Volume 2, Issue 2 February 2016 ISSN NO: 2454 - 2326

North Asian International Research Journal Consortium

North Asian International Research Journal

Of

Multidisciplinary

NAIRJC JOURNAL PUBLICATION

North Asian International Research Journal Consortium

Welcome to NAIRJC

ISSN NO: 2454 - 2326

North Asian International Research Journal is a multidisciplinary research journal, published monthly in English, Hindi, Urdu all research papers submitted to the journal will be double-blind peer reviewed referred by members of the editorial board. Readers will include investigator in Universities, Research Institutes Government and Industry with research interest in the general subjects

Editorial Board

Address: - Dr. Ashak Hussain Malik House No. 221 Gangoo, Pulwama, Jammu and Kashmir, India - 192301, Cell: 09086405302, 09906662570, Ph. No: 01933-212815,
Email: nairjc5@gmail.com, info@nairjc.com **Website:** www.nairjc.com

CAN WE WELCOME ZIKA VIRUS INTO THE US?

NDUKA, UZOMA C

PhD Scholar, Walden University, Minneapolis, MN And Harvard Medical School, Safety Quality Informatics Leadership (SQIL) Program

ABSTRACT

Zika virus (ZIKV) is no longer autochthonous to Africa and Asia. Migration of Zika virus has been noticeable in places like French Polynesia, New Caledonia, Cook Islands, Easter Island (Chile), Brazil, and Colombia. Now, there is the fear of Zika virus stepping it's foot into the US. It has long been described as a public health scare. Zika virus is of medical importance because it is an evolving world-wide mosquito-borne pathogen that could affect pregnant women and their unborn children. Presently in the US, there is no none vaccine to prevent ZIKV disease. Transmitted by Aedes spp. mosquitoes, Zika virus is related to dengue, yellow fever, and Japanese encephalitis, chikungunya, and West Nile viruses.This article is also focused on bringing to the consciousness of US residents that Zika Virus could spread into our mainland, if not properly caged by health authorities, and how they should react to the spread of ZIKV.

BACKGROUND

There is a forest called the Zika Forest. Zika Forest is situated in Uganda. Here, in the Zika Forest of Uganda, was the Zika Virus (ZIKV) first identified in 1947 (Centers for Disease Control and Prevention, 2015). ZIKV was originally isolated from a monkey in the Zika Forest (Public Health England, 2016). Zika is a small isolated tropical forest found at 32° 30' E and 0° 7' N and approximately 11 km (6.2 mi) from Entebbe located at Kisubi on Entebbe/Kampala road, Wakiso district, Uganda (Kaddumukasa, Kayondo, Masiga, Akol, Lutwama, & Masembe, 2015). The forest covers approximately 25 hectares (61.8 acres) and forms part of a narrow sinuous strip skirting the extensive grass and papyrus swamps of Waiya Bay, a sheltered inlet of Lake Victoria near Entebbe.

ZIKV, an emerging arthropod borne virus whose normal transmission cycle involves vectors from Aedes mosquitoes, belongs to the genus Flavivirus, family Flaviviridae (Faye, Freire, Iamarino, Faye, de Oliveira,

Diallo, Zanotto, & Sall, 2014; Zanluca, de Melo,Mosimann, dos Santos, dos Santos, &Luz, (2015). Chronologically, ZIKV was first isolated in 1947 from the blood of Rhesus monkey (Faye et al., 2014). In 1948, ZIKV was equally isolated in the Zika forest from a pool of mosquitoes. In 1971 and 1975, ZIKV infections were noticeable in Nigeria. The ZIKV later descended on Sierra Leone in 1972, went down to Gabon in 1975, travelled to Uganda in 1969 and 1970, was transported to Coˆte d'Ivoire in 1999, moved to in Senegal in 2011 and 2012, detected in Pakistan, reported in Malaysia, and manifested in Indonesia in 1977 and 1978. ZIKV continued its journey to the Yap Island of Micronesia in 2007and Cambodia in 2010. In 2013, a large epidemic was reported in French Polynesia (Zanluca et al., 2015). Similarly, in the beginning of 2015, numerous cases of patients presenting symptoms of mild fever, rash, conjunctivitis and arthralgia were reported in the northeastern Brazil. Today, in the US, dozen or so cases of ZIKV has been detected and confirmed cases have been reported by some state health departments like Florida, Hawaii, Illinois, New Jersey and Texas (Sun, 2016). As the Centers for Disease Control and Prevention (CDC) (2016a) has opined, 1 in 5 people infected with ZIKV develop Zika or become ill. Presently, there is no vaccine or medication in the market to prevent or treat Zika infections. Though not endemic to the US, ZIKV has been usually diagnosed in returning travelers, tourists, and immigrants (Figueiredo, 2015; Zammarchi, Fortuna, Remoll, Gunther, Venturi, & Schmidt-Chanaslt, 2015).

