Multilateral Initiative on Malaria: Justification, Evolution, Achievements, Challenges, Opportunities, and Future Plans

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Abstract. Malaria is a major public health problem; about half of the world’s populations live under exposure. The problem is increasing in magnitude and complexity because it is entwined with low socio-economic status, which makes African women and children particularly vulnerable. Combating malaria therefore requires concerted international efforts with an emphasis on Africa. The Multilateral Initiative on Malaria (MIM) was founded in 1997 to meet that need through strengthening research capacity in Africa, increasing international cooperation and communication, and utilization of research findings to inform malaria prevention, treatment, and control. The review undertaken in 2002 showed that through improved communication and science-focused institutional networks, MIM had brought African scientists together, opened up communication among malaria stakeholders, and provided Internet access to literature. The achievements were made through four autonomous constituents including the coordinating Secretariat being hosted for the first time in Africa by the African Malaria Network Trust (AMANET) for the period 2006–2010. The other constituents are the MIM TDR providing funding for peer-reviewed research; MIMCom facilitating Internet connectivity, access to medical literature, and communication between scientists inside and outside of Africa; and MR4 providing scientists access to research tools, standardized reagents, and protocols. Future plans will mostly consolidate the gains made under the MIM Strategic Plan for the period 2003–2005.

JUSTIFICATION FOR INTERNATIONAL COLLABORATION TO FIGHT MALARIA

Malaria disease burden. Malaria is a major public health problem, which is also complex and resurging in many countries. One hundred and seven (107) countries and territories with about 3.2 billion inhabitants representing 50% of the global population remain at risk of malaria worldwide; this statistic is based on the 192 nations officially listed as members of the United Nations, the most recent being Montenegro as of June 28, 2006. With increasing frequency of adverse weather and natural disasters, increased international travel for tourism and trade, population displacement due to political instability, unprecedented poverty, weak healthcare systems, and inadequate disease surveillance systems, the malaria problem could resurge in many more countries. Up to 500 million clinical malaria episodes occur each year, resulting in over 1 million deaths. Disease burden expressed in the more encompassing measurement of disability adjusted life years (DALYs) showed that of the global 1.4 billion DALYs from all causes, 45 million (3.1%) were due to malaria. However, both the status of malaria on the political agenda and funding for malaria research and control by endemic communities and their international development partners are low and disproportionate to the burden of disease.

Magnitude and complexity of malaria in Africa. The malaria disease burden is highest in Africa where 48 of its 52 countries (92%) are endemic for malaria. Therefore, of the total population of Africa, 98% live in malaria endemic countries and are at risk for the infection (Population Reference Bureau 2006—unpublished). Of the parasite species known to cause malaria in humans, Plasmodium falciparum is the most lethal. Falciparum infections account for over 90% of malaria cases in Africa. The emergence and spread of strains resistant to long-standing antimalarial drugs has effectively compromised the value of monotherapy in managing the disease and necessitated the introduction of more expensive Artemisinin Combination Therapy (ACT) in malaria endemic areas inside and outside Africa. Similarly, the development and spread of insecticide resistance in the mosquito vector is a threat to the continued effectiveness of vector management. Effective and sustainable access to new and more potent antimalarial drugs and management of insecticide resistance are important challenges being addressed by the malaria community.

It is estimated that 300–500 million malaria episodes and over 1 million deaths occur globally every year, and of these, over 60% of malaria episodes and 80% of the deaths occur in Africa. Of Africa’s estimated disease burden of 273 million DALYs in 1999, malaria accounted for 37 million (13.6%). It has also been demonstrated that malaria in Africa resulted in an annual economic loss of US$ 12 billion, retarded economic growth by 1.3%, and that malaria and poverty perpetuated each other in the region. As a result the socio-economically deprived populations including children and women of reproductive age who are most vulnerable to the infection are hindered by rampant poverty from utilization of currently recommended control interventions such insecticide treated nets (ITNs), early diagnosis, and treatment. Social injustice and gender insensitivity further complicate access and utilization of these interventions by women, who regardless of their state of health, vulnerability to malaria, and limited authority over empowering resources, are often required to nurse ill members of their households.

