



# Anticipating Risks and Uncertainties for Asia and the Pacific

A HYBRID HORIZON  
SCANNING REPORT

UNDP RBAP STRATEGIC FORESIGHT NETWORK

2022

This Hybrid Horizon Scanning Report explores risks and uncertainties for Asia and the Pacific as suggested by signals received from UNDP colleagues during the Regional Bureau for Asia and the Pacific (RBAP) Horizon Scanning Exercise 2.0 (May-August 2022).

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## Preface

The Asia-Pacific region is fast growing and fast adapting. The nexus of geopolitical, economic, natural and biological risks has heightened uncertainty across the region. Their intersection with ongoing global volatility, a looming recession and the impacts of climate change continues to intensify these interconnected challenges. New modes of [long-term and cross-disciplinary thinking](#) are required to inform adaptive and anticipatory approaches to policy, programming and governance.

Through the RBAP Regional Horizon Scanning Initiative, the [UNDP RBAP Strategic Foresight Network](#) strives to introduce insights from foresight – rooted in collective intelligence and made relevant through extensive sensemaking – to embed more anticipation into existing decision-making processes.

This bi-annual exercise seeks to continually monitor and analyse development trends, risks and uncertainties within the Asia-Pacific region to produce insights for UNDP Country Offices to consider when designing future-fit policy and programming.

The UNDP Regional Horizon Scanning Initiative 2.0 (HS 2.0) builds from the inaugural edition of the [RBAP Regional Horizon Scanning Initiative \(September-December 2021\)](#) (HS 1.0) by further exploring identified signals and risks, while building on methodological best practices and lessons learned. This includes work to understand the implications of the signals for policy and programming, as well as to strategically analyse weak signals and emerging trends relevant to the region.

This year, to advance ongoing engagement with findings, as well as facilitate ongoing monitoring and integrated sensemaking of challenges and opportunities raised through both Horizon Scanning exercises, their findings and insights are presented in a hybrid, phased and dynamic manner.

## Acknowledgements

The Core Team is incredibly grateful to the RBAP colleagues who have participated in the Horizon Scanning Initiative 2.0.

Through both signal scanning and survey participation, the time dedicated and insights shared by colleagues represent an invaluable contribution to the Initiative and its outputs.

Lastly, the Team would like to thank Aarathi Krishnan, Ioana Creitaru and Sophia Robele for their support and ongoing review during every phase of the process.

# 1. INTRODUCTION

## Background and sections

The UNDP Regional Horizon Scanning Initiative 2.0 (HS 2.0) builds from the inaugural edition of the [RBAP Regional Horizon Scanning Initiative \(September-December 2021\)](#) (HS 1.0) by further exploring initial signals and risks, alongside sensemaking to advance understanding of additional weak signals and emerging trends in Asia and the Pacific.

The methodology and hybrid presentation of results and insights from the two exercises allow for ongoing sensemaking of the disruptive as well as enabling potential of identified signals for development plans and programmes. It can inform analyses of trade-offs for existing and future planning in support of anticipatory governance.

The findings are shared in three overarching sections:

- » **Setting the Scene** presents regional trends to help contextualize emerging risks identified by this process, particularly through the lens of the UNDP Strategic Plan 2022-2025.
- » **Key Risks** describes the key risks identified by the overall HS 2.0 hybrid exercise, complemented by relevant sources and data tools to support further navigation of the findings.
- » **Exploring Meaning** provides descriptive analysis for disruptions, opportunities and remaining uncertainties. It illustrates some applications of the insights through use of scenarios, as well as identifies challenges most relevant to the Regional Office's existing planning and programming;

Building on this report, further Country Office-led sensemaking of the insights can be informed by several complementary initiatives:

- » First, with support of the UNDP Data Futures team, a [Horizon Scanning Data Platform](#) has been created to allow for independent navigation of signals, their descriptions and prioritization. The platform allows for the exploration of interconnections between signals, as well as between signals and the [Six Signature Solutions](#), the [Sustainable Development Goals \(SDGs\)](#), key themes and – most importantly – the Country Programme Documents of participating Country Offices.
- » Second, insights from HS 2.0 and its related data platform were discussed more in-depth in country-specific reports, which were shared bilaterally with participating Country Offices in October 2022, offering pathways for ongoing sensemaking and scenario based thinking.
- » The findings from HS 2.0 will feed existing corporate and RBAP mechanisms, including Country Office Business Plans (COBP), Integrated Work Plans (IWP) and risk management – as part of a holistic anticipatory risk and planning process.

## Report highlights

This report captures a broad range of risks and emerging uncertainties based on HS signals, examining their policy and programming implications for the region. ‘Uncertainty’ in the context of anticipatory risk analysis refers to situations in which multi-dimensional risks intersect and collide, making it impossible to assign appropriate ratings on risk and impact. The inability to assign risks ratings also means that the necessary responses and mitigation measures cannot be priced appropriately, and are therefore challenging to govern effectively. In such contexts of uncertainty, communities that have been historically excluded from protections and most vulnerable to shocks tend to carry the brunt of the impact. While uncertainty cannot be prevented, this report’s nuanced coverage of potential emerging risks and sources of disruption based on HS insights can help decision-makers better anticipate and prepare for consequences of many possible futures that may unfold, with an eye to their varied impacts across populations.

Some **key messages and emerging risks** discussed in this report are:

- » Challenges remain in achieving SDG 5, with backsliding or re-emergent barriers in areas including women’s electoral participation and sexual exploitation and trafficking.
  - » The trend of increasing urbanization paired with decreasing access to quality water sources poses numerous challenges across health, education, infrastructure and security dimensions.
  - » Malnutrition, both in terms of undernutrition and obesity, is on the rise, exacerbated by the effects of the pandemic, Russia-Ukraine conflict and climate change on agricultural production and food shortages.
  - » There are a number of cascading risks that changing weather conditions and energy dependencies pose to the economies, employment, livelihoods, health, food security and overall stability of the region.
- » The effects of COVID-19, and consequent hybridization of education and labour, has accelerated the exposure of a mismatch between skills taught and skills required by Asia-Pacific economies.
  - » Other areas where ‘mismatches’ between supply and demand can be seen, with implications for development trajectories and other sectors, include the domains of electric vehicles, cold chain services and medicines.
  - » Digital transformations in the region, accelerated by COVID-19, pose multi-faceted risks if issues of inclusion, availability and accessibility are not prioritized in digital infrastructure and governance.
  - » The intersection between technological revolution and erosion of democracies and civic space has become increasingly important to monitor.
  - » Signals suggest a number of areas where attitudes and societal values are in flux, including in the context of post-pandemic futures of work, burden of care, futures of transport, eco-activism and digital governance.

## 2. METHODOLOGY AND PROCESS

### Approach

The RBAP Regional Horizon Scanning Initiative is an iterative process which aims to generate a sequence of outcomes and insights which build upon each other. From September to December 2021, the inaugural Regional Horizon Scanning Initiative took place, followed by the second edition from May to August 2022.

The [2021 RBAP Regional Horizon Scanning Initiative Outcome Report](#) presented a preliminary assessment of risks and opportunities for UNDP in Asia and the Pacific in the medium- to long-term – from 2025 to 2030. Additionally, it included a reflection on the learning-by-doing process applied. Through a three-pronged approach of *Surveying, Signal Scanning and Sensemaking*, colleagues were invited to share insights, provide signals, and participate in the sensemaking process.

HS 2.0 built upon best practices and lessons learned from the inaugural HS 1.0. It equally honoured traditional foresight design principles, which require ongoing reflection within a horizon scanning process to advance the quality of its outcomes. Consequently, HS 2.0 applied a similar phased process, while significantly expanding on information management, qualitative data coding, quantitative analysis and data visualization to enhance sensemaking throughout every phase of the overall process.

Preparing horizon scanning (HS) insights for strategic deployment and integration in anticipatory planning and decision-making processes is a data-centric sensemaking exercise. It looks both inwards (strategic plans) and outwards (contextual risks and signals). Research on effective use of data highlights the necessity to *inspect* data, *engage* with content and *place* data within broader contexts. Moreover, it suggests the importance of social and technical support structures to convey the meaning behind data necessary for its use (and reuse in support of foresight iteration).<sup>1</sup>

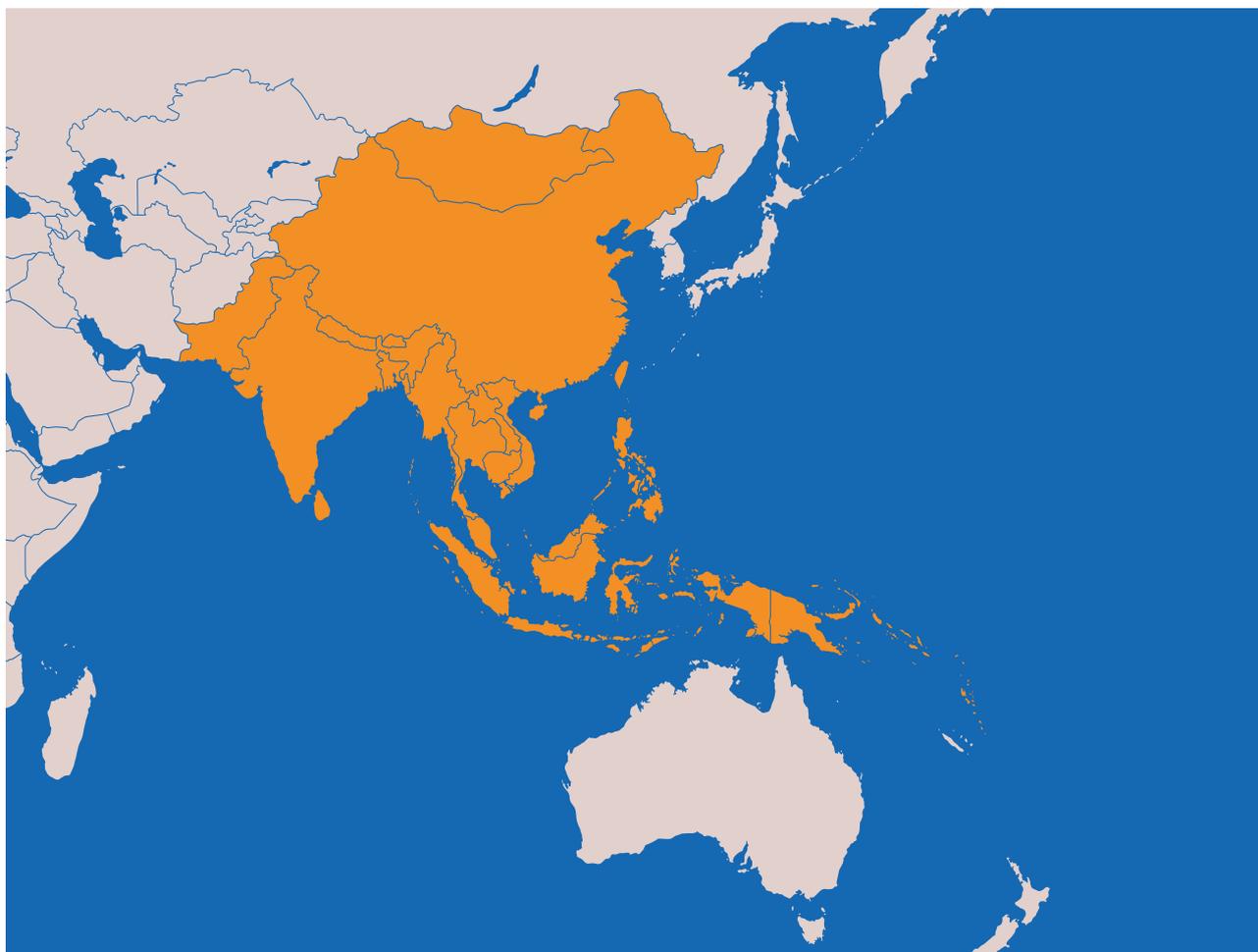
Informed by best practices and lessons learned of the HS 1.0, this year's exercise therefore made a conscious effort to add rigour, design replicable approaches and methodologies, and incorporate an automated information management system. These efforts sought to enhance interaction with, and ease navigation of, data and insights produced through past and future horizon scanning exercises.

Sensemaking of the HS signals throughout all phases of the exercise was intentionally carried out with UNDP strategic plans (namely, Regional and Country Programme Documents) in mind. Synergies between relevant datasets, strategic plans, and the SDGs were also created throughout the sensemaking process. Each Results and Resources Framework of the Regional and Country Office strategic plans was coded for integration in the RBAP Horizon Scanning information environment.<sup>2</sup>

<sup>1</sup> [Talking datasets – Understanding data sensemaking behaviours - ScienceDirect](#)

<sup>2</sup> This year, we provide Country Office-specific sensemaking reports to advance the applicability and, consequently, consideration of RBAP Horizon Scanning Initiative insights in existing decision-making, planning and programming processes.

**FIGURE 1: HS 2.0 participating Country Offices**



References to SDGs within strategic plans were equally captured in the sensemaking, or, if not directly mentioned, assigned by the core team based on corresponding thematic priorities. Signals of both HS exercises were also assigned SDG references. This supports the two distinct datasets to better ‘speak’ to each other through the medium of corresponding SDG categorization.

This integrated approach to coding signals, coupled with ongoing monitoring and analysis of interconnections between signals and potential disruptions or opportunities in relation to strategic plans, provides the information base needed for adaptive planning and anticipatory governance.

