



Public Health
England

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Human Animal Infections and Risk Surveillance (HAIRS) group

Qualitative assessment of the risk that Zika virus presents to the UK population

Version	5
Date	September 2017

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About the Human Animal Infections and Risk Surveillance group

This document was prepared by Public Health England (PHE) on behalf of the joint Human Animal Infections and Risk Surveillance (HAIRS) group.

This cross-government group is chaired by the PHE Emerging and Zoonotic Infections section. The HAIRS group acts as a forum to identify and discuss infections with potential for interspecies transfer (particularly zoonotic infections).

Members include representatives from PHE, Department for the Environment, Food and Rural Affairs (Defra), Department of Health (DH), Animal and Plant Health Agency, Food Standards Agency, Public Health Wales, Welsh Government, Health Protection Scotland, Scottish Government, Public Health Agency of Northern Ireland and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland.



Qualitative risk assessment for Zika virus in the UK population

Date of this assessment	13 September 2017
Version	5
Reason for update	Revision of country risk classifications and further detection of <i>Aedes</i> mosquitoes in the UK
Completed by	HAIRS scientific secretariat and members
Date of previous risk assessment	20 February 2017
Date of initial risk assessment	16 February 2016

Information on the risk assessment processes used by the HAIRS group can be found at <https://www.gov.uk/government/publications/hairs-risk-assessment-process>

SUMMARY OF RISK ASSESSMENT FOR ZIKA VIRUS IN THE UK POPULATION

Note: This risk assessment was completed to assess the current risk that Zika virus presents to the UK population

Overview

Zika virus (ZIKV) was first isolated from a sentinel rhesus monkey in Uganda in 1947 and has circulated in many countries since then, although its detailed global epidemiology remains unclear. Outbreaks outside of Africa and Asia have been reported in parts of the Pacific region in 2007 and 2013. Cases occurred on Easter Island in February 2014, and in May 2015, the first locally acquired cases of ZIKV were confirmed in Brazil. Since then, the geographical range of Zika virus has expanded to many countries in North, South and Central America, the Caribbean, Oceania (Melanesia, Micronesia and Polynesia), Asia and Africa.

ZIKV generally causes a mild infection. The **Brazilian ministry of health** initially proposed a link between ZIKV infection and an unusual increase in microcephaly in November 2015. Based on a systematic review of the literature up to 30 May 2016, **WHO concluded** that Zika virus infection during pregnancy is a cause of congenital brain abnormalities, including microcephaly (also referred to as congenital Zika virus syndrome) and that Zika virus is a trigger of GBS.

In the UK, the **vast majority of diagnosed cases** are in travellers returning from areas with high or moderate risk of Zika virus transmission. Sexual transmission of infection is rarely reported. As the UK lacks established populations of invasive *Aedes* spp., no cases of Zika virus infection as a result of vector borne transmission have been reported.

The risk to the UK population is predominantly related to travel to areas with high or moderate risk of Zika transmission; most of these are currently in South and Central America and the Caribbean. There is good evidence that the intensity of transmission has now decreased in most affected countries in the Americas, compared to the situation at the peak of the outbreak in 2016. While some cases will continue to be reported, the risk of infection for UK travellers has therefore reduced considerably in most of these countries.

Assessment of the risk of infection in the UK	Probability	Current situation: Very Low
	Impact	Current situation: Very Low
Level of confidence in assessment of risk	High	
Action(s)/ Recommendation(s):	<ul style="list-style-type: none"> - Although it has been determined that Zika virus currently presents a very low risk to the UK population, the extent of the epidemic has reinforced the need for a UK-wide contingency plan for the management of human and animals cases of exotic vector borne disease. The development of a coordinated response is ongoing. It includes early detection and control of invasive mosquitoes, along with ensuring all available controls are obtainable for use. - For UK residents travelling to areas with high or moderate risk of Zika virus transmission, the HAIRS group supports the advice already provided by the respective health and travel authorities: Public Health England, Public Health Wales, Health Protection Scotland, Public Health Agency of Northern Ireland, National Travel Health Network and Centre, and TRAVAX/Fit for Travel. - New evidence should continue be monitored and reviewed closely, particularly developments in Northern Europe 	

Assessing the risk to the UK population from new and emerging infections

Step One: Assessment of the probability of infection in UK population

The likelihood of an infectious threat causing infection in the UK human population. Where a new agent is identified there may be insufficient information to carry out a risk assessment and this should be clearly documented.