EVOLUTION OF THE MULTILATERAL INITIATIVE ON MALARIA

Founding of Multilateral Initiative on Malaria (MIM). Because malaria is such a complex problem, its stakeholders are varied and therefore it requires well-coordinated international collaboration. This need for coordinated international
collaboration to fight malaria was realized by the stakeholders who planned, convened, and followed up the discussions and recommendations of the International Conference on Malaria in Africa, in Dakar, Senegal, January 6–9, 1997 (African Malaria Vaccine Testing Network 1997–unpublished, and Malaria Foundation International 1997–unpublished). The overarching goal of the conference was to discuss and propose how international collaboration could strengthen and sustain the capability of malaria endemic countries in Africa to carry out the required research to develop or improve tools for malaria control. The conference had 150 participants comprising malaria experts and representatives of government, non-government, and international agencies supporting malaria research. The discussions among other things identified priority research questions, rationale for the choices, and the required collaboration for furthering the research. This conference was a watershed for the Multilateral Initiative on Malaria (MIM) and has since been referred to as the First MIM Pan-African Conference on Malaria. Smaller meetings of 50 to 60 participants consisting of senior malaria researchers, representatives of donor countries, and international agencies supporting malaria research, were convened to formalize the initiative in The Hague in July 1997, and in London at the Wellcome Trust in November 1997.

**MIM founding agencies.** Table 1 shows the agencies that were involved in the planning of the First MIM Pan-African Conference on Malaria, actively participated in the post-conference meetings in The Hague and London, and are therefore credited for the founding of MIM. The meetings conceived MIM as a loose alliance of organizations and individuals concerned with malaria as opposed to a defined body with a formalized administrative structure. The alliance was expected to support prioritized MIM activities through existing mechanisms and to establish new ones only for concerted action to fulfill specific needs. The collaboration was to foster international and mutually beneficial scientific partnerships among African scientists and between these scientists and their colleagues in the North. The modus operandi of the collaboration was to be based on consensus principles, effective communication, and transparent information.

**MIM mission, objectives, and priorities.** In pursuance of its mission of maximizing the impact of global activities against malaria in Africa, MIM has the objectives of developing research capacity in Africa, increasing international cooperation for malaria research, and facilitating relevant communication at all levels. The latter objective has broadened the MIM outlook by recognizing the importance of involving industry and communities responsible for commercial development of malaria treatment and control interventions and their implementation respectively. The priorities that required immediate MIM action were identified as:

1. Establishing an effective process for communication and advocacy on the public health importance of malaria
2. Sequencing the malaria parasite genome to facilitate discovery of new drugs and vaccines for which there was already collaboration between global research and the funding community
3. Enhancement of research sites’ Internet access, making access to medical literature possible as well as interaction between African scientists and their colleagues around the world
4. Support for a working group to explore ways of maximizing creative interaction between malaria research and control communities to optimize the use of available methods for malaria control and treatment
5. Support for an annual African malaria conference to bring together African public health and research workers
6. Creation of an inventory of research capacity existing within African malaria research institutions
7. Creation of a working group to collaborate with the World Health Organization (WHO) to address policy issues regarding the use of antimalarial drugs and surveillance of resistance to these drugs within Africa
8. Creation of a working group to work with WHO and related organizations to set targets for reducing malaria morbidity and mortality
9. Establishing a MIM Contact Group initially for the first year at the Wellcome Trust to coordinate the progress of these separate initiatives and general aims.

**Opportunities for addressing MIM initial priorities.** Commitment to address MIM priorities was evident among the founding agencies at the Dakar meeting. Malaria Foundation International was already undertaking malaria public health importance advocacy and expressed commitment to step up the activity. The U. S. National Institutes of Health and National Library of Medicine expressed commitment to enhance Internet communication between African scientists and the global scientific community, and subsequently established the MIM Communication Network. African Malaria Vaccine Testing Network (AMVTN), later renamed African Malaria Network Trust (AMANET) had already produced an inventory of research capacity within African institutions that only

