MEETING REPORT

Consultation on *Plasmodium vivax* transmission risk in Europe

Stockholm, 17–18 January 2012

Summary

In response to the malaria outbreak in Greece in 2011, ECDC organised an expert consultation on *Plasmodium vivax* transmission in Europe on 17 and 18 January 2012. The overall objective of this consultation was to acquire a comprehensive understanding of the malaria transmission potential in Greece and in Europe in order to propose recommendations for actions for preparedness and response at the EU and country levels.

The meeting concluded that the re-establishment of endemic areas for malaria in the EU remains unlikely. Nevertheless, conditions exist for clusters of locally acquired malaria. Hence the need for a more complete harmonised picture of malaria risk in the EU, which can be achieved by assessing receptivity through the development of EU-wide vector distribution maps and specific studies on vectorial capacity in specific model areas, supplemented by information on the spatial and temporal distribution of imported cases and asymptomatic carriers.

A number of possible actions were identified at the EU level. These actions include: enhancement of information collection; improved information exchange between Member States; building additional capacity for malaria laboratory diagnosis in the EU by setting up a European network for external quality assessment; development of a preparedness plan for countries at risk for local malaria transmission; and mapping of receptivity and vulnerability to obtain a comprehensive picture of the malaria risk in the EU.

Of major importance is the improved access of migrants to healthcare. This includes the development of a strategy that combines two elements: improved accessibility to appropriate healthcare for marginalised or migrant populations *and* the prevention of onward transmission.

The coordination of activities among ECDC, WHO and other stakeholders is pivotal to improve the preparedness and response to malaria in the EU.

Stockholm, April 2012

Background

The founding regulation[1] establishing the European Centre for Disease Prevention and Control (ECDC) gives ECDC a mandate to strengthen the capacity of the EU towards the prevention and control of infectious diseases.

EU Member States are malaria free since 1975, although the *Anopheles* mosquito vectors remain present. Sporadic local transmission of malaria (including airport malaria) has been reported over the last 10 years in several EU countries such as Bulgaria, France, Germany, Greece, Italy, and Spain. Between 21 May and 5 December 2011, 63 cases of *Plasmodium vivax* infection were reported in Greece. The majority of cases (n=57) were reported from the area of Evrotas in Lakonia district, Peloponnese, in southern Greece. The last detected domestic case of malaria in Lakonia showed onset of symptoms on 18 October 2011. This is the third consecutive year in which autochthonous cases have been reported from Evrotas. A further four Greek prefectures reported autochthonous cases in 2011. In total, six cases were reported.

Based on the available information, it is likely that the transmission in Greece is due to the yearly introduction of malaria parasites by migrants originating from malaria-endemic countries, resulting in subsequent onward transmission to nearby residents by local mosquito vectors during the transmission season (May to October).

The increased number of autochthonous cases reported in 2011 indicates that conditions can be considered favourable for sustained local transmission in the affected areas, especially Evrotas in Lakonia, and that intensive intervention efforts for vector control have so far been inadequate.

The risk of malaria transmission in the EU has always been considered as low. Yet, the situation in Greece raises the question of the risk of re-establishment of malaria transmission[2] in Greece and the malaria transmission risk in Europe in similar settings. Therefore ECDC held a consultation of experts to re-assess the *Plasmodium vivax* transmission risk and define priority actions for preparedness and control at the EU and country level.

Objectives and expected outcome of the consultation

The overall objective of this consultation was to acquire a comprehensive understanding of the malaria transmission potential in Greece and in Europe in order to propose recommendations for actions for preparedness and response at EU and country level.

Specific objectives were:

- to review the epidemiological situation of malaria in Greece;
- to assess the risk of local *Plasmodium vivax* transmission in Europe, given the recent autochthonous cases in Greece; and
- to discuss, identify and propose priority actions for preparedness and response at EU and country level to prevent malaria transmission in EU Member States.

[1] Regulation 851/2004 of the European Parliament and of the Council

[2] The WHO defines re-establishment of transmission as follows: '[…] renewed presence of a constant measurable incidence of cases and mosquito-borne transmission in an area over a succession of years. An indication of the possible re-establishment of transmission would be the occurrence of three or more introduced and/or indigenous malaria infections in the same geographical focus, for two consecutive years for *P. falciparum* and for three consecutive years for *P. vivax*.'