THE SOCIO-ECOLOGICAL MODEL

The socio-ecological model consists of five layers of risk of ZIKV disease infection: individual, interpersonal, organizational, community and public policy. As important as the individual level of risk of ZIKV disease infection is, it is not only the most important indicator for possible spread of ZIKV infection. The higher levels of risks including the interpersonal, organizational, community and public policy are relevant in understanding how ZIKV disease could spread or become pandemic. These higher orders are risks factors that are beyond the realm of the individual risk factor.

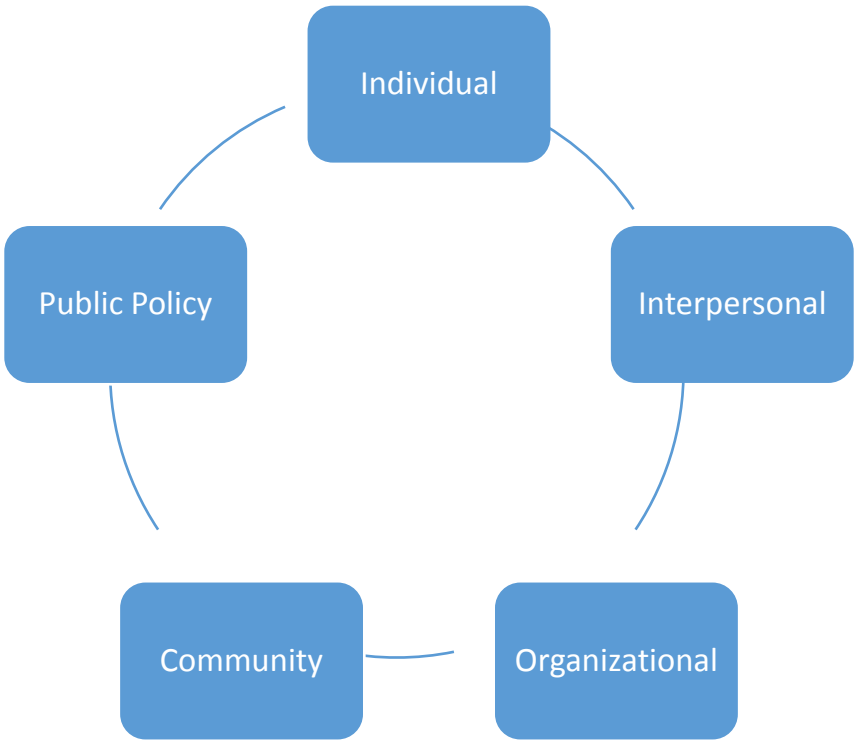

Figure I : Socio-ecological factors affecting the spread of ZIKV disease.

As Figure I above shows, these factors are intertwined and have dynamic interactions among biological, cultural, and environmental elements (Cassel, 2010). These factors can span levels and should not be considered as distinct (Baral, Logie, Grosso, Wirtz, & Beyrer, 2013) for a better understanding of this analysis. The Centers for Disease Control and Prevention (public policy) has already sent out ZIKV disease alerts targeting travelers (individuals) and pregnant women (individuals), healthcare organizations, healthcare professionals and public health practitioners (interpersonal, organizational, community), and government agencies and embassies (organizational). The CDC step provides a good first-step towards preventing and controlling the spread of ZIKV. Individuals should be able to inform and report travel plans to ZIKV-endemic countries to friends, families, workplace, and embassies. This should be considered a social responsibility of the individual towards doing what is good for the greater number of people. Governments, organizations and institutions, cultural entities, communities all have a role to play in making sure that individuals infected with ZIKV are not ridiculed or made to be public spectacles and that ZIKV is contained and controlled within the source environment.

