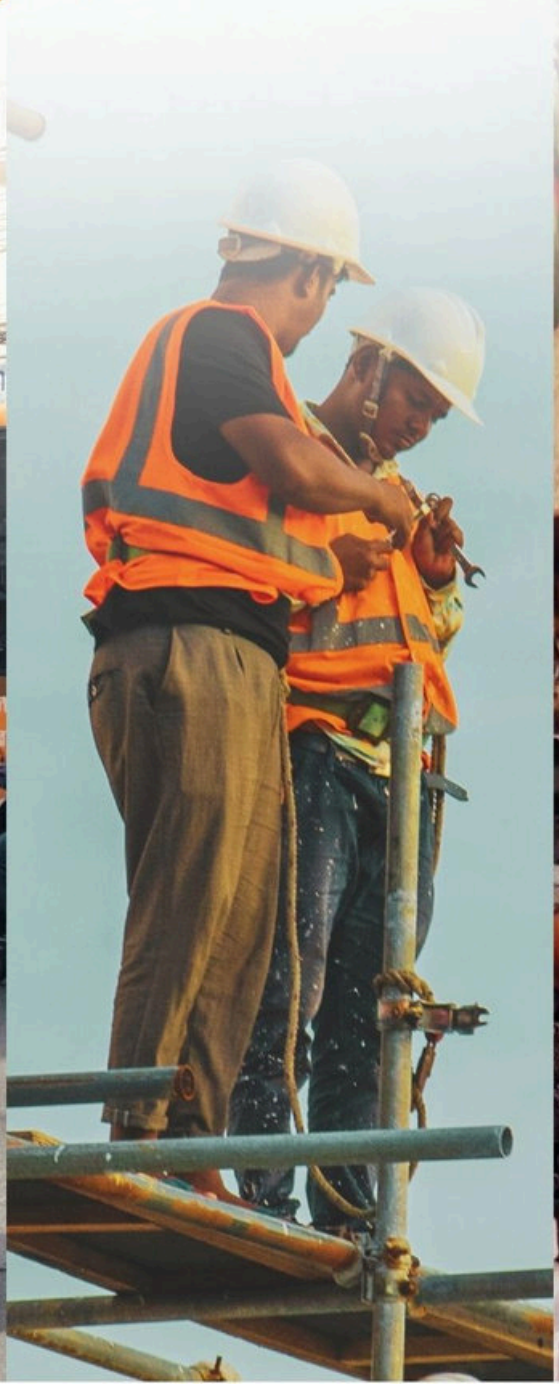
GLOBAL HEAT HEALTH
INFORMATION NETWORK
SOUTHEAST ASIA

First GHHIN Southeast Asia Heat Health Forum

Summary Report
Jan 2025
Singapore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About the Global Heat Health Information Network

The Global Heat Health Information Network (GHHIN), a United Nations initiative co-sponsored by the World Health Organization (WHO), the World Meteorological Organization (WMO), and United States National Oceanic and Atmospheric Agency (NOAA), is an independent, voluntary, and member-driven forum of scientists, practitioners, and policy makers focused on improving capacity to protect populations from the avoidable health risks of extreme heat in our changing climate.

About the GHHIN Southeast Asia Hub

The GHHIN Southeast Asia Hub is the first regional hub of the Global Heat Health Information Network (GHHIN), anchored at the Heat Resilience & Performance Centre (HRPC) at the National University of Singapore's Yong Loo Lin School of Medicine. The mission of GHHIN Southeast Asia Hub is to advance partnership, collaboration, and advocacy within Southeast Asia to protect and prepare for the impacts of heat on human health and well-being.

www.ghhin.org/southeastasia

Table of Contents

Annex

Abbreviations

ASEAN: Association of Southeast Asian Nations

ASMC: ASEAN Specialized Meteorological Centre

GHHIN: Global Heat Health Information Network

IFRC: International Federation of Red Cross and Red Crescent Societies

NUS: National University of Singapore

UHI: Urban Heat Island

UN: United Nations

UNICEF: United Nations Children's Fund

WHO: World Health Organization

WMO: World Meteorological Organization

Executive Summary

The First GHHIN Southeast Asia Heat Health Forum was held in Singapore from the 7 to 10 January 2025, marking a significant milestone with the convening of over 250 multidisciplinary delegates from the region to address the unique challenges of heat in the region.

The Forum also saw the official launch of the GHHIN Southeast Asia Hub, which will play a key role in fostering collaboration and innovation across the region. This initiative is set to be pivotal in advancing partnership, collaboration, and advocacy to address key challenges of heat and health.

One of the key outcomes of the Forum was the establishment of a consensus on Southeast Asia's heat challenge, as well as the identification of an action strategy going forward, including the need to align interests across sectors, and identifying regional priority areas (Table 1).

Despite regional challenges such as insufficient historical data and competing governmental priorities, the Forum has underscored the need to prioritise extreme heat as a critical issue impacting the region's physical, mental, and social health and economic productivity, particularly addressing the disproportionate impacts faced by vulnerable groups.

Regional leaders, policymakers, researchers, and community organisations are all called upon to act and adopt multidisciplinary approaches that foster regional cooperation so as to develop localised research, targeted interventions, and inclusive heat governance frameworks that integrate traditional knowledge and gender-focused perspectives. We urge all stakeholders to engage actively in this initiative, leveraging on collective expertise to protect and prepare the region for the growing impacts of extreme heat. A summary infographic (page 8) has been developed to consolidate the forum outcomes and next steps to help guide and facilitate follow-on discussions and collaborations.

Table 1. Summary of Identified Regional Priority Area & Interests

ALIGNING INTERESTS	REGIONAL PRIORITY AREAS
• Build Regional Cooperation and Interdisciplinary Collaboration • Emphasise Localised Research and Interventions • Increase Knowledge Sharing and Community Engagement • Foster Heat-Health Champions • Integrate Heat into Broader Frameworks	Key Thematic Areas: ◦ Urban Heat ◦ Heat at Work ◦ Community, Traditional & Cultural Perspectives Health Impacts of Specific Populations: ◦ Women & Children ◦ Older Adults & Chronic Conditions ◦ Mental Health Broader Strategies for Heat Resilience: ◦ Early Warning Systems & Heat Governance ◦ Health Service & Systems ◦ Emergency & Disaster Management ◦ Risk Communications & Media ◦ Regional Research & Capacity Building

Access the Session Recordings and other Forum content https://ghhin.org/2025-southeast-asia-heat-health-forum/

SOUTHEAST ASIA'S HEAT CHALLENGE

Challenges, Action & Priorities

Heat in Southeast Asia is a complex, cross-cutting issue with pervasive yet invisible impacts, made worse with its chronic nature of exposure.

- Weak prioritisation of extreme heat in comparison to other competing issues.
- Insufficient historical data & regional research to understand heat's impacts.
- Vulnerable populations disproportionately suffer from heat impacts.

ACTION STRATEGY

1. **Build Regional Cooperation and Interdisciplinary Collaboration**
2. **Emphasise Localised Research and Interventions**
3. **Increase Knowledge Sharing and Community Engagement**
4. **Foster Heat-Health Champions**
5. **Integrate Heat into Broader Frameworks**

REGIONAL PRIORITY AREAS

Urban Heat
Localised understanding of heat risks & solutions

Heat at Work
Establish heat stress management standards & monitor impacts

Community, Tradition & Culture
Integrate traditional & cultural knowledge into heat resilience

Women & Children
Empower women and children through inclusive heat adaptation strategies

Older adults & Chronic Conditions
Develop heat management guidelines, adaptation, and digital healthcare solutions

Mental Health
Prioritise mental health research & interventions for at-risk groups

Health Systems
Strengthen data sharing & policy development to address acute & chronic impacts

Early Warning Systems & Heat Governance
Develop standardised metrics & cross-sectoral management frameworks

Communications & Media
Develop tailored messaging & utilise digital platforms to engage community

Disaster Management
Build narratives to integrate heat into broader agendas for systematic transformative adaptation

Regional Research
Invest in collaboration and local expertise for actionable evidence.

Acknowledgements

GLOBAL HEAT HEALTH INFORMATION NETWORK

WORLD METEOROLOGICAL ORGANIZATION | World Health Organization | NUS National University of Singapore | Heat Resilience & Performance Centre, Yong Loo Lin School of Medicine

JOINT OFFICE FOR CLIMATE AND HEALTH

Core Funder

wellcome

THE STRAITS TIMES

IFRC

Meteorological Service Singapore | CapitaLand | jtc | Singapore

EARTH JOURNALISM NETWORK | Internews Local voices. Global change.

THE M.I.C.E STUDIO | GRAPHISS MEDIA | PARKROYAL HOTELS & RESORTS

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With thanks to the support of:

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Tan Xiang Ren
Tan Min Sze Pearl
Nicholas Morris Ravanelli
Joshua Dao Wei Sim

We would also like to thank the Southeast Asia Hub Steering Committee for their review of this report.

1 Introduction & Overview of the Forum

The First Global Heat Health Information Network (GHHIN) Southeast Asia Heat Health Forum was held in Singapore at the PARKROYAL on Beach Road from 7-10 January 2025. The theme of the Forum was "Toward a heat resilient Southeast Asia: Enhancing livelihoods and wellbeing". As climate change continues to intensify the heat challenges, this Forum was held at a critical time to gather the Southeast Asia region to develop collaborative efforts to safeguard lives and livelihoods. The Forum served as a pivotal platform for enhancing Southeast Asia's regional capacity, fostering partnerships, and promoting evidence-based policies to manage extreme heat risks effectively in the region.

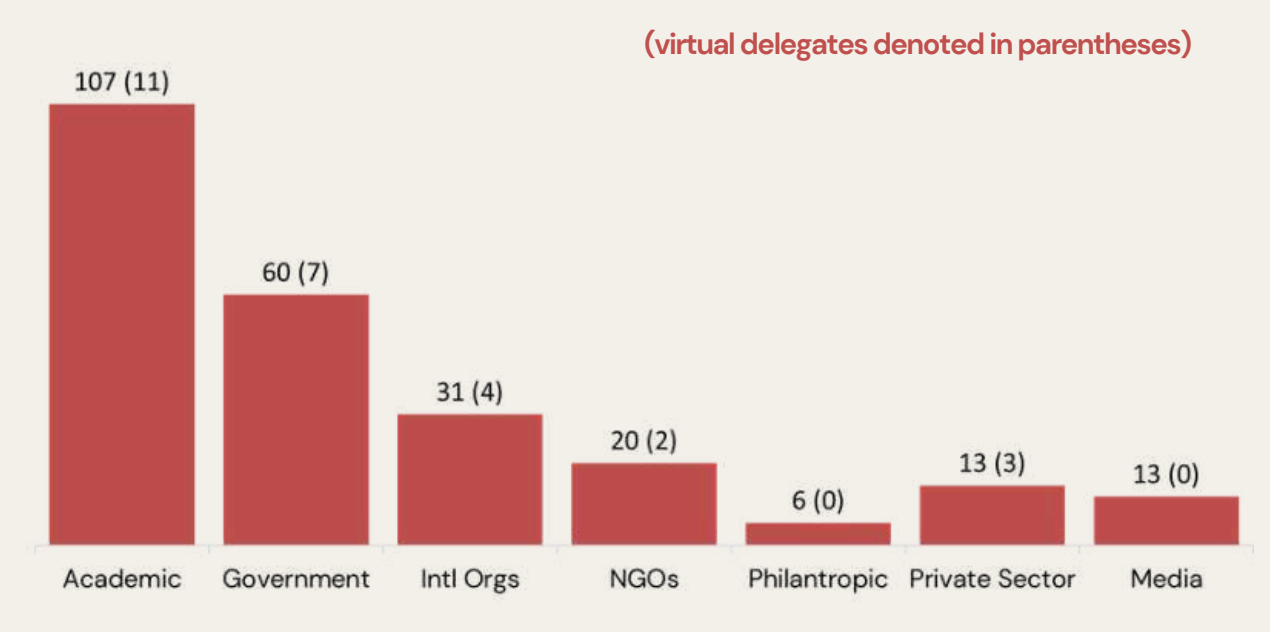
Focusing on Urgency, Impact & Solutions, Strategy, and Action across the 4-day programme, the Forum featured 67 speakers and moderators across 25 exciting multi-disciplinary sessions, addressing:

- Heat exposure from multi-sectoral perspectives
- Impacts of heat on people, health, and livelihoods
- Strategies and solutions to mitigate heat risk
- Key enablers for effective heat risk management

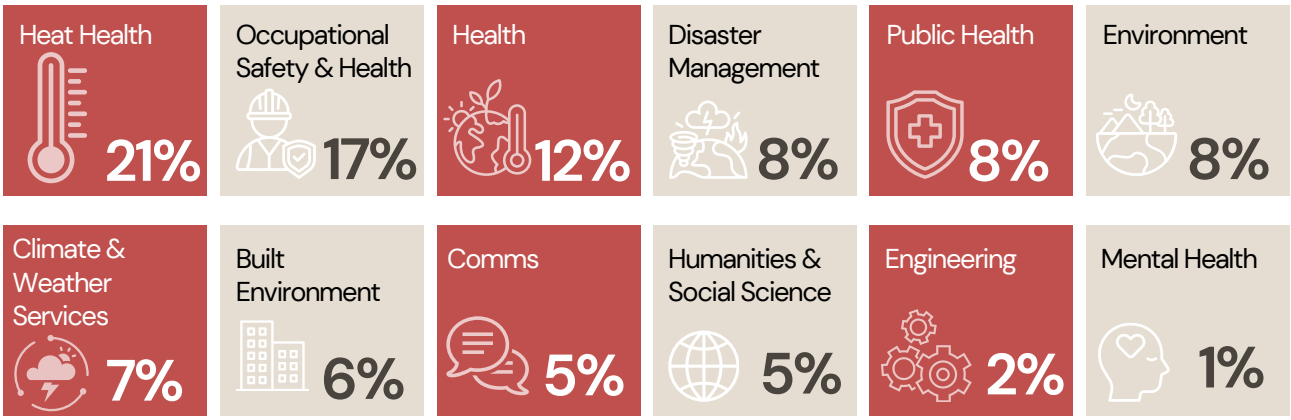
A deep dive was conducted into three key thematic areas: (1) Urban Heat, (2) Heat at Work, and (3) Community, Traditional & Cultural Perspectives (Section 4), among other priority areas (Section 5). The Forum featured 13 poster presentations (Annex 1), a journalism fellowship in partnership with Earth Journalism Network (Section 6.1), a side event hosted by the International Federation of Red Cross and Red Crescent Societies (IFRC) (Section 6.2) and four site visits across Singapore (Section 6.3). Full details of the programme can be found in Annex 2.

The Forum convened a multidisciplinary regional community with over 250 delegates, 80% of whom were from Southeast Asia. The delegates were from various organisations, including academia, governmental and non-governmental organisations, international organisations, private sectors, philanthropic organisations, and the media. In terms of expertise, the forum comprised delegates from various sectors such as the climate & weather services, built environment and engineering, occupational safety and health, humanities & social sciences, communications, mental health and more. The full list of delegates can be found in Annex 3.

Delegate Breakdown



Areas of Expertise



2 Opening Ceremony & Launch of the Regional Hub

The Opening Ceremony featured speeches by Ms Ko Barrett (Deputy Secretary-General, World Meteorological Organization), Professor Chong Yap Seng (Dean, Yong Loo Lin School of Medicine, National University of Singapore) and Guest-of-Honour Dr Koh Poh Koon (Senior Minister of State, Ministry of Sustainability and the Environment & Ministry of Manpower). All three speakers underscored the importance of regional cooperation and a regional hub to drive partnerships, knowledge generation, and policy advocacy on issues of heat and health.

Welcome Video by Ms Ko Barrett
Deputy Secretary-General, World Meteorological Organisation

The forum opened with a video welcome address by the Deputy Secretary General of the World Meteorological Organization, Ms Ko Barrett. Ms Barrett emphasised the critical importance of the forum as a key platform to kickstart the collaborative effort in addressing the escalating challenge of extreme heat in Southeast Asia. She highlighted the urgent need for evidence-based policies, innovative solutions, and regional partnerships to safeguard communities and ecosystems. Stressing the significance of leveraging other platforms and initiatives, such as the ASEAN Specialised Meteorological Centre (ASMC) and the Global Heat Health Information Network, she pointed out the potential for regional hubs to localise solutions effectively. Ms Barrett acknowledged the significance of the forum and launch of the regional hub as a pivotal moment for Southeast Asia in its efforts to advance heat governance, focusing on urban heat, workplace safety, and multi-sectoral impacts. Her key takeaway was to harness the transformative potential of partnerships and collaborative expertise in developing effective heat risk management strategies and encouraged all to seize the current challenges as an opportunity.

> **“The human cost of heat is immense – lives lost, reduced productivity and strained health systems. Yet, this is also a story of opportunity.”**
> **– Ms Ko Barrett**

Welcome Address by Professor Chong Yap Seng

Dean, Yong Loo Lin School of Medicine, National University of Singapore

In his welcome address, Professor Chong Yap Seng, Dean of the Yong Loo Lin School of Medicine (NUSMED) underscored the urgent challenges posed by extreme heat. He pointed out that extreme heat exacerbates not only health issues, but it also impacts the economy and worsens social inequalities, disproportionately impacting the most vulnerable populations. Projects like HeatSafe and Cooling Singapore 2.0 undertaken at NUSMED have made strides in providing evidence-based data to improve occupational safety and provide key insights to the physiological effects of heat on vulnerable populations. The timing of the Forum was pivotal as it gathered key regional experts to strategise on enhancing heat resilience specifically for Southeast Asia. Professor Chong expressed confidence that through sustained collaboration and scientific exchange, a heat-resilient Southeast Asia could be achieved.

