**Ethical-legal and societal debate on Zika virus epidemics complications and strategies on reproductive and mental health**

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**Abstract**

Much of the fear and uncertainty around Zika epidemics stems from potential association between Zika virus (ZIKV) infected pregnant women and risk of their babies being born with [microcephaly](http://www.cdc.gov/ncbddd/birthdefects/microcephaly.html) and other neurological pathophysiological on the embryo and fetus. But much remains unknown about transmission, diagnosis and long-term congenital pathogenesis and constellation of abnormalities including loss of fetus (miscarriage or prematurity, stillbirths) and/or severe birth defects. Worries of these unknowns with and/or without acquired immunity, dichotomy between medical, ethical, legal, religious and families regard proxy or informed consent explain the urgent needs of effective and efficient psychosocial programs and medical-legal strategies such as rubella virus, thalidomide, smoking, alcohol and so forth . Local and global efforts in maintaining the fundamental health principles in moral, medical and legal decision-making policies and interventions to preserve and promote health professionals ethical and complex nature of decision making, individual and collective autonomy, fairness, protection of most vulnerable, proportionality, morality and dignity, integrity and beneficence that should not be confused and relegated by compassionate humanitarian assistance and support. The paper explores the potential medical and ethical-legal implications of Zika virus epidemics and interventions strategies on reproductive and mental health policies and measures. As well further research on Zika-related population-based ethico-medical and societal issues implications, especially maternal-child health require attention in rolling out future Zika vaccination programs in most affected countries and worldwide.

**Key words:** Zika virus, Epidemics, ethical, legal, Abortion, Mental, reproductive, programs

**Introduction**

Zika virus is a mosquito-borne infection mainly transmitted via the bite of *Aedes* mosquitoes (of the same family as the ones that transmit dengue, West Nile and Chikungunya), and has already spread to 31 countries and territories in Latin America and the Caribbean. Until 2015, Zika had rarely appeared in the Western hemisphere and the rapid spread was declared as public health emergency of international concern by the World Health Organization (WHO) on February 1, 2016, due to explosive reemergence of reported Zika virus (ZIKV) potential link to cases of congenital microcephaly, neurological disorders’ and still birth in Brazil, Columbia and other ZIKV affected countries [1,2]. It is perhaps difficult, if not impossible to screening all reservoirs with the prevailing co-infections, with and/or without acquired immunity, dichotomy between medical, ethical, legal, religious and families. Still more evidence on the devastating microcephaly and neurological birth defects as a result of Zika virus infection that can ostensibly lead to seizures, developmental delay and shortened life expectancy are ongoing in affected populations [3].The designation could fast-track local and international funding for research to tackle the virus and put it in the same category of concern as the Ebola virus.

Much of the fear and uncertainty around Zika stems from a suspected association between pregnant women infected with Zika and risk of their babies being born with microcephaly, a birth defect characterized by an abnormally small head and brain damage [4]. But much remains unknown about transmission, diagnosis and long-term pathogenesis. Zika virus often causes minimal (or no) symptoms in infected patients. Pregnant mothers don’t need to have symptoms to transmit the virus to their fetus, and there’s neither reliable nor prompt point of care diagnostic test, nor treatment and vaccine to combat the disease and proven advice on travel or tourism, especially to places where the virus is circulating or transparent and equitable actions in morally acceptable alternatives without or limited harms “do no harms” versus “precautionary principle or uncertainty in justification” to the family/population as a whole benefits! [7].

The Centers for Disease Control and Prevention have issued a travel alert for pregnant women, suggesting they postpone travel to the areas where Zika virus transmission is ongoing. The CDC has created an algorithm for testing pregnant women, who may have been exposed to the virus, but it’s exceedingly complicated and more troublingly It may lead to the detection of microcephaly outside the window period of birth defect when it’s too late to do anything about it to possible pregnancy termination [7,8]. There is now a groundswell of support in the medical community to wipe out the species of mosquito that carries the Zika virus and potentially, to bring back DDT to do it [7,10]. Are we taking the right action or are we applying the most effective solutions? With different laws and constitutions in Latin American countries, it is difficult to approve collective or universal ethical and legal policies and frame works to favor women delay of their pregnancies for the foreseeable future, fostering attempt to proper discussions on abortion and reinforce blood products transfusion advanced screening [11].