LITERATURE REVIEW

Classified as *Flavivirus* genus, ZIKV is a single-strand, positive sense RNA virus with 10,794 kb of length (Buathong, Hermann, Thaisomboonsuk, Rutvisuttinunt, Klungthong, Chinnawirotpisan, Manasatienkij, Nisalak, Fernandez, Yoon, Akrasewi, & Plipat, 2015; Musso & Nhan, 2015). ZIKV comprises 2 lineages detected via phylo-genetic analysis (Buathong et al., 2015). One in Africa and the second in Asia. The latter ZIKV lineage has manifested in Pacific and South America. In the 1940s, the recorded number of ZIKV human infection was 14. But this number grew to 49 when there was ZIKV outbreak in Federated States of Micronesia in 2007. As a self-limited disease it presents with the following: mild fever, fatigue, cutaneous rash, arthralgia-myalgia and non-purulent conjunctivitis, headache, malaise, dizziness, oedema of the extremities, retro orbital pain, anorexia, photophobia, gastro intestinal disorders, sore throat, cough, aphtous ulcers, back pain, sweating and lymphadenopathies(Musso & Nhan, 2015).In 2013, 28,000 persons in French Polynesia experienced some of the above symptoms of ZIKV and sought medical attention (Musso, Roche, Robin, Nhan, Teissier, &Cao-Lormeau, 2015).

Several studies have suggested that direct contact could possibly be a likely route of transmission of ZIKV (Faye et al., 2014). A particular study found out that the infection could be sexually transmitted. In Colorado, for instance, an American scientist returning from Senegal in 2008 transmitted the arbovirus to his wife (Foy, Kobylinski, Foy, Blitvich, da Rosa, Haddow, Lanciotti, &Tesh, 2011). The wife of this scientist has never traveled to Africa or Asia, and has never left the USA since 2007 (Musso et al., 2015). Moreover, there was no known report of ZIKV in the Western hemisphere. The wife of this returning scientist developed the ZIKV disease 9days after her husband came back from Senegal. The husband presented with the following during hospitalization: swollen ankles, a maculopapular rash on his torso, and extreme fatigue and headache, light-headedness and chills, wrist and ankle arthalgia, and symptoms of prostatitis (perineal pain and mild dysuria), aphthous ulcers, and hematospermia (red–brown fluid in his ejaculate. He remained afebrile throughout this period. The wife had the following symptoms: malaise, chills, extreme headache, photophobia, and muscle pain, hematospermia, maculopapular rash, aphthous ulcer, arthralgia in her wrists and thumbs and conjunctivitis.

The presence of ZIKV in other countries, outside the 2 notable ZIKV-endemic continents of Africa and Asia, seems to be amongst returning travelers. For instance, the outbreak of ZIKV disease in Brazil was associated with the Asian strain of ZIKV disease (Musso, 2015). Two schools of thought have emerged with regards to the emergence of ZIKV in Brazil in 2014. Some have suggested that ZIKV was introduced in Brazil

during the 2014 World Cup Soccer tournament. Others have said that ZIKV emerged during the Va'a World Sprint Championship canoe race. It must be noted that during the 2014 World Cup soccer tournament no ZIKV-endemic Pacific nation attended. But during the Va'a World Sprint Championship canoe race, the French Polynesia, New Caledonia, Cook Islands, and Easter Island participated. These 4 Pacific countries have experienced ZIKV outbreak, respectively. With this scenario and the credence lent by phylogenetic studies, it could be adduced that ZIKV in Brazil could have been as a result of the Va'a World Sprint Championship canoe race.

To add, a Norwegian woman who was returning from Tahiti on a vacation was struck by ZIKV disease. She presented with a temperature of 37.7°C, enlarged nuchal lymph nodes, injected conjunctivae, fever, intense joint pain, and myalgia, and subsequently, a maculopapular rash at a hospital in Norway (Wæhre, Maagard, Tappe, Cadar, & Schmidt-Chanasit, 2014). In spite of the above case, there was a case of a Canadian woman returning from Thailand in 2013 and was infected by ZIKV (Fonseca, Meatherall, Zarra, Drebot, MacDonald, Pabbaraju, Wong, Webster, Lindsay, &Tellier, 2014). She experienced intermittent periods of fever and chills sore mouth and oral blisters, papular rash which spread to her extremities and included her palms, a retro-orbital headache and fever and mild conjunctivitis, and she ultimately visited the emergency department. There was yet another case of an American, a New Yorker, who had been to Ecuador, Peru, and Bolivia as well as to Chile, Easter Island, French Polynesia (Tahiti and Moorea), and Hawaii (Summers, Acosta, &Acosta, 2015). He presented with rash, malaise, fatigue, fever, arthralgia, low back pain, and bilateral exudative conjunctivitis. He further developed these symptoms: malaise, fatigue, fever (38.8°C), marked arthralgia, low back pain, and bilateral exudative conjunctivitis.