> "Our region's health depends on our region's resilience to extreme heat and a healthier future is a heat-resilient one." – Professor Chong Yap Seng

Welcome Address

Project HeatSafe

Opening Address by Dr Koh Poh Koon
Senior Minister of State,
Ministry of Sustainability and the Environment & Ministry of Manpower

Guest-of-Honour, Dr Koh Poh Koon, Singapore's Senior Minister of State, Ministry of Sustainability and the Environment and Ministry of Manpower, similarly underscored the urgent need to address the severe health and economic impacts of extreme heat, which was affecting and would continue to impact a significant portion of the global workforce.

He shared Singapore's forward-thinking heat resilience strategies, which include climate-sensitive urban planning and innovative cooling technologies, and expressed hope that Singapore could collaborate with others to help test and refine new strategies to manage rising temperatures.

He commended the efforts and initiative of GHHIN and the National University of Singapore in launching a dedicated regional Hub, as the Hub will play a central role in fostering regional cooperation, knowledge sharing, and the development of effective heat health strategies. Dr Koh called on all delegates to actively engage in discussions and leverage these insights to implement actionable policies across the region through collective action.

Opening Address

> "Together, we have the power to shape a more resilient Southeast Asia, better equipped to face the heat-related challenges of tomorrow."
> – SMS Dr Koh Poh Koon

Launch of the GHHIN Southeast Asia Hub

The Southeast Asia Hub was officially launched by Guest-of-Honour Dr Koh Poh Koon (Senior Minister of State, Ministry of Sustainability and the Environment & Ministry of Manpower), Professor Chong Yap Seng (Dean, NUS Yong Loo Lin School of Medicine), Dr Joy Shumake-Guillemot (Co-founder and Co-Chair of Global Heat Health Information Network; and Lead of the WHO - WMO Joint Office for Climate & Health), and Associate Professor Jason Lee (Chair of GHHIN Southeast Asia Hub; and Director of Heat Resilience & Performance Centre, NUS Yong Loo Lin School of Medicine). Also in attendance were leaders and representatives from the key local and regional networks (Annex 3).

3 Opening Statements & Need for Action

3.1 Insights on GHHIN's Journey & Future Vision

Dr Joy Shumake-Guillemot
Co-founder and Co-Chair of Global Heat Health Information Network; and Lead of WHO - WMO Joint Office for Climate & Health

Dr Joy Shumake-Guillemot highlighted the pivotal role and impressive growth of the Global Heat Health Information Network since its inception in 2016, emphasising its mission to leverage diverse expertise and foster interdisciplinary collaboration to combat global heat risks. She shared how the Network's involvement in significant initiatives like the UN Secretary-General's Call to Action on Extreme Heat was possible due to its ability to facilitate cross-sectoral cooperation and the application of science-based strategies to inform policy and create impact.

Community engagement and empowerment were also emphasised as crucial, with tools such as training opportunities and a repository of heat action plans enabling active participation in heat resilience efforts. The Network recognises the distinct challenges faced by different regions and believes that the establishment of hubs in targeted regions like Southeast Asia would be key to developing tailored heat health strategies suited to the region's unique contexts.

> "All actions matter. There are tangible solutions to be implemented that will help all of us confront this massive challenge."
> – Dr Joy Shumake-Guillemot

UN Secretary-General's Call to Action on Extreme Heat

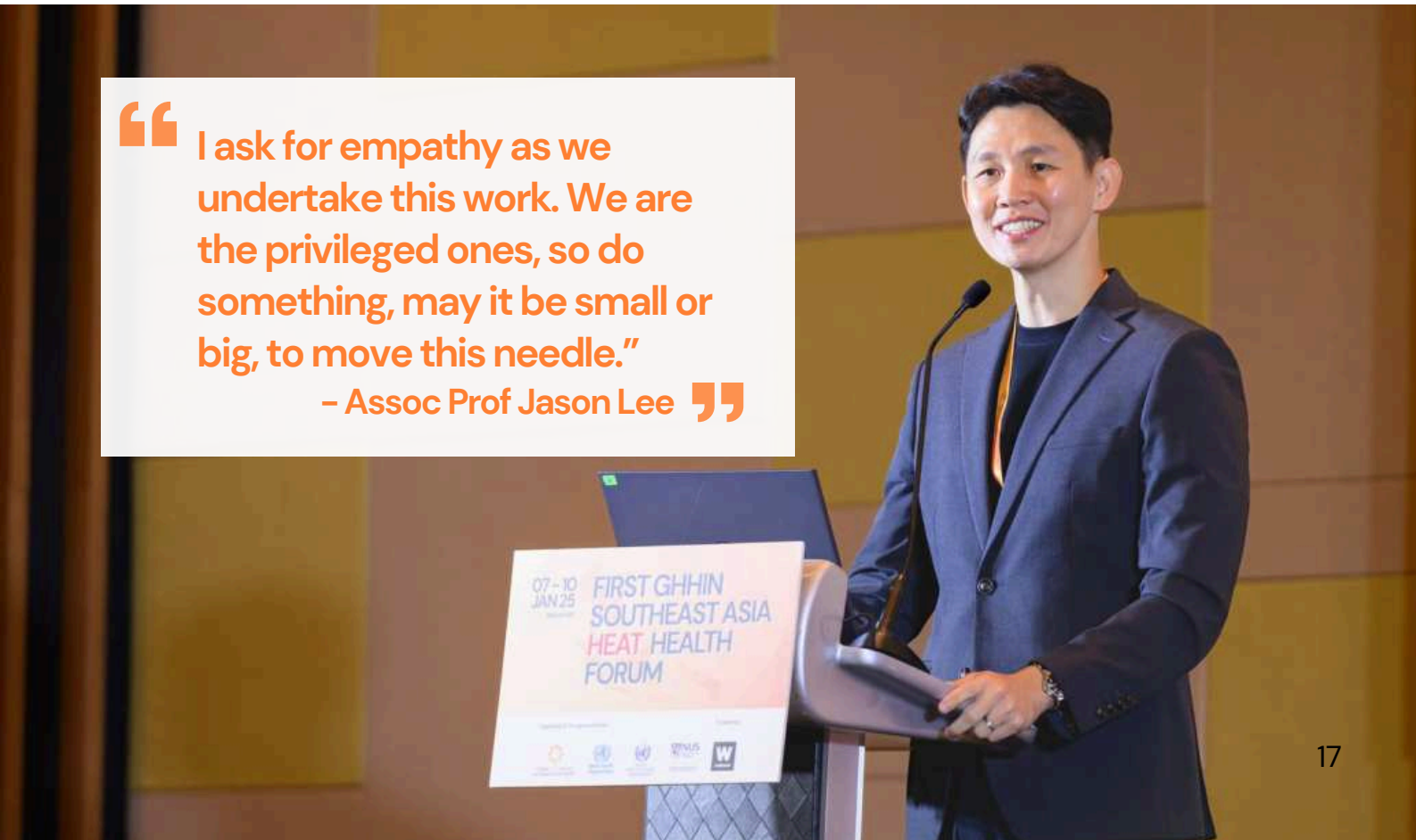
3.1 Insights on GHHIN's Journey & Future Vision

Assoc Prof Jason Lee
Chair of GHHIN Southeast Asia Hub; and Director of Heat Resilience & Performance Centre, Yong Loo Lin School of Medicine, NUS

Assoc Prof Jason Lee, Chair of the GHHIN Southeast Asia Hub, outlined the strategic direction of the Hub, emphasising its key role within the Network and in the region to consolidate and facilitate the necessary activities needed to address Southeast Asia's unique heat-related challenges.

He highlighted the Hub's focus areas on Urban Heat, Heat at Work, and Traditional & Cultural Practices, as well as the necessity for cross-sectoral and interdisciplinary collaboration to effectively mitigate the impacts of extreme heat.

The Hub will prioritise understanding local conditions, such as chronic thermal discomfort affecting marginalised communities, and developing tailored strategies to address these health risks. Community engagement and capacity building are the other two key pillars vital to the Hub's mission, and will be needed to enhance the impact of research and advocacy. The session concluded with a call for collaboration, underscoring the importance of diverse stakeholder voices and expertise in advancing the Hub's mission.



3.2 Expert Roundtable on Policy & Action: The Need for Heat Policy & Action at the Regional, National, and Local Levels

Moderator: Dr Joel Aik, *Environmental Epidemiologist*

Experts: Ms Koh Li-Na, *Assistant Chief Executive / Director-General of Meteorological Services, National Environment Agency, Singapore*

Mr Ridwan Sobri, *Director, Disaster Management, Palang Merah Indonesia (Indonesian Red Cross Society)*

Dr Eduardo P. Banzon, *Director, Health Practice Team, Human and Social Development Sector Office, Asian Development Bank*

The session commenced with an acknowledgment of the importance of building Southeast Asia's regional capacity to manage extreme heat risks through enhanced partnerships and evidence-based policies.

Current Context & Challenges

The discussion highlighted several challenges, including the lack of prioritisation of extreme heat as a significant issue by governments, a scarcity of historical data, and insufficient research focused on Southeast Asia. The complexity of heat as a cross-cutting issue within government and health systems was also noted as a significant barrier to effective policy implementation.

Observations & Advances

Obvious gaps exist in localised research and data on extreme heat impacts, particularly in diverse regions like Indonesia, which in turn hinder the development of evidence-based policies. Additionally, there are gaps in public awareness and understanding of heat risks, which affect the ability to implement effective heat mitigation strategies. To bridge these gaps, the speakers emphasised the need for increased government engagement and multisectoral collaboration. The establishment of champions within ministries to drive heat and health agendas and the development of clear, actionable research outputs to support policy formulation was advocated. Public health education and awareness campaigns were proposed as vital tools to enhance community resilience.

Policy & Action Recommendations

The session concluded with calls for stronger regional collaboration, leveraging Singapore's coordinated approach as a potential starting point. Emphasis was placed on the need for comprehensive health adaptation plans and the integration of heat-related considerations into national strategies. The development of region-specific interventions, particularly for vulnerable groups like outdoor workers and pregnant women, was highlighted as a crucial area for future research and policy development.

3.3 Insights on the Future Climate Change Projections for Southeast Asia

Dr Aurel Moise

Head of Department, Centre for Climate Research Singapore (CCRS)

The session emphasised the critical position of Southeast Asia as a "heat pump" in the Earth's climate system, with significant energy transfer affecting regional and global climate conditions. This geographical context makes understanding and addressing climate impacts in this region particularly urgent. The insights offered set the stage for a deeper exploration into the challenges, gaps, solutions, and actionable next steps needed to address the pressing climate issues facing the region as outlined in the next page.

3.3 Insights on the Future Climate Change Projections for Southeast Asia

Current Context & Challenges

Southeast Asia faces varied climate drivers, including monsoons, ocean-atmosphere interactions, and tropical cyclones, leading to fluctuations in temperature and rainfall. The complexity of these climate phenomena poses challenges for accurate modelling and prediction, especially when considering the impacts of climate change on these processes.

Observations & Advances

There is a lack of localised, high-resolution data to effectively plan and implement adaptation strategies. The session highlighted the need for better data on heat waves, sea level rise, and wet bulb globe temperature (WBGT) impacts, as well as the absence of a comprehensive understanding of the regional effects of climate change on food security and public health issues like dengue.

The session introduced a unique dataset from downscaling global climate models to high-resolution regional models, providing granular insights into temperature, rainfall, and sea level changes. This data was made available for collaboration and further research, offering a valuable resource for localised impact studies and policy planning. The development of a data sharing portal was also mentioned, which would facilitate access to this critical information.

Policy & Action Recommendations

The session called for increased collaboration using the newly available data to inform policy and action plans across Southeast Asia. Emphasis was placed on applying these insights to address specific regional challenges, such as enhancing food security through climate impact assessments on agriculture and preparing for health impacts like the spread of dengue. Policymakers and researchers were encouraged to utilise this data to tailor effective adaptation and mitigation strategies, with a focus on understanding and managing local climate risks.



4 Key Thematic Areas

The Forum featured the following three key thematic areas - (1) Urban Heat, (2) Heat at Work, and (3) Community, Traditional & Cultural Perspectives. This section synthesises the discussions across multiple sessions related to each thematic area. Content of all individual sessions, including the session recordings and presentations, can be accessed through the GHHIN website via the QR code on the right.

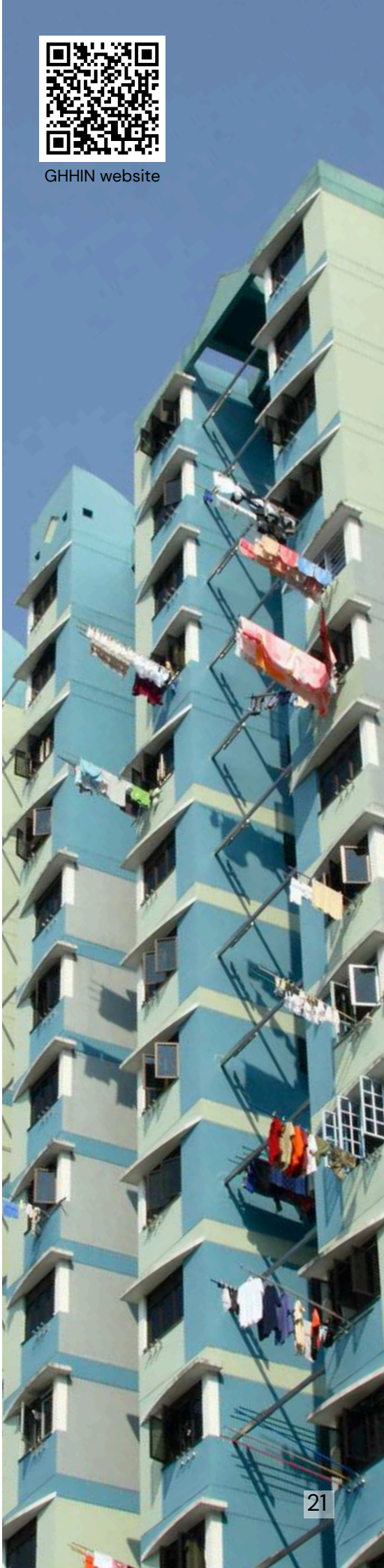
GHHIN website

4.1 Urban Heat

Urban heat presents a pressing issue exacerbated by climate change, rapid urbanisation, population growth and socio-economic disparities, particularly in tropical regions like Southeast Asia. Through diverse presentations spanning climate modelling, private sector innovation, community engagement, and practical case studies, the sessions under this theme collectively underscored the urgent need for integrated approaches to enhance heat resilience in urban environments of Southeast Asia. These talks also highlighted both the progress made, and the significant work still required to address vulnerabilities, optimise design strategies, and implement effective policies.

Current Context & Challenges

Urban areas, particularly in tropical regions like Southeast Asia, face heightened vulnerability to rising temperatures due to climate change and rapid urbanisation. Urbanised and urbanising cities like Singapore, Hong Kong, and Malacca grapple with the challenges of the urban heat island effect and socio-economic disparities. Vulnerable populations, including the elderly, low-income families, and migrant workers, face higher exposure to heat risks, and often live in conditions without adequate cooling solutions. The sessions highlighted key challenges to addressing urban heat, including considerations for rapid urbanisation, exacerbating vulnerabilities, and the compounded and cascading risks resulting from interactions between climate hazards and urban systems.



4.1 Urban Heat

A lack of awareness and complacency further impede proactive heat risk management, whereas regulatory barriers hinder energy-efficient cooling solutions and heat resilience strategies. Political changes and financial constraints further obstruct effective climate actions. There is a pressing need to address community-specific heat exposure using localised, high-resolution climate data, and to develop innovative, long-term, system-wide, and practical heat reduction strategies that provide multiple benefits across sectors.

Observations & Advances

The sessions emphasised the recent advancements made in understanding and addressing urban heat challenges. Key examples cited included Singapore's use of climate modelling, environmental monitoring, and digital urban climate twins to understand heat stress, and to optimise and inform urban planning decisions. Cross-disciplinary collaborative work in Hong Kong has used Urban Heat Island (UHI) mapping to support the update of the extreme hot weather warning system and to design Anticipatory Action for heat. In terms of building design, passive design strategies and building codes recommendations have been developed in India to produce healthy and climate resilient affordable housing.

Community engagement emerged as a vital component among multiple presentations, with Singapore Red Cross sharing initiatives to include heat adaptation and response measures into existing services, such as befriending programs, home monitoring, first aid training and other outreach programmes to empower individuals with the skills and preparedness.

Singapore Red Cross

Source: Hamel, Perrine. Learning the ins and outs of heat stress: The Resilience 4 Communities program in Melaka, Malaysia

In Malacca, Malaysia, open-source software and low-cost sensors have been used to build localised data for modelling urban heat mitigation by nature-based solutions. Additionally, cooling strategies, including the adoption of fans alongside air conditioning for efficient cooling, use of cool paints, and sustainable urban planning, offer practical means to reduce heat and carbon emissions. Aligning efforts with broader climate resilient development goals—encompassing mitigation, adaptation, and sustainable development—is essential for comprehensive urban resilience. Through these multifaceted approaches, cities can significantly enhance their capacity to manage and adapt to the challenges of urban heat.

Policy and Action Recommendations

In addressing the pressing challenges of urban heat, a comprehensive policy and action agenda is crucial to building resilient cities. The following recommendations outline some of the key strategies discussed to effectively manage and mitigate urban heat impacts, ensuring sustainable and equitable urban development and ultimately enhancing health, well-being, and energy efficiency in cities.

1 Develop Context-Specific Solutions

Tailor strategies to local climate conditions & vulnerabilities, ensuring long-term benefits that span multiple sectors.

2 Foster Cross-Sector Collaboration

Strengthen partnerships between academia, industry, government, and communities to expand solutions, ensuring effective implementation of heat resilience measures.

3 Innovate Urban Planning

Promote climate-sensitive urban design features, such as enhanced natural ventilation, to effectively reduce the impact of urban heat.

4 Update Building Regulations

Revise building codes to require heat-resilient design elements, including passive design strategies and efficient air movement, to enhance building performance in high-temperature conditions.

5 Equip the Public with Skills & Preparedness

Empower communities and individuals by increasing their knowledge and skills related to heat risks and resilience strategies, fostering a culture of preparedness.

