



Thematic brief

CLIMATE CHANGE: A THREAT TO MALARIA ELIMINATION IS ASIA PACIFIC PREPARED?

Malaria control and elimination efforts are at risk all over the world due to climate change. It is altering the transmission of vector-borne diseases (VBDs)¹, including malaria. A quantitative assessment by the World Health Organization (WHO) estimated that climate change may cause an additional 60,000 malaria deaths between 2030 and 2050 even when accounting for economic growth and health progress. It also projects that about 5% of the global malaria cases, or 21 million cases, would be attributable to climate change in 2030 (1). As the [sixth assessment report](#) by the United Nation's Intergovernmental Panel on Climate Change (IPCC) reemphasized the magnitude of the changing climate is concerning, and could wipe out the gains against malaria in Asia Pacific.

Long-term climate change takes place alongside complex socio-economic changes including land use change, population growth, urbanization, migration, and economic development. These play an equally important role vis-à-vis malaria. It is the net impact of these factors that will shape the trajectory of diseases such as malaria and dengue. However, this brief focuses on the relationship between climate change and malaria.

This brief highlights the link between climate change and VBDs² in Asia Pacific. Using malaria to tell the narrative, it lists key actions that policymakers and the public health community can consider in addressing the impact of a changing climate on health. The brief also includes a list of resources that countries can benefit from in planning their response.

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¹ Vectors are living organisms that can transmit infectious diseases between humans or from animals to humans. Mosquitoes are the best-known disease vector. Others include ticks, flies, sandflies, fleas, triatomine bugs and some freshwater aquatic snails [Source: TDR].

² For the purposes of this note, we are restricting the discussion to the mosquito as a vector. A full list of VBDs transmitted by mosquitos can be found here: <https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>

Key Messages

Climate change is one of the most pressing challenges that the global health community is facing. The health impacts of climate change are related to both extreme events such as floods and droughts but also more complex and long-term direct and indirect impacts on health. An example of the latter is the impact of a gradually changing climate on VBDs epidemiology.

Climate change is creating more suitable conditions for VBDs like malaria. VBD transmission is complex. Apart from long-term climate change, many factors – human activity (e.g. vector control programmes, construction of dams, migration, etc.), seasonal weather variations, socioeconomic conditions, drug resistance – also impact VBDs (2). Temperature and precipitation seem to be

most important (3). Pathogens, such as the malaria parasite and the dengue virus, develop faster at higher temperatures (4) (5). Mosquitoes (the vectors), such as Anopheles mosquitoes that spread malaria and Aedes mosquitoes that transmit dengue, develop faster at higher temperatures. Their lifespan, growth, and biting rates increase with temperature. Hence, we may observe higher rates of malaria transmission with rising temperatures (4)(6). Longer rainfall spells, resulting from climate change, can lead to stagnant water which is critical for mosquito breeding (4). India is already experiencing this. Researchers in India's Odisha state have found that the monsoon season has shifted and the VBDs conducive season is now longer (7).

“Changing temperatures and patterns of rainfall are expected to alter the geographical distribution of insect vectors that spread infectious diseases. Of these diseases, malaria and dengue are of greatest public health concern”

Dr Margaret Chan (Director General, WHO), 2008



Millions more will be exposed to malaria and other VBDs because of variable climate conditions. The latest IPCC report projects heat extremes will reach a critical threshold for health, and erratic rainfall has already become a reality. Malaria will likely move into areas where both people and health systems are not used to fighting the disease. Evidence from Nepal suggests that people living at higher altitudes will be at risk of malaria as a result of rising temperatures and climate change (8). Similarly, dengue and other VBDs such as Zika, caused by the Aedes mosquitoes, are likely to be found in new places as these mosquitoes expand their range owing to increasing temperatures (9). Climate change induced movement of people from areas of high transmission can result in imported cases and potential re-introduction of malaria into low-transmission or malaria-free zones.

