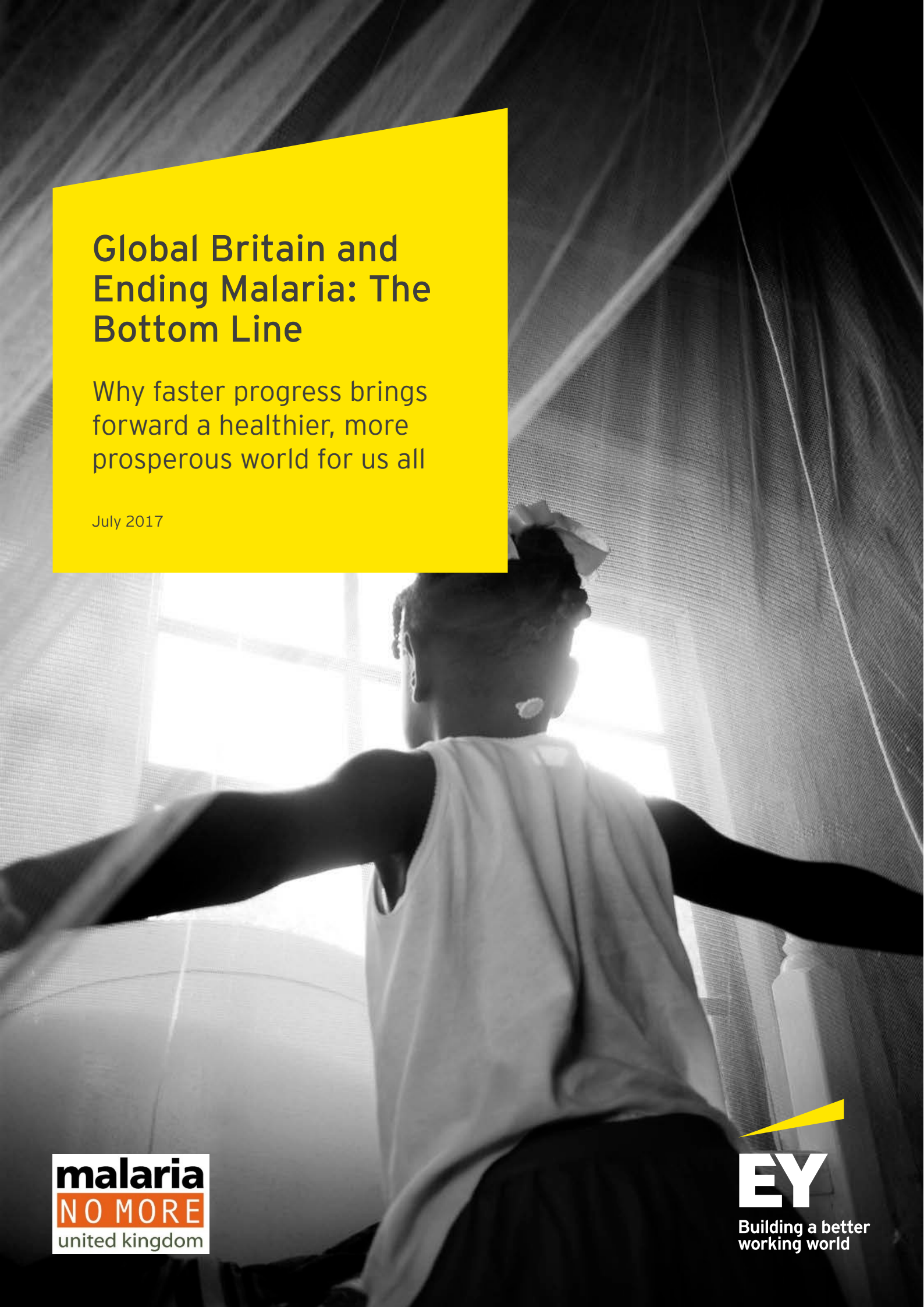


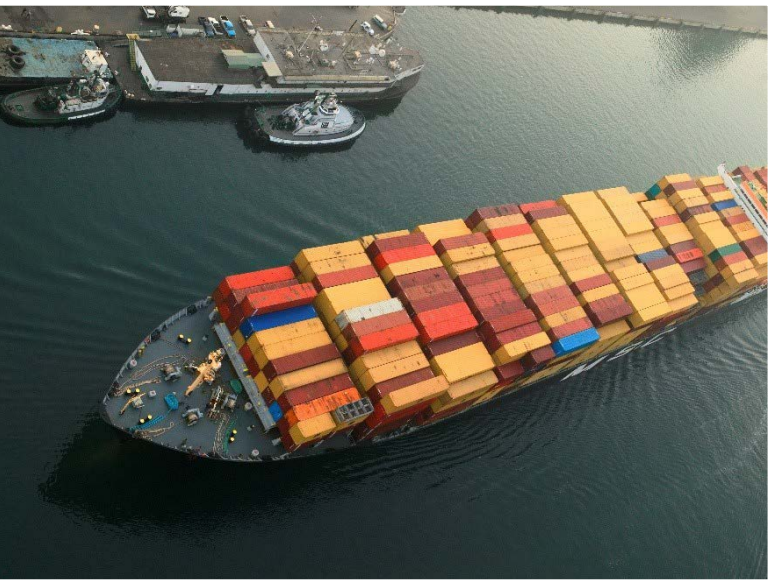
Global Britain and Ending Malaria: The Bottom Line

Why faster progress brings forward a healthier, more prosperous world for us all

July 2017

malaria NO MORE united kingdom

EY Building a better working world



Contents

Foreword

Lord Crisp KCB

Co-chair of the All-Party Parliamentary Group on Global Health

Malaria is a continuing disaster for the countries which suffer directly from the disease but it also has a very damaging impact on UK trade and the NHS. As this important report shows, however, malaria can and must be tackled and ultimately eliminated – and the UK has a leading role to play in doing so.

Health and wealth are closely linked and ill health – particularly recurrent and endemic ill health such as that caused by malaria – is one of the greatest barriers to the prosperity of individuals and nations. The 212 million cases of malaria last year led to a staggering loss of life, deprived millions of children of school days, adults of their income, and businesses of their workforce. Malaria destroys lives and livelihoods and can hold back a country's GDP by as much as 1.3% per annum. Cumulatively year on year this has a catastrophic impact on a country's economy and the lives of its whole population.

The effects on the UK are less immediately obvious and dramatic but real nonetheless. The UK needs strong trading partners and is seeking to develop and grow its exports elsewhere as it leaves the European Union. Countries affected by malaria, many of them in the Commonwealth, make up 14% of the global economy and are currently responsible for UK trade worth around £57bn a year. The potential growth of these markets is severely restricted by the effects of malaria – and the UK therefore has a great interest in working with these countries to tackle malaria and build strong and prosperous trading relationships.

Malaria is also a direct cost to the economy with the UK hosting the second highest number of imported malaria cases in developed countries: on average over 1,500 cases a year in the last decade, an entire ward a week, requiring drugs, hospitalisation and, in some cases, intensive care. Moreover, Britons make 5 million visits a year to countries affected by malaria with all the costs involved in protecting themselves and in some cases needing treatment.

The UK is a world leader in health with its research in the bio-medical and life sciences firmly underpinning industrial strategy. It has a long track record of tackling malaria from Sir Ronald Ross's Nobel Prize in 1902 to the Wellcome Trust Sanger Institute Malaria Programme focusing on using genome sequencing to open new routes to drug and vaccine development and GSK's recent development of the first malaria vaccine.

It is essential that the momentum on tackling malaria is maintained. We have seen improvements before but history has taught us that complacency and a slackening of efforts will be followed by resurgence. It has taken more than four decades to recover the ground lost since the 1970s, when anti-malaria funding dried up. It must not happen again.

The UK Government and research funders have a proud record in supporting global efforts to tackle malaria. Moreover, the Department for International Development's recent Economic Development Strategy makes the case for economic development as an essential part of spreading 'benefits and opportunities right across society.' As this report argues so convincingly tackling malaria will support the economies of some of the poorest countries in the world, benefit UK trade and demonstrate the UK's continuing role as a world leader.

It will take time, funding and determination to control, eliminate and ultimately eradicate malaria but it can be done – with the UK playing a leading role in doing so.

