



5 DISASTER MANAGEMENT

5.1. Post - Tsunami vector surveillance in South India

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CRME team conducted the post Tsunami survey of coastal areas affected by the Tsunami waves (December 26th 2004) during January to March 2005 in Tamil Nadu and January to April 2005 in Kerala to identify JE/dengue vectors and likelihood of emergence of the associated vector-borne emerging diseases.

Tamil Nadu

Thirunelveli district

The survey team has visited all the villages and preliminary entomological surveys were conducted in Tirunelveli district. Because of local group clashes night landing collections could not be carried out. In the affected villages the following vector mosquitoes were collected: *Aedes aegypti*, the vector of dengue; *Anopheles culicifacies*, the vector of malaria; *Culex tritaeniorhynchus*, the vector of Japanese encephalitis. Even though the vector abundance was at a low level, there was based a chance for building up of vector density. Hence, the concerned health officials undertook fogging operations using technical malathion to prevent any vector-borne disease.

It has been noticed that the local health authorities have taken sufficient measures to prevent epidemic of vector-borne diseases. The team has however collected mosquito samples for lab investigation. As per the findings of the team there are no indication of outbreak of vector-borne diseases in the Tsunami affected coastal areas of Tirunelveli district. The team has conducted re-surveys in the same areas as a follow up to assess the risk for vector-borne diseases.

Ramnad district

In coordination with local health authorities the Tsunami affected coastal areas were surveyed for entomological parameters in Ramnad district.

As per the record only one locality viz., Ervadi (Taluk) was affected which belongs to Paramakudi Health Unit District (HUD) (not under Ramnad HUD). A camp was established at Ervadi village on 18th Jan. itself with the co-operation of state health department (courtesy of DMOs Mr. Kathiresan & Mr. Thangamani). Accordingly one village with four hamlets affected by the Tsunami was surveyed.



Ervadi is a religious place having a total population of 14059, with large number of floating population (mainly Islamic pilgrims), consisting of 6 villages (Hamlets). Out of these, 4 coastal villages were surveyed where tsunami tidal water entered on 26th December 2004 at about 10 am. One of the villages, viz., Thonidurai was badly affected and 2 human deaths had been reported. Prior to our visit health departments had already carried out all possible vector control measures e.g. thermal fogging, antilarval spray, human blood survey etc. In past, among the vector borne diseases, only malaria was recorded from Ervadi taluk area with very less number of cases (12 indigenous cases in the year 2004. However, imported malaria cases are very commonly reported in this area due to a place of pilgrimage which leads to the intrusion of infected floating population.

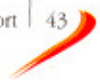
Vector surveillance comprises immature and adult collections, which include larval survey inside and outside the villages, in coconut groves about seashore, human landing collections on humans and resting collections inside the houses and cattle-sheds. Immatures were mainly recorded from coconut-pits, which were made for the purpose of the irrigation to coconut plants. These pits naturally collect rainwater and highly suitable for vector breeding, specially malaria vectors (*Anopheles*). During tsunami episode the marine water entered in these coconut pits. Altogether 45 coconut-groves pits were examined but no malaria vector was recorded. However, few anophelines are found breeding viz., *An.(Ano) barbirostris*, *An.(Ano) peditaniotus*, *An.(Cel.) subpictus* & *An.(Cel.) vagus*. No specimen of *An. (Cel.) sondaicus* was recorded. These pits were mainly infested with *Cx. tritaeniorhynchus* and *Cx. sitiens*. All the identification were confirmed in adult stages after rearing the immature stages in the laboratory.

For dengue vector survey, almost all the houses of 4 hamlets were examined. There was no water storage practice observed in this fishing community. People use small plastic containers to store or to carry the water for their daily use. None of them were positive for dengue vector. Two cemented cisterns were found out side the houses (peridomestic area) which were also breeding for culicines. No specimens of *Aedes* (dengue vectors) were collected in all the breeding habitats examined. Day time landing collections were made in all the 4 hamlets after using 8 man hours, no dengue vector specimen was found biting man.

In indoor resting and dusk collections very poor mosquito densities were recorded. Only JE vector, *Cx. tritaeniorhynchus* was recorded from one village. In past, there existed no records of JE virus infection in this area.

No specimen of filariasis vector was collected in whole survey except in one village, Thonithuni where one mud pot was found breeding with *Cx. quinquefasciatus*.

The local health authorities have also taken up preventive measures. As such there was no report of large number of fever cases or epidemic of vector-borne diseases. The vector density was also very low and that there was no symptom of any out-break of vector-borne diseases. However, a re-survey was also conducted in the same areas as a follow up to assess the risk for vector-borne diseases. All



the survey indicated that there was no possibility of vector borne disease epidemics at present in these tsunami affected villages of Ramnad district.

