

APMEN Report: Bhutan and Cross-border Malaria

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INTRODUCTION

Bhutan is a mountainous land-locked country in the eastern Himalayas, bordered by China and India (Figure 1), with a total population of 683,407.¹ In the last 15 years, incidence has dramatically declined in Bhutan: From 2000 to 2008, confirmed cases decreased from 5,935 to 329. Annual parasite incidence (API) decreased from 13.8 per 1,000 in 2000 to 2.0 in 2009.

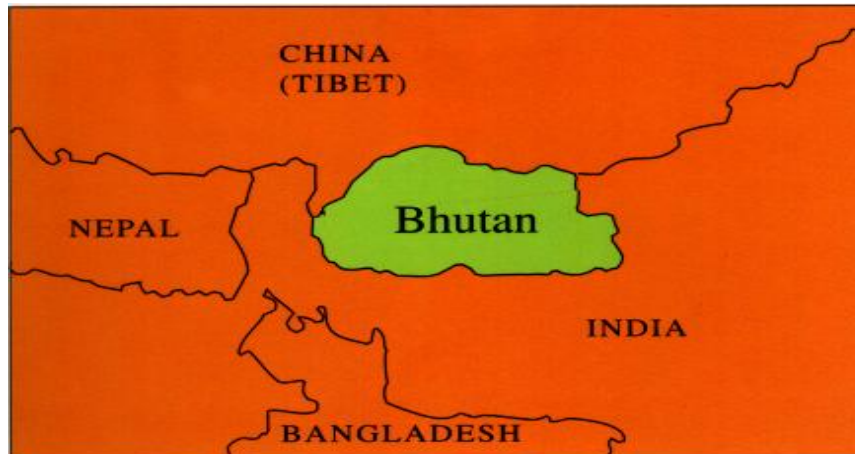


Figure 1: Map of Bhutan and surrounding countries

The country currently has a phased elimination strategy, with a goal to maintain malaria-free zones and eliminate malaria in the northern, seasonal districts (dzongkhags) by 2016, and elimination in the perennial, southern districts by 2020.

However, imported malaria from neighboring Indian states poses a major challenge for elimination in Bhutan. In 2009, the majority of cases were reported in the endemic transmission districts that border the Indian state of Assam.² There are an estimated 1,000 workers entering the country each day as labour on these development projects and as casual labour, and approximately 10-20% of all patients treated for malaria are these migrant workers.² Current and future construction projects, such as hydro-electric dams, and airport and road construction, are expected to increase the number of Indian migrant labourers in the country.

This report aims to describe the malaria context, challenges, and efforts at joint collaboration along the border between Bhutan and India. Key aspects of the border context will be examined, including geography, malaria epidemiology, health systems and national malaria control programmes, and funding sources and partners. Previous cross-border collaborations, key challenges and potential next steps are also described.

¹ Population and Housing Census of Bhutan, 2005

² Dev V (2010). Strengthening the capacity of Bhutan malaria control programme in response to epidemics with particular emphasis on vector surveillance and cross-border activities. World Health Organization Assignment Report TRL53651.

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METHODS

There were several sources of information for this report, including grey and published literature. Two documents, the National Programme Review Aide-Memoire and an Assignment Report from a WHO consultancy, were key sources for the report. A literature review of relevant malaria publications on Bhutan and India was also conducted using Pubmed, Google Scholar, and the WHO library archive databases. Reports from meetings, initiatives, and workshops, and WHO consultant reports and publications were collected in-country and remotely. News reports were examined from a variety of internet sources, including the LexisNexis database. Data was examined from the Vector-borne Disease Control Programme of the Ministry of Health of Bhutan and the Population and Housing Census of Bhutan. Proposals and other materials from the Global Fund, UNICEF and other international aid organizations were also referenced.

