Adapting to climate change: safeguarding health from disasters in Southeast Asia

Workshop report

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The Academy of Medical Sciences

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Executive summary

The climate crisis has already caused an increase in extreme weather events and natural disasters with concerning levels of severity – a trend that will likely continue in the future.

Southeast Asia is especially susceptible to these climate-related disasters, which stand to threaten the health of its populations due to the region's tropical maritime climate and geography. Some of the resulting effects of climate change include increased typhoons, floods and droughts, rising sea levels, higher temperatures, and shifting rain patterns. These changes are negatively impacting crop yields, biodiversity, forest harvests, and the availability of clean water.[1] In 2022, disasters led to over 32 million people being displaced globally, with the Asia-Pacific region accounting for 70% of these displacements.

It is vital to recognise and address the impacts of climate change on different communities. There are major disparities in the burden caused by climate disasters, which fall particularly heavily on marginalised groups. It should therefore come as no surprise that climate change is cited as a major driver of worsening inequities. Gender inequalities in particular need to be addressed, as women are far more likely to be affected by climate-related disasters, like flooding. Leveraging networks and fostering collaborative research will be critical in addressing regional and gender disparities that are exacerbated by climate change.

In January 2025, the UK Academy of Medical Sciences and the National Academy of Science and Technology, Philippines, jointly convened a workshop in Manila to discuss opportunities to safeguard health from the effects of climate disasters and to address scientific opportunities and gaps relating to the climate adaptation challenges faced by countries in Southeast Asia. Participants came from a range of countries in the region, including Malaysia, Thailand, Vietnam, Indonesia, Singapore, Japan, the Philippines and the UK.

Following introductory presentations, participants joined breakout groups to focus on different topics, including policy, research, data and community engagement. Discussions highlighted a range of key themes:

Health equity and justice should underpin climate action

Participants agreed that health equity and justice should underpin all actions to overcome the threats posed by climate change. Such threats include the **disproportionate impact of disasters on women,** with women facing increased risk of mortality during floods and impacts of climate change on women's risk of gender-based violence. As indicated above, it is vital to acknowledge how climate change is exacerbating inequities and negatively impacting segments of the population that are already vulnerable to health shocks, despite having contributed very little themselves to global emissions.[2] Political will and leadership should ensure that interventions carried out to adapt to climate change are transparent, equitable and inclusive of community perspectives.

1 Asian Development Bank (2023). When it Comes to Fighting Climate Change, Green is Golden. https://www.adb.org/news/features/when-it-comes-fighting-climate-change-green-golden#:~:text=Southeast%20Asia%20is%20acutely%20vulnerable,the%20availability%20of%20clean%20water.

2 Women Deliver (n.d.). The climate crisis. https://womendeliver.org/the-climate-crisis/

The risk of maladaptation should not be discounted

Participants emphasised **the lack of consideration of maladaptation** in the climate change agenda. Maladaptation refers to interventions that aim to help countries adapt to climate change but which unintentionally increase their vulnerability to climate risks.[3] In most instances, maladaptive consequences are not immediately apparent. Therefore, the **long-term impacts** (both intended and unintended) of adaptation interventions need to be given more consideration, and this understanding should underpin the way climate change is addressed.

Communication and engagement should be harnessed

Communication and engagement are important tools in finding effective and innovative ways to engage with key stakeholders such as communities, policymakers, the media and scientists. By working with behavioural scientists and champions for climate change and health, effective **communication strategies** can be formulated to understand the different **information needs** of stakeholders and communities facing climate disasters.

Communities should co-create interventions

Co-creation is a form of collaboration that involves working with stakeholders to develop innovative initiatives.[4] Engaging with local communities to **co-create solutions** aimed at overcoming and adapting to the challenges of climate change will be crucial. This methodology can be applied by working with communities to formulate interventions that are effective in protecting them from disasters in a way that is tailored to meet local needs. To do this successfully, the value of **indigenous knowledge** in scientific research needs to be reinforced.