6 Leverage and Align with Multilateral Platforms & Goals

Integrate heat risk reduction into comprehensive policy frameworks and align with broader development and climate mitigation objectives, using international reports and platforms to inform and guide policy development.

Related Sessions for Urban Heat

Keynote - The Urban Heat Challenge: Innovations, Strategies, and Resilience for Sustainable Cities

- Prof Winston Chow, *Professor of Urban Climate of Singapore Management University; and Co-Chair of Intergovernmental Panel on Climate Change*

Panel Presentation. Urban Heat: Addressing Vulnerabilities & Enhancing Adaptation

- Moderator: Asst Prof Nicholas Ravanelli, *Heat Resilience & Performance Centre, NUS*
- Assoc Prof Ren Chao, *Associate Professor, Faculty of Architecture, University of Hong Kong*
- Mr Benjamin William, *Secretary General, Singapore Red Cross*
- Mr Chiu Wen Tung, *Group Director (Research & Development), Urban Redevelopment Authority*
- Prof Stefano Schiavon, *Architecture and Civil and Environmental Engineering, University of California, Berkeley*

Parallel Session 2A. Heat-Resilient Cities & Indoor Environments

- Moderator: Assoc Prof Ren Chao, *Associate Professor, Faculty of Architecture, University of Hong Kong*
- Assoc Prof Yuan Chao, *Associate Professor, NUS Cities, NUS*
- Mr Joseph Deng, *Head of Business Development, APAQ Group*
- Mr Ashok B Lall, *Principal of Ashok B Lall Architects; and Network Changemaker of Global Buildings Performance Network*
- Asst Prof Perrine Hamel, *Assistant Professor, Asian School of the Environment, Nanyang Technological University*

4.2 Heat at Work

The issue of heat stress in occupational settings has emerged as a critical concern to the Southeast Asia region, for its impacts affect labour markets and vulnerable worker populations. This series of discussions focused on understanding the multifaceted impacts of heat exposure specifically in the Southeast Asia region on workers and explored potential solutions and next steps for policy and action.

Current Context & Challenges

The challenges of managing heat at work are multifaceted, affecting both indoor and outdoor workers across various sectors globally. Rising global temperatures significantly threaten labour markets, especially in agriculture, construction, and informal sectors, where prolonged exposure to extreme heat leads to health risks such as heat exhaustion, heat stroke, and mortality, as well as other consequences such as decreased productivity. Vulnerable populations, including migrant and informal workers, are disproportionately affected due to inadequate social protections and access to resources, with the Asia-Pacific region being particularly vulnerable given its high number of informal workers. Some of the key challenges to be tackled include the lack of consensus on definitions of heat stress levels and the absence of standardised guidelines across sectors and countries. Furthermore, the silent nature of heat as a health hazard, particularly its mental health impacts, often goes unnoticed and unaddressed. A significant gap in knowledge and awareness among workers about heat-related illnesses exists, and is further compounded by inconsistent global statistics and inadequate data collection, which hinder effective policy development and implementation.

4.2 Heat at Work

Observations & Advances

Current efforts to address heat stress at work have been diverse, focusing on a range of policy frameworks and technological innovations. Key examples cited include Singapore's introduction of the Platform Workers Act which aims to offer social protection and safety measures for workers in the gig economy, and the Philippines' Labor Advisory which mandates the implementation of heat stress programs in workplaces. These initiatives highlight the importance of transitioning from informal to formal employment contexts to enhance worker protections. Regions like Singapore are also emphasising acclimatisation and preventive measures for workers returning from varied climates, underscoring the need for localised solutions. Technological advancements, including wearable sensors and ventilation garments, have been proposed as effective solutions for monitoring and mitigating heat stress. One example shared was the research by Dr Ken Tokizawa where the potential of using wetting t-shirts with ventilation garments was being explored as an innovative cooling technique. Additionally, economic analyses, as presented by Prof Cai Wenjia, stresses the necessity of assessing the economic impacts of heat stress on labour productivity and the broader economy, advocating for prioritised adaptation measures and policies. This multi-faceted approach, combining policy development, technological innovation, and economic analysis, is crucial for effectively tackling heat stress in the workplace.

Policy and Action Recommendations

Addressing heat stress in the workplace requires a coordinated and comprehensive approach, engaging multiple disciplines and stakeholders. Current efforts emphasise the importance of developing effective guidelines and implementing solutions that are informed by interdisciplinary research and collaboration. Suggested key priorities include enhancing data collection and surveillance, promoting international cooperation to share best practices, and strengthening legal frameworks to protect vulnerable workers, particularly migrants and those in informal sectors. Empowering workers and employers through targeted education and awareness programs is crucial, alongside the development of scalable technologies and predictive models to mitigate heat stress risks.

1 Develop Comprehensive & Adaptive Policies

Establish national & regional heat stress management standards that account for local conditions and are underpinned by broad interdisciplinary collaboration.

2 Enhance Data Collection & Reporting

Improve the gathering and analysis of data related to heat-related illnesses and injuries to inform policy and evaluate the effectiveness of interventions.

3 Promote Technological Innovations

Encourage the development and widespread use of wearable sensors and cooling garments to facilitate real-time monitoring and mitigation of heat stress.

4 Empower Vulnerable Populations

Implement education & outreach initiatives to raise awareness and equip workers, particularly those in vulnerable sectors, with the skills needed to effectively manage heat stress.

5 Foster Cross-Sector Collaboration

Engage stakeholders from diverse disciplines and organisations to create holistic, inclusive climate adaptation strategies that integrate health, economic, and environmental considerations.

6 Leverage Economic Analysis

Utilise economic metrics to prioritise interventions, ensuring they are cost-effective and provide co-benefits across sectors, while actively involving stakeholders in the decision-making process.

Related Sessions for Heat at Work

Keynote. Heat at work: Navigating Occupational Heat Stress

- Dr Ken C. Shawa, *Senior Economist & Head of Regional and Economic Analysis Unit, Regional Office for Asia and the Pacific, International Labour Organization*

Expert Roundtable. Regional Insights and Action to address Occupational Heat Stress

- Moderator: Dr Yuka Ujita, *Senior Occupational Safety and Health Specialist, ILO Decent Work Technical Support Team for East and South-East Asia and the Pacific, International Labour Organization*
- Mr Silas Sng, *Divisional Director of Occupational Safety & Health Division of Ministry of Manpower; and Chair of ASEAN Occupational Safety and Health Network*
- Dr Jeffrin Yusof, *Acting Associate Specialist for Occupational Health Division and Head of Environmental Health Division, Ministry of Health, Brunei Darussalam*
- Dr Darryl Lucian S. Bautista, *Supervising Occupational Health Officer of the Occupational Safety and Health Center, Department of Labor and Employment, Philippines*
- COL Mohamed Feroz, *Head of Army Safety Inspectorate, Ministry of Defence, Singapore*
- Dr Dorothy Ngajilo, *Occupational Health Specialist, Occupational and Workplace Health, Environment, Climate Change and Health Department, Division of Healthier Populations, WHO*

Panel Presentation. Heat at work: Exertional Heat Stress, Productivity & Performance

- Moderator: Dr Jean Liu, *Director of Centre for Evidence and Implementation; and Adjunct Assistant Professor of NUS Yong Loo Lin School of Medicine*
- Ms Delphine Fong, *Division Head, Sport Safety, Sport Singapore*
- Dr Ken Tokizawa, *Senior Researcher, National Institute of Occupational Safety and Health, Japan*
- Prof Cai Wenjia, *Professor, Department of Earth System Science, Tsinghua University*
- Dr Thomas Gassert, *Instructor in Occupational & Environmental Medicine, Environmental Health, Harvard T.H. Chan School of Public Health*
- Dr Anh Ngoc Vu, *Research Director, Climate Change Lead, Project Lead £1.3million Wellcome Trust funded project 'The health impacts of climate change on precarious outdoor workers in megacities in Vietnam', National Centre for Social Research (United Kingdom)*

4.3 Community, Traditional & Cultural Perspectives

The region of Southeast Asia encompasses a diverse range of people groups, traditions, and cultures, which has the potential of providing a wealth of perspectives on how societies historically and currently manage heat. Drawing from cultural traditions, historical insights, and grassroots initiatives, the sessions under this theme underscored the importance of learning from and integrating traditional wisdom with modern strategies to address the multifaceted challenges posed by increasing heat. These discussions emphasised the value of community engagement and cultural understanding in developing effective heat resilience strategies.

Current Context & Challenges

In tropical Southeast Asia, heat seems like a persistent aspect of daily life. The relatively obscured onset of excessive heat exposure, compared to other disasters such as typhoons, allow potential health risks to be underestimated and go unnoticed, despite posing significant threats to public health, well-being, and economic stability. Extreme heat is increasingly recognised in some places as a severe climate emergency, such as in the Philippines, which experienced record high temperatures in 2024, leading to school closures and health emergencies.

While in other places, such as Indonesia, heat is not officially recognised as a disaster, limiting governmental response and public awareness. Different societies have historically understood and coped with heat-related challenges in multiple ways through practices such as Traditional Chinese Medicine and traditional architectural cooling solutions like those in Penang.

However, due to a lack of mutual understanding and know-how to synthesise historical knowledge with modern thought, traditional practices and cultural beliefs may sometimes be perceived as incongruent with modern heat management strategies, leading to misunderstandings. There is a pressing need to integrate traditional knowledge into modern practices and enhance awareness of traditional cooling methods. Furthermore, effective communication strategies to engage diverse demographics community and groups are needed. Community-led initiatives in cities like Medan and Surabaya have aimed to raise awareness about the impacts of heat, emphasising the need for cultural adaptation and grassroots involvement.

Source: Courtney, Christopher. Heat and Health in Chinese History

Source: Pang, Gwendolyn. Protecting Communities: Increasing Outreach & Fostering Action for Heat

Observations & Advances

Leveraging historical practices and traditional knowledge can enhance modern heat management strategies and provide valuable insights into managing heat sustainably. Research on historical practices in ancient China have identified techniques like ice distribution and architectural designs featuring natural ventilation that provided effective cooling solutions. Traditional Chinese Medicine (TCM) offers dietary adjustments and acupuncture to manage heat impacts on health, complemented by modern medical practices for acute conditions. Heritage conservation in Penang further promotes traditional knowledge by featuring traditional building materials and designs that naturally mitigate heat.

Community engagement remains central to these strategies, with organisations like the Philippine Red Cross bridging science and community action through initiatives such as emergency medical services, dengue awareness campaigns, and nature-based solutions like reforestation and urban greening. These efforts aim to enhance community resilience and promote sustainable livelihoods. Local initiatives in Indonesia including art performances, youth-led campaigns, and outdoor activities to make learning about heat risks engaging and memorable. Social media outreach further disseminates information on heat risks and protective measures tailored to local contexts.

Philippine Red Cross

Policy and Action Recommendations

To effectively address the challenges of extreme heat and promote resilient communities, policies and action must integrate cultural knowledge with modern strategies. The following recommendations aim to bridge traditional knowledge and contemporary practices, fostering sustainable and inclusive solutions.

1 Integration of Traditional Knowledge

Advocate for the inclusion of traditional and historical/cultural knowledge in modern urban planning and heat resilience strategies, and engage historians, cultural experts, and communities to develop culturally sensitive and effective heat mitigation measures.

2 Cross-sector Collaboration

Strengthen partnerships between academia, government, and community organisations to facilitate the integration of research into practical applications and policy frameworks, enhancing the overall effectiveness of these solutions.

3 Culturally Relevant Education & Interventions

Utilise culturally relevant strategies to enhance public awareness campaigns and to design interventions that address the specific needs of different communities, thereby enhancing resilience at the grassroots level.

4 Community Trust & Engagement

Build trust and foster active community engagement, encouraging participatory approaches that empower communities to take ownership of heat resilience initiatives.

5 Sustainability in Development

Promote policies that balance modern development with heritage conservation, recognising the environmental benefits of traditional architecture and materials.

Source: Lim, Gaik Siang. Why Heritage Conservation is Considered Green Development - Drawing examples from George Town World Heritage Site

Related Sessions for Community, Traditional & Cultural Perspectives

Keynote. Protecting Communities: Increasing Outreach & Fostering Action for Heat

- Dr Gwendolyn Pang, *Secretary General, Philippine Red Cross*

Panel Presentation. Heat from a Historical, Traditional, & Cultural Lens

- Moderator: Dr Joshua Dao Wei Sim, *Senior Research Fellow, Human Potential Translational Research Programme, NUS*
- Dr Christopher Courtney, *Associate Professor (Modern Chinese History), Durham University*
- Physician Brandon Yew, *Partner / Senior TCM Physician, Real Health Medical Pte Ltd*
- Ms Lim Gaik Siang, *Immediate Past President, Penang Heritage Trust*

Community Voices

- Ms Ishma F. Soepriadi, *Country Design, Monitoring, Evaluation, Research, and Learning (DMERL) Lead, American Red Cross - Indonesia Delegation*

5 Other Priority Areas

This section synthesises the discussions under other priority areas covered during the Forum. Content of all individual sessions, including the session recordings and presentations, can be accessed through the GHHIN website via the QR code below.

5.1 Health Impacts of Specific Populations

Heat impacts the health of all types of population groups, and also impacts ecosystem, plant, and animal health. This section will focus on selected population groups identified through the Forum.

GHHIN website

5.1.1 Women & Children

The intersection of climate change with the well-being of women and children is an urgent concern that needs targeted interventions. This summary explores the discussions surrounding the unique vulnerabilities faced by these groups in the face of environmental stressors, particularly extreme heat.

Current Context and Challenges

Women and children are disproportionately affected by climate change, with its impacts manifesting in various health, social, and economic dimensions. Children, due to their developing bodies, are particularly vulnerable to heat stress, which can affect their physical and cognitive development. Similarly, women, especially those who are pregnant or postpartum, face increased health risks. The lack of tailored policies and interventions exacerbates these vulnerabilities, highlighting the need for comprehensive strategies that address their specific needs. The primary challenges for this specific target population include a lack of gender-sensitive climate policies and insufficient data on the specific impacts of climate change on women and children. Socioeconomic inequalities further compound these vulnerabilities, with women facing income losses and increased risks of gender-based violence. Children, particularly in low-income regions, often lack access to safe environments for play and physical activity, adversely affecting their health and development.

5.1.1 Other Priority Areas – Women & Children

Observations & Advances

Empowering women and engaging children in climate action are key to building resilience. Initiatives like the United Nations Children's Fund (UNICEF) Beat the Heat campaign and IFRC's youth programs emphasise education, awareness, and community engagement. Promoting physical activity and improving infrastructure to support safe and healthy environments for children are essential. Additionally, integrating gender perspectives into disaster risk reduction and climate adaptation strategies can help mitigate the adverse impacts on women.

UNICEF Spotlight Risk on Extreme Heat

Policy and Action Recommendations

To effectively address the unique challenges faced by women and children in the context of climate change, a multifaceted approach is required. The following action steps outline a path forward, emphasising the importance of inclusive and targeted strategies.

1. **Enhance Gender-Sensitive Policies**
   Integrate gender perspectives into climate adaptation and disaster risk reduction strategies to address the specific vulnerabilities of women.

2. **Promote Child-Centric Interventions**
   Develop and implement policies that support safe environments for children, promoting physical activity and resilience to climate impacts.

3. **Support Community Engagement**
   Empower women and youth to advocate for themselves and lead community based initiatives that address local climate challenges.

4. **Expand Research & Data Collection**
   Prioritise the collection of gender-disaggregated data to better understand and address the impacts of climate change on women and children.

5. **Leverage Educational Systems**
   Utilise schools and educational programs to raise awareness and build resilience among children, integrating climate education into curricula.

Session

- Moderator: Dr Jiaxi Yang, *Senior Research Fellow, Global Centre for Asian Women's Health, NUS*
- Dr Mrunal Shetye, *Chief of Health, UNICEF Indonesia*
- Dr Shawnda Morrison, *Senior Research Fellow, Human Potential Translational Research Programme, NUS*
- Ms Michelle Shi Jie Chew, *Chairperson of IFRC Youth Commission, Malaysian Red Crescent Society; IFRC Global Youth Commission*

5.1.2 Older Adults & Chronic Conditions (including Disabilities)

The session highlights the increasing vulnerability of older adults and individuals with chronic conditions or disabilities to heat-related stress, emphasising the critical role of advanced early warning systems and personalised interventions. With a focus on leveraging integrated technologies and multidisciplinary research, the session explores innovative approaches to enhance heat management and adaptive capacity in vulnerable populations.

Current Context & Challenges

Older adults and individuals with disabilities are increasingly vulnerable to heat-related stress, primarily due to age-related impairments in thermoregulation and the effects of certain medications, exacerbated by reduced accessibility to information and services. The challenge is compounded by insufficient evidence guiding medication use in heat-prone environments and inadequate research on the specific risks and needs of these groups. There is a critical need to strengthen awareness among healthcare providers and integrate climate-related health risks into medical education.

Observations & Advances

Research indicates that older adults and disabled individuals are disproportionately affected by heat due to physiological and accessibility issues. Integrated early warning systems, such as the ETHOS project in Australia, have been developed to provide personalised heat alerts and recommend accessible cooling measures for older adults. Community-level initiatives, such as cooling centres and home visits in Korea, offer targeted support to high-risk groups during heatwaves. These initiatives highlight the importance of multidisciplinary collaboration in developing comprehensive heat management strategies that incorporate real-time data and technological innovations.

ETHOS project

5.1.2 Other Priority Areas – Older Adults & Chronic Conditions (including Disabilities)

Policy and Action Recommendations

To effectively address the needs of older adults and individuals with disabilities during extreme heat events, the following key actions are recommended:

1. **Enhance Research Collaboration**
   Foster transdisciplinary research to develop robust evidence for guidelines on medication use and heat management for vulnerable populations.

2. **Implement Personalised Interventions**
   Develop and pilot digital healthcare solutions that use real-time data to offer personalised interventions for high-risk individuals.