ZIKV affects the fetus. CDC suggests that ultrasound findings of and consistent with fetal microcephaly or intracranial calcifications should be tested for ZIKV infection (CDC, 2016c). According to the CDC, it has not been proven that pregnant women are most prone to ZIKV or have more devastating or severe disease during pregnancy. This claim is supported by limited data on pregnant women affected by ZIKV during pregnancy. The outbreak of microcephaly in Brazil has not been confirmed to be associated with ZIKV disease (Melo, Malinger, Ximenes, Szejnfeld, Sampaio, & de Filippis, 2016).1, 248 cases (99.7/100,000 live births) of microcephaly, including 7 deaths, have been reported in 14 states of Brazil since 2015 (Pan American Health Organization, 2015). However, these cases and deaths have not been directly linked to ZIKV. More investigation or study is needed to understand the relationship or association between ZIKV disease and microcephaly.

SOCIAL CHANGE AND PUBLIC HEALTH IMPLICATIONS

ZIKV is currently considered innocuous but its recurrent and rapid spread into non-endemic countries should be taken seriously. Moreover, ZIKV should be seen and treated as a universally emerging pathogen. With people crisscrossing and traversing the globe into ZIKV-endemic countries, there seems to be a very high propensity for spreading ZIKV through tourism and vacation (Hayes, 2009). It becomes a burden on health professionals, especially physicians, lab technicians, and nurses, to recognize and distinguish the symptoms of ZIKV from yellow fever, dengue fever and chikungunya. Public health officials and other allied healthcare professionals should take into consideration and bring to public awareness that ZIKV could be prevented and controlled via use of repellents and covering up every part of the body when in ZIKV-prone countries. Awareness is very important. The Centers for Disease Control and Prevention (CDC) has recently been bringing to public awareness the spread of and the danger ZIKV could pose to travelers (CDC, 2016b; LaMotte, 2016). Reporting of ZIKV cases should be considered by public health officials and healthcare professionals. Surveillance case definition is also necessary to enable healthcare department and public health officials to provide accurate guidance for evaluating and reporting cases.

CONCLUSIONS

With the Socio-ecological model one could identify the multiple levels of influence that contribute toward ZIKV disease risks. This theoretical framework highlighted the potential key contributions of states/governments, organizations and institutions, communities, and individuals towards identifying, preventing, and controlling ZIKV risks. Knowing full well that there is no known ZIKV disease cases in the US, it is pertinent to keep the message on to avoid a repeat of the Ebola Virus epidemic experience.

REFERENCE

- Baral, S., Logie, C.H., Grosso, A., Wirtz, A.L., & Beyrer, C. (2013). Modified social ecological model: a tool to guide the assessment of the risks and risk contexts of HIV epidemics. *BMC Public Health*, 13:482.
- Buathong, R., Hermann, L., Thaisomboonsuk, B., Rutvisuttinunt, W., Klungthong, C., Chinnawirotpisan, P., Manasatienkij, W., Nisalak, A., Fernandez, S., Yoon, I., Akrasewi, P., & Plipat, T. (2015). Detection of Zika virus infection in Thailand, 2012-2014. *The American Society of Tropical Medicine and Hygiene*. 93(2): 380-383.
- Cassel, K.D. (2010).Using the Social-Ecological Model as a research and intervention framework to

understand and mitigate obesogenic factors in Samoan population. *Ethnicity & Health*, 15(4): 397-416.

