



CLIMATE CHANGE & HEALTH

Review of Evidence for the Indo-Pacific Region

Supported by

**The Foreign, Commonwealth & Development
Office, New Delhi**

ABOUT THE STUDY

The study titled Climate change and Health-Review of Evidence for the Indo-Pacific Region was supported by the South Asia Research Hub of the Foreign Commonwealth Development Office, British High Commission. The aim is to examine the existing evidence on the impact of climate change on health in South Asia, Southeast Asia, and the Pacific Islands and arrive at evidence-based recommendations for the International Policy Research and Development (IPRD). These recommendations are designed to address the linkages between climate and health through policy and programming.

The study acknowledges the geographical and economic diversity of the region, presenting findings grouped by relevant sub-categories of countries and Climate Sensitive Diseases. Additionally, in-depth case studies have been development eleven representative countries of *India, Bangladesh, Thailand, Indonesia, Vietnam, Philippines, Cambodia, Malaysia, Nepal, Tuvalu and Fiji* considering factors such as country size, income status, vulnerability to climate risks and existing health system status. The research aims to provide valuable insights into the challenges and opportunities for making health systems in the Indo-Pacific region more resilient and sustainable in the face of climate change.

The project provided the opportunity to foster partnerships with regional partners Asian Disaster Preparedness Center (ADPC), B.P. Eye Foundation (BPEF) and Bangladesh Centre for Advanced Studies (BCAS) who supported the country specific deep dives in Southeast Asia (Thailand, Indonesia, Vietnam and Philippines), Nepal and Bangladesh respectively.

INTRODUCTION

The Indo-Pacific region is already witnessing climate induced changes in weather patterns characterized by increasing temperatures and precipitation, thereby resulting in a surge of respiratory and cardiovascular diseases, mosquito-borne afflictions such as dengue, and mental health disorders. Projections indicate that due to changes in tropical weather patterns, parts of the Indo-Pacific region, are likely to experience aggravated regional extremes including events such as heatwaves, floods, and droughts, with potential intensification [1]. This intensification not only threatens human lives but also jeopardizes decades of progress in development, global health, and poverty reduction. The numbers of exposed populations are high in most countries and are particularly significant in small island nations and countries with vast population residing in their coastal regions.



Figure 1: Flooded roads in Ho Chi Minh city in Vietnam during 2019 floods

Disturbingly, 42 million people have been displaced in the Asia-Pacific area due to climate-related factors, including storms, floods, extreme heat, and sea-level rise, leading to significant human movement within and across borders [2]. Climate change has been termed as ‘profound existential threat’ for Asia and Pacific is leading to new health challenges in the region and burdening current and future generations with the high costs of public health [3].

Based on the existing global evidence and emerging gaps on developing countries the present study attempts to provide an overview of the climate and health challenges that region is experiencing and will be facing in future. The study covers impacts of climate change on health, the vulnerable groups and drivers of their vulnerability, the existing health systems and their challenges, and finally the climate policies and plans with their health co-benefits. The study has also identified a set of recommendations based on literature and local and regional experts’ insights to support the development of climate resilient health systems in the region.

