

Short Research Communications

Malaria outbreak along the India-Bhutan border town of Saralpara, Assam, India

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ABSTRACT

Background & objectives: A remarkable progress is being made in the South-East Asia region in reducing the burden of malaria. While all countries are committed to malaria elimination, continued transmission at and across international borders poses a threat to achieving this goal.

Methods: We investigated an outbreak of malaria in the India-Bhutan border area in a district of Assam state, India. A line listing of cases occurring during the outbreak period was made and a house-to-house survey was carried out to identify additional cases in the community. Entomological investigation consisted of light trap collection of vectors. Patients and health workers were interviewed to obtain information on the possible mode of transmission and ongoing inter-country collaboration across the border.

Results: Between October 21 to November 18 2022, 37 cases of malaria (all *Plasmodium vivax*), were diagnosed in Saralpara area of Kokrajhar district of Assam, bordering Bhutan. Of these four were diagnosed in Sarpang hospital, Bhutan. Median age was 20 years (range 3 to 70 years). Male to female ratio was 1:1.2. In addition, 6 individuals with asymptomatic malaria were detected in the community through an active case finding campaign. No cases were however reported on Bhutan side of the border. *Anopheles culicifacies* and *An. annularis* were identified from light trap collection. Saralpara is a remote and forested area where most of the residents are poor and engaged predominantly in farming activities. Being a harvesting season, they tend to stay overnight to protect their harvest from elephants. The health authorities in India and Bhutan exchanged information regularly at district-to-district level on the outbreak including through available and easy modes such as WhatsApp, telephone as well as electronic mail and collaborated in coherently implementing preventive measures on both sides and in managing the cases.

Interpretation & conclusion: The outbreak of malaria in Saralpara demonstrates the risk of malaria outbreak in remote and forested areas, with possibility of spill over to the other side of the border. The fact that two countries had excellent inter-country cross-border collaboration and prior commitment thereby preventing further transmission of malaria to Bhutan can serve as a best practice for cross-border control of malaria and other communicable diseases.

INTRODUCTION

Malaria is endemic throughout the tropical areas of the world; the highest prevalence is found in sub-Saharan Africa and Asia. It is an important public health problem in the South-East Asia (SEA) region, as it aims to eliminate the disease by 2030¹. Over the last 20 years, significant progress has been made in the fight against malaria. Despite these advances and expressed political commitment, several challenges still remain to be addressed in the SEA region including India².

While Bhutan is on the verge of elimination, India continues to pursue an aggressive subnational approach to sustain and accelerate their gains. There is a consistent

decline in malaria cases in Assam over the past few years, owing to implementation of newer interventions in the control programme.

In many countries, cases occurring in international cross-border and forest areas presently constitute a significant challenge to achieving malaria elimination³. It is also true along India-Bhutan border areas where populations frequently move across borders; as cases often occur in border areas. Bhutan, for instance, has reduced malaria burden remarkably over the past few years but has not been able to achieve elimination due to cases persisting in border area with India, in particular Assam⁴. In fact, 95% of the indigenous malaria cases are

confined to border areas and active foci for malaria remain in the southern district of Sarpang bordering Kokrajhar district of Assam, India⁵. During 2022, Bhutan reported only 11 cases, of which 10 were from Sarpang district and remaining from other blocks of Sarpang bordering either Saralpara or Dadgiri in Assam, India⁶.

In view of this, India and Bhutan National Malaria Elimination Programmes have been collaborating to address cross-border malaria and have set up mechanism for information exchange and coherent prevention and control activities in corresponding border districts on both sides. These activities are facilitated by the South-East Asia Regional Coordination Mechanism Forum (SRCMF) established by the country coordination mechanisms in the South-East Asia region⁷.

In September 2022, the health authorities across the border in Bhutan alerted the counterpart in India regarding a malaria case belonging to Saralpara area having been diagnosed in Bhutan's Sarpang hospital situated at the border. Based on this, the surveillance activities were beefed up in the area, leading to detection of an outbreak in October in Saralpara area of Kokrajhar district bordering Bhutan (Fig.1). An epidemiological investigation was carried out jointly by the India and Bhutan NMEP (National Malaria Elimination Program) district teams, and control measures were instituted. In this communication, we describe how the outbreak was investigated and managed jointly in collaboration by health functionaries from the two countries.

MATERIAL & METHODS

During the outbreak, a malaria case was defined as an individual having fever and all cases were tested by Rapid Diagnostic Tests (RDTs) or smear positive during the outbreak period. A line listing of all patients meeting this case definition was prepared to understand the disease distribution by time, place and person.

