**PUBLIC HEALTH ETHICS CASE STUDY**

**Ethics of preventive strategies in dengue control: case study from Tamil Nadu**

Vijayaprasad Gopichandran, Assistant Professor, Department of Community Medicine,

ESIC Medical College & PGIMSR, KK Nagar, Chennai 600078

[vijay.gopichandran@gmail.com](mailto:vijay.gopichandran@gmail.com)

Tamil Nadu saw a major outbreak of dengue in 2017 with more than 23,000 cases and 63 deaths.Sentinel surveillance hospitals were established and a laboratory-based surveillance system was also set up. Legal notices were sent to many establishments in Tamil Nadu under section 269 of the Indian Penal Code for harbouring vector breeding sites in their premises. The state government also actively promoted a polyherbal concoction derived from a traditional Siddha system of medicine for prevention and control of dengue. These interventions and the ethics of dengue control are discussed in this presentation.

**Introduction**

Dengue is a vector borne viral illness, caused by a virus belonging to the Flaviviridae family. It is transmitted from person to person by the bite of the female Aedes mosquito. The illness is characterised by fever, head ache, body pains and a mild to severe form of bleeding condition. The bleeding condition related to dengue is also referred to as Dengue Hemorrhagic Fever (DHF) when it is mild and associated with minor bleeding in the skin, presenting as reddish rashes and as bleeding from the nose and gums. The more severe form of bleeding can lead to Dengue Shock Syndrome (DSS) in which the patients lose massive amounts of blood and go into a state of shock.[1] The more severe forms of dengue have been reported to even lead to death. Dengue is a common illness in India, with a high prevalence during the monsoon seasons of September to December, when the aedes mosquito breeds in the puddles of water.[2] Dengue has also been reported in dry regions of the country, as the water scarcity leads to storage of water in households, which becomes a potential vector breeding site.[3]

**Dengue outbreak of Tamil Nadu in 2017**

There was a massive outbreak of dengue in Tamil Nadu in the year 2017. A total of 23294 cases of dengue were reported with 65 deaths due to dengue.[4] The trends of dengue in the state from 2015 to 2018 are shown in Figure 1.

Further, the district-wise distribution of the cases due to dengue in the year 2017 are shown in Table 1.[5] These data show that the dengue problem was a major crisis in Tamil Nadu in the year 2017.

Table 1: Distribution of dengue cases in the various districts of Tamil Nadu

|  |  |  |
| --- | --- | --- |
| S.No | Districts | No. of cases of dengue |
| 1 | Madurai | 1268 |
| 2 | Thoothukudi | 1178 |
| 3 | Chennai | 1138 |
| 4 | Salem | 1072 |
| 5 | Coimbatore | 942 |
| 6 | Thirupur | 782 |
| 7 | Kanyakumari | 777 |

**Interventions by the Tamil Nadu Public Health and Preventive Medicine Department in response to this dengue outbreak**

The Department of Public Health and Preventive Medicine of the Government of Tamil Nadu focussed its efforts on anti-larval work, sentinel hospital based surveillance, laboratory based surveillance, entomological surveillance, enforcement of the legal provision of the Tamil Nadu Public Health Act 1939, focus on districts which share the border with neighbouring states, and distribution of a Siddha medicine called *Nilavembu Kudineer* as a preventive and treatment modality.[6–9] Many of these interventions led to significant ethical debates. These debates and their ethical considerations are discussed here.

**Ethical considerations of the public health interventions**

*Curative services in hospitals*

The government of Tamil Nadu set up special dengue wards with mosquito nets and isolation precautions at all tertiary care hospitals, district hospitals and primary health centres. Despite allocation of special beds for patients with dengue, it was noted that the hospitals were overflowing with patients. It was also widely publicized that all patients who had suspected dengue fever should visit a government hospital or get admitted in a government health facility for standard treatment. Private health facilities were also asked to transfer their patients to the government hospitals if they suspected dengue.This led to a deluge of patients in the government hospitals, especially in the capital city of Chennai, where the beds and health care providers became inadequate to manage the crowd.[7]One of the other main reasons for this overcrowding of Chennai hospitals was because the neighbouring district hospitals such as Kancheepuram and Thiruvallur also referred their patients with dengue to the Chennai hospitals. If the overall health system across the primary, secondary and tertiary care facilities are empowered to manage cases of dengue, with a proper flow of referral, this overcrowding and compromise of quality of care could have been prevented.