**TABLE 1**

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<tr>
<th>SN</th>
<th>Agency/institution</th>
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<tr>
<td>1</td>
<td>US Centers for Disease Control and Prevention (CDC)</td>
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<td>2</td>
<td>European Commission (EC)</td>
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<td>US National Institutes of Health (NIH)</td>
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<td>Malaria Foundation International</td>
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<td>6</td>
<td>UK Medical Research Council (MRC)</td>
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<td>7</td>
<td>US National Library of Medicine (NLM)</td>
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<td>8</td>
<td>Netherlands Organization for Scientific Research (WHO)</td>
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<td>9</td>
<td>Organization of African Unity/African Union (AU)</td>
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<td>10</td>
<td>UNESCO</td>
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SN = Serial Number.
required updating. The Special Program for Research and Training in Tropical Diseases located at the World Health Organization (WHO/TDR) was already undertaking research capacity strengthening as well as providing research grants. Wellcome Trust volunteered to set up the MIM Secretariat for the initial first year. The National Institutes of Allergy and Infectious Diseases branch of NIH (NIAID) indicated plans for selective increase of funding for malaria research and control. These efforts have since been supported by several international declarations thus putting malaria on political and development agendas. These declarations include the Harare Declaration of June 1997 on Malaria Prevention and Control for African Economic Recovery and Development, Abuja Declaration and Plan of Action on Malaria 2001,7 the Commission for Africa Report 2005, and Millennium Development Goals Report 2006.

MIM review undertaken September/October 2002. A review was undertaken 5 years after the launch of the initiative with the goal of facilitating planning for the next 5 years. The review panel consisted of 7 scientists from around the world. The panel interviewed MIM beneficiaries, non-beneficiaries, and critics including African scientists who were recipients of MIM funding, unsuccessful applicants, administrators of large malaria activities worldwide, staff of major development and research funding agencies, and personnel who managed the first Secretariat at the Wellcome Trust.

Review findings. The Multilateral Initiative on Malaria was found to have made impressive achievements, which among others were bringing African scientists together through improved communication and access to information and science-focused institutional networks. These achievements were made through four constituent organizations that had developed—namely the MIM Secretariat, MIM at the WHO Special Program for Research and Training in Tropical Diseases (MIM/TDR), MIM Communication Network (MIMCom), and Malaria Research and Reference Reagent Resource Center (MR4).

Review conclusions and recommendations. The review panel made 4 major recommendations and concluded that MIM development had 2 stars to follow. The first star was to consolidate MIM operational systems and organizational capacity to make it function smoothly, which would help the Secretariat achieve its ultimate aim of rotating permanently among African institutions. The second star was to catalyze concurrent development of African research capacity, making African science a full partner and collaborator in malaria research and control.

Recommendation 1. Refine and clarify MIM overarching vision, goals, and objectives for the next 5 years, and develop a strategic plan to fulfill them. It was observed that MIM needed to develop a coherent and well-articulated strategic plan to guide the implementation of its spectrum of activities and facilitate communication to attract and maintain funding from large national and international programs.

Recommendation 2. Enhance communication and coordination between MIM four-component organizations. It was considered essential that MIM’s overall strategic plan be designed and adopted by all its 4 components, and that each component’s specific goals and plans should be revisited to ensure they served MIM’s overarching mission and objectives. Furthermore, to attract and sustain long-term funding, it was considered necessary to bring all MIM components into a productive, self-reinforcing union with better ties between them.

Recommendation 3. Strengthen MIM organizational structure by creating an Advisory Board, increasing the tenure of MIM Secretariat, and planning for transferring the Secretariat responsibilities to African institutions. It was recommended that the MIM Advisory Board be small but powerful with a strong African voice to provide technical guidance, assist fundraising, help open doors in the public policy arena, and help leverage advocacy for African science. It should also provide much needed oversight and continuity of care for MIM, thereby helping overcome a number of existing and potential weaknesses in MIM current’s decentralized structure. Because short Secretariat hosting periods are associated with too frequent transfers, it was also recommended to extend the term to at least 4 years. The longer tenure would alleviate difficulties created by frequent transfers associated with short-term hosting periods and would facilitate scheduling of the MIM conference as well as fundraising. Non-African institutions hosting the MIM Secretariat should collaborate with interested African institutions to plan the successful hosting of the Secretariat in an African institution.

Recommendation 4. Plan strategically to augment and secure MIM long-term resources and funding. It was noted that MIM current funding approach was to identify critical issues for focus, then identify funding bodies with related interests, an approach that provides a tried and true formula for partnership investments. However, such a piecemeal funding approach detracted from MIM’s ability to address overarching strategic goals such as building African scientific capacity for malaria research. It was therefore felt that with the development of a stronger, more coherent strategic vision and plan for MIM, potential focal activities will be clarified as parts of a whole, and funding for “the Big Picture” may be more easily solicited.