BACKGROUND

Bhutan is stratified into three malaria zones: a malaria-free area (four districts), an epidemic malaria zone (nine districts) and an endemic transmission zone of seven districts bordering India (Figure 2). The Indo-Bhutan border spans over 600 kilometers in the sub-Himalayan foothills, which range from 600 to 1,500 meters in height.^{3,4} The seven southern districts of Bhutan that form the border with India are (from west to east): Samtse, Chhukha, Dagana, Sarpang, Zhemgang, Pemagatshel, and Samdrup Jongkhar (Figure 2). The total population in 2009 of the seven districts was 280,861.

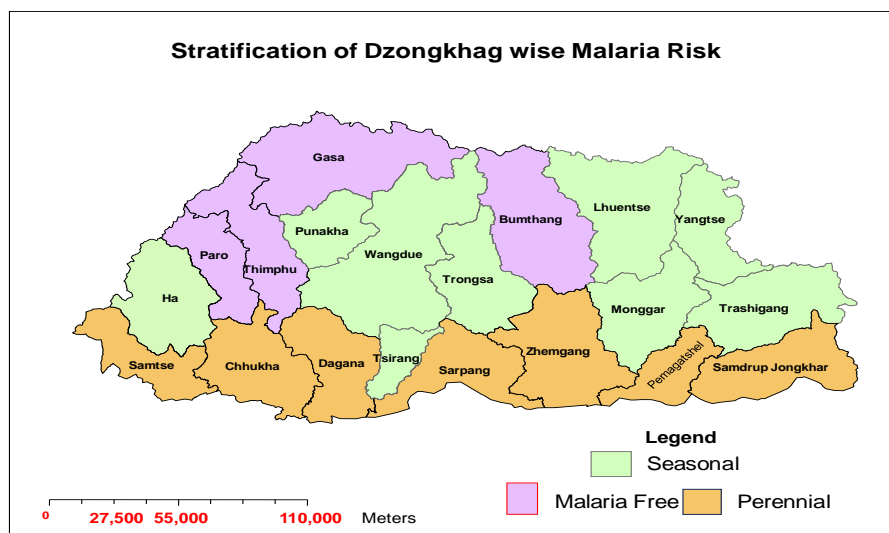


Figure 2: Map of malaria stratification in Bhutan

Health indicators and access to health services has generally improved in Bhutan over the last ten years. The national infant mortality rate has steadily decreased: In 1984, infant mortality (per 1,000 live births) was 103 and decreased to 40.1 in 2005.⁵ The number of births attended by trained health staff more

³ Kalra NL. Consultant Report, WHO Project IC TCC031, 1997. Consultant, Malaria Research Centre, Madhuban, Delhi.

⁴ Lhazeen K. Inter-country workshop on revised malaria control strategy. India: January 30 to February 2, 2006.

⁵ MOH Bhutan 2007. Health Sector Review. Bhutan: Ministry of Health.

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than quadrupled, from 10.9 in 1994 to 49.1 in 2005.⁵ Immunization rates in Bhutan are relatively high and have been sustained for many years (estimated to be 90% in 2009).

Bhutan is bordered in the east, west, and south by the Indian states of Arunachal Pradesh, Sikkim, Assam and West Bengal. Assam comprises the largest state along the Bhutan border. Within 10 kilometers of the border on the Indian side, there are large tracts of forest reserve. Health infrastructure and indicators are weak in Assam, a primarily rural district where 36% of families are below the poverty line (1999-2000) and population groups are mobile with a low level of literacy.² 17% of children in the state receive full immunization and it previously had one of the highest maternal mortality rates in India.⁶ In addition, there are pockets of political unrest and ethnic conflict (see Key Challenges, below). Transportation infrastructure is also poor in this region and access is especially difficult in the rainy season.

Health system of Bhutan

The Government of Bhutan provides free health services. The system is composed of a national referral hospital, district hospitals (one to three per district, depending on size and population) and Basic Health Units I (one to two per district), which provide malaria diagnosis and treatment. Some third tier facilities, Basic Health Units (three to 22 per district), also provide this service.

