



Public Health
England

Protecting and improving the nation's health

Malaria imported into the United Kingdom: 2014

Implications for those advising travellers

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Introduction

Malaria is a serious and potentially life threatening febrile illness caused by infection with the protozoan parasite Plasmodium. It is transmitted to humans by the bite of the female Anopheles mosquito in tropical and subtropical regions of the world. There are five species of Plasmodium that infect humans: *P. falciparum* (responsible for the most severe form of malaria and the most deaths), *P. vivax*, *P. ovale*, *P. malariae* and *P. knowlesi*.

Malaria does not occur naturally in the UK but travel-associated cases are reported in those who have returned to the UK or arrived (either as a visitor or migrant to the UK) from malaria-endemic areas.

More information about malaria is available at:

<https://www.gov.uk/government/collections/malaria-guidance-data-and-analysis>

Methodology

This report presents data on malaria imported into the United Kingdom (UK) in 2014, mostly based on figures reported to the Public Health England (PHE) Malaria Reference Laboratory (MRL). Although the MRL dataset is the most complete source of information about malaria available in the UK, a capture-recapture study estimated that the MRL surveillance system captured only 56% of cases in England (66% for Plasmodium (*P*) falciparum and 62% for London cases) [1]; furthermore, some of the epidemiological information is incomplete [2,3].

Malaria surveillance data are used to inform the UK malaria prevention strategy [4] so it is essential that the data are as complete as possible. Since 2013, the PHE Travel and Migrant Health Section has been attempting to further improve the quality of this dataset by ensuring any cases that have been reported in the PHE public health case management database (HPZone) are also included in the final dataset as well as supplementing epidemiological information, where available, from HPZone. This means that data reported from 2013 onwards may not be directly comparable with previous reports although any differences are thought to be very small.

Malaria is a notifiable disease and clinical and laboratory staff are obligated under law to notify cases to their Proper Officer [5]; however, in 2014, only 13% of malaria cases reported to MRL were officially notified (provisional data) [6]. Clinical and laboratory staff are therefore reminded of the need to notify cases to the designated local public health authority and to report all cases to PHE Malaria Reference Laboratory; a form for this purpose is available at

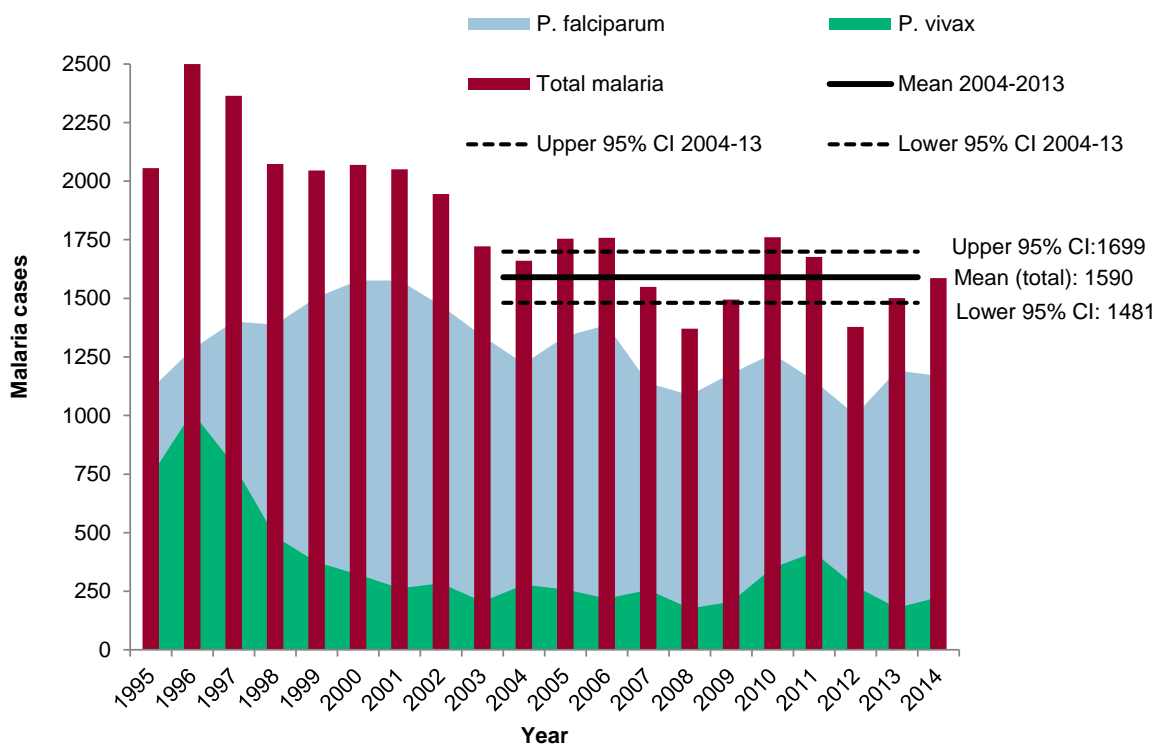
www.malaria-reference.co.uk. For more details on methods of MRL data collection, please refer to the article: Smith et al, Imported malaria and high risk groups, BMJ: 2006 [7].