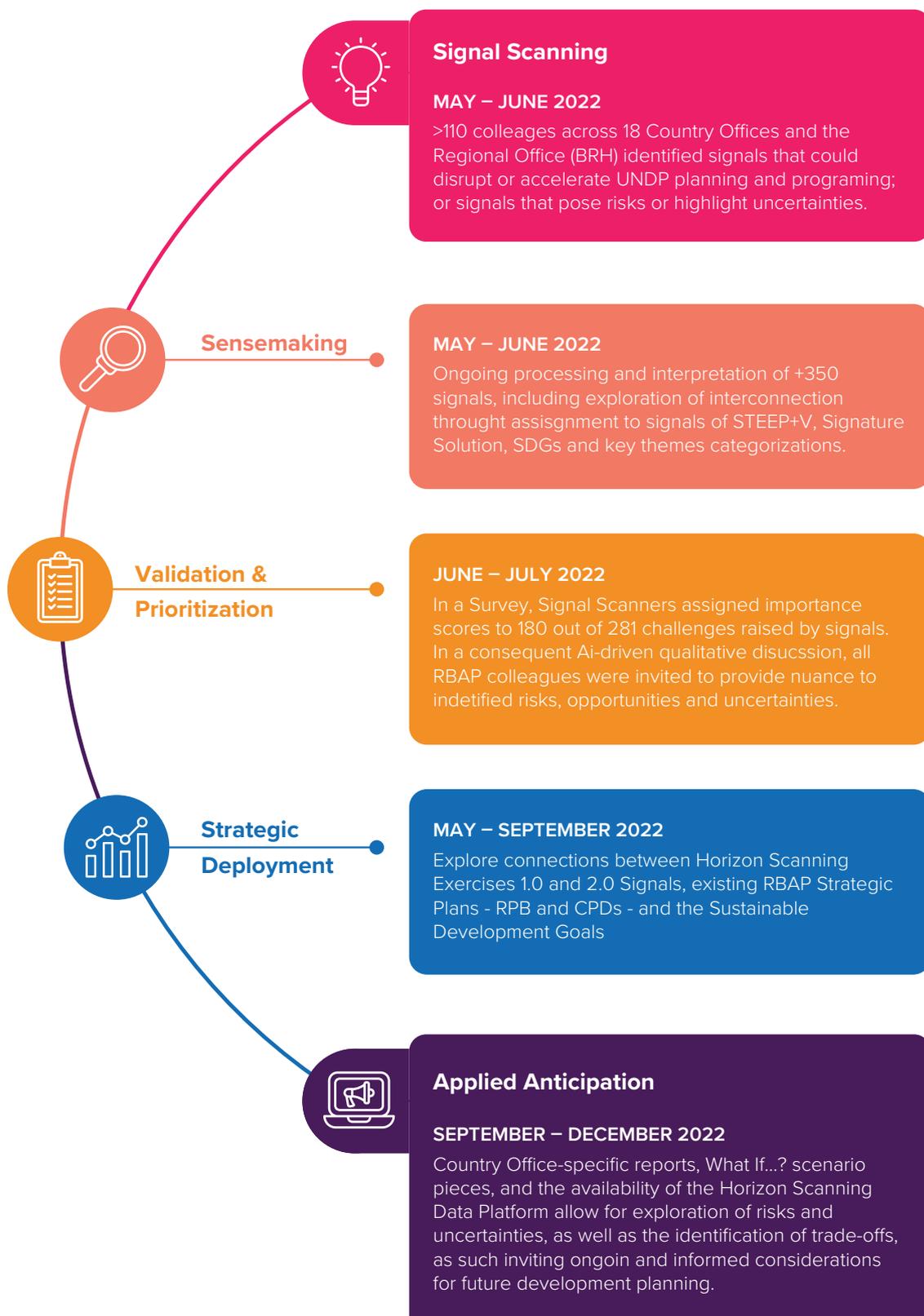
## Process

After gathering interest among Country Offices, and further outreach by the RBAP Strategic Foresight Team to ensure the participating signal scanners would reflect a variety of roles, an [Orientation](#) and [Kick-off](#) webinar to the HS 2.0 exercise took place in early May.

The overarching phases of the HS 2.0 Initiative methodology included: data collection through signal scanning; validation and prioritization; strategic deployment; and applied anticipation. All of these informed the contents of this HS 2.0 Outcome Report and the signals and key risks it reflects.

FIGURE 2: Phases of HS 2.0

## HORIZON SCANNING EXERCISE 2.0



## 3. FINDINGS

This section contextualizes the HS Exercise 2.0 findings through integration of three types of data sources: regional and country-level strategic plans (i.e., Country Programme Documents/Regional Programme Documents); the SDGs; and, lastly, the HS signals.

### Signals

In the preliminary analysis, several key themes emerged from the signals. Key nodes reflect topics that the signals referred to most, including inflation, food, energy, crisis, governance and business. Of those, food, crisis, energy and 'lack' were most interconnected with other clusters. In line with global and regional developments, the thematic focus of signals logically varied across HS 2.0 and HS 1.0.

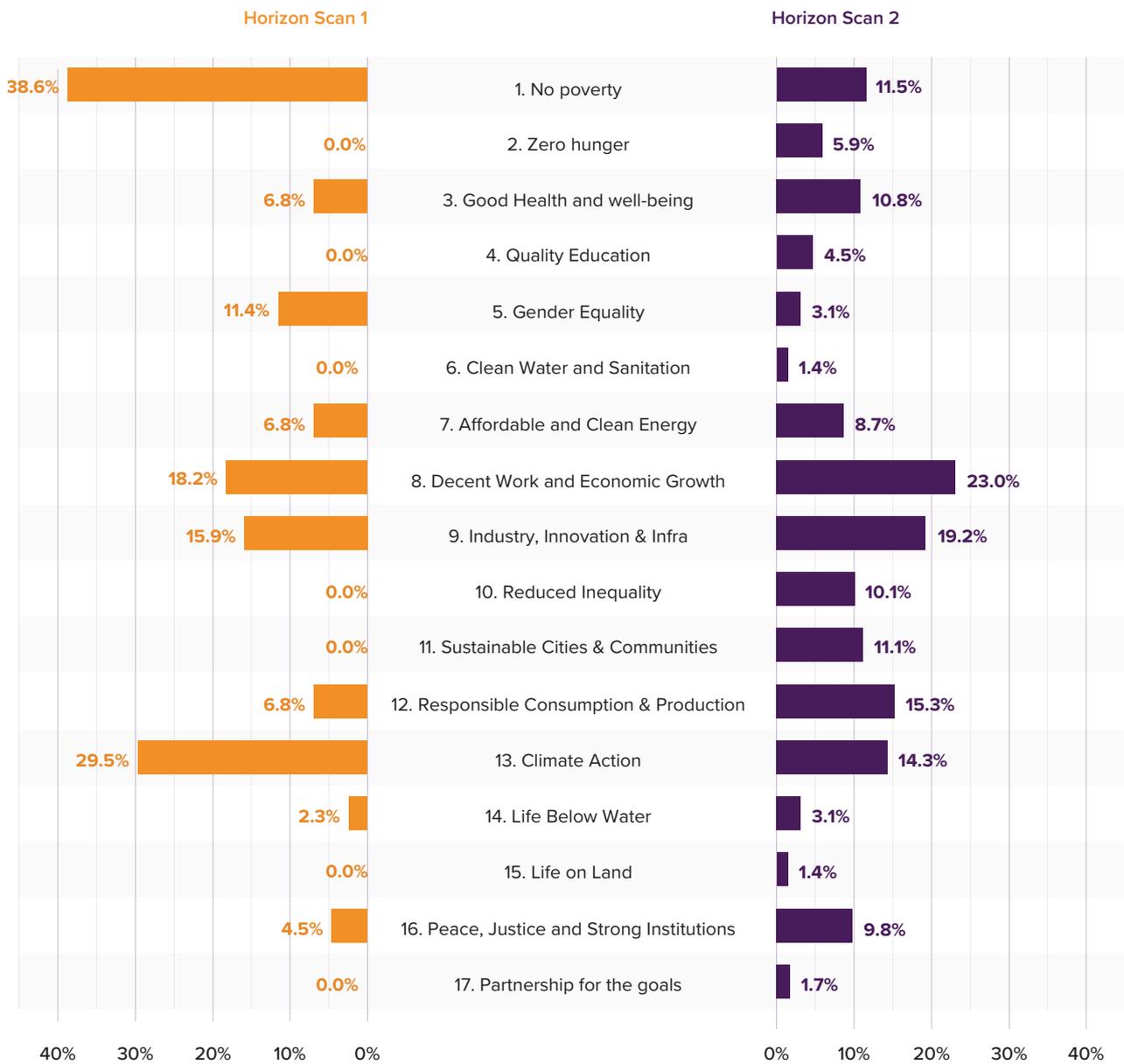
While in HS 1.0, the key themes that emerged were environment and gender equality, the focus of HS 2.0 shifted to energy, governance and resilience. Moreover, by assigning SDG references to signals, preliminary insights could be derived from emerging SDG clusters. These are presented in the figure below, which features the SDG references across the HS 1.0

and HS 2.0 signals (as a percentage of the total). Interconnections between signals and SDGs were further visualized through Network Mapping (see Figure 4). This analysis highlighted that:

- » The first, and largest cluster of signals, relates to **SDG8** (Decent Work & Economic Growth) and **SDG9** (Industry, Innovation & Infrastructure), and in particular to employment, inflation, digitalization, blockchain, innovation and economic matters. The second notable cluster relates to environmental issues, and particularly to **SDG11** (Sustainable Cities & Communities), **SDG12** (Responsible Consumption & Production) and **SDG13** (Climate Action). Key signals in this cluster cover climate change, natural hazards, waste management, green transition and energy. The final cluster relates to SDG1 (No Poverty), **SDG3** (Good Health & Well-Being), **SDG10** (Reduced Inequalities) and **SDG16** (Peace, Justice & Strong Institutions).
- » The SDGs *least* represented by signals are **SDG6** (Clean Water & Sanitation), **SDG15** (Life on Land) and **SDG17** (Partnership for the Goals).<sup>3</sup>

<sup>3</sup> The [Horizon Scanning Data Platform](#) allows for selection of signals per SDG – under Signal Description.

**FIGURE 3: Signals grouped by SDGs in Horizon Scan 1 and 2**



Each signal was manually with different SDGs based on the topics discussed within it. One signal can belong to multiple SDGs



## SDG achievement status

When overlaying these insights with recent analyses of progress on the 2030 Agenda for Sustainable Development, as presented in the [2022 Sustainable Development Report \(SDR\)](#) and [related Data Portal](#) (see [Figure 6](#))<sup>4</sup>, several insights emerge:

- » The 2022 SDR report highlights that in Asia and the Pacific in the past year, challenges pertaining to SDGs 2, 15 and 16 have stagnated if not worsened, while challenges pertaining to SDG 3 and 16 have increased significantly.
- » Meanwhile, SDG 5, 11, 16, 17 and – in particular SDG 15 – are reporting decreasing scores, meaning prior achievements towards the SDGs have been reversed.
- » On average, developments related to SDGs 1 and 4 suggest countries in the region are on track to achieve these SDGs, or are likely to maintain existing (positive) achievements.
- » SDG 12 and SDG 13 in particular are scoring high throughout the region – meaning their achievement is on track for most countries.

Interestingly, the most common HS signal themes predominantly match the SDGs considered to have been achieved or well on track to achievement [*High SDG achievement – High HS input*]. This means the signals either correspond with positive trends OR pose disruption to the positive trajectory of an SDG, which should be further explored.

Further, across both HS exercises, signals input was thin in areas where major challenges remain [*Major challenges in SDG achievement – Low HS input*], which highlights either difficulty to assess signals over trends OR highlight information gaps and difficulty to interpret what these developments mean OR reflect uncertainty in general.

## Strategic plans

Considering this is a regional HS Initiative, this report applies the methodology more in-depth in relation to the Regional Programme Document (RPD).

The RPD for 2022-2025 is rooted in the UNDP Strategic Plan 2022-2025. It references outcomes and indicators related to the following SDGs (see Annex):

- » 1. No Poverty
- » 3. Good Health & Well-being
- » 5. Gender Equality
- » 7. Affordable and Clean Energy
- » 8. Decent Work & Economic Growth
- » 10. Reduced Inequality
- » 11. Sustainable Cities and Communities
- » 13. Climate Action
- » 16. Peace, Justice and Strong Institutions
- » 17. Partnership for the Goals

After coding the SDG references against both the RPD and all signals, the first part of this analysis looked at the frequency with which the regional strategic priorities and outcomes corresponded with SDGs, then captured the number of signals with similar SDG references. This is only a preliminary step for analysis of relevance and possible impact of signals against existing strategic plans.

<sup>4</sup> The Sustainable Development Report's SDG Dashboards and Trends scores are average scores for all countries in East and South Asia, and Oceania. Qualitative assignments of SDG achievement status were converted by the HS 2.0 core team to represent numeric scores. The Dashboards score is based on: 0-4 score: 0 – Information unavailable; 1 – SDG achieved; 2 – Challenges remain; 3 – Significant challenges remain – 4 Major challenges remain. The Trends score is based on: 0-4 score: 0 – Trend information unavailable; 1 – On track or maintaining SDG achievement; 2 – Moderately improving; 3 – Stagnating; 4 – Decreasing. In support of the sensemaking process of the RBAP Horizon Scanning Exercise 2.0, signals for both HS 1.0 and HS 2.0 were assigned SDG references. Multiple SDG references can apply to a signal, for instance SDG 5. Gender Equality and SDG 8. Decent Work and Economic Growth. As such, the percent of total refers to the total number of references made to SDGs across all signals for HS 2.0 and HS 1.0, and not the number of signals received.

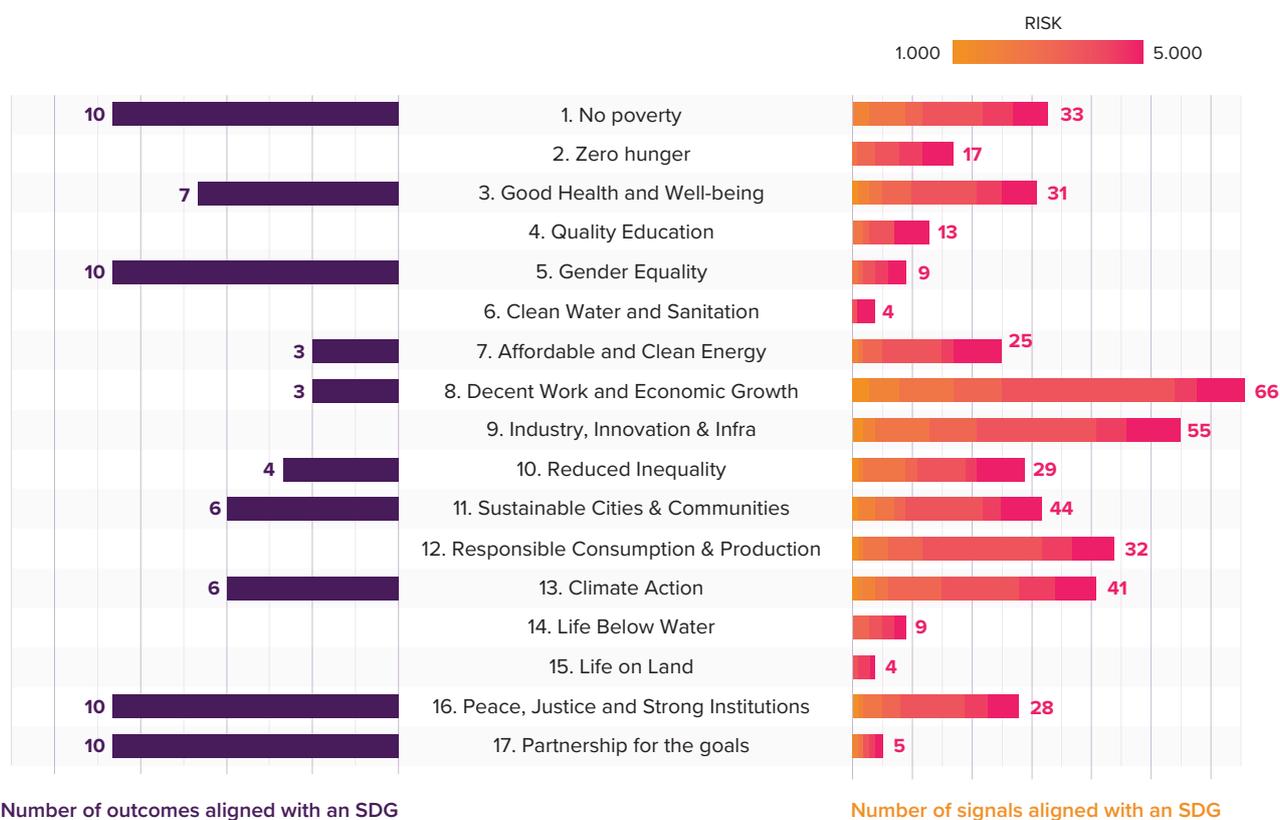
The signals aligned most closely with – and therefore can speak to – the outcomes and indicators related to Poverty (SDG 1), Gender Equality (SDG 5), Sustainable Cities and Communities (SDG 11), Climate Action (SDG 13), and Peace, Justice and Strong Institutions (SDG 16). Signals had least alignment with the following SDG-related outcomes and indicators in the strategic plan: Affordable and Clean Energy (SDG 7), Decent Work and Economic Growth (SDG 8), Industry, Innovation and Infrastructure (SDG 10), Responsible Consumption and Production (SDG 12)

The prioritization of HS 2.0 signals reflected in this report is therefore based on an awareness of their SDG achievement status as per the SDR 2022, in addition to possible disruptions or opportunities signals could pose to the current priorities as set out in the RPD. Equally, the analyses focus

on areas that showed high signal input and low coverage in the RPD, by discussing the following interconnected risk areas:

- » Energy and/or Poverty, Gender, Sustainable Cities/ Communities, Climate Action, Peace/ Justice/ Strong Institutions;
- » Decent Work and Economic Growth and/or Poverty, Gender, Sustainable Cities/ Communities, Climate Action, Peace/ Justice/ Strong Institutions;
- » Industry/ Innovation and Infrastructure and/or Poverty, Gender, Sustainable Cities/ Communities, Climate Action, Peace/ Justice/ Strong Institutions;
- » Responsible Consumption and Production and/or Poverty, Gender, Sustainable Cities/ Communities, Climate Action, Peace/ Justice/ Strong Institutions.