From: World Health Organization. Malaria elimination. A field manual for low and moderate endemic countries. Geneva: World Health Organization; 2007, p. 84

Transmission risk of malaria in EU

The epidemiology of malaria in Greece and the EU

Malaria in Greece – epidemiological situation and response

Greece was historically malaria endemic until the national eradication programme allowed the country to interrupt local transmission in 1974. Imported malaria (contracted outside the country) continued to be reported, with a total of 1027 imported cases detected over the period 1982-2010[3]. Sporadic malaria cases without travel history were reported in 1999 and 2000. In 2009, six microscopically-confirmed locally acquired cases of *Plasmodium vivax* malaria were reported from Lakonia (Evrotas). In 2010, one locally acquired case was reported from Lakonia and two from Viotia. Between 21 May and 5 December 2011, 63 cases of *Plasmodium vivax* infection were reported in Greece from five different districts, namely Lakonia (n=57), Attiki (n=2), Evoia (n=2), Viotia (n=1) and Larissa (n=1). Of the 57 cases reported from Lakonia (Evrotas), 23 cases were classified as imported and 34 as locally acquired. Of the 23 classified imported malaria cases, 21 patients originated from Pakistan and two from Afghanistan. Of the 34 cases without travel history, 27 were in Greek citizens, five in Romanian citizens, one in a Polish and one in a Moroccan citizen.

The Ministry of Health in Greece responded to the local transmission of malaria in 2011 with a number of control measures including active case finding in Evrotas (Lakonia), educational campaigns for the public regarding the use of personal protective measures against mosquitoes, raising awareness among clinicians and patients, strengthening of mosquito control and blood safety measures.

In areas where local transmission was suspected (i.e. cases where no recent travel history to a malaria-endemic country could be established), enhanced surveillance was implemented, including tracing the reported cases, visiting their homes, and conducting face-to-face or telephone interviews. Active surveillance was implemented by making weekly phone calls to local laboratories to enquire about recently diagnosed cases of malaria. Active case detection by house-to-house visits in Evrotas (Lakonia) was implemented on 1 October 2011: all households in the area were visited fortnightly to ensure early detection and prompt treatment of all malaria cases. During these visits, multidisciplinary health teams screened blood smears from all persons with a fever of 37.5 °C or higher (current or within the previous 15 days) and from asymptomatic household contacts of known malaria cases. By 1 November 2011, 2220 houses had been visited and 3621 people examined, including 1096 migrants. Overall, 292 blood samples were taken, 10 of which were found to be positive: nine from migrant workers (eight from Pakistan, one from Romania) and one from a Greek citizen. Of those patients, five had fever during blood sampling, two reported fever two days prior to the visit, and three were asymptomatic contacts of a previous case. The samples from the three asymptomatic persons were found positive with PCR.

Government and municipalities in Greece routinely implement mosquito abatement activities in many wetland areas and cities to control nuisance-biting mosquitoes with registered biocides. After the start of the outbreak in Lakonia (1 July 2011), intensified vector control activities were implemented in the affected areas. This included larviciding of breeding sites; ultra-low volume spraying in the affected villages; outdoor residual spraying in a zone of 50 meters around the houses of the cases, including backyards, neighbouring stockyards and other installations favourable for the resting of *Anopheles* adults; and limited indoor residual spraying (in 18 installations only).

Within the context of the 2011 Lakonia outbreak, two international support missions were carried out to assess the situation in Greece: the first mission (19–25 September 2011) was carried out by ECDC and the Hellenic Centre of Disease Control and Prevention (KEELPNO). The second mission (10–15 October 2011) was jointly conducted by ECDC, the World Health Organization (WHO) and KEELPNO who together visited all affected districts. The assessment teams reviewed the risks of potential re-establishment of malaria transmission in Greece, and proposed prevention and control measures for the specific areas concerned and across the country.

