



RAPID RISK ASSESSMENT

Risk of importation and spread of malaria and other vector-borne diseases associated with the arrival of migrants to the EU

21 October 2015

Main conclusions and options for response

The occurrence of malaria or other vector-borne diseases in mobile populations such as migrants, refugees and in travellers is not unexpected and further importation of cases might occur in the EU.

- The risk for onward transmission with secondary cases and localised outbreaks in the transit and/or destination country depends upon the presence of competent vectors, the season in the year, the health promotion and vector control measures at all borders, transit and settlement areas, and the access to health services.
- Competent vectors for malaria, leishmaniasis and schistosomiasis are present in some European countries (particularly southern European countries), but vector activity is low during the winter months. However, transmission could occur in the spring and summer of 2016, when environmental conditions may become permissive, and if similar migration patterns prevail.
- The risk of transmission of louse-borne diseases is a function of crowding and might be of more concern during winter months.
- Ensuring the right to health for mobile populations and universal access to public health services with rapid detection and treatment of vector-borne diseases is particularly important for the prevention of secondary cases and disease outbreaks. Vector abatement strategies are called for during the season of high vector activity.
- Preparedness regarding these vector-borne diseases in the EU requires the capacity to detect possible cases in areas with presence of the competent vectors and strengthened surveillance systems.

Migrants tend to be in relatively good health at the onset of their journey, but may be exposed to infectious pathogens during their journey. Thus, risks of acquiring other infectious diseases beyond vector-borne diseases should be considered for newly arriving migrants. In this context,

- Ensuring right to health is important, and voluntary screening for infectious diseases of newly arrived migrants could be considered based on country of origin and countries of transit. Screening should be connected to a process of diagnosis and treatment. Screening for lice infestation could be considered.
- Improving general hygiene measures and preventing or minimising overcrowding in reception centres, transit points and settlements for migrants and other mobile populations is important.
- Health education and health promotion sessions need to emphasise the positive aspects of the voluntary and periodic health assessment and stress the benefits of screening and treatment of diseases.
- Access to public healthcare for the diagnosis and treatment of communicable diseases including primary and emergency healthcare should be ensured, including documentation of treatment and outcome monitoring.

ECDC recently published an Expert Opinion on the public health needs of irregular migrants, refugees or asylum seekers across the EU's southern and south-eastern borders [1] .

Source and date of request

Directorate-General for Health and Food Safety, 16 October 2015.

Public health issue

Risk of transmission of vector-borne diseases following the possible introduction by migrants or travellers in areas with competent vectors in the EU/EEA. The request was triggered by the reporting from Swedish authorities of a case of malaria in a recently arrived migrant in Sweden.

Consulted experts

ECDC experts in alphabetical order: Denis Coulombier, Josep Jansa, Katrin Leitmeyer, Otilia Mardh, Jan C. Semenza, Wim Van Bortel.

External expert reviewers: experts from the World Health Organization (WHO) reviewed the risk assessment, but the views expressed in this document do not necessarily represent the views of the WHO.

Disease background information

This assessment focuses on vector-borne diseases:

- prevalent in countries of origin of mobile populations such as migrants and refugees that are currently arriving in Europe
- that could have been potentially acquired during travel and migration
- for which vectors are locally present in Europe and are potentially capable of transmitting pathogens to humans.

This report assesses the specific risk related to importation and spread of vector borne diseases in the context of a large number of migrants to the EU. It does not cover other health needs for these populations.

Malaria

Malaria is caused by infection with a parasitic protozoan of the genus *Plasmodium* and transmitted through the bite of an infected *Anopheles* mosquito. Five species of *Plasmodium* can infect humans: *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale*, *Plasmodium malariae* and *Plasmodium knowlesi*. Malaria is characterised by fever and influenza-like symptoms, including chills, headache, myalgia and malaise. These symptoms can be recurrent. Malaria may be associated with anaemia and jaundice and *P. falciparum* infections can cause seizures, mental confusion, kidney failure, coma and death, particularly in young children.

Malaria was eliminated from the EU in the 1970s by a combination of indoor residual spraying, environmental modification, population screening, early detection and treatment of cases. Turkey and Tajikistan are working towards the final elimination of malaria from their countries. In EU/EEA countries, malaria is now primarily linked with travel to and from malaria-endemic regions, i.e. imported cases. In 2012 (the last year for which epidemiologic data are available) there were 5 161 reported cases in the EU/EEA countries (see the Annex for country-specific data). While most (99%) of the cases with known origin were imported, 26 were notified as autochthonous cases [2]. Sporadic indigenous cases in the EU are linked to 'airport'- and 'baggage'- malaria, and blood transfusion [3]. Autochthonous transmission has been reported in Greece in 2009–2013 and in 2015 in permissive environments [4,5].

