



Malaria Elimination Oversight Committee (MEOC) focused review meeting

FEBRUARY 2019

MEETING REPORT

SUMMARY

The third meeting of the Malaria Elimination Oversight Committee (MEOC) was held in Geneva on 12–14 February 2019. Seven countries (Belize, Bhutan, Cabo Verde, Costa Rica, Malaysia, Suriname and Timor-Leste) considered on track for elimination by 2020 were invited for focused review sessions to examine their programme's performance and achievements and to identify additional issues that could be addressed to improve effectiveness. All 10 full members of the MEOC attended the meeting, along with the national programme manager of Armenia as an adjunct member representing the certified countries. National malaria programme representatives from six of the seven invited countries attended, along with WHO country, regional and headquarters staff, and fund portfolio managers and monitoring and evaluation officers from the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM).

Each eliminating country presented on their progress towards elimination and their programme's activities, successes and challenges. All countries except for Costa Rica reported a reduction in case numbers in 2018 compared to 2017, and two countries (Malaysia and Timor-Leste) reported zero indigenous malaria cases in 2018. The MEOC developed individual country recommendations in collaboration with the national programme managers, WHO and GFATM staff, as well as overarching recommendations to WHO and partners. The MEOC will meet next at the 2019 Global Forum of malaria-eliminating countries in Wuxi, China in June.

Overarching recommendations

1. The MEOC recognized the critical importance of GFATM resources in helping many countries to achieve elimination, and made the following observations:
 - It is vitally important to continue to support surveillance and response plans in countries on the verge of elimination, until certification (and beyond) while countries remain receptive and at risk of malaria importation.

- Funds could be earmarked to higher burden countries that border eliminating countries in order to reduce transmission in cross-border foci. This would be very helpful to the eliminating country. Alternatively, these areas might be considered and funded as “special intervention zones”.
 - It would be helpful to encourage country coordinating mechanisms (CCMs) with shared borders to enter into formal dialogue.
 - Creating opportunities for WHO to brief members of the Global Fund Technical Review Panel (TRP) and Technical Evaluation Reference Group (TERG) and fund portfolio managers (FPMs) on elimination strategies and the challenges of eliminating countries that could be better addressed in Global Fund grants would be helpful.
 - Encouraging catalytic and contingency fund mechanisms available on an emergency basis to address outbreaks could support countries close to elimination that are prone to outbreaks.
2. WHO should advise countries when they are implementing strategies that are not recommended by WHO (e.g., using long-lasting insecticidal nets [LLINs] and indoor residual spraying [IRS] concurrently).
 3. The MEOC should study regional initiatives such as the Regional Malaria Elimination Initiative in Mesoamerica to understand how they support elimination.
 4. WHO should develop a structured approach to programme auditing.
 5. WHO should develop clear and rational criteria for the classification of malaria cases (indigenous, imported, introduced, etc.) by personnel.
 6. Through the Chair’s annual presentation to the Malaria Policy Advisory Committee (MPAC), the MEOC will raise the issues around simian malaria cases and elimination.

BACKGROUND

The World Health Organization’s (WHO) *Global Technical Strategy for Malaria 2016–2030* (GTS) was adopted by the World Health Assembly in May 2015. One of the three pillars of the GTS calls for all malaria-endemic countries to accelerate efforts towards elimination and attainment of malaria-free status. A number of countries have had remarkable success in controlling malaria. Although these achievements have been hard-won, elimination is not assured. Countries face considerable challenges in their efforts to control malaria, achieve zero indigenous cases and subsequently prevent resurgences of malaria.

The GTS sets the milestone of 10 countries to eliminate by 2020. According to an analysis presented in the *Eliminating malaria* report released by the Global Malaria Programme (GMP) on World Malaria Day 2016, 21 countries have been identified as having the potential to eliminate malaria by 2020, based on 1) the total number of indigenous malaria cases reported from 2000 to 2014; 2) the declared malaria objectives of the country; and 3) the informed opinions of WHO experts in the field. The countries identified were: Belize, Costa Rica, Ecuador, El Salvador, Mexico, Paraguay, Suriname, (PAHO); China, Malaysia, Republic of Korea (WPRO); Iran (Islamic Republic of), Saudi Arabia (EMRO); Algeria, Botswana, Cabo Verde, Comoros, Kingdom of Eswatini, South Africa (AFRO); and Bhutan, Nepal, Timor-Leste (SEARO). These 21 countries are the special focus of WHO endeavours to accelerate national elimination efforts and monitor progress towards malaria-free status. They are referred to as the Elimination-2020 (E-2020) countries.

The E-2020 countries are spread across five WHO regions. While the countries share some common challenges in eliminating malaria, they face different and unique challenges inherent to each region and country. As the E-2020 countries are at different points along the continuum of transmission, the approach to malaria elimination will differ from country to country, depending on the epidemiology of malaria in the country, strength of the surveillance systems, level of domestic and external funding, and political commitment. However, these countries also share some similarities, including vulnerability to the importation of malaria from migrants, visitors and mobile populations. One issue that is increasingly evident is the important effect that adjacent malarious countries have on their E-2020 neighbours.

In March 2017, the WHO Malaria Policy Advisory Committee (MPAC) endorsed the creation of a new committee to support malaria elimination: the Malaria Elimination Oversight Committee (MEOC).¹ The terms of reference for the MEOC include:

- evaluating national and regional progress towards malaria elimination according to established milestones and timelines;
- determining the need for corrective actions to address programmatic or operational bottlenecks, and evaluating plans developed to address such issues;
- identifying any risks to malaria elimination that need to be addressed by WHO, regional initiatives or national programmes;
- providing observations and/or draft recommendations to WHO/GMP with respect to policies or guidance related to malaria elimination, for MPAC consideration;
- questioning the status quo and confronting difficult issues.

The MEOC had met twice prior to this meeting: first to inaugurate the Committee in April 2018 in Geneva, Switzerland, and second in conjunction with the Global Forum of malaria-eliminating countries in June 2018 in Costa Rica to review the progress and challenges of the E-2020 countries.