In the early 1990s, Gelephu Hospital in Sarpang District was overwhelmed with patients with varying illnesses from across the border.⁷ It is estimated that one-third of all patients in the Gelephu Out-patient Department (OPD) each day are from the Indian side of the border.

Health system of India

The health system of India is composed of Primary Health Centres (11 in Assam), with Sub-centres operating in the villages.⁸ Community Health Centres are the first formal contact in rural areas. Passive surveillance for malaria is carried out mainly by Primary Health Centres (PHC), Malaria Clinics, and Community Health Centres (CHC). However referral services are reportedly few in the border zone - in Assam, the majority of health care facilities are located in the plains, not in the foothills of the border zone in these areas.² Peripheral areas have a higher rate of malaria transmission, which could be the result of the surrounding socio-economic conditions and the entomological context. Arunachal Pradesh is along Bhutan's eastern border, between Assam and China. It has three general hospitals and 11 district hospitals.

The Indian Council of Medical Research (ICMR) established the Malaria Research Center (MRC) in 1977, to provide technical assistance to the national programme. There is a Regional Medical Research Centre in Assam in addition to sites in other states.

Donors & partners

The Bhutan Vector-borne Disease Control Programme (VDCP) was successful in the Round 4 and 7 Global Fund grants for malaria. WHO also provides technical and financial support. The Government of India supports funding for procurement of all insecticides used for IRS and the impregnation of

⁶ UNICEF. http://www.unicef.org/india/health_2715.htm (Accessed September 22, 2010).

⁷ Personal communication with former Bhutan NMCP director, August 7, 2010.

⁸ National Vector Borne Disease Control Programme. "About us." <http://india.gov.in/outerwin.php?id=http://nvbdcp.gov.in/> (accessed November 1, 2010).

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insecticide-treated nets in Bhutan. Private sector involvement in public health and malaria activities is very limited. While there has been growth in this sector since 2008 with the creation of the Parliament, the private sector plays a very small role in public health and malaria control.⁹

The Indian states of Assam, Arunachal Pradesh and West Bengal received Global Fund Round 4 support, starting in 2005. A branch of the Red Cross is based in Kolkata, West Bengal. There are reports that other non-governmental organizations (NGOs) work in Assam's border area, of which little is documented.

MALARIA EPIDEMIOLOGY & INTERVENTIONS ALONG INDO-BHUTAN BORDER

Malaria epidemiology and vectors - Bhutan

In 2009, there were 1,098 total confirmed cases in Bhutan, of which 126 were from across the border (Figure 3). The annual parasite index was 3.2 per 1,000 in the endemic districts, or those along the border, and 0.5 in the epidemic districts. Sarpang District has a particularly high number of malaria cases, reporting an API of 14 per 1,000 in 2009 and accounting for 66% of the national malaria burden. This district borders Assam, where 16% of cases originated. Another southern border district, Samdrup jongkhar, had the second highest number of total cases in 2009 - 94 Bhutanese and non-Bhutanese - but only 1% of cases originated in India.