*Anti-larval work*

The public health department focussed its work on anti-larval measures. The larvae of the Aedes mosquito hatch in the stagnated water in domestic spaces. Therefore, one of the important interventions to reduce the mosquito breeding was to prevent water stagnation or potential collections of water which could lead to larval breeding. In Tamil Nadu there is a diversity in climatic conditions. While there are some western districts like Coimbatore and Nilgiris which receive substantial rains during the monsoon and have water stagnation where the vector larvae can breed, there are also some districts like Chennai, Dharmapuri, which are chronically water starved and dry. In these dry areas, the households store water in pots and containers, which serve as vector breeding sites. The anti-larval drive focused on removing all water collections or unsafe storage from households by door to door inspection of households as well as an intensive information, education, communication campaign. There were instances where the public health officers who were inspecting the households for larval breeding sites emptied stored water into the drain, thereby wasting the efforts of the womenfolk of the households who often walked long distances to collect water. The ones worst affected by this process of emptying household stored water were the women, who were mostly home bound, while the men of the house had access to water at their workplace. The public health inspectors who were on these cleaning drives, often entered households unannounced and without prior intimation. In case of locked houses, they even were permitted by the public health authorities to break and enter the households for inspection.

*Enforcement of the legal provision of Tamil Nadu Public Health Act 1939*

Though the dengue outbreak itself was not officially declared as a public health emergency, the Department of Public Health invoked the provisions of the Tamil Nadu Public Health Act of 1939 to legalize forced entry into locked houses to inspect and eradicate mosquito breeding sites and slapping penalties that included fine and prison sentence on people who refused to abide by the cleanliness, water storage and eradication of vector breeding norms posed by the department.[10] More than 4000 legal notices were issued with as high as 260 legal notices on one single day to various residential and commercial establishments.[8]According to the Tamil Nadu Public Health Act, the public health authority not below the rank of health inspector is given the powers to carry out cleaning, eradication of mosquito breeding, inspection of both residential and commercial establishments provided it is during the day time and they may even forcefully enter the premises if despite 24 hours of advance notice, the owner of the premises does not permit the officer to enter. If the premises is found to have vector breeding sites, the Act authorizes the public health officer to issue a legal notice with a fine or a prison sentence or both.

There are several important critiques on the enforcement of the TNPH Act 1939 in this context. Firstly, though there was a more than 200% increase in the incidence of dengue in the state in that year, it was never officially declared as a public health emergency. Moreover, invoking the legal clauses of this act without a focus on public health provisioning of social determinants of health could seriously violate the human rights of the people. For example, without making adequate provisions for safe drinking water, emptying the stored water in houses is a violation of their rights. Without making adequate arrangements for solid waste disposal mechanisms, it could be unreasonable to penalize people who have garbage dumps in their premises. The act should be viewed in the context of the responsibilities of the public health authorities to ensure basic standards for healthy living.

*Dengue surveillance*

There were 30 sentinel surveillance sites established in Tamil Nadu for the purpose of active dengue surveillance. This included medical college hospitals, zonal entomological teams, institute of vector control and zoonoses in Hosur, and district headquarters hospital in Cuddalore and Ramanathapuram. There was also an apex laboratory established for laboratory-based surveillance. In addition, entomological surveillance by door to door larval and pupal surveys in several areas were also carried out during the outbreak. The hospital based and laboratory-based data were shared with the National Vector Borne Disease Control Program database in an anonymized manner, thus protecting the confidentiality of the patients. The vector surveillance included repeated entry into the homes of people, especially in certain specific locations like households in areas which were in the border between Tamil Nadu and its adjoining states of Kerala and Karnataka.[7] The inhabitants of these border areas are usually poor and lack even the basic civic facilities as they fall between the jurisdiction of either state. In this sense they are marginalized and resource deprived. While these households bear the brunt of invasion of privacy in the form of repeated larval surveillance, there is very little in the form of reciprocal improvement in their living conditions or health services. This leads to injustice between these areas and the more affluent areas of Tamil Nadu which also enjoy the reduction in dengue, without contributing much to the surveillance activity.