QUESTION	OUTCOME	QUALITY OF EVIDENCE
i) Is this a recognised human disease?	Yes	Good
<p>Zika is a mosquito-borne infection caused by Zika virus, a member of the genus flavivirus and family Flaviviridae (1, 2). There are two main lineages, the African and the Asian lineage (3-5). ZIKV is transmitted by <i>Aedes</i> mosquitoes, principally <i>Aedes aegypti</i>. Although the incubation period has not yet been defined clearly, it appears to range from three to 12 days. Infection is reported to be asymptomatic in many cases (60-80%) and generally mild and self-limiting, lasting two to seven days. Symptoms of ZIKV infection are similar to but usually milder than dengue or chikungunya virus infections and may include rash, itching/pruritus, fever, headache, joint and muscle pain, conjunctivitis, lower back pain and pain behind the eyes (6-8). Severe disease requiring hospitalisation is uncommon. Deaths associated with ZIKV are very rarely reported and mostly associated with underlying conditions (7, 9).</p> <p>Serious complications and deaths from ZIKV are not common. However, based on a systematic review of the literature up to 30 May 2016, WHO concluded (10) that ZIKV is a cause of microcephaly and other congenital anomalies (also referred to as congenital Zika virus syndrome (11)), and Guillain-Barré syndrome. An array of other neurological presentations and complications have also been reported (12).</p> <p>Acute infection with ZIKV can be confirmed by RT-PCR. Serological cross-reaction with related flaviviruses (eg dengue) means that such tests are problematic. No specific anti-viral treatment or vaccine is available.</p> <p>In 2007, an epidemic occurred in Micronesia (Yap Islands in the Pacific Ocean), causing 5,000 infections (6). Outbreaks were notified in several islands of the Pacific region in 2013 and 2014 with 8,750 suspected cases in French Polynesia (13) and further spread to New Caledonia, the Cook Islands and later Easter Island (Chile) (14, 15). Cases of ZIKV infection were reported in Brazil from February 2015 onwards and autochthonous transmission was confirmed in May 2015. Intense transmission in many countries and territories in south and central America and the Caribbean followed (WHO epidemiological information). The circulating virus strain is of the Asian lineage.</p> <p>In most countries the intensity of transmission has decreased in 2017 (PAHO latest epidemiological information). Localised</p>		

outbreaks of ZIKV transmission were also reported in **Florida and Texas in 2016**, but only one likely local transmission to date in 2017 (**US CDC latest epidemiological information**).

ii) Is this disease endemic in the UK?	No	Good
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No, Zika is not endemic in the UK. The **vast majority of UK diagnosed cases** are in travellers returning from areas with high or moderate risk of Zika virus transmission. Sexual transmission of infection is very rarely reported. As the UK lacks established populations of *Aedes* spp., competent for transmission of Zika virus, no cases of infection as a result of vector borne transmission have been reported.

iii) Are there routes of introduction into the UK?	Yes	Good
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Introduction could occur via imported infected mosquitoes or viraemic individuals. However, significant onward transmission of ZIKV in the UK is contingent on the presence of competent mosquito vectors. While there are native populations of *Aedes* spp in the UK, these are not competent for Zika virus transmission. No established populations of invasive *Aedes* spp. are present in the UK.