To assess the burden of malaria in the community, a house-to-house survey was carried out from 14–19

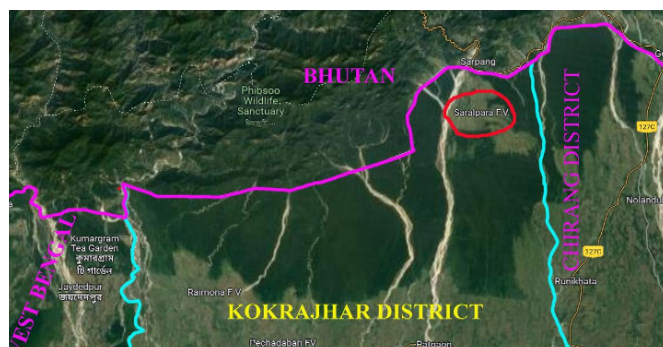


Fig. 1: Map of Saralpara area of Kokrajhar district, Assam, India bordering Bhutan.

November 2022, when all individuals irrespective of fever status were screened by BSC and RDT⁸. Eight villages, and overall, population of 987 was covered during mass survey. Environmental investigation consisted of looking for mosquito breeding sites in the vicinity, identifying vectors, and review, if any of available data on vector density in the affected area.

Cross-border collaboration between local levels for harmonized planning and responses relevant to the context and sharing of malaria information, especially relevant for border areas between India and Bhutan was assessed through review of joint reports and interview of key informants and malaria programme staff from both sides.

Ethical statement: Not applicable

RESULTS

Saralpara forest area is situated, about 63 km from Kokrajhar town along Indo-Bhutan border and 245 km from Assam state headquarter in Guwahati, India. In fact, it is near the Sarpang Dzonkhag in Bhutan. Saralpara is also famous as a picnic spot for visitors from Assam and beyond. Owing to the porous land border between the two countries there is large population movement across the border and possibilities of infection spread across borders are high.

Between October 21 to November 18, 2022, 37 cases meeting the malaria case definition occurred in Saralpara area (population 10100, 2011 census) of Kokrajhar district of Assam bordering Bhutan (see epidemic curve), with an attack rate of 3.9 per 1000 population. None were hospitalised while four malaria cases from Saralpara were diagnosed and received treatment at the bordering Sarpang hospital in Bhutan as an out-patient case. There were no deaths. All case were *Plasmodium vivax* (*Pv*); no *Plasmodium falciparum* cases were detected during the period.

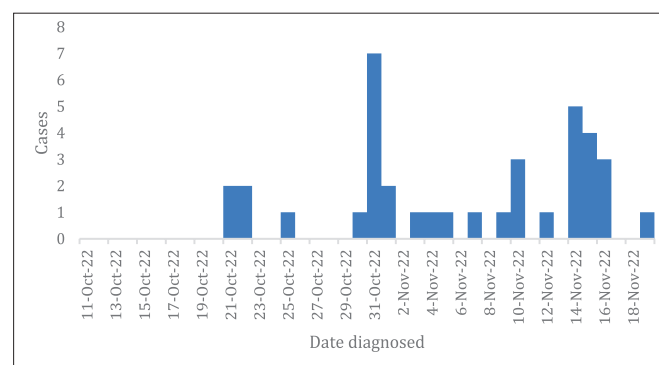


Fig. 2: Malaria cases by date of diagnosis, Saralpara area, Assam, India.

Of the total cases, 17 were male and 20 female; male: female ratio of 1:1.2. In terms of age, most cases (11) were between the age of 15–24 years, followed by 10–14 years (10 cases) and 7 above 35 years. The median age was 20 years. Overall, 8 villages were affected, with most cases in west Saralpara and Salbari villages with 17 and 16 cases, respectively.

Although analytical study could not be carried out to elucidate the risk factors associated with malaria transmission due to various logistical reasons, it was observed that the outbreak occurred in a deforested outreach area with population engaged in cultivation of crops such as paddy, mustard seed, pulses, and various types of vegetables. People inhabiting the area are all very poor, living in houses consisting just of a roof but most without surrounding walls. The river Saralbhanga flows nearby; with abundant small and slow-moving water bodies in the villages the mosquito vector gets plenty of places to breed in the favourable temperature and humidity. Malaria transmission is perennial and persistent in most parts of the state.

Moreover, the months of October and November being the harvesting season, people are busy working outdoors, often staying overnight at crop fields to keep vigil lest the elephants attack the crop. As the malaria vectors are active during the night so there are possibilities of mosquito bite. Saralpara is already a malaria endemic area and the transmission commonly occurs in the month of November.