Global Britain and Ending Malaria:

In 2015 there were

212mn cases of malaria worldwide

429,000 deaths

7 in 10

of which were children under 5

11 of the **20** countries most affected are members of the Commonwealth

Malaria is a global challenge and one of the world's biggest killers

Between 2000 and 2015 an estimated **£524bn** was lost from global GDP as a result of malaria

6.8mn lives have been saved since 2000

However, huge progress has already been made on malaria elimination

62% reduction in malaria mortality rates since 2000

17 countries have eliminated malaria since 2000

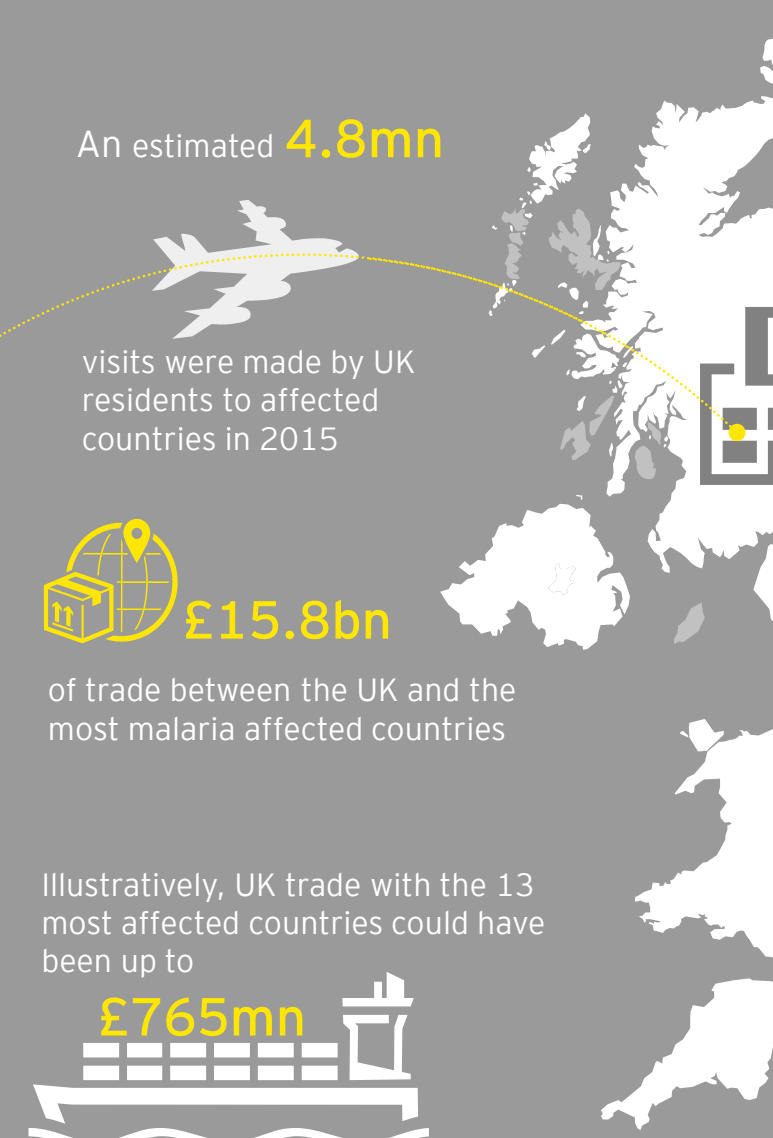
There is an ambitious global plan for malaria elimination

Reduce mortality rates and case incidence by a further **40%** by **2020** and by **90%** by **2030**

Eliminate malaria in more than **35** countries by **2030**

The Bottom Line

Malaria is a huge economic and social burden on low income countries but also developed countries, including the UK



An estimated **4.8mn**

visits were made by UK residents to affected countries in 2015

£15.8bn

of trade between the UK and the most malaria affected countries

Illustratively, UK trade with the 13 most affected countries could have been up to

£765mn

higher in 2015 but for the effects of malaria

1,547 cases of imported malaria per year in the UK

one every six hours

Equivalent to **one hospital ward** being taken up for a whole year

The cost of prevention and treatment in the UK is

£74.8mn per year

77%

of business leaders agreed that..

'Once Britain exits the European Union, it will be important to strengthen our trading links with Commonwealth countries'

70% of UK business leaders agreed that 'it is right that Britain plays its part in leading the fight to end malaria within a generation'

The UK has been at the forefront of recent success against malaria, through scientific research, funding and political leadership. This needs to continue so we can end one of history's most prolific killers for good.

Introduction

Malaria is a truly global issue. It is arguably the most deadly disease in human history, and has a huge economic and social impact on the countries where it is prevalent, as has been widely documented.

The UK has been a driving force behind recent progress in the fight against malaria, not least through the investment provided through the Department for International Development (DFID). However, there is still much work to be done to meet global goals on malaria elimination and to combat the rising threat of drug and insecticide resistance.

Malaria is both a cause and effect of poverty. It has been successfully eliminated from most of the world's richest countries, but still exacts a heavy toll on many developing countries and communities. The ongoing fight against malaria is compelling, but in an increasingly interconnected world the effects of malaria are not confined to low and middle income countries. It also has consequences for developed countries, and in particular the UK due to its cultural and historic ties to affected regions. As such there are important benefits to a global Britain from continuing to provide leadership on this issue.

This report seeks to set out the economic, social and welfare impacts of malaria on the UK. This study takes a novel approach, and rather than focusing solely on the impact of malaria on developing countries where incidence is high, it also seeks to illuminate the impact of the disease on international trade and global businesses, focusing on the UK in particular.

Research in this area has been very limited to date, and more broadly, the spill-over effects of advancement in developing countries to developed countries are rarely explored in the academic literature. Therefore, this report is intended to initiate and frame the discussion, rather than provide a complete quantitative analysis at this stage. A more comprehensive and academic study could be undertaken as a next step in progressing the debate.

In order to provide a rounded discussion of the impacts of malaria on developed countries such as the UK, this report considers five areas of impact:

- **Trade and Foreign Direct Investment (FDI)** – malaria can cause a significant drag on the growth and prosperity of countries which suffer from a high number of cases. This can lead to weaker participation in the global economy through international transactions such as trade and FDI. Countries affected by malaria can be important sources and destinations for trade in goods and services and investment capital and therefore their overall economic performance has a bearing on the performance of developed countries, including the UK;
- **Businesses** – businesses operating internationally, for example those with suppliers in countries affected by malaria, face risks. These include employee absenteeism and additional expenses related to duty of care and preventative measures, which can all result in a loss of activity and profitability to these businesses;
- **Tourism** – with the growing demand for long-haul travel, an increasing number of politically stable developing economies are looking to expand their tourism industries as a way to increase economic prosperity. Furthermore, cultural and familial links with countries such as the UK can encourage travel to countries affected by malaria. As a result the prevalence of malaria can have implications for local tourism industries as well as travellers from developing countries;
- **Healthcare costs** – although countries like the UK do not suffer from domestically generated cases of malaria, travel by UK residents to countries with malaria results in thousands of imported cases each year. These cases can lead to significant financial costs for the UK healthcare system and longer term health impacts for individuals. Furthermore, the cost of preventative measures can be significant for individuals travelling to malaria affected areas, including British servicemen and women; and
- **Research and development (R&D)** – the UK is a nation at the forefront of R&D and scientific discovery and a number of organisations in the UK are working to develop treatments and preventative measures for combating malaria. These organisations create economic value for the UK and an opportunity for the UK to export its knowledge and expertise to countries affected by malaria.

Each of these areas is complex and nuanced. As such, for each of them we have tailored the focus of our analysis to the most relevant subset of malaria affected countries. There are 90 countries that appear on the World Health Organisation's (WHO) list of countries with cases of malaria in 2015. However, a number of these countries only had very few cases. In order to ensure that the analysis in this report focused on those countries most affected by the disease, we restricted this list to those with more than 1,000 estimated cases (a list of 71 countries). We also provide greater detail and analysis on those 20 countries with the most cases of malaria in 2015. Finally, when analysing the potential to increase global GDP and UK trade with endemic countries through malaria elimination, we consider a subset of 13 countries which had over 1000 cases in 2015 and also a prevalence rate of more than 20%.

The global burden of malaria and progress towards elimination

Malaria is a mosquito-borne infectious disease caused by parasites. It is most commonly transmitted to people through mosquito bites. One of the biggest killers in human history, nearly half the world's population still lives at risk of malaria with Africa bearing the brunt of the epidemic – accounting for more than 90% of all malaria cases and deaths[1].

However, remarkable progress has been made since 2000. Mortality rates have reduced by 62% globally, 17 additional countries have eliminated malaria, and improved technology and scaling up of interventions have helped to reduce the costs of malaria treatment and prevention [1]. In 2015, the European Region reported zero indigenous cases for the first time.

This progress has been possible thanks to significantly increased funding and commitment from the global community over the last decade. Total funding for malaria interventions was estimated at US $2.9bn (£1.9bn) in 2015 with funding from malaria affected countries accounting for a third of this total and international donors financing the remainder. Nearly half of this international funding for malaria is channelled through the Global Fund, which is ranked as one of the world's most effective multilateral financing mechanisms [1,2].

The UK has played a pivotal role in driving global investment, innovation and progress against malaria, with the UK government accounting for 16% of total financing for malaria interventions second only to the US in terms of international government investment [1].

These coordinated investments have significantly increased access to effective malaria prevention, testing and treatment.

The proportion of people in Sub-Saharan Africa sleeping under an insecticide-treated net (ITN) rose from less than 2% to over 50% between 2000-2015, preventing an estimated 450mn cases. Millions more cases and deaths were averted though other interventions including indoor residual spraying, accessible diagnostics and effective treatment [1,3]. As a result of these successes the UK Government has committed to continued investment in malaria initiatives, with a yearly contribution of £500mn from 2016 until 2020.

International funding for malaria R&D is calculated separately from intervention financing, and was estimated to be worth an additional $611m (£407m) in 2014 [1]. The UK is at the forefront of pioneering research into new tools to beat malaria including the Wellcome Trust's philanthropic funding to IVCC's public private partnership, GSK's new radical cure trial for Vivax malaria, and Imperial's ground-breaking GeneDrive research.