IMPLEMENTATION OF THE REVIEW RECOMMENDATIONS

Efforts have been made to implement the review recommendations. The MIM overarching mission and objectives have since been refined and used to guide the development of the MIM Strategic Plan for the Period 2003–2005. The plan was developed with close consultations among the constituents and was overseen by the concurrent overarching MIM Strategic Advisory Board. The proposed plan for the period 2006–2010 was discussed by the second MIM SAB at its first meeting on October 28, 2006. Communication and coordination between the MIM components are being undertaken through monthly teleconferences. Furthermore all constituents contribute content to the biannual MIM Newsletter. The electronic MIM News and Opportunities publication disseminates malaria information through a listserv to over 300 subscribed stakeholders including malaria researchers, control managers, and policy makers globally. The MIM Secretariat is currently hosted by the African Malaria Network Trust (AMANET), a pan-African institution based in Dar es Salaam, Tanzania. The hosting tenure will be for a period of 5 years.
MIM CONSTITUENTS AND RESPONSIBILITIES

MIM Secretariat. The Secretariat supports MIM overarching objectives and serves as a resource for the other MIM components, participants, and partners listed in Table 2. The major duties of the Secretariat are:

1. Dissemination of malaria-related information through meetings, publications, and electronically through its website and a global listserve.
2. Organizing MIM Pan-African Malaria Conferences.
3. Coordinating MIM support among partner groups.
4. Strengthening malaria research capacity in endemic regions by organizing required short- and long-term training in collaboration with other appropriate MIM constituents.
5. Identifying research gaps to be addressed.

SPECIAL PROGRAM FOR RESEARCH AND TRAINING IN TROPICAL DISEASES, WHO (TDR)

Embedded in the WHO Special Program for Research and Training in Tropical Diseases, co-sponsored by UNICEF, UNDP, and the World Bank (TDR), MIM/TDR funds peer-reviewed research to strengthen malaria research capacity in Africa. MIM/TDR has the specific objectives of:

1. Generating knowledge and tools for malaria prevention and control in Africa.
2. Developing human resources through research partnerships.
3. Facilitating the emergence of a critical mass of African scientists and control managers engaged in discovery, development, and integration of new tools into policy.
4. Promoting partnerships of research groups inside and outside Africa, collaboration, technology transfer and training opportunities through inter- and multi-country research projects and networks.

A Task Force comprising African and non-African scientists engaged in basic and/or applied research, review grant applications, and select recipients. The focus for the MIM/TDR research and training grants is currently under review in line with current needs and priorities identified at the fourth MIM Pan-African Malaria Conference held in November 2005 in Yaoundé, Cameroon and other reports. However, in the past 8 years the focus has been on:

1. Functional genomics of the malaria parasites and vectors.
2. Pathogenesis of severe malaria and malaria in pregnancy.
4. Drug resistance, chemotherapy, chemoprophylaxis, and drug policy.
5. Vector populations, insecticide resistance, and alternative insecticides.
6. Health policy, systems and services research.
7. Socio-economic and behavioral research associated with malaria and health care.
8. Evaluation of community-based, large-scale preventive and therapeutic interventions.

MIM COMMUNICATION NETWORK (MIMCOM)

MIMCom is the communications component with the mission of enabling African scientists to connect with one another and information sources through full access to the Internet, current medical literature, and resources of the World Wide Web. MIMCom was led by the U.S. National Library of Medicine who created partnerships with organizations in Africa, Europe, the United Kingdom, and the United States. In addition to enhancing access to the Internet and medical literature, MIMCom offers training for technical systems operators and researchers, a website for researchers, a weekly newsletter, evaluation of how information technology could...
impact professional performance of researchers, and support for special research agendas.