**FIGURE 5: Distribution of signals against SDGs compared to outcomes in RPDs**



**FIGURE 6: Initial visual assessment of the correspondence and differences between HS 2.0 signals and their risk score versus the UNDP Regional Programme Document for Asia and the Pacific (2022-2025)**

Sustainable Development Goals						
	Sustainable Development Report Dashboards (average score)	Sustainable Development Report Trends (average score)	HS 2.0 (2022) Signals related to SDGs		HS 1.0 (2021) Signals related to SDGs	
			No.	% of Total	No.	% of Total
1. No Poverty	2.4286	1.8095	33	7.6	17	27.4
2. Zero Hunger	3.7143	2.2857	16	3.7	0	0.0
3. Good Health and Well-being	3.9048	2.1905	30	6.9	3	4.8
4. Quality Education	2.2857	1.381	13	3.0	0	0.0
5. Gender Equality	3.4762	2.5714	8	1.8	5	8.1
6. Clean Water and Sanitation	3.4286	1.7143	4	0.9	0	0.0
7. Affordable and Clean Energy	3.3333	2.2381	26	6.0	3	4.8
8. Decent Work and Economic Growth	3.3810	1.7143	72	16.5	8	12.9
9. Industry, Innovation and Infrastructure	3.3333	1.9048	53	12.2	7	11.3
10. Reduced Inequality	2.9048	0.9524	24	5.5	0	0.0
11. Sustainable Cities and Communities	3.1905	2.4762	29	6.7	0	0.0
12. Responsible Consumption and Production	1.6667	1.0952	44	10.1	3	4.8
13. Climate Action	1.7619	1.8095	42	9.6	13	21.0
14. Life Below Water	3.0952	2.0952	9	2.1	1	1.6
15. Life on Land	3.8571	3.0476	3	0.7	0	0.0
16. Peace, Justice and Strong Institutions	3.6667	2.4286	25	5.7	2	3.2
17. Partnership for the Goals	3.1905	2.5238	5	1.1	0	0.0

## 4. STRATEGIC DEPLOYMENT

To recap, the following chapter is divided into three interconnected sections, namely:

- » **Setting the Scene**, which lays out a short discussion of regional trends to contextualize the interaction between trends and signals in further analyses.
- » **Key Risks**, in which specific signals are discussed more in-depth according to four of the five key themes that emerged from the HS 2.0 signal scanning exercise, namely:
  - Shock-proof? Pathway to Preparedness and Resilience
  - Mind the Mismatch
  - Governing ‘Datafication’
  - Changing Values, Changing Futures
- » **Exploring Meaning**, where insights are discussed in relation to the current Regional Programme Document. Alternative approaches for further sensemaking are also presented, including an example of a ‘What if?’ scenario on renewable energy.

### Setting the Scene | Trends

#### Governance

A post released by the [World Bank Group](#) in April 2022 addresses the risks Asia-Pacific is likely to face as a result of the **war in Ukraine**. On top of the still lingering socioeconomic distress from the COVID-19 pandemic, as well as fear for future pandemics<sup>5</sup>, the region now is also struggling with a disruption in the supply of commodities, including food and fuel. With economic growth projected to slow, many households have also fallen back into poverty, despite positive trends in poverty reduction pre-pandemic. The **pandemic**,

**shrinking financial capacities of governments, and rapid emergence of populist politics** – see discussions around Myanmar, India, Malaysia, Indonesia, the Philippines – are causing distrust in leadership, and makes the future of free trade, economic globalization as well as regional integration questionable ([Atlas Institute for International Affairs, 2020](#)).

Populist politics are undermining democratic values and claiming infinite political power, which consequently have led to a **rise in political activism** in the region. According to the International Institute on Democracy and Electoral Assistance (IDEA), civil liberties were violated during the COVID-19 pandemic by measures to contain the spread of the virus ([IDEA, 2021](#)). Temporary controls included restrictions on movement, expression, religion and freedom of assembly. Governments justified these as steps taken to safeguard public health measures and to combat the spread of pandemic-related misinformation. When citizens voiced their disapproval of political leaders’ handling of the pandemic, governments issued a large number of arrests and crackdowns on protests with excessive police force ([IDEA, 2021](#)).

This **changing political landscape, restrictive legislations and oppression of political activism** are testing the resilience of more democratic regions, while **deteriorating democratic trends in more fragile states**. The ongoing dynamic movements for social change and citizen’s ever-increasing desires for self-expression, however, are becoming more challenging for political leadership to capture.

<sup>5</sup> The METABIOTA Epidemic tracker monitors epidemics globally. Specifying for the pathogen of concern, e.g., Monkey Pox, updated country-specific data, including case load and pathogen sentiment, is then available. Source: [Metabiota: Epidemic Tracking and Data Science \(epidemictracker.com\)](#)

## Economy/ Inflation

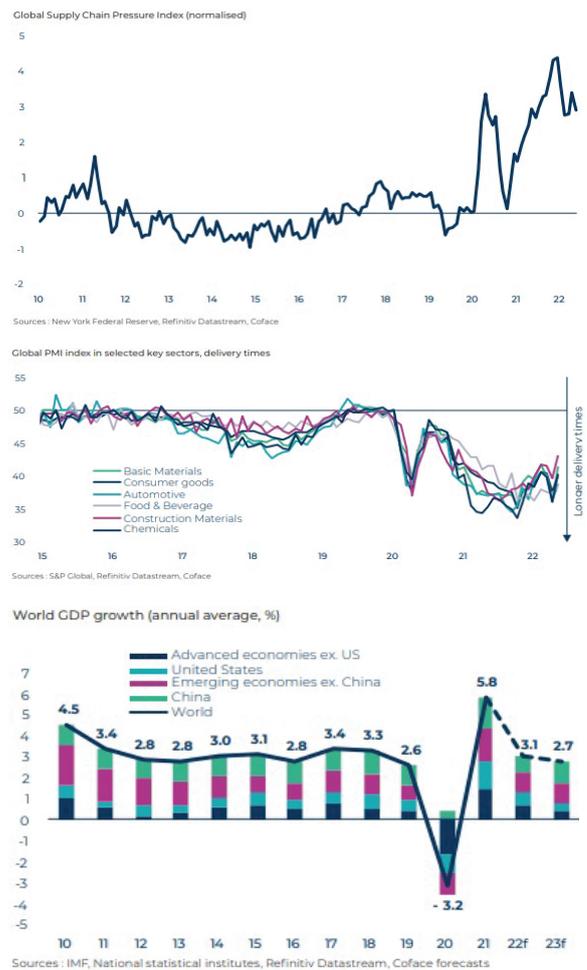
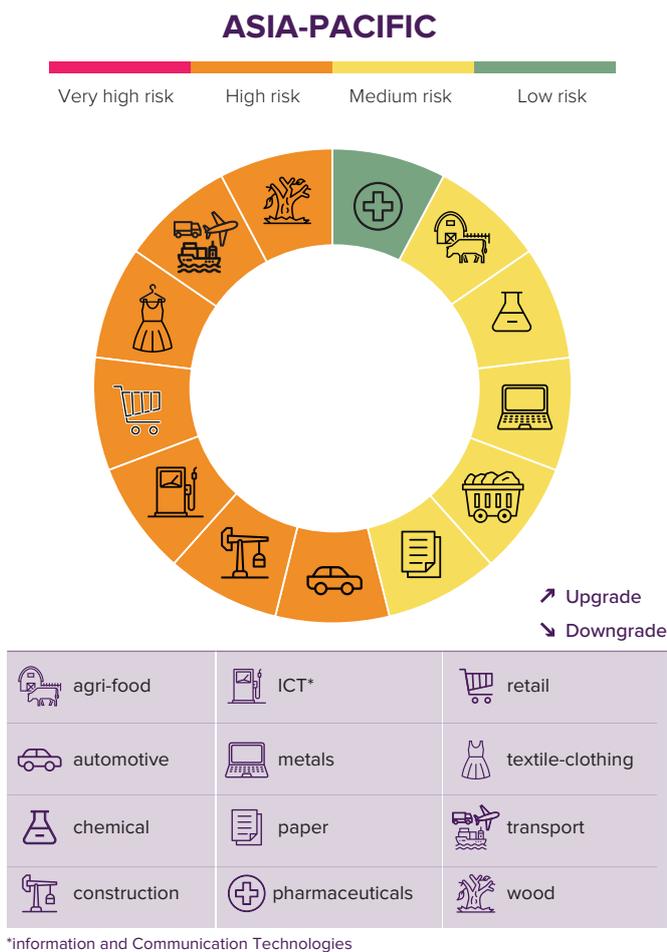
The COVID-19 pandemic saw governments in Asia-Pacific take early action measures to combat the spread of the virus and protect populations' health. For those in informal employment, who make up two-thirds of the workforce in Asia-Pacific, these mitigation measures, including lockdowns, often meant a sudden loss of incomes and livelihoods.

To date, Asian Development Bank members have spent US\$3.8 trillion, 12 percent of the total amount (US\$31.8 trillion) pledged, to combat the broad impact of the COVID-19 pandemic. Exacerbating structural inequalities pre-dating the pandemic, the government assistance delivered

to people varied widely between countries in the Asia-Pacific region. Policy responses sought to lessen the burden of the pandemic, yet in Asia-Pacific, **trade-offs between lives and livelihoods still saw reversed or slowed down trends in poverty alleviation and SDG achievements**.

The more recent conflict in Ukraine and its cascading impact globally have meant that **COVID-19 economic recovery projections in Asia-Pacific may be compromised** by "slowing global demand, rising debt, and a reliance on short-term economic fixes to cushion against food and fuel price increases,"<sup>6</sup> as the World Bank announced in September 2022.

FIGURE 7



6 <https://www.worldbank.org/en/events/2022/10/07/eap-economic-update-oct-2022-reforms-for-recovery>

## Digital transformation

Accelerated by the COVID-19 pandemic, **digitalization and technology continue to transform many aspects of citizens' lives** by necessitating the introduction of new digital platforms. These include online education, e-payments, hybrid workspaces, e-commerce, and health services. The digital revolution has had many positive advantages in the region, such as improved access to internet and mobile technologies in rural and remote areas, improved monitoring of the COVID-19 pandemic, and even enhanced productivity and more sustainable use of resources (ESCAP, 2022).

Robotics, artificial intelligence (AI), 5G capabilities, big data, the Internet of Things (IoT) and blockchain services, labelled as technologies of the Fourth Industrial Revolution, have also appeared in some parts of the region. Simultaneously, digital skills training has helped youth to take advantage of job opportunities that these emerging sectors might offer. However, **digitalization can also be a double-edged sword**, as illustrated by the COVID-19 pandemic reinforcing inequalities from the digital divide (ESCAP, 2022). For instance, women are still excluded from technology-enhanced learning and have lower access on average to internet broadband and mobile phone ownership. Furthermore, although the expansion of the internet has been noted in areas where it was not accessible before, unreliable connection is still common, depriving people of the opportunities the digital economy offers.

Beyond the general risks above, which are more commonly known, there are **emerging risks that are associated with the spread of misinformation, political polarization, environmental damage by the creation of digital waste, and the uncertainty of cryptocurrencies** (ESCAP, 2022). What's more, the interactions between these emergent risks have meant a rise in uncertainty. As existential risks are growing, they are also converging at faster rates and creating new types of tipping points across borders and issue areas. Uncertainty has become an increasingly nebulous concept

in today's global risk landscape, as it reflects "uncertainties in the minds of people about future events that may or may not happen."<sup>40</sup> This trend can be seen in the [World Uncertainty Index](#), which captures uncertainty linked to economic and political events for 143 countries. It is also reaffirmed by the [2021/22 Human Development Report](#), which defines the emergence of a new "uncertainty complex", characterized by disruptions to human development, insecurity, and democratic backsliding.

In the context of digital transformation, this **rise in both interconnected risks and uncertainties renders effective governance for emergent technologies all the more important**. Some e-government initiatives have been launched, ensuring better interaction with citizens and higher transparency through data sharing platforms, but they vary across the Asia-Pacific region in their participatory approaches and the reliability of the information provided to citizens (ESCAP, 2022). Indeed, digitalization requires new development strategies and policy planning to ensure flexible, inclusive and collaborative transformations within the sector.

## Demographics and mobility

In relation to demographics, the Asia-Pacific region is undergoing profound population changes. It is predicted that **by 2050, over a third of the population will be 60 years or older**, which means significant social, economic and political implications for the region (UNDESA, 2019). An ageing population requires strengthened social protection systems that prevent the old from falling into poverty, as well as health and care services that ensure adequate environments for people with less physical and mental capacities (United Nations, 2021).

This key trend of ageing populations is happening in contexts also affected by **rapid, unsustainable urbanization and climate change**, posing extra challenges to safeguard citizens' well-being. Among the effects is increasing climate change-induced disasters and food security-driven involuntary migration, both within and

across countries. At the same time, there is a trend of voluntary migration for temporary job opportunities. Policies and legal frameworks, however, often do not adhere to the protection of migrants and internally displaced persons (IDPs) (United Nations, 2020). Therefore, **migrants, especially women, are particularly vulnerable** to human rights violations, violence, discrimination and exploitation.

Urbanization is also creating challenges for progress on the SDGs when not well managed. There is an urgent need to transform cities into more environmentally-friendly and greener spaces, to build infrastructure more resilient to shocks and provide access to basic services for all.