3. **Expand Community Support Measures**
   Scale up community-level adaptation policies to provide comprehensive support during extreme heat events, focusing on the most vulnerable populations.

4. **Strengthen Awareness among Healthcare Providers**
   Incorporate climate and health topics into medical and nursing curricula to enhance providers' awareness of heat-related risks.

Session

- Moderator: Assoc Prof Reshma Aziz Merchant, *Head and Senior Consultant, Division of Geriatric Medicine, National University Hospital (NUH) Singapore*
- Mr Jericho Wee, *PhD Candidate, Human Potential Translational Research Programme, NUS*
- Ms. Jinah Park, *PhD Student, Public Health Sciences, Seoul National University*
- Dr Zhiwei Xu, *Research Fellow, School of Medicine and Dentistry, Griffith University*

5.1.3 Mental Health

The intersection of mental health, decision making, and learning in the context of climate change presents complex challenges and opportunities for innovation. This summary delves into the presentations and discussions of the session covering the current state of research and attempts at addressing the issues, highlights key challenges and gaps, offers solutions, and outlines actionable steps for policy and action, emphasising the integration of mental health considerations into climate resilience strategies.

Current Context and Challenges
Climate change poses significant threats to mental health, exacerbating existing conditions and increasing the risk of new ones. The impact is multifaceted, affecting individuals globally through direct and indirect pathways. As awareness of the mental health implications of climate change grows, so does the need for interdisciplinary collaboration to develop holistic interventions. Initiatives like Connecting Climate Minds and the Asia-Pacific Mental Health and Psychosocial Support Collaborative are at the forefront, bringing together stakeholders to address these intertwined crises.

A key challenge is the historical disconnect between climate and mental health research, resulting in fragmented efforts and uneven resource distribution. Vulnerable populations, such as young people and those with pre-existing conditions, face heightened risks yet often lack adequate access to services. The societal costs of climate-driven mental health disorders are significant, and there is a pressing need for quantifiable evidence to support policy development. Additionally, the complex interplay of factors influencing mental health, including socio-economic and environmental stressors, complicates the attribution of mental health changes to climate change.

Connecting Climate Minds

Asia-Pacific Mental Health and Psychosocial Support Collaborative

5.1.3 Mental Health

Observations & Advances

Integrated, interdisciplinary approaches are essential to address these challenges. Behavioural science insights can foster community resilience and motivate collective action. Existing mental health interventions must be scaled up and integrated with climate resilience strategies. Innovative solutions, such as mindfulness-based interventions and community support programs, can help individuals cope with climate-induced stress. Additionally, addressing systemic issues like working conditions, housing, and social support is crucial for long-term resilience.

Policy and Action Recommendations

To effectively address the dual challenges of mental health and climate change, a coordinated approach that integrates mental well-being into climate resilience strategies is essential. This involves fostering partnerships across disciplines, prioritising vulnerable populations, and leveraging behavioural science to motivate action. The following action steps outline a path forward, emphasising the importance of holistic, inclusive strategies that address both immediate needs and long-term resilience.

1. **Enhance Collaboration**
   Foster interdisciplinary research and collaboration between climate and mental health experts to develop comprehensive policies.

2. **Prioritise Vulnerable Populations**
   Implement targeted interventions to support at-risk groups, ensuring equitable access to mental health services.

3. **Leverage Behavioural Science**
   Utilise psychological insights to design communication strategies that motivate climate action and support mental well-being.

4. **Expand Educational Initiatives**
   Integrate mental health and climate change education into school curricula and community programs to build awareness and resilience.

5. **Advocate for Policy Change**
   Support the development of policies that address both climate change and mental health, emphasising the need for integrated adaptation strategies.

5.1.3 Mental Health

Session

- Moderator: Assoc Prof Subramania Mythily, *Assistant Chairman Medical Board (Research) and Lead Investigator of the Programme of Mental Health Policy Studies, Institute of Mental Health*
- Assoc Prof Renzo Guinto, *Committee on Environmental Health and Ecology, Philippine Medical Association; Member, National Panel of Technical Experts, Climate Change Commission, Philippines*
- Dr Eliza Yee Lai Cheung, *Lead, Asia Pacific MHPSS Collaborative, IFRC Asia Pacific Regional Office*
- Dr Cyrus Ho Su Hui, *Assistant Professor and Senior Consultant Psychiatrist, Department of Psychological Medicine, NUS*

5.2 Broader Strategies for Heat Resilience

There is a wide range of strategies and solutions across different sectors and disciplines that can facilitate the development of heat resilience in Southeast Asia. This section will focus on the selected strategies discussed at the Forum.

5.2.1 Early Warning Systems & Heat Governance

Despite advancements in climate science, the application of existing information for managing heat extremes is still emerging and has not been fully established in many places globally, necessitating an enhanced focus on early warning systems and heat governance. The sessions under this theme highlighted the importance of integrated efforts across sectors to foster resilience against heat-related impacts.

Current Context & Challenges

The complex nature of heatwaves presents itself as both an environmental and human challenge, underscoring the critical role of extreme heat services and early warning systems in mitigating climate risks, particularly in regions prone to extreme temperatures. Current heatwave management is characterised by fragmented approaches and a lack of coherence and standardisation. Key challenges include insufficient public understanding and response to heat warnings, and an overemphasis on maximum temperatures instead of cumulative heat impacts. The absence of robust infrastructure and preparedness measures increases the vulnerability of countries to heat-related health risks and economic losses.

Moreover, inconsistent policy decisions arise from a lack of regional coordination among countries sharing common climate drivers. There is a pressing need for standardised metrics for heat stress and high-resolution, localised climate data to enhance management strategies. Significant research gaps persist in characterising heatwave intensity and integrating climate and health data. The lack of legal and financial frameworks for heat action plans limits their implementation and sustainability.

5.2.1 Early Warning Systems & Heat Governance

Increasing public awareness and community engagement in heat risk management, particularly among vulnerable communities, remains a critical challenge. Effective heat management requires improved interdisciplinary communication among climate, health, and meteorological sectors.

Observations & Advances

Significant advancements have been made in the development of early warning systems and heat governance to manage the risks associated with extreme heat. Transitions to impact-based forecasting, accounting for cumulative heat exposure, was emphasised as an essential step to comprehensively address the effects of heat on health and infrastructure, thereby enhancing public understanding and response. Efforts have been underway to establish global guidance and standards for heatwave management, ensuring consistency and collaboration across regions. Integrated information systems, like those employed in the U.S., combine climate, health, and disaster data to provide comprehensive early warning services and inform heat resilience strategies. The Global Framework for Climate Services (GFCS) offers a structured approach to organising climate services, focusing on disaster risk reduction and strengthening regional capacities. This includes establishing national and regional climate forums to consolidate capacities and enhance the delivery of climate services, as well as implementing climate watch systems to monitor imminent climate extremes and provide timely advisories on potential impacts. The Early Warnings for All (EW4All) initiative aims for universal protection through life-saving multi-hazard early warning systems, anticipatory action, and resilience efforts by 2027. Myanmar's development of a simplified early action protocol for heatwaves highlights the effectiveness of community-driven solutions and innovative risk assessments. India's participatory heat action plans demonstrate the value of involving multiple stakeholders to address local needs and vulnerabilities, showcasing a collaborative approach to managing heat risks. These solutions underscore the importance of integrated and collaborative interventions to enhance heat risk management.

Global Framework for Climate Services (GFCS)

WMO Early Warnings for All (EW4All) initiative

5.2.1 Early Warning Systems & Heat Governance

Policy and Action Recommendations

To enhance early warning systems and heat governance, policy recommendations should be pursued, focusing on collaboration, localised solutions, standardisation, public engagement, and strengthening frameworks

1 Enhance Interdisciplinary & Interagency Collaboration

Foster collaboration among climate, health, and meteorological sectors, as well as disaster management, to develop coherent and effective

2 Standardise Heatwave Measurement

Facilitate the development of standardised metrics and methodologies for measuring heatwave intensity, enabling consistent and effective responses across regions.

3 Promote Legal Recognition of Heat as a Disaster

Advocate for the recognition of heatwaves as a formal disaster to unlock resources and strengthen governance frameworks.

4 Strengthen Heat Management Frameworks

Develop comprehensive national heat management frameworks that incorporate cross-sectoral collaboration and ensure sustainable implementation of heat action plans.

5 Develop Localised Solutions

Invest in the collection and analysis of localised data to tailor heat risk management plans to the specific needs of communities.

6 Increase Public Engagement & Education

Increase public awareness and engagement through community-driven initiatives and participatory planning processes that empower vulnerable populations.

7 Encourage Global and Regional Sharing

Support the development of global and regional frameworks for heat management and promote increased shared learning and capacity building at avenues such as regional forums.

Related Sessions for Early Warning Systems & Heat Governance

Keynote - Extreme Heat Services & Early Warning Systems
- Dr John Nairn, *Senior Advisor Extreme Heat (retired), WMO*

Insights. Early Warning: Climate Knowledge and Services for Early Action
- Dr Rupa Kumar Kolli, *Honorary Scientist, International Monsoons Project Office, Indian Institute of Tropical Meteorology*

Panel Presentation. What does Heat Governance & Heat Action Plans look like for our region
- Moderator: Dr Jochen Luther, *Technical Coordinator (Services), WMO Regional Office for Asia and the South-West Pacific*
- Ms Juli Trtanj, *Climate and Health Program Director and One Health Lead, US National Oceanic and Atmospheric Administration*
- Ms Moe Thida Win, *Director, Disaster Management, Myanmar Red Cross Society*
- Mr Abhiyant Tiwari, *Lead - Climate Resilience and Health, India Program, Natural Resources Defense Council*

5.2.2 Health Services & Systems

The session focused on heat-responsive health services and surveillance systems, with insights from the Western Pacific region, specifically Vietnam and South Korea. The emphasis was on understanding the health impacts of heat exposure and developing strategies to address these challenges. Presentations highlighted the role of WHO in supporting countries with developing heat action plans and the collaborative efforts at country levels to manage heat-related health risks.

Current Context and Challenges

Heat affects the functioning of multiple organs and health outcomes, but every heat-related death is preventable, necessitating the use of surveillance as a critical aspect of early warning system development. Key challenges include varying health risks associated with chronic and acute heat exposure, underreporting, and a diverse range of heat impact metrics complicating the development of effective surveillance systems.

Conflicting health advisories, such as exercising in extreme heat or balancing ventilation during heat waves and infectious disease outbreaks, pose a significant obstacle in public health communication. Inconsistencies in metrics across regions and countries hinder comparative analysis and coordinated responses. In regions like Vietnam, heat-related health issues are underprioritised, and there is insufficient intersectoral coordination between sectors like healthcare, meteorological services, and disaster management. There is a need for precise, region-specific data to better understand heat vulnerabilities and inform targeted interventions. Countries may lack the infrastructure and trained personnel to effectively manage heat health risks, particularly in rural areas.

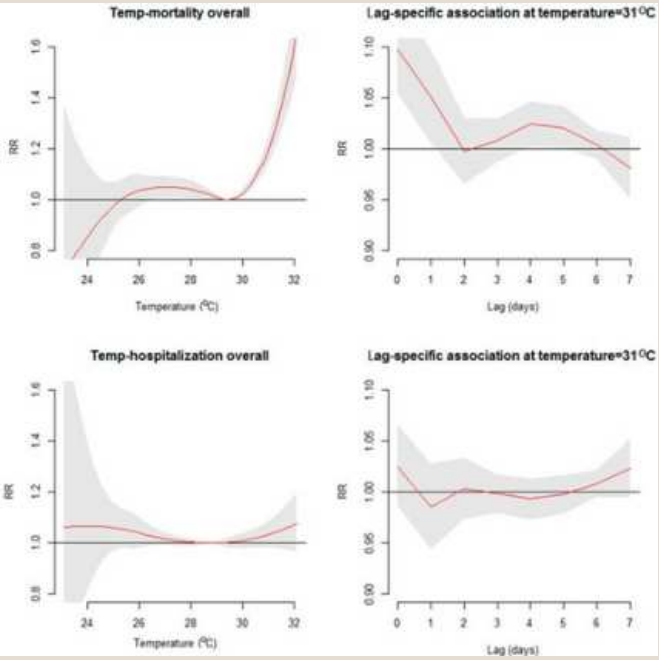
5.2.2 Health Services & Systems

Observations & Advances

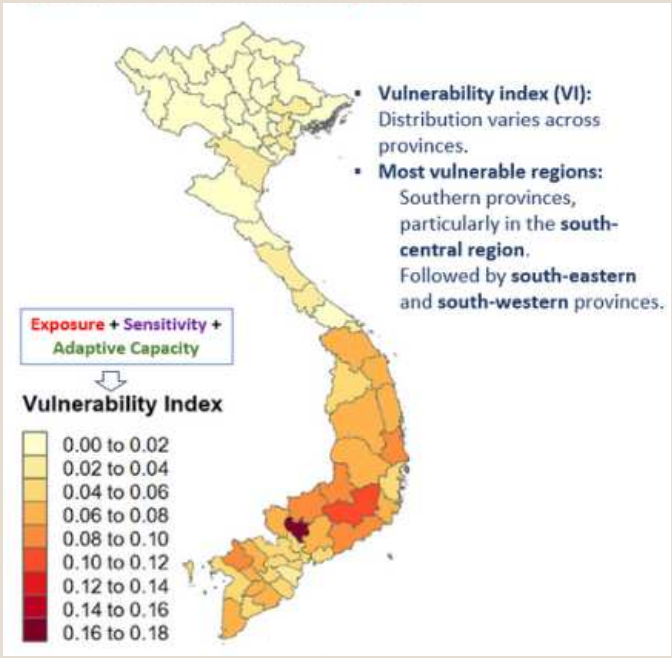
WHO has emphasised strengthening health systems to handle the multifaceted impacts of heat, focusing on climate resilience and integrating heat considerations into healthcare infrastructure and workforce planning. The organisation is involved in establishing effective surveillance systems and early warning mechanisms to provide timely alerts and mitigate health risks associated with extreme heat events. Research on the health impacts of heat have been leading to the development of surveillance systems. In Vietnam, there is a growing body of literature on heat's impact on mortality, morbidity, and specific diseases, but disease surveillance systems are primarily focused on infectious diseases rather than heat-exacerbated non-communicable diseases. Ongoing efforts include developing a national action plan focusing on health sector adaptation to climate change and initiating technical guidelines for health protection during extreme weather. South Korea has developed a long-standing national heat surveillance and warning system, involving multiple ministries responsible for disaster management, meteorological data, and labour. Innovative trials like cooling shelters, fog systems, and local initiatives using drones for communication in rural areas are part of the comprehensive heat mitigation measures employed. Both countries are working towards integrating climate resilience into health systems and enhancing inter-ministerial coordination.

Heat-Health Impacts & Vulnerabilities in Vietnam

Temperatures & Mortality and Hospitalization risk in Ho Chi Minh City (Dang, T.N et al, 2019)



Spatial distribution of vulnerability index (Dang, N.T et al., 2019)



Source: Linh Tran, Nu Quy. Heat Exposure and Human Health in Vietnam: Impacts, Vulnerabilities, Challenges, and Heat-Responsive Health Strategies

5.2.2 Health Services & Systems

Policy and Action Recommendations

To enhance heat-responsive health services and systems, the following key actions are recommended:

1. **Strengthen Inter-Ministerial Coordination**
   Foster robust inter-ministerial coordination for cohesive policy implementation on heat health strategies that are tailored to local vulnerabilities and resources.

2. **Enhance Epidemiological Assessments**
   Facilitate cross-sectoral data sharing to improve epidemiological assessments and promote longitudinal studies for understanding long-term heat health impacts.

3. **Leverage AI and Digital Tools**
   Utilise artificial intelligence and innovative technologies to achieve precise and timely heat risk management. Expand deployment of digital tools for effective early warning systems and predictive modelling.

4. **Build Health Services Capacity**
   Provide comprehensive training for healthcare personnel and community members, equipping them to effectively address and manage heat-related health challenges.

Session

- Moderator: Asst Prof Aw Su, *Assistant Professor, Saw Swee Hock School of Public Health, NUS*
- Ms Sally Edwards, *Coordinator, Health and the Environment (HAE), Division of Healthy Environments and Populations, WHO-Western Pacific Region (WPRO)*
- Dr Tran Nu Quy Linh, *Senior Research Officer, School of Public Health, University of Queensland, Australia*
- Prof Ho Kim, *Professor, Public Health Sciences, Seoul National University*

5.2.3 Emergency & Disaster Management

This session focused on emergency management and the rising challenge of extreme heat as a significant hazard. Experts in disaster management, development, emergency medicine, and academia discussed the complexities and demands of managing heat risks, emphasising the need for proactive transformative strategies and enhanced coordination across sectors.

Current Context and Challenges

Extreme heat is increasingly recognised as a serious threat yet often overshadowed by more visible disasters like floods and typhoons. As a risk magnifier, the economic and social impacts of heat are significant, disproportionately affecting disadvantaged groups and straining economies. Heat risk is outpacing resilience and adaptation efforts, such as existing heat action plans. Many current plans are incremental rather than transformative, lacking integration across sectors such as health, energy, and water systems. The lack of political will and awareness further complicates efforts to prioritise heat in policy agendas. Furthermore, there is a critical gap in effective communication and awareness-building regarding climate risks.

The lack of comprehensive early warning systems and integrated cross-sectoral approaches highlights the need for enhanced coordination and narrative-building to engage policymakers and allocate necessary resources effectively.

5.2.3 Emergency & Disaster Management

Observations & Advances

The experts presented insights and strategies for managing heat through various lenses. Dr Sanjay Srivastava highlighted the use of AI and machine learning to define hyperlocal heat risk hotspots for vulnerability and targeted warnings in a pilot project in India. Dr Luis Rodriguez shared recent IFRC's efforts to expand proactive Anticipatory Actions and Early Action Protocols and institutionalise them within legal frameworks, as well as build long-term resilience through integrated solutions, such as climate-smart agriculture practices in the Philippines and climate resilient integrated water management in Sri Lanka. Dr Jimmy Lee shared about the experiences developing heat management strategies for COVID-19 healthcare workers, field medical teams, and marshals at the F1 Grand Prix, illustrating the need for data collection, collaboration, and tailored heat action plans that consider environmental and occupational factors. Prof Benjamin Horton emphasised the alarming reality of the climate crisis, underscoring the urgency for action, education, and effective communication.