The mission recommended the development of an integrated preparedness and response plan for malaria, covering epidemiological surveillance, clinical management, laboratory diagnosis, entomological monitoring, vector control, relevant operational research, and communication and coordination. At the international level, the mission advised that areas at potential risk in Greece and the EU should be identified in order to enable the implementation of specific awareness action. Furthermore, the mission recommended that the EU directive for blood safety[4] be revised, as the deferral criterion is partly based on visiting 'endemic areas', which is particularly difficult to implement during an outbreak in an EU context. Finally, ECDC and WHO, in close collaboration, may support the

[3] Source: http://data.euro.who.int/cisid/?TabID=278443 and MOHSS, Greece

[4] Commission Directive 2004/33/EC of 22 March 2004 implementing Directive 2002/98/EC of the European Parliament and of the Council as regards certain technical requirements for blood and blood components. OJ L 91, 30.3.2004, p. 25–39.

surveillance of disease vectors and identify risk areas; provide technical guidance and assistance on planning; implement and evaluate malaria control and preventive measures, including case management and laboratory quality assurance; and facilitate inter-country cooperation on issues of direct relevance to malaria and other vector-borne diseases.

In line with one of the recommendations, ECDC, in collaboration with KEELPNO, started the production of a malaria suitability map. In Greece, local malaria cases were found in low-altitude areas (plains, river deltas) characterised by: specific land surface temperatures that spatially discriminate the habitat distribution of the vector; a vegetation index indicating agricultural activity throughout the year and with an intensive vegetation cover; and complex cultivation patterns indicating high-intensity agricultural activity requiring a high degree of manual labour. The analysis delineated suitable areas in western and southern parts of Greece. However, the northern part of Greece displays similar patterns (albeit without high-risk classes) that nevertheless could be considered environmentally suitable. This analysis is a first step in the assessment of suitable areas for malaria in Greece, but needs further updating and validation. The maps can be used to focus preparedness and response actions.

Malaria in Europe – risk factors

Malaria is an old disease of continental Europe and was eliminated in the 1970s by a combination of early detection and treatment of cases, mosquito vector control by indoor residual spraying of houses and larviciding of breeding sites, environmental modifications, and human habitat modifications. In the countries directly neighbouring Europe, malaria transmission is currently steeply declining, with only 103 locally acquired cases reported in the entire WHO European Region (which also includes Turkey, the Caucasus and Central Asia). Malaria has also nearly disappeared from northern Africa, with only very few cases reported per year from Algeria. However, a high prevalence of malaria is still observed in other (sub)-tropical countries, particularly in sub-Saharan Africa, South America and Asia, including Pakistan and Afghanistan. Migration flows and increasing international travel result in parasite importations into Europe.

The risk of reappearance of autochthonous *Plasmodium vivax* malaria transmission in Europe depends on the receptivity and vulnerability of any given area, as defined below, and the contact between parasites, human beings and potential vectors.

Receptivity is defined by WHO as the abundant presence of anopheline vectors and the existence of other ecological and climatic factors favouring malaria transmission. To appraise receptivity one needs to assess vector survival, the behaviour of the mosquito (particularly human–vector contact) and vector abundance. These vector-related factors determine malaria transmission and are strongly influenced by environmental and climatic determinants.

The ability of anophelines to transmit the *Plasmodium* parasite(s) is known as 'vector competence'. Based on limited laboratory studies, the vector competence of European anophelines for *Plasmodium falciparum* is low due to poor co-adaptation of imported parasites and local vectors. However, the vector competence for *Plasmodium vivax* is unknown because of the lack of in vitro *Plasmodium vivax* culture. Yet, the outbreak in Greece showed that local *Anopheles* vectors are competent to transmit *Plasmodium vivax.* Receptive areas do indeed exist in Europe, and the identification and assessment of these areas is of high value.

Vulnerability is defined by WHO as either proximity to malarious areas or resulting from the frequent influx of infected individuals or groups and/or infective anophelines. Malaria is often introduced by travel and migration, but the risk of onwards transmission will depend on the contact between parasites, human beings, and potential vectors. The vector–human contact is most often localised in non-urban environments. The vector–parasite contact is normally very rare but can alter with socio-economic changes.

