



BORDER HEALTH NEWSLETTER - February 2016

WELCOME!

Hi everybody! Zika is still a highlight for the border health news, there are so many discussions and speculations circulating, and researchers around the globe are trying to find out more about this virus and the possibility of a vaccine.

Now that Brazilian scientists were able to infect *Culex quinquefasciatus* with the virus in a lab study, a new wave of enquiries is occurring.

However, it could not be shown that *Culex sp.* is able to transmit the disease in the field. More cases that substantiate the theory of transsexual transmission have occurred but it is still unclear if women can infect men. Also, it is still not proven that microcephaly is caused by Zika, or if different agents are to blame.

But don't let us forget about the other arboviruses, such as Dengue and Malaria. See the news regarding a Dengue Vaccine in Philippines.



Sexual transmission of Zika virus confirmed.

SAMPLES

During February 1057 samples were collected by staff from 12 District Health Boards with 477 positive. The enormous number of *Culex quinquefasciatus* collected this month does not look very unusual compared with February 2015. However, this year *Cx. quinquefasciatus* is well established at the Auckland airport which is also reflected by the interception responses. Dry rock pools at Wellington shores lead to low numbers of *Opifex fuscus* this month.

Species	Adults		Larvae	
	Feb 16	Feb 15	Feb 16	Feb 15
New Zealand Mozzies				
<i>Aedes antipodeus</i> (winter mosquito)	6	7	Nil	Nil
<i>Ae. australis</i> (saltwater mosquito)	2	Nil	Nil	2
<i>Ae. notoscriptus</i> (striped mosquito)	1455	3512	4626	2653
<i>Coquilletidea iracunda</i>	34	108	Nil	Nil
<i>Coq. tenuipalpis</i>	Nil	2	Nil	Nil
<i>Culex astilae</i>	Nil	Nil	2	4
<i>Cx pervigilans</i> (vigilant mosquito)	103	167	2689	4360
<i>Cx. quinquefasciatus</i> (southern house mosquito)	1378	1350	6313	7417
<i>Opifex fuscus</i> (rockpool mosquito)	2	Nil	13	42
Total	2980	5146	13643	14478



INCURSIONS/INTERCEPTIONS

During February 29 suspected interceptions were detected and responded to. Please note that the interceptions of live unwanted mosquitoes are highlighted in red. Exotic species in general are highlighted in light blue.

- 2.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI search area flying around - very likely to be a local one.
- 3.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB Border Agency Service Kiosk flying around - very likely to be a local one.
- 3.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB customs briefing area flying around - very likely to be a local one.
- 3.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI lab flying around - very likely to be a local one.
- 3.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI search area flying around - very likely to be a local one.
- 5.2.1016 One live male *Cx. quinquefasciatus* was found at AIAL ITB MPI search area X-ray I flying around - very likely to be a local one.
- 6.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB Border Agency Service Kiosk flying around- very likely to be a local one.
- 6.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB flying around - very likely to be a local one.
- 7.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB flying around - very likely to be a local one.
- 7.2.2016 Two live female *Cx. quinquefasciatus* was found at AIAL ITB at the biosecurity dog drinking area - very likely to be a local one.
- 9.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB flying in the MPI lab (has been preserved in alcohol) - very likely to be a local one.
- 9.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB Biosecurity area - very likely to be a local one.
- 10.2.2016 One live male *Cx. quinquefasciatus* was found at AIAL ITB - very likely to be a local one.
- 10.2.2016 One live male *Cx. quinquefasciatus* was found at MG Marketing AKL in MPI room associated with grapes from Peru.
- 11.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI X-ray room - very likely to be a local one.
- 12.2.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB - very likely to be a local one.
- 12.2.2016 One dead male *Cx. quinquefasciatus* was found at the Food market Trans. Fac. Primor Produce AKL in a box with melons from Australia.
- 14.2.2016 Two female *Cx. quinquefasciatus* were found within half an hour flying in the MPI office at ITB – AIAL – very likely to be local.
- 15.2.2016 One *Aedes albopictus* male was found dead at the AIA luggage search area in a suitcase coming from Taipei, Taiwan.