5.2.3 Emergency & Disaster Management

Policy and Action Recommendations

To effectively address the multifaceted nature of heat management, a comprehensive policy and action agenda is essential, emphasising the need for comprehensive, cross-sectoral, and community-driven approaches.

1 Building Narratives

Developing compelling evidence-based economic and social narratives of heat risk and impact to engage key stakeholders on agenda prioritisation, political support, and funding.

2 Policy Integration for a Multi-Hazard Approach

Integrate heat risk into climate agendas and broader disaster risk reduction frameworks to ensure comprehensive emergency management strategies, coherent policies, and adequate resource allocation.

3 Transformative Adaptation

Develop systemic approaches across health, labour, food, water, and energy sectors, moving beyond incremental changes to transformative adaptation strategies

4 Proactive & Community-based Approaches

Shift from reactive measures to proactive planning for long-term resilience and locally-driven heat resilience solutions that incorporate local knowledge and address specific vulnerabilities

5 Enhance Communication & Education

Increase efforts by educational institutions and media organisations to raise awareness about heat risk and impacts, while actively combating misinformation and advocating for young scientists' involvement

6 Leverage Technology for Risk Management

Leverage on AI and technological solutions to improve early warning systems and enhance the effectiveness of emergency management actions.

Session

- Moderator: Ms Eva Yeung, *Senior Manager, Community Resilience, Hong Kong Red Cross, Branch of Red Cross Society of China*
- Dr Sanjay Srivastava, *Chief, Disaster Risk Reduction, ICT and Disaster Risk Reduction Division, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)*
- Dr Luis C. Rodriguez, *Thematic Lead, Climate and Resilience; Health, Disasters, Climate and Crises, IFRC Asia Pacific Regional Office*
- Dr Jimmy Lee, *Senior Consultant, Department of Emergency Medicine, Ng Teng Fong General Hospital*
- Prof Benjamin Horton, *Director of the Earth Observatory of Singapore, Professor at the Asian School of the Environment, Nanyang Technological University*

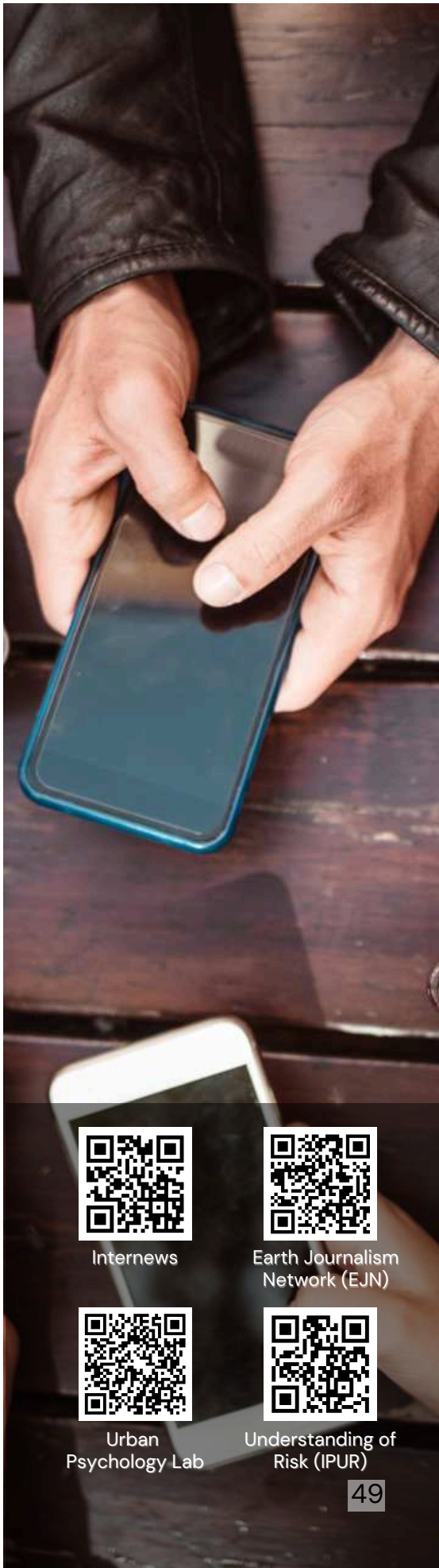
5.2.4 Risk Communications & Media

The role of risk communication and media in addressing challenges related to climate change and extreme heat is critical. Effective communication can empower communities to make informed decisions, enhancing resilience against environmental hazards. This summary outlines the discussions at the session, focusing on how media and communication strategies can bridge the gap between scientific findings and public understanding.

Current Context and Challenges

The media landscape is evolving, with traditional media outlets being complemented by social media platforms. These platforms are increasingly becoming the primary sources of information for younger generations. Efforts like those of Internews and the Earth Journalism Network emphasise the importance of accurate, accessible information to help communities affected by climate change, such as during the 2015 heatwave in Pakistan.

Additionally, research institutions like the Urban Psychology Lab and Institute for the Public Understanding of Risk (IPUR) are exploring how urban heat can catalyse climate action through innovative risk communication strategies. Key challenges include the normalisation of heat as a natural hazard, which leads to complacency in public and policy responses. The disconnect between scientific knowledge and public understanding often results from spatial, temporal, and scalar disparities, making climate change seem distant or irrelevant to individuals. There is a lack of consensus on effective communication strategies, with current practices often failing to motivate behaviour change or adequately address the needs of vulnerable populations. Furthermore, media outlets face constraints such as budget limitations, the complexity of visualising heat impacts, and journalists' safety in extreme conditions.



5.2.4 Risk Communications & Media

Observations & Advances

Solutions emphasise interdisciplinary collaboration and leveraging media to enhance public awareness and action. Media can play a pivotal role by creating relatable narratives, countering misinformation, and highlighting the inequitable impacts of heat on different demographics. Initiatives like those by the Earth Journalism Network and IPUR underline the importance of empowering communities with actionable information and fostering a sense of agency. Additionally, integrating research findings into media reporting can provide nuanced insights that enhance public understanding and drive behavioural change.

Policy and Action Recommendations

To effectively tackle the challenges posed by climate change and extreme heat, it is crucial to adopt a comprehensive, collaborative approach that bridges the gap between scientific knowledge and public understanding. This involves fostering partnerships between researchers, media, and communities to enhance communication and empower individuals to take informed, proactive measures. The following action steps are proposed to strengthen policy and communication strategies, ensuring that they are inclusive, effective, and responsive to diverse needs.

Policy and Action Recommendations (continued)

1. **Enhance Media-Research Collaboration**
   Foster long-term partnerships between researchers and journalists to ensure accurate and timely dissemination of scientific findings.

2. **Develop Comprehensive Communication Strategies**
   Tailor messages to address diverse audience needs, considering cultural beliefs and socioeconomic constraints.

3. **Prioritise Vulnerable Populations**
   Focus communication efforts on vulnerable groups, ensuring they receive relevant and actionable information.

4. **Leverage Technology and Innovation**
   Utilise digital platforms for wider reach and engagement, employing visual tools to effectively communicate heat risks.

5. **Promote Community Engagement**
   Encourage community-based initiatives that build resilience and empower individuals to take proactive measures against heat stress.

Sessions

- Moderator: Ms Audrey Tan, *Assistant News Editor, The Straits Times*
- Ms Amy Sim, *Regional Program Manager for Asia-Pacific (Environment), Internews' Earth Journalism Network*
- Dr Samuel Chng, *Research Assistant Professor, Urban Psychology Lab, Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design*
- Dr Olivia Jensen, *Deputy Director and Lead Scientist (Environment and Climate), Lloyd's Register Foundation Institute for the Public Understanding of Risk, NUS*

Community Voices - Journalism Fellowship to Southeast Asia Heat Health Forum

- Dr Jaya Shreedhar, *Senior Health Media Advisor, Internews*
- Ms Paritta Wangkiat, *Mekong Program Officer, Internews' Earth Journalism Network*

5.2.5 Regional Research & Capacity Building

The effort to build regional research capacity in addressing climate change and its impacts on human health are multifaceted, involving diverse strategies across institutions. Highlighted here are the experiences and perspectives of Universitas Gadjah Mada in Indonesia, Mahidol University in Thailand, and the University of Sydney in Australia where efforts to build their own research capacity and capabilities have begun. Very different and unique approaches were adopted to overcoming the associated challenges, but all had a common emphasis on the importance of innovation, collaboration, and adaptability.

Current Context and Challenges

Universities and research centres are pivotal in fostering knowledge, innovation, and action to tackle complex crises. Across the globe, initiatives are underway to integrate climate change and health topics into educational curricula, develop cutting-edge research facilities, and collaborate with global networks.

These efforts are driven by the pressing need to address climate-related health issues and ensure sustainable solutions. Common challenges faced by all three speakers include access to and having sufficient resource and support, the need for structured institutionalisation of climate initiatives, and the translation of research findings into actionable policies. Public awareness about heat-related health issues is often lacking, and there is a need for comprehensive interdisciplinary approaches to address the complex interplay of factors influencing heat health. More comprehensive strategies that leverage local expertise and knowledge should also be developed.

5.2.5 Regional Research & Capacity Building

Observations & Advances

Solutions can and are being developed in a variety of areas and of varying scales to enhance research capacity and address these challenges. Universitas Gadjah Mada is integrating climate change into its curriculum and collaborating with advanced institutions to expand its research reach. Mahidol University has created a DIY heat chamber to study effective cooling interventions for managing heat stress and has established key data and insights to inform strategies and solutions. The University of Sydney employs a lifespan approach, using state-of-the-art facilities to simulate heatwaves and develop sustainable cooling strategies.

Policy and Action Recommendations

A common key enabler across the session was that institutions need to focus on interdisciplinary collaboration, leverage local expertise, and enhance infrastructure to build effective regional research capacity. Increasing public awareness and integrating research into educational curricula were also raised as being vital for equipping future generations with the necessary knowledge and skills. Additionally, translating research findings into policy and practice is essential for addressing heat-related health risks. Continued partnerships with external stakeholders will be crucial in achieving these goals and ensuring that research leads to impactful, scalable solutions. The following are some specific actions and strategies that institutions can focus on to strengthen their research capacity, contribute to global knowledge, and play a leading role in addressing climate change and its impacts on human health.

Policy and Action Recommendations (continued)

1. **Foster Interdisciplinary Collaboration**
   Encourage partnerships across institutions and disciplines to share resources, expertise, and best practices, enhancing research capacity and innovation.

2. **Leverage Local Expertise and Knowledge**
   Utilise local knowledge and cultural insights to develop context-specific solutions that address regional challenges effectively.

3. **Enhance Infrastructure and Resources**
   Invest in research infrastructure, such as climate chambers and laboratories, to support cutting-edge research and attract global collaborations.

4. **Integrate Research into the Curriculum**
   Embed climate change and health topics into educational curricula to equip future generations with the knowledge and skills needed to address global challenges.

5. **Translate Research into Policy and Practice**
   Bridge the gap between research findings and policy implementation by engaging stakeholders and developing actionable evidence that drive real-world impact.

Session

- Moderator: Ms Shabana Begum, *Correspondent, The Straits Times*
- Prof Yodi Mahendradhata, *Dean for Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada*
- Asst Prof Juthamard Surapongchai, *Assistant Professor, Faculty of Physical Therapy, Mahidol University, Thailand*
- Prof Ollie Jay, *Professor of Heat and Health, University of Sydney*

6 Other Forum Activities

6.1 Earth Journalism Network (EJN) Fellowship

The Forum provided an excellent opportunity to partner with Internews' Earth Journalism Network (EJN) to host a heat-health reporting fellowship program for Southeast Asian journalists. The fellowship aimed to build the capacity of journalists to report on the urgent priorities relating to heat and heath within the region, and to increase the knowledge and understanding of the latest research, strategies, policy levers, and technologies needed to enhance preparedness and build heat health resilience in Southeast Asia.

A total of seven EJN fellows attended the Forum, covering countries from across the Southeast Asia region. With support of onsite mentors Ms Paritta Wangkiat and Dr Jayalakshmi Shreedhar from Internews, the fellows took part in a virtual pre-conference workshop and in-person orientation, participated in daily briefings, and interviewed high-level experts and policymakers at the conference. Subsequently, the fellows produced 12 stories in text-based, TV news or multimedia formats in their local languages or English. The stories encompassed a range of topics, including the impact of urban heat on workers in Indonesia and Vietnam, how heat affects agriculture and public health in Laos, the intersection of electricity shortages and heat in Myanmar, and solutions to reduce heat risk in Thailand.

> "The Heat Health Forum increased my knowledge about the impact of heat in Southeast Asia, especially in Indonesia, a country on the equator. This is a serious concern because people are in dangerous conditions and [the threat] needs proper and early handling. I started to understand the connection between the climate crisis and heat, how heat affects vulnerable groups, and what kind of early warning system can be used. Every country and region has shared but also some unique concerns."
>
> Glenys Octania, a fellow and a journalist from Kompas TV, Indonesia.

6.1 Earth Journalism Network (EJN) Fellowship

As a final activity to wrap up the fellowship, a virtual roundtable was held on 10 March 2025 to bring together the fellows, mentors and related Forum delegates to share on-the-ground experiences and insights. The interactive discussion focused on main takeaways from the Forum, challenges in heat reporting, and explored the information gaps and pathways for journalists and stakeholders to work together. The conversations highlighted data accessibility, public awareness, political dynamics, and effective communication of complex heat-health concepts and their impacts in different geographical contexts as key obstacles journalists encountered.

Several recommendations were discussed for improving media coverage of heat and health issues, including increased communication of research to journalists using accessible and relatable formats with concrete examples, proactive reporting about mitigative measures ahead of the hot season, and solutions-based journalism in addition to reporting on the negative impacts of extreme heat.

EJN Fellows and their stories produced from the Forum:
(in alphabetical order)

- Glenys Octania, Indonesia (Kompas TV)
  - Forum Heat Health Asia Tenggara Bahas Ini
  - Forum GHHIN di Singapura: Ungkap Tantangan & Strategi Atasi Risiko Panas Ekstrem
  - GHHIN 2025 Digelar di Singapura
  - 2024 Jadi Tahun Terpanas, Seberapa Siap Pemerintah Indonesia Hadapi Cuaca Ekstrem?
- Kheuakham Chanlivong, Laos (The Laotian Times)
  - Climate crisis in Laos: Heatwaves threaten agriculture and public health
- Kieu Mai, Vietnam (The Leader Magazine)
  - Lao động ngoài trời gánh chịu biến đổi khí hậu
  - English version: Lives under the scorching sun: Outdoor workers racing against climate change
- Krixia Subingsubing, The Philippines (The Inquirer)
  - It's time to take the heat seriously, experts warn
- Meng Seavmey, Cambodia (Cambodianess)
  - Heat is more than just discomfort: Experts
- Nyein Nyein, Myanmar (The Irrawaddy)
  - Life without power spells daily misery for Yangon's residents
- Supachat Lebnak, Thailand (The Momentum)
  - ดร.เจสัน ลี ผู้เชี่ยวชาญเรื่องสุขภาพกับความร้อน พาไปรู้จักสิ่งที่เรียกว่า Heat Health และผลกระทบกับสุขภาพมนุษย์ (On TikTok & Instagram)
  - Heat Health กับ ผศ.ดร.จุฑามาศ สุระพงษ์ชัย คณะกายภาพบำบัด มหาวิทยาลัยมหิดล (On TikTok & Instagram)

Find all their stories & other news articles in the "In the News' section

6.2 IFRC Side Event: "Beat the Heat: Building Heat Resilience through Innovations & Community Engagement"

The International Federation of Red Cross and Red Crescent Societies (IFRC) held a side event featuring recent initiatives to enhance heat resilience through community engagement and innovative solutions. The discussion highlighted the challenges and strategies in addressing heat impacts across diverse regions, emphasising the importance of collaboration and leveraging local knowledge. Key activities featured included heat perception studies to gather data and inform Early Action Protocols and heat action plans in Myanmar and Indonesia, programmes to replace older electrical appliances and install fans for high-risk populations living in subdivided units in Hong Kong, and efforts to integrate heat health resilience with existing first aid training in Singapore. Innovative solutions, such as a universal First Aid App with heat notifications, have been developed to provide critical information. Awareness campaigns and educational initiatives, including via social media and mobile applications, have been launched to promote behavioural change and increase public knowledge about heat risks. Collaborations with academic institutions and government agencies have been used to access real-time data and apply scientific insights to practical solutions. It was reiterated that expanding these partnerships and increasing the ownership of local governments will be essential to comprehensively addressing heat risks and improving community resilience in the long term.

Session

- Moderator: Ms Afrhill Rances, *Manager, Communications, IFRC Asia Pacific Regional Office*
- Ms Moe Thida Win, *Director, Disaster Management, Myanmar Red Cross Society*
- Mr Ramiz Khan, *Urban Advisor, Red Cross Red Crescent Climate Centre*
- Mr Ridwan Sobri, *Director, Disaster Management, Palang Merah Indonesia (Indonesian Red Cross Society)*
- Ms Eva Yeung, *Senior Manager, Community Resilience, Hong Kong Red Cross, Branch of Red Cross Society of China*
- Ms Mercedes Aguerre, *In-charge of Asia Pacific Region and DRR, IFRC Global First Aid Reference Centre, French Red Cross*
- Mr Sahari Ani, *Group Director and Dean of the Singapore Red Cross Academy*
- Ms Criselda Longga, *Manager, Disaster Management, Philippines Red Cross*

6.3 External Site Visits

The afternoon of the third day of the Forum saw delegates participating in one of four site visits across the city to experience heat-health related services and solutions in Singapore.