Climate change is a “threat multiplier” which will indirectly exacerbate the malaria risks for already vulnerable groups including women and children, and communities living in remote areas (10). Hard-to-reach areas in the Greater Mekong Subregion are often entirely cut off during unseasonal heavy rains and flooding. Hilly tribes in Lao PDR and people living in forested areas of Cambodia are at increased risk of malaria when distribution of essential medicines is disrupted because of heavy rainfall. Also, climate change can alter living patterns. For example, dry weather brought about by climate change will force people to store more water. The storage systems can become breeding grounds for mosquitoes if not managed properly.

“These days, vectors of dengue, kala-azar (visceral leishmaniasis) and malaria can easily survive in the hill and mountain regions, which were considered safe from these diseases in the past”

Dr Megnath Dhimal (Chief Researcher, Nepal Health Research Council), 2015

Evidence from Asia Pacific

Asia Pacific is highly susceptible to health impacts of climate change



Geography

The region's geography makes it highly susceptible to rising sea levels, other weather-related events, and climate change. It is one of the most disaster-prone regions in the world. Small island states and areas along the coasts and in remote mountain regions will be among the most vulnerable. Evidence from South Asia suggests that malaria and dengue are increasingly being found in the higher altitude mountainous areas of this region (11).



Heavy burden of vector borne diseases

The region has a disproportionately high burden of VBDs. Malaria, dengue, and Zika are some of the common infectious diseases which are likely to be impacted more by changing weather patterns. As per WHO's World Malaria report 2019, South-East Asia is the second highest region accounting for 3.4% of malaria cases in 2018 (12). Globally, it is estimated that 3.9 billion people are at risk of infection with dengue virus covering 129 countries. Nearly 70% of the dengue burden is in Asia (13).



Vulnerable populations

Low-income populations mainly in tropical/subtropical countries are likely to be most affected. According to IPCC, the vulnerability of a population depends on factors such as population density, level of economic development, food availability, income level and distribution, local environmental conditions, pre-existing health status, and the quality and availability of public health care. People living in malaria and dengue prevalent areas with a lack of effective primary healthcare are more susceptible to the health effects of climate change (14).



Over-burdened public health systems

Several countries in Asia-Pacific region are facing the double burden of disease. There is an increasing incidence of communicable diseases alongside non-communicable diseases. This is putting immense stress on their health systems. Health systems with weak health infrastructure will find it difficult to cope with the impact of climate change on VBDs without external assistance to prepare and respond. These conditions will be exacerbated by unexpected events such as COVID-19.



Solution

Climate change considerations should be a critical component of strategies for control and elimination of VBDs. Since the impact of climate change will vary from country to country and over time, the response too should be tailored to local conditions.



1 | Bhutan

The Ministry of Health conducted a systematic national vulnerability and adaptation assessment on health outcomes of climate change in 2012 as part of the "climate change adaptation to protect human health" project (15) in collaboration with Environmental Health Programme, and other stakeholders such as Meteorological Services in Bhutan. The influence of climate on current and future VBDs formed one component of the assessment. The need to integrate climate information with disease surveillance to develop disease early warning systems emerged as a key recommendation.



2 | India

The Indian Meteorological Department (IMD) and the Indian Council of Medical Research (ICMR) are exploring climate-based solutions to accelerate malaria elimination. The Met Department already issue a weekly bulletin -"Climate Information for Health"- which includes information on temperature thresholds, and district wise disease transmission window to forecast malaria outbreak (16). The two departments have since partnered with Malaria No More to launch an interagency expert committee to examine malaria patterns and operationalize climate-based solutions and prediction tools and a pilot project has been initiated in Odisha (17). Realising that the health department cannot deal with climate change alone, there is now a concerted effort in the state towards a 'whole of government' effort.



Photo Credit: Asia Development Bank



3 | Nepal

The Nepal National Adaptation Programme of Action (NAPA)³ to climate change identified VBDs as one of the highest priority areas for the health sector and formulated appropriate adaptation strategies for the same (18). Climate change is likely to intensify the risk of VBD epidemics in the mountain regions of Nepal if other non-climatic drivers of VBDs remain constant (18). NAPA included adaptation strategies for the same: awareness raising and public health initiatives at the community level; conducting research to understand the scale and epidemiology of health problems caused by climate change; and, supporting piloting of studies to assess impact of climate change on emergence and outbreak of disease (19).