Improve transdisciplinary coordination and develop a regional science policy–practice continuum

There is a need to improve governance with regard to climate-related health issues. Enhancing coordination **across agencies and disciplines,** both within and outside of the healthcare sector, could support such efforts. In addition, **translating scientific evidence into policies** remains a challenge in Southeast Asia: the region would benefit from the development of a policy–practice continuum informed by science, including efforts to build scientific evidence into the policymaking process.[5]

Strengthen the evidence base and maximise the use of technologies

Discussions during the workshop highlighted a need to strengthen the evidence base in key areas related to climate and health, to facilitate better linkages between science and policy. One current gap which should be addressed is the absence of **community-generated knowledge** to inform climate initiatives. Efforts should also be made to maximise the use of different technologies, such as portals and software that can process and integrate data.

3 Schipper L (2020). Maladaptation: When Adaptation to Climate Change Goes Very Wrong, *One Earth,* **3(4),** 409-414. https://doi.org/10.1016/j.oneear.2020.09.014

4 Million F (2022). Co-Creation Toolkit: From design to implementation. *Oxfam-Québec.* https://policy-practice.oxfam.org/resources/co-creation-toolkit-from-design-to-implementation-621384/

5 Al-Akhali R (2020). A guide to evidence based policymaking. *Oxford University.* https://onlinecourses.bsg.ox.ac.uk/blog/guide-to-evidence-based-policymaking

Facilitate knowledge sharing at different levels

Harmonising and sharing knowledge at different levels could prevent avoidable overlaps and in turn benefit research agendas. Leveraging existing networks (research-specific and others) to gather information could be a key step in promoting knowledge sharing, while the development of a regional mechanism for multisectoral collaboration would vastly improve knowledge sharing in the field.

Improve data accessibility

To facilitating knowledge sharing, the workshop participants emphasised the need to make data sharing, accessibility and linkage more straightforward. Areas for improvement include the ability to link data to local areas and weather conditions, as well as connecting data on climate-related events to health impacts. Moreover, there is an even greater challenge in developing capacity in the skills required to analyse data, particularly for **linking climate change to health.** More training opportunities need to be available to address these skills gaps and there is a need to establish a **platform** that can improve data accessibility.

Introduction

The Intergovernmental Panel on Climate Change (IPCC) has stressed that the climate disasters now taking place across the world surpass its projections.[6] Despite contributing relatively little to climate change, Southeast Asia is one of the most susceptible regions to natural disasters in the world.[7,8]

Half of global mortality attributed to disasters occurs in Southeast Asia, and the region experiences annual economic losses of US$780 billion as a result. This susceptibility and loss puts the wellbeing of its populations in a very precarious position and creates an immense burden on these countries to adapt to the changing environment. For this reason, it is important to bring attention to the destruction climate change is inflicting on countries in Southeast Asia.

In addition to other negative impacts, climate change has complex impacts on people's health. These fall into three broad categories: i) direct impacts, such as heat and extreme events; ii) indirect impacts via ecosystems, which include impacts on global food supplies and changes in vector-borne disease transmission; and iii) indirect impacts via socio-economic systems, exemplified by increased poverty and intensification of existing inequalities and migration. The magnitude of these impacts will increase at least until the climate is stabilised.[9]

Climate and health are of particular relevance to the Philippines, given that a 2019 report from the Institute for Economics and Peace named it as the country most at risk of the climate crisis.[10] This in part is due to the fact that it is entirely surrounded by seas.[11] The warming of seas and oceans leads more heat to be released into the atmosphere, which creates storms with increasing levels of severity. Issues that endanger the health of Filipinos include extreme weather events, epidemics and food insecurity.