Meteorological Service Singapore Central Forecast Office @ Changi Airport Terminal 2

Delegates observed Singapore's weather and climate services in action on a visit to the Central Forecast Office @ Changi Airport Terminal 2. The Meteorological Service Singapore (MSS) is Singapore's national authority on the weather and climate, and an operational pillar under the National Environment Agency (NEA). The mission of MSS is to observe and understand the weather and climate affecting Singapore and to provide services in support of national needs and international co-operation. This site visit shed light on the diverse range of services MSS provides, ranging from public weather updates to specialised information for research and aviation. MSS shared insights into the numerous weather stations and the intricate operations required to tailor weather services to meet various needs. Additionally, the delegates witnessed firsthand the meticulous work of MSS meteorologists, who tirelessly deliver precise weather forecasts and warnings around the clock, as well as the array of equipment and instruments utilised. Overall, the visit provided delegates with a comprehensive understanding of MSS's critical role in weather and climate research and operations.

CapitaSpring

Delegates experienced a green integrated development in the heart of the city at CapitaSpring and explored CapitaLand's sustainable design and construction practices. They learned about the on-site garden, where plants were used by the building's restaurants for their dishes. The building was also designed to maximise natural light in the building, and seamlessly integrated nature throughout. Additionally, the integrated development incorporated bicycle lots and showers to encourage office workers to cycle to work. The guided experience provided an eye-opening view of CapitaLand's green technologies, architectural innovations, and community-focused initiatives, as the integrated development offers space to work, live, and play in a vertically connected environment.

Punggol Digital District

Delegates learned about neighbourhood-wide sustainability and cooling measures at the Punggol Digital District (PDD), an envisioned smart and sustainable business park integrating industry, education, and community spaces. The integration of the new campus of the Singapore Institute of Technology (SIT) facilitates seamless collaboration between students, faculty, and industry professionals. PDD employs large-scale sustainable practices in energy and water efficiency, material and waste management, environmental planning, low-energy buildings, and transport. Smart technologies, such as facial recognition and autonomous delivery robots, are integrated throughout the district to enhance efficiency and the overall user experience. With integrated passive design strategies alongside advanced mechanical and electrical systems, the district aims to achieve 35% reduction in operational carbon emissions yearly, equivalent to taking 4,000 cars off the road.

The district cooling system (DCS) at PDD spans a 4km underground pipe network and is expected to reduce CO_2 emissions by 3,700 tons per year while achieving up to a 30% reduction in energy consumption compared to standard commercial buildings. The incorporation of green spaces contributes to improved air quality and offers natural cooling effects, reducing reliance on artificial climate control systems. By integrating a district cooling system, passive design strategies, and green spaces, the district minimises urban heat buildup while enhancing energy efficiency, setting a benchmark for climate-resilient urban developments in line with Singapore's sustainability vision.

Local Community Visit with Singapore Red Cross

Delegates engaged with the local elderly community living in the heat through a multi-stop visit organised by the Singapore Red Cross (SRC). Delegates first interacted with elderly beneficiaries at a community centre under the ElderAid programme, a social and wellness initiative that keeps seniors mentally and socially active through the support of community befrienders. An educational session and interactive quiz to raise awareness on heat was conducted in Chinese, English, and Malay, ensuring inclusivity and accessibility. By bridging the gap between isolated seniors and the wider community, SRC not only provides companionship and support but also equips seniors with the knowledge and resources to cope with excessive heat.

Delegates also learned about the Home Monitoring and Eldercare (HoME+) system, a 24-hour, non-invasive monitoring solution that enhances the safety of seniors seeking an alternative to assisted living. The system detects inactivity or panic button activations, triggering immediate alerts to a 24-hour call centre, where community responders are mobilised to provide assistance. Accompanied by SRC volunteers, delegates visited the homes of elderly HoME+ beneficiaries to gain firsthand insight into the system's installation, functionality, and the lived experiences of Singaporean seniors living alone.

6.4 Commitment Wall

Over the course of the four-day programme, delegates shared their commitment to action on heat-health through penning ad posting their suggestions and pledges on the Commitment Wall. There was an emphasis on adopting more sustainable cooling practices and developing healthy habits to build heat resilience. Proposals for proactive heat management mechanisms and evidence-based community-oriented policy development were also among the highlights.

Cooling Practices Count: 12	**Healthy Habits** Count: 11	**Climate mitigation & Climate-friendly practices** Count: 10
Proactive Adaptation Count: 7	**Heat Acclimatisation** Count: 5	**Public Awareness** Count: 5
Proactive Heat Management Mechanisms & Policies Count: 4	**Advocate for the Vulnerable** Count: 3	**Evidence-Based Community-Oriented Policy Development** Count: 3
Increased Knowledge Development Count: 2	**Research** Count: 2	**64** COMMITMENTS FOR ACTION

7 Key Outcomes & Messages

The following paragraphs summarise the key outcomes across the range of presentations, discussions and conversations made during the Forum.

CONSENSUS ON SOUTHEAST ASIA'S HEAT CHALLENGE

Overall, the Forum discussed the complexity of heat as a cross-cutting issue and recognised that the lack of prioritisation of extreme heat was a significant concern. Heat, with its intangible yet pervasive impacts, is frequently sidelined by governments due to preoccupation with and need to address competing priorities. This oversight is further entrenched by the scarcity of historical data and insufficient regional research, rendering the full extent of heat risks inadequately understood. Despite these challenges, more stakeholders are realising the realities of heat and the additional challenge of its chronic nature in the region, as a rising challenge, increasingly manifesting in cities, workplaces, and communities. Its repercussions are far-reaching, undermining physical, mental, and social health, and impacting productivity and more. Particularly vulnerable segments of the population such as the elderly, low-income families, migrant and informal workers, women, children, those with disabilities, and individuals with pre-existing conditions are already facing the brunt of extreme heat disproportionately. These impacts necessitate urgent and comprehensive understanding and enhanced monitoring to illuminate the breadth of the region's challenges.

ACTION STRATEGY: ALIGNING INTERESTS ACROSS SECTORS

The need for a cohesive and comprehensive approach involving regional cooperation, inter-disciplinary collaboration, and knowledge sharing to craft effective heat health strategies and bolster heat resilience was clearly articulated as a key and primary piece to move the agenda on heat in the region. Specific action items were identified as follows:

1. **Build Regional Cooperation and Interdisciplinary Collaboration**
   Collaborative efforts and partnerships are crucial in addressing the heat challenges in Southeast Asia, as heat impacts cur across multiple sectors, demanding more interministerial government engagement and sustained multisectoral collaboration.

2. **Emphasise Localised Research and Interventions**
   Actionable research outputs and participatory research processes are needed to support tailored community interventions and policy development, especially for vulnerable populations.

3. **Increase Knowledge Sharing and Community Engagement**
   Interdisciplinary scientific exchange and dissemination is vital for capacity building and for enhancing community engagement and awareness on heat-health.

4. **Foster Heat-Health Champions**
   Identifying champions within ministries, academia, and non-governmental organisations can propel the heat and health agendas and actions forward.

5. **Integrate Heat into Broader Frameworks**
   Heat-related considerations must be woven into national strategies, disaster frameworks, and broader climate-resilient development goals to address competing priorities effectively.

ACTION STRATEGY: REGIONAL PRIORITY AREAS

The key areas for the region to prioritise and focus on were identified, with consensus established that a multidisciplinary approach would be critical in pushing forth action:

Urban Heat
Increase localised understanding of heat risks and develop context-specific solutions that provide long-term benefits across multiple sectors, such as climate-sensitive urban design and building regulations

Heat at Work
Enhance stakeholder understanding through improved data collection of heat-related illnesses and injuries and economic case studies to establish heat stress management standards and strengthen legal frameworks protecting vulnerable workers.

Community, Traditional & Cultural Perspectives
Integrate traditional, historical, and cultural knowledge into modern urban planning and heat resilience strategy establishment, developing culturally sensitive and relevant heat resilience initiatives through active community engagement and participatory approaches.

Women & Children
Create inclusive heat adaptation strategies that integrate gender and child-focused perspectives, prioritising gender-disaggregated data collection, and empower women and children to advocate for themselves.

Older adults & Chronic Conditions
Develop evidence-based heat management guidelines, community-level adaptation measures, and digital healthcare solutions for older adults and other high-risk individuals, while strengthening awareness among healthcare providers.

Mental Health
Foster interdisciplinary research on the climate-mental health nexus, prioritising interventions for at-risk groups and integrated policy and education strategies, further utilising behavioural science to motivate climate action.

ACTION STRATEGY: REGIONAL PRIORITY AREAS (Continued)

Early Warning Systems & Heat Governance
Facilitate the development of standardised metrics and methodologies for measuring heat, develop comprehensive cross-sectoral heat management frameworks, and advocate for the legal recognition of heat as a disaster.

Health Systems
Strengthen inter-ministerial coordination, cross-sectoral data sharing, and healthcare training on heat & health to facilitate cohesive locally relevant policy development and epidemiological assessments addressing the acute and chronic impacts of heat, while leveraging AI and digital tools for timely heat risk management.

Communications & Media
Develop comprehensive communications strategies with tailored messages to vulnerable populations, utilising digital platforms and promoting community engagement and media-research partnerships.

Disaster Management
Build evidence-based narratives of heat impact to integrate heat risk into multi-hazard frameworks and broader climate agendas, developing the impetus for systematic transformative adaptation and proactive heat resilience solutions.

Regional Research
Invest in interdisciplinary collaboration, knowledge sharing, research infrastructure, and local expertise to generate actionable evidence that drive real-world impact and equips future generations.

8 Conclusions & Call to Action

This First GHHIN Southeast Asia Heat Health Forum underscored the complexity of extreme heat as a cross-cutting issue with significant yet often overlooked impacts on physical, mental, and social health, as well as productivity in Southeast Asia. The Forum illuminated how the prioritisation of extreme heat is currently hindered by competing governmental priorities, a dearth of historical data, and insufficient regional research. Despite these challenges, there was a strong consensus on the urgent need to address the disproportionate impacts faced by vulnerable groups, including the elderly, low-income families, and migrant workers, through comprehensive understanding and proactive measures.

Delegates at the Forum advocated for a multidisciplinary approach and regional collaboration to foster cohesive action, emphasising the importance of knowledge sharing, localised research, and targeted interventions to develop effective heat-health strategies and enhance resilience. Key regional priorities identified include addressing urban heat, managing heat in workplaces, integrating traditional and cultural perspectives, and developing inclusive heat governance frameworks. Additionally, effective communication strategies and evidence-based narratives are crucial for incorporating heat risks into broader national, climate, and disaster agendas.

The GHHIN Southeast Asia Hub, which was launched at the Forum, will take forward the mission to advance partnership, collaboration, and advocacy within Southeast Asia to protect and prepare for the impacts of heat on human health and well-being.

8 Conclusions & Call to Action

The Forum calls upon all stakeholders to engage actively in this initiative, leveraging on collective expertise to protect and prepare the region for the growing impacts of extreme heat. Regional leaders, policymakers, researchers, and community organizations are urged to adopt a multidisciplinary approach to develop localized research, targeted interventions, and inclusive heat governance frameworks that integrate traditional knowledge and gender-focused perspectives. There was a call for continued engagement through platforms like LinkedIn and future events, emphasizing the need for ongoing dialogue and partnership to sustain momentum. The Forum concluded with acknowledgments to all partners, organisers, exhibitors, and delegates for their contributions and engaging discussions, alongside a call to continue learning, innovating, and engaging as part of a larger regional and global community.

Annexes

A1. List of Poster Presentations

- Effect modification of particulate matter air pollution on heat-related mortality in five provinces of Thailand: a two-stage time-series study - *Assoc Prof Yoonhee Kim, University of Tokyo, Japan*
- Intersectional vulnerabilities and strategies to address climate-related occupational health and safety risks in Tanzanian seaweed workers - *Dr Dorothy Ngajilo, University of Cape Town, South Africa*
- Assessing a decision-support tool for urban heat mitigation in Southeast Asia - *Dr Emma Ramsay, Nanyang Technological University, Singapore*
- Weather-connected tolerance as a heat management strategy in Singapore - *Dr Joshua Dao-Wei Sim, National University of Singapore*
- Outdoor Heat Perception and Adaptive Behaviours in Semi-Urban Communities: Insights from a Longitudinal Study in Malaysia - *Dr Min Thu, South East Asia Community Observatory (SEACO)*
- Investigation of Heat-stroke Deaths at a Mass Gathering Event, District A, India, April 2023 - *Dr Nivethitha N Krishnan, National Centre for Disease Control, Delhi, India*
- From Policy to Practice: India's Heat-Health Response Journey under National Programme on Climate Change and Human Health - *Dr Purvi Patel, National Centre for Disease Control, Delhi, India*
- The Paradox of Aircon Reliance in The Urban Tropics - *Dr Sarah Chan, Singapore University of Technology and Design*
- Impact of heatwave timing on dengue fever infection in four South and Southeast Asian countries: A modelling study - *Dr Yawen Wang, The University of Hong Kong*
- Urban Heat and Health Vulnerabilities in Mumbai - *Mr Rakesh Ravikumar, Tarutium Global Consulting*
- High levels of heat stress will become the norm in Southeast Asia - *Ms Sonali Manimaran, Nanyang Technological University, Singapore*
- Building Resilience: Occupational Health for Agricultural Workers in a Changing Climate - *Prof Efi Yuliati Yovi, IPB University, Bandung, Indonesia*
- Mitigating Urban Heat and Its Health Impacts through Green Space: Insights from Vietnam - *Dr Tran Ngoc Dang & Mr Nguyen Thien Minh, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam*

Find all poster presentations
in the 'E-Posters' section

A2. Forum Programme

Day 1 – Urgency Day (Tuesday, 7 January 2025)	
Time	Activity
8:00 - 8:30	Registration
8:30 - 9:30	Opening & Launch Ceremony **Welcome Video** by Ms. Ko Barrett, WMO Deputy Secretary-General, World Meteorological Organization **Welcome Address** by Professor Chong Yap Seng, Dean, NUS Yong Loo Lin School of Medicine **Opening Address** by Guest-of-Honour Dr Koh Poh Koon, Senior Minister of State, Ministry of Sustainability and the Environment & Ministry of Manpower Launch of the Global Heat Health Information Network Southeast Asia Hub
9:30 - 10:00	Morning Tea (Exhibition & Poster viewing)
10:00 - 10:15	Emcee Welcome
10:15 - 11:00	**Insights** The Global Heat Health Information Network's Journey & Future Vision • Dr Joy Shumake-Guillemot, Co-founder and Co-Chair of Global Heat Health Information Network; and Lead of WHO - WMO Joint Office for Climate & Health • Assoc Prof Jason Lee, Chair of GHHIN Southeast Asia Hub; and Director of Heat Resilience & Performance Centre, Yong Loo Lin School of Medicine, NUS

Day 1 – Urgency Day (Tuesday, 7 January 2025)	
Time	Activity
11:00 - 12:00	**Expert Roundtable** Policy & Action: The Need for Heat Policy and Action at the Regional, National, and Local Levels (Moderator: Dr Joel Aik, Environmental Epidemiologist) • Ms Koh Li-Na, Assistant Chief Executive / Director-General of Meteorological Services, National Environment Agency, Singapore • Mr Ridwan Sobri, Director, Disaster Management, Palang Merah Indonesia (Indonesian Red Cross Society) • Dr Eduardo P. Banzon, Director, Health Practice Team, Human and Social Development Sector Office, Asian Development Bank
12:00 - 12:15	Community Voices • Ms Ishma F. Soepriadi, Country Design, Monitoring, Evaluation, Research, and Learning (DMERL) Lead, American Red Cross - Indonesia Delegation
12:15 - 13:30	Lunch Break (Exhibition & Poster Viewing)
13:30 - 14:30	**Keynote** The Urban Heat Challenge: Innovations, Strategies, and Resilience for Sustainable Cities • Prof Winston Chow, Prof of Urban Climate of Singapore Management University (SMU); and Co-Chair of Intergovernmental Panel on Climate Change (IPCC)
14:30 - 15:00	**Insights** Future Climate Change Projections for Southeast Asia • Dr Aurel Moise, Head of Department, Centre for Climate Research Singapore

Day 1 – Urgency Day (Tuesday, 7 January 2025)	
Time	Activity
15:00 - 16:00	Afternoon Tea (Exhibition & Poster Viewing)
16:00 - 17:30	**Panel Presentation** Urban Heat: Addressing Vulnerabilities & Enhancing Adaptation (Moderator: Asst Prof Nicholas Ravanelli, Assistant Professor, Heat Resilience & Performance Centre, National University of Singapore (NUS)) • Beating the Heat: Reducing Health-inequalities under Climate Change in Hong Kong - Assoc Prof Ren Chao, Associate Professor, Faculty of Architecture, University of Hong Kong (HKU) • Urban Heat: Vulnerable Communities and Service Adaptation - Mr Benjamin William, Secretary General, Singapore Red Cross • Shaping a Heat-Resilient City - Mr Chiu Wen Tung, Group Director (Research & Development), Urban Redevelopment Authority (URA) • Cooling people with air movement - Prof Stefano Schiavon, Professor, Architecture and Civil and Environmental Engineering, University of California, Berkeley
17:30	End of Day
18:00	Welcome Reception for VIPs & Speakers

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
8:30 - 9:00	Registration
9:00 – 9:45	**Keynote** Heat at work: Navigating Occupational Heat Stress • Dr Ken C. Shawa, Senior Economist & Head of Regional and Economic Analysis Unit (RESA), Regional Office for Asia and the Pacific, International Labour Organization (ILO)
9:45 - 10:30	**Expert Roundtable** Regional Insights and Action to address Occupational Heat Stress (Moderator: Dr Yuka Ujita, Senior Occupational Safety and Health Specialist, ILO Decent Work Technical Support Team for East and South-East Asia and the Pacific, International Labour Organization (ILO)) • Mr Silas SNG Wee Kiat, Divisional Director of Occupational Safety & Health Division of Ministry of Manpower; and Chair of ASEAN-OSHNET (ASEAN Occupational Safety and Health Network) • Dr Jeffrin Yusof, Acting Associate Specialist for Occupational Health Division and Head of Environmental Health Division, Ministry of Health, Brunei Darussalam • Dr Darryl Lucian S. Bautista, Supervising Occupational Health Officer of the Occupational Safety and Health Center, Department of Labor and Employment, Philippines • COL Mohamed Feroz, Head of Army Safety Inspectorate, Ministry of Defence, Singapore • Dr Dorothy Ngajilo, Occupational Health Specialist, Occupational and Workplace Health, Environment, Climate Change and Health Department, Division of Healthier Populations, World Health Organization
10:30 - 11:00	Morning Tea (Exhibition & Poster Viewing)

