

A Global Report on Population Mobility and Malaria:

Moving towards elimination with migration in mind



International Organization for Migration (IOM)
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IOM Malaria Day Campaign, Mae Hong Son Province, Thailand, 2012

Population Mobility and Malaria

Today's globalised world is witnessing unprecedented human mobilityⁱ and migrationⁱⁱ trends. There are 214 million international migrantsⁱⁱⁱ, along with 740 million internal migrants^{iv}. One out of 7 persons is on the move. The increasingly multi-directional massive movements of people with marked feminisation raises complex implications on global health throughout the phases of migration – before departure, during travel and transit, at destination and upon return.

As societies become more culturally and ethnically diverse, migrants' health is often determined by factors outside the health sector. Migrants and mobile populations face many obstacles in accessing equitable essential health care services due to factors such as living and working conditions, education level, gender, irregular migration status, language and cultural barriers, anti-migrant sentiments, and lack of migrant-inclusive health policies among others. Thus migration is considered a social determinant of health for migrants and other marginalized and vulnerable groups.

Migrant labour is an integral part of many country economies such as in the mining, transportation and construction industries, or in health care or domestic work. Development is contingent upon a healthy workforce and thereby healthy migrant and mobile populations. Health in the post-2015 Development Agenda should highlight the importance of migrants' health as a crucial enabling factor in sustainable and equitable economic development^v.

Malaria poses a global threat to this progress and growth. As of 2011, 99 countries and territories faced on-going

transmission of malaria. It is the fifth leading cause of death from infectious disease worldwide, and the second leading cause of death in Africa. There were 216 million cases of malaria worldwide in 2010, 174 million cases in the African Region.^{vi}

Migration is often cyclical and seasonal. When populations move from low malaria transmission areas to high transmissions areas, they are more susceptible than the resident population. Migration from these high transmission areas to the low transmission area can expose previously malaria-free vectors to the disease.^{vii} This cycle of re-introduction threatens progress towards malaria elimination and the control of artemisinin resistance.

Increasingly governments and health actors are recognising the need for a wide-ranging approach to migration and health. In addressing malaria control and elimination among migrants and mobile populations, several considerations need to be in place. These include access to vector control programming and services, prevention and early access to malaria diagnosis and treatment using culturally-understood methods as well as surveillance of artemisinin resistance. Efforts should be directed towards implementation of integrated interventions through multi-lateral partnerships across health and non-health sectors.

More dialogue is needed to enhance understanding of migrants' right to health and the concept that health and social costs are reduced when healthy migrants are fully integrated into their host communities. Furthermore, these discussions should take place at all levels of government as addressing malaria across the migration continuum requires critical inter-country coordination for sharing of information and good practices among all key stakeholders.

Operational Framework on the Health of Migrants

The 61st World Health Assembly Resolution on the Health of Migrants (WHA 61.17)^{viii}, adopted in May 2008, calls upon governments to “*promote migrant-sensitive health policies*” and “*to promote equitable access to health promotion and care for migrants*”.

Guided by this resolution, IOM, WHO and the Government of Spain organised a Global Consultation on the Health of Migrants – The Way Forward^{ix} in March 2010. The consultation developed an operational framework through which health issues like malaria could be viewed with migrants in mind.

Malaria through the Operational Framework

Monitoring migrant health

Research and information dissemination will strengthen knowledge on health of migrants, mobile populations, marginalized and other hard-to-reach communities to ensure evidence-based programming and policy development. Collected data should be disaggregated by gender, age, socio-economic status, geographic location, migration status among others. Indicators should reflect any progress achieved in removing the various social barriers that determine the health outcomes in the context of migration as well as those that measure universal health coverage for marginalized individuals and populations, such as migrants and mobile populations regardless of legal status.

Policy and legal framework

Governments and policy makers are assisted in advocacy efforts and development of migrant-inclusive health policies including malaria programmes at national, regional and global levels to promote and protect the health of migrants. To improve health equity for migrants and implementation of universal health coverage, policies outside the health sector (such as social welfare, transportation, immigration, labour, etc) need to be adapted and integrated into a holistic response.

Migrant sensitive health systems

Actions are directed to address and facilitate rights-based health service delivery, build capacity of local authorities, key stakeholders as well as migrant communities to promote equitable access to comprehensive health services including malaria prevention, diagnosis and treatment as well vector control practices. With the aim of achieving universal health coverage, programmes and actions should include public health and non-health sector interventions that address the underlying migration-related determinants of health.

Partnerships, networks & multi-country frameworks

Country, regional frameworks and international coordination and partnerships with international, national and civil society partners as well as migrant communities aim to ensure that multi-sectoral malaria actions are programmatically integrated across countries.

MIGRATION AS A SOCIAL DETERMINANT OF HEALTH

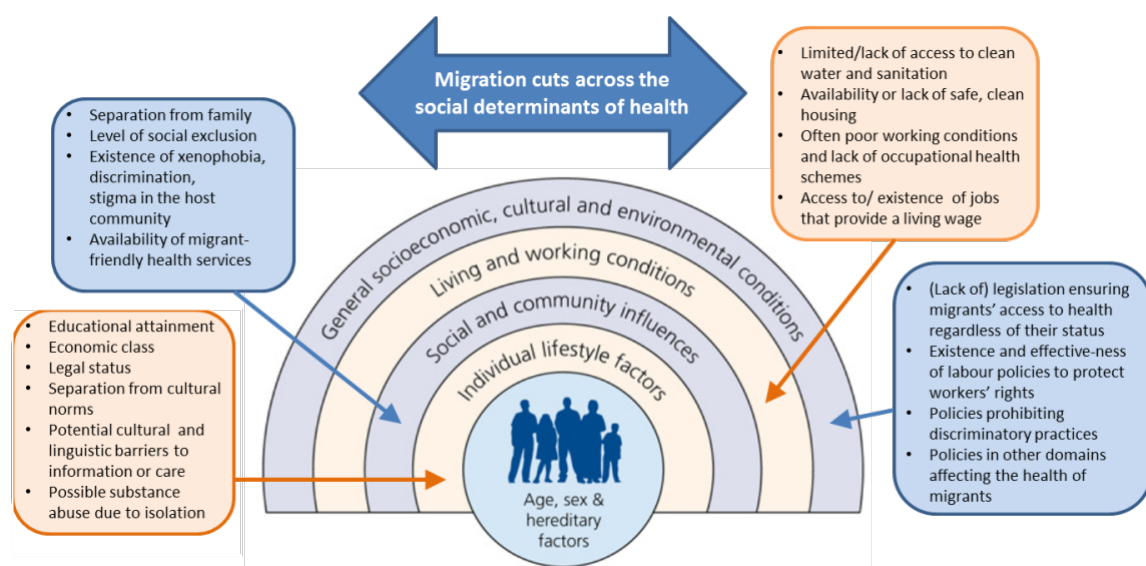


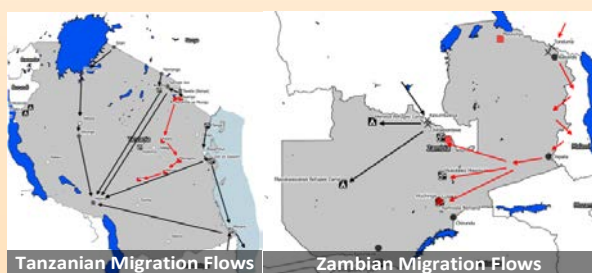
Diagram 1: Adapted from: Commission on Social Determinants of Health. *Closing the gap in a generation: health equity through action on the social determinants of health. Final report of the Commission on Social Determinants of Health.* Geneva, World Health Organization, 2008.

Southern Africa

The challenges that migration poses to malaria elimination are recognised by governments throughout Southern Africa. Multi-sectoral partnerships continue to be built and operationalization of existing partnerships has been made a priority.

The Southern Africa Development Community (SADC) is composed of 15 southern African countries: Angola, Botswana, the Democratic Republic of the Congo (DRC), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe. Within SADC there is varying success at combating and controlling malaria.