General objective

The purpose of the meeting was to convene the MEOC and Ministry of Health (MoH) staff from countries that are on track for malaria elimination and where expert opinion suggests that the 2020 elimination target can be met. The objective of the meeting was to conduct a focused programme review with countries to identify programme components that need to be addressed in order to improve operational performance, and for the MEOC to identify overarching issues or lessons learned. The countries identified to participate in the focused review meeting were Belize, Bhutan, Cabo Verde, Costa Rica, Malaysia, Suriname and Timor-Leste. These seven countries experienced an 80% decrease in cases between 2017 and 2018, and two of them (Malaysia and Timor-Leste) reached zero indigenous human malaria cases in 2018.

The specific objectives of the meeting were to:

- review progress to determine whether the country is on track to achieve elimination by 2020;
- analyse audit reports from national elimination programmes to identify programme structures, organization, management and activities that are missing, inadequate or not in alignment with WHO guidance;
- jointly develop solutions to major challenges or barriers to elimination;

- identify needs for high-level advocacy to address problems requiring solution at high levels of government;
- share lessons learned and experiences among eliminating countries at similar stages.

Method of work

Before the meeting, national malaria programmes were asked to complete an annual progress report, which will also form the basis for their future national malaria certification report. On the first day of the meeting, each country gave a 30-minute presentation on the status of their programme, using a template based on the annual progress report, which was provided by the WHO Secretariat. Participants asked clarifying questions that could be answered briefly and immediately, and in-depth questions were noted down to be answered the next day.

On the second day, the MEOC members conducted focused review sessions with each country team. Two MEOC members were chosen as the focal points for each country, responsible for leading the discussion, taking notes and proposing recommendations. The meetings were also attended by WHO Secretariat staff and regional malaria elimination focal points, as well as by portfolio managers and monitoring and evaluation specialists from the Global Fund to Fight HIV/AIDS, Tuberculosis and Malaria (GFATM) if the country was a GFATM recipient. Programme weaknesses and areas for improvement were identified jointly by the programmes, WHO staff and MEOC members; GFATM staff also engaged in the discussions to identify possible opportunities to reprogramme grants based on identified needs. Key recommendations were shared with the national programmes during a plenary session at the end of the second day.

On the third day, the MEOC members, WHO Secretariat and regional malaria elimination focal points met for a half-day session to finalize country and overarching recommendations. Additionally, WHO briefed the MEOC members on upcoming certification requests and other elimination-related activities.

MEETING OPENING

The Director of GMP, Dr Pedro Alonso, opened the MEOC meeting by welcoming the MEOC members and representatives from the national malaria programmes. Dr Alonso provided a brief update on the global malaria situation and urged the seven countries present to help achieve the elimination milestones set out in the *Global Technical Strategy for Malaria 2016–2030* (GTS). The Chair of the MEOC, Dr Frank Richards, said a few words of welcome and declared the MEOC to be the “committee of good news”, as the countries reaching zero malaria cases and certification were helping to keep positive reports on malaria in the news.

SUMMARY OF THE PRESENTATIONS AND MEOC RECOMMENDATIONS TO COUNTRIES

Presentations from each country will be briefly summarized below in the order they were given to the committee.

Timor-Leste

Timor-Leste reported zero indigenous malaria cases in 2018, 17 in 2017 and 91 in 2016. Timor-Leste is a new country, having declared independence in 2000. It shares the island of Timor with West Timor, Indonesia. In the past, malaria was a leading cause of morbidity, but the malaria burden has since declined substantially. The country reported seven imported cases in 2018: one female aged 0–4 years old, and five males and one female 15–59 years old. Most imported cases have been among Timorese returning from travel to Indonesia. The municipality and special administrative region of Oecusse is physically separated from the rest of Timor-Leste and surrounded by Indonesia. Three of the imported cases in 2018 came from this municipality. The primary and secondary malaria vectors in Timor-Leste are *Anopheles barbirostris* and *An. subpictus*. Both species can be found throughout the country, except at altitudes above 1500 m above sea level (asl). The country has prioritized providing universal, free access to malaria diagnosis and treatment throughout the country in order to ensure that all infections are detected and treated early. Active case detection is undertaken in border areas and among migrants and fishermen. Vector control includes distribution of long-lasting insecticidal nets (LLINs) to all households within 2 km of the border with West Timor, as well as on Atauro Island. These mass distributions are held every three years and supplemented through continuous distributions to pregnant women, migrants, fisherman and other high-risk groups in the border areas, Oecusse and Atauro Island. In addition to LLINs, the country conducts indoor residual spraying (IRS) campaigns annually before the malaria transmission season in all households within 2 km of the border and throughout Oecusse and Atauro Island. The class of insecticide used for IRS is rotated annually to prevent development of insecticide resistance.

Malaria cases are notified to authorities within 24 hours to allow for a rapid response. Within five days, case investigations are conducted to determine the case classification and likely location of infection, and response activities are initiated within 10 days. Reactive case detection is conducted as part of focus investigations within a 1.5 km radius of the index case. This process is repeated twice at 14-day intervals and once per year for three years to ensure there is no ongoing transmission. Entomological surveys are also conducted within a 1.5 km radius to determine availability of vector, vector bionomics, potential breeding sites and insecticide susceptibility. As part of the response activities, IRS is conducted in all residences within 1.5 km of the index case, and LLINs are either provided, if the area was not covered under a mass campaign, or topped up.

The country's challenges to achieving and maintaining elimination are related to the potential for cases imported from West Timor. The country first held a cross-border meeting with Indonesia in February 2017. A high-level meeting will be held with policy-makers and technical officers from both countries in February 2019 to develop a cross-border action plan. This will be followed by another technical meeting in March 2019 to agree on how the action plan will be implemented. In future, technical meetings will be held quarterly.

Timor-Leste has challenges related to G6PD testing of the population to provide primaquine treatment in the case of *Plasmodium vivax* or mixed infections. They are working towards including prophylaxis for Timorese travelling to Indonesia or other risk areas in their national treatment protocol. While the country has made significant strides in facilitating the reporting of malaria cases from the private sector, including ensuring that only the public sector is able to import antimalarial medications, currently 23 (66%) of 35 private facilities report to the MoH. The MoH is working to strengthen the legislation around private sector reporting. A significant challenge for malaria elimination and prevention of re-establishment in Timor-Leste is the degree to which the National Malaria Control Programme (NMCP) is financed through their grant from the GFATM. Currently 80% of the officers serving in the NMCP are funded by GFATM.