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
11:00 - 12:45	**Panel Presentation** Heat at work: Exertional Heat Stress, Productivity & Performance (Moderator: Dr Jean Liu, Director of Centre for Evidence and Implementation; and Adj Assistant Professor of NUS Yong Loo Lin School of Medicine) • Heat Stress Management in Sports - Ms Delphine Fong, Division Head, Sport Safety, Sport Singapore • Novel practical body cooling techniques and wearable measurements for core temperature in occupational heat exposure - Dr Ken Tokizawa, Senior Researcher, National Institute of Occupational Safety and Health, Japan (JNIOSH) • Economic impacts of climate change- related health risks - Prof Cai Wenjia, Professor, Department of Earth System Science, Tsinghua University • Considerations for developing a national Occupational Heat Exposure Standard and Guideline for implementation - Dr Thomas Gassert, Instructor in Occupational & Environmental Medicine, Environmental Health, Harvard T.H. Chan School of Public Health • The health impacts of climate change on informal outdoor workers in urban Vietnam - Dr Anh Ngoc Vu, Research Director, Climate Change Lead, Project Lead £1.3million Wellcome Trust funded project 'The health impacts of climate change on precarious outdoor workers in megacities in Vietnam', National Centre for Social Research (United Kingdom)
12:45 - 13:30	Lunch Break (Exhibition & Poster Viewing)

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
13:30 - 15:00	**Parallel Session 1** People, Health, & Livelihoods 1A: Women & Children (Moderator: Dr Jiaxi Yang, Senior Research Fellow, Global Centre for Asian Women's Health, National University of Singapore (NUS)) • BEAT the heat for children: An Overview and Recommendations - Dr Mrunal Shetye, Chief of Health, UNICEF Indonesia • How high heat impacts childhood physical activity, fitness, literacy, and its lifelong health implications - Dr Shawnda Morrison, Senior Research Fellow, Human Potential Translational Research Programme, National University of Singapore (NUS) • #BeatTheHeat: RCRC Youth-led Climate Solutions - Ms Michelle Shi Jie Chew, Chairperson of IFRC Youth Commission, Malaysian Red Crescent Society; IFRC Global Youth Commission 1B: Older adults, Chronic Conditions, & Disabilities (Moderator: Assoc Prof Reshma Aziz Merchant, Head and Senior Consultant, Division of Geriatric Medicine, National University Hospital, Singapore) • A Hot Topic: Medication-Induced Risks for Older Adults in the Heat - Mr Jericho Wee, PhD Candidate, Human Potential Translational Research Programme, National University of Singapore (NUS) • Higher heat impact on people with disabilities in South Korea: How to make policy more inclusive? - Ms. Jinah Park, PhD Student, Public Health Sciences, Seoul National University • The development and pilot testing of an individualised heat early warning system in Queensland, Australia - Dr Zhiwei Xu, Research Fellow, School of Medicine and Dentistry, Griffith University

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
13:30 - 15:00	1C: Mental health, Decision-making, & Learning (Moderator: Assoc Prof SUBRAMANIAM Mythily, Assistant Chairman Medical Board (Research) and Lead Investigator of the Programme of Mental Health Policy Studies, Institute of Mental Health (IMH)) • Connecting Climate Minds: Protecting Mental Health in an Era of a Warming Planet - Assoc Prof Renzo Guinto, Committee on Environmental Health and Ecology, Philippine Medical Association; Member, National Panel of Technical Experts, • Climate Change Commission, Philippines Climate anxiety, ecological grief, and the increasing incidence of mental health conditions: How are we prepared to respond to the climate related mental health and psychosocial impact? - Dr Eliza Yee Lai CHEUNG, Lead, Asia Pacific MHPSS Collaborative, IFRC Asia Pacific Regional Office • Climate in Mind: Navigating the Psychological Impact of a Changing Environment - Dr Cyrus Ho Su Hui, Assistant Professor and Senior Consultant Psychiatrist, Department of Psychological Medicine, National University of Singapore (NUS)
15:00 - 16:00	Afternoon Tea (Exhibition & Poster Viewing)

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
16:00 - 17:30	**Parallel Session 2** Challenges & Strategies for Heat Resilience 2A. Heat-resilient Cities & Indoor Environments (Moderator: Assoc Prof Ren Chao, Associate Professor, Faculty of Architecture, University of Hong Kong (HKU)) • Climate Modelling and Analytics for Urban Heat Risks Mitigation and Adaptation – Assoc Prof Yuan Chao, Associate Professor, NUS Cities, National University of Singapore (NUS) • Unlocking the Potential of Private Sector Innovation in Microclimate Monitoring - Mr Joseph Deng, Head of Business Development, APAQ Group • Design Guidelines for Healthy and Climate Resilient Affordable Housing - Mr Ashok B Lall, Principal of Ashok B Lall Architects; and Network Changemaker of Global Buildings Performance Network (GBPN) • Learning the ins and outs of heat stress: The Resilience 4 Communities program in Melaka, Malaysia - Asst Prof Perrine Hamel, Assistant Professor, Asian School of the Environment, Nanyang Technological University (NTU) 2B. Heat-responsive Health Services & Surveillance System (Moderator: Asst Prof AW Su, Assistant Professor, Saw Swee Hock School of Public Health, National University of Singapore (NUS)) • Heat, Health, and Health Systems - Ms Sally Edwards, Coordinator, Health and the Environment (HAE), Division of Healthy Environments and Populations, WHO-Western Pacific Region (WPRO) • Heat Exposure and Human Health in Vietnam: Impacts, Vulnerabilities, Challenges, and Heat-Responsive Health Strategies - Dr Tran Nu Quy Linh, Senior Research Officer, School of Public Health, University of Queensland, Australia

Day 2 – Impacts & Solutions Day (Wednesday, 8 January 2025)	
Time	Activity
16:00 - 17:30	• Heat surveillance and warning system in Korea: An Overview of Strategy and Implementation - Prof Ho Kim, Professor, Public Health Sciences, Seoul National University 2C. Risk Communications & Media (Moderator: Ms Audrey Tan, Assistant News Editor, The Straits Times) • Communicating the causes and risks of global heating: What is the role of the media? - Ms Amy Sim, Regional Program Manager for Asia-Pacific (Environment), Internews' Earth Journalism Network • From Urban Heat to Climate Solutions: Engaging Citizens for Change - Dr Samuel Chng, Research Assistant Professor, Urban Psychology Lab, Lee Kuan Yew Centre for Innovative Cities, Singapore University of Technology and Design (SUTD) • What lies behind public perceptions of risk and why do their perceptions matter? - Dr Olivia Jensen, Deputy Director and Lead Scientist (Environment and Climate), Lloyd's Register Foundation Institute for the Public Understanding of Risk, National University of Singapore (NUS)
17:30	End of Day
18:30	Forum Dinner

Day 3 – Strategy Day (Thursday, 9 January 2025)	
Time	Activity
8:30 - 9:00	Registration
9:00 - 9:15	Community Voices Dr Jaya Shreedhar, Senior Health Media Advisor, Internews Ms Paritta Wangkiat, Mekong Program Officer, Internews' Earth Journalism Network
9:15 - 10:00	Keynote Extreme Heat Services & Early Warning Systems Dr John Nairn, Senior Advisor Extreme Heat (retired), World Meteorological Organization
10:00 - 10:30	Insights Early Warning: Climate Knowledge and Services for Early Action Dr Rupa Kumar Kolli, Honorary Scientist, International Monsoons Project Office (IMPO), Indian Institute of Tropical Meteorology (IITM)
10:30 - 11:00	Morning Tea (Exhibition & Poster Viewing)
11:00 - 12:30	**Panel Presentation** What does Heat Governance & Heat Action Plans look like for our region (Moderator: Dr Jochen Luther, Technical Coordinator (Services), WMO Regional Office for Asia and the South-West Pacific) • Heat Planning and Resilience in the US - The National Integrated Heat Health Information System (NIHHIS): A Coordinated Federal Initiative to Prepare the Nation for Extreme Heat - Ms Juli Trtanj, Climate and Health Program Director and One Health Lead, US National Oceanic and Atmospheric Administration (NOAA) • Heat Risk Assessment and the Process of Developing the Simplified Early Action Protocol for Heatwaves in Myanmar - Ms Moe Thida Win, Director, Disaster Management, Myanmar Red Cross Society

Day 3 – Strategy Day (Thursday, 9 January 2025)	
Time	Activity
11:00 - 12:30	• Heat Action Plans and Heat Governance in India - Mr Abhiyant Tiwari, Lead - Climate Resilience and Health, India Program, Natural Resources Defense Council (NRDC)
12:30 - 13:30	**Lunch & IFRC Side Event** Beat the Heat: Building Heat Resilience through Innovations and Community Engagement
13:30 - 15:00	**Site Visits / Meetings** • Meteorological Service Singapore Central Forecast Office @ Changi Airport Terminal 2: Observe Singapore's weather and climate services in action organised by Forecast Operations Department@ NEA • CapitaSpring: Experience a green integrated development in the heart of the city organised by CapitaLand • Punggol Digital District: Learn about neighbourhood-wide implementations of sustainability and cooling measures organised by JTC • Local Community Visit: Explore and interact with the local community living in the heat organised by Singapore Red Cross
15:00 - 16:00	Afternoon Tea (Exhibition & Poster Viewing)
16:00 - 17:30	(continuation) Site Visits / Meetings
17:30	**End of Day**

Day 4 – Action Day (Friday, 10 January 2025)	
Time	Activity
8:30 - 9:00	Registration & Morning Tea
9:00 - 9:45	**Keynote** Protecting Communities: Increasing Outreach & Fostering Action for Heat • Dr Gwendolyn Pang, Secretary General, Philippine Red Cross
9:45- 11:15	**Panel Presentation** Heat from a Historical, Traditional, & Cultural Lens (Moderator: Dr Joshua Dao Wei Sim, Senior Research Fellow, Human Potential Translational Research Programme, Yong Loo Lin School of Medicine, National University of Singapore (NUS)) • Heat and Health in Chinese History - Dr Christopher Courtney, Associate Professor (Modern Chinese History), Durham University • Our heaty Earth needs cooling tea - A peek into TCM culture - Physician Brandon Yew, Partner / Senior TCM Physician, Real Health Medical Pte Ltd • Why Heritage Conservation is Considered Green Development - Drawing examples from George Town World Heritage Site - Ms Lim Gaik Siang, Immediate Past President, Penang Heritage Trust
11:15 – 12:15	**Expert Roundtable** Taking a Multi-Hazard Emergency Management Approach to Extreme Heat (Moderator: Ms Eva Yeung, Senior Manager, Community Resilience, Hong Kong Red Cross, Branch of Red Cross Society of China) • Dr Sanjay Srivastava, Chief, Disaster Risk Reduction, ICT and Disaster Risk Reduction Division, United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)

Day 4 – Action Day (Friday, 10 January 2025)	
Time	Activity
11:15 – 12:15	• Dr Luis C. Rodriguez, Thematic Lead, Climate and Resilience; Health, Disasters, Climate and Crises, IFRC Asia Pacific Regional Office • Dr Jimmy Lee, Senior Consultant, Department of Emergency Medicine, Ng Teng Fong General Hospital (NTFGH) • Prof Benjamin Horton, Director of the Earth Observatory of Singapore, Professor at the Asian School of the Environment, Nanyang Technological University (NTU)
12:15 - 13:00	Lunch Break (Exhibition & Poster Viewing)
13:00 – 14:30	**Panel Presentation** Regional Research Showcase: Capacity Building in and for the Region (Moderator: Ms Shabana Begum, Correspondent, The Straits Times) • Institutionalizing climate resilience in higher education institutions - Prof Yodi Mahendradhata, Dean for Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada • Heat health study at Mahidol University, Thailand - Asst Prof Juthamard Surapongchai, Assistant Professor, Faculty of Physical Therapy, Mahidol University • Building resilience to extreme heat and hot weather across the human lifespan - Prof Ollie Jay, Professor of Heat and Health, University of Sydney
14:30 – 15:00	Closing Remarks • Assoc Prof Jason Lee, Chair of GHHIN Southeast Asia Hub; and Director of Heat Resilience & Performance Centre, Yong Loo Lin School of Medicine, NUS
15:00 – 15:30	Afternoon Tea
15:30	End of Day

A3. List of Delegates

INVITED GUESTS

1. BANZON Eduardo P., Asian Development Bank (Philippines)
2. CHIU Wen Tung, Urban Redevelopment Authority (Singapore)
3. CHNG Wee Joo, National University of Singapore (Singapore)
4. CHONG Yap Seng, NUS Yong Loo Lin School of Medicine (Singapore)
5. CHOW Wai Leng, Ministry of Health (Singapore)
6. CULLINGFORD Tim, Wellcome (United Kingdom)
7. HENG Derrick, Ministry of Health (Singapore)
8. KIM Juja, International Federation of Red Cross and Red Crescent Societies (Malaysia)
9. KOH Li-Na, National Environment Agency (Singapore)
10. KOH Lian Pin, National University of Singapore (Singapore)
11. KOLLI Rupa Kumar, Indian Institute of Tropical Meteorology (India)
12. LIM Desmond Rodney, DSO National Laboratories (Singapore)
13. LUI Pao Chuen, National University of Singapore (Singapore)
14. MILLS Lauren, Wellcome (United Kingdom)
15. PANG Lead Shuan, Ministry of Defence (Singapore)
16. PLATZER Barbara, Wellcome (United Kingdom)
17. QUEK Gim Pew, Ministry of Defence (Singapore)
18. SNG Silas Wee Kiat, Ministry of Manpower (Singapore)
19. TAN Zhong Wei Mark, Singapore Armed Forces (Singapore)
20. ZHANG Weijie, Ministry of Sustainability and the Environment (Singapore)

IN-PERSON DELEGATES

21. AGONCILLO Micaela P., Asian Development Bank (Philippines)
22. AGUERRE Mercedes, International Federation of Red Cross and Red Crescent Societies (France)
23. AIK Joel, Environmental Epidemiologist (Singapore)
24. ALHADAD Sharifah Badriyah Binte Syed Abdullah, NUS Yong Loo Lin School of Medicine (Singapore)
25. ANG Wee Hon, NUS Yong Loo Lin School of Medicine (Singapore)
26. ANG Xing Yu, NUS Yong Loo Lin School of Medicine (Singapore)
27. ANI Sahari, Singapore Red Cross (Singapore)
28. ANNAMALAI Visala, Climate Resilience for All (USA)
29. ARDCHAWUTHIKULAWONG Phattaraset, International Labour Organization (Thailand)
30. AW Su, NUS Saw Swee Hock School of Public Health (Singapore)
31. AW Chung Teng, Singapore Armed Forces (Singapore)
32. BAQA Muhammad Fahad, International Research Center of Big Data for Sustainable Development Goals (China)
33. BAUTISTA Darryl Lucian S, Department of Labor and Employment (Philippines)
34. BEGUM Shabana, The Straits Times (Singapore)
35. BHUSAL Sushma, IFRC Asia Pacific Regional Office (Malaysia)
36. BOEY Jit Ming Benjamin, NUS Yong Loo Lin School of Medicine (Singapore)
37. BOHARI Muhammad Nabil Bin, NUS Yong Loo Lin School of Medicine (Singapore)
38. CAI Wenjia, Tsinghua University (China)
39. CHAN Sarah, Lee Kuan Yew Centre for Innovative Cities, SUTD (Singapore)
40. CHAN Charis, Singapore Red Cross (Singapore)
41. CHANLIVONG Kheuakham, The Laotian Times (RDK Group) (Laos)
42. CHEN Tingyu Chloe, NUS Yong Loo Lin School of Medicine (NUS Medicine) (Singapore)

IN-PERSON DELEGATES (Continued)