Experiences from Italy

Malaria imposed a heavy burden of suffering and death on Italy, but malaria control operations were substantially increased between 1920 and 1930, resulting in a marked reduction of the endemic areas. In the period 1947–1951, Italy launched a five-year national campaign of malaria eradication based on vector control (indoor residual spraying) and prompt and correct treatment. In 1948, after the first year of intervention, *Plasmodium falciparum* malaria transmission was interrupted and up to 1962 only sporadic cases of *Plasmodium vivax* malaria occurred in Sicily. In 1970, Italy was certified malaria free by the WHO. Currently malaria is a mandatory notifiable disease in Italy. Between 2000 and 2010, almost 7700 cases of malaria were reported from Italy, of which 13 were classified as autochthonous. Vectors of malaria in Italy include *Anopheles labranchiae*, *Anopheles maculipennis sensu lato* and *Anopheles superpictus*. *Anopheles sacharovi*, which was the main vector along the north-eastern coast of the country during the pre-eradication period, is now considered absent, most likely because of the disruption of its breeding sites (costal brackish water swamps).

The risk of malaria re-introduction in the previous hyper-endemic areas of Italy was assessed based on the determinants presented above. The results of this study show that there is a very low risk of re-establishment of

malaria transmission in the study area, but climatic, environmental, and socio-economic changes may strongly influence the receptivity and vulnerability and hence the risk for transmission. In conclusion, the return to a situation of endemic malaria in Italy (or any other European countries recently investigated) is unlikely, whereas the occurrence of sporadic, isolated cases or small outbreaks of introduced *Plasmodium vivax* malaria is considered possible.

Discussion

Drivers in Greece and risk for Europe

Greece has experienced local transmission of malaria in recent years because of a climate favourable to the breeding of mosquitoes and malaria transmission , the proximity of human and mosquito vector populations in rural agricultural areas, and the recently increasing number of migrant workers from malaria-endemic countries. Other Mediterranean countries may be facing a similar risk.

As mentioned above, malaria is often introduced to Europe by travel and migration, but onwards transmission from the imported parasite carriers will depend on:

- the introduced parasites and the ability of the local malaria vectors to transmit these parasites;
- timing and location, i.e. the introduction of parasites to receptive areas in a time when local vector species are active and favourable ambient temperatures and other factors allow the completion of the parasite life cycle inside the mosquito; and
- the frequency of contacts between the parasite carriers, the vector and susceptible humans, which might be influenced by the number of imported cases and their socio-economic conditions (geographic location of housing units, e.g. urban or rural areas; housing conditions; access to healthcare; and social exclusion).

In Greece, the origin of the seasonal workers seems to have changed over the last three years. Seasonal workers from central Europe are increasingly replaced by workers from the Indian subcontinent, which might explain the increased risk of malaria transmission. Moreover, large groups of seasonal workers stay for extended periods in receptive areas and are in close contact with potential vectors, increasing the likelihood of onwards transmission. Whether this applies to other regions in the EU is not clear and worth investigating.

Other hypotheses to explain the recent upsurge of malaria in Greece should be explored. Hence, a thorough outbreak investigation is essential to understand the malaria situation and inform the appropriate response. The re-activation (relapse) of *Plasmodium vivax* in elderly might explain some of the observed cases, although it was recognised that this can only partially describe the observed malaria transmission. PCR-based genotyping of the parasite can be helpful to test hypotheses on the re-establishment of transmission cycles. Changes in the receptivity of the areas, such as changes in vector species composition, vector abundance, and vectorial capacity still need to be assessed. In 2011, mosquito abatement was implemented late in the season due to administrative restructuring and might have influenced the receptivity of the area. In Greece, the presumed vector is *Anopheles sacharovi* but other vectors should be considered and followed and basic data on their biology and behaviour collected. For Greece and other EU countries, data on receptive areas should be updated or assessed to better understand the current potential risk and changes that can occur thereafter. Several countries started to assess the situation but a global EU approach is needed and receptive areas at EU level need to be mapped.

Conclusion

The malaria situation in Greece merits full attention for the timely implementation of evidence-based malaria control measures during the 2012 transmission season.

Provided that current healthcare, mosquito control and public health infrastructures remain intact, the re-establishment of endemic areas for malaria in the EU remains unlikely. Nevertheless, conditions exist for clusters of locally acquired malaria. Hence the need for a more complete harmonised picture of malaria risk in the EU. The assessment in the EU can be done by:

- assessing the receptivity in areas by developing EU-wide vector distribution maps and setting up specific studies on vectorial capacity in specific model areas; and
- adding information on spatial and temporal distribution of imported cases and asymptomatic carriers.