Health Vulnerability Study of Mixed Migration Flows from the East and Horn of Africa and the Great Lakes to Southern Africa – IOM South Africa



In response to an increasingly complex migration landscape in Southern Africa, IOM in August 2012 commissioned the study. It aims to expand IOM knowledge of population mobility in Southern Africa and elucidate the experiences, health vulnerabilities and challenges for irregular migrants in transit.

Formative Stage Results:

The study looked at air, sea and land routes. Migrants often utilised different means of transport for different legs of the journey. Land routes have become more popular as governments increased their efforts to stop the sea routes via the Indian Ocean and Lake Malawi.

Migrants faced various health risks inherent in their modes of travel. Lack of access to food, water and shelter; frequent contact with violence; and imprisonment were all major risks for migrants in transit. Imprisonment notably holds risk of exposure to multi-drug resistant tuberculosis (MDR-TB).

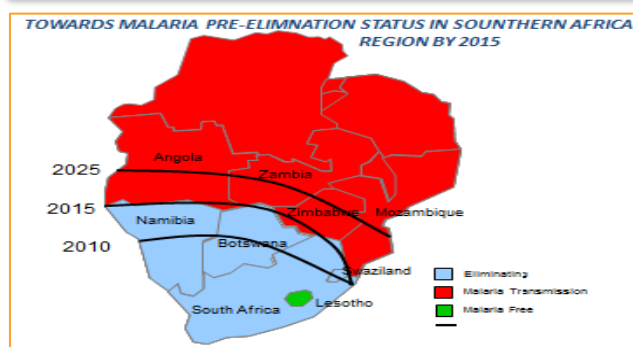
Relevance to Malaria:

Understanding the risks and routes of migrants can provide predictive evidence of population movements and needs. This evidence can be used to predict the movement of malaria in the Southern African region.

The Malaria Elimination (E-8)

In 2007, four mainland countries in Africa were identified by SADC as having the greatest potential to achieve malaria elimination by 2015: Botswana, Namibia, South Africa, and Swaziland. Together with the four neighboring countries to the north – Angola, Mozambique, Zambia and Zimbabwe – they form the Malaria Elimination (E-8). The E-8 is a coordinated effort amongst the eight countries to bring the four southern countries closer to malaria elimination by 2015 and reduce malaria incidence amongst all eight nations (Figure 1.1). The effort is a salient example of a regional body recognising the role of migration and the need for trans-border collaboration to combat malaria.

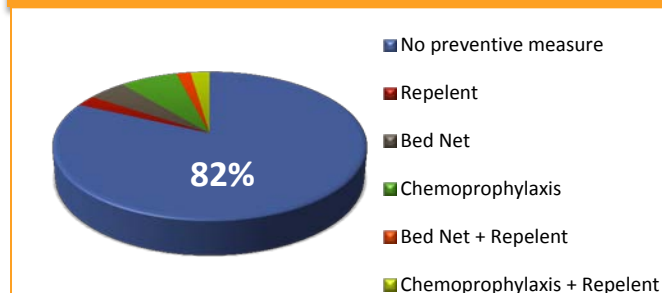
Figure 1.1: Rationale for the E-8; South to North Elimination Model



For example, in the northern South Africa province of Mpumalanga, from 2001 to 2009, 48% of malaria cases were acquired in Mozambique.^x

Migrants often have limited access to healthcare services. They are less likely to receive treatment and thereby remain contagious for longer periods of time. Persons on the move have limited knowledge of and are not able to practice malaria-prevention measures. SARN reported that 82% of travelers in the region do not use prevention measures (Figure 1.2).

Figure 1.2: Use of Preventive Measures Amongst Travellers



Malaria in the E-8

The southernmost nations of Botswana, Namibia, South Africa and Swaziland have had marked a dramatic decrease in malaria incidence over the past decade.

A pronounced disparity between north and south is seen in the population distribution by malaria risk zone¹ and cases per 1,000 population in 2011² (Figure 1.3, 1.4, Table 1.1).

Figure 1.3: E-8 Country Population Distribution by Malaria Risk Zone

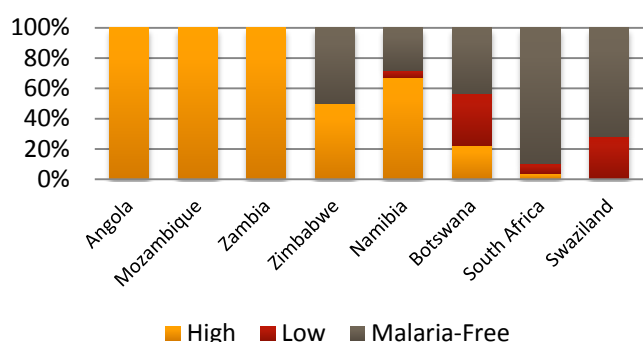
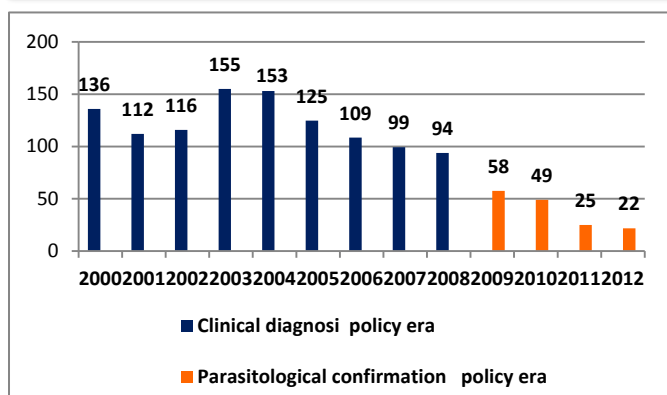


Table 1.1: E-8 Country Malaria Cases per 1,000 Population in 2011

Angola	Mozambique	Zambia	Zimbabwe
129.19	73.42	341.96	25.08
Namibia	Botswana	South Africa	Swaziland
6.20	0.56	0.20	0.66

Figure 1.4: Zimbabwe Trends of Malaria Incidence per 1,000 Population



Meeting on Population Mobility and Malaria Elimination in Southern Africa



An informal meeting hosted by IOM on 22 May 2013 aimed to strengthen regional collaborative efforts to reduce and eliminate malaria among migrants, mobile populations and hard-to-reach communities. The participants discussed support for malaria elimination in E-8 countries through a focus on universal access to malaria treatment and essential health services for these vulnerable populations in Southern Africa.

Key challenges in addressing malaria control in the Southern African region:

1. Barriers to malaria funding
2. General lack of data and research
3. Lack of communication between countries of origin and destination

Funding remains a major barrier to the operationalization of trans-border initiatives. Several countries noted the inflexibility of partners with disease specific funds. Additionally middle income countries like South Africa and Botswana are ineligible for some funding (e.g. Global Fund) even as the disease burden remains high. Multi-country proposals face a lower acceptance rate than single country proposals for Technical Review Panel (TRP) funding from the Global Fund (25.3% vs. 44.9%).^{xi}

Recommendations for effective implementation of malaria programmes in E-8 countries:

1. Operationalise trans-border initiatives
2. Prioritise access and coverage of health services for migrants and mobile populations in the Post 2015 Health Agenda
3. Support further study of health vulnerability in mixed migration flows

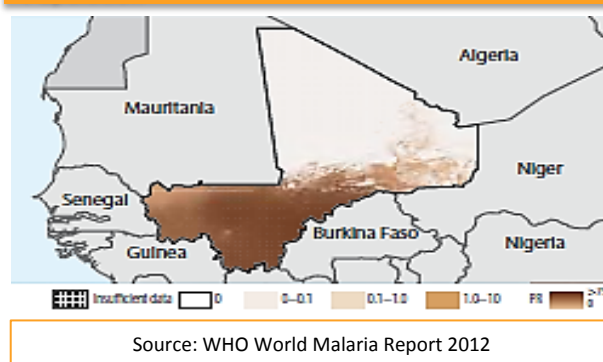
¹ WHO Malaria defines "high risk" as incidence ≥ 1 case per 1000 population, "low risk" as 0-1 cases per 1000 population and "malaria-free" as 0 cases per 1000 population.