This paper addresses medical, ethical-legal and societal issues and implications of Zika virus epidemics; and advocates on innovative solutions in tackling the sexual-reproductive and mental health alongside transfusion medicine policies, programs and interventions strategies.

**Improving Aedes-mosquito vectors transmission interruption and better access to quality health care delivery**

Immediate action must urgently be implemented in the most affected areas and nations with across borders integrated mosquito control programs. Travel restrictions and even that women delay their pregnancies have been advised. Strengthening the role of national governments, trust in those governments, and the strength and preparedness of local health systems are paramount [12]. Related recommended contraceptive methods, information, education and communication measures should be reinforced in the modern era vector control labile context ethico-medical, cultural and societal issues because of public resistance, intense urbanization and migration, crowding and poor sanitation and hygiene [2,4,13]. Among the best preventive measures against Zika virus include but not limited to breeding sites in household screens, air-conditioning and removal of yard and household debris and containers that provide mosquito-breeding sites [13].

**Zika and pregnancy related medical care interventions**

The mainstays of management are bed rest and supportive care. When Zika virus and other arboviruses species are co-circulating, specific viral diagnosis, if available, can be important in anticipating, preventing, and managing complications due to societal ethico-medical perceptions and practices challenges and issues. The global community has the responsibility to protect and promote the health of all people as stated in the first international declaration underlining the importance of primary health care [15]. The risk of microcephaly and neurological defects for many unborn children is far too great to justify any avoidable trip or seek advice from medical providers and follow the recommendations and guidelines of WHO, CDC and public health authorities [2,6,9,17]. Also, it is still uncertain and even frightening to think of the potential implications of Zika-related pathophysiological, emotional and societal consequences such as trauma, stress, depression, stigmatization and social withdrawal impacts on the affected populations and nationwide socio-demographic and economic over time.

The ethical implications of medical decision-making in Zika epidemics can be tricky especially in pregnant women patient ethical framework at all stages of pregnancy including mother-child post-delivery rehabilitation measures. So why not follow the evidence? It is also important to strengthen the basic responsibilities in the orientation and management of population and family planning programs. For example in November 2015, Brazil declared a state of emergency following a sudden and unprecedented surge in the number of newborns born with microcephaly spilling to stillbirth and fetal death, placental insufficiency, fetal growth retardation and damage to the central nervous system being linked to Zika infection during pregnancy [2,11,16,18]. There are reports of almost 4,000 babies born potential ZIKV linked microcephaly in Brazil in recent months, compared with a normal rate of about 150 cases a year. Microcephaly can also because by a range of factors and illnesses including genetic abnormalities, exposure to certain teratogenic drugs or products and radiation exposure intensity and duration [2,3,7,9,11]. However, there is relatively high rate of intellectual disability, epilepsy and other developmental problems in children born with microcephaly, neurological disorders and other syndromes characterized by small size head, reversible or irreversible cognitive or neurodegenerative symptoms which might be serious problems during childhood development. The CDC has created an algorithm for testing pregnant women, who may have been exposed to the virus, but it's exceedingly complicated and more troublingly, it may lead to the detection of microcephaly outside the window period of possible pregnancy termination [19].