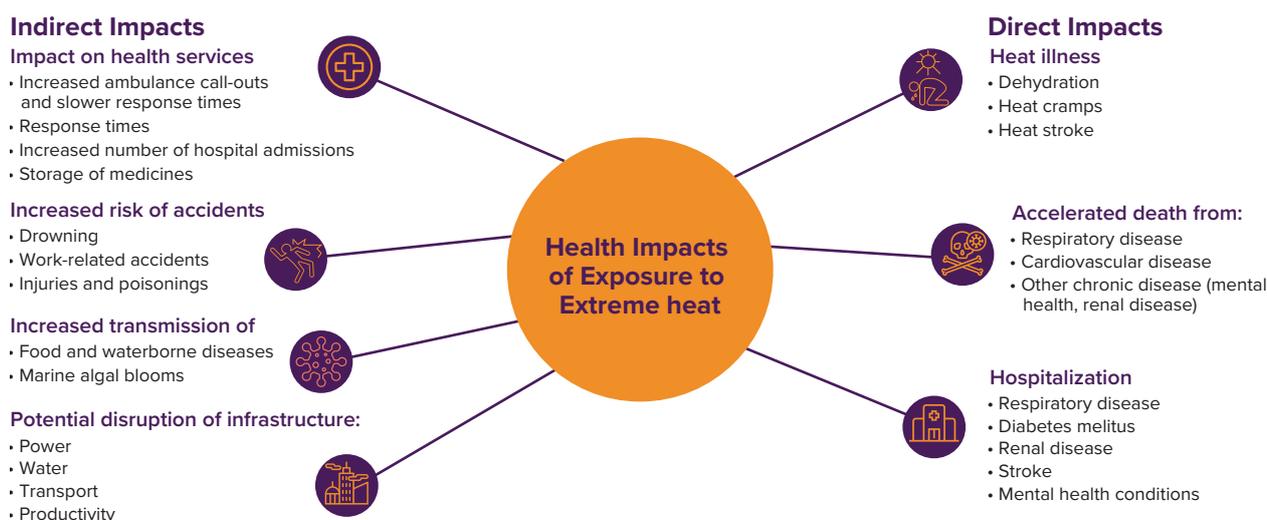
### Climate change

Given the high exposure of the Asia-Pacific region to natural hazards, countries are investing in disaster risk reduction and climate change adaptation strategies to strengthen national capacity for coping with shocks. Despite the efforts, however, most are **still ill-prepared for the multiple and increasingly overlapping crisis**, which have cascading impacts on lives and livelihoods.

According to the [IPCC's AR6 report](#), there is strong possibility that **temperatures in the region will continue to rise**, coupled with more frequent heat extremes, stronger precipitation and continued regional-mean sea level rise. Extreme weather events and sea level rise are contributing to **biodiversity loss**, as scientists warned in 2018 (UNEP, 2018). The Asia-Pacific region is home to 17 of the 36 biodiversity hotspots, and several communities depend on ecosystem-based services, such as forestry, fishery and agriculture for their livelihoods. However, unsustainable practices, including overfishing, overgrazing and deforestation, are causing a rapid decline of flora and fauna.

Since human well-being and a well-functioning ecosystem are co-dependent, **strengthened biodiversity conservation practices, regional collaboration, sharing of best practices, platforms for local communities to voice their interests, and a shift from a hazard-to-hazard to a multi-hazard risk management approach** is more needed than ever before.

FIGURE 8



Source: WHO (2018). Fact Sheet: Heat and Health

## KEY RISKS

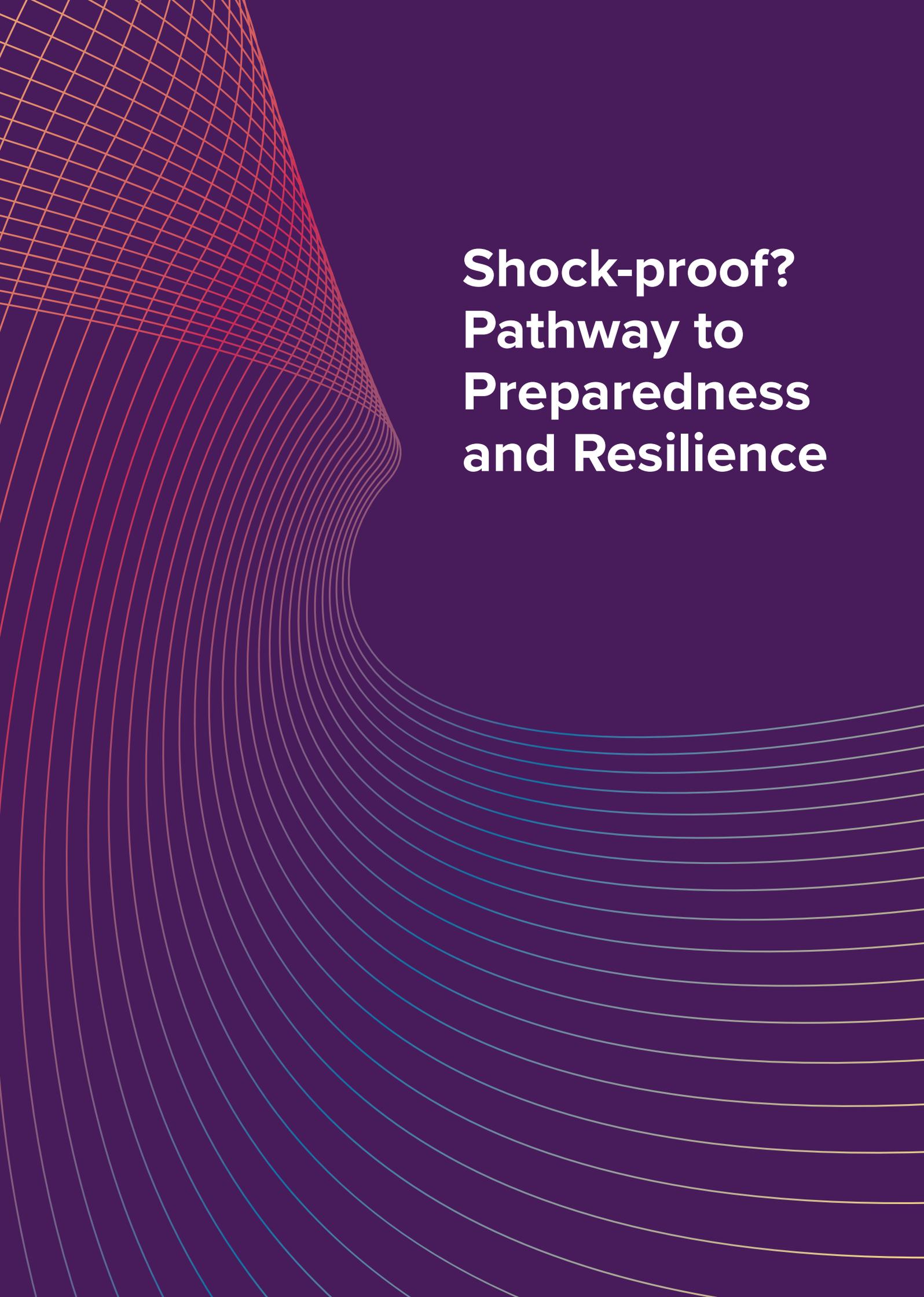
The following sections provide an in-depth look into emerging risks suggested by HS 2.0 signals, through the lens of four overriding themes:

**SHOCK-PROOF?  
PATHWAY TO  
PREPAREDNESS  
AND RESILIENCE**

**GOVERNING  
'DATAFICATION'**

**MIND THE  
MISMATCH**

**CHANGING  
VALUES,  
CHANGING  
FUTURES**



**Shock-proof?  
Pathway to  
Preparedness  
and Resilience**

As highlighted by both the [Global Assessment Report on Disaster Risk Reduction 2022](#) and WEF's [Global Risks Report 2022](#), the global risk profile is rapidly evolving. The systemic and cascading nature of risk poses a horizontal threat to the fulfilment of development agendas such as the [2030 Agenda for Sustainable Development](#) and the [Sendai Framework for Disaster Risk Reduction 2015-2030](#). While true globally, Asia-Pacific is the most exposed region to, and will bear the brunt of, several environmental, social and economic challenges ahead.

This section captures **signals related to resilience and preparedness challenges**, including climate change and natural hazards, energy, education and food insecurity. It provides figures and statistics about the not-so-optimistic future lying ahead.

However, the extent to which countries in the region will be affected by the challenges discussed in this chapter varies widely.

In Thailand, Vietnam, Lao People's Democratic Republic (PDR) and Sri Lanka, for instance, where there are abundant natural resources and diversified agricultural production, climate change and related exposure to more frequent and intense natural hazards could create significant disruptions for economic potential. Likewise, in Pakistan, Nepal and Cambodia, the agricultural sector makes up a high share of gross domestic product (GDP), export baskets and workforce ([COFACE 2022](#)).

In the past few months, natural hazards have significantly disrupted planting and harvesting seasons, as well as caused extensive damage and crop losses. Equally, more frequent and intense heatwaves pose increased risk, from effects on individual and community health to the built environment ([UNDRR 2022](#)). **Heatwaves significantly exacerbate pre-existing vulnerabilities**, including through physiological stress, exacerbated illness, including non-communicable diseases, and increased risk of death from exposure to excess heat ([WHO 2018](#)). It also compounds vulnerabilities linked to socio-economic dimensions, such as precarious housing,

demographic dimensions, including age- and gender-related factors, and water scarcity, particularly in areas vulnerable to drought that lack infrastructure to cope ([WMO 2022](#)).

Another area of concern for the region is **high energy dependency**, coupled with **deficient electricity production and underdeveloped or inadequate infrastructure**. Broadly, Asia-Pacific countries have been affected by fuel shortages, which have cascading negative impacts on several economic sectors and livelihoods. At the same time, signals highlight these developments have encouraged interest in solutions that reduce oil and fuel dependencies, and consequently could be more climate-friendly. Nevertheless, countries like Pakistan and India are significantly affected by energy import volatility. For the region as a whole, energy mix changes and innovation towards renewables – including interrelated environmental deterioration – should be monitored closely to assess the risk that dependencies pose in the medium- to long-term ([COFACE 2022](#)).

This section presents examples – as suggested by the HS 2.0 signals – of **cascading risks that changing weather conditions and energy dependencies pose to the economies, employment, livelihoods, health, food security and overall stability** of countries in Asia and the Pacific ([COFACE 2022](#)). A cooperative, holistic and systemic approach to resilience-building will not only be important, but vital to overcoming development challenges in these areas over the next decades.

- » Energy inflation and the cost for food security
- » Green, clean and (un)sustainable: A future for renewable energy
- » Exceptional is the new normal: preparedness for sudden-onset disasters
- » A boiling frog syndrome? Climate change and slow-onset cascading risks
- » Education in Emergencies
- » What a Waste
- » Everything is Water

## Energy inflation and the cost for food security

### The global energy shock

Following Russia’s invasion of Ukraine, **global energy markets have experienced the largest rise in the price of crude oil since the 1970s**. Energy prices are forecast to increase by an average of 50 percent in 2022 and aren’t expected to subside in the near future. Globally, as of September 2022, crude oil prices are up by 19 percent and natural gas prices are up by 138 percent when compared to January 2022 (UNCTAD 2022). This will have significant consequences upon global growth, with energy price rises forecast to reduce global economic output by nearly 1 percent by the end of 2023 (World Bank, 2022).

Continuing a surge in food prices – as observed since mid-2020 due to recovery of demand, adverse weather impacts on supply, growing trade restrictions and soaring input costs – the global energy shock will further disrupt agricultural production, increase food prices, and consequently exacerbate food insecurity<sup>7</sup> (IEA, 2022).

### The current food security picture of Asia-Pacific

In 2020, there were 375.8 million people facing hunger in Asia-Pacific, a rise of 54 million since 2019. This is expanded upon in the diagram below, which depicts the prevalence of food insecurity by country (Food Insecurity Experience Scale (FIES), 2022). The diagram shows that nearly half of the population of Cambodia is food insecure. In Pakistan, people have seen the largest rise in food insecurity out of the countries in the region for which data was available.

**FIGURE 9** Prevalence of moderate or severe food insecurity in total population (5, 3 year average)



Source: FAOSTAT. Accessed September 2022

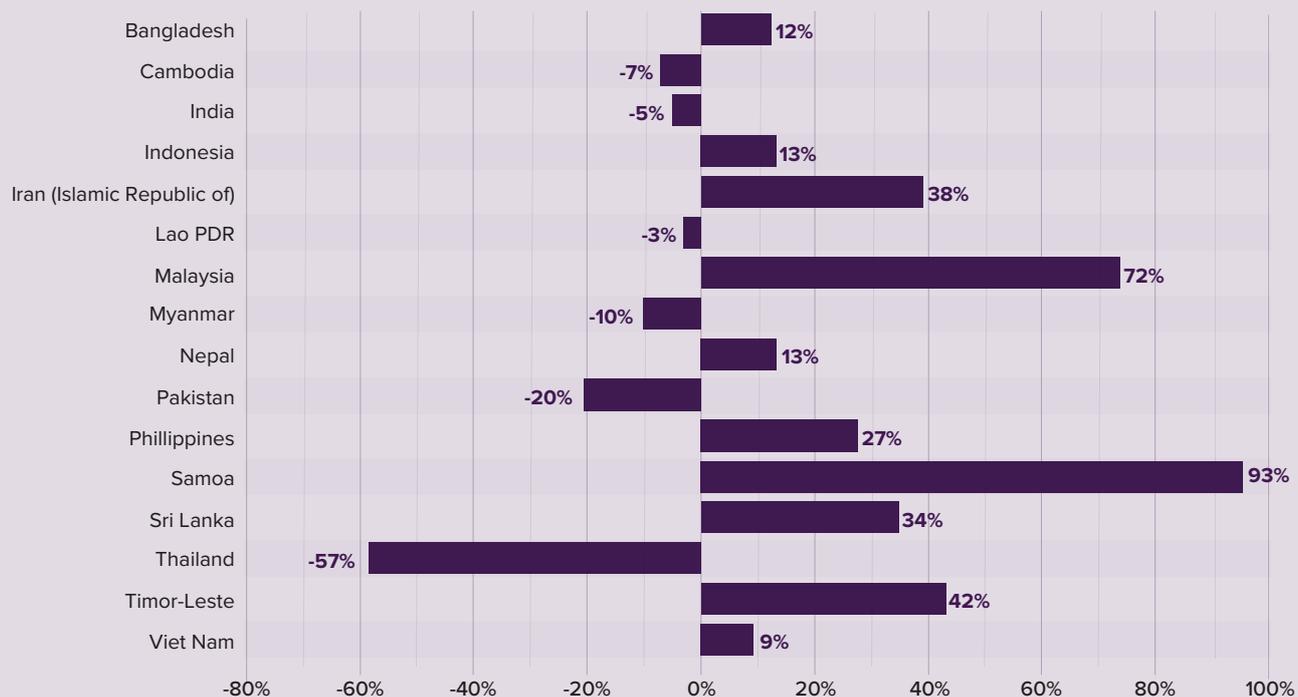
<sup>7</sup> Food insecurity refers to when a person “lacks regular access to enough safe and nutritious food for normal growth and development and an active and healthy life”. In addition to the relationship between energy and food outlined in this section, food insecurity can also arise due to climate change, any decline in agricultural productivity, disruptions in the global supply chain, and through price fluctuations (FAO, 2022).

## Signalling the relationship between energy and food

The agriculture and food sectors use energy for various purposes, both directly and indirectly. Direct energy requirements include electricity for irrigation, fuel for farm machinery, as well as energy for food processing, packaging, transportation and distribution. Pesticides and

fertilisers also require large amounts of indirect energy consumption due to their highly energy intensive manufacturing process. The **role of energy in agriculture will be complex looking forward, with the agricultural sector also being heavily impacted by climate change** and increasing frequencies of weather extremes ([UNEP, 2022](#)).

**FIGURE 10** Cereal import dependency



Time period from 2017 to 2019 - Source: FAOSTAT (2019)

Locally, signals show a similar **relationship between food and energy security**. Laos, for instance, is struggling with acute fuel shortages, rising food prices and growing debt following the surge in global energy prices. State importers announced they could only import around a sixth of the country's monthly fuel needs. The risks from this crisis are compounded by the impacts of COVID-19, which have pushed the country into an increasingly serious debt crisis ([Strangio, 2022](#)).