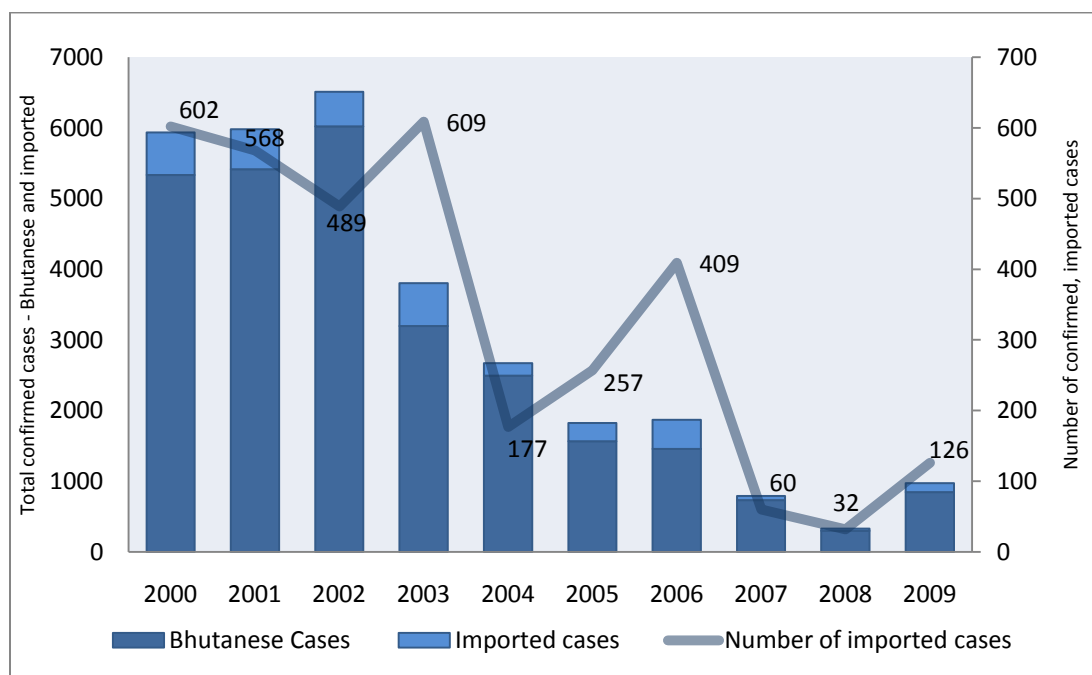


Figure 3: Confirmed cases in Bhutan, Bhutanese and Imported, 2000 to 2009

Nationally, in 2009, the proportion of *P. falciparum* was higher in non-Bhutanese cases (79%) than in Bhutanese (58%). *P. vivax* or mixed infections form the remainder of infections. Generally, Bhutan reports an increase in cases when incidence rises across the border in India. It is thought that *An.*

⁹ Bhutan Vector-borne Disease Control Programme. Elimination of malaria in seasonal transmission districts and strengthening of control activities in perennial transmission districts of Bhutan, Round 10 Proposal for the Global Fund to Fight AIDS, Tuberculosis, and Malaria. Unpublished as of November 6, 2010.

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minimus and *An. fluvialis* may have been eliminated in Bhutan.¹⁰ *An. pseudowillmori*, *An. willmori*, and *An. maculates* are now considered the dominant vectors in Bhutan.

Malaria epidemiology and vectors - India

The WHO reports a burden of approximately one to 100 reported cases per 1,000 in the Indian districts bordering Bhutan.¹¹ Assam and Arunachal Pradesh are considered highly endemic. In 2009, the districts in Assam directly bordering Sarpang District of Bhutan, the most endemic, reported an API of 6.70 and 10,066 positive cases.² In all five districts of Assam State that border Bhutan, there were 28,105 cases reported in 2009, which contrast with the 719 cases reported across the border. 72% of reported cases in Assam were *P. falciparum*.

Other border Indian states reported fewer cases. The state of Arunachal Pradesh in India reported 12,480 positive cases in 2009, zero deaths and an SPR of 10.64. 30% of cases were *P. falciparum*. That same year, West Bengal reported 32,692 cases, 34 deaths, and an SPR of 1.22. 25.5% of malaria cases were *P. falciparum*.

In 2004, it was reported that *An. minimus* (perennial), *An. dirus* (monsoon) and *An. fluviatilis* (winter) were the dominant vector species in Assam.¹² *An. dirus* populations may be dwindling because of deforestation due to increased paddy cultivation. In the forested areas, *An. minimus* and *An. baimaii* are implicated in transmission.² These vector species are considered to be “highly anthropophilic and efficient carriers” with the ability to cause major outbreaks when there is a lack of coordinated interventions along the border.