OBJECTIVES

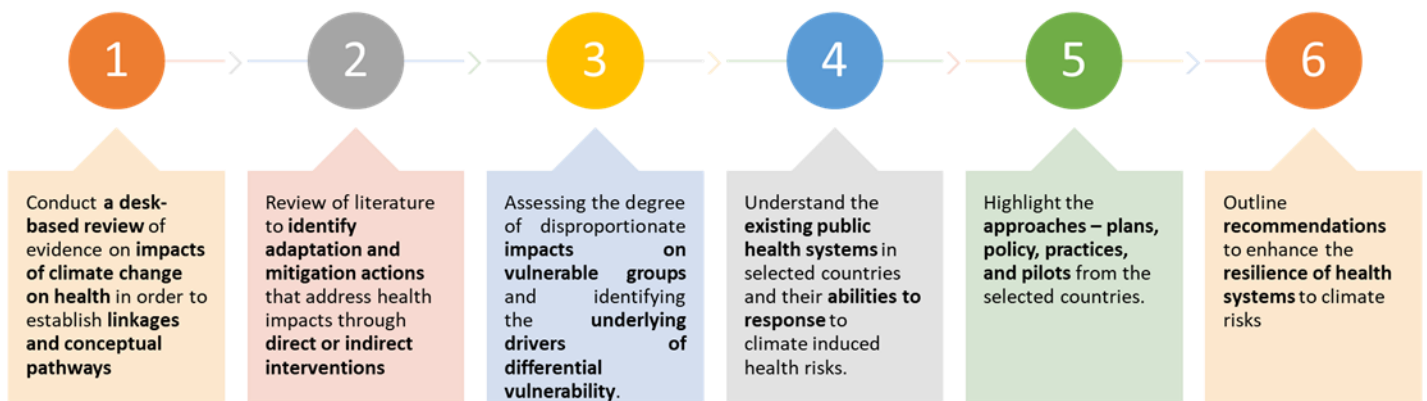


Figure 2: The study objectives

The broad scientific understanding and the large evidence base shows that climate change impacts human health both directly and indirectly thereby adding an additional strain on existing health systems, in many cases in developing countries which may already lack the resources or capacity to respond effectively. Thus, to ensure that our health systems are equipped to shoulder the increasing disease burden, it is critical to understand the climate health linkages, pathways of growth and gaps in current research on climate and health. Also, response measures and its adequacy may help understand how well countries may respond to the challenges of this growing concern on human health impacts. The aim of this report is to discuss the impacts of climate change on human health and its responses in the Indo-Pacific region. Given these concerns, there are few key research questions that the study looks to address: What is the current understanding and advancement in science discussing various pathways that indicate the linkages between climate change and health?; What are the key adaptation and mitigation actions/priorities in the study region as outlined in the Nationally Determined Contributions (NDCs), Long Term Strategy (LTS), and National Adaptation Plans (NAPs)?; What are the main drivers of differential vulnerability identifying marginalized populations affected by climate change impacts on health and how do they interact with each other?; What are the abilities of existing health systems in responding to climate-induced health impacts?; Are there approaches by way of plans, policies, practices, pilots that serve as good practice for scaling up?; and, What recommendations can be provided to improve on health systems response to climate-induced risks in the selected countries? Based on the above, this study seeks to focus on a set of six objectives as described in the Figure 2.

METHODOLOGY

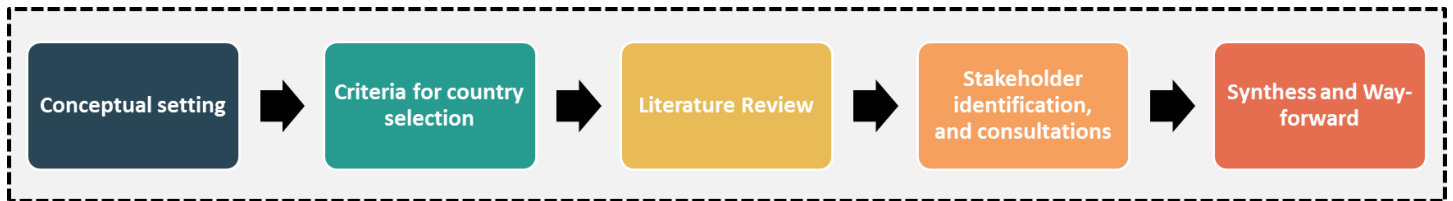


Figure 3: The study methodology

Step 1: Conceptual setting

The initial step was to establish a foundation for the exploration of the inter-linkages between climate change and health. This stage involved a thorough search for existing research on climate and health, using relevant keywords across databases and sources. This step helped in arriving at key themes, methodologies, and research gaps in literature.

Step 2: Criteria for country selection

Using a pre-defined criterion, countries that are most affected by climate risks and have limited capacities to respond were identified in step 2. The selection criteria included: (a) Low Per Capita Income, (b) Low Human Development Index (< 0.550), (c) High World Climate Risk Index, (d) Qualifying for Official Development Assistance, (e) High INFORM Climate Risk Index, and (f) Low Global Health Security Index. Figure 4 shows the selected countries.