To take stock of these issues and their implications for research and policy, in January 2025 the UK Academy of Medical Sciences and the National Academy of Science and Technology, Philippines, jointly organised a two-day workshop in Manila. The workshop included a series of scene-setting talks and presentations on specific examples of climate change and health research in Southeast Asia, while breakout groups discussed potential future actions relating to research, policy, data, and community engagement.

6 Vernick D (2025). Is climate change increasing the risk of disasters? *World Wildlife Fund* https://www.worldwildlife.org/stories/is-climate-change-increasing-the-risk-of-disasters

7 Bößner S (2024). Feeling the momentum for climate action in Southeast Asia and beyond. Stockholm Environment Institute. https://www.sei.org/perspectives/climate-action-momentum-southeast-asia/

8 United Nations Women (n.d.). Southeast Asia (ASEAN). https://wrd.unwomen.org/explore/regions/southeast-asia-asean

9 Academy of Medical Sciences and the Royal Society (2021). A healthy future – tackling climate change mitigation and human health together. https://acmedsci.ac.uk/file-download/94272758

10 Amnesty International UK (2021). Philippines country most at risk from climate crisis. https://www.amnesty.org.uk/philippines-country-most-risk-climate-crisis

11 Haiyan T (2016). How is climate change affecting the Philippines? *Climate Reality Project.* https://www.climaterealityproject.org/blog/how-climate-change-affecting-philippines#:~:text=This%20is%20thanks%2C%20in%20part,surface%20temperatures%20continue%20to%20rise.

Regional context

To set the scene, Dr Faye Cruz, from Manila Observatory, shared insights from her research on climate change in Southeast Asia. She explained that the region is seeing an increasing frequency of extreme weather events, such as storms, floods, rising sea levels, extreme heat and drought.

Projections indicate that the region will see rises in average temperatures, and that rainfall will generally increase in the northern parts of Southeast Asia but decrease in the Maritime Continent. In addition to this there is an increased risk of compound events: for example, coastal flooding may become more frequent and more severe, due to higher sea levels, which could lead to more risk for coastal areas. These consequences of climate change fall under what the IPCC defines as **climatic impact-drivers** (CIDs). CIDs refer to *"physical climate system conditions (e.g., means, events, and extremes) that affect an element of society or ecosystems. Depending on system tolerance, CIDs and their changes can be detrimental, beneficial, neutral, or a mixture of each across interacting system elements and regions."* [12]

In a recent IPCC report, CIDs were used to translate climatic events into the consequences they have on people and ecosystems.[13] Moreover, a CID framework has been developed to make it possible to process climate data into information for decision-making. This is vital because the negative impacts from climate change on various sectors such as health, food production, water and infrastructure will intensify if they are not addressed.

Despite this, Dr Cruz explained that there are still gaps that need to be addressed, such as the need for high-resolution climate data, including observations. High-resolution climate data is important for developing climate strategies and predicting trends because it provides more accurate information about climate change variables.[14] This information can then provide experts with a technical understanding of potential climate change impacts. However, the data collected must be useful for and relevant to impact assessments. Dr Cruz identified encouraging **collaboration** between climate researchers and impact scientists and the use of **downscaling techniques** as two strategies for developing high-resolution data.

Dr Ronald Law, Director, Health Emergency Management Bureau and Lead of Health and Climate Change, Philippine Department of Health, built on Dr Cruz's presentation by drawing attention to the response of the Philippines health system to climate change. According to Dr Law, some of the actions being undertaken by the Filipino Department of Health to address the impacts of climate change include:

- The creation of a new accreditation scheme for local emergency teams and environmental health programmes, relating to climate disasters.
- The Department for Health developing a National Adaptation Plan (NAP), in collaboration with the Climate Change Commission.
- The World Health Organization (WHO) supporting the Philippines in developing a roadmap to raise awareness around climate change and health.

