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**Zika References**

***(updated 7\_14\_17)***

**Zika, Environment, Climate**

I**nterrelationship between Climatic, Ecologic, Social, and Cultural Determinants Affecting Dengue Emergence and Transmission in Puerto Rico and Their Implications for Zika Response**.<https://www.hindawi.com/journals/jtm/2017/8947067/abs/>

**Climate services for health: predicting the evolution of the 2016 dengue season in Machala, Ecuador.**“This dengue prediction framework, which uses seasonal climate and El Niño forecasts, allows a prediction to be made at the start of the year for the entire dengue season. Combining active surveillance data with routine dengue reports improved not only model fit and performance, but also the accuracy of benchmark estimates based on historical seasonal averages. This study advances the state-of-the-art of climate services for the health sector, by showing the potential value of incorporating climate information in the public health decision-making process in Ecuador.”[http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(17)30064-5/fulltext](http://www.thelancet.com/journals/lanplh/article/PIIS2542-5196%2817%2930064-5/fulltext)

**Understanding Zika’s silent presence in Africa is key to tackling the next epidemic**.<https://theconversation.com/understanding-zikas-silent-presence-in-africa-is-key-to-tackling-the-next-epidemic-80343>

**Linking only *Aedes aegypti* with Zika virus has world-wide public health implications**.<http://journal.frontiersin.org/article/10.3389/fmicb.2017.01248/full>

**Education,  Knowledge and Attitudes**

**Lessons Learned from Diverse Efforts to Change Social Norms and Opportunities and Strategies to Promote Behavior Change in Behavioral Health: Proceedings of Two Workshops (2017**)<https://www.nap.edu/read/24824/chapter/1>

**Knowledge, attitudes and practices regarding dengue, chikungunya, and zika and their vector *Aedes aegypti* in Villavicencio, Colombia.**Authors concluded “It is necessary to review campaigns, communication, and education promoted in the municipality because they do not reflect the knowledge of the people.”<https://benthamopen.com/EPUB/BSP-TOPHJ-2017-41>

**WHO toolkit for the care and support of people affected by complications associated with Zika virus.**“The toolkit includes three manuals to provide countries with tools to effectively recognize people affected by Zika virus and deliver comprehensive care and support: Manual for public health planners and managers; Manual for health care professionals; and Manual for community workers.”<http://who.int/mental_health/neurology/zika_toolkit/en/>

**Mosquito Control: Traps, Pesticides, Nets, Surveillance**

**A simple trap kills mosquitoes without chemicals** A short audio about the CDC autocidal gravid ovitra <https://www.yaleclimateconnections.org/2017/06/a-simple-trap-kills-mosquitoes-without-chemicals/>

Su**stained, Area-Wide Control of Aedes aegypti Using CDC Autocidal Gravid Ovitraps.** <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4257658/>

**Insecticide resistance to permethrin and malathion and associated mechanisms in *Aedes aegypti* mosquitoes from St. Andrew Jamaica.** <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0179673>

**Pupal Survey: An Epidemiologically Significant Surveillance Method for *Aedes aegypti*: An Example Using Data from Trinidad (1997) (Not Open Access).**“If targeted source reduction programs were directed by how important various container types were in the production of *Ae. aegypti*, environmental sanitation efforts designed to actually eliminate the ubiquitous small receptacle and tires would reduce mosquito densities by 43%; the provision of an adequate water supply system precluding the need for water storage in drums and buckets would have the potential to eliminate an additional 38%. Combined, these two measures have the potential to reduce the sources responsible for > 80% of *Ae. aegypti* production in the country.In our survey, the traditional Stegomyia indices used to document the density of Ae. aegypti and predict the threat of dengue transmission, the House, Container, and Breteau indices, were seen to have virtually no correspondence with the actual number of pupae per hectare or per person. We conclude that pupal survey is more appropriate for assessing risk and directing control operations.” <http://www.ajtmh.org/content/journals/10.4269/ajtmh.1997.56.159>

**Using Drones for Vector Control and Surveillance of *Aedes* Mosquitoes in Guatemala.**Images collected using drones are used to identify and map breeding sites to serve in targeted application of larvicides.<https://www.rti.org/impact/using-drones-vector-control-and-surveillance-aedes-mosquitoes-guatemala>