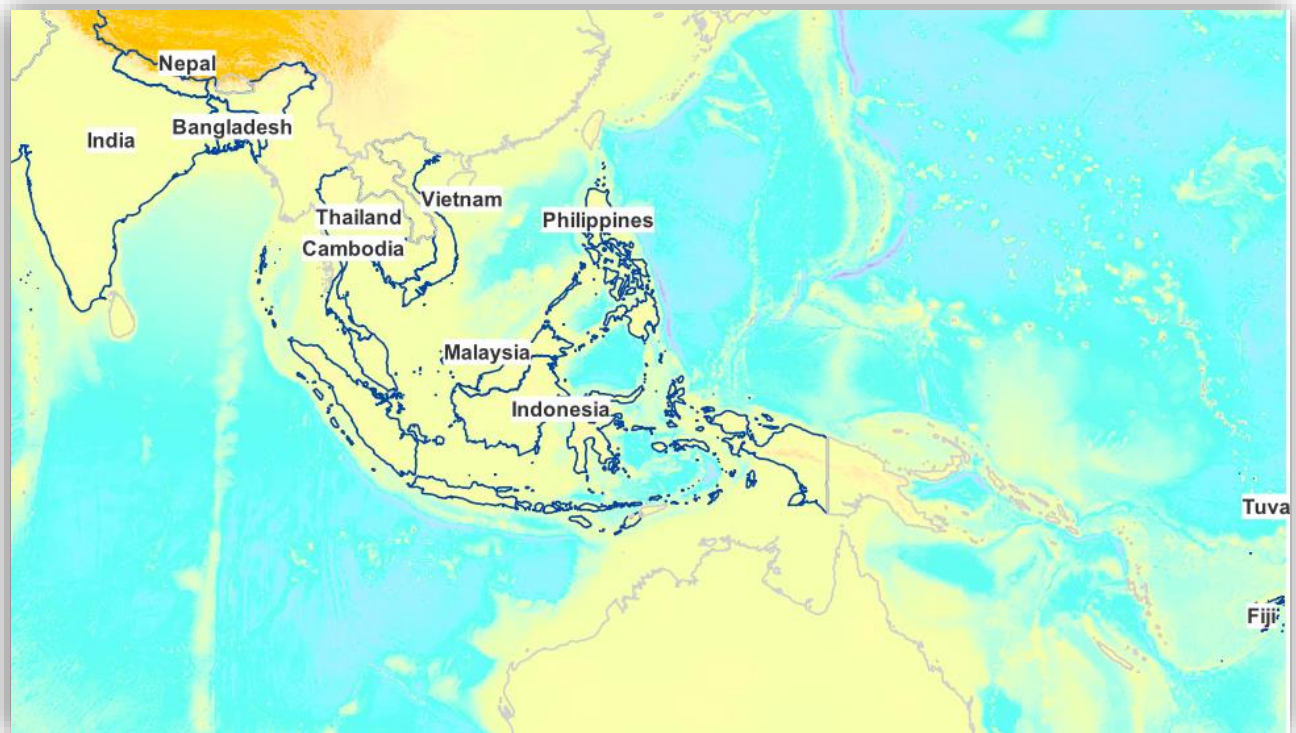


Figure 4: Selected countries for the study

Step 3: Secondary review of literature

A secondary literature review was conducted to elucidate the causal pathways, interconnections, and health consequences of climate change. Due attention was given to understanding the extent and severity of health impacts on vulnerable groups, including women, children, the elderly, and disabled groups.

The review also documented the existing state of health systems infrastructure, challenges encountered by the health sector, and examined adaptation plans, as well as the integration of health considerations within climate policies.

Step 4: Stakeholder Engagement and Consultations

Besides the secondary review, stakeholders working at the intersection of climate and health inter-linkages in the study countries were identified. Country specific consultations were carried out to gain insights regarding their health systems, status of implementation of adaptation and mitigation measures as well as identification of best practices.

Step 5: Synthesis and Way Forward

The findings from secondary review and stakeholder engagements have been compiled in the form of final technical report, country reports as well as policy briefs. Highlighting the key challenges, recommendations, and best practices for enhancing health systems resilience to climate change.

GLOBAL CLIMATE CHANGE & HEALTH IMPACTS

Impacts of climate change extend beyond environmental concerns and have far reaching consequences and the potential to disrupt and impede developmental priorities aimed at addressing poverty, hunger and malnutrition. In 2015, nearly 13% of the world's population was observed to be allocating a considerable amount of their household budget (> 10%) to healthcare, thereby reflecting that the most vulnerable populations (often those who are uninsured) face the more heightened risks [4]. Evidence points that the current health shocks and stresses are driving 100 million individuals into poverty, thereby exacerbating existing inequalities including in healthcare [5].

Berrang-Ford et al., (2021) [6] observed distinct patterns in existing evidence on the relationship between climate change and health. Authors note that majority of the evidence is generated in high-income and upper middle-income countries, with varying topics based on national burden of disease and existing research capacity. These variations in evidence underscore the need for expanding research and prioritize responses to address the adverse impacts on health. Gaps are particularly evident, especially in central Asia, north and central Africa, and South America. The review brings to fore, existing evidence on the health impacts of climate change and categorizes the impacts into direct and indirect impacts. Furthermore, indirect impacts are further categorized into those mediated by ecological factors and those mediated by social determinants. These impacts are illustrated below in Figure 5.