At the same time, signals suggest that governments in Asia-Pacific are working to mitigate rising energy prices and their effects on food security. For example, the government of Timor Leste introduced fuel subsidies as part of a

relief package to business, including those in the food and agriculture industry ([Independente, 2022](#)).

## Supply chain disruptions and additional shocks to food security

The relationship between energy and food is further complicated by Asia-Pacific countries' increasing dependency on imports and exports over the last few years. The graph below shows the cereal import dependency ratio across the region, and highlights Thailand, Cambodia, India, Laos, Myanmar and Pakistan as net food exporters ([FAO, n.d.](#)).

Energy shocks in these countries, which affect agricultural production, may have a direct impact on neighbouring countries.

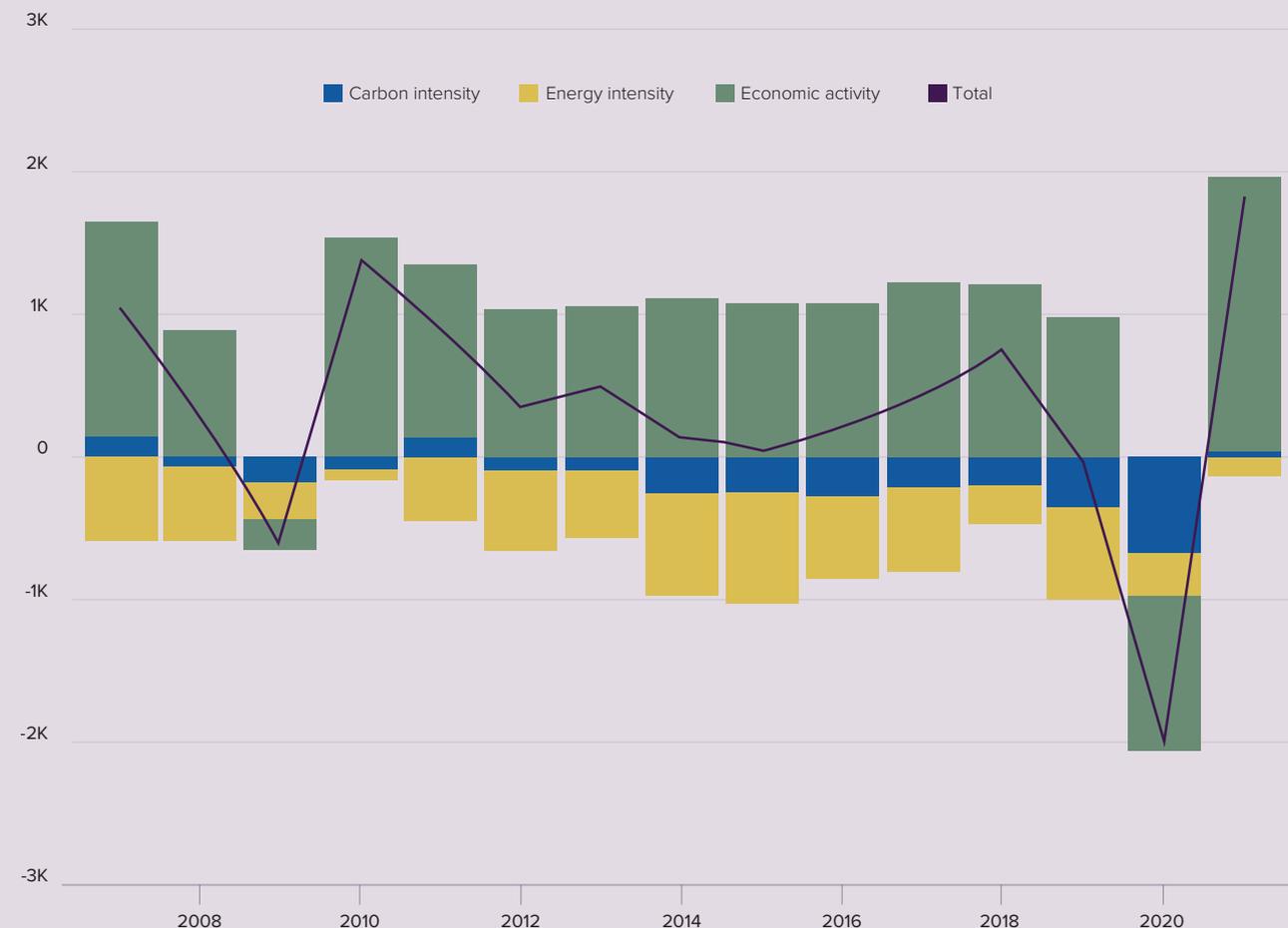
### Looking ahead – energy, food and development

As the cascading impacts of the crisis in Ukraine continue to impact global energy prices, rising levels of food insecurity cannot be ignored.

When looking forward at reducing the impacts of energy price rises in Asia-Pacific, the World Bank (2022) advises **reducing the mismatch between energy supply and demand**, stating that policymakers should “*prioritize policies*

*that encourage greater energy efficiency and accelerate the transition towards low-carbon energy sources.”*<sup>8</sup> When considering the nearer future, it advises that temporary targeted support to those most vulnerable can be prioritized over energy subsidies, **cushioning the adverse effects of the global energy shocks** to households in Asia-Pacific. The IMF (2022) stresses the importance of social safety nets in policy development to protect the most vulnerable. They advise that countries provide targeted support relying on existing social protection programs, expand existing programmes, implement digital solutions, and commit to eliminating subsidies in the coming years.

**FIGURE 11** Change in CO2 emissions from energy



Energy, economy, and climate – what does energy intensity mean for CO2 emissions? This chart shows the evolving relationship between carbon intensity, energy intensity, and economic activity over the last 30 years. Despite turbulence, the relationship between the three has remained consistent. Decreases in energy intensity bring with it decreases in carbon intensity. In 2020, the relationship between energy and economic activity was highlighted when decreases to both are witnessed, coinciding with the COVID-19 pandemic.

<sup>8</sup> World Bank (2022). <https://blogs.worldbank.org/developmenttalk/energy-shock-could-sap-global-growth-years>

## II. Green, clean and (un)sustainable: A future for renewable energy

Renewable energy is becoming a cheaper, more efficient and increasingly reliable way to power homes, businesses, and infrastructure across Asia-Pacific. Increasing the production and consumption of renewable energy offers a path to implementing [SDG 7 – Affordable and Clean Energy](#), and ensures everyone can access affordable, reliable, sustainable and modern energy.

### Dependency risks

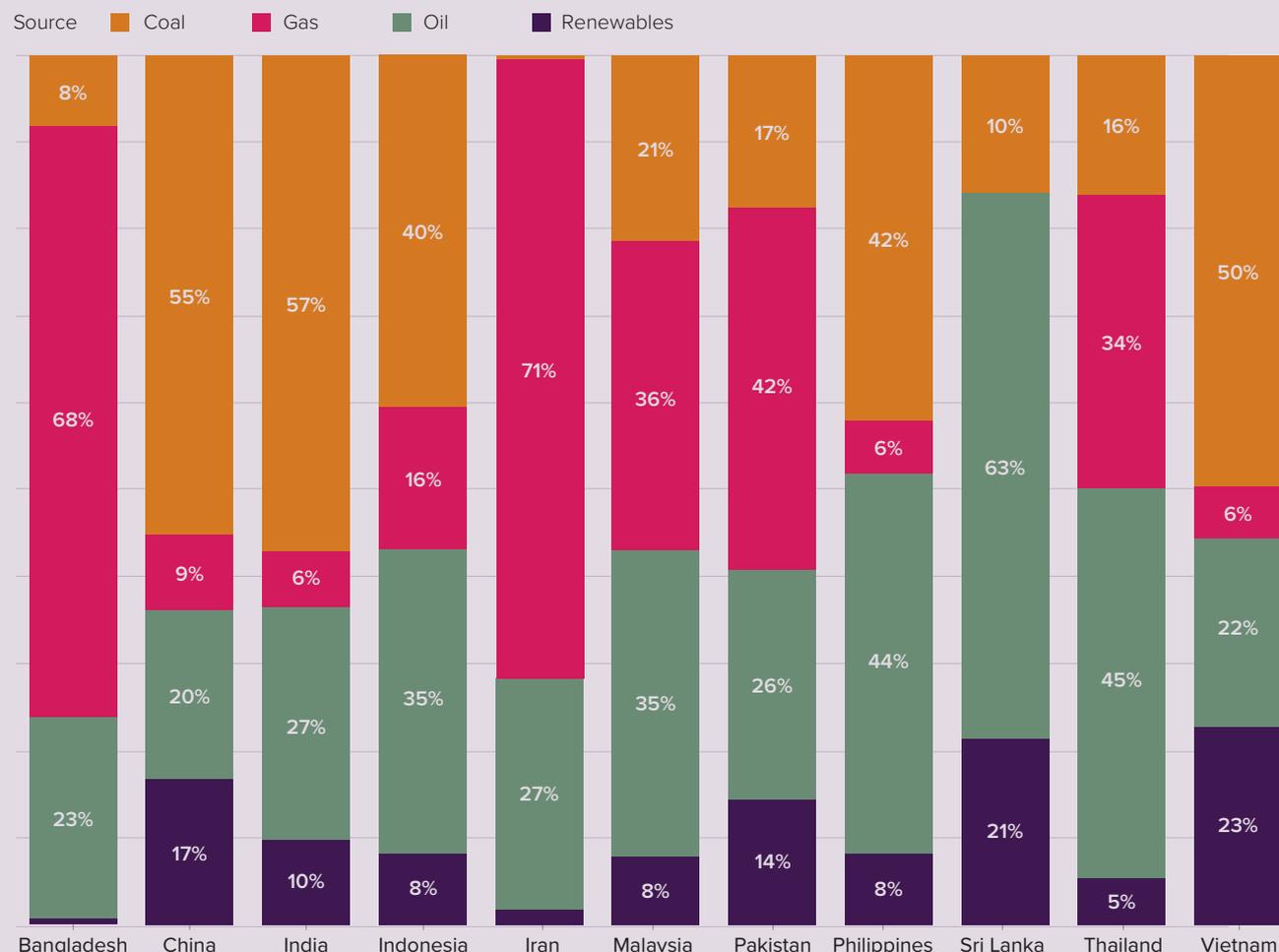
The energy portfolio mix of Asia-Pacific, shown below, shows a **dependency on fossil fuels** throughout the region. While the percentage of renewables in the energy mix varies between countries, the overall proportion of energy

sourced from renewables remains low compared to coal, oil, and gas.

Bangladesh and Iran in particular have an overwhelming reliance on fossil fuels, with 99 percent and 98 percent (respectively) of their energy portfolio derived from coal, oil and gas.

The impacts of this fossil fuel dependency are substantial and far-reaching. The section [Energy inflation and the cost for food security](#), discusses recent global events causing oil prices to soar and bringing insecurity through cascading effects on supply chains, affecting food, transport and economies ([ADB, 2022](#)).

**FIGURE 12: Energy Portfolio Mix for Asia Pacific as of 2021**



Energy, economy and climate – what does energy intensity mean for CO2 emissions? Presenting the energy portfolio mix of Asia-Pacific, this chart shows a dependency on fossil fuels for the countries shown throughout the region.

Another **key risk of fossil fuel dependency relates to greenhouse gas (GHG) emissions**. For instance, due to their dependency on fossil fuels, South and Southeast Asia have the world's fastest growing rate of GHG emissions ([ADB, 2022](#)). The health implications are significant as well, with air pollution from emissions recently being linked to 2.2 million premature deaths every year in Asia-Pacific ([WHO, 2018](#)). This comes as China moves to postpone the expansion of their Emission Trading System (ETS)<sup>9</sup>, which was launched for the energy sector in 2021 ([Bloomberg, 2022](#)).

The changes in CO2 emissions demonstrates that increases and declines in economic activity were mirrored by total CO2 emissions, particularly after economic activity receded and bounced back in line with restrictions imposed during the COVID-19 pandemic. The close link between emissions and economic activity highlights that fossil fuel dependencies paired with postponements in schemes aiming to reduce emissions have broad and significant implications.

There are, however, signs of change. Since 2000, a gradual increase has been observed in the share of renewables used in Asia-Pacific for electricity production, rising from 5 percent in 2000 to 13 percent by 2021 ([Enerdata, 2021](#)). China, which currently has the world's largest fleet of renewables (at 17 percent of its energy mix), had larger increases in renewable electricity generation than any other country ([IEA, 2021](#); [Bloomberg, 2022](#)). Vietnam is also experiencing significant progress in renewable energy production, particularly in solar energy. Between 2017 and 2021, the country had the fastest increase in usage globally, making it the tenth biggest producer of solar power by 2021 and a leader in reducing fossil fuel dependency in Asia and the Pacific looking forward ([Economist, 2022](#)).

In general, the **Asia-Pacific region is forecasted to become a key player in renewable energy development** throughout the next decade,

reducing its dependency on fossil fuels. A 2020 IEA assessment stated that more than half of electricity in Asia-Pacific could be produced from renewable sources by 2050. However, disruptions in supply chains and economic activity through the COVID-19 pandemic – and further challenged by the global impact of the conflict in Ukraine – have created uncertainties in projections for future renewable production due to rising commodity, energy, and shipping prices for the resources needed. Signals of this uncertainty were witnessed in 2021, when annual additions of renewable capacity dropped by 5 percent ([IEA, 2022](#)).

### Resilience to shocks and projections for renewable growth

Recent global and geopolitical events demonstrate the importance of energy resilience. Globally, countries have been affected by extremely high and volatile energy prices. A 2022 [report](#) by the UN Global Crisis Response Group (GCRG) suggests that **further turmoil in energy markets** is expected, with significant global implications. Among other trends, it is anticipated that the **cost-of-living crisis will push more people into food insecurity and extreme poverty** by the end of 2022, creating broader implications for sustainable development outcomes in Asia-Pacific. This includes cascading impacts on nutrition and health outcomes, which are likely to result in the intensification of social unrest and political instability.

Equally, growth outlooks have diminished due to **concerns of a potential 'stagflation'**, or a period of slow economic growth and high unemployment, coinciding with rising inflation ([WEF, 2021](#)). While Asia-Pacific's trade and financial exposure to Russia and Ukraine is limited, economies in the region are affected by higher commodity prices, slower trade and a resurgent pandemic ([IMF 2022](#)). Beyond stagflation, **'greenflation' is another challenge** amid the transition to more sustainable

9 Launched in 2017, the ETS allocates emissions allowances to enterprises based on their outputs and enterprises can sell or share unused allowances. The ETS initially covered coal and gas fired power plants, and plans were to extend the scheme to other industries which the end goal of limiting and reducing CO2 emissions ([IEA, 2020](#)).

energy sources. Greenflation refers to inflation in the prices of commodities used in renewable energy production, such as the minerals used in renewable technologies. As demand for those minerals increases, the supply will become constrained, causing inflated prices and a drive to produce more resources ([Schnabel, 2022](#)).