Despite this phenomenal progress, much work still needs to be done. Millions of those most at risk from malaria still lack access to basic prevention and treatment. In 2015, countries such as Venezuela and South Sudan experienced severe outbreaks that have been exacerbated by economic and humanitarian crises. We face the threat of emerging drug and insecticide resistance, with combination drugs starting to fail in parts of South East Asia, creating a pressing global health risk. This preventable, treatable disease still caused an estimated 212 million cases and 429,000 deaths in 2015, 70% of which were children under the age of five [1].

Malaria in numbers

In 2015

212 million cases of malaria worldwide

90% of the cases were in WHO Africa region

429,000 deaths

70% of deaths were children under 5

Since 2000

Proportion of the population sleeping under ITNs in Sub-Saharan Africa increased from **2%** to **55%**

Mortality rates reduced by **62%**

17 countries have eliminated malaria

6.8 million lives saved

2016-2030 New Global Goals

International organisations are continuing to work towards the elimination of malaria, and the international community has taken a number of steps in recent years.

Building on the success in achieving the malaria related Millennium Development Goals, and acknowledging the heavy toll malaria still takes on those most at risk, the international community has set new global goals with 2020 and 2030 targets toward the vision of a malaria free world.

These plans are set out in the WHO and Roll Back Malaria's Partnership 2016-2030 malaria strategies, with targets to reduce malaria cases and deaths by a further 40% by 2020 and 90% by 2030 (compared to 2015 levels), as well as eliminating the disease in at least 35 more countries.

In order to reach the 2020 target goals, $6.4bn (£4.2bn) in malaria investment is estimated to be needed each year by 2020[4]. Although mobilising resources will be challenging, spending on malaria prevention and treatment (e.g. insecticide-treated nets (ITNs), indoor residual spraying, and effective drugs) has been shown to yield high returns, with an estimated $36 return on every dollar invested[5]. Sustained efforts to prevent the reintroduction of malaria following elimination have also been shown to yield high returns (e.g. spending on surveillance systems). Based on a study of Sri Lanka, the most recent country to be certified malaria-free, preventing malaria reintroduction could yield a return on investment of 13.3 to 1[6].

The UN has established a set of 17 Sustainable Development Goals (SDGs), which replace the Millennium Development Goals (MDGs). These goals will determine the future direction of development work over the next 15 years. The goals include 169 targets covering a broad range of sustainable development issues, from ending poverty and hunger to improving health and education, reducing inequality, improving access to sustainable energy, and combating climate change.

The new global malaria targets fit with and contribute to achieving these wider global goals, in particular those of ending poverty, quality education and gender equality.

Malaria is considered to be both a cause and consequence of poverty. Concentrated investments in malaria improves both the quality and quantity of human capital. These benefits are particularly relevant for women and children, who are disproportionately affected by the disease. Reducing malaria for these populations enables children to attend school and frees up capacity for mothers to work. This translates to higher incomes, improved education levels and higher female participation in political and labour markets.

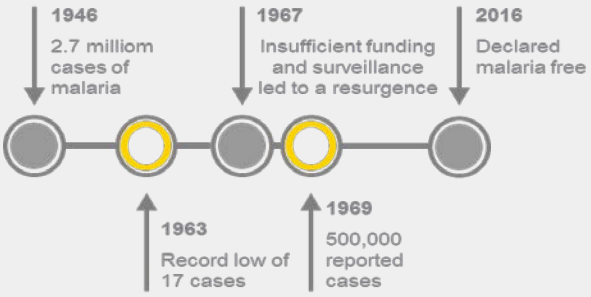
Eliminating malaria and the link to economic prosperity

The burden of malaria hinders an individual's ability to study and to work, limiting both the quantity and quality of human capital. On a macroeconomic level, this translates to lower productivity and growth, perpetuating a vicious cycle of poverty and health outcomes in high burden countries.

Research suggests that malaria has a negative impact on economic growth in the long run of between 0.25% and 1.3% of annual GDP[7,8]. These estimates translate into large differences in national income. For example, findings by Sachs and Gallup (2001), suggest that countries unaffected by malaria have on average three times the national income per capita of those affected by the disease, all else being equal.

Since 2000, Malaria has been successfully eliminated in 17 countries.

The most recent case of elimination is that of Sri Lanka, which was officially declared malaria free on 5 September 2016.



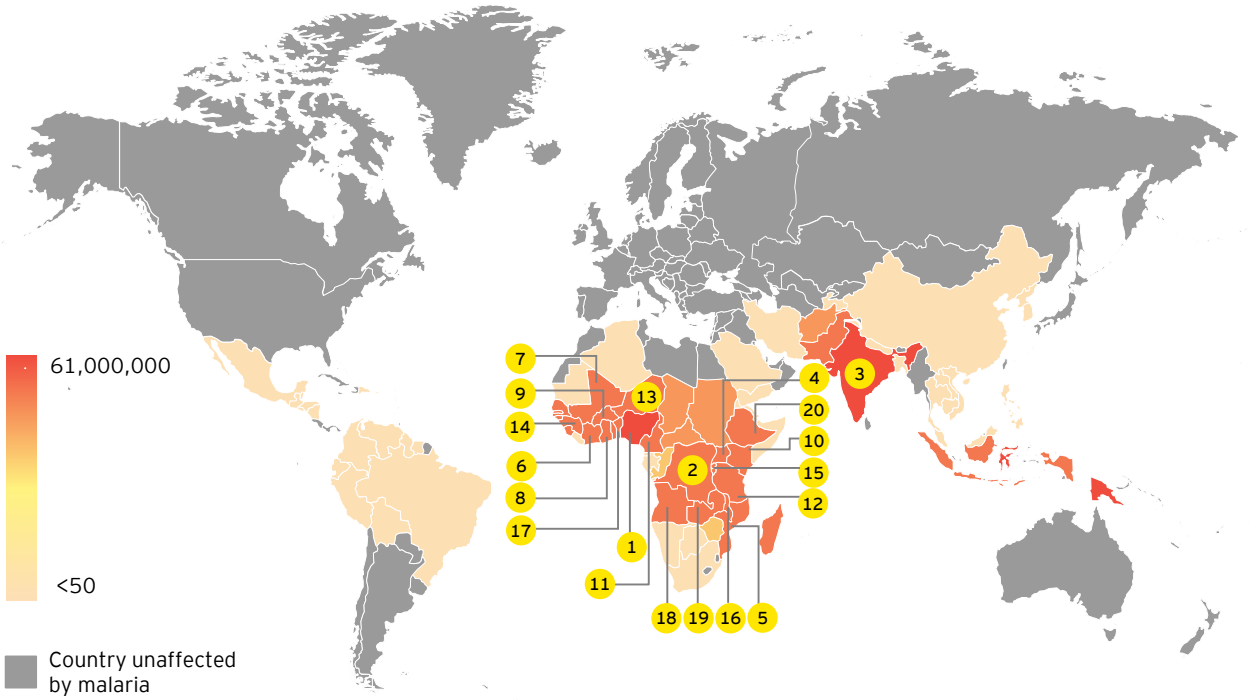
The success in Sri Lanka has been attributed to their sustained malaria elimination programme, that persisted even through 30 years of political conflict[9].

This, and other successful malaria campaigns, have been found to have positive effects at the household level:

- In Sri Lanka and Paraguay, programmes increased literacy and educational attainment for women[10];
- In the US, Brazil, Colombia and Mexico, advancements in malaria health technology led to higher labour productivity and income[11]; and
- In the Kigezi District of Uganda, a successful malaria programme increased schooling by 8%, corresponding to a 3% increase in income per year[12].

The UK's relationship with the countries most affected by malaria

Number of Estimated Cases of Malaria



	Country	Estimated number of cases (mn)	Number of fatalities ('000s)	Population (mn)
1	Nigeria	61	110	182
2	Democratic Republic of Congo	19	42	77
3	India	13	24	1,311
4	Uganda	8.5	12	39
5	Mozambique	8.3	15	28
6	Côte d'Ivoire	7.9	14	23
7	Mali	7.5	21	18
8	Ghana	7.3	13	27
9	Burkina Faso	7.0	15	18
10	Kenya	6.5	12	46
11	United Republic of Tanzania	5.3	17	53
12	Cameroon	5.3	9	23
13	Niger	5.2	10	20
14	Guinea	4.6	10	13
15	Rwanda	3.5	3	12
16	Malawi	3.3	7	17
17	Benin	3.2	6	11
18	Angola	3.1	14	25
19	Zambia	2.8	7	16
20	Ethiopia	2.8	5	99
Total		**185**	**366**	**2,059**

Sources: World Malaria Report[1], UN Comtrade[13], HMRC[14], World Bank[15]

In the context of the UK's forthcoming exit from the European Union, it will be important for a global Britain to develop stronger relationships with partners that have a high potential for sustainable economic growth, and as such for increased trade and investment. The UK already has strong ties with many of the countries affected by malaria*, with the potential to grow these further.

Political links: There are two important groupings of countries within those affected by malaria which have strong political ties with the UK:

- Commonwealth countries – a third of Commonwealth countries are affected by malaria. Due to a shared political history, these countries often have commonalities with the UK, including language and legal structure. As a result, it has been estimated that it costs British companies 20% less to do business them[16]; and
- UK Trade Mark East Africa Challenge (TRAC) Fund countries – $7mn (£4.7m) designed to challenge businesses, private sector organisations and civil society organisations from Kenya, Uganda, Tanzania, Burundi and Rwanda to develop innovative ideas to promote cross-border trade.