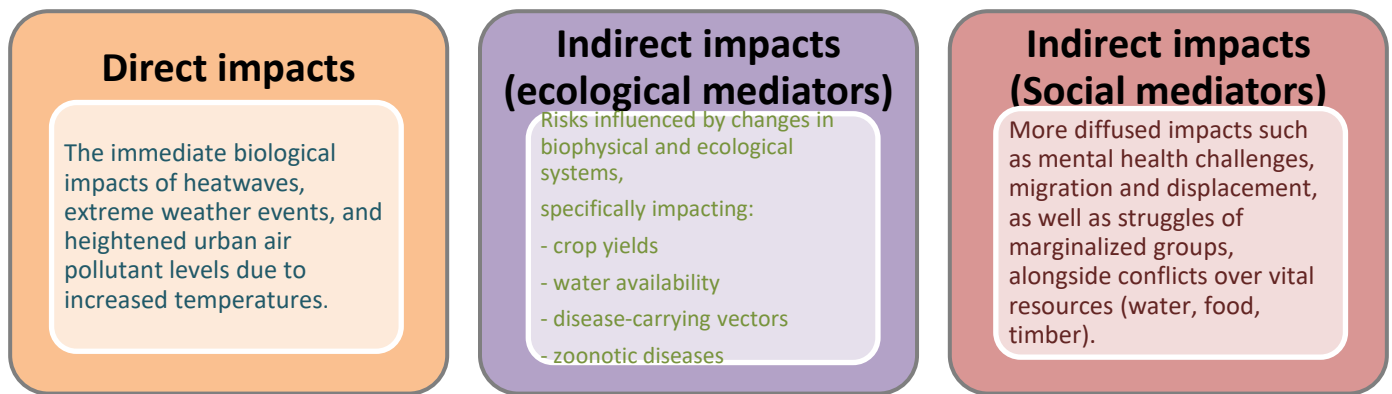


Figure 5: Impacts of climate change as categorised by Berrang-Ford et al. (2021)

The understanding of direct and indirect impacts as well as complex interlinkages between climate change and human health have been drawn expanding the Driver-Pressure-State of environment-Exposure-Response (DPSEER) framework [7]. The modified framework is illustrated in Figure 6. Based on this framework, it was found that the most prominent direct and visible impacts of climate change on human health is through extreme temperatures. Despite this fact, the evidence on impact of heatwaves in tropical countries is lacking in general, with only few studies focusing on the relationship between heatwaves and all cause hospitalizations and mortality in the Indo-Pacific nations (e.g. Vietnam, India and Bangladesh). Research and action on mental health impacts in particular is largely lacking in the Indo-Pacific nations.