Pudukkottai district

Of the 26 PHCs in Aranthangi health unit district (HUD) in Pudukkottai district, four PHCs are in coastal region. Of the 245 villages in four coastal PHCs, 22 villages were reported to be affected villages. Details of PHCs and the number of villages affected during tsunami.

No human deaths were reported in this district but the neighboring district (Nagapattinam) was the worst affected district in Tamil Nadu, which recorded large number of deaths. However, heavy damage for the boats kept at the seashore was observed. No other damage was recorded. Tsunami tidal waves entered in some villages about half a kilometer though with less intensity.

Entomological survey were made in nine villages (affected villages), to assess the risk for vector borne diseases.

Immature survey was carried out in two villages in each coastal PHCs. Nearly 50 houses in each PHC was examined for presence of immature mosquitoes of dengue vectors. Immature mosquitoes collected were brought to the field laboratory and reared to adults for identification.

Indoor resting/landing collections was made for 1 or 2 hours in each village. Dusk collection was also made for one hour in one village in each PHC. Adult mosquitoes collected were brought to the camp-laboratory and identified into species. Adult mosquitoes collected in dusk/resting catch (*Cx. tritaeniorhynchus* & *Ae. aegypti*) were dried in the room temperature and preserved for determining JEV/dengue infection status.

Salient findings of the entomological survey are as follows:

- No malaria vectors could be collected in the villages surveyed.
- Breeding of dengue vectors was nil/low in most of the villages. Only in two villages the Breteau index was more than 20. However, no pupae could be collected in the villages and hence the pupal index was nil in all the villages surveyed. Abundance of dengue vector mosquitoes (*Ae. aegypti*) was very less.
- Due to intensive rice cultivation abundance of vectors of Japanese encephalitis was recorded in all the villages and the PMH density ranged between 6.0 – 210.0 which is more or less the same as in the neighboring JE endemic villages in Nallur PHC in Cuddalore district, which were not affected by the tsunami.
- No *Anopheles sundaicus* mosquitoes could be collected from the villages surveyed.



Status of the vector mosquitoes prevalent in the affected coastal villages was informed to the state health officials for carrying out the appropriate control measures. In the villages where the breeding the dengue vectors was recorded, source reduction approach and application of abate was advocated. As such there is no immediate threat for any mosquito borne diseases in Pudukottai district, at present.

Kanyakumari district

Nearly 33 coastal villages were affected due to the disaster. More than 2000 people were injured and nearly 1000 people including children were dead due to Tsunami. The Government of Tamil Nadu took immediate relief action through District Health services in the affected coastal villages immediately after the Tsunami. The Government health officials started their Tsunami relief work from 26th night itself like hospitalization of people, removal of dead bodies by involving the local people & private agencies and giving protection to the wounded people.

State health officials divided the Tsunami affected coastal villages in to five Zones for Tsunami relief work (Kanniyakumari, Rajakkamangalam, Muttom, Colachel & Enayam). We have selected 3 worst affected villages from each Zone for post Tsunami vector survey in Kanyakumari district as follows:

Colachel municipality included 11 small villages having a total of 515 deaths. All the dead bodies were buried en masse in three burial grounds created at St.Mary's Church Campus (351 dead bodies), Kottilpadu village (197 dead bodies) & Mohideen Mask Campus (34 dead bodies).

AVM Canal: Anantha Victoria Marthanda varma Maharaja created the channel for about 133 Km from Kollam (Kerala) to (Manakudy), Tamilnadu for Maharani's boating purpose. This channel is connected to the sea as Bampori vaikkal at Mandaikadu pudur. In Kanniyakumari, this channel existing now only for 5km from Mandaikadu pudhur to Gurumbanai. During Tsunami attack, more people were killed in this canal.

This channel was fully infested with Eichornia, plants with Mansonia breeding, the vector of Brugian filariasis. After Tsunami, this canal is free from the aquatic weeds and the Anopheline breeding was reported. At present, during our study, the canal started to support the breeding to the culicine like *Culex tritaeniorhynchus* (JE vector), *Cx. sitiens*, *Cx. quinquefasciatus* and very few specimens of *An. subpictus* and *An.culicifacies* were also recorded.

In all the surveyed villages, the vectors of dengue, malaria and JE were collected. However, the density of the vectors were found to be low except Colachel zone in which JE vector breeding is very high. If the dengue vector breeding is found in all zones the chances of getting dengue epidemic is nil because the BI is found to be between 3.00-15.00 The State health officials are also undertaking pyrethrum fogging for the mosquito control in the affected villages and for fly control. Hence, it can be concluded that the chances of getting outbreak of vector borne disease are very less.



Thoothukudi district

Altogether 25 villages were reported as affected and all of them belonged to Thoothukudi HUD except only one from Kovilpatti HUD.