12 Ruane AC, et al (2022). The Climatic Impact-Driver Framework for Assessment of Risk-Relevant Climate Information, *Earth's Future,* 10 (11), e2022EF002803. https://doi.org/10.1029/2022EF002803

13 Ranasinghe R, et al (2021). Climate Change Information for Regional Impact and for Risk Assessment. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change,* 1767–1926. https://doi.org/10.1017/9781009157896.014

14 European Union Copernicus (n.d.). High-resolution climate projections. https://climate.copernicus.eu/high-resolution-climate-projections#:~:text=Climate%20projections%20from%20IPCC%2DCMIP,of%20The%20Climate%20Data%20Factory

However, there are still challenges in integrating climate and health in different sectors, such as transport. Political will, better coordination within the health sector and a systematic approach are also critical to mitigating the strain climate change poses to the health system in the Philippines. For this reason, it is vital to identify key opportunities to influence current and new administrations to make climate change a priority on the political agenda.

Following on from the discussion of the impacts climate change is bringing about in the region, **Dr Albert Salamanca,** from the Stockholm Environment Institute, turned participants' attention to the need to mitigate and adapt to these challenges. Dr Salamanca explained while adaptation is important, populations can only adapt so much to these impacts. He also pointed out that maladaptation can worsen a country's vulnerability to climate change. Moreover, Dr Salamanca explained climate change perpetuates economic disparities, and he noted the Philippines and Indonesia are the countries in Southeast Asia that are most vulnerable to rising levels of poverty linked to climate change. This is in part due to their susceptibility to drought, which has been correlated with a low human development index.

Dr Salamanca also touched on the **political climate** in the region, noting the trend of more governments adopting far-right politics, and how this in turn is influencing climate action. To facilitate climate-resilient development in Southeast Asia, he suggested that adaptation actions need to be gender-driven and be considerate of vulnerable groups in their approach.

Breakout sessions and emerging themes

Following the introductory presentations, the participants joined breakout groups focused on policy, research, data and community engagement. The discussions highlighted a range of key themes:

Health equity and justice should underpin climate action

The participants agreed that health equity and justice should underpin all actions to overcome the threats posed by climate change. Some of the key issues identified were the **disproportionate impacts of disasters on women.** When climate-related disasters, such as flooding, occur, women are **14 times more likely** to die than men.[15] This is in part caused by the fact that women have limited access to information and resources. Women are also less likely to be taught how to swim in some settings, putting them at a higher risk of mortality.

Another issue is the impacts climate change can have on women's risk of experiencing gender-based violence. Women in rural communities are often required to travel to isolated areas and to cover longer distances to secure food and water for their households due to increased drought and water source contamination related to climate change. Travelling to these isolated areas puts these women at an increased risk of violence. For these reasons, it is vital to acknowledge how climate change is exacerbating inequities and negatively impacting segments of the population that are already vulnerable to health shocks, despite having contributed very little to global emissions.[16] Political will and leadership should ensure that interventions implemented to adapt to climate change are transparent, equitable and inclusive of community perspectives.

The risk of maladaptation should not be discounted

While there is a significant focus on how populations in the region should adapt to the challenges climate change poses, participants emphasised **the lack of consideration of maladaptation** in the climate change agenda. Maladaptation refers to interventions that aim to help countries adapt to climate change but which unintentionally increase their vulnerability to climate risks.[17] For example, in Bangladesh the implementation of flooding measures reduced soil nutrients from the water and erased floodplains that were a notable source of food and income, particularly for women. In most instances, maladaptive consequences are not immediately apparent. Therefore, the **long-term impacts** (both intended and unintended) of adaptation interventions need to be given more consideration and this understanding should underpin the way climate change is addressed. If this does not happen, progress towards safeguarding health could be undermined, leaving populations more susceptible to climate change than before.