Data analysis for this report was conducted by the PHE Travel and Migrant Health Section and colleagues at the Malaria Reference Laboratory have reviewed and approved the report.

General trend

In 2014, 1586 cases of imported malaria were reported in the UK (1475 in England, 76 in Scotland, 33 in Wales and two in Northern Ireland), 5.7% higher than reported in 2013 (N=1501) and just 0.25% below the mean number of 1590 cases reported between 2004 and 2013 [Figure 1].

Figure 1. Cases of malaria in the United Kingdom: 1995– 2014



In the last 10 years (between 2005 and 2014), the total number of malaria cases reported in the UK each year has been fluctuating around a mean of 1583 (95% CI: 1475-1690); this is a significant decrease of 23% ($p < 0.0001$) compared to the mean for the previous 10 years (2048, 95% CI: 1868-2229).

The majority of cases in 2014 were caused by *P. falciparum*, which is consistent with

previous years, although the proportion of the total decreased slightly compared to 2013, as a result of an increase in *P. vivax* and *P. ovale* cases in 2014 [Table 1].

Table 1 Malaria cases in the UK by species: 2014 and 2013

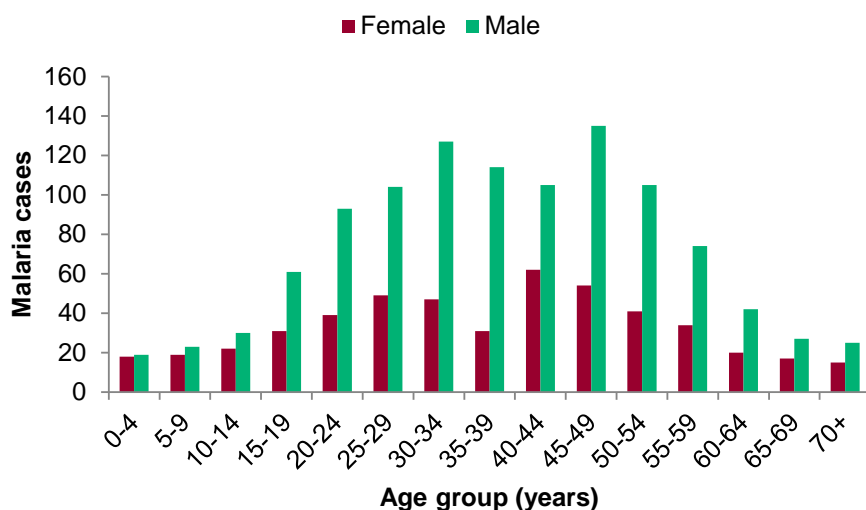
Malaria parasite	Cases (% of total)	
	2014	2013
<i>P. falciparum</i>	1169 (73.7%)	1192 (79.4%)
<i>P. vivax</i>	225 (14.2%)	179 (11.9%)
<i>P. ovale</i>	130 (8.2%)	78 (5.2%)
<i>P. malariae</i>	41 (2.6%)	39 (2.6%)
Mixed	21 (1.3%)	13 (0.9%)
Total	1586	1501

Only three deaths from malaria were reported in 2014 compared to seven in 2013, all from falciparum malaria acquired in Nigeria. There is a small variation in the number of deaths from malaria in the UK every year but the total for 2014 is low compared to the annual average of six over the last 10 years. As the number of deaths from vivax malaria in any year is very low, PHE MRL data over 27 years has been combined and demonstrates that old age is a major risk factor for vivax as well as falciparum malaria, with all vivax deaths occurring in those aged over 50 years [8].

Age and sex

Age and sex were known for 1582/1586 cases; of these 69% (1084/1582) were male, consistent with previous years. Males dominated all age groups [Figure 2] and the median age was 38 years for both males and females. Children aged less than 18 years accounted for 11% (179) of all cases.

Figure 2. Cases of malaria in the United Kingdom by age and sex: 2014 (N=1582)



Geographical distribution

London continues to report the largest proportion of cases in England (779/1475, 53%), with cases resident in South East and North East and North Central London sectors bearing the highest burden in London. An increase in cases was reported in eight Health Protection Teams (HPTs) in England and in Scotland and Wales compared to 2013 [Table 2].