Response activities

WHO presentation

The global Roll Back Malaria (RBM) partnership and the WHO Regional Office for Europe aim at interrupting malaria transmission by 2015 and at preventing the re-establishment of malaria transmission in countries where it has been eliminated. As a result of the malaria elimination effort, the number of autochthonous malaria cases in the region decreased drastically in the period 1990–2011. In 2011, 103 locally acquired cases were reported to the WHO Regional Office for Europe, 56 of which were reported in Central Asia, five in the southern Caucasus, two in Turkey, and 40 in Greece.

The following key interventions towards malaria elimination in the endemic countries of the WHO European Region were considered essential:

- to deplete the reservoir of malaria infection and halt local transmission nationwide, based on intensive vector control measures (particularly indoor residual spraying with insecticides, with a strict total coverage of all active foci) combined with adequate coverage and high-quality disease management;
- to set up case- and foci-based malaria surveillance and information/reporting systems to ascertain whether malaria transmission still takes place in a given area;
- to conduct operational research focused on issues of direct relevance to malaria elimination;
- to increase human resource capacity for malaria elimination by appropriate training and to maintain a national core technical group of adequately trained professionals with the necessary epidemiological expertise; and
- to strengthen cross-border coordination and cooperation, especially in situations where a risk of spread of malaria among neighbouring countries exists.

After having achieved the complete interruption of malaria transmission, a country or region may still be receptive to malaria: in the absence of appropriate actions, local transmission can occur again. The probability of re-establishment is determined by the levels of receptivity and vulnerability. The interaction of receptivity and vulnerability that determines the magnitude of the malariological potential should be assessed to decide on the basic vigilance activities appropriate to each particular country or area. A number of key interventions are decisive when it comes to preventing and controlling the reintroduction of malaria:

- In order to predict and prevent the re-establishment of malaria transmission at the onset, an early warning system should be developed to measure the malaria risk factors in terms of vulnerability and receptivity.
- A reliable surveillance system with full coverage of potential malaria-risk areas should be in place to detect any possible re-establishment of malaria transmission.
- Adequate epidemiological and entomological services with an operational research component should be in place in order to determine the underlying causes of resumed transmission.
- A functional system for easy access to reliable laboratory diagnosis and prompt and adequate treatment for every citizen should be established to timely detect and notify all suspected and confirmed cases; their treatment outcomes should be monitored.
- Epidemic preparedness and rapid response mechanisms should be built up at the national level in order to cope with possible emergency situations.
- Participation of a motivated community in malaria prevention should be promoted to improve preventive practices.

Discussion and feedback from working groups

For countries with areas at risk for local malaria transmission, it is essential to develop an integrated preparedness and response plan for malaria that covers all aspects of surveillance, clinical management, laboratory diagnosis, entomological surveillance, vector control, and communication. In general, the objectives of the plan should be to prevent onwards transmission from imported cases and to prevent re-establishment of transmission in areas where locally acquired cases occur regularly. The plan should take into account the RBM and WHO-EURO target to eliminate malaria in Europe by 2015.

The plan should be based on different risk levels and assign tasks adapted to the local context and the various communities. These risk levels need to be defined according to the receptivity and vulnerability of an area/region and the occurrence of locally acquired cases in previous years. This implies that basic knowledge on vectors and *Plasmodium* parasite importation is available.

Depending on the risk level, surveillance should go from passive to active with focus on the increased completeness of notification. The general practitioners play a key role in the early detection of malaria. Specific

surveillance activities can be implemented in areas with high receptivity and vulnerability ('hotspots' for malaria introduction risk) in order to obtain a comprehensive picture of the malaria situation. In case of an outbreak, active case finding around locally acquired cases is essential to detect asymptomatic and symptomatic cases early in order to decrease the risk of onwards transmission.