Since 2015, an increase in travel-associated cases of ZIKV infection diagnosed in the UK occurred in response to ongoing international outbreaks. However, in 2017 there is evidence to suggest that transmission has declined, particularly in the Americas (16), and as a result of this, travel-associated cases have also declined (17). In addition, sexual transmission of ZIKV infection has also occurred in the UK but is very rarely reported (**a single case to date**).

There is no evidence to suggest that ZIKV would infect animals in the UK. Although other species cannot be ruled out, non-human primates are the only known reservoir for ZIKV.

The main vector responsible for transmission of ZIKV is *Aedes aegypti*, which, in Europe, is only present around the Black Sea coast in Russia and Georgia as well as the island of Madeira (**see ECDC mosquito maps**). *Aedes albopictus* may also have a role as vector for ZIKV. This species has been imported into some areas of Europe via used tyres and wetfooted plants, and colonised new areas via main highway routes, having moved across regions in vehicles. *Ae. albopictus* has been reported in Paris for two consecutive years, and is expected to become established in further areas of northern France in the next few years (18).

Active surveillance programmes are run by PHE entomologists in collaboration with Port Health authorities (19, 20). To date, there have been no reports of either *Aedes aegypti* or *Ae. albopictus* being established in the UK. However, sporadic introductions have recently been detected. The first detection of *Ae. albopictus* eggs was made in 2016 in Kent (21) and an unusual finding of a male *Ae. aegypti* in Merseyside was reported in early 2017 (22). Both findings were followed up, and so far in

both cases, no further mosquitoes were found. In late July 2017, eggs and larvae of *Ae. albopictus* were found in a second location in Kent. (23)

The main route of transmission of ZIKV is through a mosquito vector, and person-to-person transmission has not been widely reported. However, mother-to-child transmission can occur, most probably transplacentally or during delivery in a viraemic mother (24). The virus has been shown to persist in semen for prolonged periods (25, 26) and has also been found in the female genital tract (27-30). Sexual transmission of ZIKV has been reported, mostly male-to-female but with some reports of male-to-male and female-to-male transmission. The risk of sexual transmission of Zika virus is considered to be low.

During the 2013 ZIKV outbreak in French Polynesia, 3% of blood donations were found to contain ZIKV by PCR (31) and thus transmission would be expected to occur via this route. A small number of cases of transfusion transmission have subsequently been reported outside Europe (32, 33).

iv) Are there effective control measures in place to mitigate against these?	No/Yes	Good
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Should the vector be found in the UK, a combination of source reduction to reduce aquatic habitat and control (adulticides and larvicides) would need to be implemented in order to reduce or eradicate the population. K-Othrine deltamethrin adulticide is licenced for use in the UK.

A UK-wide contingency plan for invasive mosquito control is being developed. In the event of established competent mosquitoes, there may also be a requirement for case finding and local mosquito control in the vicinity of imported human cases of Zika (and other VBDs).

In the UK since mid 2015, there has been a deferral of blood donors for four weeks for those who have visited countries under the tropical virus deferral guidelines, and for six months under current malaria deferral guidelines if the affected area also has a malaria risk. The tropical deferral guidelines also now specifically include countries with high or moderate risk of ZIKV transmission. Any donors with confirmed or compatible symptoms indicating chikungunya, dengue or Zika virus infection after returning from a “Tropical Virus Risk” country **cannot donate blood or tissues for six months from their return to the UK.**

Advice for UK travellers to reduce the risk of sexual transmission has been in place since January 2016.