NEW ZEALAND BIOSECURE

- 16.2.2016 One live male *Cx. quinquefasciatus* was found at Turners and Growers AKL in MPI room associated with a box of oranges from the USA.
- 18.2.2016 One live female *Cx. quinquefasciatus* was caught at the search bench at AIAL ITB - very likely to be a local one.
- 19.2.2016 A dead *Ae. taeniorhynchus* and a crane fly were found in a container with bananas from Ecuador at a Trans. Fac. Mt Wellington AKL.
- 20.2.2016 One live female *Aedes aegypti* was caught flying around at AIAL in the unclaimed-luggage area.
- 21.2.2016 One live female *Cx. quinquefasciatus* was caught at the MPI search bench at AIAL ITB - very likely to be a local one.
- 22.2. *Aedes sp.* was found at the MPI search bench at AIAL ITB in a fishing kit – possible origin of Finland.
- 22.2 Three live female *Cx. quinquefasciatus* were caught at the MPI area at AIAL ITB - very likely to be a local one.
- 24.2.2016 One female *Cx. quinquefasciatus* was found flying in the MPI office at ITB – AIAL – very likely to be a local one.
- 25.2. One live male *Cx. quinquefasciatus* was found at AIAL ITB MPI search area X-ray I flying around - very likely to be a local one.
- 26.2.2016 After insect activity has been observed and a container with bananas from Ecuador had been fumigated an *Ae. taeniorhynchus* and *Cx. quinquefasciatus* were found the container at Fresh Max - AKL.
- 26.2.2016 One live female bloodfed *Cx. quinquefasciatus* was found at AIAL ITB MPI office flying around - very likely local.

SOUTH PACIFIC NEWS



Pacific syndromic surveillance report – Week 6, ending 7 February 2016

Zika virus: Fiji: increasing numbers of Dengue-Like Illness (DLI) have been reported for week ending 14 February 2016. Source: Fiji Syndromic Surveillance System.

Dengue: Fiji: increasing numbers of Dengue-Like Illness (DLI) have been reported for week ending 7 February 2016. Source: Fiji Syndromic Surveillance System

French Polynesia: there were 53 confirmed cases for week ending 31 January 2016. Dengue serotype 1 is in circulation. Source: French Polynesia Ministry of Health.



MONTHLY NOTIFIABLE DISEASE SURVEILLANCE REPORT - JAN 2016

Zika virus infection: 10 confirmed cases of zika virus infection were notified in January 2016. Cases were reported in the 40–49 years (3 cases), 20–29 years and 50–59 years (2 cases each), 1–4 years, 10–14 years and 60–69 years (1 case each) age groups. All cases were confirmed by the Clinical Virology lab by PCR. All cases reported overseas travel during the incubation period, and countries visited included Samoa (5 cases), Tonga (4 cases) and American Samoa (1 case).

Dengue fever: 16 cases of dengue fever (15 confirmed and 1 under investigation) were notified in January 2016 compared to 28 cases notified in the same month of the previous year. The travel history was recorded for all cases, and all cases had travelled overseas during the incubation period for the disease. The countries visited included: Samoa (9 cases), Australia, French Polynesia and the Philippines (2 cases each). Some cases reported travel to more than one country.

PICTURE OF THE MONTH



Presbitero Maestro Cemetery in Lima, Peru *Photo: AP*



ZIKA

Zika virus can be carried by more common mosquito, scientists say - *Aedes aegypti* has been seen as the main Zika transmitter but research indicates *Culex quinquefasciatus* may also be a vector

Reuters in Rio de Janeiro 3 March 2016 excerpt



A female *Culex quinquefasciatus* mosquito feeds on human blood. Photograph: Jim Gathany/Centers for Disease Control/EPA

Research by scientists in Brazil indicates that a mosquito more common than the one primarily known to transmit Zika infections may possibly be able to carry the virus, a development that could further complicate efforts to limit its spread.

The mosquito species *Aedes aegypti* has been identified as the main transmitter of Zika infections, which have been linked to thousands of birth defects as the virus spreads rapidly in Brazil and other countries in Latin America and the Caribbean.