### Sustainable consumption and production for renewable energy

Despite the risks they pose, dependencies are also increasingly perceived as an opportunity. Renewable energy sources facilitate the greatest reduction in exposure to the volatility of fossil fuel prices, particularly in countries who are dependent on fuel imports ([IEA, 2022](#)). However, **care must be taken in the renewable transition to mitigate potential challenges**. For example, a transition from fossil fuel energy production to renewable energy production will also require a transition in the skills and capabilities of the energy sectors' workforce. While the renewable sector provides socio-economic gains and employment, it must be supported by labour market incentives, industrial policies and the adoption of social protection measures ([IRENA, 2021](#)).

HS 2.0 signals equally reflect a concern for how responsibly renewable energy transitions and production are carried out, meaning considerable of – and mitigating – its environmental footprint. For instance, mining for the minerals used in the production of renewable technologies could see large areas of land destroyed, and the mining processes themselves can consume large amounts of energy and water, generate hazardous waste and produce air pollution – with mining accounting for 22 percent of global industrial emissions ([Stone, 2022](#)).

### Increased demand for minerals could also see mining exploitation carried to life below water.

The resource-rich submarine Clarion-Clipperton Zone (CCZ)<sup>10</sup>, found under the Pacific Ocean, is estimated to hold 21 billion tonnes of minerals used in renewable energy production. Seeking to support their economic development, and despite unknown environmental impacts, some Pacific Island nations within the CCZ have already begun to sponsor mining companies for deep-sea mining ([Mcdonald, 2021](#)). Moreover, scanning towards the end of renewable technology's lifecycle, one signal identified that improper and unsustainable electronic waste (e-waste), despite being classified as hazardous waste, is increasing. This has been attributed to low transparency in customs procedures; limited knowledge of customs officials and police to discover illegal e-waste imports; and gaps in existing rules and regulations on e-waste management and regulation ([Hien, 2019](#)).

### Fueling innovation & infrastructure

Increased **interest and investment in renewables will nevertheless trigger technological innovation, greening of infrastructure and broader efficiency drives**, regardless of the challenges discussed. Several HS 2.0 signals indicated the potential for emerging technologies to make extraction of materials required for the renewable energy transition more sustainable ([Stone, 2022](#)). For instance, where solar panels were previously limited by their inefficiency on overcast days and at night, advancements in technology are signaling the emergence of market-ready nocturnal solar panels ([WEF, 2022](#)).

Another innovation to address the intermittency of solar energy is the **advancement in energy storage systems**.<sup>11</sup> The energy storage market is forecast to increase twentyfold between 2020 and 2030, driven by supportive policies, climate

<sup>10</sup> The Clarion-Clipperton Zone (CCZ) covers a 5,000 kilometre area under the Pacific Ocean, recent expeditions have found the marine area to be rich in marine life. However, the sediment within the CCZ is also home to mineral sources of great mining interest, opening up the region to exploitation through deep sea mining. For more information see the National Oceanic and Atmospheric Administration's [information pages](#).

<sup>11</sup> Energy storage systems can store solar and wind energy so that it can be used to respond to fluctuations in demand at any time, making the energy infrastructure more resilient ([EESI, 2019](#)).

commitments and increased demand to store solar and wind generated energy ([Bloomberg NEF, 2021](#)). For countries in Asia-Pacific, which represented six of the top ten solar energy producers in 2020, these innovations can bring consistency and reliability to the solar and wind energy market ([IRENA, 2022](#)).

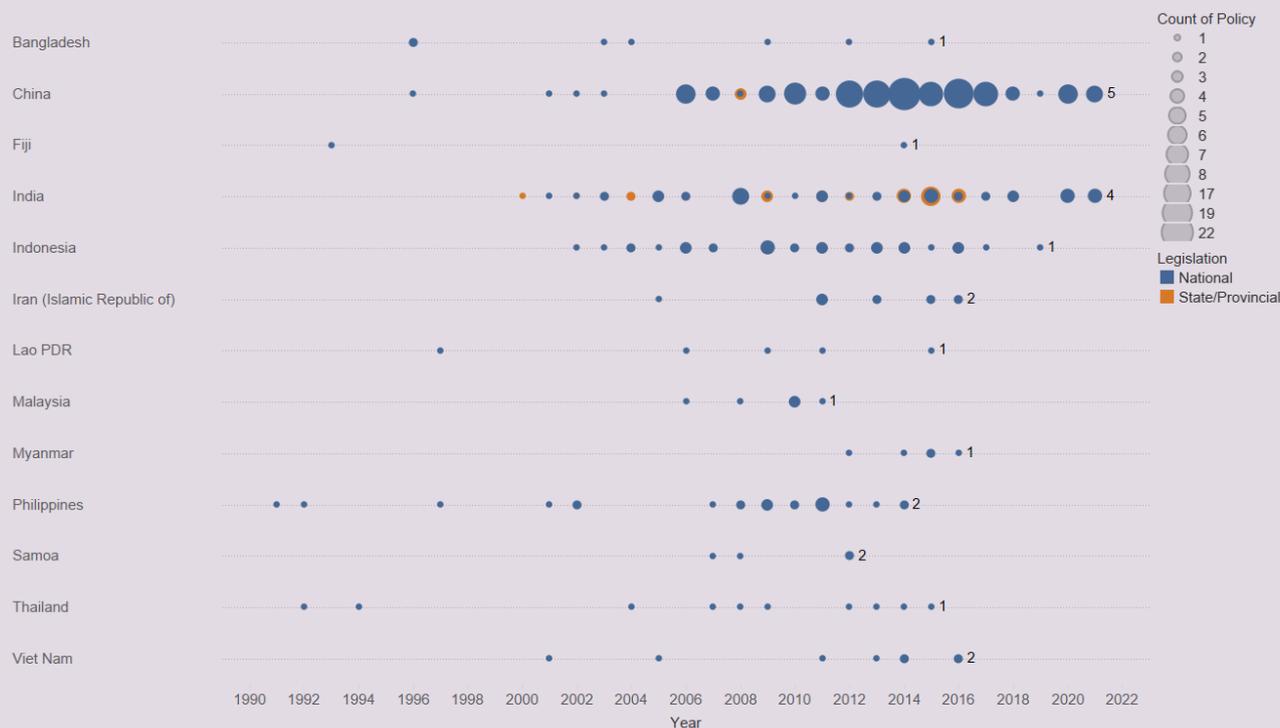
As renewable energy sources become more affordable and reliable, they may also contribute towards the **electrification and sustainable development of rural areas** that are likely to have limited access to electricity grids ([Hossain et al., 2014](#)). However, despite the many opportunities presented by developments in energy technology, innovation in technology can bring challenges to the energy sector. The **rise of non-fungible tokens (NFTs) in Asia-Pacific**, for instance, has had wider cultural, economic, and social impacts on business models in the creative industry throughout Asia-Pacific ([Tng, 2021](#)). Yet, growing consumer demand amid limited understanding of the environmental impact of NFTs' carbon footprint is of concern, as one of the HS 2.0 signals indicated. Similarly, **cryptocurrencies**, which are discussed in the [section Governing 'datafication'](#), consume large

amounts of energy in their production, yet have shown to be key features of digital innovation across Asia-Pacific ([Shumba, 2021](#)). **Encouraging sustainable approaches in innovation**, such as the use of renewable energy sources, can be a way to support digital creativity in the region whilst also minimizing the impacts of energy intensive production.

### Looking forward at a renewable future

Due to the volatility of the energy crisis and looming market uncertainties, it is challenging to forecast trends in renewable energy production. As faster policy implementation is assessed to drive growth of renewables, forecasting renewable growth for 2023 and beyond will depend on the introduction and implementation of new and stronger policies in the next six months ([IEA, 2022](#)). **Monitoring the introduction and implementation of such policies**, as expanded upon in the chart "Renewables Policies in Asia Pacific" (IEA/IRENA), can be a key signal of renewable growth in the region as well as inform adaptive planning and anticipatory governance for development and energy resilience in Asia-Pacific.

**FIGURE 13: Renewables Policies in Asia Pacific**



Number of policies on size and legislation on color. The year corresponds to the year in which the policies were put in place. Source: IEA/IRENA Renewables Policies Database. Accessed September 2022.

Representing information on policy trends from the IEA (2022), this chart shows that the number of policies in the region increased in the 2000's and 2010's. However, the data suggests the number of policies implemented has stalled towards the late 2010's and early 2020's. Of the policies implemented, the majority are at the national level, with few state/provincial level policies – the majority of which are in India. Interestingly, the number of renewable energy policies shown here do not always correlate to the percentage of renewables in the energy portfolio mix of a country shown above. China, for example, leads in the number of renewable policies implemented, yet it is Vietnam with comparatively few policies which has the highest percentage of renewables in its energy portfolio.

Substantial challenges remain as renewable energy production grows and, in an increasingly insecure energy market, there are no straightforward predictions of what a renewable future will look like. The HS 2.0 signals show no doubt of the importance of this transition towards renewables, yet **whether its execution is handled responsibly will define the path to energy resilience** for Asia and the Pacific. The *'Exploring Meaning'* section further explores possible pathways forward through a scenario-based application of HS 2.0 signals: *What if... a renewable energy boom does not come with responsible mining?*

### III. Exceptional is the new normal: preparedness for sudden-onset disasters

#### Medium- to large-scale disasters will increase 40 percent between 2015 and 2030 (UN, 2022).

According to WMO, between 1970 and 2019, the number of weather-related disasters has already increased by a factor of five, driven by climate change, more extreme weather as well as improved reporting, highlighting the need for enhanced data collection and monitoring to have an all-encompassing view of existing hazards. Asia alone – without considering the south and west Pacific – accounts for approximately a third (31 percent) of climate-related disasters globally, a third of their associated economic losses and nearly half of all deaths (WMO, 2021). Floods (general-, riverine- and flash floods), tropical

cyclones and general storms are the most frequent and damaging sudden-onset hazards.

As shown in the graph below, in Asia, between 1970 and 2019, about 3,450 disasters were recorded, causing some 975,620 deaths and US\$2 trillion reported in economic damages ([UN News 2021](#)). Moreover, environmental degradation and climate change increasingly generate cascading, consecutive or interrelated (compound) hazards – challenging response efforts and highlighting the **need for multi-hazard risk approaches** to analysis and resilience-building ([Anticipation Hub, 2021](#); [UN, 2022](#)).<sup>12</sup>

Interestingly, the majority of HS 2.0 signals related to sudden-onset hazards pointed to floods, heatwaves and wildfires, but no mention was made of tropical cyclones. One signal captured a rise in severe sand and dust storm.

### Flood is thicker than water

As stated, flooding is among the leading climatic threats to people's livelihoods, affecting development prospects worldwide and reversing years of progress in poverty reduction ([World Bank, 2022](#)).

At 668 million people, **East Asia has the highest number of flood-exposed people**, corresponding to about 28 percent of its total population. Almost 70 percent (1.24 billion) of flood-exposed people live in South and East Asia, with China and India alone accounting for over one-third of the global exposure. In several South and East Asian subnational areas, more than two-thirds of the population are exposed to significant flood risk ([World Bank, 2022](#)).

According to climate models, the **wet season in Asia-Pacific will become increasingly more concentrated, while the dry season will last longer**, with low-lying coastal territories and lower-altitude regions being the most at risk. The record-breaking floods that recently impacted

Pakistan, submerging one-third of the country and impacting over 33 million people, already caused over US\$10 billion worth of economic damage ([BBC, 2022](#)). Exemplifying the cascading risks of natural hazards, stagnant flood waters are currently posing public health risks, particularly for vulnerable populations with limited resources, and in affected areas with overwhelmed or damaged infrastructure. WHO is urging governments to expand surveillance of water and vector-borne diseases, polio and COVID-19 to prevent outbreaks, while ensuring access to essential health care services ([UN News, 2022](#)).

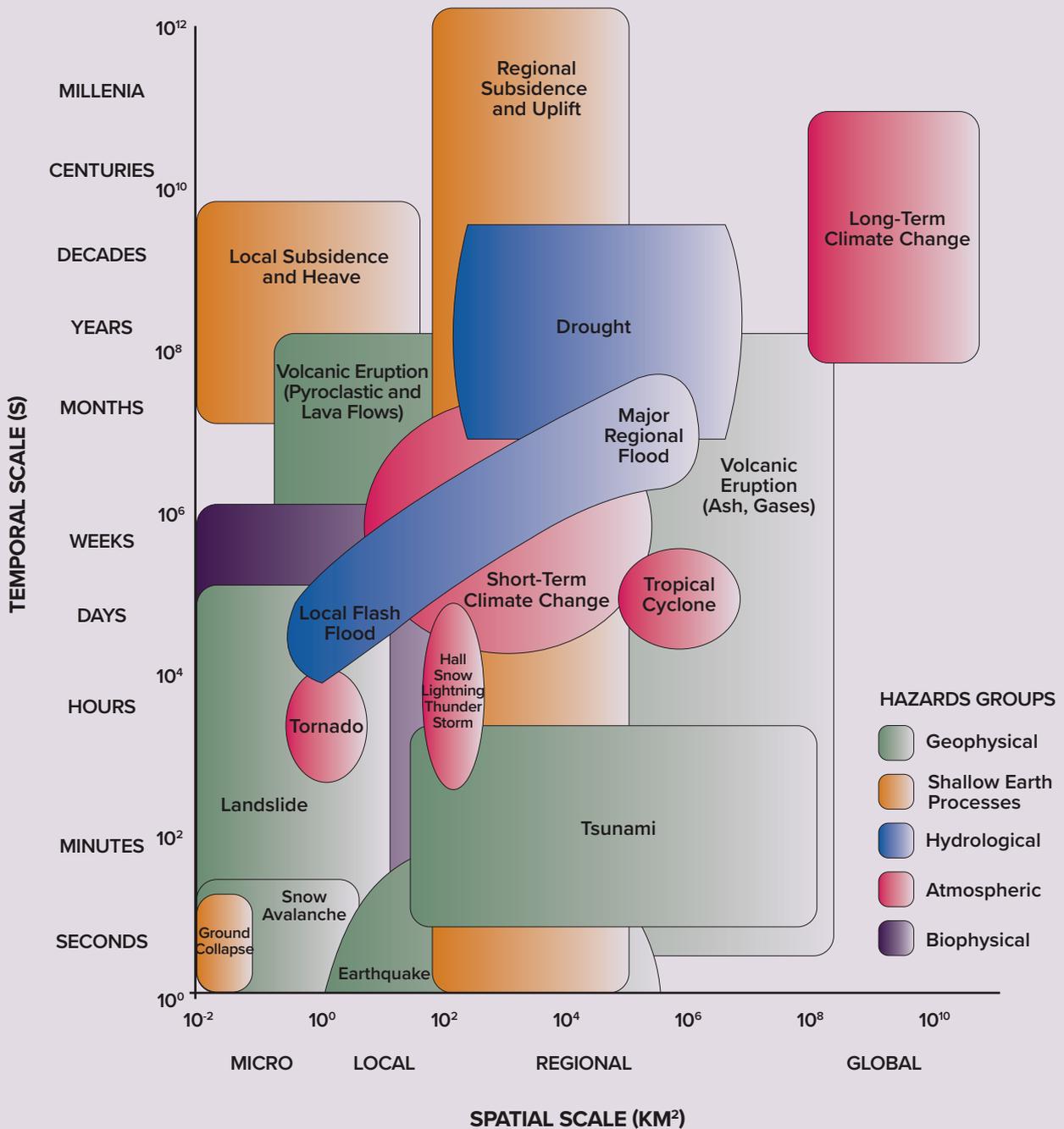
Current research shows that by 2050, 300 million people could live in places where climate-triggered flooding would likely occur, with the most vulnerable being in Asian countries, such as China, India, Bangladesh and Vietnam ([Financial Times, 2020](#)). As temperatures keep rising, the occurrence of **record floods will become the new norm** ([UNEP, 2020](#)), causing extensive losses to fisheries resources, agriculture, biodiversity and livelihoods.