Economic links: Countries affected by malaria play an important role in the world economy. Their overall value of GDP was £7,079bn in 2016, equivalent to 14% of the global economy. Their share of UK total trade was 8% in the same year.

High growth nations, including Mozambique, Ghana and Tanzania, which are expected to experience a three fold increase in exports and doubling of household spending[17], also have high incidence of malaria.

11 of the 20 countries with the highest number of cases are Commonwealth members, with four of these also members of TRAC – an initiative to boost trade in East Africa.

Social links: Due to the UK's political history, it has always attracted high levels of immigration. As a result, the current population of the UK has a wealth of different cultures and nationalities. In many cases this includes familial and cultural links to countries affected by malaria.

The table below shows some key statistics for the 20 countries which have the highest number of estimated cases of malaria in the world.

GDP (£mn)**	Population in the UK	Trade Groups	Total value UK Trade (£mn)
303,750	216,268	Commonwealth	2,482
19,437	20,971		121
1,501,571	776,603	Commonwealth	10,013
17,181	65,447	Commonwealth and TRAC	64
9,362	6,368	Commonwealth	99
22,222	8,535		31
8,300	411		25
30,425	102,837	Commonwealth	513
7,636	237		8
34,149	151,073	Commonwealth and TRAC	626
28,609	38,691	Commonwealth and TRAC	147
19,909	11,009	Commonwealth	137
4,997	217		7
3,441	2,529		22
5,238	4,781	Commonwealth and TRAC	16
5,560	17,871	Commonwealth	35
5,728	678		60
67,988	15,712		1,115
17,048	30,897	Commonwealth	80
31,620	16,654		227
2,144,170	**1,487,789**	**11 Commonwealth, 4 TRAC**	**15,827**

* For purposes of this study, we define 'Countries affected by malaria' as countries with more than 1000 estimated cases in 2015; ** Based on a 2015 average period exchange rate of US$1.5 per GBP from the Bank of England

The UK's economic ties to the countries affected by malaria

Key Facts

Total value of trade between the UK and countries affected by malaria was **£57bn** in 2015

20 countries with highest number of cases account for **£15.8bn** of trade with the UK

The UK invested **£39bn** in Africa in 2015 and earnings from past investments yielded an average of £4.4bn per annum from 2012-2015

13% of UK overseas investment projects in countries affected by malaria

Malaria is a **0.25-1.3%** annual drag on an affected country's GDP

Illustratively, UK trade with 13 high prevalence countries could have been **£765mn** higher in 2015 but for the effects of malaria

In an interconnected, global world, success is often shared. Improving the GDP of malaria affected countries creates and grows markets for trade and investment for developed countries, especially where other strong historical and cultural links exist. It has been estimated that every £1mn spent on bilateral aid leads to a £220k increase in UK exports and the creation of 2.5 UK jobs[18] and conversely that a 1% slowdown of growth in emerging economies would lead to a reduction of growth in developed countries by 0.2%[19].

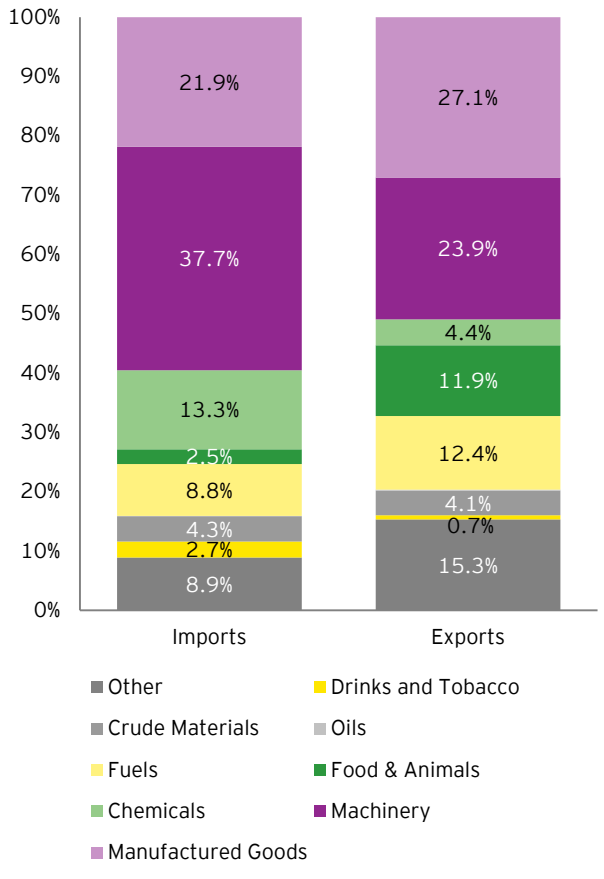
Malaria has been found to have a strong economic drag on countries with a high prevalence, reducing their growth rate by 0.25%-1.3% per year[7, 8]. One of the most important reasons for this is the cost of the disease on productivity. As highlighted by DFID's Economic Development Strategy, a critical prerequisite for growth is a healthy, educated and productive workforce for the future[20].

Given the strong links between the UK and many of the countries most affected by malaria, and the existing economic ties as set out in the rest of this section, there is a clear opportunity for the UK to increase its own opportunities for trade and investment through driving global efforts to eliminate malaria.

Trade

The total value of trade between the UK and countries affected by malaria was £57bn in 2015, and with the 20 countries with the highest incidence of malaria the value of trade was £15.8bn. The largest values of trade were with: India £10bn; Nigeria £2.5bn; Angola £1bn; Kenya £600mn; Ghana £500mn.

Proportion of total exports and imports by sector



Source: HMRC[14]

These top 20 countries currently account for just 4% (1% excluding India) of global GDP and 2.2% (0.8% excluding India) of the UK's total trade. However, this significantly under-represents the potential of these economies and their associated trade flows, which account for 28% of the world's total population.

Investment

Foreign Direct Investments (FDI) are capital flows between countries that establish control and influence over foreign businesses. These investments take many forms, including the opening of subsidiaries or new production facilities, mergers and the provision of new management or technology. As a result FDI benefits both the investor country that earns returns and the recipient, which gains the associated benefits from economic growth.

Due to the political and economic links with the UK, particularly with Commonwealth countries, the level of investment between the UK and countries affected by malaria is relatively high.

The UK invested a total of £39bn in Africa in 2015, which included key investments in the mining and quarrying industries, as well as financial services[21]. These investments reap significant annual earnings for the UK. On average, the UK generated annual earnings of £4.4bn from investments in Africa between 2012-2015. Notably, UK investments in Nigeria and India generated £1.2bn and £1.5bn in earnings respectively in 2015.

13% of all overseas investment projects made by the UK in 2015 were in countries affected by malaria.

Similarly, 8% of inward investment projects were from countries affected by malaria[22].

In particular, India was a key source of investment as well as a key destination. However, other notable countries include Kenya, Nigeria, Ethiopia and Ghana which collectively were recipients of 20 investment projects from the UK in 2015[22].

The link to UK economic success

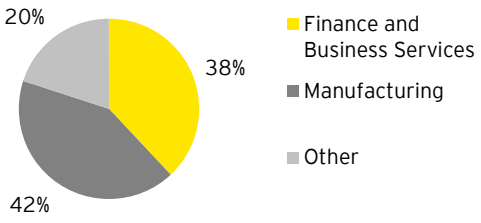
Developing countries have huge economic potential and therefore present desirable trade and investment opportunities for wealthier nations including the UK.

The GDP growth in 2015 of the top 20 countries affected by malaria was 5.2% compared to an OECD average of 2.3% and a UK growth rate of 2.2%. However, malaria exerts a drag on growth and as such limits those trade and investment opportunities.

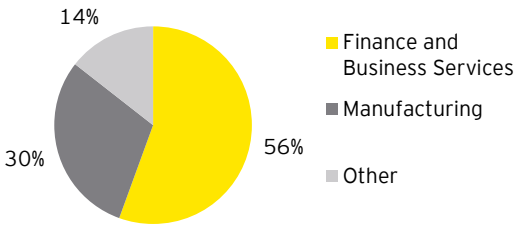
The graph below shows a broad estimate of the lost output potential as a result of malaria, using estimates from academic literature of the economic drag the disease exerts*. This shows that, between 2000 and 2015, a total of £96bn-£524bn world economic output could have been lost as a result of malaria. This is equivalent to 2015 GDP being £11bn-64bn lower than it might otherwise have been were these countries malaria free.

For illustrative purposes, assuming a constant ratio of GDP to trade with the UK, increases in GDP of these countries by £11bn-64bn could result in an additional £136mn-765mn of trade with the the UK. This is equivalent to a 4-21% increase on 2015 levels.