But the scientists in Brazil announced on Wednesday that they were able to infect another species, *Culex quinquefasciatus*, with the virus in a laboratory, raising concerns that Zika could be carried by a species more prevalent than *Aedes aegypti*. They said much more research is needed to learn whether the *Culex* mosquitoes can transmit Zika infections.

In Brazil, *Culex quinquefasciatus* is 20 times more common than *Aedes aegypti*, the researchers said.

The research, conducted by scientists at the government-funded Oswaldo Cruz Foundation in the North-eastern city of Recife, is part of an ongoing trial in which researchers injected 200 of the *Culex quinquefasciatus* mosquitoes with rabbit blood infected by Zika.

The virus, they said, circulated through the mosquitoes' bodies and into their salivary glands, meaning they might be able to transmit a Zika infection by biting a person.

"We saw an ease of infection and an ease of dissemination of the virus to the salivary glands," Constanca Ayres, the lead scientist in the study, told Globo, Brazil's leading television network.



Global Zika update: The World Health Organization (WHO) released their Zika Situation Report

Outbreak News Today February 5, 2016

Incidence: Between 2015 and 2016, 33 countries have reported autochthonous transmission- Barbados, Bolivia, Brazil, Cape Verde, Colombia, Curaçao, Costa Rica, Dominican Republic, Ecuador, El Salvador, Fiji, French Guiana, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Maldives, Martinique, Mexico, Nicaragua, Panama, Paraguay, Puerto Rico, Saint Martin, Samoa, Solomon Islands, Suriname, Tonga, United States Virgin Islands, Vanuatu and Venezuela.

Brazil has reported by far the most cases, in fact, the outbreak got so large they stopped counting cases. Best estimates from Brazil health officials say there has been 497,593 and 1,482,701 cases of Zika virus since the outbreak began.

Following Brazil is Colombia with more than 20,000 cases since first reported last October.

In October 2015, Cape Verde, an island off the coast of West Africa, reported an outbreak of Zika virus and has reported 7 081 cases as of 17 January 2016.

Microcephaly: Concerning microcephaly, between 2001 and 2014, Brazil reported an average of 163 microcephaly cases nationwide annually.

As of 30 January 2016, the Ministry of Health reported 4,783 cases of microcephaly and/or central nervous system (CNS) malformation including 76 deaths.

Authorities in Brazil have concluded the investigation into 1,113 of the 4,783 cases of reported cases of microcephaly: 709 cases were discarded, 17 cases had laboratory confirmation of Zika infection, and 387 cases had radiological findings compatible with a congenital infection.

Of the 17 laboratory-confirmed cases, 2 were miscarriages and the remaining 15 cases were live births, all residents from North-eastern states of Brazil. Of the 76 reported deaths due to congenital malformations, Zika virus was identified in fetal tissue of 5 cases, all from the northeast of Brazil.

Guillain-Barré syndrome: In the context of Zika virus outbreak, Brazil, Colombia, El Salvador, Suriname, and Venezuela have reported an observed increase of Guillain-Barré syndrome (GBS), just as French Polynesia reported during the 2013 – 2014 outbreak.

In 2015, a total of 1,708 cases of GBS were registered nationwide in Brazil, representing a 19% average increase from the previous year (1,439 cases of GBS), though not all states reported an increase in incidence.

In February 2016, the Colombia International Health Regulations (IHR) National Focal Point (NFP) reported an increase in cases of GBS. Colombia reports an average of 242 cases of GBS per year. However, in the five weeks to 30 January 2016, there were 86 cases of GBS already reported.

From 1 December 2015 to 6 January 2016, 46 GBS cases were recorded in El Salvador, including 2 deaths, while the annual average number of GBS cases is 169.



Side-view illustration of a baby with microcephaly (left) compared to a baby with a typical head size.
Credit: Centres for Disease Control and Prevention



Two Studies Strengthen Links Between the Zika Virus and Serious Birth Defects

MARCH 4, 2016 by DONALD G. McNEIL Jr. and CATHERINE SAINT LOUIS - excerpt

1) In the first study, published in *The New England Journal of Medicine*, researchers found that 29 percent of women who had ultrasound examinations after testing positive for infection with the Zika virus had fetuses that suffered “grave outcomes.”