Table 2. Cases of malaria in the United Kingdom by geographical distribution: 2014 and 2013

Geographical area	2014	2013	% change
London PHEC	779	785	-1%
London - South East HPT	291	298	-2%
London - North East & North Central HPT	270	258	5%
London - North West HPT	122	122	0%
London - South West HPT	96	105	-9%
London - unknown HPT	-	2	-
West Midlands PHEC	115	91	26%
Yorkshire and Humber PHEC	97	88	10%
Greater Manchester PHEC	75	70	7%
Sussex, Surrey and Kent PHEC	73	61	20%
Anglia and Essex PHEC	68	55	24%
South Midlands and Hertfordshire PHEC	61	53	15%
Thames Valley PHEC	40	41	-2%
Avon, Gloucestershire and Wiltshire PHEC	37	40	-8%
East Midlands PHEC	32	35	-9%
Cheshire and Merseyside PHEC	32	15	113%
Wessex PHEC	29	35	-17%
Cumbria and Lancashire PHEC	14	24	-42%
Devon, Cornwall and Somerset PHEC	13	13	0%
North east PHEC	10	6	67%
England total	1475	1412	4%
Northern Ireland	2	8	-75%
Scotland	76	59	29%
Wales	33	22	50%
UK total	1586	1501	6%

PHEC – Public Health England Centre; HPT – Health Protection Team

Travel history and ethnic origin

Of those with travel history/country of residence information available (1264/1586, 80%), the majority of malaria cases reported in the UK were UK residents who had travelled abroad (1000/1264, 79%). Cases that travelled abroad from the UK includes: those where reason for travel was holiday, business/professional, civilian/air crew, armed forces or visiting friends and relatives; where reason for travel was not stated, those whose country of usual residence was the UK were also included in this category. The remaining cases were new entrants, which includes UK expats and foreign students (158/1264 (13%) and foreign visitors to the UK (106/1264 (8%). Of the three deaths reported, two were foreign visitors to the UK and one was a UK resident who had travelled abroad from the UK.

Of the 1000 cases that travelled abroad from the UK, reason for travel was known for 862 (86%). Of these, 682/862 (79%) had visited family in their country of origin (also known as visiting friends and relatives, or VFR travellers), 114/862 (13%) travelled for business (including armed forces and civilian air crew) and 66/862 (8%) travelled for a holiday.

Country/region of birth for cases that travelled abroad from the UK

Country or region of birth information was known for 657 (66%) of 1000 cases that travelled abroad from the UK, of which almost two-thirds were born in Africa [Figure 3].

Figure 3. Region of birth for malaria cases that travelled abroad from the UK: 2014 (N=657)

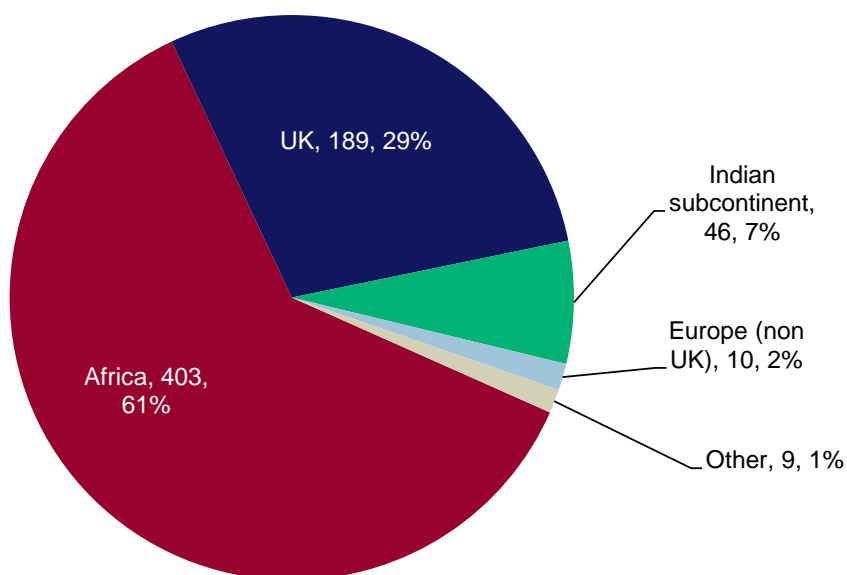


Table 3. Malaria cases that travelled abroad from the UK by region of birth and proportion of VFR travellers: 2014 (N=601)

Region of birth	N	VFR	% VFR
Africa	372	365	98%
Europe - UK	170	61	36%
Indian subcontinent	40	35	88%
Other*	19	6	32%

N – cases where region of birth and reason for travel was known

VFR – cases that have travelled to visit family in country of origin

* - includes non UK Europe

Ethnicity for cases that travelled abroad from the UK

Where ethnicity was known, the majority of malaria cases that travelled abroad from the UK (70%, 680/972), were of Black African ethnicity or African descent (African descent is determined from other information about the patient if ethnicity is not given) [Figure 4].