Split of outward investment by industry type

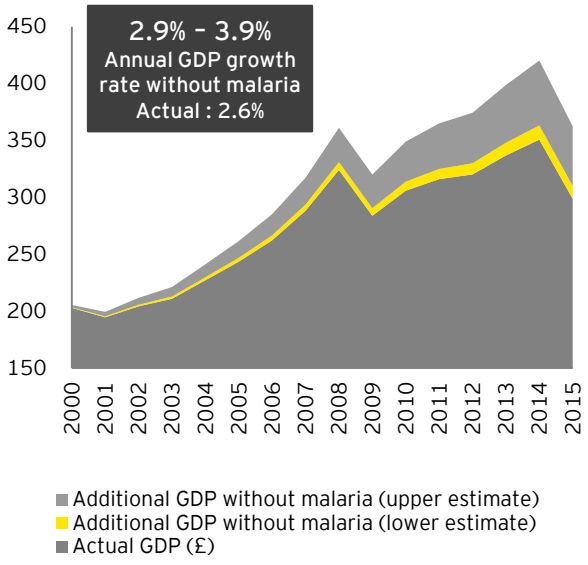


Split of inward investment by industry type



Source: EY Global Investment Monitor[22]

2000-2015 GDP (£bn), countries affected by malaria with > 20% prevalence



Source: EY Analysis, Oxford Economics, ONS

*the analysis of the GDP and trade impacts of malaria in this section are based on the range of estimates found in the economic literature (0.25%-1.3% p.a.) on the drag malaria exerts on the most affected county's GDP. The estimated impact is restricted to the 13 countries which had over 1,000 cases and >20% prevalence in 2015. This is done to avoid overestimation; **calculation purely for illustrative purposes. The relationship between trade and GDP is complex, and a more in depth analysis would be required to calculate the actual impact on UK trade of global malaria elimination

British business and malaria

To British businesses operating in endemic countries, malaria has a disruptive influence, affecting operations and reducing profits repatriated to the UK, and in turn reducing UK growth and tax receipts.

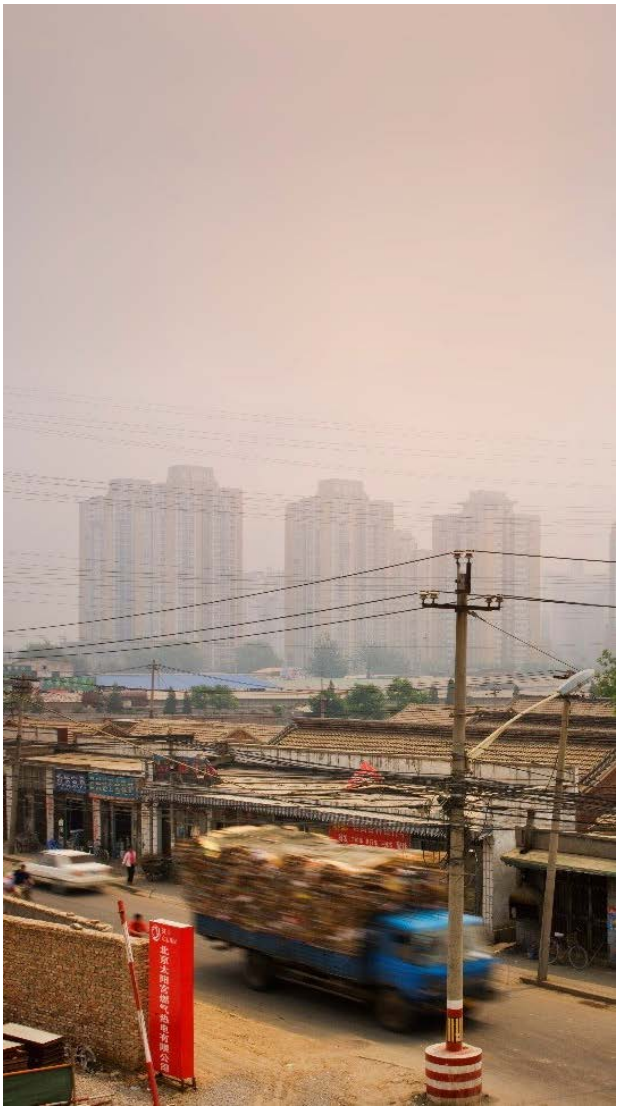
In primary sectors such as mining and agriculture, the cost of preventative clothing, equipment and medication increases operating costs, while sickness absence disrupts operations and supply chains.

In tertiary sectors such as telecommunications and IT, malaria can negatively affect demand; for example there is some evidence to suggest that disease outbreaks more generally affect demand patterns in the tourism industry compared to domestic facing industries.

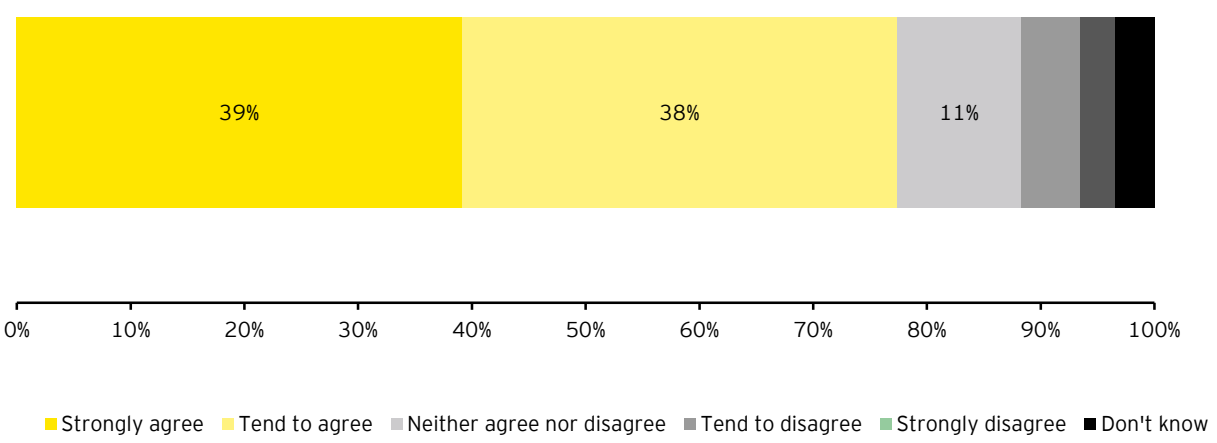
The result of a YouGov poll of business leaders from multiple sectors commissioned by Malaria No More UK[23] suggests that business leaders in general support the cause of malaria elimination, and believe that the UK's leadership role in the fight against malaria can contribute to building trade relationships to help offset any loss of trade experienced in the wake of Brexit. For example:

- 77% of respondents agreed that strengthening trading links with Commonwealth countries post-Brexit is important. As 11 of the 20 countries most affected by malaria belong to this group of countries, malaria elimination is one way the UK can do this;
- 54% agreed that British aid for malaria makes it easier to negotiate good trade deals; and
- 70% agreed that it is right that Britain plays a part in leading the fight to end malaria within a generation.

More than a quarter (26%) also stated they would like their own business to play a leading role in ending malaria.

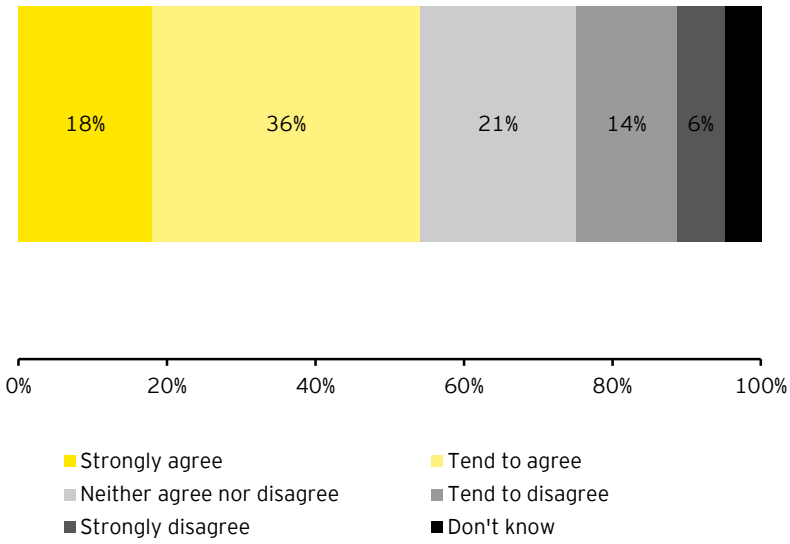


"Once Britain exits the European Union, it will be important to strengthen our trading links with Commonwealth countries"



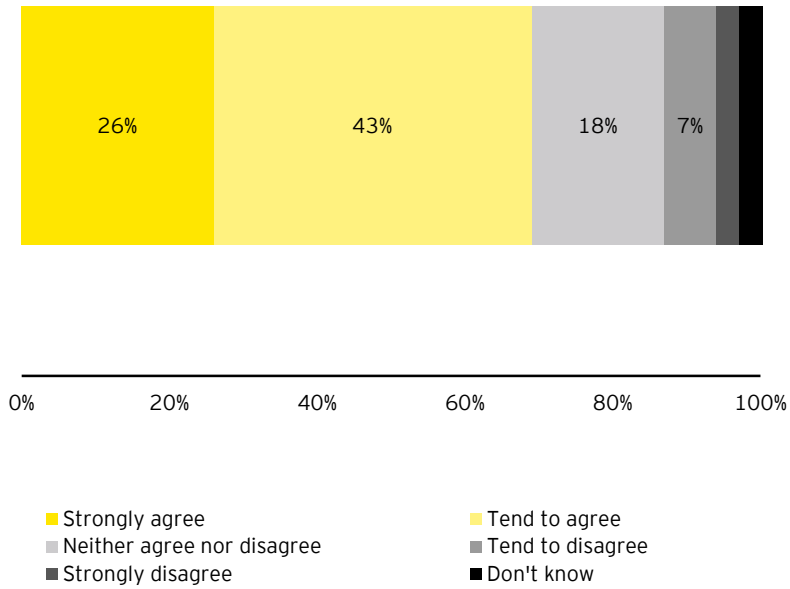
Source: YouGov [23]

"British aid spent on treating the poorest people affected by malaria builds healthier, more productive economies, better relationships with foreign leaders around the world, and makes it easier to negotiate good trade deals"



Source: YouGov [23]

"It is right that Britain plays its part in leading the fight to end malaria within a generation"



Source: YouGov [23]

The UK's travel and tourism links to malaria affected counties

Tourism can be an important driver of growth for emerging economies, supporting employment for lower skilled workers and stimulating investment in critical infrastructure. The travel and tourism industry in Africa is expected to grow by 4.9%, and currently accounts for 9% of the continent's GDP[25].