The small size of the study, which looked at 88 women at one clinic in Rio de Janeiro, was a limitation, Dr. Fauci added. From such a small sample, it is impossible to be certain how often fetal damage may occur in a much larger population.

Two fetuses died even though the mothers were infected relatively late in pregnancy, at 25 and 32 weeks — and even after earlier ultrasounds had shown the fetuses to be normal. Other fetuses whose mothers were infected late in pregnancy suffered brain calcifications or abnormally slow growth.

Doctors in Brazil had previously said that the worst damage appeared in fetuses whose mothers were infected in the first trimester.

The World Health Organization is awaiting results from a similar but much larger study involving 5,000 women, mostly from Colombia. They are not expected until May or June, when large numbers of the babies will come to term.

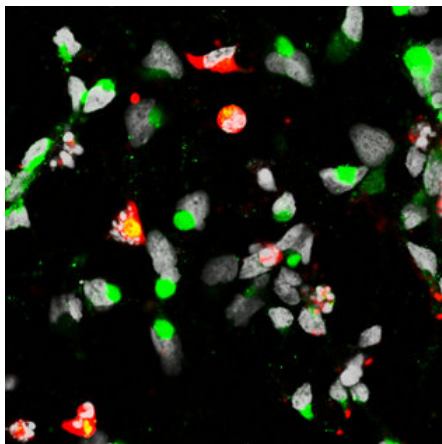
2) In the second study, published in the journal *Cell Stem Cell*, researchers at Johns Hopkins and elsewhere cultured several types of cells present in early fetal development, including so-called cortical neural progenitor cells, which form the cortex, the outer brain layer responsible for many higher functions.

Three days after they infected all the cells with the Zika virus, 90 percent of the progenitor cells were damaged: They were unable to divide normally and often died.

By comparison, the other two types of fetal cells were much less affected.

“The cell types responsible for forming the cortex are the target of the Zika virus,” said Hongjun Song, a neurologist at Johns Hopkins University School of Medicine and a senior author of the study.

Some experts cautioned that, because the experiment was conducted with laboratory-grown cells, the results might not apply to humans. Sara Cherry, a microbiologist at the University of Pennsylvania, noted that the cells were infected with a Zika strain “quite distinct” from the one now infecting people in Latin America. Dr. William B. Dobyns, a pediatric neurologist at Seattle Children’s Research Institute, called the work “highly significant.”



If the cells that should form the brain cortex grow too slowly, he said, “you get a small brain, but on top of that there’s cell death, which means whatever the size the brain is, it will shrink.” That reduction may lead to a conspicuous space between the skull and brain. “This paper fits like a glove what I’m seeing,” said Dr. Dobyns, who has reviewed brain scans from Brazil. Those scans have shown gaps between severely shrunken brains and the inner skull, unusually smooth brain surfaces and other anomalies.

Neural progenitor cells exposed to Zika virus. The virus is shown in green, and cells that have died are shown in red.

Credit: Sarah C. Ogden/Johns Hopkins Medicine



From Ebola to Zika, tiny mobile lab gives real-time DNA data on outbreaks

The Guardian

3 February 2016 by Lisa O'Carroll - excerpt

The pocket-sized MinION device, a revolutionary DNA sequencing instrument, which could help break the chain of transmission of viruses such as Ebola and Zika, has been developed by British scientists. It can help identify mutations in viruses in real time, allowing health workers in emergencies to quickly establish the evolution and geographical journey of the virus through communities. Previous tests involved shipping blood samples back to highly controlled labs such as those in Porton Down with the results returned to the field weeks or a month later.

"It has revolutionised next generation sequencing. In the old days it was good enough to know what kind of virus or bacteria caused an illness ... but now you can sequence the entire pathogen in 24 hours". Carroll says applications for the technology are myriad: not only could it help trace the movement of the Zika virus in Brazil and elsewhere, it could also determine quickly whether viruses have mutated into drug-resistant pathogens.