### Earth, wind and fire

As discussed in the introduction, **South Asia is the most affected region by heat stress**. [Beijing Climate Centre \(BCC\)](#) indicated that the combined intensity of the June-July 2022 regional heatwave superseded 60-year-old records in China ([China Meteorological Administration, 2022](#)) and caused 90 fatalities in both India and Pakistan. Given their wide geographical extension and duration, these **heatwaves should be a once-in-a-century event, yet a recent study established that these heatwaves are 30 times more likely by the climate crisis and could become one-in-five-year events** if global heating increases to 2 degrees Celsius ([IPCC 2022](#); [Al Jazeera, 2022](#)).

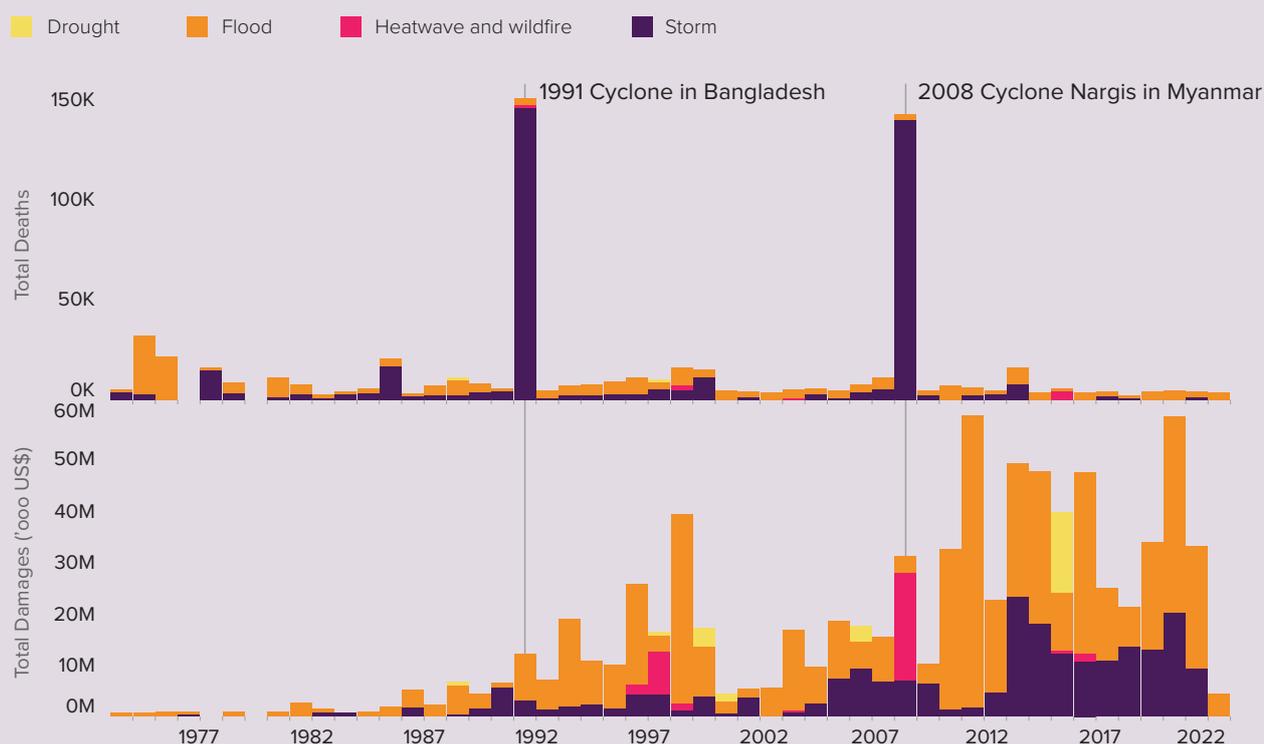
<sup>12</sup> The [2022 Global Assessment Report on Disaster Risk Reduction](#) and the [Asia Pacific Risk & Resilience Portal](#) constitute valuable resources for exploring how structures are evolving to better address systemic risk.

**FIGURE 14** Temporal and spatial scale of different categories of single hazard



Temporal and spatial scale of different categories of single hazard taken from Gill & Malamud (2014). Source: [Multi-Hazard Risk Analysis Methodologies - Anticipation Hub \(anticipation-hub.org\)](https://www.anticipation-hub.org/)

**FIGURE 15** Death and damage from climate-related disaster in Asia Pacific



Countries considered: Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Iran (Islamic Republic of), Lao PDR, Myanmar, Malaysia, Maldives, Mongolia, Nepal, Pakistan, Papua New Guinea, Philippines, Samoa, Sri Lanka, Thailand, Timor-Leste, Viet Nam. Time period between 1973 and 2022.

Source: EM-DAT. Accessed September 2022

Heatwaves can also contribute to more wildfires, which are equally becoming an expected part of seasonal calendars in Asia and the Pacific, yet deaths and damages due to these two hazards are more difficult to assess. Wildfires significantly affect the global carbon cycle and economies, as well as have detrimental effects on respiratory and cardiovascular health, wildlife and biodiversity and water catchments. In its 2022 report, *Spreading like Wildfire*, UNEP estimates that, due to climate change and land use planning, extreme fires will increase up to 14 percent by 2030, 30 percent by the end of 2050 and 50 percent by the end of the century. **Wildfires could also trigger tipping points** as the large amounts of carbon dioxide (CO<sub>2</sub>) they produce broaden and intensify the conditions that start wildfires in a positive feedback loop ([Visual Capitalist, 2022](#)).

### Sand storms: the dark horse of natural hazards?

Sand and dust storms (SDS) are complex events with transboundary impacts ([World Bank, 2019](#)). Besides a broad range of health impacts, including as a cause and aggravation of asthma, bronchitis, lung cancer, respiratory diseases and infections, SDS also can severely impact agriculture, transport, infrastructures, industries, political stability and the environment in general. Last year, Central Asia witnessed the worst sand storm in over a decade, with big environmental and economic impacts, harming air quality for millions of people and directly killing 9 people ([WMO, 2021](#)).

Sand and dust storms are strongly related to climate change, and **their impact in the West and Central Asia region has been increasing** in the past few years, exacerbated by intensified droughts, wind erosion and extreme weather events. Given the **transboundary nature** of this hazard, action in individual countries will not be

sufficient to slow down its impact. Rather, global adaptation efforts – as well as the establishment of **regional early warning systems** – will be vital to cope with the consequences of SDS ([The Lancet, 2021](#)). A good example is given by the [United Nations Convention to Combat Desertification \(UNCCD\)](#), a legally binding international agreement established in 1994 and made up of 19 members, which works on the challenges linking the environment and development to sustainable land management.

Both signals and recent publications outline a gloomy picture when it comes to sudden-onset hazards, with their increasingly violent and frequent impact being observed year after year. Yet there is another set of hazards whose consequences are not as evident, as is the focus of the next section.

## IV. A boiling frog syndrome? Climate change and slow-onset cascading risks

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*“Traditionally, intensive disasters are the ones that grab the headlines, but while slow-onset events are not as dramatic, they are much more insidious and long-term,”* declared Tiziana Bonapace, director of the Disaster Risk Reduction division at the United Nations Economic and Social Commission for Asia and the Pacific ([DEVEX, 2021](#)).

**Slow-onset disasters account for nearly two-thirds of disaster losses** in the region; and annualized economic losses more than quadruple to USD \$675 billion when slow-onset disasters are added to the region’s risk scape ([UNESCAP, 2019](#)). Signals indicate that the main slow-onset risks for Asia and the Pacific are **drought and several processes related to the oceans**, including sea level rise, temperature increase, acidification and saltwater intrusion.

### Droughts: an underreported threat

Droughts have deep, widespread and underestimated impacts on societies, ecosystems and economies. The extensive impacts of drought are consistently underreported, even though they span large areas, cascade through systems and scales and linger through time ([GAR, 2021](#)). With much of the Asian population living in drought-prone areas, **water scarcity is a prevailing risk** across Asia through water and food shortages leading to malnutrition ([IPCC, 2022](#)). In the early part of the 20th century, millions of people in Asia and the Pacific died from drought, and billions more were affected. Since 1970, drought has claimed far fewer lives at 5,700 people, but has still affected more than 1.6 billion people and cost more than US\$53 billion in damage ([UNESCAP, 2015](#)).<sup>13</sup>

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<sup>13</sup> For this reason, UNESCAP has established the [Regional Cooperative Mechanism for Drought Monitoring and Early Warning in Asia and the Pacific](#), also known as the Drought Mechanism. This regional mechanism uses data and imagery from the region’s spacefaring countries – such as, Thailand, India, China, Japan and others – and shares it with other countries, especially those perennially prone to drought.

**FIGURE 16: Additional population exposed to annual coastal floods due to sea level rise, as a share of actual population (%).**



Source: Kulp & Strauss (2019)

The chart describes the range of projected populations on vulnerable land assuming intermediate carbon emissions (RCP 4.5) for 2050 and 2100. Maldives could expect more than half of its population to be exposed to coastal floods by 2100, followed by Bangladesh (35%) and Vietnam (22%). More than 70% of the total number of people worldwide currently living on implicated land are in eight Asian countries: China, Bangladesh, India, Vietnam, Indonesia, Thailand, the Philippines, and Japan.

### “Save our oceans, protect our future”<sup>14</sup>

The [WMO 2021 State of the Global Climate Report](#) states that **both ocean heat content and ocean acidification** – namely the process occurring when CO<sub>2</sub> absorbed by the oceans reacts with seawater thus reducing the pH levels – **hit a new peak** level last year. Ocean acidification poses a major threat to organisms and the balance of ecosystem services, with potential devastating consequences on food security, coastal protection and tourism-dependent economies ([WMO, 2021](#)). These processes also pose a major threat to the ocean’s biodiversity, especially to warm-water coral reefs in coastal areas of the Pacific and Indian oceans.

Southeast Asia contains nearly 100,000 square kilometers of coral reefs, accounting for nearly 34 percent of the world’s total. These reefs feature the highest levels of marine biodiversity on the planet, however, about 60 percent of coral reefs in the region are at risk from coral bleaching and destructive human activities ([UNESCAP, 2022](#)).

When it comes to ocean-related slow-onset processes, however, the **most unsettling signal for the Asia and Pacific region is sea level rise**. The 2022 IPCC Sixth Assessment Report reiterates that this hazard poses a distinctive and severe adaptation challenge, as it implies dealing with slow-onset changes and increased frequency and magnitude of extreme sea level events. There is *high confidence* the situation will escalate in the coming decades ([IPCC, 2022](#)).

The sea level on Asian coasts is also rising at a faster pace compared to the global average. According to projections, **70 percent of the people that will be affected by rising sea levels worldwide are located in just eight Asian countries: China, Bangladesh, India, Vietnam, Indonesia, Thailand, the Philippines, and Japan** ([Visual Capitalist, 2022](#)). Concurrently, mainly due to groundwater extraction, Asian cities are subsiding at a more rapid rate than anywhere else in the world, at a pace that is even faster compared to sea level rise ([Wu et al., 2022](#)). **Land subsidence increases the risk of flooding and might lead to cascading events not captured by existing models**, therefore

<sup>14</sup> This was the title of the [UN World Oceans Conference](#), held from 27 June to 1 July 2022 in Lisbon, during which stakeholders reunited at a critical time to mobilize action and propel science-based innovative solutions to protect the health of oceans and their resources.

any adaptation efforts should consider multiple scenarios and compounded risks.

As sea levels rise along the coasts, saltwater can move onto the land, especially when storm surges or high tides overtop areas low in elevation, in a phenomenon called **saltwater intrusion**. This also occurs when saltwater infiltrates freshwater aquifers and raises the groundwater table below the soil surface, likely leading to shortages of drinking and irrigation water and causing dramatic changes in aquatic ecosystems as well as agricultural land.

Changes in river salinity and the availability of freshwater will also affect the productivity of many capture fisheries ([The World Bank, 2014](#)). For instance, in the Mekong Delta, the hydrogeological systems have been transformed from an almost undisturbed state to a human-impacted one, with saltwater intrusion into surface water. Moreover, groundwater systems have grown to be a detrimental issue recently, seriously threatening freshwater supply and degrading the eco-environment ([Xiao et al., 2021](#)).<sup>15</sup>

The cases presented in this chapter are just a few examples of the interconnected impact of slow-onset events, but they provide a clear outline of what we can expect if we do not take early action. It is therefore vital that resilience-building efforts in the region are not just channelled toward sudden-onset events, but also more widespread and creeping slow-onset hazards that are increasingly exacerbated by climate change. While communication and outreach on this topic have received increased recognition in recent years, the amount of investment and strategies to reduce their risks is still unmatched by the actions taken for the far more sensational and visible impact of floods and wildfires.

## V. Education in Emergencies

Education is a fundamental human right, and equitable access to quality education is at the core of *SDG 4*. More and better quality education often translates to better employment opportunities and higher incomes, breaking vicious cycles of poverty and inequality and stimulating national economic growth. Similarly, gender equality and human and environmental health improve with access to the knowledge and opportunities that education provides ([ESCAP, 2018](#)).

Emergencies and crises threaten to reverse educational gains and undermine progress in sustainable development and in UNDP's development pathways. They frequently cause widespread disruption to education for children, youth and adults – although data on disruptions to adult learning is limited – with the potential for long-term repercussions.

The COVID-19 pandemic saw public spending on education dwindle as finances were channelled towards emergency response, whilst costs to sustain education increased. Education became a comparatively low priority for governments, with UNESCO estimating that education accounted for less than one percent of government stimulus packages in Asia-Pacific during the pandemic ([NEP, 2022](#)).

It is fitting that against a backdrop of severe disruptions to education globally resulting from COVID19, compounded by more localised educational disruptions resulting from crises, including the military coup in Myanmar and Taliban take-over in Afghanistan, HS 2.0 signals relating to educational inequalities and disruptions were considered of high importance.

<sup>15</sup> The latest [2022 UNESCAP Asia-Pacific Disaster Report](#) provides a comprehensive outlook of how these hazards interrelate under the disaster-climate-health nexus, and how exposure and vulnerability vary within the different sub-regions of the continent.

## Persistent educational inequalities

Across Asia and the Pacific, **substantial educational inequalities exist**. Secondary school enrolment rates vary significantly between and within countries, and dropout rates are high in some areas (ESCAP, 2018), compounded by extrinsic shocks such as the COVID-19 pandemic and climate crisis. In Cambodia, signals point to disparities in quality of education between private schools, which mostly serve affluent urban areas, and public schools which serve rural populations, with similar patterns elsewhere in the region. Public schools frequently have **higher dropout rates, and lower educational attainment and English proficiency**, which is regarded as a cornerstone of development (Khmer Times, 2022).

Low literacy skills are strongly associated with poverty and socioeconomic inequalities. In low-income countries in Asia-Pacific, it is estimated that 90 percent of children and adolescents enrolled in school do not achieve basic literacy and numeracy skills (Ugwuegbula, 2019). This proportion is expected to have only increased during COVID-19 school closures. In addition, the region accounts for nearly 60 percent of the world's illiterate adults, pointing to shortcomings in quality education (Ugwuegbula, 2019). These shortcomings were recognised by the 5<sup>th</sup> Asia-Pacific Meeting on Education 2030 (APMED2030) held in Bangkok in October 2019 – which brought together key stakeholders in the region to discuss progress and challenges in select SDG 4 targets – noting signs of stagnation and recommendations for the future. Without quality education, sustainable development is impossible.