Tourism not only benefits the local economies, it also supports a large and growing travel sector back home. The UK outbound tourism industry is valued at £24.6bn with the majority of this spent on air fares and travel agencies[26]. Due to rising prices in traditional travel destinations, UK tourists are increasingly looking for more exotic locations. Travel operators and airlines are opening up new destinations to the 'mass market', such as Thailand, Costa Rica, Chile, Sri Lanka, Vietnam and the Caribbean[27].

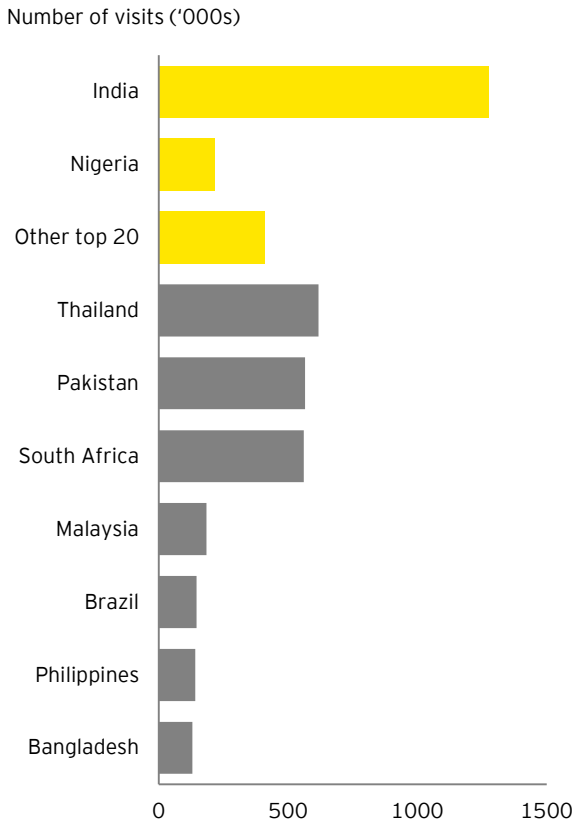
Due to the cultural and social links between the UK and many of the countries affected by malaria, a large number of UK residents make trips to malaria affected countries each year. In 2015, 4.8mn trips were made to countries affected by malaria. The main countries visited included India, South Africa, Pakistan, Nigeria and Malaysia. The main reason for visiting malaria affected countries was to visit friends and family (57% of travellers). However, a significant proportion of travellers also went for holiday and business (43%).

The World Economic Forum has identified South Africa, Namibia, Kenya, Tanzania, Rwanda and Zambia as amongst the top 10 Sub-Saharan African nations with the most tourism-ready economies, all of which are affected by malaria[25]. They highlight health as being a key challenge for growth in the sector for these countries, and make particular reference to malaria and its ability to affect labour force productivity and a country's attractiveness to tourists.

The relative stability of malaria prevalence makes it difficult to determine the drag it is having on the tourism sector in affected countries. However, empirical and anecdotal evidence from outbreaks of other diseases shows that it can lead to a contraction in tourist numbers and, as such, malaria affected countries may experience an ongoing impairment of their tourist trade. Health risks from diseases such as malaria can make operating in these countries difficult, increasing risk to customers and staff and resulting in the need for high levels of protection.

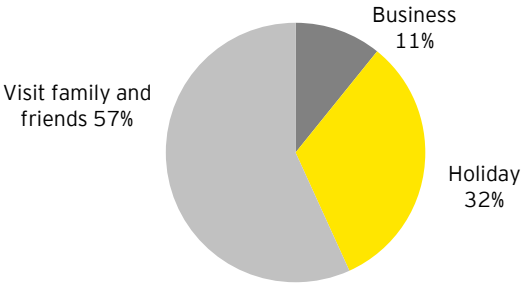
There is also a global risk posed from malaria cases imported to non-endemic countries like the UK, which impose a substantial financial and health cost. Increasing global tourism combined with the emerging threat of drug resistance mean both the number of imported cases and severity of the disease could increase over time.

Visits by UK residents to countries affected by malaria

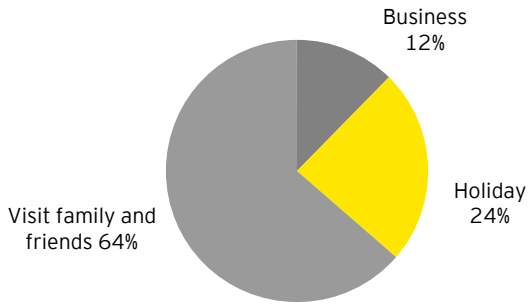


Source: ONS[24]

Reasons for UK residents to visit countries affected by malaria



Reasons for UK residents to visit the 20 countries with the most number of cases



Source: ONS[23]

"Flight Centre Travel Group is one of the world's largest travel companies with over 18,000 staff and 2,500 stores across its leisure, corporate and wholesale businesses. We have more than 80 high street stores here in the UK and worldwide Flight Centre operates in Australia, New Zealand, South Africa, Canada, the USA and more.

Globally, some 46 million more tourists (overnight visitors) travelled internationally last year compared to 2015, according to the United Nations World Tourism Organisation – the seventh year of sustained growth.
With more and more people travelling to well-known destinations, our leisure travel business has seen an increasing appetite for holidays that are off the beaten path. This, coupled with rising accommodation costs in established markets, has encouraged consumers to explore additional destinations that may have been previously overlooked.
However, demand is held back in countries with a high prevalence of malaria when compared to other similar locations. Less adventurous individuals making enquiries about travel to countries where malaria is a risk are often concerned even by the need to take anti-malaria medication. For example, a recent resurgence of malaria along India's South Goan coast has led to health warnings being issued and is likely to affect the local tourism industry.
This is in keeping with how the demand we see for non-essential travel is affected by health concerns more broadly. When there has been a media spotlight on disease outbreaks such as Ebola or Avian Flu, we have, unsurprisingly, seen travellers self-select away from affected countries when a similar experience is available elsewhere. Of course, travel to these destinations has recovered when the perceived risk has passed.

For business travel, issues of security and duty of care to staff play an important role in whether this travel takes place. Furthermore, the impact that malaria has on a country's economy holds back foreign investment as the non-discriminatory nature of the disease means that foreign investors as well as tourists are likely to favour countries where malaria is not present.

By contrast, countries that can effectively eliminate malaria can see positive gains from the travel and tourism industries. In countries such as Greece, Spain and Jamaica the rapid development of their tourism industries was only possible because of malaria elimination. Over the last few years we've seen increases in demand for travel to countries such as Sri Lanka and Mauritius, which have also been able to eliminate malaria. Any destination that invests in achieving the same goal - at a time when established destinations are nearing capacity - has an opportunity to benefit from this continued sustained growth in tourism.

Moreover, destinations that are as yet untouched by tourism are extremely enticing and have the potential to eclipse over-developed tourist hotspots. If malaria elimination can be coupled with sensitive development, this would attract our socially conscious travellers who are increasingly concerned with sustainable tourism criteria and willing to pay more for an authentic, less impactful experience."

Chris Galanty, Managing Director, Europe and Africa, Flight Centre Travel Group

"Malaria is one of a number of health risk factors that travel operators and tourists have to manage when visiting tropical countries. However, the active anti-malaria programmes that countries like India, Thailand, Viet Nam and Botswana have in place means that malaria does not need to be a major concern for most travellers, and when we are asked about malaria it is usually along the lines of 'is this an area where I need malaria prevention?' which shows that most people who enquire about this kind of trip have already taken the risk into account.

However, the rise of drug-resistant strains of malaria poses a very real health risk and threatens tourism industries of countries like Thailand. A resurgence of drug-resistant malaria there could be devastating for the industry and the local economy as tourism is one of its largest export earners."

Michael Wright, Founder and Director, Riviera Travel

The healthcare burden of malaria prevention and treatment in the UK

Key Facts

890,000 visits to regions of Africa most affected by malaria with an average trip length of four weeks

Average of **1547** reported cases of malaria imported to the UK per year

On average **5.8** deaths per year

Average age of infected person is **39** years old

75% of cases require admission

8% of admissions require intensive care

Average length of stay is 10 days meaning **36** hospital beds occupied through the year – more than a ward

Annual total cost to the NHS, self-payers and MoD of **£74.8mn**

The healthcare impact of malaria is usually thought of as a problem for developing countries alone. However, imported malaria has a tangible effect on healthcare resources in developed countries too, in terms of both prevention for outbound travellers and treatment of imported cases. This is particularly an issue for the UK, which after only France, has the second highest number of imported cases per year in developed countries: an average of 1547 reported cases per year from 2006-2015[28].