**International workshop on insecticide resistance in vectors of arboviruses, December 2016, Rio de Janeiro, Brazil** “This report summarizes the main outputs of the first international workshop on Insecticide resistance in vectors of arboviruses held in Rio de Janeiro, Brazil, 5–8 December 2016. The primary aims of this workshop were to identify strategies for the development and implementation of standardized insecticide resistance management, also to allow comparisons across nations and across time, and to define research priorities for control of vectors of arboviruses. The workshop brought together 163 participants from 28 nationalities and was accessible, live, through the web (> 70,000 web-accesses over 3 days).”<https://link.springer.com/article/10.1186%2Fs13071-017-2224-3>

All the talks given during the meeting are available in the You Tube channel of the WIN Network <https://www.youtube.com/channel/UCrbBSAfVFsBA91l3byOkgjQ/videos>

**Ethics**

**New WHO guidelines on ethical issues in public health surveillance.**“The WHO Guidelines on Ethical Issues in Public Health Surveillance is the first international framework of its kind, it fills an important gap. The goal of the guideline development project was to help policymakers and practitioners navigate the ethical issues presented by public health surveillance. This document outlines 17 ethical guidelines that can assist everyone involved in public health surveillance, including officials in government agencies, health workers, NGOs and the private sector.”<http://apps.who.int/iris/bitstream/10665/255721/1/9789241512657-eng.pdf?ua=1>

**Pregnant women and the Zika virus vaccine agenda: Ethics guidance on priorities, inclusion, and evidence generation.**“The Working Group came to consensus on three key imperatives, each with accompanying concrete recommendations. The first imperative and its recommendations address the importance of prioritizing and incentivizing development of a ZIKV vaccine that can be used by pregnant women. The second imperative and set of recommendations address the need for research specific to vaccine use in pregnancy for all ZIKV vaccines, with corresponding data collection efforts, in order to generate evidence that is critically needed to inform responsible public health policy and clinical practice affecting pregnant women. The third imperative and its recommendations address the importance of ensuring the fair inclusion of pregnant women in research studies carrying the prospect of direct benefit. These recommendations also take up best practices for involving key actors and experts in decision-making processes, responsibly communicating decisions and scientific findings to the public, and ensuring that pregnant women – as a class and as individuals – are given appropriate respect.” <http://www.zikapregnancyethics.org/guidance>

**Responding to Zika: the imperative to ensure rights and protection (Not Open Access).**“This article expands on one of the Assessment’s recommendations (refers to “A Socio-economic Impact Assessment of the Zika Virus in Latin America and the Caribbean”): for governments to ensure the rights of the affected through the enhancement and adaptation of social protection in the context of Zika, while better identifying and including groups susceptible and vulnerable to the impacts of Zika. We analyze the relevant human rights obligations of states and social protection instruments that can be provided to families affected by Zika. We argue that current welfare adaptations, while needed, are insufficient and that further changes should be based on redefined minimum standards of care and support. Country-specific assessments are needed to identify relevant unit costs to inform fiscal planning. Further analysis of the nature and extent of the unfolding impacts of Zika on vulnerable groups and the efficacy of social protection systems will better inform and strengthen multisectoral responses and support to affected communities.”<http://www.tandfonline.com/doi/abs/10.1080/17450128.2017.1330577>

**Responding to Zika: Ethical Challenges of Zoonotic Diseases.**<http://www.thehastingscenter.org/responding-to-zika-ethical-challenges-of-zoonotic-diseases/>

Institutionalizing community-focused maternal, newborn, and child health strategies to strengthen health systems: A new framework for the Sustainable Development Goal era.

“In this paper, we propose a new conceptual framework that depicts three primary pathways through which NGOs can contribute to the institutionalization of community-focused maternal, newborn, and child health (MNCH) strategies to strengthen health systems at the district, national or global level.” <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5485706/pdf/12992_2017_Article_259.pdf>

**More lawmakers want the Army to hold a hearing on Zika vaccine pricing.**“A half dozen U.S. senators want the U.S. Army to hold a public hearing to explore the controversy over the pricing of a Zika virus vaccine that Sanofi is developing with taxpayer dollars.”There is an ongoing controversy because of Sanofi pricing plans for a Zika vaccine initially developed with public funding.<https://www.statnews.com/pharmalot/2017/06/26/lawmakers-army-hearing-zika-vaccine-pricing/>