Timor-Leste has a national malaria elimination committee (a technical working group) as well as an independent malaria advisory committee. Both committees assist with confirmation of case classification. The technical working group meets routinely to discuss progress and update activities. While a special elimination committee was planned for Oecusse, the change in government has delayed implementation, which is now expected for 2019.

Recommendations from MEOC

1. Given the achievement of zero indigenous malaria cases in 2018 and the fact that the country has now exceeded 17 months without an indigenous malaria case, Timor-Leste should start preparing the documentation and planning required for WHO certification.
2. Timor-Leste needs to achieve and maintain a balance between current elimination efforts (including vector control, active surveillance along the border, etc.) and enhancing the overall surveillance and response system, with a view to eventually sustaining elimination status.
3. Timor-Leste should develop a financial and human resources plan for sustaining interruption of transmission after cessation of the GFATM grant by improving efficiencies and planning for increased domestic financing.
4. Promising measures are underway for greater cooperation with West Timor to control malaria across the border. Continued improvements in collaboration and cooperation in border areas with West Timor should be actively pursued in order to sustain malaria elimination in Timor-Leste.
5. There is a need to clearly determine the origin of cases along the porous border with West Timor in order to differentiate introduced cases from indigenous cases.
6. The NMCP should continue to support the private sector both in the diagnosis of malaria and in increasing the proportion of private clinics reporting malaria cases.

Malaysia

Malaysia reported zero indigenous human malaria cases in 2018, 85 in 2017 and 282 in 2016. Malaysia borders Thailand to the north on the Malay Peninsula, and Brunei Darussalam and Indonesia on the island of Borneo. In addition, frequent travel between Palawan in Philippines opens an 'ocean border' with the Philippines in the Sabah province.

Malaysia's specific elimination strategies have been developed in accordance with WHO guidelines. Emphasis is placed on surveillance through development of a web-based focus registration system that classifies focus status as active, residual non-active, or cleared. The country has also made a concerted effort to prevent re-establishment in its malaria-free territory through innovative approaches to indices for receptivity and vulnerability. Foci with high indices for these factors have a set of interventions implemented to prevent reintroduction of malaria transmission. Equity issues are addressed by the national programme, ensuring that the segments of the population that are impoverished, marginalized or vulnerable are equally protected.

The country registered 478 imported and 21 introduced human malaria cases in 2018. The country had only one active and one residual non-active focus remaining in 2018. The majority of imported and introduced human malaria cases were *P. vivax* (between

51% and 58% since 2015). Most imported cases (475/478, or 99%) were over the age of 15, and most (98%) were male. The age and sex distribution of introduced cases was similar to that of imported cases. Most (72%) of the imported cases were Malaysian nationals who acquired the infection largely from Papua New Guinea (40% of imported cases whose origin could be determined). Despite sharing borders with Thailand, Indonesia and Philippines, those countries were responsible for only three (0.7%), 23 (5%) and zero (0%) imported cases, respectively, in 2018.

The vector profile is complex, with unique sets of vectors on peninsular Malaysia, Sabah and Sarawak. All vectors tested remain susceptible to pyrethroids. Sentinel sites for entomological surveillance have been established at representative sites across both the Malaysian Peninsula and Sarawak and Sabah.

Malaysia's elimination strategy includes vector control, case management and surveillance and response. The majority of cases are identified through passive surveillance. In areas with risk groups, a proactive approach is taken to screen high-risk groups for malaria symptoms and then test those who are positive. Active case detection targets military, indigenous people in West Malaysia, mobile ethnic groups in Sarawak, and isolated, forest communities in Sabah. Mass testing and treatment are conducted proactively every six months in high-risk areas, in conjunction with IRS and re-treatment of insecticide-treated nets (ITNs). Mass testing and treatment may also be conducted during outbreaks. Reactive case detection is conducted around local cases. Potential 'contacts' of cases are grouped into four categories, tested and treated:

- Category 1: household residents
- Category 2: contacts with exposure at the same place of infection (i.e., friends and coworkers)
- Category 3: contacts with exposure at the same place of infection but who live elsewhere
- Category 4: household contacts of those in Category 3.

Malaysia has adapted the China 1-3-7 model into a 1-3-7-42 approach wherein every case is considered an outbreak. Case notification is mandatory within 24 hours; case investigations take place within 1-3 days after case notification; focus investigation, classification and registration, and the first cycle of vector control occur within 7 days; and the community is followed up for 42 days, after which the outbreak is considered to have ended. All case classifications are reviewed internally by a MoH national review committee, as well as by independent reviewers from universities and public health research institutions within Malaysia.

Vector control is directed at the population at risk, defined as: those living within active or residual non-active foci; people living in cleared foci with a medium to high receptivity/vulnerability index; and special populations including aboriginal people and foreign workers. In 2016, Malaysia began a switch from re-treating ITNs to purchasing LLINs. In 2018, the country distributed more than 100 000 LLINs across the country. IRS was used in more than 82 000 households in 2018. Insecticide resistance surveillance is conducted at five sentinel sites, representing the three main regions in Malaysia.

Although Malaysia reported zero indigenous human malaria cases in 2018 within its territory, the number of zoonotic malaria cases due to *P. knowlesi* continues to increase, as do the number of deaths due to *P. knowlesi*. In 2018, there were 4131 cases of zoonotic malaria. As it currently stands, there is no evidence-based strategy to control *P. knowlesi*. The eventual certification of the country as free of human malaria will present a communications challenge given the large number of zoonotic malaria cases.

Malaysia uses several platforms to collaborate with its neighbours. These include exchange of information, notification about outbreaks and harmonization of activities. Malaysia's National Malaria Programme is fully funded by the government.