These costs impact directly upon NHS and military health budgets, as well as individuals in the form of out-of-pocket expenses, and the wider economy in the form of lost productivity. There is also a social cost in terms of harm and loss of life with an average of 5.8 deaths per year in the UK[28].

Using the conceptual model overleaf, we have estimated these costs and, as such, the potential annual benefit to the UK of malaria elimination in terms of reduced healthcare costs.

GPs in England, Scotland, Wales and Northern Ireland wrote 400k prescriptions for malaria drugs in 2016[29] at a total cost (shared between individual and NHS depending on circumstances) of £12.3mn. These prescriptions would have required a GP visit, with an estimated cost per appointment of £68, creating an additional cost of £27.6mn.

Approximately 890k trips per year were made to the most affected parts of Africa in 2015, with an average duration of four weeks[30]. Assuming 0.5 cans of mosquito repellent were used per week, the out-of-pocket cost to UK residents would have been £16.2mn[31].

75% of UK imported malaria cases are for the malaria type falciparum and usually require hospital admission[28]. This means an average of 1,190 admissions per year for malaria to UK hospitals with an average cost of £4,731 per admission[32].

These admissions have an average length of stay of 10 days[32], meaning that c. 36 NHS beds were used throughout the year by people with malaria – more than a ward – whilst 8% of admissions for imported malaria are so serious they require intensive care with an average length of stay on ICU of 4.5 days[33] at an additional average cost of £1,551 per day[32]. All malaria cases will require some form of ambulatory or primary care appointments, placing an additional burden on the health system. In total, we have estimated the cost of treatment for malaria cases imported to the UK at £7.6mn per year.

The symptoms of malaria include a high temperature (fever), sweats and chills, headaches, vomiting, muscle pains, and diarrhoea and most cases require hospitalisation. This means that individuals with malaria often miss work. Assuming 20 days per case, at a living wage of £8.45 per hour and an eight hour work day[34], we have estimated the impact of lost domestic productivity on the UK economy at £2.1mn.

Malaria also has a health cost burden on the armed forces for troops stationed in or travelling to affected regions. Responding to a freedom of information request, the Ministry of Defence (MoD) informed us that for the 12 months to 1 April 2017 it spent £1.3mn on anti-malaria drugs. The MoD also informed us that in the 6 months to 1 April 2017 there were 12 armed forces personnel with confirmed cases of malaria.

On average 5.8 people in the UK die of malaria per year[28]. With an average age of 39 years and an average life expectancy in the UK at 83 years[35], each death represents a loss of 44 years of life. Attributing a notional cost of £30k per life year lost[36], we estimate a further societal burden of £7.7mn.

As such we estimate a total healthcare burden of £74.8mn for the UK for malaria treatment and prevention each year.

Malaria's healthcare burden in the UK includes the direct expense of prevention for outbound travellers and of treating imported cases, and an indirect burden in terms of lost economic activity and loss of life

Cost Type	Cost Driver	Cost Bearer	Value
Direct healthcare costs	Prevention and treatment	NHS, out of pocket & MoD	Prevention = £57.4mn Treatment = £7.6mn
Indicators	**Prevention:** ▸ Drugs purchased per visit ▸ GP appointments prior to visit ▸ Other (e.g. mosquito spray)	**Treatment:** ▸ Primary and ambulatory care ▸ Drugs tests ▸ Admissions ▸ Intensive care	
Economic impact	Lost work days	Individual or employer	Economic loss = £2.1mn
Indicators	Lost salary and economic contribution due to inability to work		
Social impact	Loss of life	Individual and society	Loss of life = £7.7mn
Indicators	The monetised value of lost life years on a QALY basis. Note that this could also be thought of as the lost formal and informal economic contributions		

Total Cost = £74.8mn per year

There is a significant human cost to imported cases of malaria. Jo Yirrell lost her son to malaria after he returned from volunteering in Ghana; she now acts as a special ambassador to Malaria No More.

Despite the risk from imported malaria generally being considered low, recent modelling by Public Health England has predicted the possibility of more localised infections in the UK as early as 2030 as climate change brings warmer summers and more rainfall. Combined with the rise of drug and insecticide resistance, this underlines the importance of robust surveillance systems, and concerted global efforts to eliminate malaria.

"Nothing can ever change my feelings of grief after losing my son Harry. He volunteered in a village school in Ghana and came home having unknowingly contracted a deadly strain of malaria. He seemed fine at first, but within a matter of days he had needlessly lost his life to this preventable disease"

Jo Yirrell, Special Ambassador to Malaria No More

Note: The analysis above represents a best estimate of the disease burden based on available information. However, it relies on a number of important assumptions:

- The number of cases, especially mild cases, is often under-reported;
- There are known instances of imported malaria resulting in severe disability, which would could have a similar economic cost to fatality. These are not accounted for in the current analysis;
- GP prescription data excludes private prescriptions and therefore likely underestimates true expenditure;
- Demand for anti-mosquito spray is limited to travel to a subset of countries where malaria is most prevalent;
- Only falciparum cases require hospital admission. However, other strains of malaria sometimes require admission and some centres are willing to treat mild falciparum cases;
- Average length of stay and cost per case is based on the NHS code (HRGs) under which malaria is classified. However there is significant variation within this cohort of patients; and
- There is little data on absenteeism, a 20 days per case estimate is used as an indicative value.

How the pursuit of malaria elimination supports UK life sciences, research and development

Continued innovation and research is vital to progressing the fight against malaria, particularly given the dual imperatives of the growing threat of drug and insecticide resistance and innovation needed to end the disease for good. As a result, engaging the life sciences sector in the malaria agenda is crucial.

From an economic perspective, life sciences is a key sector for the UK as it:

- Hosts c. 5000 companies with c. £51bn combined turnover and employs c. 170k people with a large proportion of roles for highly educated staff[37]; and
- Accounts for £59.2bn of trade, £29.7bn imports and £29.5bn of exports; 44% to the EU[38].

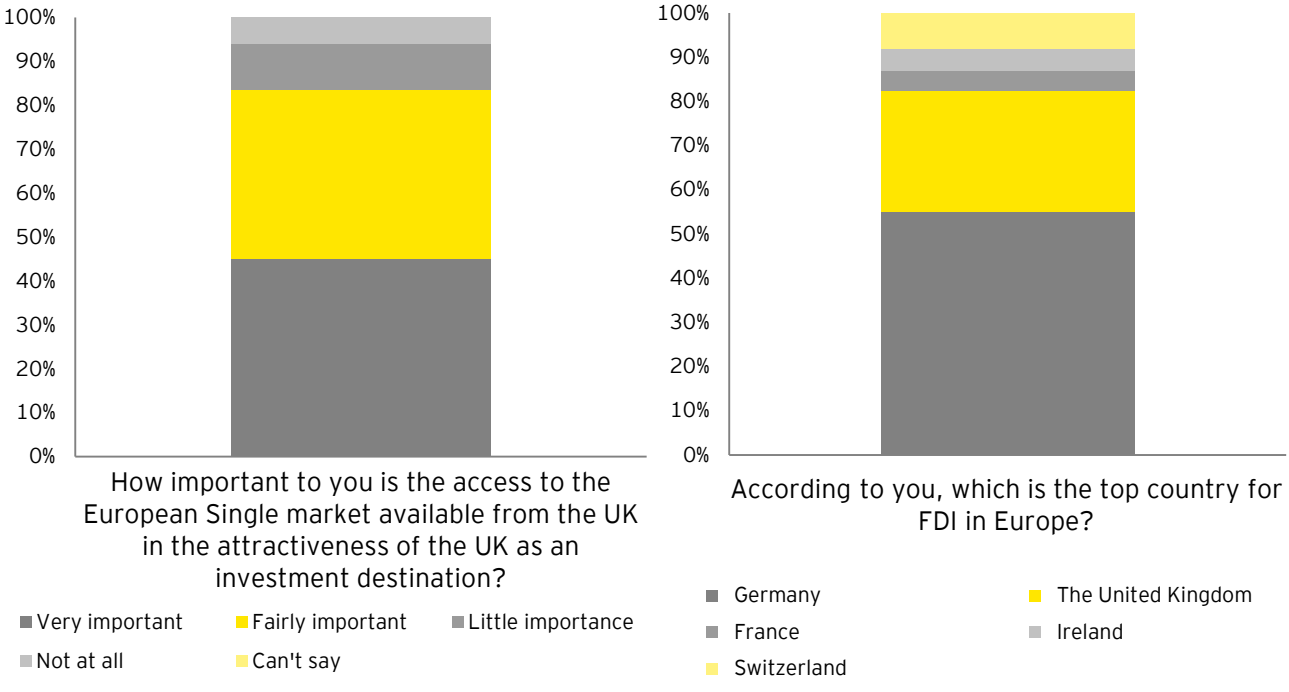
It is also one of the industries most likely to be impacted negatively by Brexit. The UK will lose the European Medicines Agency (EMA) and potentially access to the Single Market, both of which are highly valued by the industry. There is a highly competitive landscape for FDI, with Germany, Switzerland, France and Ireland also being viewed as attractive destinations for investors in life sciences. If the UK is to continue growth in this sector following (a potentially 'hard') Brexit, it must build and exploit sources of competitive advantage beyond the Single Market.