² Cases per 1000 population calculated using 'reported and presumed cases' and 'UN population' from the WHO World Malaria Report 2012.

Table 1.2: Cross-border Malaria Initiatives in the E-8

Name	Acronym	Countries Involved
Lubombo Spatial Development Initiative	LSDI	Swaziland, Mozambique and South Africa
Trans-Zambezi Malaria Initiative	TZMI	Angola, Botswana, Namibia, Zambia and Zimbabwe
Zam-Zim Malaria Initiative	ZAM-ZIM	Zambia and Zimbabwe
MOZIZA Malaria Initiative	MOZIZA	Mozambique, Zimbabwe and South Africa
Trans-Kunene Malaria Initiative	TKMI	Angola and Namibia

Figure 2.1: Mali Distribution of Cases per 1,000 Population



Djibouti and Mauritius: re-introduction and resurgence

In Mauritius, elimination of local transmission was achieved in 1969, followed by re-emergence in 1975, and second elimination period in 1998. Work now focuses on maintaining elimination. The re-introduction in 1975 was linked to an outbreak of 41 cases in a community of migrant workers outside the capital.^{xv}

Djibouti reported only 624 presumed and confirmed malaria cases in 2011. However, in 2013, Djibouti experienced more than 800 cases of malaria in less than 2 months period. The re-emergence is linked to migration.^{xvi}

Djibouti originally also achieved elimination decades ago, with re-emergence suspected to have occurred sometime in the early 1970's.^{xvii} Early in 2013, the country experienced a spike of malaria cases in Dikhil region (one of the main migrants' entry points to Djibouti). Malaria quickly spread to Djibouti-Ville. Among the highest incidence areas were areas hosting large numbers of migrants.

IOM Spotlight: Djibouti

In 2013, IOM and the Government of Djibouti jointly collaborated on malaria interventions.

Main activities included: 1) sensitization of local population and migrants on the prevention of malaria, 2) conducted fumigation services, 3) training of medical staff on malaria diagnosis and, 4) mosquito net distribution.

In 2014, IOM intends to continue these activities including training of volunteers on RDTs within migrant transit centers and destination sites, as well as distribution of long lasting insecticide-treated nets (LLINs) and repellants.

Other African Contexts

South Sudan: malaria deaths in the world's youngest state

Since its independence in 2011, an estimated 2.5 million South Sudanese have returned to their homeland, mainly from Sudan.

Malaria is endemic in South Sudan. Those who grow up in the country learn best practices for prevention and treatment. However, returnees from non-endemic regions lack this knowledge, as well as, disease immunities, increasing their vulnerability. In communities already struggling with limited health resources, adoption of malaria-safe practices, early treatment and continuity of care remains a challenge.

South Sudan reported a case incidence of 77.16 per 1,000 population in 2011.^{xii} However, in 2012 the Upper Nile State reported 1 in 5 deaths were a result of malaria.^{xiii}

Mali: internal displacement and malaria

Conflict in northern Mali broke out in early 2012. Internally displaced persons (IDPs) are projected to rise to 350,000 by then end of 2013.^{xiv} The northern regions of the country are non-endemic and IDPs seeking refuge in the south arrive into these malaria endemic areas with no natural immunities (Figure 2.1).

Southeast Asia: Greater Mekong Sub-region

The Greater Mekong Sub-region (GMS) is an economic area composed of six countries, namely, Cambodia, the People's Republic of China (PRC, specifically Yunnan Province and Guangxi Zhuang Autonomous Region), Lao People's Democratic Republic (Lao PDR), Myanmar, Thailand and Vietnam along the Mekong River.

Migration in the GMS

Intra-regional migration has been a growing phenomenon in the GMS. Largely driven by poverty and widening economic disparities within and between neighbouring countries, people in this region are increasingly migrating internally and internationally for employment to improve human security. In the past decade, investment in road infrastructure to promote and facilitate the Association of Southeast Asian Nations (ASEAN) economic integration have opened new routes for the movement of people and goods, but have also exposed communities to a range of environmental issues and related behaviours. Across GMS countries, there are significant mixed migration flows, which are characterised predominantly by international migrants, seasonal and permanent migrant workers, as well as internal migrants, displaced persons and refugees. Internally displaced persons and refugees are found in these countries as are mobile and migrant populations moving within and across countries of the GMS. Thailand hosts over 1.6 million officially registered migrants from Cambodia (17%), Myanmar (76%) and Laos (7%)^{xviii}. However, these official figures do not take into consideration migrants that are unregistered and undocumented. Unofficial estimates indicate the number of migrants in Thailand could be closer to 2.6 million.

Malaria in the GMS

At least 50% of the population in all countries are at some risk of malaria transmission (Figure 3.1), yet the vast majority of malaria cases (79%) are in Myanmar (Figure 3.2). Country level incidence per 1,000 population remains relatively low in the GMS (Cambodia: 4.01, Myanmar: 11.74, Thailand: 0.36, Laos: 2.85, Vietnam 0.51, Yunnan: 0.03). Only Myanmar is above 10. However, case incidence was noticeably higher in certain border provinces. In 2007, the incidence of malaria reached over 40 cases per 1,000 population in Monduliri and Pailin provinces in Cambodia and the Sekong province in Laos.

Figure 3.1: GMS Country Population Distribution by Malaria Risk Zone

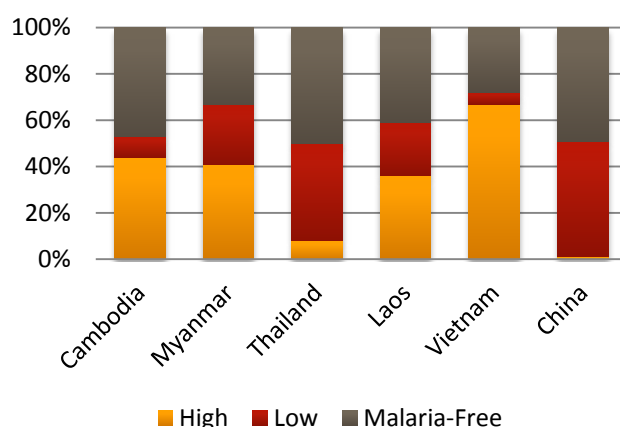
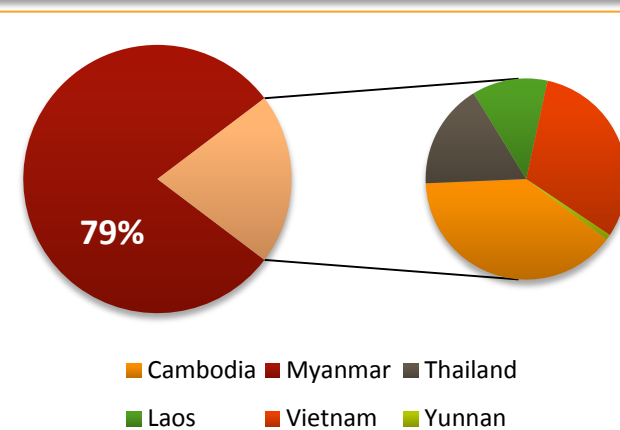


Figure 3.2: Distribution of Malaria Cases in the GMS



Population Mobility, Malaria and Artemisinin Resistance

The link between migration and the spread of malaria is well documented in the sub-region, particularly at the Thai-Myanmar, Thai-Cambodia, Laos-Yunnan (China) and Laos-Vietnam borders^{xix}. In the Yunnan Province of China, 98.8% of total malaria cases and 75% of *P. falciparum* malaria cases were found to be imported from neighbouring countries.^{xx} Migrants particularly those working in forested areas are highly vulnerable to malaria due to lack of access to prevention and knowledge of symptoms.^{xxi} Studies have shown though that their limited options for available or affordable diagnosis and effective treatment, tendency to self-medicate with fake drugs or monotherapy given their remote and inaccessible locations, as well as weak malaria programming are also important factors affecting their vulnerability.