The device looks like an old clam-shell mobile phone and can fit in a pocket. The MinION plugs into the USB port of a laptop, which provides it with power and allows sample data from the device to immediately be sent anywhere in the world for rapid analysis.

MinION device, which weighs less than 100g, takes frequent electrical current measurements as a single strand of DNA passes through one of 2,000 pores in a

plastic membrane. Photograph: Tommy Trenchard/EMLabs

Google wants to help map Zika outbreaks

CNNMoney (San Francisco) March 3, 2016 by Heather Kelly



Google is throwing its weight behind efforts to combat the Zika virus, with new tools, grant money, and some help from the Latin American Sesame Street. Since November, Google searches related to the mosquito-borne virus have blown up. There has been a 3,000% increase in Zika related searches around the world. On Thursday, the company's philanthropic organization,

Google.org, announced plans to help UNICEF and other organizations fight the virus.



Because this is Google, it's starting with the data. "We ... have to find better ways to visualize the threat so that public health officials and NGO's can support communities at risk," said Google.org Director Jacqueline Fuller in a blog post announcing the initiative. Google engineers and data scientists are teaming up with UNICEF to map the spread of the Zika virus and better predict future outbreaks. They are pulling data from sources like the weather and travel patterns and plugging it into a new open source platform that will be available to governments and NGOs.

Fighting the Zika virus with mutant mosquitoes

Google has also added additional Zika-specific information to its search results in 16 languages, including public health alerts.

It's not just donating skills and resources. Google.org is giving UNICEF a \$1 million grant that will be used to spread prevention information, invest in research and reduce mosquito populations.

To help raise awareness, YouTube is working with creators on new educational videos, including a video of Elmo teaching kids how to avoid mosquito bites in Spanish.

Founded in 2004, Google.org takes a uniquely Google approach to addressing current humanitarian issues, such as Ebola, the refugee crisis and natural disasters. It doles out a combination of cash in the form of grant money and direct donations, and Google's own talent and products.

Zika vaccine possible 'within months'

BBC News

4 March 2016 by Tulip Mazumdar - excerpt

A Zika vaccine could be ready for human trials later this year, according to the man in charge of the US government's research programme.

Dr Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases, hopes to start testing a DNA vaccine by September. About 100 Americans have been diagnosed with Zika after returning from affected countries. Scientists at the institute helped develop a vaccine for Ebola. They are now trying to do the same for Zika, with a special focus on pregnant women because of the strongly suspected link between the virus and babies being born with under-developed brains.

Dr Fauci said he's hoping human trials will start in America soon.

"We will have a vaccine ready to go into humans to test - not to distribute - but to test for safety and whether it induces a response that you can predict will be protective.

"That phase 1 trial I believe will likely start towards the end of this summer or early fall".

But phase 1 trials are only the start of a potentially lengthy process.

If the outbreak starts to wane, as happened in the advanced stages of the agency's Ebola vaccine trials, it will not be possible to conduct big enough studies to confirm how effective the vaccine is in at-risk populations.

The Zika vaccine in development uses synthesised genetic information from the virus, rather than live virus, to trigger an immune response in the body.

So if a person then becomes infected with the virus, their body is already primed to fight it. Developing new vaccines can take decades. But scientists working at the labs in Maryland believe they can fast-track the process because they had already been working on a vaccine for West Nile virus, which is spread by the same *Aedes aegypti* mosquito.

Dr Barney Graham, deputy director of the National Institute of Health Vaccine Research Center, where the vaccine is being developed, said: "The challenge is that we don't know a lot about Zika, but we know a lot about other flaviviruses.

"Vaccines are generally not made quickly. We still don't have a vaccine for some viruses that have been around for 70 or 80 years."



But he added: "There are new technologies now. DNA vaccines can go quickly - Dr Fauci said the American vaccine would focus on pregnant women, and women of childbearing age, with a longer-term goal of offering a vaccine to everyone, particularly if that link to microcephaly is confirmed.

However, it is already too late for the thousands of babies thought to be affected by this mysterious virus. And despite the best efforts of scientists at the NIH, the very earliest a vaccine could be widely distributed is around 2018.