**Ethical-legal impacts on Zika virus epidemics birth control sexual-reproductive policies and measures**

There is no vaccine or treatment for the ZIKV and no known treatment for children who suffer brain damage in the womb; Caribbean and Asia-Pacific-prone regions aiming at preventing vertical mother-to-child transmission impacts require innovative strategies including expanded sexual and reproductive health measures against their aspirations for freedom and liberty in most affected populations [19]. Despite these documented urgent needs, affected populations still suffered the lack or shortage of protective and preventive measures; dearth informed and understood consent, and adequate information communication to the most vulnerable populations in remotes settings. The situation is complicated with limited pre- and ante-natal diagnostics for pregnancy screening, and palliative measures. Hence, ZIKV perception discordances, knowledge and skills to community health workers and public, scaling up diagnostics to women and fetal development monitoring, access to sexual and reproductive education, contraceptive measures, birth and abortion reforms should be reconsidered to curb the ZIKV transmission dynamics to supplement informative and practical public health recommendations in line with WHO or CDC guidelines. Reproductive Health is a state of complete physical, social, and mental reproductive well-being and not merely the absence of reproductive disease or reproductive infirmity as stated by the WHO [18,21].

It is estimated that by the end of the year (2016), ZIKV in Brazil will be about 16,000 cases of microcephaly across the country. While the prognosis varies on a case-to-case basis, some of the babies born with the condition will have short and painful lives. The epidemic has been of considerable concern particularly because it has been linked to microcephaly (unusually small heads) in newborn babies that can lead to potentially severe or devastating brain problems and other health complications have made the fetus unviable or “low compatibility with healthier life” [1,2,5,7,9]. But is it ethical to use birth control to control Zika microcephaly? From suspicion to confirmation of a fetus with microcephaly, pregnant women would be offered ultrasound screening from 20 weeks every two to four weeks based on serial measurements of baby’s head and the change in velocity of growth over time [12,19]. Moreover, MRI scans could help by identifying whether the brain was still smooth or had developed the normal walnut-type wrinkling and neurological disorders [12,19,20].

**Zika virus epidemics complications and abortion**

Zika outbreaks continue to raise concern and fear on worsening maternal and child health in most developing countries [1,2,6]. Particularly, fears of rise in deaths from unsafe abortions as campaigners urge governments in Latin America to rethink bans on abortion and make contraception widely accessible and available. Campaigners are calling on Latin American governments to rethink their policies on contraception and abortion. This is because ZIKV spread by sexual intercourse and potential via shared injections, might lead to intensification of ZIKV transmission course and rise in women’s infection incidence leading to risky, unsafe and illegal abortions. Predictably, surge in microcephaly and brain-damaged babies that could lead to serious degrees of disability later in life resulting to as well as the [1,2,23,24]. For example, the rubella epidemic congenital syndrome during pregnancy, occurred in 1964-1965 in United States, led to 12, 5 million cases. A total of 20,000 children were born with congenital syndrome (11,000 deaf, 3,500 blind and 1,800 mentally retarded, and 2,100 neonatal deaths and more than 11,000 abortions [25]

Hence, several governments in the Caribbean region have advised women to postpone getting pregnant for up to two years, which sexual and reproductive health professionals in affected countries where birth control is not easily accessible and available and/or some women fall pregnant through sexual violence and suffered from related stigmatization and depression [25]. The paper calls more proactive and smart governments programs and strategies should include expansion of integrated vector control programs and proven solutions and expansion access to contraception, reinforcement of blood arboviral screening and microbial screening by scaling up laboratories facilities particularly for groups that have low incomes [1,3,4,26,27]. Also, expansion of access to safe abortion services could be regularized. More awareness campaign to communities on the risk of Zika, acute and severe consequence alongside suitable and effective options should readily be availed by legal and recommended health and legal professional in ZIKV affected countries similar to rubella through effective and reliable psychosocial measures, and medical-legal response strategies [4,6,25,27,28,29].