Recommendations from MEOC

1. WHO should liaise with senior officials in Malaysia to support the programme, emphasizing three key areas:
 - the need to reduce staff turnover for key technical support staff: currently many move after one year, but staff retention for at least three years would be more sustainable;
 - the need to maintain financial support for the programme;
 - the need to upgrade the surveillance system software to make it fit for the elimination phase rather than the control phase for which it was developed.
2. It is important to increase the awareness of the need for prophylaxis for Malaysians travelling to malaria-endemic areas outside of the country.
3. Cross-border collaboration at the local and technical level is adequate though somewhat informal. There would be a benefit from increased strategic and coordinated collaboration. This might include areas such as cross-audits of programmes by neighbouring country programmes and development of a more formal mechanism for border surveillance and information exchange.
4. There needs to be a major focus on the *P. knowlesi* challenge. Two areas for attention are:
 - development of a communications strategy for (a) target groups, (b) the general public and (c) an international audience in order to explain how it is both possible and beneficial to undertake the elimination of human malaria while still having zoonotic malaria;
 - development of a specific evidence-based strategy for *P. knowlesi* control. It may be helpful to convene a series of meetings to bring the programme, Malaysian universities and international researchers together to review the evidence base and develop a research programme around control of *P. knowlesi*.
5. A structured audit of the malaria programme and its components could be helpful to ensure all aspects are functioning as expected.

Cabo Verde

Cabo Verde reported two indigenous cases of malaria in 2018, after halting a large malaria outbreak in 2017 with 423 indigenous cases and reporting 47 indigenous cases in 2016. For the 12 months following the two cases that occurred in January 2018, Cabo Verde reported no new indigenous cases. During the outbreak, all indigenous cases were reported from the municipality of Praia, the capital city located on the island of Santiago. The majority of cases were males aged ≥ 20 years, with a few malaria cases in children and two reported in pregnant women. The cause of the epidemic was *P. falciparum*, confirmed through use of both rapid diagnostic tests (RDTs) and microscopy. The vector in Cabo Verde is *An. gambiae s.l.*

Cabo Verde is an archipelago of 10 islands located in the Atlantic Ocean, 570 km from the West African coast. The island nation has a population of approximately 500 000 persons. With a GDP per capita of US\$ 2998, it is categorized as a lower middle-income

country. Until the late 1950s, Cabo Verde reported between 5000 and 15 000 malaria cases per year. Since that time, Cabo Verde has twice achieved malaria elimination using IRS, but both times, transmission of malaria was re-established after IRS was withdrawn. As an island nation, the country does not have to contend with mass importations from bordering countries, but there is considerable movement of Cabo Verdeans to and from the continent and of persons from other malaria-endemic African countries to Cabo Verde. As a result, the country identifies multiple imported malaria cases every year. There has been a steady decline in the annual number of indigenous malaria cases since 2009, with only one indigenous case reported in 2012.

Cabo Verde launched a vigorous response to the 2017 epidemic, including re-training all IRS spray operators to improve the quality of the operations, re-spraying all households in the affected areas of Praia, creating a special malaria treatment unit at the central reference hospital, strengthening passive surveillance, initiating reactive case detection and conducting vector insecticide susceptibility testing. The epidemic occurred between July 2017 and January 2018, and there have been no indigenous cases registered since that time.

Vector control is achieved through IRS and larval source management. The latter takes several forms: environmental modification with the drainage and restoration of several canals that drain water into the ocean, and use of *Gambusia* spp. fish in cisterns, temephos in drinking water, and diesel oil in stagnant water.

Cabo Verde detects most cases through passive surveillance at health clinics and the central reference hospital. Antimalarial medications are only available in the public sector from the central hospital. Peripheral clinics have access to RDTs for diagnosis, but all positive cases are referred to the central hospital for microscopy and treatment. Cases are hospitalized for three days until their parasitaemia is cleared. Patients are followed after discharge through day 28 to ensure complete cure. When cases are found, reactive case detection is conducted among symptomatic individuals up to 100 m from the index house, along with focal IRS and focal larviciding.

Cabo Verde is in the process of a malaria programme review to inform a new strategic elimination plan. The country is also working to establish an independent National Advisory Committee for malaria elimination.

Cabo Verde is part of the Sahel Malaria Elimination Initiative that has brought together eight countries of the region to collaborate on reducing malaria transmission.

Recommendations from MEOC

1. Recognizing Cabo Verde's achievement of 12 months with no indigenous cases, the country is urged to consolidate this achievement and take all necessary steps to keep it free of indigenous malaria.
2. Cabo Verde should put the necessary elements together to complete their plan for elimination and put it into action, with attention to the following:
 - ensuring reorientation of the programme mindset and national strategy from control to elimination;
 - establishing an active surveillance system among migrant populations and an entomological surveillance system, supported by a functional database;
 - improving the human resources available at all levels of the national programme;
 - ensuring sustainable financing of the programme.

While acknowledging the significant political will that exists, there is need to ensure that this continues now that zero cases have been achieved. Additionally, there is a need to translate the prevailing political climate into increased financing, technical improvements and all other components of the programme to ensure the sustainability of the achieved results.

Suriname

Suriname reported 33 indigenous malaria cases in 2018, 40 in 2017 and 77 in 2016. Suriname is part of the Guiana Shield, an eco-region that covers an area of 270 million ha and is made up of various critical ecosystems. Suriname is the smallest independent country in South America, situated between French Guiana to the east and Guyana to the west. The southern border is shared with Brazil and the northern border is the Atlantic coast.

P. falciparum was the predominant malaria species in Suriname until 2006, after which it declined to 7.1% (six cases) of indigenous cases in 2016. *P. falciparum* was still found in 39.9% (106 cases) of the imported cases in 2016. Since 2007, *P. vivax* has been the predominant species for indigenous Surinamese cases. The priority vector is *An. darlingi*. Historical studies during high-incidence times (1980s) showed that *An. darlingi* biting densities increased during the rainy seasons, following increased water levels in the rivers.

The population at risk for malaria in Suriname is composed of stable and mobile populations in the interior of the country. The stable populations are Maroon and Amerindian populations living in tribal villages along rivers in the forests of the interior. Since 2007, the population at risk was extended to include the mobile gold-mining communities in remote areas in the forest. These are mostly migrant miners of Brazilian origin. The total number of population at risk varied from 47 372 in 2000 to 80 000 in 2018. This increase was due to both stable population growth and the inclusion of mobile migrants as a risk population. The number of mobile migrants is unknown and varies depending, among other things, on gold availability, gold prices and military counterintervention in neighbouring countries (especially in French Guiana). It is estimated at around 20 000 people.

Suriname is confronted with significant challenges with respect to policies in neighbouring French Guiana, an overseas territory of France. As a result of efforts to limit illegal gold mining, Brazilian miners in French Guiana, who have little to no access to care in French Guiana, enter Suriname to seek health care and evade French military forces.