15 United Nations (n.d.). Why women are key to climate action. https://www.un.org/en/climatechange/science/climate-issues/women

16 Women Deliver (n.d.). The climate crisis. https://womendeliver.org/the-climate-crisis/

17 Schipper L (2020). Maladaptation: When Adaptation to Climate Change Goes Very Wrong, *One Earth,* **3(4),** 409-414. https://doi.org/10.1016/j.oneear.2020.09.014

Communication and engagement should be harnessed

Communication and engagement are important tools for exploring effective and innovative ways to engage with key stakeholders. Mutual communication can help facilitate engagement between key stakeholders, such as communities, policymakers, the media and scientists. Each of these stakeholders has a responsibility to engage effectively with others. For instance, governments need to work with communities and researchers to determine the best ways to communicate disaster risks to local communities and to enhance people's understanding of climate change. By working with behavioural scientists and champions for climate change and health, effective **communication strategies** can be formulated, to understand the different **information needs** of stakeholders and communities facing climate disasters.

To engage with stakeholders effectively, the workshop participants suggested mapping and creating an inventory of stakeholders, who can be engaged with to tackle the cross-cutting issues involved in climate change. In addition to which stakeholders to engage with, the discussion also focused on how information should be communicated. Participants emphasised the need to tailor communication to local practices, and to harness existing channels. Instant messaging systems like WhatsApp were suggested as a channel that can be used to disseminate disaster warnings to local communities.

Communities should co-create interventions

It is crucial to engage with local communities to **co-create solutions** to overcome and adapt to the challenges that climate change presents. Co-creation is a form of collaboration that involves working with stakeholders to develop innovative initiatives.[18] This methodology can be applied in the context of climate change by working with communities to formulate interventions that are effective in protecting them from disasters in a way that is tailored to meet local needs. To do this successfully, the value of **indigenous knowledge** in scientific research needs to be reinforced. Recognising the role communities can play in safeguarding health and working with them to build capacity and knowledge in the climate space should be at the centre of engagement initiatives.

Across the region, there are good examples of where indigenous knowledge can inform policy in an effective and equitable manner if co-creation is employed to overcome current barriers. During the workshop, one example of where community knowledge has demonstrated value was shared: this related to identifying the most accurate tree map for mapping floods in Thailand. Upon comparing three tree maps – a map produced by the Thai Government, a map produced by the local community, and the official map – it was determined that the community map was the most accurate. Developing a value-based framework specific to climate change and that places an emphasis on trust, transparency and working collaboratively can help bridge the underrepresentation of community data in the field.

Improve transdisciplinary coordination and develop a regional science policy–practice continuum

Enhancing coordination **across agencies and disciplines,** both within the healthcare sector and outside of it, can alleviate some of the governance challenges faced in addressing climate-related health concerns. Strengthening public–private partnerships in research is one way of doing this. Furthermore, improved coordination, and mapping of stakeholders in the health sector and beyond, can help in navigating issues that cut across multiple disciplines.

In addition to coordination, **translating scientific evidence into policies** remains a challenge. Southeast Asia would benefit from developing a regional policy–practice continuum that is informed by science.

18 Million F (2022). Co-Creation Toolkit: From design to implementation. *Oxfam-Québec.* https://policy-practice.oxfam.org/resources/co-creation-toolkit-from-design-to-implementation-621384/

Establishing a science policy–practice continuum would mean building scientific evidence into the process by which interventions are formulated and enacted on a national scale.[19] National science academies may have a role to play in supporting this, but a formalised framework is fundamental to supporting an evidence-based approach to climate action. Moreover, this could support the integration of health into climate interventions.

Strengthen the evidence base and maximise the use of technologies

Another theme that emerged from the discussions was the need to strengthen the evidence base in key areas related to climate and health, and to maximise the use of technologies such as portals and software that can process and integrate data. Specific areas in which the evidence is currently lacking include the **social determinants of health,** such as mental health, justice and equity, and their relationship to climate change and health. Other areas identified were the **data and metrics** required to inform NAPs and other national strategies. Thailand, Vietnam and the Philippines are examples of countries in the region that have begun to incorporate evidence into their NAPs. Strengthening the evidence base around data could facilitate better linkages between science and policy. The final area where the evidence base was deemed by participants to be incomplete was around **community-generated knowledge** and the use of this knowledge to inform climate initiatives. This includes indigenous knowledge, best practices and approaches that are both inclusive and participatory. The creation of a regional climate change and health centre, as well as a database for climate and health research, are potential solutions to overcome the gaps in the evidence base.