**Disease Transmission**

**Optimal control of Zika virus infection by vector elimination, vector-to-human and human-to-human contact reduction.**“From the numerical results, it is shown that time resource and human resource in implementing the strategy will be required mostly at the beginning of the period and then lessen over time. Additionally, the variation of the model parameter has an effect on the optimal controls. Our simulations imply that the areas with higher mosquito’s biting rate require more efforts in controlling the disease. In conclusion, the behavior of the optimal controls should be changed according to the scenarios. This will help us to plan the strategy most efficiently. Furthermore, apart from mosquito elimination and protection against mosquito’s biting which is the standard measure, the human-to-human contact reduction also contributes to the control of the outbreak. Besides using pesticides, using protection against mosquito contacts and sexual contacts could help in reducing the spread of Zika virus infection.”<https://advancesindifferenceequations.springeropen.com/articles/10.1186/s13662-017-1220-4>

**Rapid spread of an ongoing outbreak of Zika virus disease in pregnant women in a Mexican hospital.**“In the first nine weeks of implementation of a Zika Virus Preparedness Plan in a Mexican Public Hospital, we cared for 221 pregnant women with any signal or symptom suggesting ZIKV infection and 99 (44.8%) patients were found to be positive for ZIKV. The median age of patients was 25.3 years (range 13–49). Symptoms in PCR-positive patients were rash (91.4%) followed by headache (53.1%), myalgia (46.9%), arthralgia (45.7%), pruritus (35.8%), retroocular pain (29.6%), conjunctivitis (21%), and fever (21%). The women's epidemiologic exposure history indicates local transmission and a community outbreak.”<http://www.sciencedirect.com/science/article/pii/S141386701630681X>

**Women’s reproductive intentions and behaviors during the Zika epidemic.**“…we provide an overview of the Brazilian context and describe how and why the ZIKV epidemic may affect reproductive processes. We then use new focus group data collected in two regions of Brazil with different onsets of the ZIKV epidemic and ZIKV and microcephaly rates to explore how the epidemic is affecting women's fertility intentions and contraceptive use. We pay special attention to how women's socioeconomic status and geographic location are related to their responses to the epidemic.”<http://onlinelibrary.wiley.com/doi/10.1111/padr.12074/abstract>

**Sexually acquired Zika virus a systematic review.**[http://www.clinicalmicrobiologyandinfection.com/article/S1198-743X(16)30659-0/fulltext](http://www.clinicalmicrobiologyandinfection.com/article/S1198-743X%2816%2930659-0/fulltext)

**Zika Virus and Sexual Transmission: A New Route of Transmission for Mosquito-borne Flaviviruses .**This perspective will outline the evidence for sexual transmission and persistence of viral infection in semen and vaginal secretions as well as review the animal models for sexual transmission of Zika virus <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5482308/>

**Accuracy of Zika virus disease case definition during simultaneous Dengue and Chikungunya epidemics.** “In areas where multiple arboviruses circulate, the presence of rash with pruritus or conjunctival hyperemia, without any other general clinical manifestations such as fever, petechia or anorexia is the best Zika case definition.”<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0179725>

**Zika virus dynamics: When does sexual transmission matter?**“Our model reveals a 4.8% contribution of sexual transmission to the basic reproductive number, R0. This contribution is too minor to independently sustain an outbreak but suggests that vector transmission is the main driver of the ongoing epidemic. We also find a minor, yet statistically significant, difference in the mean number of cases in males and females, both at the peak of the epidemic and at equilibrium. While this suggests an intrinsic disparity between males and females, the differences do not account for the vastly greater number of reported cases for females, indicative of a large reporting bias.”<http://www.sciencedirect.com/science/article/pii/S1755436517301093>

**Effective population sizes “Ne” of a major vector of human diseases, *Aedes aegypti*.** This is an interesting article… Not an easy reading (not for me), but worth the effort given its relevance regarding methods involving or resembling the use of genetic modifications.“In summary, we have shown that Ne in *Ae. aegypti* is relatively small across our worldwide sample, suggesting that these mosquitos form localized breeding units even in large cities where the regional census size is large. This is important because *Ae. aegypti* has become a model system in design of control programs using genetic methods that aim to suppress or genetically modify populations to decrease their efficiency at transmitting pathogens. Methods of genetically modifying vector populations that rely on inundation and replacement are quite feasible with such small populations. On the other hand, such small breeding units must be quite spatially limited. This means genetic modification over a larger area will require many local releases spatially separated across a target area. Even those genetic modifications based on gene-drive would need to be seeded in many locations across a target area. The very slow spread of successful Wolbachia replacement in local sites in an Australian city is consistent with this view of *Ae. aegypti* population structure.”<http://onlinelibrary.wiley.com/doi/10.1111/eva.12508/full>

