Gorakhpur’s Japanese encephalitis malady

When you make a mistake, there are only three things you should ever do about it: admit it, learn from it, and do not repeat it.

—Paul “Bear” Bryant

Baba Raghav Das (BRD) Medical College in Gorakhpur became the epicentre of a controversy after more than 60 children there died earlier this month. Even as the confusion continued about the cause of death, the debate shifted back to the old culprit—Japanese encephalitis (JE)—the child killer disease.

JE is a viral disease that is transmitted by the infective bite of the Culex species of mosquitoes. The infection can lead to high fever, headache, stiffness in muscles, seizures, coma, and in worst cases, death. It primarily affects children because of their weaker immune systems.

In 2016, Uttar Pradesh (UP) contributed 25.5% of JE deaths in India. The last time JE made news in UP was in 2005 when 5,737 people were affected by the disease in seven districts of eastern UP and 1,344 people died. The centre of outbreak was Gorakhpur.

As long as Gorakhpur’s JE problem will be looked at from the narrow prism of only providing for beds and medicines, it will continue to haunt the district. It is important to understand that factors that influence propagation of vector-borne diseases are complex and sometimes fall outside the purview of the health department.

Climate: Gorakhpur has a climate that makes it vulnerable to JE. The temperatures in Gorakhpur range from 8.9 degrees Celsius to 38.3 degrees Celsius. The district receives rainfall between June and August with an average of 52.2 days in a year. In their research (goo.gl/sYh1S8), U. Suryanarayana Murty, M. Srinivasa Rao and N. Arunachalam found that 28 degrees Celsius temperature with 50-55% relative humidity is the most appropriate condition for increase in mosquito density.

Agricultural and husbandry: JE vectors thrive in irrigated paddy fields. Large swathes of land in the district are cultivated for paddy. Approximately 63% of the total workforce of Gorakhpur is directly engaged in agricultural activities. Families that depend on agriculture supplement their income with cattle rearing. Pigs and birds are considered to be primary carriers of the JE virus.

Urban development and management: Previously, it was believed that the JE virus resides in rural areas. However, emerging research suggests that JE virus may not be constrained to rural environments. *Culex tritaeniorhynchus* and *Culex gelidus* are two important Culex vectors in India. Murty et al found that while *Culex tritaeniorhynchus* was more prevalent in rural areas, *Culex gelidus* was common in urban areas. Gorakhpur is a bowl-shaped city with high groundwater tables. The gradient of the city is low to flat, which leads to problems of water logging and flooding. This creates ample habitation for JE vectors to thrive in urban areas.

Public health infrastructure: There is a shortage of sub-centres and primary health centres in rural areas. More than 81% of Gorakhpur’s population is rural. Due to unavailability of health facilities and medical attention within 5-10km, patients go to far-off district hospitals such as BRD Medical College—one of the major government health facilities in the region.

Vector-borne diseases like JE require intersectoral coordination. Going forward, the following steps ought to be taken.

Address agro-climatic concerns: It is important to converge climate and agriculture to tackle the issue of vectors. Irrigation technologies like alternate wetting and drying (AWD) methods can help with vector control. AWD refers to intermittent drying and re-flooding the rice fields without stressing the plants. This technique improves land and water usage, and lack of standing water also helps with vector control.

Address husbandry practices: Gorakhpur should be studied as a case for poultry as potential carriers of JE vectors. The total number of pigs in Gorakhpur is only 1.3% of UP's total pig population. Also, 86% of Gorakhpur's livestock comprises poultry. Natalie B. Cleton, Angela Bosco-Lauth, Michael J. Page, and Richard A. Bowen have found that young poultry between the age of two and 42 days, have high viremia and if they catch JE infection they can be amplifying hosts (goo.gl/tobu6Y). The state government should run campaigns to make citizens aware that pigs and poultry need to be segregated from humans.

Address urban development issues: In Gorakhpur, more than 80% of the rural population defecates in the open. This puts children at risk as their immunity is compromised. Thus, a cycle of disease is perpetuated. Climate change is likely to increase rain events throughout Gorakhpur over the next 50 years. Therefore, flood-resilient housing, solid waste management and sewage treatment should be pursued on priority.

Address public health issues: Immunization is a good strategy but coverage remains low due to low levels of awareness among people and low availability of vaccines. The pure public good in vector-borne disease is surveillance of all types of vector-borne diseases. Mosquito population counts should be done for all cities and local entomological knowledge repositories should be maintained to strategize vector control.

Vector-borne diseases are determined by a set of complex interrelated social, economic, and environmental factors. This means that health cannot be left to the health sector alone: it requires intersectoral coordination, cooperation and action. Traditionally, much of the government works in silos. Intersectoral action for health would require government departments to work with each other horizontally (inter-ministry cooperation) as well as vertically (at national, regional and local levels). Without intersectoral action, health outcomes will remain underachieved.

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