Both indigenous and imported cases in Suriname have decreased significantly since 2000, after an initial peak in 2001 of 12 197 cases to a low of 235 cases in 2018, of which 34 were indigenous. Imported malaria cases have been recorded separately since 2004 and have steadily increased in proportion over time, from 5.4% of the total number of confirmed cases in 2004 to 75.6% in 2016. Most imported cases registered in Suriname have originated from French Guiana (94.2% between 2004 and 2016) among individuals of Brazilian nationality (89.4% between 2007 and 2016).

Vector control for malaria is currently achieved through use of LLINs, first introduced in 2006. Almost 13 000 LLINs were distributed in 2018 to mining areas and stable communities at risk. Entomological surveillance is irregular, and insecticide resistance testing of *Anopheles* mosquitoes was last conducted in 2014.

Passive and active case detection methods are deployed with the use of both microscopy and/or RDTs. Case reporting is done via the standardized surveillance form, accompanied with the case investigation form if positive. Cases are often notified prior to

sending the forms to the central level by radio communication system (Medical Mission) or by phone (calls and text message). The national database does not include how (passive, proactive or reactive) cases were detected.

Suriname has joined with partners to conduct an evaluation of a novel approach to reaching highly mobile populations. The Malakit is a self-contained malaria diagnostic and treatment kit provided to persons who are involved in or working at illegal gold mining in French Guiana. They are trained on how to use RDTs and how to complete a full treatment course. The pilot began in 2018 and has yet to be fully evaluated.

Recommendations from MEOC

1. A major weakness identified by the country was the dependency on external funding to meet the expense of operations in the interior of the country where malaria cases occur. This situation needs to be addressed urgently to ensure the sustainability of activities.
2. The highly mobile, migrant mining population in French Guiana is the major source of imported malaria into Suriname. This population lacks malaria services in French Guiana and is a source of a continuous importation of malaria cases into Suriname. The policies of the French Government in French Guiana that affect the malaria situation need to be addressed at the highest political levels. WHO should take the lead on initiating dialogue with France regarding the situation.
3. A review of cases reported in 2018 indicates the possibility that, while there was limited ongoing transmission of malaria in Suriname, some of the 33 cases classified as indigenous in 2018 were likely acquired in French Guiana or at the border. It is a challenge for the programme to classify cases accurately due to the inability to get honest travel histories from cases, as they may fear repercussions from providing complete information about their travel to the border or into French Guiana. The programme is urged to identify the minimal essential data on the diagnostic intake form that would allow the correct classification of cases.
4. The MEOC commended Suriname for its innovative work in delivering malaria services through border posts and for the pilot project in migrant self-diagnosis and treatment (Malakit).
5. Cross-border collaboration with other neighbouring countries (Brazil and Guyana) is needed to tackle the issue of malaria among migrants. Improved information exchange is especially needed between the Guyanese and Surinamese programmes.

Costa Rica

In 2018, Costa Rica registered 70 indigenous malaria cases, compared with 12 in 2017, four in 2016 and zero in 2014–2015. Costa Rica is bordered to the north by Nicaragua and to the south by Panama, a situation that has led to re-establishment of transmission in this Central American country after it appeared to have interrupted malaria transmission in 2014 and 2015. Most (76%) of the 38 imported cases in 2018 were of Nicaraguan origin.

In 2018, an illegal gold-mining operation started in northern Costa Rica, which has attracted many migrants from Nicaragua. After identifying an initial cluster of malaria cases associated with the gold mine, the MoH began active case detection among the mining communities to identify cases that were not seeking treatment. The majority of indigenous cases registered in 2018 were identified through active surveillance in San Carlos Canton, the area where the illegal mining is occurring.

Costa Rica has an excellent health care system, with the public sector overseen by the Costa Rican Social Security Fund. The approach to malaria elimination relies heavily on surveillance and response. There is no proactive vector control, but significant actions are taken when cases are identified by the passive surveillance system, including reactive case detection within a radius of 500 m of the index case, after case investigations have determined the likely location of infection and case classification. Costa Rica is working to implement the PAHO operational strategy of Detection-Treatment-Investigation-Response (DTIR) and to develop micro response plans for each of the six active foci.

Recommendations from MEOC

1. Costa Rica should continue the intense work in the illegal gold mining communities in order to detect and treat all cases and prevent any further introduction. The country should strengthen intersectoral collaboration with migration, security and local officers.
2. The 2018 outbreak should be documented, including cost analysis, so that lessons can be learned and similar situations prevented both in Costa Rica and other eliminating countries.
3. Costa Rica's entomological capacity should be strengthened and entomological surveillance should be planned in risk areas.
4. RDTs should be deployed to public health services, particularly in the most vulnerable areas.
5. PAHO and COMISCA should support Costa Rica jointly and quickly to establish a mechanism for dialogue (binational border committees) with Panama and Nicaragua in order to try to reduce potential importation from those countries.
6. Vector control should be implemented in the areas with the greatest malariogenic potential.

Belize

Although representatives of the Belize malaria programme were not able to attend the meeting in person, they presented their programme via teleconference.

Belize registered three indigenous cases in 2018, down from seven cases in 2017 and four in 2016. The history of malaria control in Belize prior to the eradication era is not well documented. In 1930, records of deaths in health facilities in what was then called British Honduras indicate that more than 10% were due to malaria. In 1939, an estimated 50% of the population outside of city centres had malaria, and severe malaria was particularly common in the southern districts.

Belize launched an IRS programme in 1950 that was so effective that malaria had essentially disappeared by 1963, and the National Malaria Eradication Service (NMES) ceased regular spraying activities under the consolidation phase of its elimination strategy. Unfortunately, cases reappeared after spraying was stopped, and throughout the 1960s and 1970s, the malaria burden fluctuated in response to the inconsistent implementation of IRS. By 1982, over half of all localities in Belize's six districts had reported malaria cases. Incidence continued to rise in the early 1980s, a trend attributed to the shrinking NMES budget, as well as an influx of refugees from neighbouring endemic countries during the political upheaval. From 1985–1989, USAID provided assistance to the Vector Control Unit (VCU) of the National Malaria Service, as it had been renamed, through provision of vehicles and spray equipment and overall strengthening of

the programme. Cases declined during this period. The conclusion of USAID support and the inconsistent application of IRS as a result of inadequate funding of the VCU resulted in a reduction of spraying activities throughout the early 1990s. In 1994, in response to environmental concerns regarding the safety of DDT, the VCU limited spraying to only those localities along the border with Mexico. The consequences were seen immediately: approximately 10 000 cases were reported annually throughout Belize in 1994 and 1995, nearly doubling the caseload of 5341 reported in 1992. After DDT was banned, deltamethrin was introduced.