Why should you care about “effective population size”<http://www.instituteofcaninebiology.org/blog/why-you-should-care-about-effective-population-size>

**The visual system in infants with microcephaly related to presumed congenital Zika syndrome.**“A total of 70 infants with microcephaly were referred to the clinic. Of these, 25 (mean age, 3 months; 14 males) had ophthalmologic changes: 18 (26%) had intraocular abnormalities, including macular chorioretinal atrophy, mottled retinal pigment epithelium and optic nerve pallor; 7 patients (10%) had strabismus or nystagmus without intraocular abnormalities. Visual acuity was below normal range in all 11 infants tested.”<http://www.sciencedirect.com/science/article/pii/S1091853116307364>

**Knowledge, attitudes and practices regarding dengue, chikungunya, and zika and their vector *Aedes aegypti* in Villavicencio, Colombia.**Authors concluded “It is necessary to review campaigns, communication, and education promoted in the municipality because they do not reflect the knowledge of the people.”<https://benthamopen.com/EPUB/BSP-TOPHJ-2017-41>

“The present study was undertaken to test the hypothesis that the subtractive dysmorphic brain malformations observed in Zika′s microcephaly are primarily due to the massive induction of apoptosis of neuroprogenitor cells. We have designed a physiopatological algorithm based on the examination of the following medical findings: epidemiological data, ultrasound images, computed tomography scans, placental tissue, cerebral fluid analysis, eye fundoscopy, neurological examination and necroscopic findings.”<http://onlinelibrary.wiley.com/doi/10.1111/aogs.13184/abstract>

**Zika: CNS and Birth Defects**

**Zika virus tropism and interactions in myelinating neural cell cultures: CNS cells and myelin are preferentially affected.**“Through systematic quantification of ZIKV infected cells in myelinating cultures, we found that ZIKV infection is enhanced in the absence of the type I interferon responses and that Central Nervous System (CNS) cells are considerably more susceptible to infection than Peripheral Nervous System cells. In particular, we demonstrate that CNS axons and myelinating oligodendrocytes are especially vulnerable to injury. These results have implications for understanding the pathobiology of neurological symptoms associated with ZIKV infection.”<https://actaneurocomms.biomedcentral.com/articles/10.1186/s40478-017-0450-8>

**Pathophysiological mechanisms of Flavivirus infection of the central nervous system (Not Open Access).**<http://www.sciencedirect.com/science/article/pii/S1246782017300678>

**Recent advances in understanding the adaptive immune response to Zika virus and the effect of previous flavivirus exposure (Not Open Access).** “ZIKV shares structural similarities with other flaviviruses, especially DENV, and co-circulates in dengue-endemic regions; The understanding of the immune response to ZIKV infection has dramatically increased in the last year through in vitro studies with monoclonal and polyclonal antibodies derived from ZIKV-infected individuals, animal studies, and longitudinal analysis of human immune sera from returned travelers and from dengue-endemic regions; Both ZIKV type-specific antibodies and DENV cross-reactive are generated, which have been shown to be either protective or enhancing in animal models; The effect of prior DENV exposure on the adaptive immune response to ZIKV infection is an area of active investigation, and many questions still need to be addressed, particularly by placing in vitro and in vivo findings in an epidemiological context.”<http://www.sciencedirect.com/science/article/pii/S0168170217304628>

**Raised Frequency of Central Nervous System Malformations Related to Zika Virus Infection in Two Birth Defects Surveillance Systems in Bogota and Cali, Colombia (Not Open Access).**“In 2016, rates of microcephaly appeared to start increasing around May (8 months after the reported start of the Zika virus epidemic), peaking in July, and declining through December 2016 to levels close to those reported in May 2016. If these estimates are generalizable to the 2016 birth cohort in the cities of Cali and Bogota, then 121 cases of severe microcephaly associated with Zika virus epidemic would be expected in both cities and 588 cases in Colombia for 2016.”<http://journals.lww.com/pidj/Abstract/publishahead/Raised_Frequency_of_Central_Nervous_System.96979.aspx>