In 2015, 189 malaria cases were detected in Sweden of which none were locally acquired [6].

Detailed information regarding the disease can be found in the ECDC fact sheet [7].

Leishmaniasis

Leishmaniasis is a parasitic disease caused by a protozoan of the genus *Leishmania* and transmitted in Europe, the Americas, Asia and Africa through the bite of an infected *Phlebotomus* sand fly. Three clinical forms are known: cutaneous, visceral and mucocutaneous leishmaniasis. Without treatment, most patients with the visceral disease will die and those with diffuse cutaneous and mucocutaneous disease can suffer chronic infections associated with secondary life-threatening infections. Treatment should be considered even for self-healing cutaneous leishmaniasis, because of the disfiguring scars.

There are only two transmission cycles endemic in Europe: visceral and cutaneous human leishmaniasis caused by *Leishmania infantum* throughout the Mediterranean region, and cutaneous human leishmaniasis caused by *Leishmania tropica*, which sporadically occurs in Greece and probably in neighbouring countries. Human leishmaniasis cases in the EU are imported following travel to tropical countries [8].

Further information regarding the disease can be found in the ECDC fact sheet [9].

Schistosomiasis

Schistosomiasis is a parasitic disease caused by trematodes of the genus *Schistosoma*. Urinary schistosomiasis is a disease caused by *Schistosoma haematobium* of tropical and inter-tropical zones. The disease is endemic in several areas in Africa, Madagascar and the Middle East. The route of infection for humans is skin exposure to parasite-infested fresh water during routine occupational, recreational or domestic activities [10].

The parasitic transmission cycle starts when people with urinary schistosomiasis contaminate freshwater sources with urine that contains parasite eggs. Under specific environmental conditions, the eggs hatch and the released miracidia penetrate specific freshwater snails (*Bulinus* spp.), the intermediate hosts. Cercariae, the infective form, are released by the snails and can penetrate the skin of a human host upon exposure to fresh water. In their human hosts, adult *Schistosoma* live three to ten years, but in some cases they can live for 40 years. The disease caused by *S. haematobium* is characterised by chronic urogenital complications due to the presence of eggs in tissues [11]. In endemic areas, the infection in people can remain subclinical for a long period, but still causes progressive damage to the urogenital tract.

More detailed information about urinary schistosomiasis is available in the ECDC rapid risk assessments [12,13].

Louse-borne diseases

Louse-borne diseases are transmitted by the human body louse *Pediculus humanus humanus*. They include trench fever due to *Bartonella quintana*, louse-borne relapsing fever caused by *Borrelia recurrentis*; and louse-borne typhus (syn. epidemic typhus or exanthematic typhus) caused by *Rickettsia prowazekii*.

These infectious diseases remain a public health concern in populations living in crowded and unsanitary conditions predisposing them to infestation with human body lice. However, each pathogen presents specific epidemiological features. Since the 1990s, *Bartonella quintana* has been recognised as a re-emerging pathogen among impoverished and homeless populations living in unsanitary conditions and crowded areas in both developing and developed countries. Louse-borne relapsing fever is still found in limited endemic foci in north-eastern Africa. Louse-borne typhus was responsible for large epidemics in populations with poor sanitary and overcrowded conditions but still exists in foci associated with poor sanitary conditions (such as in prisons and refugee camps), and colder climates found in mountainous regions.

Early diagnostic and timely administration of appropriate antibiotic treatment and supportive care significantly reduce mortality. Primary prevention of louse-borne diseases relies on measures for avoiding infestation with body lice.

Detailed information regarding the disease can be found in the ECDC fact sheet [14].