Health system decentralization in 2001 divided the country into four health regions with services managed by regional administrations. Decentralization resulted in competition for finances by various health programmes. The gradual improvement in the network of voluntary collaborators and community nurse aides (now community health workers) to increase surveillance, and renewed mass IRS led to the gradual decrease in malaria seen today.

The main malaria vectors in Belize are *An. albimanus*, *An. vestitipennis*, *An. darlingi* and *An. pseudopunctepennis*. Insecticide resistance data are outdated, but the national strategic plan will prioritize conducting tests.

Passive case detection in health facilities is supported by a network of approximately 300 community health workers and voluntary collaborators. Active case detection may be conducted in prioritized localities at least monthly and then periodically throughout the year in high-risk populations such as sugarcane and banana workers. Reactive case detection is conducted up to 500 m to 1 km from an index case within 72 hours of case detection. Focus investigations are conducted to identify factors contributing to transmission.

Financing for the Belize programme is primarily domestic, provided by the Government of Belize. Belize is part of the InterAmerican Development Bank's Regional Malaria Elimination Initiative.

Recommendations from MEOC

1. Belize should take steps to strengthen the surveillance system (particularly passive) in a sustainable manner, including capacity strengthening of frontline health staff.
2. Human resource planning and development should be carried out and long-term personnel succession plans put in place to ensure availability of the needed trained human resources, e.g., entomologists.
3. The country should continue to invest in efforts to establish cross-border collaboration with Guatemala and Mexico, as this is critical for the last mile of malaria elimination.
4. It should be ensured that microscopy skills are maintained and a quality assurance system for microscopy results is in place.
5. The country should implement clear and relevant strategies to reach the mobile and migrant population with screening and services.
6. Belize should seek support from PAHO to help with advocacy for the malaria programme at the highest political levels.
7. PAHO should assist Belize to establish a National Malaria Elimination Advisory Committee.

Bhutan

Bhutan reported six indigenous cases in 2018, compared to 11 in 2017 and 15 in 2016. Bhutan borders India to the south and east and China to the north. Most malaria cases are due to *P. vivax*, and most local cases between 2013 and 2018 were in individuals over 15 years of age. Most (68%) imported cases have been among those of Indian nationality. Remaining areas of transmission in Bhutan are all located along the international border with India.

The major vector in Bhutan is *An. minimus*. Vector control is achieved through use of LLINs, IRS and larval source reduction. Surveillance is through passive case detection in health facilities, while active case detection is conducted in high-risk areas. Reactive case detection is undertaken within 1 km of an index case. Focus investigations are to be completed within 48 hours.

Bhutan's greatest challenge to elimination is the proximity of the Indian border and the lack of malaria control on the Indian side. Despite several cross-border initiatives facilitated by WHO over the years, there has been no effective engagement between Indian and Bhutanese officials to share information or develop joint action plans.

Recommendations from MEOC

1. Although the country has been very close to elimination for the past 2–3 years, there are obvious weaknesses in the system that need to be addressed in order to make further progress to interrupt local transmission and maintain malaria-free status. Although national guidelines are available, field and central level staff are insufficient for effective implementation.
 - Increase the number of field staff in border districts.
 - Ensure training at the central level for improved epidemiological analysis and effective use of data.
2. Financial resources:
 - Ensure the availability of adequate financing for staff resources and implementation of case and entomological surveillance and response in the border districts.
3. WHO should provide immediate assistance to Bhutan on case classification. Given the complexity of the epidemiology of malaria along the Indian border, some innovative new thinking has to be brought to case classification in Bhutan.
4. WHO should alert the GFATM to allow for re-allocation of funds to meet the priorities identified above.
5. WHO should facilitate information sharing with India across border districts. Partners have committed to working through the platforms of WHO, the Asia-Pacific Malaria Elimination Network (APMEN) and the Asia-Pacific Leaders Malaria Alliance (APLMA) to support information-sharing with Bhutan.

MEOC OVERARCHING RECOMMENDATIONS

Over the course of two and a half days, the MEOC interacted closely with representatives of the national malaria programmes and had several opportunities for in-depth discussions of the challenges facing the programmes. As with the most recent Global Forum of malaria-eliminating countries, the issue of transmission foci that cross international boundaries and the challenge of classifying cases in those areas as indigenous, introduced or imported was a major topic of conversation. The problem of classifying cases in border areas was identified as a key challenge for Bhutan and Timor-Leste, which border India and Indonesia, respectively. For these two countries, development and funding of the 'special intervention zone' concept could be helpful. A related challenge, identified by all countries except Malaysia and Cabo Verde, arises from imported malaria cases coming from neighbouring countries with a higher burden of malaria. In these instances, earmarked support to higher burden countries to address the areas contributing the imported cases could help. Cabo Verde, although an island, remains vulnerable to importation if its receptivity is not well managed. Malaysia, meanwhile, has greater concern over its own citizens who travel abroad for work and may import the parasite when they return. For the former, focused, continued vector control in the most receptive areas will be needed, while for the latter, travellers' clinics and provision of chemoprophylaxis to travellers might reduce rates of importation.

The inclusion of GFATM FPM and M&E officers in the meeting was helpful, as it involved the GFATM staff who make funding decisions in the discussions around programmatic and operational issues that could require reprogramming of existing GFATM grants. The MEOC identified other opportunities for increased engagement with GFATM that could benefit eliminating countries. The MEOC has always recognized the importance of GFATM in elimination, but has been concerned that countries transitioning out of GFATM grants, either due to improvements in their economic status or because they were getting close to elimination, could put countries with high malariogenic potential at risk for resurgences or re-establishment of transmission.