The UK's historic leadership in malaria R&D has had a positive impact on the broader UK life sciences sector, and a continued focus on malaria can contribute to reinforcing the UK's attractiveness:

- As of 2014 GSK, the UK's largest life sciences company, had invested $350mn developing the world's first malaria vaccine, which has been recommended for pilot implementation, and £71M spent in 2016 on the development of a single dose radical cure for a latent form of malaria. GSK also has a public private partnership phase III new malaria treatment trial underway;
- Malaria research also attracts large scale funding from philanthropists. The Gates Foundation and Wellcome Trust contributed $143mn and $21mn respectively in 2014 of a £556mn global total[39]. The UK's leadership role in malaria elimination in general means this funding is more likely to support UK based R&D efforts; and
- UK academics and scientists are also prominent in the world of malaria and infectious diseases more generally. 6 of the top 10 most cited researchers on malaria are UK based[40], and the UK is home to world renowned malaria research centres including London, Liverpool, Oxford and Cambridge with strong international links. This reputation generally enhances the prestige and profile of the UK life sciences and academic sectors.

By continuing to take a leading role in R&D investment in malaria the UK can positively impact its life sciences sector as well as the sciences and academia more broadly. In addition to this UK benefit, it is vital in the effort towards elimination and managing emerging risks such as drug resistance.

The attractiveness of the UK for life sciences companies*



Source: EY UK attractiveness survey 2016[42]

*Responses to EY's UK attractiveness survey 2016 from 38 pharmaceutical and chemical industry companies

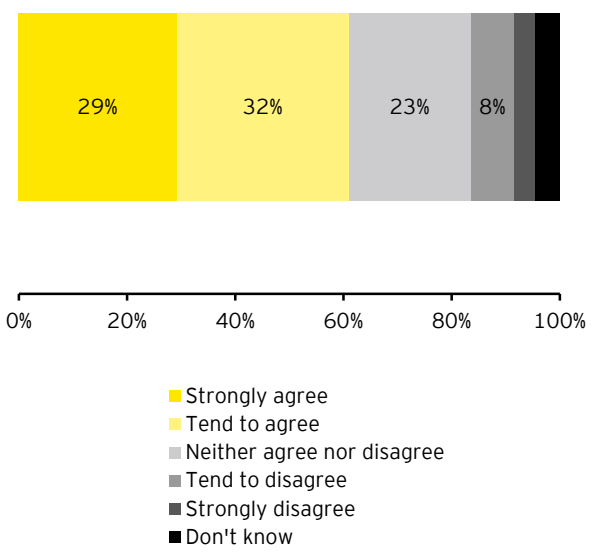
"The UK Government's support is a key enabler of the contribution the life sciences industry makes towards malaria elimination.

An important example is support for Product Development Partnerships (PDPs), which enable companies such as GSK to invest more in R&D for diseases of poverty such as malaria because the costs and risks are shared. These partnerships include the Medicines for Malaria Venture (MMV), with whom we are developing tafenoquine – an important investigational medicine for relapse prevention of P vivax malaria.

The UK's support for the Global Fund and GAVI (the vaccine alliance) also provides us with the confidence that if we invest in R&D for malaria treatments and vaccines, then any products which are successfully developed are more likely to reach the people who need them."

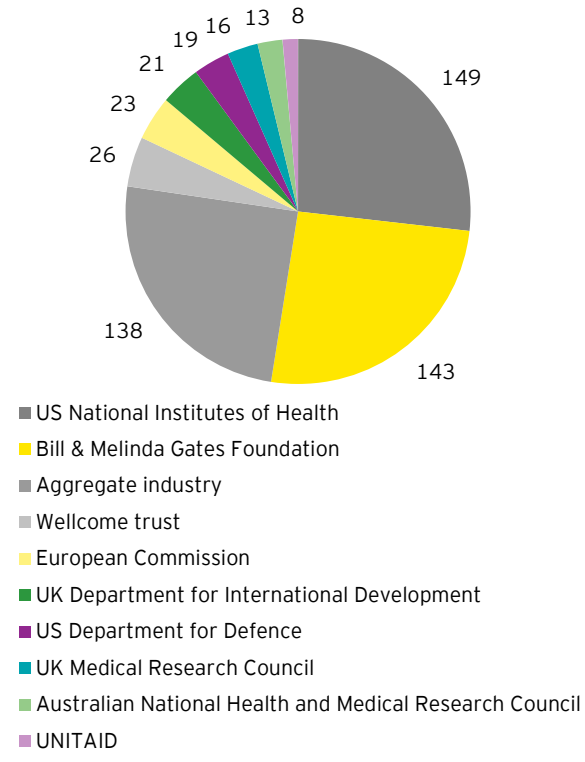
Jon Pender, GSK

"Once Britain exits the European Union, it should be at the cutting edge of science and innovation to eradicate disease"



Source: YouGov[23]

Malaria research funding by donor 2014 (USD)



Source: G-FINDER report 2015[39]

Conclusion

Since 2000 phenomenal progress has been made in dramatically reducing the global burden of malaria. British political commitment, financial investment, scientific ingenuity and public support have been critical factors across successive governments in bringing the end of malaria within sight.

Maintaining a focus on this ambitious goal will help reduce poverty experienced by the world's poorest people, and unleash untapped economic potential in malaria affected countries. A healthy, educated population is a precondition for economic development and growth.

The UK has strong economic, political and cultural links with many of the countries most affected by malaria, not least through membership of the Commonwealth. The nation's exit from the European Union provides an important opportunity for the UK to review and strengthen its global relationships, including with developing countries. By supporting malaria elimination, the UK can improve the economic performance of these nations, increasing its own scope for trade and investment.

Our businesses operating abroad would benefit too, in terms of reduced disruption to their operations and supply chains, while the UK life sciences sector would benefit from the UK continuing to take a prominent role in malaria elimination.

Though not endemic to the UK, malaria has a direct health cost to the NHS and to UK citizens. Alongside France, the UK has the highest number of imported cases of malaria per year and global elimination would reduce this in terms of NHS capacity, financial and economic costs, and loss of life.

The UK Government has an enviable reputation as a global champion in the campaign to end malaria for good.

There are three things that the nation can do in the years to 2020 to drive faster progress towards a healthier, more prosperous world for us all:

1. Maintain its aid commitments to the poorest people, especially through its smart investments in malaria control and elimination, as a hallmark of an outward facing global Britain;
2. Use its convening power and voice on the international stage to secure financial and political action from other regional and global leaders, for example through its role hosting the Commonwealth Summit 2018; and
3. Continue to cultivate a world-leading academic and scientific environment in which new, more effective and cheaper tools against malaria can be developed.

Next steps

This document is one of the first to attempt to understand the direct impact of malaria – often seen as an issue for developing countries alone – on the UK and by extension other developed countries. This is incredibly relevant in an increasingly global, connected world. We hope this is just the start of the debate.

Our intention is to continue to expand this evidence base to shine further light on the global burden of malaria and the benefits of eliminating it for good.

Appendices

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Appendix B: List of countries affected by malaria

The below provides a full list of the 71 countries affected by malaria referenced throughout this report. In this report, 'affected by malaria' relates to those countries that had more than 1,000 cases of malaria in 2015.

	Country	Number of estimated cases in 2015 ('000s)
1	Nigeria*	61,000
2	Democratic Republic of the Congo	19,000
3	India	13,000
4	Uganda*	8,500
5	Mozambique*	8,300
6	Côte d'Ivoire	7,900
7	Mali*	7,500
8	Ghana*	7,300
9	Burkina Faso*	7,000
10	Kenya	6,500
11	Cameroon*	5,300
12	United Republic of Tanzania	5,300
13	Niger*	5,200
14	Guinea*	4,600
15	Rwanda*	3,500
16	Malawi	3,300
17	Benin*	3,200
18	Angola	3,100
19	Ethiopia	2,800
20	Zambia	2,800
21	Togo	2,500
22	Madagascar	2,400
23	Sierra Leone	2,000
24	Chad	1,900
25	South Sudan	1,900
26	Burundi	1,400
27	Central African Republic	1,400
28	Senegal	1,400
29	Sudan	1,400
30	Indonesia	1,300
31	Liberia	1,100
32	Pakistan	1,000
33	Zimbabwe	960
34	Papua New Guinea	900
35	Congo	800
36	Somalia	700
37	Gambia	420
38	Gabon	400
39	Afghanistan	390
40	Yemen	310
41	Mauritania	260
42	Myanmar	240
43	Venezuela (Bolivarian Republic of)	230
44	Equatorial Guinea	180
45	Brazil	180
46	Guinea-Bissau	160
47	Peru	150
48	Cambodia	120
49	Lao People's Democratic Republic	88
50	Colombia	79
51	Haiti	69
52	Eritrea	65
53	Thailand	52
54	Solomon Islands	39
55	Nepal	24
56	Namibia	22
57	Guyana	20
58	Philippines	13
59	Viet Nam	13
60	South Africa	12
61	Guatemala	11
62	Bolivia (Plurinational State of)	10
63	Bangladesh	8
64	Democratic People's Republic of Korea	8
65	Honduras	7
66	Djibouti	6
67	Nicaragua	5
68	São Tomé and Principe	3
69	Comoros	3
70	Malaysia	2
71	Republic of Korea	1

Top 20 countries most affected by malaria.

* 13 countries with over 20% prevalence, and over 1000 cases

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