Facilitate knowledge sharing at different levels

Participants underlined the advantage of **harmonising and sharing knowledge** at different levels to prevent avoidable overlaps, and the discussed how this could in turn benefit research agendas. **Leveraging existing networks** (research-specific and others) to gather information could promote knowledge sharing. Examples of networks that could be utilised to bridge these gaps are the WHO's Alliance for Action on Climate Change and Health (ATACH) and the Association of Southeast Asian Nations' (ASEAN's) climate resilience network. Similarly, the Connecting Climate Minds Hub promotes collaboration by providing a space for people working at the intersection of mental health and climate change to connect. These intergovernmental and grassroots-initiated networks draw on the collective power of their members to promote the consolidation of the climate change and health nexus in policy. The development of a regional mechanism for **multisectoral collaboration** would vastly improve knowledge sharing in the field.

At the institutional level, health systems have achieved success in solidifying the integration of climate change and health by embedding early warning systems into healthcare. However, policies beyond health systems, in areas such as education (for example, in medical schools), need to be considered. Implementing such changes could help to provide future generations with better awareness around the interplay between climate and health at an earlier stage.

Improve data accessibility

Alongside the need to facilitate increased knowledge sharing, the workshop participants emphasised the need to make data sharing, accessibility and linkage more straightforward. Areas for improvement that were raised included the ability to link data to local areas and weather conditions, as well as connecting data on climate-related events to health impacts. An example here would be to connect information on temperature with heat stress data. Additionally, it was pointed out that there are hurdles – including sometimes costs – to gaining access to data. In some countries, for instance, payment is required to access non-governmental data. Moreover, developing capacity in the skills required to analyse such data is an even greater challenge. This includes relevant skills to identify information in datasets and analytical skills, especially in regard to **linking climate change to health.** It was suggested that more training opportunities need to be established to address these skills gaps and that developing a **platform** to improve data access using existing structures would be beneficial in creating better regional links.

19 Al-Akhali R (2020). A guide to evidence based policymaking. *Oxford University.* https://onlinecourses.bsg.ox.ac.uk/blog/guide-to-evidence-based-policymaking

Research case studies

Following the discussions, speakers presented local climate initiatives to showcase best practice and improve the understanding of how climate change is impacting health in Southeast Asia. Summaries of these case studies are outlined below.

Mental health and climate change

The climate crisis is leading to worse mental health outcomes, yet the links between climate change and health are often neglected. This is also the case for climate change adaptation policies. **Victoria Pratt,** from Invisible Flock, presented the study she conducted which demonstrates the link between **mental health and ecosystem health** in indigenous farming communities in northern Thailand.[20] As Pratt explained, rotational farming plots are an important cultural, spiritual and economic anchor for the Karen community, who have practised this on their land for generations. However, a policy has been introduced whereby farms located in mountainous areas will be re-zoned as a new conservation area, to increase Thailand's forest regions and to address climate hazards. This re-zoning of indigenous land will transfer land ownership of a large area of sacred farmland for the Karen community to the state. The cultural loss the Karen community is experiencing has already caused a mental health crisis in this community. This study demonstrates the importance of considering the impacts of policies to address climate change on local communities.