In Greece and elsewhere, the early detection of cases is essential to prevent – or at least decrease – the risk of onwards transmission. The role of the general practitioner and of the health system in the timely detection of malaria cases is essential and depends on the awareness of clinicians, the possibility to detect cases, and the level of access to appropriate health information and care. The biology of *Plasmodium vivax* poses specific challenges to early detection as it is impossible to detect all parasite carriers because of dormant liver stages which are not detected by laboratory diagnostic methods. Symptoms are sometimes mild, hence persons will not seek care and asymptomatic infections, especially among migrants from endemic countries, may occur. Moreover, the socioeconomic status (including housing conditions and access to healthcare) of migrant workers makes this group particularly vulnerable to onwards transmission. Health prevention and care is often difficult to access for migrant worker (barriers include language, distance, cost) and this high-risk group may not seek formal medical care. What has to be developed is a strategy that combines improved accessibility to appropriate healthcare for marginalised or migrant populations with the prevention of onward transmission. Different approaches (including active case finding, seasonal chemoprophylaxis and/or distribution of insecticide-treated mosquito nets) might be considered. It is essential to involve community leaders of marginalised or migrant populations in health and intervention measures. Other options for involvement should also be explored and go hand in hand with good communication, trust, and support at the local administrative level.

Reliable laboratory diagnosis is essential for the early recognition, surveillance and control of malaria. Microscopic examination of Giemsa-stained blood smears (thick and thin film) is the reference, but the use of rapid diagnostic tests (RDT) in specific situations needs to be evaluated. The use of RDTs for the early detection of *Plasmodium vivax* cases in the EU is hampered by their low sensitivity for this species of *Plasmodium*. In addition, their positive predictive value is low in areas where malaria is such a rare event among febrile patients[5]. Countries and areas at risk should pay special attention to requirements for laboratory diagnosis, and specific training for malaria diagnosis among EU microbiologists might be needed. It was also suggested to set up a European network for external quality assessment (EQA) – with ECDC support and in close collaboration with WHO. EQAs should cover both the peripheral and the central level, including those reference laboratories where alternatives to thick and thin film are used (e.g. molecular tests).

Entomological surveillance is essential to define receptive areas. It is not enough to focus only on the known historic risk areas and the known vector species, but new areas and situations need to be taken into account. Vector density does not always provide a reliable indication for disease transmission risk. Hence, basic information on the presence/absence, abundance, vector biology, biting times, interaction between vectors and human populations are needed to assess the risk and guide vector control. This information needs to be collected in a timely manner, preferably before an outbreak occurs. Entomological surveillance can be included as part of the case investigation if local transmission happens to identify potential vectors that are involved in the transmission. In case of an outbreak, vector control will contribute to limit the transmission. Several interventions are possible depending on the involved vector. Indoor residual spraying, when implemented correctly, proved to be an efficient measure to control malaria in Europe, while ULV (Ultra-low volume) sprays are not appropriate to control transmission of malaria.

The outlines of the preparedness plan above need to be adapted to a specific country context and specific actions need to be identified. However, isolated actions are insufficient, and only concerted and coordinated actions among the different stakeholders will have a positive effect on controlling malaria.

[5] An overview of WHO product testing of malaria RDTs is available at: http://www.who.int/tdr/publications/documents/rdt3.pdf

Recommendations

Based on the above discussion, a number of actions have been identified at the EU level:

- Information collection and exchange:
  - It would be of value to set up a framework at the EU level for informal communication (e.g. EPIS) in order to discuss relevant epidemiological signals (i.e. local transmission) from EU countries. This information exchange should rely on a designated network.
  - Feedback from the outbreak investigation would be helpful, as would the exchange of lessons learnt (e.g. when to launch active surveillance; sharing of investigation materials such as questionnaires).
- Laboratory capacity and EQA: the need for reliable laboratory diagnosis has been recognised. Building capacity for the laboratory diagnosis of malaria is therefore needed. It was recommended that a European network for external quality assessment should be set up to improve the quality of malaria laboratory diagnosis in the EU. This should be done in close collaboration with WHO.
- Preparedness plan: the need for the development of a preparedness plan for countries at risk for local malaria transmission was identified. For many Member States malaria, and by extension vector-borne diseases, are not necessarily priority diseases and the required expertise is not always available. ECDC could support the Member States by developing a generic plan for vector-borne diseases that could be adapted to the local context by the Member States. Additionally, ECDC might explore facilitating national or regional workshops to develop preparedness plans for vector-borne diseases (similar to the materials developed for influenza pandemic preparedness planning); (self-)assessment of preparedness for vector-borne diseases and subsequent improvement should be part of this process.
- Receptivity and vulnerability: ECDC can support the Member States by identifying receptive and vulnerable areas as well as vulnerable populations in close collaboration with other stakeholders and organisations. In particular, it can provide updated maps on the distribution of anopheline mosquitoes.
- Access to healthcare: inclusion of malaria in the work on migrant health ongoing at ECDC
- Co-ordination: ECDC should ensure co-ordination with WHO