43. CHEONG Kai Xiong, Singapore Armed Forces (Singapore)
44. CHEUNG Eliza Yee Lai, IFRC Asia Pacific Regional Office (Hong Kong SAR, China)
45. CHEW Michelle Shi Jie, Malaysian Red Crescent Society; IFRC Global Youth Commission (Malaysia)
46. CHHENG Saoleng, International Labour Organization (Cambodia)
47. CHIN Junhan, Ministry of Defence (Singapore)
48. CHNG Samuel, Singapore University of Technology and Design (Singapore)
49. CHNG Luke Cheng Lin, Singapore Armed Forces (Singapore)
50. CHOO Kester, Singapore Sport Institute (Singapore)
51. CHOW Winston, Singapore Management University (Singapore)
52. CHOY Kenneth, Ministry of Manpower (Singapore)
53. CHUA Terence, NUS Yong Loo Lin School of Medicine (Singapore)
54. CHUA Kee Leng, Ministry of Manpower (Singapore)
55. CHUA Audrey, Ministry of Sustainability and the Environment (Singapore)
56. CHUA Cedric, NUS Yong Loo Lin School of Medicine (Singapore)
57. COURTNEY Christopher, Durham University (United Kingdom)
58. DENG Joseph, APAQ Group (Singapore)
59. DU Flora Yuting, Singapore University of Technology and Design (Singapore)
60. DUNGCA Anna, National University of Singapore (Singapore)
61. EDWARDS Sally, WHO-Western Pacific Region (Philippines)
62. EE Loon Shin, Ministry of Manpower (Singapore)
63. FERNANDES Colin, American Red Cross (India)
64. FEROZ Mohamed, Ministry of Defence (Singapore)
65. FONG Delphine, Sport Singapore (Singapore)
66. GAN Benjamin, Ministry of Sustainability and the Environment (Singapore)
67. GOH Joyce Xixin, NUS Yong Loo Lin School of Medicine (Singapore)
68. GOMEZ Faustina, WHO-South East Asia Region (India)
69. GOVINDA KRISHNAN Prahlad, Ministry of Manpower (Singapore)
70. GUINTO Renzo, Committee on Environmental Health and Ecology, Philippine Medical Association; National Panel of Technical Experts, Climate Change Commission (Philippines)
71. GUNTHER Samuel Henry, NUS Yong Loo Lin School of Medicine (Singapore)
72. HAMEL Perrine, Nanyang Technological University (Singapore)
73. HASHIZUME Masahiro, University of Tokyo (Japan)
74. HO Janice Ying-en, NUS Yong Loo Lin School of Medicine (Singapore)
75. HO Cyrus Su Hui, NUS Yong Loo Lin School of Medicine (Singapore)
76. HO Cheng En, Singapore Armed Forces (Singapore)
77. HORTON Benjamin, Nanyang Technological University (Singapore)
78. HOW Rui Yee, NUS Yong Loo Lin School of Medicine (Singapore)
79. HTAY Zin Wai, National Institute for Environmental Studies (Japan)
80 HUANG Yuyin, NUS Yong Loo Lin School of Medicine (Singapore)
81. HUANG Liyan, Sport Singapore (Singapore)
82. IVANOV Ivan D., World Health Organization (Switzerland)
83. JAIN Deepesh, Médecins Sans Frontières Hong Kong (India)
84. JAY Ollie, University of Sydney (Australia)
85. JENSEN Olivia, National University of Singapore (Singapore)
86. KAMPS Shona, WHO-WMO Joint Office for Climate and Health (Switzerland)

IN-PERSON DELEGATES (Continued)

87. KHAN Ramiz, Red Cross Red Crescent Climate Centre (India)
88. KHEPLA Muskaan, SingHealth Duke-NUS Global Health Institute (Singapore)
89. KIM Ho, Seoul National University (South Korea)
90. KIM Yoonhee, The University of Tokyo (Japan)
91. KOH Evelyn, Ministry of Manpower (Singapore)
92. KOH Ruth, NUS Yong Loo Lin School of Medicine (Singapore)
93. KWEK Jun Hao, NUS Yong Loo Lin School of Medicine (Singapore)
94. KYAW Gabriel May Moe, NUS Yong Loo Lin School of Medicine (Singapore)
95. LALL Ashok B., Ashok B Lall Architects; Global Buildings Performance Network (India)
96. LANGKULSEN Uma, Faculty of Public Health, Thammasat University (Thailand)
97. LAU Yue Ting Rachel, NUS Yong Loo Lin School of Medicine (Singapore)
98. LAW Yu Li Lydia, NUS Yong Loo Lin School of Medicine (Singapore)
99. LEBNAK Supachat, The Momentum (Thailand)
100. LEE Jason Kai Wei, NUS Yong Loo Lin School of Medicine (Singapore)
101. LEE Jimmy, Ng Teng Fong General Hospital (Singapore)
102. LEE Heow Yong, Ministry of Manpower (Singapore)
103. LEE Yeung, Urban Institute, Singapore Management University (Singapore)
104. LEE Wei Qiang, Urban Redevelopment Authority (Singapore)
105. LENG Tong, Department of Occupational Safety and Health (Cambodia)
106. LEONG Lucy, Ministry of Manpower (Singapore)
107. LEOW Hong Wei Clarence, NUS Yong Loo Lin School of Medicine (Singapore)
108. LI Yunjing, Lee Kuan Yew Centre for Innovative Cities, SUTD (Singapore)
109. LIM Claudia Chew Har, NUS Yong Loo Lin School of Medicine (Singapore)
110. LIM Gaik Siang, Penang Heritage Trust (Malaysia)
111. LIM Koon Teck, Ministry of Manpower (Singapore)
112. LIMSAKUL Atsamon, Department of Climate Change and Environment (Thailand)
113. LIN Wei, NUS Yong Loo Lin School of Medicine (Singapore)
114. LIN Matthew, NUS Yong Loo Lin School of Medicine (Singapore)
115. LIU Jean, Centre for Evidence and Implementation; NUS Yong Loo Lin School of Medicine (Singapore)
116. LIU Qingyun, NUS Yong Loo Lin School of Medicine (Singapore)
117. LIU Shi, Tsinghua University (China)
118. LOKE Mei Qi Jessica, NUS Yong Loo Lin School of Medicine (Singapore)
119. LONGGA Criselda, Philippine Red Cross (Philippines)
120. LOW Ivan Cherh Chiet, NUS Yong Loo Lin School of Medicine (Singapore)
121. LOW Lin Hui Stesha, NUS Yong Loo Lin School of Medicine (Singapore)
122. LOW Chee Yong, Singapore Sport Institute (Singapore)
123. LUA David, Singapore Armed Forces (Singapore)
124. LUTHER Jochen, WMO Regional Office for Asia and the South-West Pacific (Singapore)
125. MAHMOOD Jemilah, Sunway Centre for Planetary Health (Malaysia)
126. MANI Raagavi, NUS Yong Loo Lin School of Medicine (Singapore)
127. MANIMARAN Sonali, Nanyang Technological University (Singapore)
128. MASALLO Jorybell Anareta, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA-DOST) (Philippines)
129. MENG Seavmey, Cambodianess News (Cambodia)
130. MERCHANT Reshma Aziz, National University Hospital (Singapore)

IN-PERSON DELEGATES (Continued)

131. MICHIKO Naomi, NUS Yong Loo Lin School of Medicine (Singapore)
132. MOISE Aurel, Centre for Climate Research Singapore (Singapore)
133. MORRISON Shawnda, NUS Yong Loo Lin School of Medicine (Singapore)
134. MUNIANDY Christina, C40 Cities (Singapore)
135. NAING Khant Min, Lee Kuan Yew Centre for Innovative Cities, SUTD (Singapore)
136. NAIRN John, World Meteorological Organization (Australia)
137. NAQVI Tanisha, SingHealth Duke-NUS Global Health Institute (Singapore)
138. NASIR Mohamed Corleon Bin Mohamed, NUS Yong Loo Lin School of Medicine (Singapore)
139. NASTITI Anindrya, Institut Teknologi Bandung (Indonesia)
140. NAVANEETHA KRISHNAN Nivethitha, SAFETYNET (India)
141. NG Naomi Estelle, NUS Yong Loo Lin School of Medicine (Singapore)
142. NG Sebestian Pui Kim, Singapore Armed Forces (Singapore)
143. NGAJILO Dorothy, World Health Organization (Tanzania)
144. NGEOW Nicole, Prudence Foundation (Malaysia)
145. NGUYEN THIEN Minh, University of Medicine and Pharmacy at Ho Chi Minh city (Vietnam)
146. NUAL-ON Akarapong, Department of Labour Protection and Welfare (Thailand)
147. NWE Shwe Yee, Department of Meteorology and Hydrology (Myanmar)
148. OCTANIA Glenys, Kompas TV (Indonesia)
149. O'HAGAN Christina, Global Buildings Performance Network (Singapore)
150. ONG Irina Rae, NUS Yong Loo Lin School of Medicine (Singapore)
151. ONG Sandy, Freelance science journalist (Singapore)
152. PAN Yiqi, World Health Organization (Switzerland)
153. PANG Gwendolyn, Philippines Red Cross (Philippines)
154. PARK Jinah, Seoul National University (South Korea)
155. PATEL Purvi, National Centre for Disease Control (India)
156. PRAKAASH Suriya, Singapore Armed Forces (Singapore)
157. QUACH THI KIEU Mai, TheLEADER Magazine (Vietnam)
158. RAMLEE Kornkanok, Faculty of Physical Therapy, Mahidol University (Thailand)
159. RAMSAY Emma, Nanyang Technological University (Singapore)
160. RANCES Afrhill, IFRC Asia Pacific Regional Office (Malaysia)
161. RAVANELLI Nicholas, NUS Yong Loo Lin School of Medicine (Singapore)
162. RAVIKUMAR Rakesh, Tarutium Global Consulting (India)
163. REMUS Alexandria, NUS Yong Loo Lin School of Medicine (Singapore)
164. REN Chao, The University of Hong Kong (Hong Kong SAR, China)
165. RENARD Michèle, King's College London (United Kingdom)
166. RILEY Brian, Asian Development Bank (Philippines)
167. ROBINSON Alex, Rockefeller Foundation (USA)
168. RODRIGUEZ Luis C., IFRC Asia Pacific Regional Office (Malaysia)
169. SAEZ REALE Alejandro, WHO-WMO Joint Office for Climate and Health (Switzerland)
170. SAINIYOM Patarawadee, Mahidol University (Thailand)
171. SAKAMOTO Yu, NUS Yong Loo Lin School of Medicine (Singapore)
172. SALOR Muhammad Rieo Syafi'i bin, Ministry Of Health Brunei Darussalam (Brunei Darussalam)
173. SCHIAVON Stefano, University of California, Berkeley (USA)
174. SHAWA Ken C., International Labour Organization (Thailand)

IN-PERSON DELEGATES (Continued)

175. SHETYE Mrunal, UNICEF Indonesia (Indonesia)
176. SHREEDHAR Jaya, INTERNEWS (India)
177. SHUMAKE-GUILLEMOT Joy, WHO-WMO Joint Office for Climate and Health (Switzerland)
178. SIM Amy, Internews' Earth Journalism Network (Singapore)
179. SIM Joshua Dao Wei, NUS Yong Loo Lin School of Medicine (Singapore)
180. SO Jimmy, Hong Kong Red Cross, Branch of Red Cross Society of China (Hong Kong SAR, China)
181. SOBRI Ridwan, Palang Merah Indonesia (Indonesian Red Cross Society) (Indonesia)
182. SOEPRIADI Ishma, American Red Cross Indonesia Delegation (Indonesia)
183. SOO Sze Mun, Ministry of Manpower (Singapore)
184. SRIVASTAVA Sanjay, United Nations Economic and Social Commission for Asia and the Pacific (Thailand)
185. SUBINGSUBING Krixia Zhienelle, Philippine Daily Inquirer (Philippines)
186. SUBRAMANIAM Mythily, Institute of Mental Health (Singapore)
187. SULTAN Zuraimi, Singapore University of Social Sciences (Singapore)
188. SURAPONGCHAI Juthamard, Mahidol University (Thailand)
189. SWAMINATHAN Veerappan, Sustainable Living Lab (Singapore)
190. TAN Min Sze Pearl, NUS Yong Loo Lin School of Medicine (Singapore)
191. TAN Audrey, The Straits Times (Singapore)
192. TAN Bing Yang, NUS Yong Loo Lin School of Medicine (Singapore)
193. TAN Gerald Zheng Yang, NUS Yong Loo Lin School of Medicine (Singapore)
194. TAN Gerald Yong Qi, NUS Yong Loo Lin School of Medicine (Singapore)
195. TAN Ping Ping, Prudential Assurance Company Singapore (Singapore)
196. TAN Andrew, Singapore Armed Forces (Singapore)
197. TAN Keith, Singapore Armed Forces (Singapore)
198. TAY Ling Li Vanes, NUS Yong Loo Lin School of Medicine (Singapore)
199. TAY Yi Xuan, Lee Kuan Yew Centre for Innovative Cities, SUTD (Singapore)
200. TEO Ya Shi, NUS Yong Loo Lin School of Medicine (Singapore)
201. TEOH Dilys, Urban Redevelopment Authority (Singapore)
202. THU Min, Monash University Malaysia (Malaysia)
203. TIONG Bang Xiang, Ministry of Manpower (Singapore)
204. TIWARI Abhiyant, Natural Resources Defense Council (India)
205. TOKIZAWA Ken, National Institute of Occupational Safety and Health (Japan)
206. TRAN Canh Khanh Trinh, NUS Yong Loo Lin School of Medicine (Singapore)
207. TRAN Nu Quy Linh, University of Queensland (Australia)
208. UJITA Yuka, International Labour Organization (Thailand)
209. ULAGAPAN Arvindh C., Singapore Armed Forces (Singapore)
210. UNTIMANON Orrapan, Division of Occupational and Environmental Diseases (Thailand)
211. VONGCHANH Kinnaleth, Institute of Technology of Cambodia (Cambodia)
212. VU Ngoc Anh, National Centre for Social Research (United Kingdom)
213. WANG Yawen, The University of Hong Kong (Hong Kong SAR, China)
214. WANGKIAT Paritta, Internews' Earth Journalism Network (Thailand)
215. WEE Jericho, NUS Yong Loo Lin School of Medicine (Singapore)

IN-PERSON DELEGATES (Continued)

216. WIDYANTI Ari, Institut Teknologi Bandung (Indonesia)
217. WILLIAM Benjamin, Singapore Red Cross (Singapore)
218. WIN Moe Thida, Myanmar Red Cross Society (Myanmar)
219. XU Zhiwei, Griffith University (Australia)
220. YANG Jiaxi, NUS Yong Loo Lin School of Medicine (Singapore)
221. YAP Ming Cheng, Yale University (Singapore)
222. YEO Sook Yi, Ministry of Sustainability and the Environment (Singapore)
223. YEUNG Eva, Hong Kong Red Cross, Branch of Red Cross Society of China (Hong Kong SAR, China)
224. YEW Brandon, Real Health Medical Pte Ltd (Singapore)
225. YOUTH Sokpheara, Department of Occupational Safety and Health (Cambodia)
226. YOVI Efi Yuliati, IPB University (Indonesia)
227. YUAN Chao, National University of Singapore (Singapore)
228. YUSOF Jeffrin, Ministry of Health (Brunei Darussalam)
229. ZHANG Zhe Xin, NUS Yong Loo Lin School of Medicine (Singapore)
230. ZHANG Xiaohan, NUS Yong Loo Lin School of Medicine (Singapore)
231. ZHENG Yifei, NUS Yong Loo Lin School of Medicine (Singapore)
232. ZHU Hui, Qingdao University of Technology (China)
233. ZIN Ei Shwe, The Irrawaddy (Myanmar)

VIRTUAL DELEGATES

234. AL-AABIDEEN Alaa' Zain, Sunway Centre for Planetary Health (Malaysia)
235. ANDO Tomonori, LOTTE CO.,LTD Research and Development Center (South Korea)
236. BROWN Harry, University of Canberra (Australia)
237. CASSIM Jihada, University of KwaZulu-Natal (South Africa)
238. DAIMI Zeeshan, Sustainable Living Lab (Singapore)
239. DE LEON Irene, International Labour Organization (Philippines)
240. EBI Kristie L, University of Washington (USA)
241. GASSERT Thomas, Harvard T.H. Chan School of Public Health (USA)
242. GHWOIDI Badr, Taif Health Cluster (Saudi Arabia)
243. GLANGKARN Sumattana, Faculty of Public Health, Mahasarakham University (Thailand)
244. GOPAL Kavya, Global Building Performance Network (France)
245. HOSOKAWA Yuri, Waseda University (Japan)
246. JOHAR Hamimatunnisa, Heidelberg Institute of Global Health (Germany)
247. JONES Hunter, US National Oceanic and Atmospheric Administration (USA)
248. JUNAIDI Ahmad Fakhri , Brunei Shell Petroleum Company (Brunei Darussalam)
249. KURTHS Kristina, International Labour Organization (Indonesia)
250. LI Ge, Graduate School of Sport Sciences, Waseda University (Japan)
251. MAHENDRADHATA Yodi, Universitas Gadjah Mada (Indonesia)
252. NDIAYE Ousmane, Agency of Civil Aviation and Meteorology (Senegal)
253. NONSA-ARD Rujira, Mahasarakham University (Thailand)
254. PANDITHA Anjalee, Griffith University (Australia)
255. PAUDEL Sagun, Public Health Initiative (Nepal)
256. RUSTANDIE Januar, International Labour Organization (Indonesia)

VIRTUAL DELEGATES (Continued)

257. SAHA Shubhayu, Centers for Disease Control and Prevention (USA)
258. TAN Gwyneth, Ministry of Health (Singapore)
259. TRTANJ Juli, US National Oceanic and Atmospheric Administration (USA)
260. WANG Qiong, Sun Yat-sen University (China)
261. WEST Maddie, WHO-WMO Joint Office for Climate & Health (Switzerland)
262. YAP Kar Lin, Meteorological Service Singapore (Singapore)
263. YOON Sojung, Red Cross Red Crescent Climate Centre (South Korea)
264. ZHOU Qingliang, National Meteorological Centre, China Meteorological Administration (China)

A4. List of Exhibitors

EXHIBITORS

Asia Pacific Air Quality Group Pte Ltd (APAQ Group)
BeeInventor SG Pte Ltd
BodyCAP
Global Healthcare SG Pte Ltd
International Federation of Red Cross and Red Crescent Societies (IFRC)
Meteorological Service Singapore (MSS)
National University of Singapore Yong Loo Lin School of Medicine

A5. Delegate Feedback Survey

Total Participants in the Feedback Survey: 63
Responses from In-person Delegates: 55 (22% of attendees)
Responses from Virtual Delegates: 8 (26% of attendees)

Delegate Feedback Survey	**Average Score (out of 10)**	
Question	**In Person (n = 55)**	**Virtual (n = 8)**
Quality of Sessions	8.9	9.1
Topics Relevant & Engaging	8.8	8.8
Programme aligned with theme & objectives	8.9	8.8
Feel equipped for heat-health work or action	8.2	8.3
Organisation	9.2	9.1
Event Communication	8.9	8.4
Networking opportunities	8.9	NA
Site Visits	8.7	NA
Overall Satisfaction	9	8.6
Interest in future Forums	9.3	8.8
Recommend Hub to others	9.2	8.9
Quality of Livestreaming	NA	8.6
Total Average Score	**8.91**	**8.74**

GLOBAL HEAT HEALTH
INFORMATION NETWORK

SOUTHEAST ASIA