Women-led initiatives to address disasters

The importance of community-led initiatives was echoed throughout the workshop. In particular, **Dr Farah Mulyasari,** from Universitas Pertamina, showcased the **female-led** initiatives in Indonesia being used to address disasters.[21,22] With Indonesia being particularly prone to climate disasters, developing solutions to address the vulnerabilities faced by women is imperative. These vulnerabilities are due to their economic dependence, their limited access to resources, and cultural norms. Dr Mulyasari highlighted that when women are involved in community-level disaster preparedness, the conservation of water increases and **emergency responses are more effective.** Dr Mulyasari noted the large role women played in the response to the 2004 Indonesia Tsunami, as well as explaining how in Borneo women distributed masks and educated communities about the air quality during forest fires. Other efforts she alluded to included women in Bandung becoming intermediaries between agencies and communities to address risk communication, as well as ensuring households receive timely warnings and understand evacuation procedures. She emphasised a culturally senstive approach that is considerate of women can improve community awareness to disasters. However, more strides should be made in capacity building, policy inclusion and the economic empowerment of women, to further enhance disaster preparedness.

20 Pratt V (2024). Climate and Health: Science-based policy solutions. The InterAcademy Partnership, 149-159. https://www.interacademies.org/publication/climate-change-adaptation-health-book-case-studies

21 Mulyasari F & Shaw R (2013). Role of women as risk communicators to enhance disaster resilience of Bandung, Indonesia. *Nat Hazards* **69**, 2137–2160. https://doi.org/10.1007/s11069-013-0798-4

22. Takeuchi Y, Mulyasari F, & Shaw R (2011). Roles of family and community in disaster education, *Disaster Education (Community, Environment and Disaster Risk Management)* **7,** 77-94. https://doi.org/10.1108/S2040-7262(2011)0000007010

Community-centred approaches to flood risk in Malaysia

Many countries in Southeast Asia are facing increased flooding risk due to climate change, and Malaysia is no exception. The intensity of flooding is projected to increase by **140%** from 2035 to 2045, with the highest rainfall predicted to occur between 2020 and 2029. **Dr Faizah Che Ros,** from Universiti Teknologi Malaysia, discussed her involvement in 'SeDAR', a four-year programme that aims to equip local governments and community leaders in Selangor with the skills and knowledge to develop disaster risk reduction initiatives from the bottom up.[23] This programme is a joint effort between Tohoku University, Selangor Disaster Management Unit and the Malaysia-Japan International Institute of Technology. SeDAR draws on disaster management learnings from Japan and applies them to Malaysia, and involves instilling a science-based understanding of disaster risks among communities and community leaders, as well as local authorities. This intervention fosters **collaboration** to develop disaster risk reduction activities that best suit the needs of local communities and build their resilience to disasters.

The rise of infectious diseases in the Philippines

One area of health that has been exacerbated by climate change is infectious diseases. **Kimberly Fornace,** from NUS Saw Swee Hock School of Public Health, highlighted the **climate-sensitive nature of malaria** in the Philippines. Drought is a strong predictor of malaria risk and as the climate crisis worsens droughts are becoming more frequent. While there is strong evidence of the impact of climate change on malaria and other vector-borne diseases, and increasing mention of this in policy documents, there are still gaps in regard to designing effective adaptation strategies across the Asia-Pacific region.[24] Technology can be leveraged to enhance surveillance and enable **predictive prevention of diseases.** For instance, artificial intelligence and other technological solutions are being harnessed to determine the effects of the changing environment on malaria cases.

In addition to malaria, the incidence of dengue has heightened as a result of the changing climate. **Dr Julius Hafalla,** from the London School of Hygiene and Tropical Medicine, talked about the impact of altitude on dengue cases in the Philippines. Rising temperatures, increased rainfall, and urbanisation have created optimal conditions for Aedes mosquitoes, which are the primary vectors of dengue. According to Dr Hafalla, to address the intensified risk of dengue, vector control efforts should focus on low-lying, densely populated urban areas, where transmission intensity is highest. Moreover, he suggested using patient age as a proxy for force of infection (FOI), rather than incidence reports, which do not fully capture the complex transmission of dengue.[25]