Emerging strains of artemisinin-resistant malaria at the border areas have further complicated the problem and threaten regional and global efforts to control and eliminate malaria (Figure 3.4).

Figure 3.4: Risk for Artemisinin Resistance in the GMS

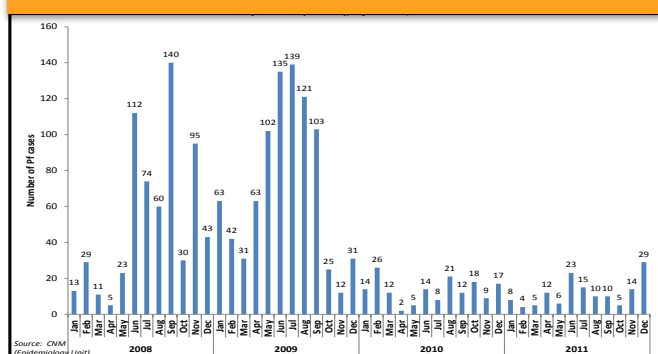


Recent confirmation of artemisinin resistance in *P. falciparum* malaria parasites in the Thai-Cambodia border led to the World Health Organization (WHO) Global Plan for Artemisinin Resistance Containment (GPARC) that classified the geographical 'priority' areas into tiers according to the location where resistance is noted and the populations in the area, thus implying the importance of migration data^{xxii, xxiii, xxiv}.

Control of Artemisinin Resistance

The first response to artemisinin resistance along the Cambodia-Thailand border began in 2008 and aimed to contain the problem by eliminating the resistant parasites. This aggressive and innovative approach developed originally in Cambodia has significantly reduced and in some areas such as Pailin, once one of the highest transmission areas, interrupted transmission of *P. falciparum* (Figure 3.5).

Figure 3.5: Confirmed Malaria Cases in Pailin, 2008-2011



The fact that evidence of resistance has now been detected in several other sites indicates that the initial hopes of containment have not been realised, either due to spread of resistance or its spontaneous emergence elsewhere.

Containment activities are now ongoing in a number of areas across the region, although all of these efforts are significantly under resourced.

IOM Spotlight: Thailand

Partnership for Containment of Artemisinin Resistance and Moving Towards the Elimination of Plasmodium Falciparum in Thailand (Global Fund 10, 2011 - 2013)

IOM and partners conducted:

- Community mapping and long lasting insecticide-treated nets (LLINs) pre-distribution survey of 34,018 migrant households in 1,531 villages in 20 provinces
- LLINs distribution using migrant household survey.
- 5,706 migrant workers in workplaces and 102,620 migrants in communities reached by community health workers and volunteers trained on malaria prevention and directly observed treatment in follow-up confirmed *P. falciparum* malaria cases
- Provincial migrant networks were strengthened to improve malaria information sharing in source, transit and destination sites.

IOM Spotlight: Myanmar

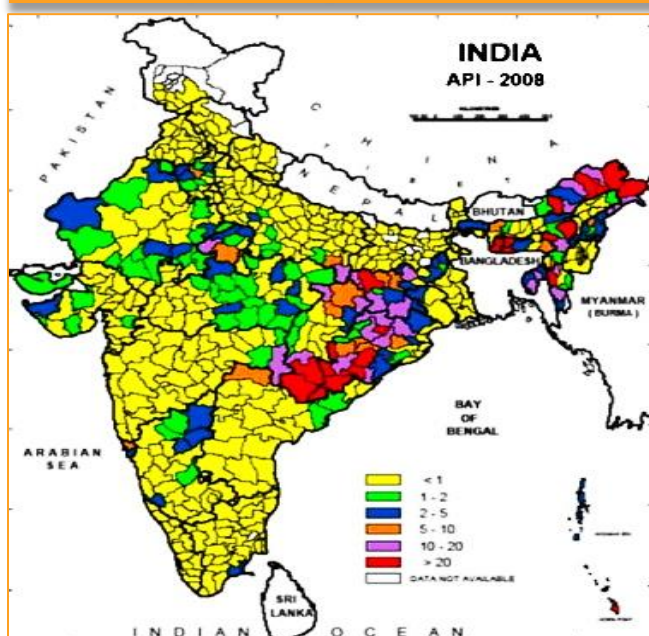
Community Based Malaria Control Programme in South-East Myanmar (2006 - present):

- Extending reach of the national malaria control and artemisinin containment strategies
- Community mapping undertaken in partnership with the National Malaria Control Programme, as well as the development of the National Migrant Malaria guidelines in 2012
- 273 community groups addressing malaria at migrant work sites and in 'malarious' villages
- 368 rapid diagnostic and testing (RDT) volunteers presently deployed, as well as mobile teams and fixed microscopy units
- From 2012 to mid-2013, 26,000 RDTs and thick smears performed; 1,000 persons treated for *P. falciparum* and 1,000 for non-*falciparum* malaria
- Prevention includes targeted awareness raising, distribution of LLINs, provision of insect repellents
- Improved messaging needs for migrants in urban areas of GMS to raise awareness of incubation period and to promote testing within two weeks of visiting forest areas.

South Asia: India and Sri Lanka

India and Sri Lanka currently operate in very distinct malaria contexts, but the challenges of human mobility are still very pertinent to the malaria prevention and control efforts in both countries. India continues to be an up-hill battle, though the country recently achieved control of malaria transmissions. Meanwhile, Sri Lanka is working to achieve complete elimination.

Figure 4.1: Annual Parasite Incidence (API), Slide-Positive Cases per 1,000 Population in 2008



India: Malaria Context

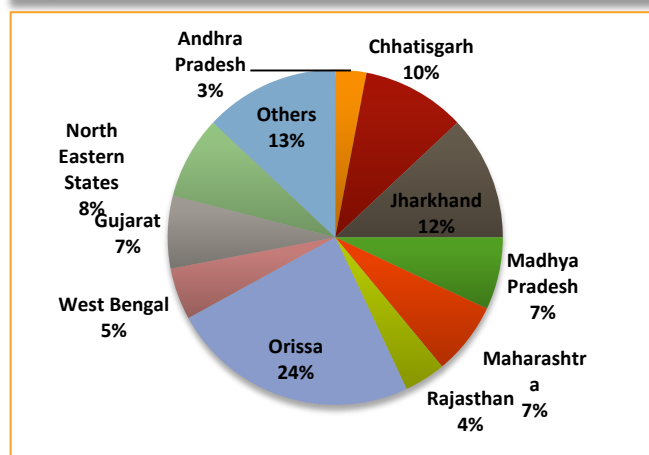
India has a malaria incidence per 1,000 population of 1.06.^{xxv} However, the following figure illustrates the transmission diversity within the country, showing the different incidence ratios according to area (Figure 4.1).^{xxvi} The Orissa (Odisha) state, which contains only 3.4% of the country's population, contributed 24% of the total malaria cases. Together the states of Orissa, Jharkhand, North Eastern States, Chhattisgarh, Madhya Pradesh, Maharashtra and Rajasthan accounted for roughly 80% of the country's cases, yet only 20% of the population (Figure 4.2).^{xxvii}

India: Role of Migration

India recently recognized that mobile populations are an overlooked group in India's malaria control efforts. In urban areas, which account for 15% of India's malaria disease

burden, the disease is primarily associated with internal migrant workers, who move between provinces searching for work in the construction sector.^{xxviii, xxix} A study of over 500 migrant workers in Gujarat, found 25.3% of the workers tested positive in 2007 and 34.3% tested positive in 2010.^{xxx}

Figure 4.2: State Distribution of Malaria Cases, India



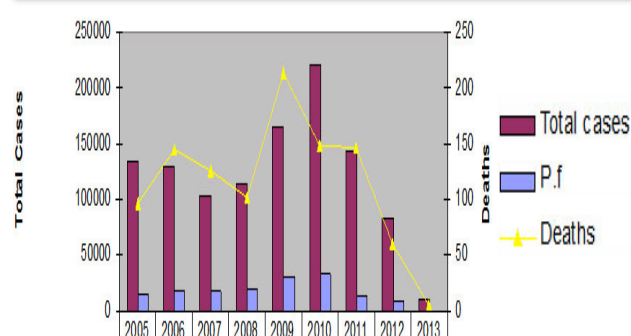
India: Control Activities

The National Vector Borne Diseases Control Programme (NVBDCP) began in 2002, bringing all control efforts for vector-borne diseases under a single programme.