Vector-borne Disease Control Programme of Bhutan

The VDCP of Bhutan is part of the Ministry of Health Department of Public Health, Communicable Diseases Division. The VDCP headquarters, located in the high transmission district of Sarpang, manages the administration of the programme and the entomological and drug surveillance research. Decentralized vector control activities are implemented in nine districts.⁴ Funding is provided by the Government of Bhutan in addition to some external funding (see Donors & partners section)

Vector Borne Disease Control Programme of India

The National Vector borne Disease Control Programme (VDCP) of India is under the purview of the Ministry of Health and Family Welfare. The VDCP Directorate provides technical guidelines and policies, guides states in implementation of malaria strategies, creates budgets, and conducts planning and monitoring. 17 Regional Offices for Health and Family Welfare are located at different state headquarters, implementing and monitoring activities and infrastructure development. There are 565 district malaria units in India. The Government of India contributes half of the expenditure required for malaria control and states are expected to contribute the remainder.

¹⁰ World Health Organization (2010). Bhutan Malaria Programme Review: Towards a Malaria Free Bhutan, Aide Memoire and Summary. Draft report from the World Health Organization.

¹¹ World Health Organization, World Malaria Report 2009

¹² Dev V, Phookan S, Sharma VP, Anand SP. Physiographic and entomologic risk factors of malaria in Assam, India. *Am J Trop Med* (2004); 71: 4; 451-456.

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Prevention

The main tools for prevention in the Bhutanese districts along the border are IRS and bed nets. DDT was phased out in 1995 as evidence of resistance grew. Deltamethrin was introduced, then Cyfluthrin was used because of stock-outs. Long-lasting insecticide-treated net (LLIN) distribution was used targeting high-risk and hard to reach areas: 23,100 LLIN were distributed from 2008 to 2009.

In India, DDT is used for IRS in the Northeast states, namely in Arunachal Pradesh and Assam.¹² Yet coverage is reportedly low, especially in Assam, due to the instability caused by the resurgence. Other states had more consistent protection because of insecticide application in the tea estates.¹³

Surveillance

Bhutan has a well-functioning public health system, capturing and treating positive cases through passive case detection. While active case detection (ACD) is not yet implemented, the national elimination strategy calls for mobile clinics to implement ACD, and surveillance to be conducted at border malaria screening posts (see Way Forward section, below).

In the state of Assam of India, there are no known surveillance activities or referral services for diagnosis and treatment, unless these services are provided by NGOs based in the area.²

Case management

ACT (artemether-lumefantrine) was introduced in Bhutan in 2006 for treatment of *P. falciparum*. A 14-day regimen of primaquine with chloroquine has been implemented since the early 1990s. There are very few private sector pharmaceutical sellers thus most treatment occurs in public health facilities. Most diagnosis is confirmed by microscopy, with some clinical diagnosis occurring in remote areas. Rapid diagnostic tests (RDT) are used in outbreaks and emergencies.

Assam State has 11 districts considered chloroquine-resistant and revised the drug policy in 2008 to include ACT (AS+SP).¹² The availability, however, of ACT in all health facilities is not known and stock-outs are reportedly a challenge. Chloroquine and primaquine (14-day treatment) is used in *P. vivax* cases.¹² Clinical diagnosis still occurs in some areas.¹²

CROSS-BORDER COLLABORATION

The Malaria Eradication Programme of Bhutan was established, with Indian support, in 1965 with a focus on the reduction of malaria incidence in the lowland areas. Due to a lack of trained Bhutanese staff, Indian physicians and staff developed and coordinated malaria activities.¹⁴ Bhutanese programme staff then took the reins of the Bhutan Vector-borne Disease Control Programme in 1984.

Over the years, several efforts were made to establish cross-border mechanisms for Bhutan and India to improve malaria control, surveillance, information sharing, and research. For instance, in the beginning years of the malaria control programme, IRS campaigns were synchronized along the border: IRS

¹³ "Incidence of Malaria Up Dramatically in 1999." Reported on BBC Monitoring South Asia, from Kuensel, Bhutan, online website in June 2000.

¹⁴ Ward M, Jackson F. Medicine in Bhutan. *The Lancet*, 1965 285; 7389: 811-813.

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coordinators would meet at the border, celebrate, then spray two kilometers along each side of the border.¹⁵ Other types of collaboration are described below.