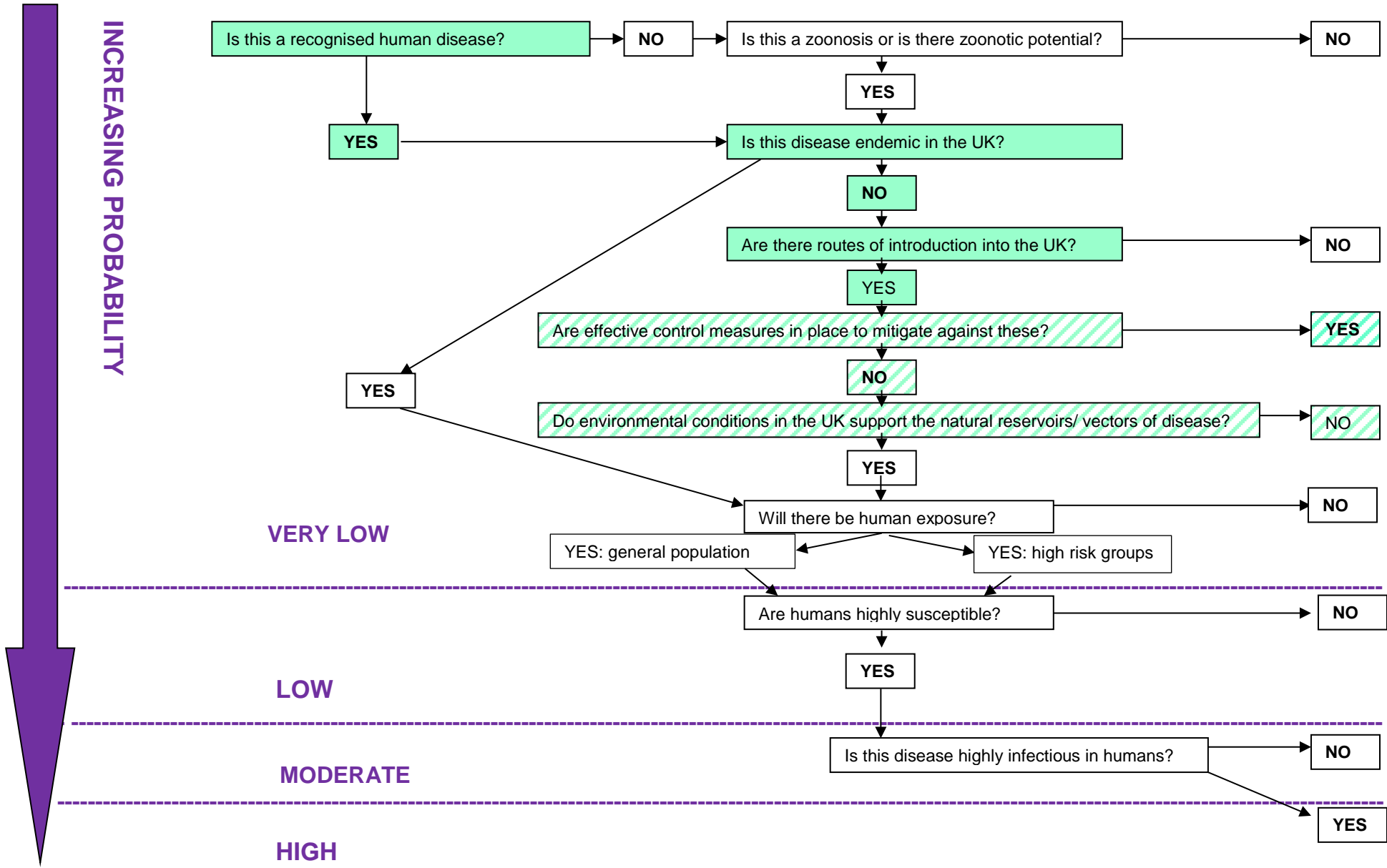
v) Do environmental conditions in the UK support the natural reservoirs?	No	Good
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Aedes aegypti would not survive more than two or three days at temperatures below 14°C, although introduced individual

mosquitoes might be able to survive for a few days or weeks in the summer months. It is too cold for *Aedes aegypti* to overwinter and establish in the UK (34). A recent review of historical distribution of *Aedes aegypti* has shown that established populations (up until the 1950s) were restricted to Southern Europe (35).