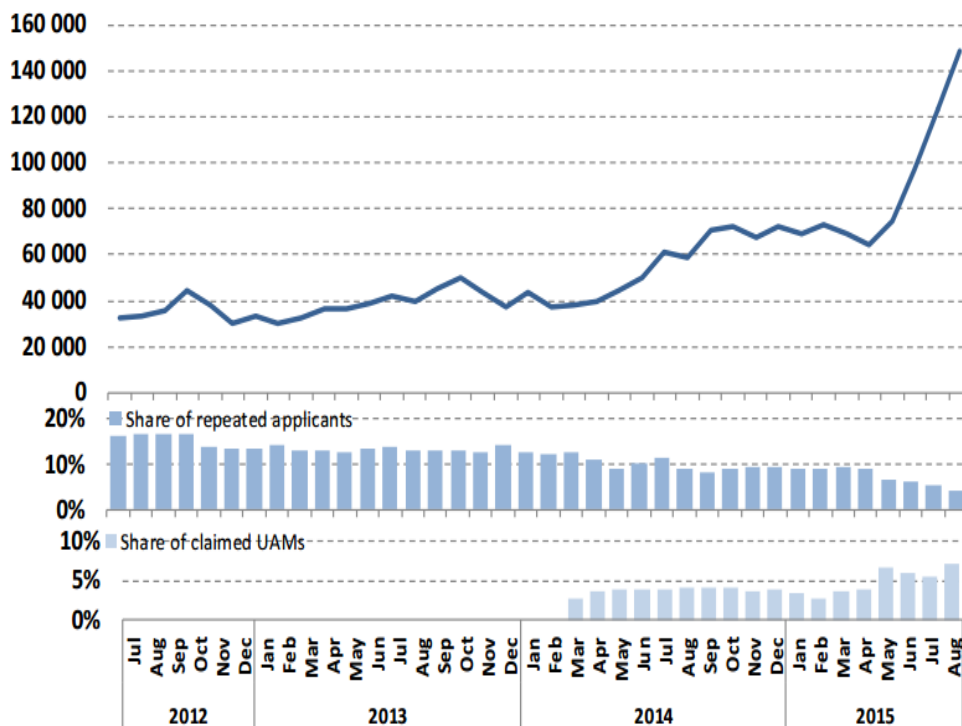
Event background information

On 16 October, Sweden posted an EWRS message aimed at raising awareness about the possibility of *Plasmodium vivax* malaria infection among refugees from Syria. A Syrian child was diagnosed with *Plasmodium vivax* malaria in a Swedish hospital on 8 October. In the ten days before admission, the child had symptoms of fever, chills and headache. Treatment has been initiated in the hospital and the patient is responding well.

The child arrived with the family in Sweden on 15 September after a journey that started on 31 August. On their way to Sweden, they travelled through Turkey, Greece, the former Yugoslav Republic of Macedonia, Serbia, Hungary and Austria. From Austria, they travelled to Sweden. During the trip, they spent several nights in camps with refugees from different countries. It is not known where the child was infected with malaria. Syria has been declared malaria-free, but this status may have changed in recent years. Turkey and Greece have experienced limited autochthonous transmission in recent years, with most recent sporadic autochthonous cases documented in Greece in 2015.

Since April 2015, Europe is experiencing an unprecedented increase in asylum applications according to data from the European Asylum Support Office (EASO) (Figure 1). In August 2015, a 21% rise compared with the previous month of official asylum applicants for EU countries plus Norway and Switzerland was recorded by EASO. This was the highest increase ever recorded, with Syria as the most common country of origin of applications followed by Afghanistan, Iraq, Pakistan, Somalia and Eritrea (Figures 1 and 2). However, this does not take into account unregistered migrants and migrants from European countries. In Greece, a record number of migrants arrived in August 2015, according to Frontex (The European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union).

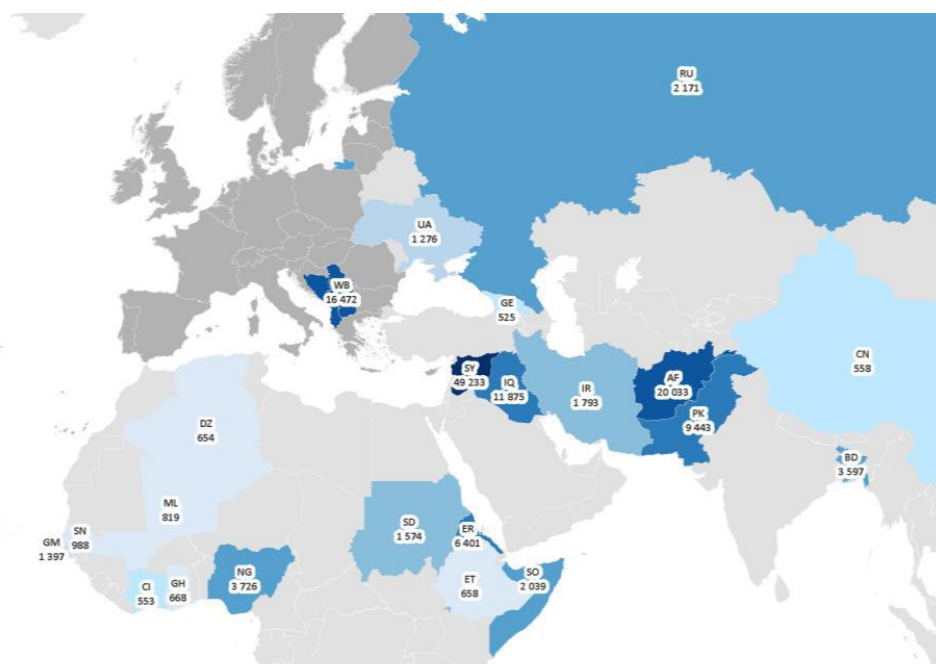
Figure 1. Number of applications for international protection in the EU-28 plus Norway and Switzerland, August 2015.