During the house-to-house survey, when all individuals irrespective of fever status were screened by RDT, 12 (1.21%) malaria positive individuals were detected, all of whom were asymptomatic and *Pv* positive. The survey activity was coordinated by medical officers specifically designated for this purpose and no symptomatic cases were found during the house-to-house survey.

In the entomological survey conducted by zonal malaria office, (Guwahati Zone) in west Saralpara village on 20 December 2022, *Anopheles culicifacies* and *An. annularis* were identified through light trap in the houses of the community for collection of vectors. No vector density however could be ascertained⁹. Indian Council of Medical Research-National Institute of Malaria Research (ICMR-NIMR) Guwahati field station also did the entomological investigation, but did not find any vectors.

The current outbreak in Saralpara area was jointly managed by India and Bhutan very promptly and effectively. The two countries have been interacting regularly on WhatsApp, telephone as well as electronic

mail when required, and shared real time malaria data. To address the cross-border malaria, such as the one described here, India and Bhutan have formalised an agreement on joint activities and have developed a draft operational plan for Indo-Bhutan cross-border collaboration, including synchronised IRS, LLIN distribution, surveillance and other programme-related information sharing. There has been a consensus on these activities resulting from several bilateral meetings at various levels between the NMEPs officials of two countries towards cross-border collaboration¹⁰.

DISCUSSION

The outbreak of malaria along India-Bhutan border demonstrates that diseases know no boundaries and that disease pathogens, including that cause malaria, can spread across international borders with the movement of populations. India and Bhutan have a long and porous border and people are administratively allowed to move freely across the two countries. Since the member countries in South-East Asia are committed to malaria elimination by 2030, information and data sharing and coherent disease control measures among member countries with land borders assumes critical importance.

While there was a policy agreement between India and Bhutan malaria programmes for cross-border collaboration, during the current outbreak, the counterparts in Kokrajhar and Sarpang, the two adjoining districts on India and Bhutan side respectively, organised cross border meetings, exchanged information verbally and through WhatsApp as a part of the policy framework already agreed at the national level. While no cases were reported from Bhutan side, a few cases from India were treated in a neighbouring hospital in Bhutan.

Malaria is endemic in Assam, India especially in forested area and people are continually exposed to the disease. This explains the sub-clinical infections found during house-to-house survey which was carried out in the wake of the outbreak situation in Saralpara.

The increase in malaria in the outbreak area was associated in part with heavy rainfall, repeated flash flooding of Saralbhanga river flowing from Bhutan to India. Often, the farmers divert the river water for irrigation purposes through a labyrinth of small canals to irrigate rice and vegetable farms, thereby creating an environment conducive to mosquito breeding. Communities on both sides of India-Bhutan border are thereby at risk of malaria.

This is an excellent example of a joint cross-border collaboration at the local level between India and Bhutan

in containing the outbreak and something other countries and regions can learn from. A potential agreement on the 5 km radius as buffer zone on both sides for joint cross-border interventions. Sharing of information at district-to-district level through identified focal points on both sides of the border has helped coordination and implementation of cross-border joint activities. The role played by Accredited Social Health Activist (ASHA) worker, as well as by local volunteers, in ensuring complete treatment, is also well recognised.

During the outbreak, two National Malaria Programs have been able to manage the outbreak by following the recommendations made at the local level Indo-Bhutan Bilateral cross-border malaria elimination meeting in line with recommendations and agreement to respond immediately. This was facilitated by the SRCMF which was able to bring two National Malaria Elimination Programme together to intensify and further accelerate coordination of malaria elimination at a local level under technical guidance of the World Health Organization (WHO) and in coordination with other partners.

Going forward, all countries of the South-East Asia region need to reaffirm their commitment to make efforts to achieve malaria elimination and maintain malaria-free status, to strengthen capacity for integrated vector surveillance and vector control, and to improve their supervision and monitoring and BCC. Partnership building with government departments, such as health, labour, civil society, private organizations, and international donor and technical agencies, will help strengthen primary health care in border districts in terms of human resources and financial support.

In fact, SRCMF has organized several bilateral meeting for malaria elimination between India-Bhutan, India-Bangladesh and India-Nepal. Given that SRCMF was established by the member countries themselves through their country coordination mechanisms, each of which is represented on its board, it is better placed to facilitate inter-country collaboration while addressing cross-border issues².

Advocacy for increased political attention and

mobilization of additional resources has been key in this regard. The progress made by India and Bhutan in inter-country coordination and collaboration augurs well for the future. Preventing and quickly managing such outbreaks is important for interrupting disease spread across borders and for achieving the goal of malaria elimination regionally and nationally.

Conflict of interest: None

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