The malaria prevention and control efforts of the NVBDCP include: 1) early detection and completion of treatment, 2) vector control, and 3) interventions on behavior change, capacity building and monitoring programs.

Continued rural to urban migration has increased the importance of focusing on malaria control efforts in urban areas. The Urban Malaria Scheme (UMS), originally sanctioned in 1972, now includes 131 towns and covering a population of 130.3 million. The programme has achieved parasite control through treatment in public and private sector health care facilities, as well as, mega-city malaria clinics (Figure 4.3).^{xxxi}

Figure 4.3: Cases and Deaths in the UMS, 2005 - 2013

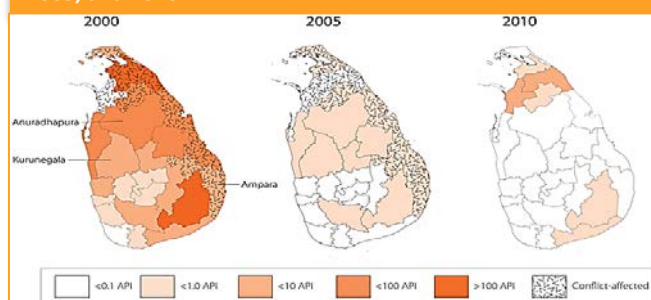


Sri Lanka: Achieving Pre-elimination

Sri Lanka currently has 93% of its population living in malaria-free areas.^{xxxii} Yet, conflict, as well as, socioeconomic, health and environmental factors have all threatened to derail the countries steady progress towards elimination over the past decade (Figure 4.4).^{xxxiii}

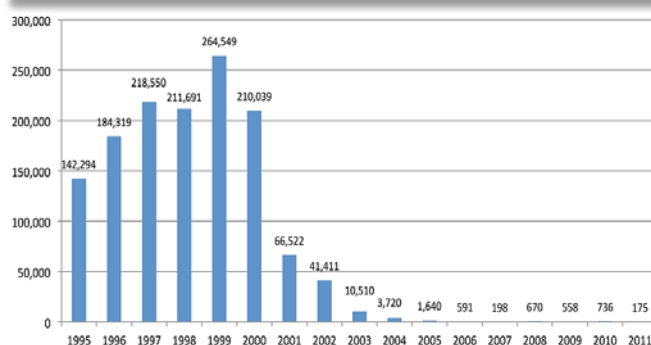
Sri Lanka's control efforts fall under the Anti-Malaria Campaign (AMC) which is funded by the Sri Lankan Government and the Global Fund. From 1999-2011, the AMC achieved a 99.9% reduction in confirmed infections (Figure 4.5).

Figure 4.4: Map of Annual Parasite Incidence (API) (Confirmed Infections per 1,000 Population At-Risk) by District, 2000, 2005, and 2010



Source: Abeyasinghe, R. et al;

Figure 4.5: Total Confirmed Infections from Active and Passive Case Detection, Sri Lanka, 1995 to 2011



Source: Abeyasinghe, R. et al;

The decade of impressive reduction in malaria cases over the last decade was achieved given many challenges, most notably protracted conflict and natural disasters. The 26-year long civil conflict concluded in 2009, but left in its wake an estimated 11,144 conflict related deaths in 2008 alone. Sri Lanka faced further challenges to malaria prevention and control in the aftermath of the 2004 Asian tsunami that led to the displacement of some 866,000 people. Remarkably malaria surveillance and prevention activities were maintained through this period even when primary health care clinics, hospitals and other public infrastructure were forced to close.^{xxxiv}

Proper preparedness plans emphasizing diligence in surveillance, indoor residual spraying, distribution insecticide-treated nets and focused treatment strategies enabled Sri Lanka to achieve pre-elimination in such adverse conditions.

Today, malaria in Sri Lanka is mostly found amongst travelers returning from endemic countries such as African countries and India.^{xxxv} A recent study of Sri Lankan migrants returned by IOM from a human smuggling operation in West Africa found increased incidence of malaria amongst this group (IOM Spotlight below).^{xxxvi}

Sri Lanka: Challenges going forward

Rapid Diagnostic Screening (RDT) is considered a cost effective replacement for "gold standard" microscopy methods of detection. However, the use of RDT alone without follow-up can lead to missed cases. This is true in the case of RDTs used to monitor inbound migration flows and the result can be malaria reintroduction.^{xxxvii}

Given this enhanced understanding on the dynamics of migration into and within Sri Lanka, AMC has revised its guidelines on follow-up care to include repeat RDTs for select populations, including IOM-assisted returnees and Sri Lankan UN Peace Keepers returning from endemic areas.^{xxxviii} With rising irregular migration flows since the end of the civil conflict in 2009, the monitoring of inbound populations is critical for comprehensive malaria prevention and control efforts.

IOM Spotlight: Sri Lankan Returnees from West Africa



From January to June 2012, IOM assisted in the voluntary return of 287 Sri Lankans.

The migrants had been smuggled through seven malaria endemic West African countries. The malaria risk was 14 per 1000. Normal travel risk is 3 per 1000. High malaria incidence in the group drew attention to the challenge migration poses to Sri Lanka as it enters nears the elimination phase for malaria.

[Photo: IOM Sri Lanka]

The Americas

Within the 21 malaria endemic countries in the Region of the Americas, the malaria threat varies widely. Six countries are in the pre-elimination stage (Argentina, Costa Rica, Ecuador, El Salvador, Mexico and Paraguay), while four countries reported an increased incidence during the period of 2000 – 2011 (The Dominican Republic, Guyana, Venezuela and Haiti). A further 13 countries reported reductions in case incidence of more than 75% from 2000 to 2011 (Figure 5.1). About 30% of the malaria endemic countries are at some risk, while about 8% of these populations are at high risk (Figure 5.2).

Figure 5.1: Percentage Change in Malaria Incidence, 2000–2011

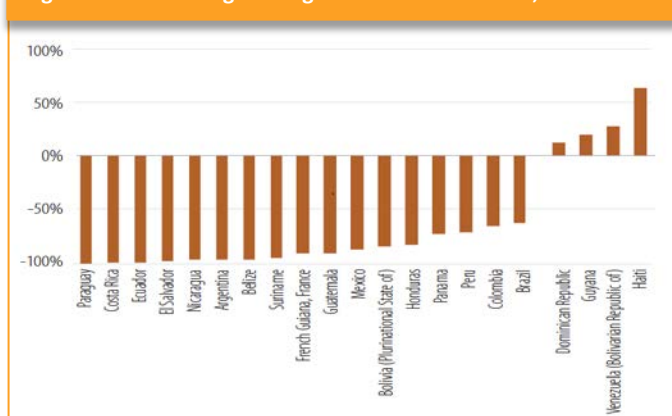
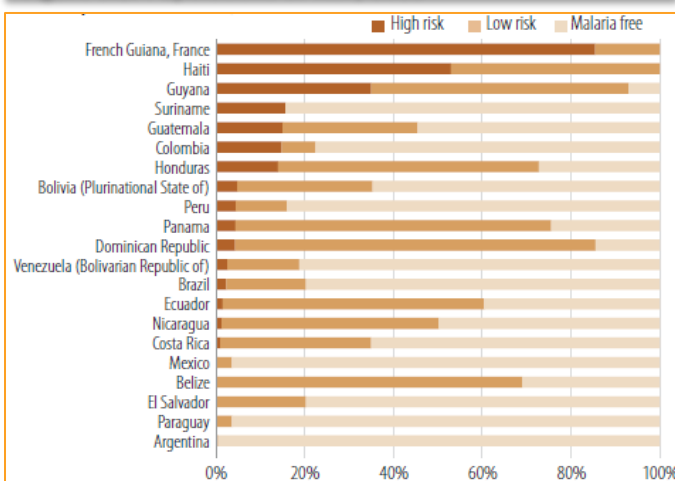