The MEOC developed six overarching recommendations from the focused review meeting:

1. The MEOC recognized the critical importance of GFATM resources in helping many countries to achieve elimination, and made the following observations:
 - It is vitally important to continue to support surveillance and response plans in countries on the verge of elimination, until certification (and beyond) while countries remain receptive and at risk of malaria importation.
 - Funds could be earmarked to higher burden countries that border eliminating countries in order to reduce transmission in cross-border foci. This would be very helpful to the eliminating country. Alternatively, these areas might be considered and funded as 'special intervention zones'.
 - It would be helpful to encourage country coordinating mechanisms (CCMs) with shared borders to enter into formal dialogue.
 - Creating opportunities for WHO to brief members of the Global Fund Technical Review Panel (TRP) and Technical Evaluation Reference Group (TERG) and FPMs on elimination strategies and the challenges of eliminating countries that could be better addressed in Global Fund grants would be helpful.
 - Encouraging catalytic and contingency fund mechanisms available on an emergency basis to address outbreaks could support countries close to elimination that are prone to outbreaks.

2. WHO should advise countries when they are implementing strategies that are not recommended by WHO (e.g., using LLINs and IRS concurrently).
3. The MEOC should study regional initiatives such as the Regional Malaria Elimination Initiative in Mesoamerica to understand how they support elimination.
4. WHO should develop a structured approach to programme auditing.
5. WHO should develop clear and rational criteria for the classification of malaria cases (indigenous, imported, introduced, etc.) by personnel.
6. Through the Chair's annual presentation to MPAC, the MEOC will raise the issues around simian malaria cases and elimination.

MEETING CONCLUSION

The meeting was concluded by Dr Pedro Alonso after a short address by the Chair, Dr Frank Richards, and words of thanks from several of the representatives of national malaria programmes. The MEOC will convene next at the Global Forum of malaria-eliminating countries in June 2019 in Wuxi, China.

Endnote

1. Terms of reference for the MEOC are available here: <https://www.who.int/malaria/areas/elimination/meoc-tor.pdf>.

LIST OF PARTICIPANTS

MEOC members

Evelyn Ansah
Director
Center for Malaria Research
University of Health and Allied Sciences
GHANA

Tom Burkot
Professor and Tropical Leader
Australian Institute of Tropical Health and
Medicine
James Cook University
AUSTRALIA

Rose Leke
Emeritus Professor of Immunology and
Parasitology, Faculty of Medicine and
Biomedical Sciences
University of Yaoundé
CAMEROON

Kevin Marsh
Senior Adviser
African Academy of Sciences
KENYA

Kamini Mendis
Independent Consultant in Malaria and
Tropical Medicine
SRI LANKA

Frank Richards (MEOC CHAIR)
Director, River Blindness Elimination
Program, Lymphatic Filariasis Elimination
Program and Schistosomiasis Control
Program, Carter Center
USA
Mirta Roses
Senior Independent Adviser
ARGENTINA

Leonardo Simão
Chairman of the Board of Patrons
Manhiça Foundation
MOZAMBIQUE

Linhua Tang
Former Director and Professor, National
Institute of Parasitic Diseases
China Center for Disease Control
CHINA

Yongyuth Yuthavong
Senior Adviser to the President,
National S&T Development Agency
Thailand Science Park
THAILAND

MEOC country representatives

Lusine Paronyan
Head of Vector Borne and Parasitic
Diseases Epidemiology Department
National Center for Disease Control and
Prevention
Ministry of Health
ARMENIA

Representatives of E-2020 countries

Marvin Manzanero
Director of Health Services
Ministry of Health
BELIZE

Kim Bautista
Chief of Operations, Vector Control Unit
Ministry of Health
BELIZE

Russell Manzanero
Epidemiologist, Epidemiology Unit
Ministry of Health
BELIZE

Rixin Jamtsho
Chief Program Officer
Communicable Diseases Division
Ministry of Health
BHUTAN

Kinley Penjor
Senior Medical Officer
Vector Diseases Control Programme
Ministry of Health
BHUTAN

Tenzin Wangdi
Chief Entomologist
Vector Diseases Control Programme
Ministry of Health
BHUTAN

Artur Correia
National Director of Health
Ministry of Health and Social Security
CABO VERDE

Ullardina Furtado
Head of the Delegation of Praia
CABO VERDE

Antonio Moreira
National Malaria Programme Manager
NMCP, Ministry of Health
CABO VERDE

Rodrigo Marin Rodriguez
Director
Health Surveillance
Ministry of Health
COSTA RICA

Teresita Solano Chincilla
Health Surveillance Management Officer
Responsible for Malaria
Ministry of Health
COSTA RICA

Daisy Corrales Diaz
Director Health Services Development
Social Security Fund
COSTA RICA

Gabriela Rey Vega
Consultant
PAHO
COSTA RICA

Rose Nani Binti Mudin
Head of Vector Borne Disease Sector
Disease Control Division
Ministry of Health
MALAYSIA

Jenarun Jelip
Principal Assistant Director
Disease Control Division
Ministry of Health
MALAYSIA

Perada Wilson Putit
Science Officer
Ministry of Health
MALAYSIA

Robert Mohamed
Deputy Director of Health
Ministry of Health
SURINAME

Helene Hiwat
Coordinator of the Malaria Programme
Ministry of Health
SURINAME

Representatives of E-2020 countries

Marvin Manzanero
Director of Health Services
Ministry of Health
BELIZE

Kim Bautista
Chief of Operations, Vector Control Unit
Ministry of Health
BELIZE

Russell Manzanero
Epidemiologist, Epidemiology Unit
Ministry of Health
BELIZE

Rixin Jamtsho
Chief Program Officer
Communicable Diseases Division
Ministry of Health
BHUTAN

Kinley Penjor
Senior Medical Officer
Vector Diseases Control Programme
Ministry of Health
BHUTAN

Tenzin Wangdi
Chief Entomologist
Vector Diseases Control Programme
Ministry of Health
BHUTAN

Artur Correia
National Director of Health
Ministry of Health and Social Security
CABO VERDE

Ullardina Furtado
Head of the Delegation of Praia
CABO VERDE

Antonio Moreira
National Malaria Programme Manager
NMCP, Ministry of Health
CABO VERDE

Rodrigo Marin Rodriguez
Director
Health Surveillance
Ministry of Health
COSTA RICA

Teresita Solano Chincilla
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Ministry of Health
COSTA RICA