DENGUE

Sanofi's Dengue Vaccine Made Widely Available for First Time Philippines plans to immunize schoolchildren starting in April

The Wallstreet Journal By CRIS LARANO
Feb. 23, 2016

MANILA - Sanofi Pasteur, the vaccines division of France's Sanofi SA, on Tuesday made the Philippines the first country where its vaccine for dengue fever will be widely available. Conchita Santos, manager for Sanofi Pasteur in the Philippines, said the company's facility in France is expected to produce 100 million doses of the vaccine a year when it is fully operational to cover global demand.

The Philippines in December became the second country after Mexico to license the vaccine, which provides protection for all four strains of dengue. The vaccine has yet to be marketed in Mexico. Brazil and El Salvador have since approved the vaccine.

The vaccine, branded Dengvaxia, can be administered to people aged between nine and 45 years old. This is the first dengue vaccine in the world and was developed over two decades, with the participation of 40,000 people in clinical trials conducted in endemic areas.

The Department of Health said it is hoping to immunize 1 million schoolchildren in 12 months starting in April in the three most vulnerable regions of the Southeast Asian country, including the capital, Manila.

Last year, more than 200,000 suspected dengue cases—the highest in the Western-



Pacific region—were reported in the Philippines, many of them children, according to the World Health Organization. A total 598 were reported to have died due to dengue.

"We've set aside 3.5 billion pesos (\$73.5 million) for this school-based vaccination program," said Lyndon Lee Suy, spokesman for the Health Department.

The department plans to give each child three doses, each six months apart, to ensure they can fight off dengue infections brought by the *Aedes aegypti*.

Mr. Lee Suy said the vaccination program is expected to reduce the cost of dealing with the disease by 80% and lead to improved labor productivity in areas where the



vaccination program will be undertaken.

Sanofi Pasteur said one estimate placed the direct and indirect cost of dealing with dengue in Asian countries, where the virus is endemic, around \$6.5 billion a year.

Dengue fever, a major health issue in Asia, which has 70% of the global cases, infects an estimated 400 million people every year in 128 countries where the disease is endemic.

The WHO has said that half of the world's population is now at risk of contracting dengue as the mosquito carrying the virus has spread to 128 countries from just a handful a century ago. An estimated 500,000 people with severe dengue require hospitalization each year, many of them children, WHO said.

ZIKA, CHIKUNGUNYA, DENGUE

Colombia: Sincelejo man contracts dengue fever, chikungunya and Zika fever simultaneously

Outbreak News Today by Robert Herriman February 6, 2016

A Colombian man has been diagnosed with co-infections of three mosquito borne viruses transmitted by *the Aedes* vector, dengue fever, chikungunya and Zika, according to a study published in the Journal of Infection and Public Health.

The researchers from Sincelejo, Colombia say the 49-year-old man from Sincelejo constantly traveled to different regions of the country and was probably exposed to different viruses in different areas.

The patient sought hospital after spending four days with fever of 38 ° C, conjunctivitis and red spots on the back and arms. After being subjected to antibody tests to detect the three viruses, all were positive.

Addition to these symptoms, doctors still noticed redness and swelling of the lymph nodes in the legs. No specific symptom was detected as result of interaction between the two viruses, however. The researchers say that one must be attentive to the co-infection in areas such as Brazil and Colombia, where the three viruses circulating.