*Distribution of Nilavembu Kudineer a complementary and alternative medicine drug for prevention and cure of dengue*

*Nilavembu Kudineer* is an herbal concoction prepared according to the principle of Siddha stream of complementary and alternative medicine. This concoction was widely distributed by the public health department of Tamil Nadu at street corners, bus stops, railway stations, schools and primary health centres all over the state. This concoction was said to prevent dengue as well as treat and cure the symptoms of dengue. This policy was based on the findings of a research study, which itself was heavily criticized for its scientific rigour. The study was a case-control study, which is best suited to understand association between risk factors and diseases and not for studying the efficacy and safety of preventive and curative treatments. Moreover, there was no adjustment or matching for confounders in the study, thus throwing important questions about its validity. The absence of a rigorous randomized controlled experiment to establish the efficacy and safety of the concoction, limits the evidence for its effectiveness.[9] Therefore aggressive distribution of this concoction by the public health department of the state is a matter of ethical concern. By actively promoting this concoction, the public health authorities not only created a sense of reassurance among people without adequate scientific evidence, but they also diverted the efforts of the primary health care providers such as doctors, nurses, nurse auxiliaries into this effort rather than other competing priorities like case finding, surveillance, case reporting etc. This issue was of great debate at the time of the outbreak.

**Discussion**

Vector borne diseases are emerging as serious public health threats in the recent years. With emergence of Zika virus and the re-emergence of dengue in India, there is a need for greater emphasis on vector borne disease control in the country. The fear and panic caused by the outbreaks of these vector borne diseases often pushes governments and public health authorities to take aggressive measures against the vectors and the disease. Such measures are often wrought with ethical problems. While the World Health Organization is in the process of developing ethical guidance for interventions to prevent and control vector borne diseases, there is a need to closely evaluate the interventions against VBD with an ethical lens.[11] Interventions against vector borne diseases range from simple ones including cleanliness, sanitation, safe drinking water, proper disposal of wastes, avoiding water logging in residential areas to gene drive technology, Wolbachia infected aedes mosquitoes etc. The southern state of Tamil Nadu experienced a major outbreak of dengue in 2017 and the response of the state to contain the outbreak offers an opportunity to perform a critical ethical analysis and learn from it regarding the ethical review of such interventions. Some of the key ethical considerations that can be learned from this case study include:

1. To move from a disease control to a social determinant focus in public health[12] – This dengue outbreak response is a typical example of how public health systems tend to focus on disease control activities immediately following an outbreak, to contain the outbreak and fail to focus on social determinants that caused the outbreak. In this context, the imposition of legal sanctions and forced cleaning of households was the immediate response to the outbreak, rather than a sustained long-term focus on provision of safe drinking water, proper solid waste management and sanitation.
2. To ensure equitable distribution of benefits and burdens of the intervention and reciprocity to those who suffer more burdens[13] – It was observed in this case study that the poor and marginalized people living in the border district areas bore the greatest burden of the invasion of privacy during the surveillance, whereas the benefits of the surveillance were shared by all the people of Tamil Nadu. There is a need to specifically compensate for this extra burden on these people by improving their standards of life and access to health care.
3. To carefully review the Tamil Nadu Public Health Act 1939, to make it more rights based, and ensure that it stipulates responsibilities for governments while it vests great powers in their hands to take legal action to improve the health status of the population.
4. To ensure that public health policy is evidence informed and rational in order to ensure optimal beneficence and non-maleficence to the community.
5. To ensure that public health resources such as money, man power and other resources are optimally utilized for public health interventions that are proven to be effective, rather than diverting them to wasteful interventions away from useful ones.
6. To strengthen the overall public health system rather than keeping it top heavy at the tertiary care facilities, thus offsetting the unmanageable crowds that are seen in tertiary care facilities during these conditions.