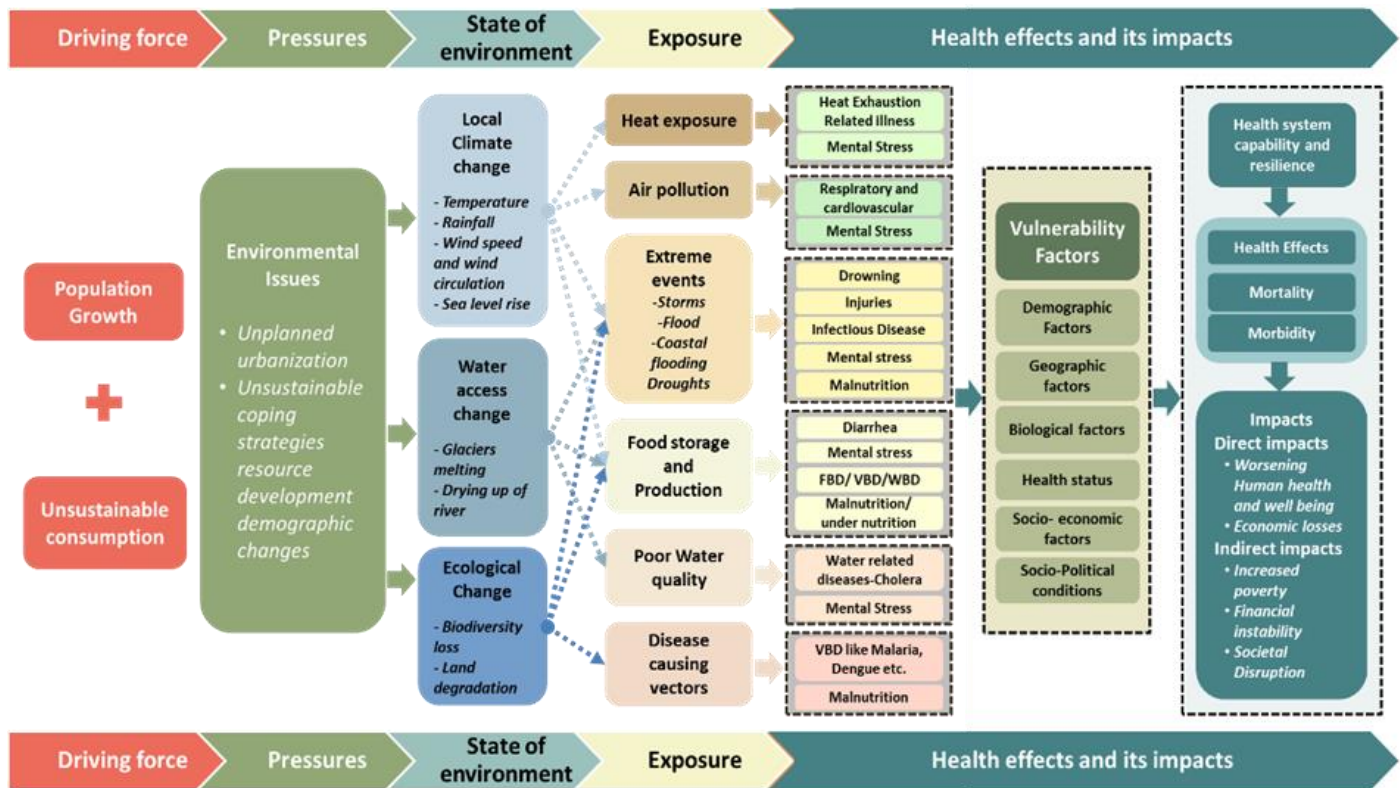


Figure 6: DPSEER framework depicting linkages between climate change and human health in the Indo-Pacific Region

Apart from direct impacts of heat, the indirect impacts fall under the broad categories of vector- and water-borne diseases as well as food-related illnesses. Climate change is altering ecosystems where vectors or hosts thrive. Relationship between rising temperatures and mosquito-borne disease outbreaks have been established by various studies and are found to peak in south and southeast Asia. The Pacific region also exhibits this effect, where elevated temperatures, extended rainfall, and high humidity are offering a thriving environment for *Aedes* mosquitoes, which are known carriers of dengue, Zika, and chikungunya viruses [8].

REGIONAL IMPACTS & VULNERABILITIES

The Indo-Pacific region is bearing a significant brunt of rising temperatures and variable rainfall patterns. Evidence from South Asia highlights that the region has suffered a substantial loss of life due to heat exposure, with almost 25,726 heat related deaths being reported in India alone between 1992 and 2016. This phenomenon isn't confined to South Asia alone; other parts of the Indo-Pacific, including East and Southeast Asia, are expected to experience an increase in extreme weather events such as heatwaves, flash floods, and stronger tropical cyclones. These changes not only pose a threat to human lives but also jeopardizes decades of progress in development, global health, and poverty reduction. The below table provides a glimpse of various climate sensitive diseases in the select countries of the Indo-Pacific region:

CLIMATE SENSITIVE DISEASES	IMPACTS & VULNERABILITIES
Heat Related Illnesses	<ul style="list-style-type: none"> ▪ In the year 2021, 167 billion potential labour hours were lost in India due to heat exposure [9] ▪ Temperature in garment factories in Dhaka pose high to very high risks to workers, with indoor temperatures reaching 38°C [10] ▪ In Thailand, outdoor workers are found to be more vulnerable to HRIs, such as farm workers [11], [12]
Extreme events	<ul style="list-style-type: none"> ▪ Typhoon mortality in The Philippines highlighted the disproportionate nature of vulnerabilities with emerging urban centres being more affected, and higher per capita deaths (due to drowning) among men and older age groups [13] ▪ Findings from Pacific Island Countries including Fiji and Tuvalu indicate that extreme weather events, have the potential to induce psychological trauma, anxiety and depression within affected populations [14] ▪ Rahman (2013) highlights the ordeal of pregnant, breastfeeding and menstruating women in Bangladesh facing high risks owing to their need for sanitary and reproductive health products [15]
Infectious diseases-vector, water and food	<ul style="list-style-type: none"> ▪ Increases in ambient temperature were found to correspond to an elevated incidence of diarrheagenic <i>E. coli</i> in Bangladesh [16] ▪ Research undertaken in India has found malaria outbreaks are correlated with meteorological parameters of rainfall and temperature [17], [18] ▪ Observations from Vietnam show that climate variability, such as El Niño and La Niña events, can increase the risk of WBD outbreaks in the country [19]
Food-related illnesses	<ul style="list-style-type: none"> ▪ A study in India, observed that exposure to floods is associated with malnutrition in children, with newborn children being most vulnerable with long-term health impacts [20] ▪ In northeast Bangladesh's Haor region, almost 24% households reported being food insecure on average in August, depicting an increasing trend from the month of May. This food insecurity was driven by various climatic factors including delayed rainfall, severe heatwaves as well as flash floods in Sylhet and Chattogram divisions [21]. ▪ In Fiji, extreme events such as intense storms, cyclones, and heavy rains, destroy crops and cause shortage of fresh fruits, vegetables, and fish. As a result of this, households face a high risk of consuming processed, high-salt, high-fat, and nutritionally poor imported canned foods which can further worsen the existing issue of obesity prevalent in adults and children above five years [22]

CLIMATE SENSITIVE DISEASES	IMPACTS & VULNERABILITIES
Air-pollution related illnesses	<ul style="list-style-type: none"> Exposure to ambient pollutants in air links to various health issues such as COPD, respiratory illnesses as well as a high rate of hospitalizations and visits. The long-term effects of ambient air pollution are associated with deficit lung function, asthma, heart attack, cardiovascular mortality and premature mortality have received much attention [23] An estimated 78,145 to 88,229 deaths and 1.0 billion to 1.1 billion days lived with illness in Bangladesh in 2019 were attributable to ambient air pollution [24]

CLIMATE & HEALTH RESPONSE

HEALTH SYSTEMS INFRASTRUCTURE

Health systems possess the inherent capacity to respond to and mitigate challenges associated with climate change. Acknowledging the urgency of climate change, governments worldwide are prioritizing its integration across diverse agencies. Health professionals recognize the impact of climate change on public health, although concerns are raised regarding the inadequacy of knowledge on the subject. Notably, there is a dearth of research exploring the interlinkages between climate change and health. Despite these evidence gaps, health professionals and policymakers are tasked with formulating and executing health interventions as public policies, to respond to climate change.