23 Izumi T & Motoyama E (2024). Strengthening the disaster risk capacity to improve the safety and safety of communities by understanding disaster risk, *Tohoku University,* 1-79. https://jppsedar.net.my/wp-content/uploads/2024/05/Final-Report-JPP-SeDAR.pdf

24 Trujillano F, et al (2023). Mapping Malaria Vector Habitats in West Africa: Drone Imagery and Deep Learning Analysis for Targeted Vector Surveillance, Remote sensing, **15(11),** 2775. https://doi.org/10.3390/rs15112775

25 Biggs J.R, et al (2021). Estimating the annual dengue force of infection from the age of reporting primary infections across urban centres in endemic countries, *BMC Med* **19,** 217. https://doi.org/10.1186/s12916-021-02101-6

The resilience of health systems

Healthcare facilities face increasing threats from climate change, which are impacting their capacity to deliver care. This can in turn worsen social inequities in countries where access to healthcare is already an issue. **Ramon San Pascual,** Executive Director of Health Care Without Harm SEA, emphasised the need to make **health systems more resilient** to natural disasters, which are being compounded by climate change. He cited the case of Amang Rodriguez Memorial Medical Center. This is a frontline hospital that was severely impacted by Typhoon Ulysses in 2020, which saw 80% of Marikina flooded in the first year of the COVID-19 pandemic. It took three to four days to clean the hospital, which heavily disrupted the hospital's ability to provide critical health services. To mitigate future threats, the Amang Rodriguez Center responded by designing an infrastructure resilience plan that included measures such as repurposing the basement to house a water reservoir; adjusting elevators to not go down to the basement; and moving vital equipment to the higher floors of the building. As this case shows, it is vital that hospitals have resilience plans in place to **minimise disruptions to health services** due to climate disasters, which are increasingly damaging essential infrastructure.

Conclusion

The workshop identified a range of reasons why it is critical to act on climate change to safeguard health from climate-related disasters in Southeast Asia. It is important now more than ever that vulnerable groups are not left to suffer the consequences of increased greenhouse gas emissions. Some actions are already being taken this regard, such as NAPs in many countries in the region, but despite this momentum many challenges persist. Inadequate communication and interdisciplinary collaboration, along with barriers to data accessibility and governance, hinder the development of effective adaptation strategies to safeguard public health from climate disasters.

Next steps

The workshop participants agreed that the following actions would help to address the threat disasters pose to health:

Meaningfully engaging with communities
Governments should engage with local communities to co-create solutions to overcome and adapt to the challenges presented by climate change.

Embedding an evidence-based approach to climate action
Southeast Asia would benefit from developing a regional framework for building scientific evidence into the policymaking process, to reduce the risk of maladaptation.

Integrating climate change and health initiatives
Linking climate and health initiatives will enable interventions to take a holistic approach to addressing poor health related to climate change. Moreover, it would ensure that policies look beyond healthcare and prioritise prevention over treatment.

Strengthening research networks
Strengthening research networks would help bring together researchers with different areas of expertise and would support knowledge sharing. This in turn can help facilitate collaborative research in the climate space.

Facilitating collaborative research
Promoting transdisciplinary and multisectoral collaboration in climate-adjoining fields is crucial to ensure that climate change and health initiatives are integrated. Bringing together experts from different fields will support the implementation of multi-faceted policies that take into account the different ways climate change is harming health.

Implementing these actions will provide policymakers with the knowledge they need to implement effective climate change interventions that make health a priority. National science academies can play a role here, by working together to bridge some the current gaps and to influence climate action for the better.

Annexe 1

Workshop steering committee

Co-chairs

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Annexe 2

Participant list

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Victoria Pratt, Invisible Flock

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Annexe 3

List of acronyms

ASEAN Association of Southeast Asian Nations

CID Climatic impact-driver

IPCC Intergovernmental Panel on Climate Change

NAP National Adaptation Plan

WHO World Health Organization

The Academy of Medical Sciences

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