**Conclusion**

In conclusion, public health interventions in case of crisis situations, such as the one during the dengue outbreak of 2017 in Tamil Nadu, must be carefully assessed for ethical issues. An ethical intervention would balance benefits and risk, be equitable, respect individuals, and invest only on evidence based interventions with optimal utilization of resources.

***Declaration:***

*This paper has been presented as part of a workshop / symposium organized by the Ethics Unit of the World Health Organization on ethics of Vector Borne Diseases at the Joint 14th World Congress of Bioethics and 7th National Bioethics Conference held between 5-7 Dec 2018 at Bengaluru.*

**References:**

1. Gubler DJ. Epidemic dengue/dengue hemorrhagic fever as a public health, social and economic problem in the 21st century. Trends Microbiol. Elsevier; 2002;10:100–3.

2. Ukey PM, Bondade SA, Paunipagar P V, Powar RM, Akulwar SL. Study of seroprevalence of dengue fever in central India. Indian J. community Med. Off. Publ. Indian Assoc. Prev. Soc. Med. Wolters Kluwer--Medknow Publications; 2010;35:517.

3. Kalra NL, Kaul SM, Rastogi RM. Prevalence of Aedes aegypti and Aedes albopictus-Vectors of Dengue Haemorrhagic Fever in North, North-East and Central India. WHO Regional Office for South-East Asia; 1997;

4. MoHFW M of H and FW. Dengue/DHF situation in India [Internet]. Natl. Vector Borne Dis. Control Progr. 2018 [cited 2018 Nov 28]. Available from: http://nvbdcp.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715

5. MoHFW M of H and FW. Central team of multi-disciplinary experts to investigate outbreak of febrile illness in Tamil Nadu [Internet]. Press Inf. Bur. Gov. India. 2017 [cited 2018 Nov 28]. Available from: http://pib.nic.in/newsite/PrintRelease.aspx?relid=171681

6. Rao M. TN and Kerala had highest number of dengue cases in 2017, what went wrong? News Minute [Internet]. 2017; Available from: https://www.thenewsminute.com/article/tn-and-kerala-had-highest-number-dengue-cases-2017-what-went-wrong-73264

7. Govindarajan V. Chennai’s government hospitals are filling up with dengue patients from around Tamil Nadu. Scroll.in [Internet]. 2017 Oct 20; Available from: https://scroll.in/pulse/852569/chennais-government-hospitals-are-filling-up-with-dengue-patients-from-around-tamil-nadu

8. ENI ENS. 4,000 legal notices issued in dengue drive in Tamil Nadu: Director of Public Health. New Indian Express [Internet]. Chennai; 2017 Aug 27; Available from: http://www.newindianexpress.com/states/tamil-nadu/2017/aug/27/4000-legal-notices-issued-in-dengue-drive-in-tamil-nadu--director-of-public-health-1648735.html

9. S SS. Tamil Nadu government promotes Siddha medicine for dengue but doubts loom about its scientific basis. Scroll.in [Internet]. 2017 Oct 20; Available from: https://scroll.in/pulse/854724/tamil-nadu-government-promotes-siddha-medicine-for-dengue-but-doubts-loom-about-its-scientific-basis

10. MoHFW M of H and FW. The Tamil Nadu Public Health Act [Internet]. 1939. Available from: https://www.latestlaws.com/wp-content/uploads/2015/11/Tamil-Nadu-Public-Health-Act-1939.pdf

11. WHO WHO. Ethical issues associated with vector-borne diseases: report of a WHO scoping meeting [Internet]. Geneva; 2017. Available from: http://www.who.int/iris/handle/10665/259687

12. Arunachalam N, Tana S, Espino F, Kittayapong P, Abeyewickrem W, Wai KT, et al. Eco-bio-social determinants of dengue vector breeding: a multicountry study in urban and periurban Asia. Bull. World Health Organ. SciELO Public Health; 2010;88:173–84.

13. Kass NE. An Ethics Framework for Public Health. Yale J. Biol. Med. 2005;78:235–50.