**MALARIA RESEARCH AND REFERENCE REAGENT RESOURCE CENTER (MR4)**

The NIH commitment to the MIM was extended with the ambitious development of a central repository for malaria research reagents and protocols through the development of MR4. The mission of MR4 is to provide improved global access to research tools, standardization of reagents and protocols, integration of malaria information resources, and development and sponsorship of workshops and training in critical areas of malaria research. It operates with funding from the NIAID at the American Type Culture Collection (ATCC) Manassas, VA, USA, with production of mosquito vector reagents at the CDC Foundation, Atlanta, GA, USA. The MR4 biorepository houses human, simian, and rodent model malaria parasite species, live and preserved mosquito vectors, antibodies and hybridomas, genomic and plasmid DNAs, libraries and sequenced library clones, and genetic arrays. These tools are distributed free of production cost to registered malaria and vector researchers. The catalogue of stocked reagents and biologicals is available on both the Internet and on CD-ROM, and laboratory methods in malaria research protocols are maintained online and in laboratory manual format. Bound copies of these are distributed freely upon request. MR4 maintains an internationally recognized Scientific Advisory Board (SAB) of at least 12 members that include representation by African scientists. SAB members serve 3- to 4-year terms, communicate regularly through conference calls and meet annually to provide direction and feedback on MR4 priorities.

Great advances have been made in the understanding of the biology of the parasite and mosquito concomitant with the increasing completion of genome sequencing projects. With the changing direction of the malaria research field in the post-genomic era, new research tools will be required, with an increased emphasis toward vaccine and clinical needs and extension of the capacity and availability of these tools in endemic regions. New isolates of chemically resistant and naive populations of parasites and mosquitoes will be required to understand geographic diversity, susceptibility, and spread of resistance. Critical protein and molecular markers should be readily and cheaply available to the global research community. With a new commitment for NIAID funding through 2011, the MR4 will continue to serve as a global resource for these tools, and to seed local research communities with critical research tools, protocols, and training.

**MIM CHALLENGES, OPPORTUNITIES, AND ACHIEVEMENTS**

**Challenges and opportunities.** To pursue its mission of maximizing the impact of research on malaria, MIM has the challenge of regularly updating research priorities and capacity needs assessments. It is imperative for MIM to have a refined and updated mission for its niche with regard to the ever increasing number of organizations addressing malaria and related problems particularly in Africa. MIM has the challenge of identifying positive areas for collaboration with other organizations combating malaria rather than duplicate efforts. Some of the newer organizations involved in combating malaria are the Roll Back Malaria (RB) partnership, Medicines for Malaria Venture (MMV), Malaria Vaccine Initiative (MVI), African Malaria Network Trust (AMANET), European and Developing Countries Clinical Trials Partnership (EDCTP), European Malaria Vaccine Initiative (EMVI), Malaria Foundation International (MFI), and Malaria Clinical Trials Alliance (MCTA) to name only the leading few. Although these recent entrants in the malaria research arena may be considered as threats, they may be better considered as opportunities for enhanced collaboration and cooperation in malaria research, prevention, and control. Changes in the research priorities could at times comprise retention of development partners and/or attraction of new ones.

Multilateral Initiative on Malaria as an alliance has a special organizational structure of 4 independent and self-governing institutions, which must be coordinated without crossing the line to governing. Each constituent must appreciate the added value of being in this structure and what is required of it to capture this value. Limiting the rotation of the Secretariat to the resource-constrained African institutions could adversely affect funding of its operations, overarching capacity strengthening, and sustainability.

Advocacy for equitable use of the global resources, mobilization of responses against malaria, and abject poverty through such recent declarations and reports on the G8 Summits, Millennium Development Goals, and Africa Commission, are providing invaluable opportunities that could be used for promoting MIM mission, objectives, and activities. Furthermore, there has recently arisen considerable interest in malaria advocacy among famous artists, activists, journalists, economists, and other academics, in addition to many researchers who have shifted their interests to malaria research. There are also unprecedented funding opportunities for malaria research and control from new philanthropic opportunities and bilateral and multilateral donors.

**Achievements.** Multilateral Initiative on Malaria achievements over the 6 years since its founding have been published recently.1 MIM/TDR has supported over 40 research projects promoting national, international, and multidisciplinary collaborations and multi-center research networks. The projects have also provided structured research training to young African scientists. In a more recent step MIM/TDR, The WHO Global Malaria Program, and WHO Regional Office for Africa are collaborating in providing grants for research and training in strategic areas with imminent relevance to the improvement of malaria control activities such as diagnosis and access to treatment, scaling up preventive interventions, and impact evaluation of combined control interventions.

MIMCom has facilitated fast and reliable Internet connectivity at over 27 research sites in 12 African countries, and through the connectivity access to current medical literature online. MR4 has acquired collections of well-characterized and catalogued research materials, and is able to supply these not only free of charge but also covering shipping and handling costs to requesting African projects.