Only three human deaths occurred on 26.12.2004 in this district (2 in Thoothukudi HUD and 1 in Kovilpatti HUD). Apart from these deaths, fishing community had heavy damages to the boats and fishing nets. Tsunami tidal waves raised upto 15' high in some of the affected villages and water entered in low-lined houses. Fishing activity was resumed almost in all the villages after a month. The state health department is carrying out public health care activities

Entomological survey:

Entomological survey (larval and adult) was made in 12 affected villages, to assess the risk for vector borne diseases.

Salient findings:

- In Immature survey, *An. stephensi* (Malaria vector) was collected in few numbers. No adult mosquitoes were collected in the villages surveyed, neither in resting nor in human landing collections.
- Breeding of dengue vector *Ae. aegypti* was recorded in all the tsunami affected coastal villages surveyed. In two villages, the density was very high as Breteau Index was more than 30. and this was mainly due to the irregular water supply. Hence, the villagers are forced to store water in big containers (Cemented/plastic) and dengue vector breeding was well established in these habitats. Public health authorities are taking control measures regularly. Since tsunami water did not enter in most of villages, breeding of dengue vectors in these villages could not be attributed to the tsunami which indicate that *Ae. aegypti* was well established long before tsunami episode.
- JE vector was collected in good numbers (Per Man Hour = 107) in only one village, where rice cultivation was practiced. Density of JE vector was almost negligible in other villages.
- No specimens of *Anopheles sundaicus* mosquitoes (malaria vector) could be collected from the villages surveyed.
- Status of the vector mosquitoes prevalence in the affected coastal villages was informed to the state health officials for carrying out the appropriate control measures. Villages where the breeding the dengue vectors were recorded, source reduction approach and application of larvicide, abate was advocated.

As such at present there is no immediate threat for any epidemics of vector-borne diseases in tsunami affected areas of Thoothukudi.



KERALA

Kollam and Allapuzha districts

Surveys were conducted to assess the risk for vector-borne diseases in affected districts. Heavy larval breeding was observed in the affected areas of Kollam and Allapuzha districts and the samples were collected from different habitats and brought to our laboratory for rearing and identification. However, adult vectors were found in low numbers and hence the possibility of any direct significance for the risk of vector-borne diseases is very low.

JE / dengue virus infection in wild caught mosquitoes collected from Tsunami affected districts

A total of 26 pools of *Cx. tritaeniorhynchus* comprising 1216 specimens, which were collected from Pudhukottai [15 pools], Tuticorin [4 pools], Kanyakumari [5 pools] and Tirunelveli [2 pools] were tested for JE by ELISA. Of 26 pools tested, 6 pools [Pudhukottai (1), Tuticorin (3) and Tirunelveli (2)] were found positive for JEV which were collected during January 2005 and February 2005.

During the same period 40 pools of *Ae. aegypti* [22 male pools and 18 female pools] and one pool of *Aedes vittatus* were also collected. They were screened for DENV by ELISA. Of 41 pools tested, 2 pools of *Aedes aegypti* [1 male pool in Pudhukottai district and 1 female pool in Kanyakumari district] collected in January 2005 and March 2005 were found positive for DENV.



5.2. Healthcare facility based surveillance among Tsunami affected people and studies on vector borne infections in Tsunami affected area of Kanyakumari district, Tamil Nadu.

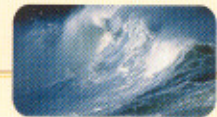
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Period of study : January to March 2005.

Funding Agency : Disaster Management, ICMR

In collaboration with National Institute of Epidemiology (NIE), Chennai.

In collaboration with NIE, a survey was conducted in connection with the health care facility based surveillance among the Tsunami affected people at Kanyakumari district, Tamil Nadu. The objective of the survey is to assess basic demographic structure, identify vulnerable groups and basic minimum needs of people in the shelters. Data collection forms were distributed to medical officers posted at the shelters/ camps. A total of 34 shelter/camps were covered under this survey. From the study it was concluded that the medical care provided by the health authorities was adequate. The shelters were situated in well-constructed buildings like churches, schools, colleges and marriage halls. Total population residing at the shelters at the time of survey was 38,200 approximately. Total number of children under the age group of 5 years reported to be residing in the camp was 4551. A total of 253 pregnant women were reported to be residing in the camps and about 659 lactating mothers were found residing. Food supply was found adequate. Based on the survey, certain recommendations were made, like Vulnerable group need special attention by maintaining a list of the children, administering booster vaccination and a special care should be given to the pregnant women etc., to improve the living condition of the affected people. In addition to the demographic survey, we have conducted study, to assess the possible emergence of vector borne diseases among the tsunami-affected people. As no cases of suspected viral fever noticed among the occupants in the shelters, we had not collected any blood samples.



CRME's research activities in the Tsunami affected areas



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