4 | Solomon Islands

A climate-based malaria monitoring and early warning system (MalaClim) has been developed in the Solomon Islands (15). Working together, the Solomon Islands Meteorological Service and the Vector-Borne Disease Control Programme, supported by the Australian government have successfully developed a model that uses rainfall data to provide early warning of a potentially severe malaria season (15) (20).

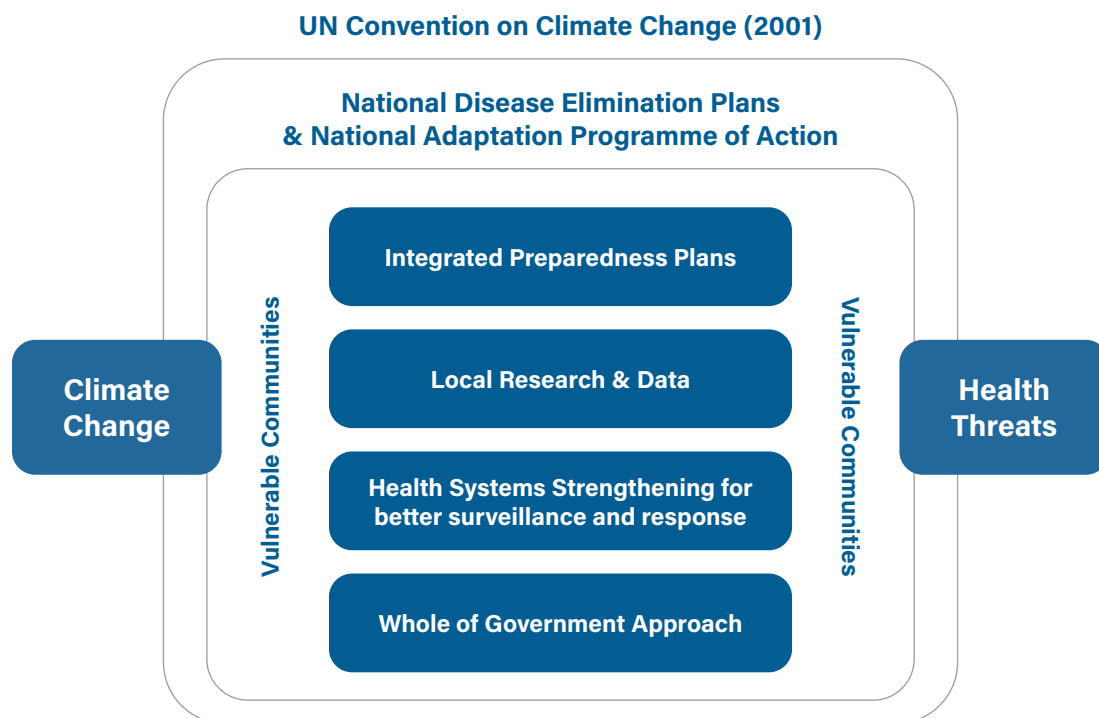


Photo Credit: DFAT

³ NAPA was designed as part of the United Nations Framework Convention on Climate Change process in 2001 to support least developed countries to address urgent and immediate climate change adaptation needs. In 2010, WHO assessed the inclusion of health within the NAPAs. A majority of the countries identified health as a priority sector impacted by climate change. A different process - The National Adaptation Programme (NAP) - was designed to provide support for medium- and long-term adaptation planning needs. The WHO has created a guidance document to ensure that the process of iteratively managing the health risks of climate change is integrated into the overall NAP process (25)

Recommendations

A few strategies have proven effective to mitigate the consequences of climate change on malaria and VBDs. Here are 4 policy recommendations to support a more integrated approach to climate change and health, with a view to protecting vulnerable communities first.