Indo-Bhutan Collaboration

WHO consultant reports and meeting records describe malaria control collaboration along the Indo-Bhutan border between 1995 and 1997. Bhutan and India jointly requested and received WHO assistance and funding for these meetings. Participants were from national programmes and district malaria officers in addition to administrative officers from the MOH or districts.

Objectives of the collaboration included information sharing about programme activities, study tours, joint training, cross-case reporting and epidemic reporting, joint operational research, and in particular, strengthening of entomological surveillance.

BBIN Network

Through the USAID Bureau for Asia and the Near East (ANE) and USAID/Nepal, a regional initiative of Bangladesh, Bhutan, India, and Nepal (BBIN) was developed in 2000 to implement cross-border activities for control of important infectious diseases, namely malaria, leishmaniasis, and Japanese encephalitis. Funding from the USAID mission in Nepal and the ANE bureau was provided. The goal was to support the development of new interventions, expansion of proven interventions, and to improve surveillance programmes. At the first meeting, in 2000, WHO-SEARO and the South Asian Association for Regional Cooperation (SAARC) attended. WHO collaborated on certain activities.

A Plan of Action was formed and follow up meetings were held. Most planned activities were not implemented because of a lack of resources, follow up, and coordination support. However, some activities were implemented along the Indo-Nepal border. Two reports were commissioned by the EHP: a report on the status of insecticide resistance,¹⁶ and a report on drug resistance in BBIN countries.¹⁷ A study was also conducted on cross border population movement (2003) across Nepal and India for leishmaniasis and malaria treatment, capturing target population demographics, health care access, and health-seeking behavior. Many respondents reported crossing the border to seek treatment at a nearby facility or to find free treatment.

Major results of the network centered on information-sharing via a website. Reports drafted for the network included inventory reports, guidelines for surveillance, research studies, an IEC national programme, and a surveillance system initiated in Bhutan. Though USAID was asked to continue supporting the four countries, the network was eventually disbanded.

While cross-border activities were halted, recommendations came out of the collaboration, which could be used when considering future inter-country networks for malaria control. External funding must be sought, and focal points for guidance and activities must come from the Ministry of Health in each country, WHO offices and from SEARO. WHO-SEARO and SAARC were thought to be best suited for the higher level dialogue and institutionalization of agreements and programme guidelines. District-level

¹⁵ Personal communication, Dr. Rama, previous VDCP Director, August 7, 2010.

¹⁶ Mittal PK, Wijeyaratne P, Pandey S. Environmental Health Project, Activity Report 129. Status of Insecticide Resistance of Malaria, Kala-azar and Japanese Encephalitis Vectors in Bangladesh, Bhutan, India and Nepal (BBIN). Washington, DC: Environmental Health Project, March 2004.

¹⁷ Wijeyaratne PM, Valecha N, Joshi AB, Singhe D, Pandey S. Environmental Health Project, Activity Report 130. An Inventory on Malaria Drug Resistance in Bangladesh, Bhutan, India and Nepal.

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projects required work with national and local officials was considered more successful by organizations with a substantial in-country presence.

KEY CHALLENGES

Migration

Bhutan is economically dependent on India for the provision of labour, especially from the highly endemic regions of Bihar and Orissa. Currently, there are an estimated 35,000 long-term workers from India employed in Bhutan on numerous development projects, most of which are located in the seasonal, or epidemic-prone, transmission districts.⁹ In addition, there are several major market centers along the porous border, with daily migrants entering and exiting for business or for leisure. Bhutan's immigration regulations require all non-nationals who are not long-term workers to return at night to their country. As a result, temporary shelters have sprung up in border towns which do not have close access to health facilities.² It was estimated in the late 1990s that 25 to 30% of positive cases in Bhutan's border cities resulted from labour migration.