Note: The share of repeated applicants is the proportion of repeated applicants in the total number of applicants for international protection. The share of UAM (unaccompanied minors) represents the proportion of asylum applicants claiming to be below the age of 18 years in the total number of applicants rather than those assessed to be such after an age assessment has been carried out.

Source: [EASO Latest Asylum Trends](#)

Figure 2. Main countries of origin of asylum applicants in the EU-28 plus Norway and Switzerland in August, 2015.



Source: *EASO Latest Asylum Trends*

ECDC threat assessment for the EU

The migrant populations arriving in the EU/EEA are not a homogenous group and may have diverse health needs depending on their country of origin. Table 1 provides an overview of the vector-borne diseases to which these migrants might have been exposed to in their country of origin. It is important to note that it is not possible to fully rely on the epidemiology from countries of origin when determining which infectious diseases to be vigilant against for the following reasons:

- those who migrate are often younger and healthier and may not be representative of the population of origin
- during their journey, they might have been exposed in countries through which they have travelled to diseases not present in their country of origin.

Table 1. Vector-borne diseases to consider for the top six countries of origin for migrants entering the EU in 2015.

Disease	Indicator	Syria	Afghanistan	Iraq	Pakistan	Eritrea	Somalia
Malaria	Risk of malaria	Malaria-free	High risk of <i>P. vivax</i> >> <i>P. falciparum</i>	Malaria-free	High risk of <i>P. vivax</i> >> <i>P. falciparum</i>	Risk of <i>P. falciparum</i> >> <i>P. vivax</i>	High risk of <i>P. falciparum</i> and <i>P. vivax</i>
Leishmaniasis	Risk of cutaneous leishmaniasis	✓	✓	✓	✓	✓	
	Risk of visceral leishmaniasis	✓	✓	✓	✓	✓	✓
Helminthiasis	Risk of urinary schistosomiasis	✓	ND	✓	ND	✓	✓
Louse-borne diseases	trench fever <i>Bartonella quintana</i>	ND	✓	ND	ND	ND	ND
	louse-borne relapsing fever <i>Borrelia recurrentis</i>	ND	ND	ND	ND	✓	✓
	louse-borne typhus <i>Rickettsia prowazekii</i>	ND	ND	ND	ND	ND	ND

Sources: WHO and WHO-EMRO country profile for malaria: Syria and Iraq ([Link](#)); Afghanistan, Eritrea, Pakistan and Somalia ([Link](#)); [15] for Leishmaniasis; ECDC factsheets for *Bartonella quintana* infection/ trench fever; Louse-borne relapsing fever; Epidemic louse-borne typhus; Global Infectious Diseases and Epidemiology Online Network (GIDEON)

Legend: ✓=present; ND=not described

Transmission risk in the EU/EEA

The transmission of vector-borne diseases requires the presence of a competent vector (or intermediate host in the case of schistosomiasis), a susceptible host and the pathogen.

Malaria

The risk for malaria is very limited to non-existent in the Middle East and North African countries, but should be considered for persons originating from sub-Saharan Africa (Eritrea, Sudan, Nigeria, Senegal, Ghana) or Asia (Afghanistan, India, Pakistan). Yet, migrants cross countries such as Turkey and Greece, where local transmission of *Plasmodium vivax* is possible in specific environments provided that the parasite is introduced.

Malaria in recent immigrants from malaria endemic countries is often asymptomatic because of premunition acquired through repeated exposures. Vulnerable groups include pregnant women and children. In children, malaria can be easily confused with common childhood illnesses, particularly those with vomiting and fever, which may delay the correct diagnosis.

A possible concern is the re-introduction of *Plasmodium vivax* into areas where competent *Anopheles* mosquito vectors are present and environment is permissive for transmission as observed in Greece in 2009–2013 [4]. In 2015, Greece has observed an increase in imported *Plasmodium vivax* cases and six locally-acquired cases are reported as of 16 October 2015 [5]. These locally-acquired cases are reported from areas that are suitable for *Plasmodium vivax* transmission [16]. Potential *Plasmodium vivax* vectors are present in the EU/EEA and comprise primarily *Anopheles sacharovi*, *Anopheles labranchiae* and *Anopheles superpictus* [17]. Autochthonous cases might occur after a re-introduction of the parasite during the summer months when conditions are favourable to sustain vector activity. With the coming winter season in the EU/EEA, onwards autochthonous transmission is unlikely.

