regulatory authorities should be encouraged to produce or facilitate import of quality cheaper versions of the needed drugs, either brand or generic, as is their right within international trade agreements.[12] In the case of cryptococcal meningitis, further efforts to increase access to amphotericin B and flucytosine are urgently needed and would translate into fewer deaths and less disability from a common HIV-associated opportunistic infection.

*Tihana Bicanic, Robin Wood, Linda-Gail Bekker, Marta Darder, Graeme Meintjes, Thomas S Harrison*
LGB, TB, and TSH are at the Desmond Tutu HIV Centre, University of Cape Town, Cape Town, South Africa; RW is the Director of the Desmond Tutu HIV Centre, University of Cape Town. MD is the coordinator of the Access to Essential Medicines Campaign, Médecins sans Frontières, South Africa. GM is a consultant at the GF Jooste Hospital, Cape Town. TB and TSH are also at St George's Hospital Medical School, London, UK.
Correspondence to: Dr Tihana Bicanic, Desmond Tutu HIV Centre, Wehner and Beit Building North, Institute of Infectious Diseases and Molecular Medicine, University of Cape Town Faculty of Health Sciences, Anzio Road, Observatory 7925, Cape Town, South Africa. Tel +27 21 6506986; fax +27 21 6506963; tihana.bicanic@hiv-research.org.za

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# Malaria receptivity in the tsunami-hit coastal villages of southern India

Following our earlier observations on the risk of outbreak of vector-borne diseases in the tsunami-hit villages of southern India,[1] we continued surveillance to assess the dynamics of malaria "receptivity" in the Nagapattinam district of Tamil Nadu and the Karaikkal region of Pondicherry.

In the 4th week post-tsunami we observed a surprising phenomenon of invasion of the urban malaria vector *Anopheles stephensi* into the tsunami-affected coastal villages of both areas. Immature *An stephensi* were recorded in 13 of 24 bodies of water examined from five villages (Tirumullaivasal, Pattinacherry, Keechankuppam, Akkaraipettai, and Vizhundhamavadi) covering a stretch of about 80 km along the coast. *An stephensi* was the predominant species, constituting 74% of all the mosquito species.

The breeding habitats of *An stephensi* included ground pools, coconut and groundnut garden pits, wells, water storage cement-lined tanks, and water pools in and around the remains of destroyed buildings (figure). These habitats were either created or had

***Figure:*** **A tsunami-devastated coastal village in Nagapattinam**

been inundated by the tsunami, and their salinity ranged from 2541 to 17 468 ppm.

The prevalence of *An stephensi* in Pattukottai, a town neighbouring Nagapattinam, was reported long ago.[2] We recorded the prevalence of this species in urban areas adjoining the tsunami-hit villages. It is likely that the species was present in the urban localities—"mother foci"—earlier and would have invaded the coastal villages after the tsunami.

The rural malaria vector *Anopheles culicifacies* has also been recorded subsequently (5–20 weeks post-tsunami) from ground pools and coconut garden pits in the villages of Tirumullaivasal, Akkaraipettai, Vizhundhamavadi, and Pushpavanam, with salinity ranging from 2303 to 7067 ppm. This species is already known to be prevalent in the area,[3] but its adaptation to a higher level of salinity is in contrast with earlier reports.[2]

We collected yet another malaria vector species, *Anopheles varuna*, from mango garden pits (salinity: 476 ppm) in Vizhundhamavadi during the 8th week post-tsunami. *An stephensi* continued to occur in bodies of water inundated with seawater as well as non-inundated water bodies (salinity: 80–635 ppm) until the 12th week post-tsunami. Subsequently, with the onset of summer in April–May, most of the tsunami-deposited breeding habitats dried up and *An stephensi* was not found in the remaining habitats either.

The tsunami-hit areas had been highly receptive to malaria, with the presence of two major malaria vectors—ie, *An stephensi* and *An culicifacies*—and a secondary vector—ie, *An varuna*—for a period of 3 months up to March 2005. Yet, there was no increase in malaria incidence (annual parasite incidence remained less than 0·1), possibly due to the limited movement of the human population and intensified pubic-health measures. The situation may change once the vector-breeding sources increase during the monsoon (October–December) and the migration of fishermen and pilgrimages in the coastal areas are resumed.

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*K Gunasekaran, P Jambulingam, R Srinivasan, C Sadanandane, P S Boopathy Doss, S Sabesan, K Balaraman, P K Das*

CS, KB, KG, PJ, PKD, PSBD, RS, and SS are at the Vector Control Research Centre, Indira Nagar, Pondicherry, India.
Correspondence to: Dr S Sabesan, Vector Control Research Centre, Medical Complex, Indira Nagar, Pondicherry 605 006, India; sabesan1@yahoo.com

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# The other side of the coin in disaster management

We read with interest the article by K Balaraman and colleagues[1] on the risk of outbreak of vector-borne diseases in the tsunami-hit areas of southern India. The risk of vector-borne infections increases because of damaged and contaminated water supplies and deteriorating hospital conditions in the disaster areas. A sudden change in living and feeding conditions, along with deep psychological depression that could make people less immune and more susceptible to diseases, have a role in this increased risk.

The need for well-organised crisis desks that can allocate tasks immediately is obvious, and the successful efforts[2] and contributions of WHO, the US Centers for Disease Control and Prevention, UN agencies, non-governmental organisations, and other relief organisations in these difficult circumstances are beyond any appreciation.

Before disasters occur, various scenarios should be considered and a surveillance system established to detect and control infections immediately after the incident. However, whether the predetermined protocols can be implemented under the chaotic conditions following a disaster, when medical services are provided to a large number of traumatised people, is completely unpredictable.

Our experience following the Marmara earthquake in Turkey in 1999 (with 17 465 deaths and 43 953 injuries) revealed that when numerous traumatised patients rush