The Lancet Countdown on Health and Climate Change (2020) reports on the global involvement of health professionals, with health institutions pledging substantial divestments from fossil fuels, exceeding \$42 billion. The health systems of countries in the Indo-Pacific region predominantly constitute tiered structures wherein central ministries hold the highest authority. Nearly all the countries under the ambit of the study are undergoing economic and demographic transitions and simultaneously witnessing impacts on health variables. The health systems in these countries exhibit a dynamic mix of public and private delivery including methods of traditional systems of health and medicine. Southeast Asian countries are characterized by an increasing trend in private health expenditure relative to government expenditure. Inadequate health workforce relative to the burgeoning populations persist (Table 1), and climate change further compounds challenges for health systems. Climate change also has broader consequences for health systems. It can impact the access and quality of health services while imposing financial burdens on healthcare delivery systems. Additionally, climate change worsens existing disparities in health and healthcare, creating complex challenges for the overall resilience and effectiveness of health systems.

Table 1: Key Health Indicators of the Select Countries in the Indo-Pacific Region

INDICATORS* [25], [26]	INDIA	BANGLADESH	INDONESIA	PHILIPPINES	VIETNAM	THAILAND	FUJI	NEPAL	MALAYSIA	CAMBODIA	TUVALU
Physicians per 1000 population	0.7	0.7	0.6	0.8	0.8	0.9	0.9	0.9	1.7	0.2	1.2
Nurses and mid-wives per 1000 population	1.7	0.5	4.0	5.4	1.4	3.2	4.0	3.5	3.4	1.0	3.7
Beds Occupancy per 1000 inhabitants	0.5	0.8	1.0	1.0	2.6	2.1	2.0	0.3	2.0	1.2	4.2
Total health expenditure (% of GDP)	3.27	2.63	3.41	5.61	4.68	4.36	3.75	5.4	1.9	7.53	20.0

INDICATORS* [25], [26]	INDIA	BANGLADESH	INDONESIA	PHILIPPINES	VIETNAM	THAILAND	FIJI	NEPAL	MALAYSIA	CAMBODIA	TUVALU
<i>Out-of-pocket expenditure as percentage of current health expenditure (CHE) (%)</i>	50.59	74.00	31.79	45.03	39.60	10.54	13.66	57.7	31.5	60.4	0.35

* The data is based on WHO's Global Health Workforce Statistics, OECD, and supplemented by country data and might not be entirely inclusive of the data from private sector. It is important to note that many countries see a mix of expenditure from private sector and government health support system

Policies, Action Plans & Programmes

The Indo-Pacific countries are actively addressing the impact of climate change on health. The approaches vary from involving early warning systems, healthcare capacity enhancement, healthcare sustainability measures, integrating climate change into development and disaster management, combines adaptation and mitigation efforts hence strengthening their health system resilience. These countries collectively demonstrate a strong commitment to mitigating climate change and enhancing public health. The evidence indicates that despite rich information on different policies and plans in place (Figure 7), limited information is available on effectiveness of implementation of these and their progress in the respective countries.