The rotating MIM Secretariat convened the 2nd, 3rd, and 4th MIM Pan-African Malaria Conferences respectively in Durban (1999), Arusha (2002), and Yaoundé (2005). The
keynote addresses and selected presentations to the 3rd MIM Pan-African Malaria Conference have been published in a special issue of Acta Tropica. The conference in Durban expanded MIM objectives to include facilitating the application of research findings to malaria prevention, treatment, and control through regular updates of research priorities; translation of practical problems into manageable research questions; and stimulating dialogue between scientists, public health professionals, policy makers, and industry. The conference in Yaoundé, Cameroon was organized jointly by MIM and the Roll Back Malaria Partnership signifying increased collaboration between research and control stakeholders. The conference provided a unique forum for scientific discourse to over 1,500 participants from all over the world, among whom were world-renowned expert malariologists. There were over 600 posters, 300 oral presentations through 32 parallel sessions and 23 symposia, 44 exhibitors of health devices and products, and over 70 international journalists who gave the Conference unprecedented media coverage.

FUTURE PLANS

Proposals that would constitute the overarching MIM Strategic Plan for 2006–2010 were presented by each of the four MIM constituents for discussion by the MIM Strategic Advisory Board at its meeting on October 28, 2006 in Cairo, Egypt. The tabled plans were based on the MIM mission and objectives as in the Strategic Plan for 2003–2006. Most of the proposed activities were geared toward consolidation of the previous gains, which were noted to include the following enhancements:

1. Collaboration between the MIM constituents
2. MIM collaboration with Malaria R & D Alliance being convened by MIM Secretariat to urge for increased global funding for malaria R & D; RBM Partnership strengthening interaction between malaria research, academia, and control; E U Network of Excellence for Biology and Pathology of Malaria Parasite (BioMalPar) strengthening the MIM TDR research grants; and A U Commission advancing malaria R&D on the African political agenda and ownership
3. Effectiveness of the MIM Pan-African Malaria Conferences fostering dialogue between the diverse malaria stakeholders; joint identification of research priorities and available research results for implementation; and MIM visibility
4. Opportunities for African institutions to host the MIM Secretariat through reliable support from all malaria stakeholders.

MIM Secretariat Plans. The Secretariat was advised to limit itself to activities only pertaining to its core functions because these were expected to attract funding from the stakeholders. These activities were identified as the following:

1. Website maintenance and upgrading
2. Convening governance meetings and conference calls
3. Coordination of preparation of the MIM strategic plan
4. Convening the MIM Pan-African Malaria Conference of which preparations were underway for the next one
5. Opening up and maintaining dialogue with the African Union Commission
6. Collaborating with AU on preparations for the next African Malaria Day during which the AU budgeted efforts will be launched
7. Preparation and updating the MIM brochure
8. Compiling, editing, and publishing the MIM Newsletter
9. Maintaining and expanding the MIM listserv as a venue for disseminating Malaria News and Opportunities.

There were other proposals that were presented for discussion and whose outcomes should be noted. The discussions on the Malaria R&D Alliance recommended that the Secretariat should continue participating in the Alliance activities urging for increased global funding for malaria R&D. However, it was felt that the Secretariat should not be the Alliance convener. The discussions on a new publication to disseminate malaria R&D and control success stories including translation of research findings into policy and guidelines showed that there was preference for using the MIM Newsletter rather than starting a new publication for the purpose. There were also discussions on appointing goodwill ambassadors for advocacy for malaria R&D, which recommended using joint ambassadors with other malaria stakeholders such as RBM, rather than having separate ones for MIM advocacy. The concepts of networks and centers of excellence as well as a critical mass of researchers were noted as being floated by several agencies; others considered these concepts to be elitist ideologies unlikely to make rational use of resources. However, it was considered worthwhile for the Secretariat in collaboration with MIM/TDR Task Force to convene a meeting of interested parties to explore these concepts.

Received September 19, 2006. Accepted for publication July 5, 2007.

Acknowledgments: Ms. Julia Royall, Chief of International Programs, National Library of Medicine, Bethesda MD 20894, USA, is gratefully acknowledged for editing the information on MIM Communication Network (MIMCom). The Swedish International Development Agency (SIDA/Sarec) is gratefully acknowledged for its financial support of the MIM Secretariat, U S National Institutes of Health (NIH), and the US Library of Medicine for supporting MIM constituents.

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