MALARIA

Ebola outbreak indirectly increases deaths from malaria, HIV, TB

Parpia AS, et al. Emerg Infect Diseases March 1, 2016 - excerpt

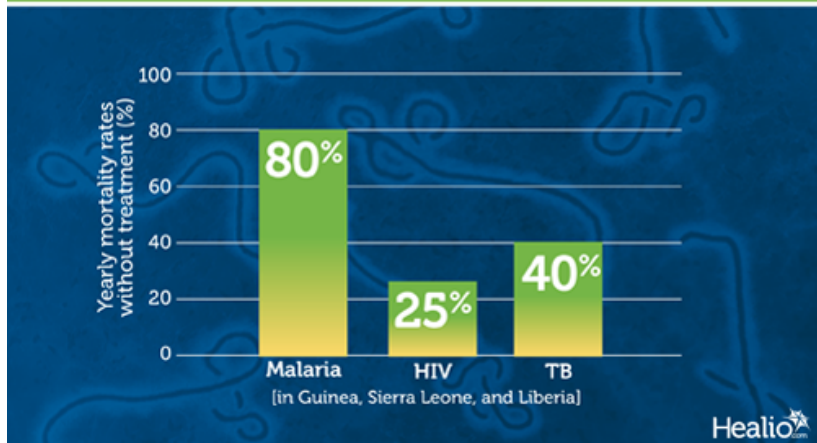
Recent findings published in *Emerging Infectious Diseases* showed that the 2014-2015 Ebola outbreak indirectly increased the number of deaths caused by malaria, HIV, and tuberculosis in Guinea, Liberia and Sierra Leone.

related links googleoff: index

“Our results estimate that the 2014-2015 Ebola outbreak in West Africa has substantially impeded the fight against malaria, HIV/AIDS, and TB in the three countries most affected,” Martial L. Ndeffo-Mbah, PhD, MSc, research scientist in microbial diseases at the Yale School of Public Health, and colleagues wrote. “The deaths of several health care workers early in 2014, as well as the strain on health care facilities caused by increased numbers of patients and decreased staff, resulted in the closure of many clinics and the interruption of routine health delivery services, including HIV testing, childhood vaccinations, and maternity care.”



Ebola outbreak indirectly increases deaths from malaria, HIV, TB



In West Africa, outpatient attendance dropped as low as 10% due to the fear of Ebola, the researchers wrote. As a result, patients with malaria, HIV or TB received less treatment, where yearly mortality rates without treatment are reported to be as high as 80% for severe malaria, 25% for HIV and 40% for TB.

Malaria vaccine: Army reports on 1st in-human study

Posted by Press Release on February 28, 2016 - excerpt

Walter Reed Army Institute of Research (WRAIR) researchers recently published the results of testing a *Plasmodium vivax* malaria vaccine candidate in a human challenge model.

A vaccine to prevent infection and disease caused by *P. vivax* is critical to reduce sickness and mortality from vivax malaria, a common cause of malaria among deployed service members.

The vaccine candidate developed by WRAIR and tested jointly with GlaxoSmithKline (GSK) to prevent *vivax* malaria infection is the first in-human study of its kind under an investigational new drug application with the US Food and Drug Administration. WRAIR investigators immunized 30 volunteers with three doses of the vaccine candidate. Malaria is only transmitted through the bite of a female mosquito. Immunized volunteers took part in WRAIR's well-established controlled human malaria infection (CHMI) model where they were bitten by malaria-infected mosquitoes. The efficacy of the vaccine candidate was then determined based on whether or not volunteers developed malaria by looking at blood smears or if it took longer for malaria parasites to appear in the blood.

The study's results were published today in the journal *PLOS Neglected Tropical Diseases*. Unlike *P. falciparum* where a CHMI model is well established, the *P. vivax* CHMI model must rely on blood donations from infected humans to initiate infections in mosquitoes.

For this trial, the WRAIR investigators worked with the WRAIR overseas lab in Bangkok, Thailand, the Armed Forces Research Institute of Medical Sciences (AFRIMS), to acquire *P. vivax*-infected mosquitoes which were then transported to WRAIR for the malaria challenge. The vaccine candidate was well tolerated in all volunteers and generated robust immune responses. While the vaccine candidate did not prevent malaria infection, it did significantly delay parasitemia in 59% of vaccinated subjects.

Malaria challenge models require effective treatment for any resulting malaria infections. Investigators were also able to demonstrate that individuals with low or absent levels of a specific liver enzyme were unable to convert primaquine to an active drug form to kill the dormant stage of the parasites. These volunteers were more likely to experience *vivax* malaria relapse. The clinical data in this study is the first to show that differences in a



NEW ZEALAND BIOSECURE

person's genetics can result in primaquine treatment failure. Despite this newly identified limitation, primaquine remains the only FDA-approved drug to treat the dormant stages of *vivax* malaria.