Daisy Corrales Diaz
Director Health Services Development
Social Security Fund
COSTA RICA

Gabriela Rey Vega
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PAHO
COSTA RICA

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Head of Vector Borne Disease Sector
Disease Control Division
Ministry of Health
MALAYSIA

Jenarun Jelip
Principal Assistant Director
Disease Control Division
Ministry of Health
MALAYSIA

Perada Wilson Putit
Science Officer
Ministry of Health
MALAYSIA

Robert Mohamed
Deputy Director of Health
Ministry of Health
SURINAME

Helene Hiwat
Coordinator of the Malaria Programme
Ministry of Health
SURINAME
Stephen Vreden
Vice Chair of the Malaria Elimination Task
Force
SURINAME

Pedro Canisio da Costa Amaral
Director of Public Health
Ministry of Health
TIMOR-LESTE

Joana Guterres
Program Coordinator Malaria at M&E
Dep.
Ministry of Health
TIMOR-LESTE

Maria do Rosario Mota
National Programme Manager for Malaria
Programme, Dept. CDC
Ministry of Health
TIMOR-LESTE

Manel Yapabandara
Technical Adviser (Malaria)
NMCP, Ministry of Health
TIMOR-LESTE

WHO country and regional staff, inter-country support staff and malaria elimination advisers

Ebenezer Baba
Medical Officer
WHO Regional Office for Africa
REPUBLIC OF THE CONGO

Blanca Escribano
Advisor, Malaria Elimination
WHO Regional Office for the Americas
Pan American Health Organization
USA

Kharchi Tfeil
Medical Officer
WHO Regional Office for Africa
BURKINA FASO

James Kelley
Technical Officer, Malaria
WHO Regional Office for the Western
Pacific
PHILIPPINES

Rabindra Abeyasinghe
Coordinator
WHO Regional Office for the Western
Pacific
PHILIPPINES

Risintha Premaratne
Technical Officer, Malaria
WHO Regional Office for South-East Asia
INDIA

Job Joseph
Specialist, malaria and other vector-borne diseases
BELIZE

Carolina Gomes
National Professional Officer
CABO VERDE

Oscar Mesones Lapouble
Specialist, malaria and vector-borne diseases
SURINAME

WHO CDS/ Global Malaria Programme

Pedro Alonso
Director
SWITZERLAND

Laurent Bergeron
Project Officer
SWITZERLAND

Kim Lindblade
Team Leader
Malaria Elimination Unit
SWITZERLAND

Xiao Hong Li
Technical Officer
Malaria Elimination Unit
SWITZERLAND

Leonard Ortega
Team Leader
Technical Support & Capacity Building
SWITZERLAND
Amanda Tiffany
Epidemiologist
Malaria Elimination Unit
SWITZERLAND

Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund)

Roopal Patel
Disease Adviser, Malaria
SWITZERLAND

Manab Basnet
Global Fund Portfolio Manager, Timor-Leste
SWITZERLAND

Pamela Liyala
Public Health and Monitoring and Evaluation (PHME) Specialist, Bhutan and Timor-Leste
SWITZERLAND

Blanca Gil Antunano Vizcaino
Global Fund Portfolio Manager, Bhutan
SWITZERLAND

Tsvetana Yakimova
PHME Specialist, Bhutan
SWITZERLAND

AGENDA

Chair: Frank Richards

TUESDAY, 12 FEBRUARY 2019 – JOHN KNOX CENTER (FLORY ROOM)

Time	Activity	Speaker
09.00 – 09.15	Welcome and opening of the meeting	Pedro Alonso
	Introductions	Frank Richards
	Group photo	
09.15 – 09.30	Meeting objectives and process	Kim Lindblade
Presentations by Ministries of Health		Facilitators
09.30 – 10.15	Timor-Leste presentation (30') Points of clarification (15')	Tom Burkot Kamini Mendis
10.45 – 11.30	Malaysia presentation (30') Points of clarification (15')	Yongyuth Yuthavong Kevin Marsh
11.30 – 12.15	Bhutan presentation (30') Points of clarification (15')	Kamini Mendis Linhua Tang
13.15 – 14.00	Cabo Verde presentation (30') Points of clarification (15')	Leonardo Simao Rose Leke
14.00 – 14.45	Suriname presentation (30') Points of clarification (15')	Frank Richards Mirta Roses
14.45– 15.30	Belize presentation (30') Points of clarification (15')	Evelyn Ansah Frank Richards
16.00 – 16.45	Costa Rica presentation (30') Points of clarification (15')	Mirta Roses Rose Leke
16.45 – 17.30	MEOC and secretariat only meeting	Frank Richards

WEDNESDAY, 13 FEBRUARY 2019 – JOHN KNOX CENTER

09.00 – 10.30	Session 1 – Timor-Leste (Strasbourg room) (17.00 – 18.30 local time) Co-Chairs: Kamini Mendis and Tom Burkot	Session 2 – Malaysia (Flory room) (16.00 – 17.30 local time) Co-Chairs: Kevin Marsh and Yongyuth Yuthavong
11.00 – 12.30	Session 3 – Bhutan (Strasbourg room) (16.00 – 17.30 local time) Co-Chairs: Linhua Tang and Kamini Mendis	Session 4 – Cabo Verde* (Flory room) (09.00 – 10.30 local time) Co-Chairs: Rose Leke and Leonardo Simao
13.30 – 15.00		Session 5 – Suriname (Flory room) (9:30 – 11:00 local time) Co-Chairs: Mirta Roses and Frank Richards
15.00 – 16:30	Session 6 – Belize (Strasbourg room) (08:00 – 09:30 local time) Co-Chairs: Frank Richards and Evelyn Ansah	
15.30 – 17:00		Session 7 – Costa Rica* (Flory room) (08:30 – 10:00 local time) Co-Chairs: Rose Leke and Mirta Roses

THURSDAY, 14 FEBRUARY 2019 – WHO D BUILDING, D23016 (CLOSED SESSION TO MEOC)

09.00 – 10:30	Development of final recommendations for each country and plan for MEOC involvement	Frank Richards
11.00 – 12.00	Review of the process and overarching recommendations from MEOC	Frank Richards
12.00 – 12.30	Next steps and wrap-up	Kim Lindblade