Figure 5.2: Populations at Risk, 2011



Source: WHO World Malaria Report 2012

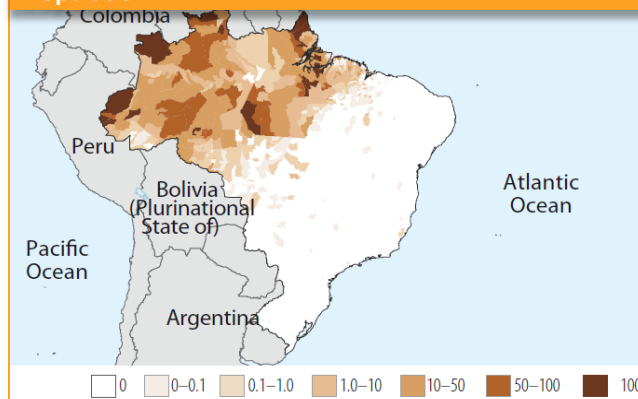
Historical Context

One study speaks of the introduction of malaria to the highlands near Quito Ecuador by workers and passengers of the Guayaquil to Quito Railway as early as 1890.^{xxxix}

Another study shows evidence that migration into the Amazon basin during the large scale colonisation project in

Brazil from 1965 to 1985 was marked by dramatic increase in malaria incidence.^{xi} As of 1999, there were 600,000 malaria cases in Brazil, 99.7% of which were concentrated in the Legal Amazon (Figure 5.3).^{xii}

Figure 5.3: Brazil Distribution of Cases per 1,000 Population



Source: WHO World Malaria Report 2012

Malaria and Population Mobility in the Americas

There is strong evidence linking increased of malaria with migration in the Americas.

“Pan-American Health Organization (PAHO) reports 50 to 70 % of malaria cases in Argentina are imported”

A study in Quibdó, Colombia found among 679 *P. falciparum* cases 75% were amongst foreign nationals.^{xlii} In Suriname, an investigation in the spread of Artemisinin resistance was recommended by PAHO due to “active trans-border migration” between the Suriname and French Guyana.

In the Dominican Republic, the high levels of migration from Haiti as a result of the 2010 earthquake- some 30,000 to 50,000 persons in the first month, are expected to increase malaria transmission into the country, a low-endemic area.^{xliii}

The migration of non-immune populations to endemic areas impacts the cadence of malaria transmission.^{xliiv} Seasonal and short-term migrant workers can play an important role in this respect. For instance, loggers and agriculturalists who migrate into rainforest areas for work often risk not only their own exposure to malaria, but also risk transmitting the disease upon their return to their home villages. The impact, can be significant, and include

the secondary infection of non-migrant members of these communities from the newly infected vectors (i.e. the migrants themselves).

A series of epidemiologic studies further support the malaria-migration link through evidence correlating higher malaria prevalence with higher levels of immigration into communities in the Amazon. Prevalence of malaria was 1-2% at the Fort, a stable community with little to no immigrants versus 8-9% at Costa Marques, a growing community, and 14-26% in the new settlements in the Amazon forest.^{xlv}

The Guyana Shield: Building a Multi-Country Framework



The Guyana Shield is the most northern region of the Amazon Rainforest incorporating French Guyana, Guyana, Suriname, Eastern Venezuela, and Northern Brazil. It is characterised by dense forests and gold deposits. Trans-border malaria efforts between French Guyana, Suriname, Guyana and Brazil are ongoing and efforts to bring Venezuela on board are underway.

Suriname: State progress but cross-border problems

Suriname implemented a five year program titled, the Medical Mission Malaria Programme (MM-MP) from 2005-2009. The interventions of the MM-MP included new strategies for prevention, vector control, case management, behavioural change and strengthening of the health system (surveillance, monitoring and evaluation and epidemic detection system). Through these efforts, malaria has been reduced to pre-elimination levels in most stable communities with the disease largely confined to the interior locations of the country. Populations at risk are mobile miners^{xlvi} who may not easily access malaria services and among whom 81% of the estimated 15,000 mobile miner population have been diagnosed and treated for malaria.^{xlvii}

However, regional inconsistency and service gaps remain. Many miners work in French Guyana, but cross the border into Suriname or Brazil to access malaria diagnostic and treatment services.

Progress in regional collaboration in the Americas

There is recognition of the need for enhanced regional and bilateral efforts to address malaria. A meeting from 21 to 23 February 2011 between French Guyana, Guyana, Suriname, Brazil, as well as, PAHO and the Global Fund reported three areas for intensified multi- and bilateral efforts on cross-border malaria control:^{xlviii}

1. Joint preparation and planning
2. Joint management and delivery
3. Joint reporting on progress and performance

The meeting highlighted the need to incorporate Venezuela into the anti-malarial efforts of the Guyana Shield. Border regions in the Venezuelan Amazon have reported incidence as high as 68.4 cases per 1000 population.^{xlix}

More recently concerns over *possible emergence of artemisinin resistance malaria* have both encouraged and mobilized regional collaboration.ⁱ A consultation on the emergence of artemisinin resistance in South America was held in Washington, 21 February 2013 and was attended by the Suriname and Guyana Ministries of Health. The discussions held supported further evaluation of the presence of artemisinin resistance in those countries and the need for a full meeting of the Guyana Shield to be planned for the second half of 2013.

Other Containment Efforts in the Region

Ecuador: Global Fund Project



A campaign in Ecuador focusing on indoor residual spraying for targeted vulnerable populations including migrant communities near the Colombian border was successfully implemented from 2000-2009. During this period, Ecuador saw a 96% reduction in reported malaria cases and as a result, today, only 4% of the 13.8 million people who live in Ecuador are at high risk for malaria.ⁱⁱ

Europe

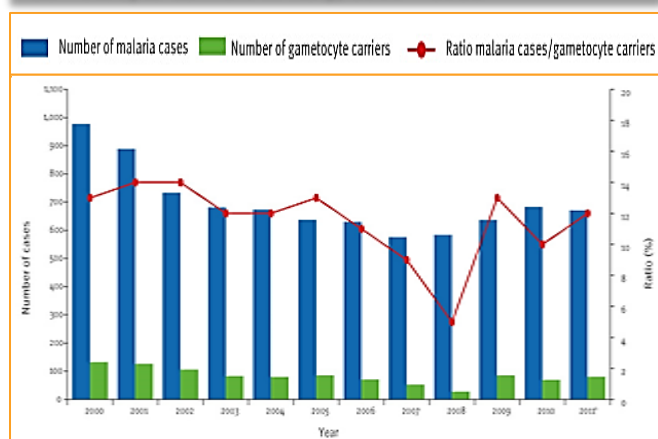
Malaria was largely eliminated from the European continent following the advent of Dichloro-Diphenyl-Trichloroethane (DDT) in the post-World War II era. However, rising population mobility and migration trends have led to an increase of imported malaria in the European Region from 1,500 cases in 1970 to 15,500 cases in 2000^{lii}. While considerable progress has been made in reducing this number over the past decade – 6,244 cases in 2010^{liii} – recent cases of non-imported malaria in Italy, as well as small outbreaks in Greece and Albania are causes for concern.

Italy

WHO deemed the country malaria-free on November 1970. The last holdout was in Palermo, Sicily where sporadic cases of *P. vivax* continued until 1962.^{liv}

Imported cases of malaria have remained in the country as people return from malaria endemic regions. Few of them however carry the gametocytes, necessary for the host to spread the malaria to local vectors (Figure 6.1).

Figure 6.1: Annual Imported Malaria Cases and Gametocyte Carriers in Italy, 2000 – 2011



Recently, concerns about the re-emergence of locally acquired malaria have been raised as two cases in 2009 and 2011 were most likely linked with transmission from local vectors^{lv, lvi}.