There is potential for *Aedes albopictus* to be implicated in the transmission of Zika virus, however laboratory studies have shown it is less efficient than *Aedes aegypti*, and in southern Europe where *Ae. albopictus* is abundant ([mosquito distribution maps](#)), there has been no documented transmission of Zika virus by this mosquito.

The **PROBABILITY** of human infection with Zika virus in the UK population: **VERY LOW**



Step Two: Assessment of the impact on human health

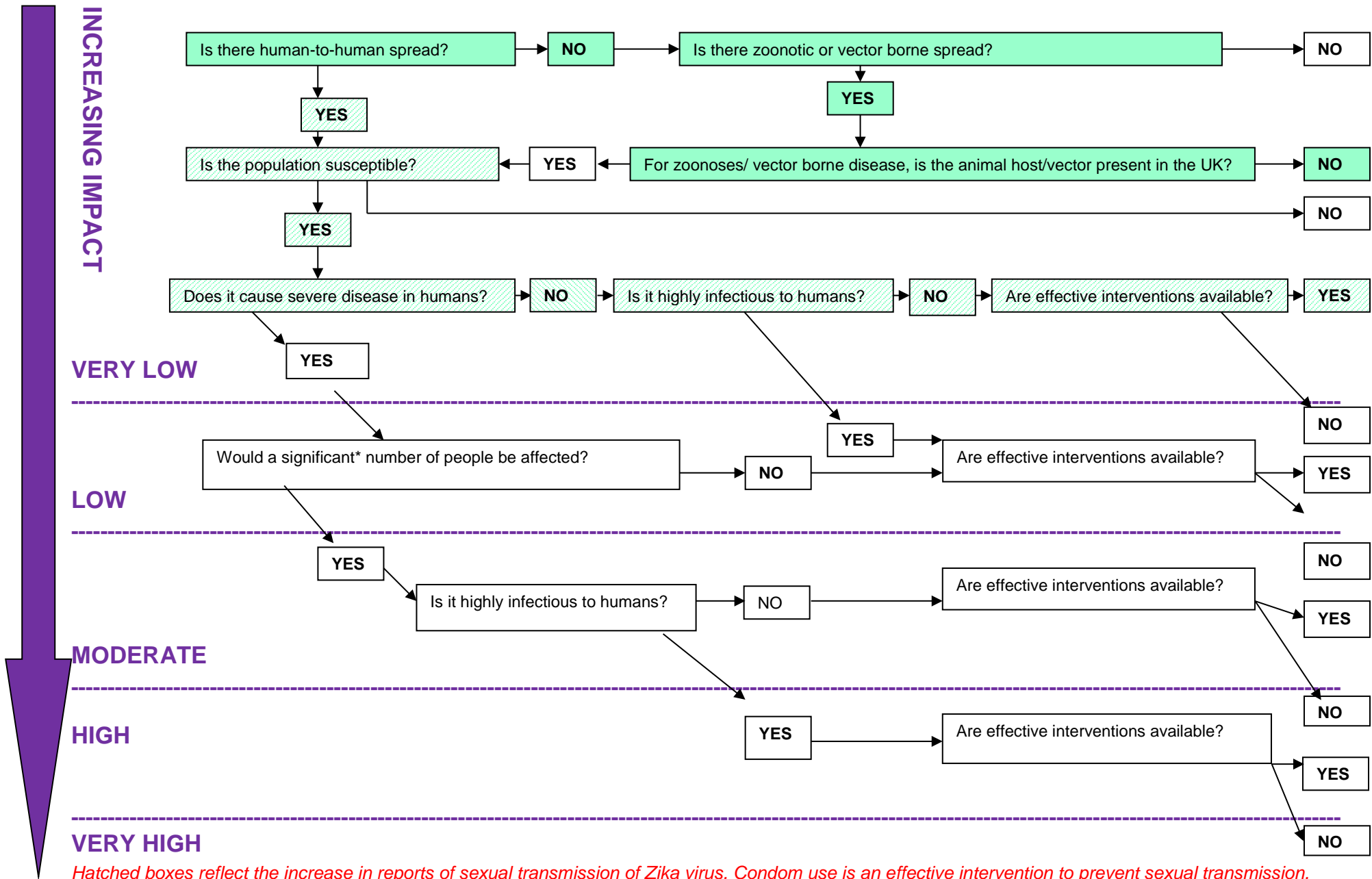
The scale of harm caused by the infectious threat in terms of morbidity and mortality: this depends on spread, severity, availability of interventions and context. Please read in conjunction with the Impact Algorithm following the boxes shaded green.