**Preliminary Report of Microcephaly Potentially Associated with Zika Virus Infection During Pregnancy - Colombia, January-November 2016.**“In Colombia, approximately 105,000 suspected cases of Zika virus disease (diagnosed based on clinical symptoms, regardless of laboratory confirmation) were reported during August 9, 2015-November 12, 2016, including nearly 20,000 in pregnant women… Colombia's Instituto Nacional de Salud (INS) maintains national surveillance for birth defects, including microcephaly and other central nervous system defects. This report provides preliminary information on cases of congenital microcephaly identified in Colombia during epidemiologic weeks 5-45 (January 31-November 12) in 2016. During this period, 476 cases of microcephaly were reported, compared with 110 cases reported during the same period in 2015.”<https://www.ncbi.nlm.nih.gov/pubmed/27977645>

**Neuroimaging findings of congenital Zika virus infection: a pictorial essay.**“In this pictorial essay, we aim to illustrate the prenatal and postnatal neuroimaging findings that may be seen in fetuses and neonates with congenital Zika syndrome, and will discuss possible radiological differential diagnoses. A detailed knowledge of these findings is paramount for an early correct diagnosis, prognosis determination, and counseling of the affected children and families.”<https://link.springer.com/article/10.1007%2Fs11604-016-0609-4>

**Presumed congenital infection by Zika virus: findings on psychomotor development - a case report (4 cases).“**This study presents the results of the interdisciplinary assessment with standardized instruments to detect alterations in the development of infants up to 4 months old with congenital infection presumed to be ZikV. According to the evaluation, these children have in common, hyperreflexia and hypertonia, atypical development and a deficit in the manual function. However, the visual and swallowing function do not follow the same pattern perhaps it is associated to alterations of the brain and the location of the calcifications. After birth, even at the first quarter of life, it is already possible to identify signs of severe brain injuries, from abnormalities present in the muscle tone, in the primitive reflexes, in postural reactions and voluntary motricity.”<http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1519-38292016000800004&lng=en&tlng=en>

**Guillain–Barré Syndrome and Chikungunya: Description of All Cases Diagnosed during the 2014 Outbreak in the French West Indies (Not Open Access).“**The chikungunya epidemics, which occurred in Martinique and Guadeloupe in 2014, affected 308,000 people in these two islands. GBS occurred during or immediately after acute chikungunya infection in 13 patients (10 men, three women; mean age: 61 years). Median time from acute chikungunya to GBS onset was 9 days. Twelve patients were treated with intravenous polyvalent immunoglobulins, nine of whom improved within 7 days. Five of 13 patients required mechanical ventilation. Two patients with severe GBS died. At 6 months of follow-up, 7/13 achieved a good functional recovery with no or minor residual symptoms. A 2-fold increase in incidence was observed during the year of chikungunya outbreak. This study supports prior reports suggesting that GBS may be a complication of chikungunya.”<http://www.ajtmh.org/content/journals/10.4269/ajtmh.15-0753>

**Inhibition of autophagy limits vertical transmission of Zika virus in pregnant mice.**“… researchers administered hydroxychloroquine, an FDA-approved drug known to inhibit autophagy, to Zika-infected pregnant mice. Consistent with the results seen in mice who lacked the Atg16l1 gene, mice treated with hydroxychloroquine have lower levels of detectable virus in their placentas and less placental damage, compared to untreated mice. The treatment also restricts Zika infection in the fetal head and leads to a larger fetal body size, suggesting that the drug limits cross-placental transmission of the virus.”<http://jem.rupress.org/content/early/2017/07/07/jem.20170957>

**Lineage-dependent differences in the disease progression of Zika virus infection in type-I interferon receptor knockout (A129) mice.**“Using a mouse strain with a deficiency in the type-I interferon receptor (A129), after challenge with ZIKV using a route that resembles the natural route of infection via mosquito bite we compared the two major lineages of ZIKV: African (ZIKAAF) and Asian (ZIKVAS). Whilst it was known that ZIKVAF causes a lethal disease in A129 mice, we observed a non-lethal infection with ZIKVAS. To confirm the finding, a recent isolate of ZIKVAS was additionally assessed and demonstrated the same observations. Our studies provide new insights into the mechanisms of ZIKV infection in a small animal model; and may help to elucidate the different pathologies caused by this virus.”<http://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0005704>