- Centers for Disease Control and Prevention. (2016a). Zika Virus. Retrieved from http://www.cdc.gov/zika/symptoms/index.html.
- Centers for Disease Control and Prevention. (2016b). Zika-affected areas. Retrieved from http://www.cdc.gov/zika/geo/.
- Centers for Disease Control and Prevention. (2016c). Interim guidelines for pregnant women during a Zika Virus outbreak — United States, 2016. Retrieved from http://www.cdc.gov/mmwr/volumes/65/wr/mm6502e1.htm.
- Centers for Disease Control and Prevention. (2015). First case of Zika virus reported in Puerto Rico. Retrieved from http://www.cdc.gov/media/releases/2015/s1231-zika.html.
- Faye, O., Freire, C.C., Iamarino, A., Faye, O., de Oliveira, J.V., Diallo, M., Zanotto, P.M., &Sall, A.A. (2014). Molecular Evolution of Zika Virus during Its Emergence in the 20th Century. *PLOS Neglected Tropical Diseases*, 8(1): 1-10.
- Figueiredo, L.T. (2015). The recent arbovirus disease epidemic in Brazil. *Revista da Sociedade Brasileira de Medicina Tropical*, 48(3):233-234.
- Fonseca, K., Meatherall, B., Zarra, D., Drebot, M., MacDonald, J., Pabbaraju, K., Wong, S., Webster, P., Lindsay, R., & Tellier, R. (2014). Case Report: First case of Zika Virus infection in a returning Canadian traveler. *The American Society of Tropical Medicine and Hygiene*, 91(5):1035-1038.
- Foy, B.D., Kobylinski, K.C., Foy, J.L., Blitvich, B.J., da Rosa, A.T., Haddow, A.D., Lanciotti, R.S., & Tesh, R.B. (2011). Probable non–vector-borne transmission of Zika Virus, Colorado, USA. *Emerging Infectious Diseases*,17(5): 880-882.
- Hayes, E.B. (2009). Zika virus outside Africa. *Emerging Infectious Diseases*, 15(9): 1347–1350.
- Kaddumukasa, A.M., Kayondo, K.J., Masiga, D., Akol, M.A., Lutwama, J.J., &Masembe, C. (2015). High proportion of mosquito vectors in Zika forest, Uganda feeding on humans has implications for the spread of new arbovirus pathogens. *African Journal of Biotechnology*, 14(16): 1418-1426.
- LaMotte, S. (2016). Zika virus reported in Puerto Rico. Retrieved from http://www.cnn.com/2016/01/01/health/zika-mosquito-virus-puerto-rico/.
- Melo, A.S., Malinger, G., Ximenes, R., Szejnfeld, P.O., Sampaio, S.A., & de Filippis, A.M. (2016).Zika virus intrauterine infection causes fetal brain abnormality and microcephaly: tip of the iceberg?Ultrasound Obstetrics Gynecology, 47:6–7
- Musso, D. (2015). Zika Virus transmission from French Polynesia to Brazil. *Emerging Infectious*

Diseases, 21(10): 1887.

- Musso, D.,& Nhan, T. (2015). Emergence of Zika virus. *Clinical Microbiology*, 4(5): 1-4.
- Musso, D., Roche, C., Robin, E., Nhan, T., Teissier, A., & Cao-Lormeau, V. (2015).Potential Sexual Transmission of Zika Virus. *Emerging Infectious Diseases*, 21(2) : 359-361.
- Pan American Health Organization. (2015). Neurological syndrome, congenital malformations, and Zika virus infection. Implications for public health. Retrieved from file:///C:/Users/Somma09/Downloads/2015-dec-1-cha-epi-alert-zika-neuro-syndrome%20(1).pdf.
- Public Health England. (2016). The characteristics, symptoms, diagnosis and epidemiology of Zika. Retrieved from https://www.gov.uk/guidance/zika-virus.
- Summers, D.J., Acosta, R.W., &Acosta, A.M. (2015). Zika Virus in an American recreational traveler. *Journal of Travel Medicine*, 22 (5): 338-340.
- Sun, L.H. (2016). CDC: 'Dozen or so' cases of Zika virus among U.S. residents. Retrieved from https://www.washingtonpost.com/news/to-your-health/wp/2016/01/20/cdc-dozen-or-so-cases-of-zika-virus-among-u-s-residents/.
- Wæhre, T., Maagard, A., Tappe, D., Cadar, D., & Schmidt-Chanasit, J. (2014). Zika Virus Infection after travel to Tahiti, December 2013. *Emerging Infectious Diseases*, 20(8):1412-1414.
- Zammarchi, L.T., Fortuna, C., Remoll, M.E., Gunther, S., Venturi, G.B., &Schmidt-Chanaslt, J. 2015). Zika virus infection in a traveler returning to Europe from Brazil, March 2015. *European Surveillance*, 20(23): pii-21153.
- Zanluca, C., de Melo, V.C., Mosimann, A.L., dos Santos, G.I., dos Santos, C.N., & Luz, K. (2015). First report of autochthonous transmission of Zika virus in Brazil. *Memórias do Instituto Oswaldo Cruz*, 110(4): 569-572.

Publish Research Article

Dear Sir/Mam,

We invite unpublished Research Paper,Summary of Research Project,Theses,Books and Book Review for publication.

Address:- Dr. Ashak Hussain Malik House No-221, Gangoo Pulwama - 192301 Jammu & Kashmir, India
Cell: 09086405302, 09906662570,
Ph No: 01933212815
Email: nairjc5@gmail.com, info@nairjc.com
Website: www.nairjc.com