Question	Outcome*	Quality of Evidence
i) Is there human-to-human spread?	No/Yes	Satisfactory
<p>The overwhelming majority of ZIKV cases are vector borne but human-to-human and mother-to-child transmission also occurs. The virus has been shown to persist in semen for prolonged periods (25, 26). ZIKV has also been found in the female genital tract (27-30). A relatively small number of cases of sexual transmission of ZIKV have been reported, which have been mainly male-to-female. Limited reports of male-to-male and female-to-male transmission have also been reported. The risk of sexual transmission of Zika virus is considered to be low.</p> <p>Spread of ZIKV infection through transfusion or transplantation is not believed to play a major role in ZIKV transmission although 3% of blood donors in French Polynesia, asymptomatic at the time of blood donation, were PCR positive for ZIKV, supporting a potential risk of transfusion-derived transmission (31, 36). Transmission via blood products has been demonstrated (32, 33)</p>		
ii) Is there zoonotic or vector borne spread?	Yes	Good
Yes, vector borne (see previous section).		
iii) For zoonoses/vector-borne disease, is the animal host/vector present in the UK?	No	Good
<p>There are no established populations of <i>Aedes</i> spp., competent for transmission of Zika virus in the UK. A range of surveillance approaches have been used by PHE and partners as part of national efforts to understand the potential risk posed by invasive mosquitoes, and to help in preparedness for detection and control. Surveillance projects have included both passive (eg PHE Mosquito Recording Scheme and Mosquito Watch) and active surveillance. Active surveillance has been conducted at airports and seaports, at used tyre importer companies, and surveys at motorway service stations along the direct links from south-coast ferry ports and Eurotunnel.</p> <p>Sporadic introductions of invasive <i>Aedes</i> spp. have been detected. The first detection of <i>Ae. albopictus</i> eggs was made in 2016 in</p>		

Kent (21) and an unusual finding of a male *Ae. aegypti* in Merseyside was reported in early 2017 (22). Both findings were followed up, and so far in both cases, no further mosquitoes were found. In late July 2017, eggs and larvae of *Ae. albopictus* were found in a second location in Kent. (23) Ongoing surveillance in Kent will determine whether *Ae. albopictus* has established.

iv) Is the population susceptible?	Yes	Satisfactory
Immunologically naive populations are assumed to be susceptible, but most infections are asymptomatic.		
v) Does it cause severe disease in humans?	No	Good
Most (80%) infections are asymptomatic, and even amongst symptomatic individuals most infections are mild. Neurological presentations including GBS and encephalitis have however been reported, and infection in the fetus can lead to severe birth defects.		
vi) Is it highly infectious to humans?	No	Good
The vast majority of infections are vector-borne.		

The **IMPACT** of Zika virus on human health in the UK: **VERY LOW**



Hatched boxes reflect the increase in reports of sexual transmission of Zika virus. Condom use is an effective intervention to prevent sexual transmission.

**This question has been added to differentiate between those infections causing severe disease in a handful of people and those causing severe disease in larger numbers of people. 'Significant' is not quantified in the algorithm but has been left open for discussion and definition within the context of the risk being assessed.*

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