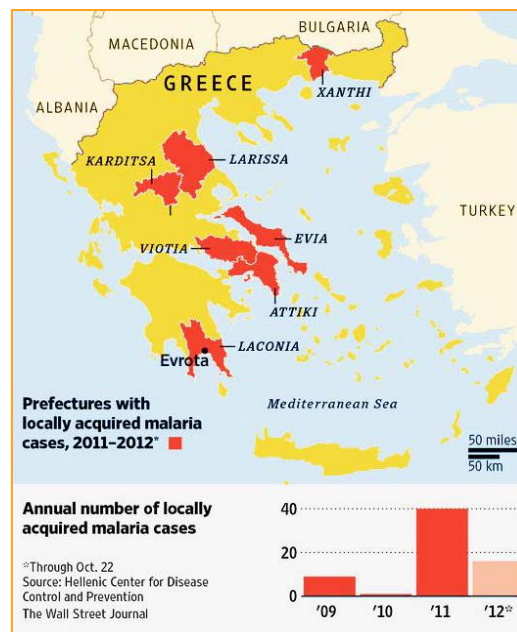
Lampedusa and Linosa

A 2012 joint report from the Italian Ministry of Health, the Regional Health Authority of Sicily and the WHO Regional Office for Europe identified “outbreaks of malaria” as a threat to the islands’ health system. The ongoing large influx of refugees and migrants from Northern Africa could

also lead to outbreaks, so preparedness and risk management strategies are being developed.^{lvii}

Greece

Malaria was officially eradicated from Greece in 1974, yet, cases of imported malaria have continued at a pace of approximately 30 to 50 cases per year.^{lviii} Recently there have been outbreaks of locally acquired malaria.



Three cases of locally acquired malaria were reported in 2010 and 40 cases in 2011. The original hosts of the disease were migrant workers from Pakistan. Local authorities are taking active steps to contain the outbreaks and prevent re-emergence of malaria in the country.^{lix} As of 3 September 2012, eight cases of locally acquired malaria were reported in Greece.^{lx}

Albania

Eradication was achieved in 1967.^{lxi} However, the first cases of malaria in Albania were reported in 2010. The two cases were registered in two males with a travel history to Greece. In 2012, five more cases of imported malaria were registered in individuals returning from Equatorial Guinea.^{lxii}

Risks of Re-emergence

Full reemergence in Europe is unlikely. However, there is a risk that migration could bring small-scale outbreaks back to Mediterranean states. Risk management strategies must be implemented to prevent future outbreaks. Moreover, active monitoring and reporting of imported cases must continue to be supported.

References

Introduction

ⁱ United Nations Development Programme (UNDP) – Definition of human mobility
2009 Human Development Report 2009: Overcoming barriers: Human mobility and development.
http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf

ⁱⁱ International Organization for Migration (IOM) - Definition of migration
2011 International Migration Law N°25 - Glossary on Migration.
http://publications.iom.int/bookstore/index.php?main_page=redirect&action=url&goto=publications.iom.int%2Fbookstore%2Ffree%2FGlossary+2nd+ed+web.pdf

ⁱⁱⁱ World Bank
2012 Migration and Remittances Factbook 2011, 2nd Edition.
<http://data.worldbank.org/data-catalog/migration-and-remittances>

^{iv} United Nations Development Programme (UNDP)
2009 Human Development Report 2009: Overcoming barriers: Human mobility and development.
http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf

^v Mosca D, Rijks B, Schultz C
2013 Health in the Post-2015 Development Agenda: The importance of migrants' health for sustainable and equitable development. Migration Policy Practice Vol II, Number 6, December 2012-January 2013.
http://publications.iom.int/bookstore/free/MigrationPolicyPracticeJournal8_27Dec2012.pdf

^{vi} World Health Organization
2012 World Malaria Report 2012. Global Malaria Programme.
http://www.who.int/malaria/publications/world_malaria_report_2012/report/en/

^{vii} Lynch C, Roper C
2011 The Transit Phase of Migration: Circulation of Malaria and Its Multidrug-Resistant Forms in Africa. PLoS Med 8(5): e1001040. doi:10.1371/journal.pmed.1001040
<http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001040>

^{viii} World Health Assembly
2008 Resolution 61.17 on the Health of Migrants. Agenda item 11.9
http://apps.who.int/gb/ebwha/pdf_files/A61/A61_R17-en.pdf

^{ix} World Health Organization, International Organization for Migration, Government of Spain
2010 Global Consultation on Health of Migrants – The Way Forward
http://www.who.int/hac/events/consultation_report_health_migrants_colour_web.pdf

Southern Africa

^x Ngomane L, De Jager C.
2012 Changes in malaria morbidity and mortality in Mpumalanga Province, South Africa (2001–2009): a retrospective study. Malar Journal, 11:19.
<http://www.malariajournal.com/content/11/1/19>

^{xi} C.S. Gueje, A.Teng et al
2012 Parasites and vectors carry no passport: how to fund cross-border and regional efforts to achieve malaria elimination. Malaria Journal, 11:344.
<http://www.malariajournal.com/content/11/1/344>

Other African States

^{xii} See reference vi (WHO: World Malaria Report 2012)

^{xiii} IOM Mission: South Sudan
2013 Malaria Action Framework [under review].

^{xiv} UNHCR
2013 2013 UNHCR country operations profile - Mali situation (Mali, Niger, Burkina Faso).
<http://www.unhcr.org/pages/49e484e66.html>

^{xv} Tatarsky, A. et al.
2011 Preventing the Reintroduction of Malaria in Mauritius: A Programmatic and Financial Assessment. PLoS ONE 6(9): e23832. doi:10.1371/journal.pone.0023832
<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0023832>

^{xvi} International Organization for Migration
2013 Djibouti Country Sheet [under review].

^{xvii} Louis, J.P. and J.P. Albert.
1988 Malaria in the Republic of Djibouti [Article in French]. Med Trop (Mars), 48(2):127-31.
<http://www.ncbi.nlm.nih.gov/pubmed/3043137>

South East Asia: Greater Mekong Sub-region

^{xviii} Thailand Ministry of Labour
2013 Department of Employment

^{xix} World Health Organization
2010 Malaria in the Greater Mekong Sub-region: Regional and Country Profiles. pp. 11-14
http://www.searo.who.int/myanmar/documents/malaria_in_the_greatermekongsubregion.pdf

^{xx} See reference xi (C.S. Gueje, A.Teng et al)

^{xxi} Tipmontree, R. et al
2009 Migrants and malaria risk factors: a study of the Thai-Myanmar border. Southeast Asian J Trop Med Public Health, 40(6):1148-57. <http://www.ncbi.nlm.nih.gov/pubmed/20578448>

^{xxii} Dondorp AM, Nosten F., Poravuth Y., et al.
2009 Artemisinin Resistance in Plasmodium falciparum malaria. New England Journal of Medicine 361: 455-467.
<http://www.nejm.org/doi/full/10.1056/NEJMoa0808859>

^{xxiii} Dondorp AM, Fairhurst RM, Slutsker L, MacArthur, JR, et al
2011 Perspective: The Threat of Artemisinin-Resistant Malaria. New England Journal of Medicine. 365:1073-1075.
<http://www.nejm.org/doi/full/10.1056/NEJMp1108322>

^{xxiv} See reference vi (WHO: World Malaria Report 2012)

South Asia: India and Sri Lanka

^{xxv} See reference vi (WHO: World Malaria Report 2012)