**Poverty-related Zika virus epidemics on mental health and transfusion medicine**

ZIKV primary route of transmission is via the *Aedes* mosquito species bite, although the extend from other routes of transmission require further research such as human-mosquito-human, sexual transmission, bodily fluids transmission (*e.g.*, semen, saliva, urine, breast milk) [30, 31,32]. With very scarce access to mental health professionals shortages in most affected countries can led to more stigmatization, panic and anxiety stress, depression, to suicidal and other social issues in pregnant women and affected communities. Tackling the gaps and issues requires urgent new and appropriate mitigation measures and ways, psychosocial awareness, psychiatry rehabilitation and mental education strategies. An early spectrum of less severe brain damage among infants have correlated with ZIKV, but these conditions can only be detected well after birth when cognitive testing can be conducted over time [5,15,32,33].

Public health challenges and problems have been left unaddressed for the developing countries and lack of running water and waste management in conjunction with urban crowding and poor housing. These factors coupled together have given rise to the perfect set of conditions for the transmission of such mosquito-borne viruses [34,35,36]. Still, Brazilian authorities recommended preventive and protective measures against ZIKV infections during the February 2016, Rio Carnival attended by more than 500,000 visitors, and additional evidence-informed guidelines will be drawn to protect all local, visitors and players at the forthcoming Olympic and Paralympics games in September 2016, in Brazil[38,39] . As well, sexual transmission of the virus from male-female partners, homosexual or sex workers for undefined periods of time after the partner's infection as well as well maternal-child health additional ethico-medical and societal issues implications require further research in rolling out future Zika vaccination programs [35,37,39,40,41].

**What next?**

Moving forward will require engaging the global community including all stakeholders to advocate and participate in strengthening local and national Zika and other arboviruses surveillance and open data sharing, early warning systems in public engagement and vigilance. Timely and effective risk communication and information dissemination is imperative in guiding knowledge-based ethical, legal and societal practical and acceptable recommendations and guidelines in protecting the life of most vulnerable populations and communities worldwide. More research innovative and sustainable proportionate global mosquito control, response approaches and interventions especially Zika vaccines and treatments are urgent.

Just as health workers, medical practitioners and public health experts are working to address key determinants regarding testing, screening, treatment, vaccination and prevention of ZIKV; lawyers, ethicists, legislators and policy-makers are assessing emerging legal and ethical issues. Legal triage entails prioritization of these issues in real-time to facilitate legitimate public health and medical responses by: (1) identifying enabling and disabling issues; (2) gauging changing legal and ethical norms; (3) crafting and explaining innovative solutions; and (4) consistently revisiting the utility and efficacy of legal guidance. Profound reproductive rights issues surround access and use of contraception and abortion, especially among pregnant minors. Many of the nation’s experiencing widespread ZIKV infections have religious foundations and related laws that deeply conflict with these services. Until ZIKV threatens a greater portion of pregnant women domestically, screening recommendations may apply only to at-risk groups like infants born to mothers with prior or current exposures to endemic regions. Potential for discrimination arises as mothers (e.g., migrants from Mexico) are targeted for screening. The 2016 Summer Olympics and Paralympics games in Brazil and continued mosquito spread to North America heighten the potential for rapid global extents of ZIKV. WHO has expressed disdain for any national travel bans or restrictions? CDC has issued recommendations and voluntary travel warnings for pregnant women and vulnerable population in affected countries as well as tourists. As seen in response to EVD and SARS, other nations may impose restrictive travel policies on their citizens or attempt to keep out or screen persons arriving from "hot spots ZIKV zones”. Furthermore, research into more sensitive and field or point of care diagnostic for mandatory population-based screening, especially children for ZIKV at birth and during the course of development. Conversely, if efficacious treatments for ZIKV infections among infants become a part of the standard of care, failures to screen at risk infants may lead to liability later if their disabilities could have been prevented.

**Competing interest**

Authors declare no conflict of interests

**Authors’ contributions**

ET generated the idea and constructed the framework. ET and GM searched relevant literature, scrutinized all relevant information and draft the manuscript. ET, CKW, OAO, CFC and EIMK provided additional information. All authors read and approved the final manuscript.

**Acknowledgements**

No funding supported this work

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