For non-White British cases, where reason for travel was known, 678/720 (94%) were VFR travellers.

Figure 4. Ethnicity for malaria cases that travelled abroad from the UK: 2014 (N=972)

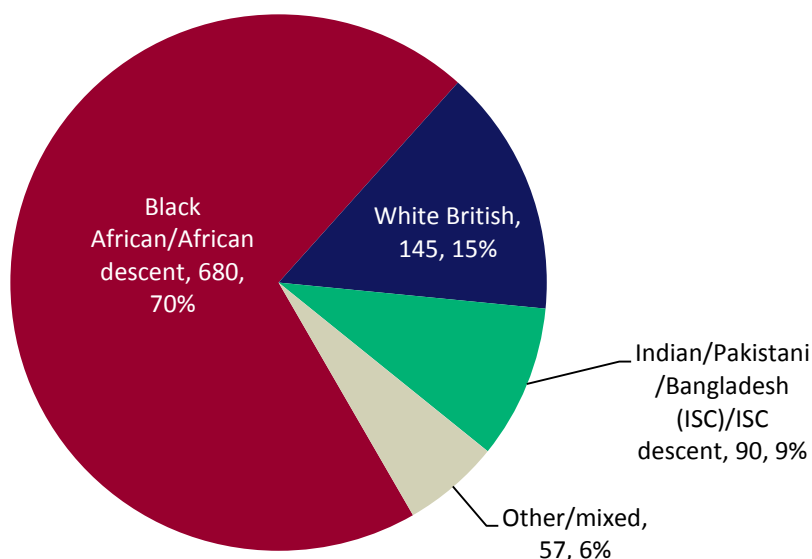


Table 4 shows the breakdown of malaria cases reported by region of travel and parasite species and the top 20 countries of travel are shown in Table 5. The majority of cases (where travel history was known) continue to be acquired in Western Africa (631/1000, 63%), followed by Eastern Africa (131/1000, 13%) and Southern Asia (91/1000, 9%). While it is important not

to over-interpret changes in individual countries because numbers are low, cases acquired in Sierra Leone decreased by a third in 2014 (98) compared with 2013 (149). This may partly be explained by the fact that 5% fewer people travelled to Sierra Leone in 2014 (17163 estimated visits by UK residents) compared with 2013 (18108 visits) [9], probably as a result of the Ebola outbreak. International Passenger Survey data should, however, be interpreted with caution as the estimate for visits to countries less visited will be subject to larger confidence intervals than those more frequently visited). It is also possible that cases acquired in Sierra Leone are returning to baseline levels after an increase in 2012 and 2013 [3]. No cryptic cases were reported in 2014.

Country/region of travel for cases that travelled from the UK

Table 4. Cases of malaria that travelled abroad from the UK by species and region of travel: 2014 and 2013

Region of travel [10]	P. falciparum	P. vivax	P. ovale	P. malariae	Mixed	2014 total	2013 total
Western Africa	571	1	43	12	4	631	669
Eastern Africa	101	4	13	11	2	131	111
Southern Asia	3	87	-	1	-	91	83
Middle Africa	69	-	5	4	1	79	83
Northern Africa	8	3	3	1	-	15	22
South America	3	5	-	-	-	8	7
Africa unspecified	6	-	2	-	-	8	15
Southern Africa	4	-	-	-	-	4	1
South-Eastern Asia	-	1	2	-	1	4	5
Western Asia	-	1	-	-	-	1	-
Central America	-	1	-	-	-	1	-
Oceania	-	1	-	-	-	1	3
Not stated	19	2	3	1	1	26	45
Total	784	106	71	30	9	1000	1044

Table 5. Cases of malaria that travelled abroad from the UK by species and top 20 countries of travel: 2014 and 2013