- ^{xxvi} Kumar, A. et al
2012 Malaria in South Asia: Prevalence and control. *Acta Tropica*; 121:3, 246–255.
<http://dx.doi.org/10.1016/j.actatropica.2012.01.004>
- ^{xxvii} Dua, B. and Acharya, A.
2013 Malaria: current strategies for control in India. *Indian Journal of Medical Specialties*; 4(1):59–66.
<http://dx.doi.org/10.7713/ijms.2012.0089>
- ^{xxviii} Dash, A. et al
2008 Malaria in India: Challenges and opportunities. *J Biosci*; 33(4):583–92. <http://www.ias.ac.in/jbiosci/nov2008/583.pdf>
- ^{xxix} Singh, N. et al
2004 Migration malaria associated with forest economy in central India. *Current Science*; 87:12.
<http://www.iisc.ernet.in/currsci/dec252004/1696.pdf>
- ^{xxx} Srivastava, H.C. et al
2011 Malaria in seasonal migrant population in Southern Gujarat, India. *Tropical Biomedicine* 28(3): 638–645.
<http://www.msptm.org/files/638 - 645 Srivastava H C.pdf>
- ^{xxxi} Ministry of Health and Family Welfare, India
2013 Urban Malaria Scheme. <http://nvbdcp.gov.in/UMS.html>
- ^{xxxii} See reference vi (WHO: World Malaria Report 2012)
- ^{xxxiii} Abeyasinghe et al
2012 Malaria Control and Elimination in Sri Lanka: Documenting Progress and Success Factors in a Conflict Setting. *PLoS ONE* 7(8): e43162. <http://dx.doi.org/10.1371/journal.pone.0043162>
- ^{xxxiv} See reference xxxiii (Abeyasinghe et al)
- ^{xxxv} Premaratna, R. et al
2011 What clinicians who practice in countries reaching malaria elimination should be aware of: lessons learnt from recent experience in Sri Lanka. *Malaria Journal* 2011, 10:302
<http://www.malariajournal.com/content/10/1/302>
- ^{xxxvi} Wickramage, K. and Galappaththy, G. N. L.
2013 Malaria burden in irregular migrants returning to Sri Lanka from human smuggling operations in West Africa and implications for a country reaching malaria elimination. *Trans R Soc Trop Med Hyg*;107(5):337–40
<http://trstmh.oxfordjournals.org/content/107/5/337.long>
- ^{xxxvii} Wickramage, K. et al
2013 Irregular Migration as a Potential Source of Malaria Reintroduction in Sri Lanka and Use of Malaria Rapid Diagnostic Tests at Point-of-Entry Screening. *Case Reports in Medicine*; 2013, Article ID 465906.
<http://dx.doi.org/10.1155/2013/465906>
- ^{xxxviii} See reference xxxvii (Wickramage, K. et al)
- ^{xli} Caldas de Castro, M. et al
2006 Malaria risk on the Amazon frontier. *PNAS*, 103(7).
<http://www.pnas.org/cgi/doi/10.1073/pnas.0510576103>
- ^{xlii} Osorio, L., Todd, J., Pearce, R., & Bradley, D.
2007 The role of imported cases in the epidemiology of urban *Plasmodium falciparum* malaria in Quibdó, Colombia. *Tropical Medicine and International Health*, 12(3), 331–341.
<http://dx.doi.org/10.1111/j.1365-3156.2006.01791.x>
- ^{xliii} Downing, J.
2012 Eliminating malaria in the Dominican Republic (A. Phillips & C. Cotter, Eds.).
<http://globalhealthsciences.ucsf.edu/sites/default/files/content/ghg/country-briefings/Dominican-Republic.pdf>
- ^{xliv} Oliveira-Ferreira, J. et al
2010 Malaria in Brazil: an overview. *Malaria Journal*, 9(115).
<http://dx.doi.org/10.1186/1475-2875-9-115>
- ^{xlv} McGreevy, P., Dietze, R., Prata, A., & Hembree, S.
1989 Effects of immigration on the prevalence of malaria in rural areas of the Amazon basin of Brazil. *Mem Inst Oswaldo Cruz*, 84(4), 485–491. <http://dx.doi.org/10.1590/S0074-02761989000400005>
- ^{xlvi} Hiwat, H. et al
2012 Novel strategies lead to pre-elimination of malaria in previously high-risk areas in Suriname, South America. *Malar J*, 11:10
<http://www.malariajournal.com/content/11/1/10>
- ^{xlvii} Srisantharajah, S.
2012 Rags, riches and resistance – the story of mining and malaria. *BioMed Central*.
<http://blogs.biomedcentral.com/bmcblog/2012/11/15/rags-riches-and-resistance-the-story-of-mining-and-malaria/>
- ^{xlviii} Vreden, S.
2011 Focus on Malaria in the Guyana Shield. PAHO/WHO.
<http://new.paho.org/hq/dmdocuments/2011/13-Towards-malaria-control-Guyana-shield1.pdf>
- ^{xlix} Metzger W. et al
2009 A rapid malaria appraisal in the Venezuelan Amazon. *Malaria Journal* 2009, 8:291
<http://www.malariajournal.com/content/8/1/291>
- ⁱ World Health Organization
2013 Status of the efficacy of artemisinin-based combination therapy (ACT) in Guyana and Suriname. Malaria Policy Advisory Committee Meeting, WHO HQ.
http://www.who.int/malaria/mpac/drug_resistance_guyana_suriname_report.pdf
- ⁱⁱ The Global Fund
2013 Ecuador: success in malaria control and community mobilization. <http://www.theglobalfund.org/en/blog/31652/>

The Americas

- ^{xxxix} Pinault, L. L., & Hunter, F. F.
2012 Malaria in Highlands of Ecuador since 1900. *Emerg Infect Dis.*, 18(4), 615–622. <http://dx.doi.org/10.3201/eid1804.111267>
- ^{xl} Aramburu Guarda J, Ramal Asayag C, Witzig R.
1999 Malaria reemergence in the Peruvian Amazon region. *Emerg Infect Dis*, 5:209–15.
<http://www.ncbi.nlm.nih.gov/pubmed/10221872>

Europe

- ^{lii} Sabatinelli G, Ejov M, Joergensen P
2001 Malaria in the WHO European Region (1971–1999). *Euro Surveill*, 6:61–65.
- ^{liii} WHO Regional Office for Europe
2012 Centralized information system for infectious diseases (CISID).
<http://data.euro.who.int/cisid>

- ^{liv} Majorig, G.
2012 Short History of Malaria and Its Eradication in Italy With Short Notes on the Fight Against the Infection in the Mediterranean Basin. *Mediterr J Hematol Infect Dis*, 4(1): e2012016
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3340992/>
- ^{lv} Romi, R et al
2012 Probable autochthonous introduced malaria cases in Italy in 2009–2011 and the risk of local vector-borne transmission. *Eurosurveillance*, 17: 48.
<http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20325>
- ^{lvi} World Health Organization
1963 Terminology of malaria and malaria eradication. Report of a Drifting Committee. Geneva: WHO.
<http://apps.who.int/iris/bitstream/10665/39007/1/9241540141.pdf>
- ^{lvii} Ministry of Health of Italy/ Regional Health Authority of Sicily / WHO Regional Office for Europe
2012 Second assessment of migrant health needs Lampedusa and Linosa, Italy.
http://www.euro.who.int/_data/assets/pdf_file/0010/184465/e96796.pdf
- ^{lviii} Hellenic Center for Disease Control & Prevention
2011 Malaria Infection in Greece.
<http://www2.keelpno.gr/blog/?p=574&lang=en>
- ^{lix} See reference lviii (Hellenic Center for Disease Control & Prevention)
- ^{lx} European Centre for Disease Prevention and Control
2012 Epidemiological update: Malaria risk to travelers in Greece remains low.
http://ecdc.europa.eu/en/press/news/Lists/News/ECDC_DispForm.aspx?List=32e43ee8%2De230%2D4424%2Da783%2D85742124029a&ID=721&RootFolder=%2Fen%2Fpress%2Fnews%2FLists%2FNews
- ^{lxi} WHO Regional Office for Europe
2002 Epidemiological Surveillance of Malaria in Countries of Central and Eastern Europe and Selected Newly Independent States. Sofia, Bulgaria.
http://www.euro.who.int/_data/assets/pdf_file/0006/98781/E77302.pdf
- ^{lxii} Shkurti, K. et al
2013 Imported malaria in Albania and the risk factors that could allow its reappearance. *Malaria Journal*, 12:197.
<http://www.malariajournal.com/content/12/1/197>