1. Integrate preparedness plans using climate-related information

Countries should use weather information and seasonal forecasts to enhance risk assessment and preparedness for malaria. A number of resources and tools such as WHO's Vulnerability and Adaptation Assessment tool are now available for countries to leverage for this purpose. Some countries like Solomon Islands have developed weather or climate-based early warning systems for malaria. Models used to assess the impact of climate change on VBDs transmission must integrate variables that interact with both the environment and VBDs, and incorporate human interventions and social contexts (21)(22).

3. Promote 'whole of government' approaches

'Whole of government' responses have proven to be more effective in dealing with impact of climate change on VBDs and health in general. Mechanisms that promote coordinated action among health and non-health sectors (particularly agricultural, environmental, and meteorological sectors) and different levels of government are needed.

2. Promote local research on impact of climate change on VBDs and improve surveillance

The impact of climate change on VBDs will vary across locations and over time. Moreover, the relationship between variables such as temperature and malaria is not linear. Thus, strengthening local research capacity to monitor the potential impact of climate change on VBDs will be critical. Modelling can help better predict the impact of climate change on VBDs. Local authorities and malaria programme staff, particularly in decentralized settings, must be supported to conduct local research and monitoring.

4. Strengthen health systems for better surveillance and response

Health systems strengthening projects must include actions that will strengthen the response to climate-sensitive VBDs in specific ways. Core investments in the health sector will protect us from climate change-related health risks including malaria. This includes investments in integrated surveillance mechanisms and information sharing.

"If we're going to prevent a climate disaster, climate-specific interventions and solutions aren't enough. We need to be thinking about the indirect effects, too, like how a warmer planet will affect global health."

Bill Gates (Co-Chair & Trustee, Bill & Melinda Gates Foundation), 2020

APLMA and APMEN have compiled a list of resources on climate change and health. While this is not an exhaustive list, the materials listed below can provide some guidance on the integration of climate change considerations within malaria elimination strategies. Feel free to contact us at info@aplma.org for more information

Resources

TOOLS AND PLANNING RESOURCES	WHO: Launched a “Protecting health from climate change: vulnerability and adaptation assessment” tool. It provides guidance on conducting an assessment of current and future vulnerability to the health risks of climate change considering the multiple determinants of climate-sensitive health outcomes. Malaria No More: Launched a new initiative - “Forecasting Healthy Futures”. This will develop weather data-informed strategies and policies to help governments and partners better time and target effective health interventions.
TECHNICAL ASSISTANCE	WHO/ World Meteorological Organization (WMO): A joint office has been set up to promote the coordinated development and use of climate services to improve public health. The Joint Office will help to achieve the goals of the “Global Framework for Climate services”. IPCC: A United Nations body to explain the science related to climate change. IPCC has developed “a report on how climate change impacts human health”.
ADVOCACY AND CROSS-SECTORAL LINKAGES	APLMA: A regional initiative established under the East Asia Summit, now endorsed by 23 Heads of Government. It drives implementation of the “APLMA Leaders Malaria Elimination Roadmap” to expedite elimination by 2030. RBM Partnership to End Malaria: A global platform for coordinated action against malaria. It mobilizes action and resources and forges consensus among partners. RBM has called for “a joint approach between public health and environment professionals” to deal with the impact of a changing climate on health.
RESEARCH AND EVIDENCE	Malaria Consortium: Specialising in the prevention, control and treatment of malaria and other communicable diseases, this leading technical organisation strives to incorporate responses to climate-related risks into its programmes - based on nine key approaches outlined in “Adapting to minimise the health impacts of climatic changes.” TDR: TDR, is a global programme of scientific collaboration that helps facilitate, support and influence efforts to combat diseases of poverty. A key focus area for TDR is investigating the “effects of environmental and climate change on major vectors and vector-borne diseases.”
CAPACITY BUILDING AND PEER LEARNING	APMEN: A regional platform for malaria elimination in the Asia Pacific. It facilitates knowledge exchange and peer-to-peer support between different partners and help address gaps in knowledge. APMEN will leverage its Working Groups to advance discussions on climate change and malaria.

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