Country of travel	P. falciparum	P. vivax	P. ovale	P. malariae	Mixed	Total 2014	Total 2013
Nigeria	287	-	18	4	2	311	308
Ghana	107	-	7	4	-	118	111
Sierra Leone	83	-	12	1	2	98	149
Pakistan	-	60	-	1	-	61	44
Côte D'Ivoire	40	-	5	-	-	45	27
Cameroon	37	-	4	2	-	43	35
Uganda	24	2	4	4	1	35	56
Kenya	20	-	2	4	-	26	16
India	3	23	-	-	-	26	38
Gambia	22	-	-	-	-	22	33
Congo	16	-	1	1	1	19	16
Malawi	18	-	-	1	-	19	9
Sudan	8	3	3	1	-	15	22
Zambia	12	-	3	-	-	15	7
Tanzania	11	-	-	1	-	12	9
Guinea	8	-	-	-	-	8	11
Angola	7	-	-	1	-	8	19
Liberia	5	-	-	1	-	6	9
Mozambique	4	-	2	-	-	6	3
Burkina Faso	4	1	-	-	-	5	4
Other Western Africa	15	-	1	2	-	18	17
Other Eastern Africa	12	2	2	1	1	18	11
Other Middle Africa	9	-	-	-	-	9	13
Africa unspecified	6	-	2	-	-	8	15
South America	3	5	-	-	-	8	7
Other	4	8	2	-	1	15	10
Not stated	19	2	3	1	1	26	45
Total	784	106	71	30	9	1000	1044

Prevention and treatment

Chemoprophylaxis

Among patients with malaria who had travelled abroad from the UK, where the history of chemoprophylaxis (antimalarial medication) was obtained, 604/741 (82%) had not taken chemoprophylaxis.

Of those that had taken some form of chemoprophylaxis, 66% (91/137) had taken a drug that is currently recommended by the PHE Advisory Committee for Malaria Prevention in UK Travellers

(ACMP) for their destination [4]; however, this only represented 12% (91/741) of the total cases where chemoprophylaxis information was available. (Note that whether the cases had taken the drug regularly was poorly completed and should also be taken into consideration when interpreting these data). Although 2014 data are similar to the last 5-6 years, in the early 2000s the proportion of those who had not taken chemoprophylaxis was much lower (48% in 2000, 41% in 2001). The proportion of the total cases with chemoprophylaxis information that took a drug recommended by the ACMP has however remained between 12% and 16% since 2000. These data imply that health messages about the importance of antimalarial chemoprophylaxis are still not reaching groups who are at particular risk of acquiring malaria, eg those who are visiting family in their country of origin, particularly those of Black African heritage and/or born in Africa, or they are not taking these messages seriously.

It seems likely that these groups are either not seeking or not able to access medical advice on malaria prevention before they travel, or they are not being given good advice, or they are not adhering to it; they may not perceive themselves to be at risk because the destination is familiar to them. Probably all these factors contribute. The burden of falciparum malaria in particular falls heavily on those of Black African ethnicity, and this group is important to target for pre-travel advice. The London Malaria Group, in partnership with PHE and MRL, are working with African Diaspora Action Against Malaria (ADAAM) to address this.

A recent analysis of malaria deaths over 20 years in the UK [11] showed that, while African born travellers visiting family in their country of origin are at particular risk of acquiring malaria; once acquired, the risk for mortality is significantly higher in those born outside Africa and travelling for other reasons (eg holiday travellers). There is also a strong association between increasing age and mortality, so elderly travellers should also be considered a particular risk group.

Prevention advice

Malaria, an almost completely preventable but potentially fatal disease, remains an important issue for UK travellers. Failure to take chemoprophylaxis is associated with the majority of cases of malaria in UK residents travelling to malaria risk areas. The number of cases in those going on holidays is small but there is continuing evidence that those of African or Asian ethnicity who are non-UK born and going to visit family are at increased risk of malaria, as well as a number of other infections [12]. The elderly are at particular risk of dying from malaria if they acquire the infection. Those providing advice should engage with these population groups wherever possible, including using potential opportunities to talk about future travel plans outside a specific travel health consultation, such as during new patient checks or childhood immunisation appointments [13].

The ACMP guidelines [4] and resources available from the National Travel Health Network and Centre (<http://www.nathnac.org/>) should assist clinicians in helping travellers to make rational decisions about protection against malaria.

Useful resources for travellers, including translated leaflets, are also available on [GOV.UK](#)

Taking fever seriously on return from a malaria risk area

P. falciparum can progress to severe and life-threatening illness, including cerebral malaria, if it is not diagnosed and treated promptly. Travellers returning from malaria risk areas should seek urgent medical advice for any symptoms, especially fever, during their trip or in the year following their return home, including a same day result malaria blood test.

Treatment guidelines and algorithms for clinicians are available from the British Infection Society: <http://interim.britishinfection.org/content/clinical-guidelines#ukmal>

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