Leishmaniasis

Cutaneous leishmaniasis is endemic in the Middle East. An upsurge of cases has been reported in Syria in recent years with nearly 72 000 cases reported in 2013 compared with almost 18 000 in 2007 [18].

Transmission cycles of *Leishmania infantum* and *Leishmania tropica* do exist in the EU/EEA in areas confined to the Mediterranean countries. Only limited numbers of cases are reported annually in the EU/EEA [18]. *Leishmania tropica* (also known as 'Oriental sore') is usually transmissible from humans to vertebrate animals such as dogs and rodents (anthroponotic disease). The principal vector *Phlebotomus sergenti* is locally abundant in southern Europe [19]. New foci could be initiated by people infected in North Africa and the Middle East but transmission during winter months is unlikely.

Visceral leishmaniasis is endemic in the Middle East and East African countries where most of the immigrants are coming from. *Leishmania infantum* and *Leishmania donovani* have been reported from the Middle East but in East Africa, *Leishmania donovani* is the predominant species. Dogs are important reservoirs for *Leishmania infantum* and potential vectors are widely distributed in southern Europe. More information on sand fly distribution can be found on the ECDC website [19].

Schistosomiasis

The autochthonous transmission of *Schistosoma haematobium* in Corsica, France, occurred in 2013 and highlights a potential risk for receptive areas of southern Europe where transmission can occur when the parasite is introduced [12,13].

Louse-borne diseases

Poor living conditions, crowded shelters, detention centres and refugee camps may increase the risk for the spread of lice which in rare cases can carry diseases e.g. louse-borne diseases such as relapsing fever, trench fever or epidemic typhus. In recent months, sporadic cases of relapsing fever have been reported in the Netherlands, Germany, Finland and Belgium among migrants from Eritrea, Somalia and Sudan [20]. Transmission of lice is facilitated in crowded living/travel situations, particularly during the colder months when individuals congregate in heated environments and cannot change their clothing regularly.

Body lice infestations are primarily found among populations having a low socioeconomic status, living in overcrowded situations with poor personal hygiene.

Conclusions and options for response

The occurrence of malaria or other vector-borne diseases in mobile populations such as migrants and refugees and in travellers is not unexpected and further importation of cases might occur in the EU.

- The risk for onward transmission with secondary cases and localised outbreaks in the transit and/or destination country depends on the presence of competent vectors, the season in the year, the health promotion and vector control measures at all borders, transit and settlement areas, and the access to health services.
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Migrants tend to be in relatively good health at the onset of their journey but may be exposed to infectious pathogens during their journey. Thus, risks of acquiring other infectious diseases beyond vector-borne diseases should be considered for newly arriving migrants. In this context,

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Annex

Table 1. Number of confirmed malaria reported cases, EU/EEA, 2008–2012*.

Country	2008 n	2009 n	2010 n	2011 n	2012 n
Austria	57	44	48	7	28
Belgium	181	144	166	184	206
Bulgaria	0	8	5	8	16
Cyprus	0	1	1	6	1
Czech Republic	22	10	11	28	25
Denmark	-	-	-	-	-
Estonia	0	4	1	1	6
Finland	42	34	33	33	46
France	2 246	2 199	2 439	1 891	1 851
Germany	547	523	615	562	547
Greece	39	51	45	92	95
Hungary	5	8	5	10	5
Ireland	82	90	82	61	65
Italy	586	651	662	-	-
Latvia	2	6	5	4	3
Lithuania	3	3	3	3	6
Luxembourg	2	3	12	3	7
Malta	3	1	0	1	2
Netherlands	229	237	247	253	194
Poland	22	22	35	14	21
Portugal	42	44	50	67	71
Romania	13	12	19	40	32
Slovakia	2	0	2	1	6
Slovenia	3	7	9	6	7
Spain	290	356	351	405	421
Sweden	91	81	115	95	85
United Kingdom	1 371	1 495	1 761	1 677	1 378
EU Total	5 880	6 034	6 722	5 452	5 124
Iceland	-	-	-	-	-
Liechtenstein	-	-	-	-	-
Norway	32	34	37	30	37
EU/EEA Total	5 912	6 068	6 759	5 482	5 161

*Ninety-nine percent of these reported cases are travel related

Adapted from ECDC Annual epidemiological report 2014 – emerging and vector-borne diseases, 2014 [2]