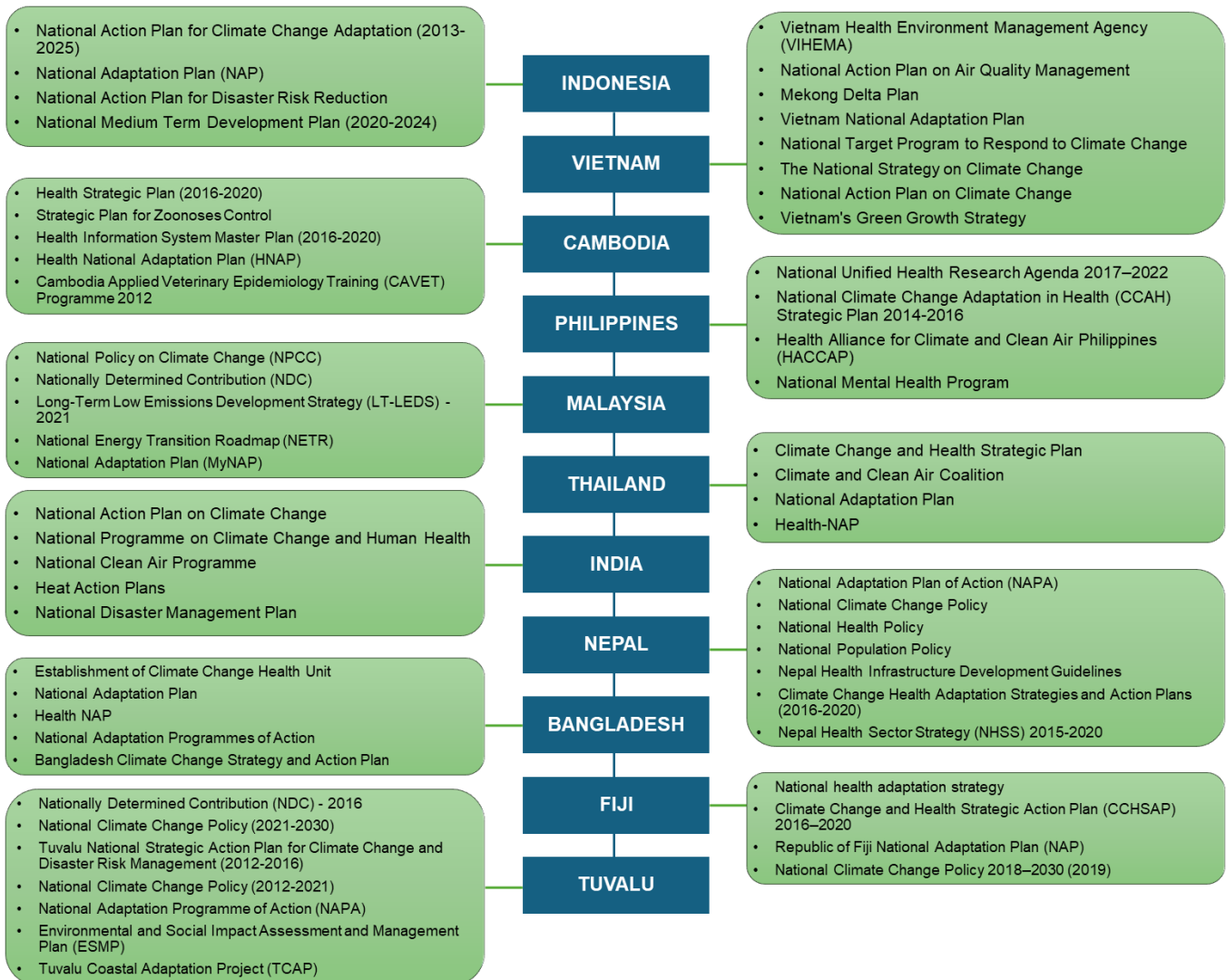


Figure 7: Health Adaptation Response in the select countries

CHALLENGES FACED BY HEALTH SYSTEMS

The Indo-Pacific region faces significant health system challenges, that are further aggravated by climate change. Some of the common challenges faced by nations in this region include disparities in healthcare access, inadequate infrastructure, and workforce shortages. Bangladesh for instance, is grappling with a shortage of healthcare professionals, with approximately one registered physician for every 1,410 individuals, resulting in a doctor-patient ratio significantly higher than the WHO-recommended 1:1,000 [27]. Similarly, Indonesia faces a severe shortage of hospitals and hospital beds, having only 2,925 hospitals with a bed capacity of 388.106 serving a population of nearly 270 million [28].

The Philippines and Thailand lack comprehensive long-term care policies to address the evolving health needs of their aging populations, which can lead to challenges in providing adequate care for the elderly.

Indo-Pacific nations additionally face the challenges of insufficient health financing. The COVID-19 pandemic exposed vulnerabilities in health systems, with disruptions in primary care, community care, and emergency services in many countries, resulting in increased mortality for COVID-19 cases and backlogs in the management of NCDs. The main reasons for these disruptions were identified as a lack of healthcare resources and policies that led to reduced services and care-seeking. Pacific Island Countries face the challenge of quick staff turnover where a proportion of health workers migrate frequently. This was also witnessed during COVID-19 Pandemic health workers moved to Australia and New Zealand.

Moreover, these countries have inadequate policies to address the mentioned concerns. Nepal for example faces the challenge of inadequate policies and initiatives to address diverse healthcare needs, challenges in decentralization leading to lack of meaningful involvement of service users and caregivers. The country requires improved policies beyond successful HIV/AIDS initiatives. Even if these policies are in place, these nations lack effective implementation on ground.

