether PMI has had a beneficial or detrimental impact on the broader functioning of health systems.
- **Control vs. elimination:** There is debate within the global health community over the degree to which the international community should commit itself to malaria control (reducing the disease burden to a level at which it is no longer a public health problem) or malaria elimination (reducing incidence of infection to zero in a defined geographic). While the majority of international funding for malaria efforts in the past decade has been focused on control efforts, a number of experts have argued that efforts should increasingly focus on elimination of the disease. Key issues affecting the debate over control versus elimination include whether countries have the capacity to support more ambitious programs, whether donor assistance is predictable enough to support elimination efforts, and how the international community can avoid any potentially detrimental consequences of an elimination campaign, such as increased insecticide and drug resistance.

Author Contact Information

Alexandra E. Kendall
Analyst in Global Health
akendall@crs.loc.gov, 7-7314