

Malaria in Bandarban

an ICDDR,B field site

*Malaria is a parasitic infection transmitted by the female Anopheles mosquito, infecting humans and insects alternatives with four species (*P.vivax*, *P.falciparum*, *P.ovale* and *P.malariae*). Malaria is a public health problem in 109 countries around the world, affecting 300 million people and responsible directly for about one million deaths annually. Africa counts for 90% of the mortality burden for malaria and South-East Asia accounts for 9%.*

Why malaria control in Bangladesh?

Bangladesh is one of the malaria endemic countries in South Asia, with 26.9 million people living in the endemic districts alone (13/64 districts of Bangladesh). From these, 1.5 million people in 3 districts are at highest risk for malaria. This population is larger than many African nations and even the slightest malarial epidemic outbreak in this densely populated region would cause more deaths than the places where the major portion of funds for malaria are currently distributed (Africa).

Unique aspects of malaria epidemiology in Bangladesh

Population: 162,221,000

Area: 147,570km² / 55,599 sq mi

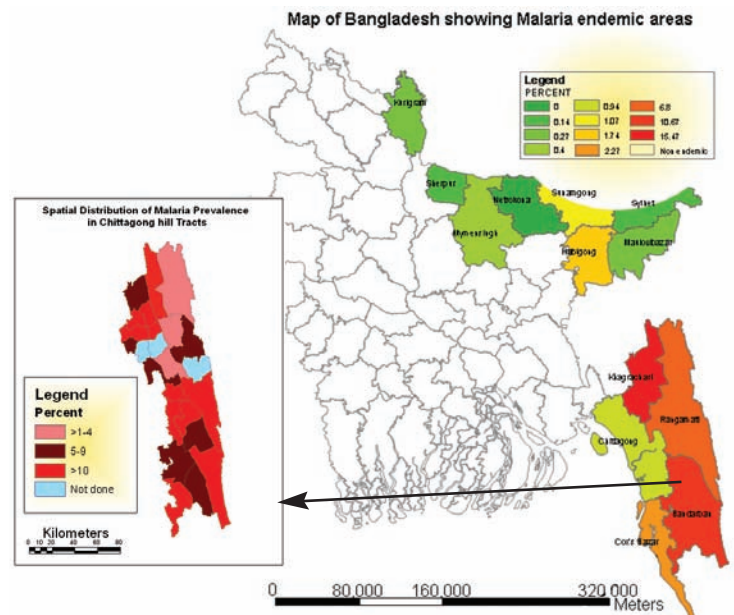
Pop. density: 1063/km² or 2750/m²

- Close to the epicentre of malaria drug resistance in Thai-Cambodia-Burma region
- Numerous diverse Anopheles species with different biting habits
- Ability to follow *P. vivax* and *P. falciparum* in the same human and mosquito populations and age distribution
- Seasonality and transmission patterns distinct from most of African countries
- Representative of southeast Asia
- Population density is 10-100 times more than African nations

Malaria prevalence by region

- Overall prevalence rate in Bangladesh: 3.97% (southeast 6% and northeast 0.4%)

- *P. falciparum*: 91%; *P. vivax*: 5%; mixed infection: 4%
- High prevalence in Chittagong hill tracts: 11%
- Overall prevalence in 3 hill districts: Rangamati (8%), Bandarban (12%) and Khagrachari (18%)



ICDDR,B malaria study site: Bandarban

ICDDR,B began malaria-related activities in Bandarban in 2006. Bandarban (4479 km²) with a population of 292,900 is a southeastern district of Bangladesh with malaria prevalence as high as 12%.

General symptoms of malaria include headache, nausea, fever, vomiting and flu-like symptoms; however these can vary depending on the species causing the infection. While most control strategies as well as surveillance methods are focused on symptomatic malaria and the prevention of illnesses, transmission of malaria also occurs because of circulating gametocytes and the presence of gametocytes without any symptoms. These persons then become the source for malaria transmission.

A cross-sectional malaria survey showed a large reservoir of asymptomatic malaria infections. Laboratory confirmation of clinically suspected cases does not seem to be sufficient as a tool for mapping malaria prevalence in regions where high numbers of asymptomatic malaria are seen. New strategies for malaria control are required in this region, where malaria control

is entirely relying on the treatment of symptomatic patients. This situation highlights the need to develop new intervention strategies specifically targeting asymptomatic carriers among specific populations to identify high risks for malaria transmission. Advanced techniques for the diagnosis of low-level parasitemia (e.g. PCR confirmed diagnosis) may help to detect clandestine transmission ratios.

Ongoing ICDDR,B malaria projects

Mapping malaria epidemiology in Bangladesh

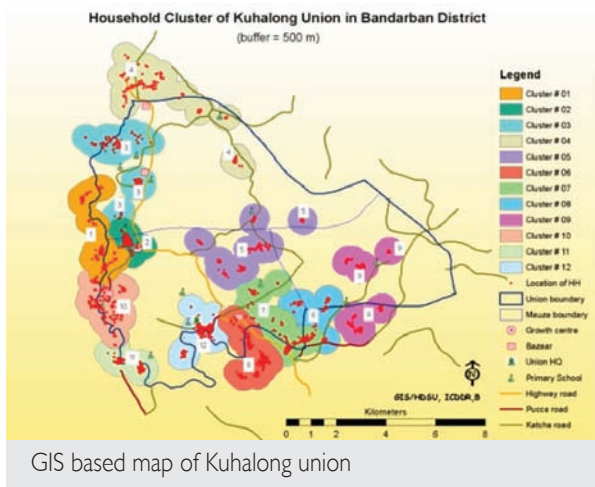
Collaborator: Johns Hopkins Malaria Research Institution, USA

Study Site: 2 areas of Bandarban: Kuhlalong and Rajbila

Type of Study: Prospective, active, randomized population-based surveillance

Objective:

- Define the basic epidemiological features of symptomatic and asymptomatic malaria (rates of infection, risk factors in relationship to age, sex, pregnancy status, season or weather patterns, and socio-demographic status)
- Establish a demographic surveillance system (DSS) for future epidemiological studies
- Validate diagnostic methods (microscopy and rapid diagnostic test with PCR)
- Characterize the epidemiological patterns of gametocyte prevalence
- Define the local vectors which transmit malaria and their behavior.
- Implement GIS based spatio-temporal mapping of malaria transmission dynamics to monitor malaria control efforts



Field workers during active surveillance



Entomology team collecting mosquitoes using CDC light trap

Prevalence of malaria and non-malaria febrile illnesses among febrile patients in Bandarban

Collaborator: Medical University of Vienna (MUV), Austria

Objective: This survey will complement the data collected as part of the GFATM-funded nationwide malaria baseline survey in the 13 endemic districts of Bangladesh providing additional data on febrile illnesses and common malaria-associated disorders.

Randomized controlled trial to determine artemisinin resistance in Bangladesh

Collaborator: Medical University of Vienna (MUV), Austria

Objective: To assess baseline data for artemisinin sensitivity and efficacy in Bangladesh, a country where artemisinins have never been used to any significant extent. This study is part of an effort coordinated by the WHO to define the problem, extent, and spread of artemisinin resistance in South and Southeast Asia following recent report of artemisinin resistance from Cambodia.

For further information, contact Dr Wasif Ali Khan at wakhan@icddr.org.