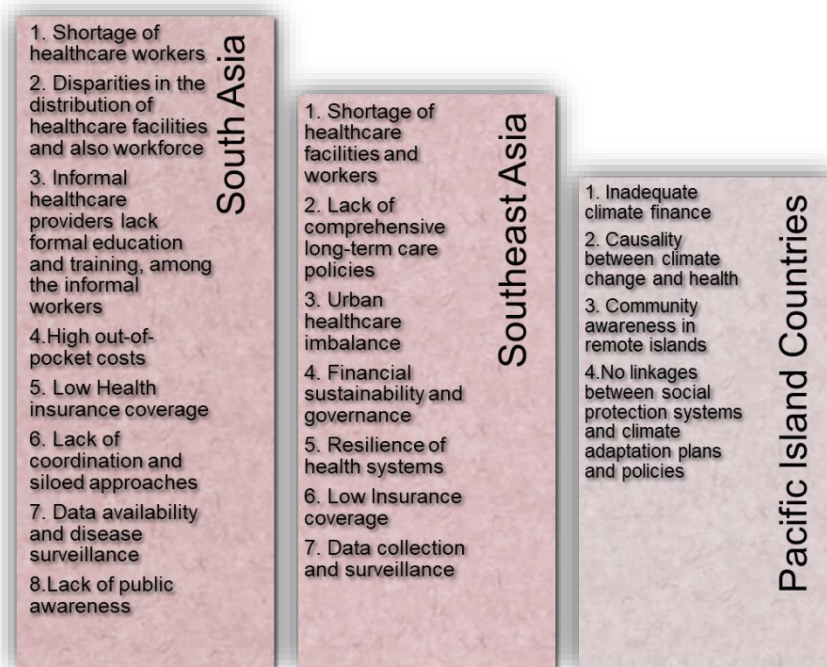


Figure 8: list of challenges faced by South Asia, South East Asia and Pacific Island Countries

EVIDENCE GAPS

Research Gaps

- Data gaps as a result of limited understanding with regards to the inherent issues that underlie the health sector and the way it intersects with climate given the lack of collection of that data and in templates that are needed
- Monitoring and surveillance needs of diseases and data collection in templates

- The Indo-Pacific region faces a dearth of evidence-based studies on the interconnections between climate and health, hindering the availability of readily applicable insights for medical practitioners.
- There is a further need to foster an understanding on the ecological and socio-economic mediating factors that determine the impact of climate change on health.
- There is a notable gap in research documents of health impacts on specific demographic groups within the region, particularly focusing on children, the elderly, and disabled populations. Existing studies insufficiently address the unique vulnerabilities and health implications that these specific groups may face due to climate-related factors.
- A research gap exists in the examination of menstrual and reproductive health among women in disaster-affected areas within the Indo-Pacific region. Research fails to provide an understanding on the specific challenges, needs, and impacts on women's reproductive health affected in a post-disaster setting.

Policy Gaps

- While, several countries have developed and submitted their Nationally Determined Contributions (NDCs), National Adaptation Plans (NAPs), Health-NAPs and Disaster Preparedness Plans, there are limitations in comprehending the health co-benefits of these climate actions.
- Majority of the countries except for India, do not have Heat Action Plans, despite the growing concerns on the increased frequency of extreme heat events in the region.

Others

- Despite the momentum and rigor in acknowledging the climate impacts on health and health systems, there persists a tendency toward siloed approaches.
- Very few country-level assessments on the vulnerability of health to climate-related impacts exist

RECOMMENDATIONS

The Indo-Pacific region is likely to experience huge impacts including the impacts to be felt on the health sector. Besides, though each country which has been studied in detail have their own systems in place for managing health response, they have not been integrated concerning ensuing and future risks related to climate. As a result nations should prioritize strengthening their overall health system responses keeping in mind the need to build climate resilience.

Based on a review and consultations with experts, for each selected country in the region, the report seeks to suggest a list of recommendations that can assist countries in fostering long-term resilience and ensuring equitable access to healthcare amidst growing climate challenges. Provided below are core areas that need to be revisited for strengthening of health system responses in the region (Figure 11).



Figure 9: List of recommendations that emerged from the study

The review indicates the gaps in healthcare systems in the region in integrating climate concerns in their policy and planning, highlighting the dire need for strengthening of healthcare systems in the region. It is also observed that in many cases the emerging risks cut across sectors and directly or indirectly impact health and therefore need to address the responses considering those linkages.

Though several relevant programmes and plans are emerging from the nations indicating the will and efforts from policy makers, but there is still a lack of understanding on the linkages between climate change and various health and health sector impacts to support evidence-based policy making.

Strengthening of surveillance systems and data collation is needed in many cases. Additionally, this knowledge is required to garner support and coordination for effective on ground implementation of plans and programmes. Moreover, capacities of institutions, health workforce needs to be built to ensure effective implementation of the actions needed to be promoted on the ground for strengthening health systems resilience.

Awareness and effective communication channels can be introduced to communicate the information in simpler ways to target groups to ensure promotion of good practices and scalability of actions.

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