Annex 1. List of participants

Aafje Rietveld, WHO – World Health Organization

Anastasia Pantazopoulou, Ministry of Health and Social Solidarity, Greece

Angel Kunchev, Ministry of Health, Bulgaria

Anne-Lise Bienvenu, Faculty of Medicine, Hôpital de la Croix Rousse, France

Bülent Alten, Hacettepe University, Turkey

Colin Sutherland, London School of Hygiene and Tropical Medicine – LSHTM, United Kingdom

Didier Fontenille, IRD – Institut de Recherche pour le développement, France

Eugena Tomini, National Institute of Public Health, Albania

Fortunato Paolo D'Ancona, Istituto Superiore di Sanità, Italy

George Koliopoulos, Laboratory of Insecticides of Public Health Importance, Greece

Georges Snounou, Institut National de la Santé et de la Recherche Médicale, France

Harold Noël, Institut de Veille Sanitaire, France

Iva Pem Novosel, Croatian National Institute of Public Health, Croatia

José Miguel Rubio, Instituto de Salud Carlos III, Parasitogy Department of the National Centre for Microbiology, Spain

Kostas Danis, Hellenic Centre for Disease Control and Prevention (KEELPNO), Greece

Marieta Braks, RIVM – National Institute for Public Health and the Environment, Netherlands

Mikhael Ejov, WHO – World Health Organization

Nikolaos Vakalis, National School of Public Health, Greece

Paula Vasconcelos, Directorate-General of Health, Portugal

Paulo Almeida, Institute for Hygiene and Tropical Medicine, Universidade Nova de Lisboa, Portugal

Philippe Gillet, Institute of Tropical Medicine, Belgium

Philippe Parola, EuroTravNet, France

Roberto Romi, Instituto Superiori di Sanita, Italy

Roumyana Petrova Benedict, IOM – International Organization for Migration

Silvia Villanueva (via TC), European Commission

Viorica Gheorghiu, INSP – National Center for Surveillance and Control of Communicable Diseases, Romania

Participants from ECDC:

Annick Lenglet, Bertrand Sudre, Eva Warns-Petit, Herve Zeller, Lara Payne, Laurence Marrama, Wim Van Bortel

Annex 2. Agenda

Tuesday, 17 January 2012

13:30–13:40	Opening of the meeting – scope and objectives	ECDC Herve Zeller Wim Van Bortel
13:40–14:00	Malaria transmission in Greece: assessment of the situation covering the last three years	KEELPNO Kostas Danis
14:00–14:20	Feedback from the ECDC/WHO missions in Greece	ECDC Annick Lenglet
14:20–14:40	Mapping areas of malaria suitability in Greece to support assessment and response	ECDC Bertrand Sudre
14:40–15:00	Migration in the EU	IOM Roumyana Benedict
15:00–15:30	Coffee break	
15:30–15:45	The situation and experience of Italy regarding autochthonous malaria	ISS Roberto Romi
15:45–16:10	Risk of *Plasmodium vivax* in Europe: drivers of transmission	IRD/CNEV Didier Fontenille
16:10–17:40	Discussion on the transmission risk of *Plasmodium vivax* malaria in Europe	ECDC Wim Van Bortel
17:40–18:00	Conclusions of first day	ECDC Herve Zeller Wim Van Bortel

Wednesday, 18 January 2012

09:00–09:15	Scope and objectives of day 2	ECDC Wim Van Bortel
09:15–09:45	Malaria preparedness and response in the WHO European Region	WHO-Euro Mikhail Ejov
09:45–10:00	Introduction to the discussion	ECDC Wim Van Bortel
10:00–12:30 (including break)	To identify, discuss and propose priority actions for preparedness and control to cope with malaria transmission in the EU Break-up in two working groups	ECDC – all
12:30–13:30	Lunch	
13:30–14:30	Reporting from WG	ECDC Wim Van Bortel
14:30–15:00	Conclusions and recommendations of the meeting	ECDC Herve Zeller Wim Van Bortel