Inequity in Malaria Programmatic Activity

In addition to the border challenges, key constraints on the Bhutan side are lack of high-level training for malaria programme staff, in particular in entomology, and insufficient staff. Challenges reported in the discussed Indian states include major gaps in funding, vacant posts, and delays in Indoor Residual Spray (IRS) implementation and lack of entomological support. These challenges seriously affect implementation of vector control.

Conflict and Political Instability

Since the early 1990s, armed insurgent groups have operated in Assam. The insurgency has reduced the provision of supplies and services for government-run health facilities and programmes in India. In the 1990s, Bhutan became directly affected by this conflict when Indian separatist groups installed illegal camps in Bhutan's southern forests.¹⁸ From 1996 to 2003, the Bhutan government attempted to negotiate with these groups to move them out of the area, without success. In December 2003, the Indian separatist groups moved out of Bhutan. West Bengal and Arunachal Pradesh, in contrast, are relatively stable.

Development

It was reported in 2005 that Assam may be a site of exploration for the Oil and Natural Gas Corporation of India.¹⁹ In the 10th Development Plan of Bhutan, 2008-2013, there are many construction projects that will increase the need for labourers from India and possibly other countries.

WAY FORWARD

Bhutan generally sees an increase in cases when incidence rises across the border in India. Because of this, and taking into account general trends in transmission and the recent reduction in confirmed cases, Bhutan has developed a phased elimination strategy. The current strategy aims to interrupt

¹⁸ The Australian. "Bhutan acts to drive out Indian guerillas." December 26, 2003. Accessed December 2, 2010 from <http://www.lexisnexis.com>.

¹⁹ GlobalSecurity.Org. <http://www.globalsecurity.org/military/world/war/assam.htm> (Accessed December 2, 2010).

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transmission in the seasonal and malaria-free areas, and maintain malaria control measures in the southern border districts, to reduce the potential for importation of parasites from the southern highly endemic state of Assam, and to a lesser extent, West Bengal. The long and medium-term strategies for malaria control in the Indian states of Assam, West Bengal, and Arunachal Pradesh are not yet known.

Surveillance

Surveillance of asymptomatic populations on both sides of the border will make clear the extent of transmission. Radical treatment should be available to all asymptomatics. An increase in passive and active case detection is recommended for the Indian states along the border, to be accomplished with NGO and community engagement given the lack of public services.²

Management of imported malaria

Bhutan has added to its strategic plan the management of imported malaria, specifically the identification, treatment and prevention of malaria in migrant workers.⁹ As described above, in addition to an estimated 1,000 daily migrants, there are an estimated 35,000 longer-term workers who cross the border to work in Bhutan for three months or more. While malaria screening is currently a prerequisite to obtain permits to hire migrant labour, it is often not completed due to overcrowding at clinics. The VDCP proposes to install six border screening centers at major thoroughfares and implement active case detection in construction sites, implemented by staff and village health workers. It is also suggested to install health check-up facilities in all major development project sites and delivery of LLINs to all workers at these sites. An IEC (Information, Education, and Communication) programme targeting migrant workers is also planned.

Intersectoral collaboration, involving authorities from many different sectors, would help in planning activities by widening the perspective and identifying appropriate epidemiological or entomological surveillance measures. Development project managers, security forces, and forest officials would work together to prepare coordinated action for early diagnosis and treatment, and help to guard against drug-resistant parasites from becoming a major problem in Bhutan.²

Cross-border collaboration

Also planned by the VDCP are cross border collaborative meetings between Bhutan and Indian district and province representatives, to harmonize and synchronize activities along the border, including prevention (IRS, ITN and LLIN distribution) and treatment. An information-sharing system will also be established to relay information on cases, treatment protocols, and guidelines among border districts. Communication between border districts could facilitate the harmonization of drug and insecticide policies, joint malaria control teams, and information-sharing on operational or service delivery.

Other cross-border strategies suggested are to establish a hotline between bordering districts to share information on outbreaks. Focal IRS is suggested for both sides of the border, and to increase access to treatment and prevention services, in particular LLIN, in refugee and internally displaced person (IDP) camps, to guard against drug resistance.