## Remote learning in the age of COVID-19

During COVID-19 school closures, disparities widened and continue to be visible with the return of on-site learning. By April 2020, almost all schools in the region had shut down (UNESCO, 2021). During school closures, which were in some instances prolonged (for example in Bangladesh where schools were closed for nearly 18 months), governments and organisations developed

strategies for remote learning. Methods varied across Asia-Pacific; for example, in Bangladesh, educational television lessons were broadcast daily and in Fiji, daily radio broadcasts covered literacy and numeracy for grades one to eight, increasing accessibility (UNESCO, 2021). Online learning was, however, the most common method, creating **significant challenges in areas lacking technological infrastructure, digital literacy, and sufficient resources to reach rural and vulnerable populations** (UNESCO, 2021). A UNESCO-UNICEF-World Bank (2020) survey found that 38 percent of students in South Asia were unable to access any form of remote working during school closures and were subsequently left behind.

## A post-pandemic return, or not?

The implications of prolonged school closures will have **long-term effects and could last for decades**. Disruptions to adult education programmes during and after emergencies are also likely to be significant, and individuals and communities may be required to take on new responsibilities that are prioritized over their education. However, data on adult learning in emergencies is very limited.

Educational disruptions undoubtedly impacted learning, and learning losses were felt unequally, contributing to a reversal of positive education trends (Park, 2022). In addition, an ongoing study in Bangladesh signalled detrimental impacts for adolescents, especially girls, in educational aspirations, psychosocial wellbeing, and the imposition of greater restrictions on social mobility and relations (TBS, 2022), outlining just some of the manifold gendered impacts of COVID-19 (UNESCO, 2021a).

As was also discussed as part of the RBAP Regional Horizon Scanning Initiative 2021 Outcome Report (HS 1.0), “*when children do not go to school, they are at increased risk of violence, abuse and exploitation. Girls face the additional risk of teen pregnancy and early marriage*” (Hulshof and Tapiola, 2021). Additional consequences include missed school meals – impacting the health and nutrition of the millions of students across the

region who rely on them – as well as disruptions to routine vaccinations and increased incidence of child labour and trafficking.

In the return to onsite learning, authorities need to recognize that COVID-19 is a (mental) health and socio-economic issue. Schools and authorities should be prepared to provide additional emotional and financial support to students. Failure to do so could **reduce lifetime earning potential for students**, as well as **damage economic equity** across the region ([Park, 2022](#); [ADB, 2022](#)).

Strengthening support and social safety nets is also essential to prevent school dropouts. Out of some 7.2 million children of school age, 1.9 million were at risk of dropping out of school in 2021, increasing the likelihood that they will become unskilled workers in the future and trapped in a cycle of poverty ([Thai PBS World, 2022](#)). Rising poverty amongst students in Thailand, recorded by [ISEE \(2022\)](#), is likely to have contributed to this figure. To support their education and encourage school attendance, children in Thailand from low-income families at risk of dropping out are now provided with cash grants ([Hulshof and Tapiola, 2021](#)). In Vietnam, adjustments to the school curriculum aim to reduce academic pressure and psychosocial stress on students to support their learning ([Hulshof and Tapiola, 2021](#)).

Whilst most school dropouts eventually return to education, many will not if they do not receive sufficient support. The longer children are out of education, the less likely they are to return. Additional financing is necessary to establish re-enrolment campaigns and remediation programmes to support the return of the most marginalized groups ([NEP, 2022](#)). Unfortunately, budgetary allocations are failing to keep pace; the significant cuts to public spending in education made during the COVID-19 pandemic remain a significant barrier ([NEP, 2022](#)).

## A climate change – displacement - education nexus

Approximately 40.5 million new displacements were recorded globally in 2020, nearly three-quarters prompted by weather-related hazards and disasters. South Asia<sup>16</sup> is particularly vulnerable to the effects of climate change, and accounted for nearly a third (approximately 9.2 million) of new disaster displacements in 2020 ([IMDC, 2021](#)). In 2018, the [World Bank](#) estimated that **internal climate migrants in South Asia could total over 40 million by 2050**. Meanwhile, [UNICEF \(2021\)](#) estimated that in 2020, children accounted for 9.8 million of the new weather-related internal displacements.

With displacement occurring in such large numbers, the disruptive effects of climate change on education cannot be ignored. Children and young people displaced by weather- and climate-related hazards face significant barriers to accessing education. Firstly, **under international law, climate-displaced people have no explicit right to education** ([UNESCO, 2020](#)). Damage and destruction to education infrastructure or the use of schools as emergency shelters, saturated school capacity, language barriers, and discrimination create further challenges. The effects of climate change and related disasters on exacerbating poverty compound these barriers to education. In Bangladesh, for instance, climate change impacts are prompting people living in low-lying areas exposed to flooding, storms and erosion to migrate to the slums of Dhaka ([Aljazeera, 2022](#)). Aforementioned barriers, coupled with financial struggles, mean that many children are unable to attend school or forced to drop-out to instead become laborers, carrying long-term repercussions. In Bangladesh, at least 1.7 million children are laborers, with girls working in domestic labour rarely included in statistics ([UNICEF, 2022](#)).

16 At the end of 2020, China, the Philippines, Bangladesh, and India had the highest numbers of internally displaced people globally ([IMDC, 2021](#)).

A lack of education restricts future opportunities for children, leading to **intergenerational cycles of poverty and child labour**. Education must therefore go beyond re-establishing normalcy after hazard events, instead recognising its crucial role in addressing underlying inequalities and supporting the recovery of psychosocial trauma associated with disaster and displacement. Raised in April 2022 during the [Asia Pacific Regional Dialogue on Education in Emergencies](#), governments must act now to ensure that policies, plans and long-term adaptive programmes are put in place to protect educational institutions – including infrastructure, teachers and students – during and after emergencies and crises to minimise disruptions to learning and the long-term impacts associated.

For these strategies to be effective, governments must increase the presently insufficient public financing for education. This necessitates **enhanced advocacy and awareness-raising on the importance of financing for public education in emergencies** – a core objective of the [Regional Dialogue](#).

## VII. What waste: towards a trash-free future?

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Globally, we are generating more waste than ever. Across Asia-Pacific, projections indicate an 802 million tonne increase in waste generated by 2030. In Southeast Asia in particular, **waste volume is estimated to more than double between 2016 and 2030** ([ASEAN, 2020](#)).

### Waste production across Asia-Pacific

Signals indicate that in Cambodia, rapid urbanization and economic growth has led to an increased accumulation of plastic and waste, which severely affects major cities such as Phnom Penh and Sihanoukville by blocking waterways, sewage and drainage systems, and increasing exposure to flooding ([UNDP, n.d.](#)). Another signal on waste suggests that annual per capita plastic consumption in the urban municipalities of Bangladesh increased from 3.0 kg in 2005 to 9.0 kg in 2020, while only one-third of plastic waste is recycled every year ([The World Bank, 2021](#)). The High Court initiated authorities to ban single-use plastic in coastal cities and all hotels in the country, but these initiatives are challenging to sustain without cooperation between all stakeholders, public and private, with governments leading stricter enforcement.

In 2020, China also announced a five-year roadmap to significantly reduce, and even ban, several types of single-use, environmentally unfriendly plastic products. The plan, which took effect in January 2021, involves a ban on plastic straws in restaurants and non-degradable plastic bags in cities and towns by 2022 ([BBC, 2020](#)). The expected outcome of the roadmap is to effectively control plastic pollution, the sales of plastic bags significantly fell already by 2021.

Most recently, India has also declared a ban on single-use plastic items as rapid urban economic growth resulted in 14 million tonnes of plastic used annually ([ABC News, 2022](#)).

However, enforcement is often poor and as a result there is lack of compliance, while opinions are divided whether the list of items is comprehensive enough.

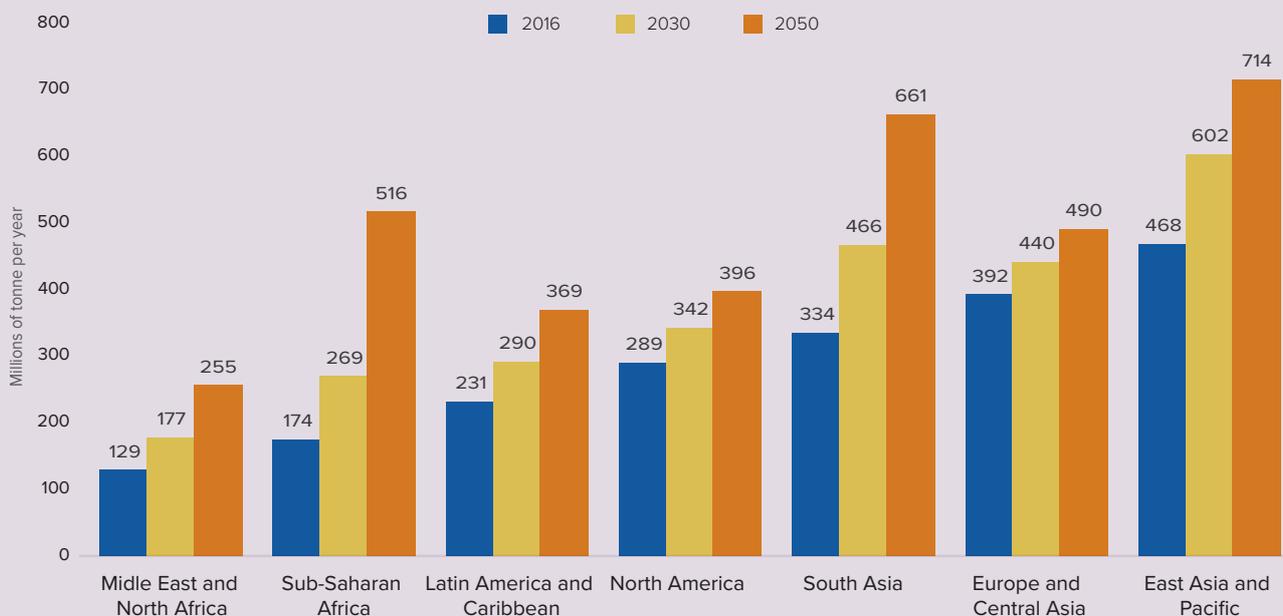
Meanwhile, research revealed that eight out of the ten rivers that carry 88-95 percent of plastic waste into ocean systems are located in the Asian continent (WEF, 2018). This is displayed by the [Visual Capitalist map](#), where the size of the blue circles illustrates higher plastic inputs from the rivers they represent. The map showcases how rapid and unsustainably planned urban sprawl in Asia Pacific has had adverse effects globally.

Behavioural change to reduce, reuse, recycle and recover is emphasized by several local and international agencies ([The World Bank, 2021](#)), in combination with investment in waste management infrastructure. A report by [Kaza and al. \(2018\)](#) 'What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050' estimates that in South Asia **waste generation will double by 2050**, as displayed in the graph "Projected waste generation by region."

Despite this prediction, the study also highlights **positive trends in waste management** emerging in Asia-Pacific countries, such as an active efforts by governments to build regulated sanitary landfills and appropriate infrastructure for waste collection, as well as strengthen policies on waste disposal and recycling. For instance, separation of cardboards, cans, metals, plastic and glass is already commonly practiced in cities in the Pacific nations.

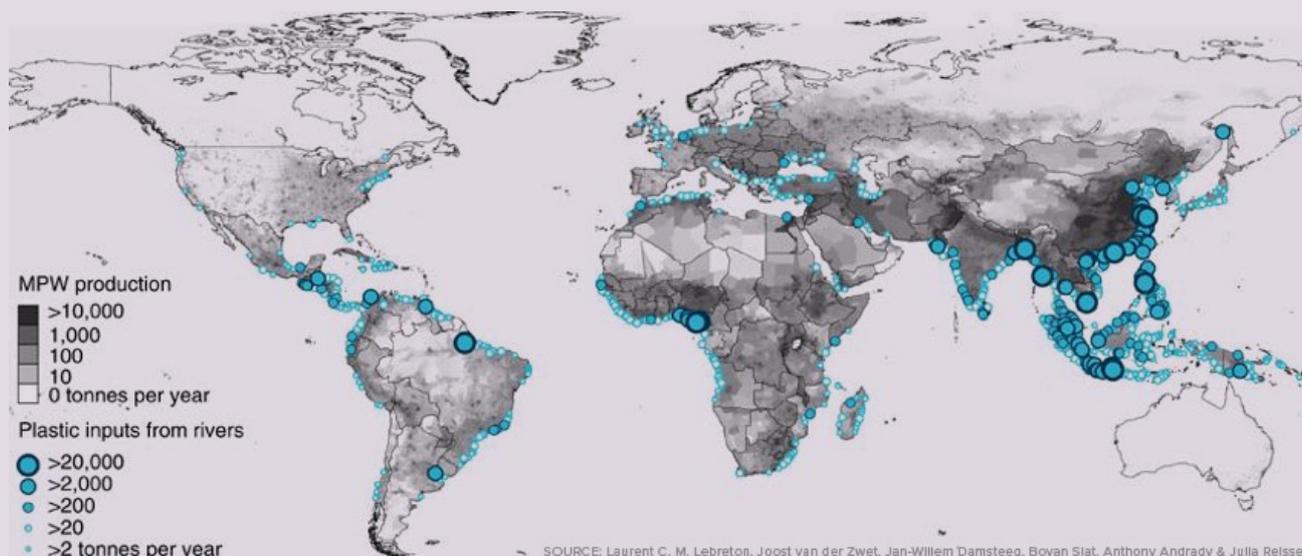
On the one hand, the intention to lower the demand for plastic goods is reflected in efforts made by the aforementioned countries, such as in the [ASEAN Framework of Action on Marine Debris](#). **Even though policies exist, however, their implementation is often weak.** Policies do not necessarily translate into breakthrough actions if not complemented by enforcement mechanisms, an effective set of binding rules and a multistakeholder approach that strictly monitors the entire value chain, from production to consumption ([Global Alliance for Incinerator Alternatives, 2021](#)).

**FIGURE 17: Projected Waste Generation by Region**



Source: Kaza and al. (2018) What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050

**FIGURE 18: Visualizing the World's Top Plastic Emitting Rivers**



Source: Visual Capitalist, Visualizing the World's Top Plastic Emitting Rivers, 2019

### Waste production through COVID-19

Several HS 2.0 signals refer to waste management in the context of the COVID-19 pandemic. In Vietnam, for instance, the pandemic added to a significant increase in plastic waste, pushing cities beyond their solid waste management capacities. A paper published by [Yadav and al. \(2022\)](#) suggests similar trends in India, China and Sri Lanka, but explains that additional, effective measures were taken in these countries to counteract a surge in plastic and hazardous (including medical) waste produced during the pandemic. In light of these findings, COVID-19 could offer opportunities for sustainable waste management across the region.

Even though improving infrastructure for waste management is a costly procedure, it would have positive spillover effects on progress towards achieving SDG 3 for good health and well-being, SG 6 for clean water and sanitation, SDG 11 for sustainable cities and communities and SDG 12 for sustainable consumption and production.

### Future challenges – the interconnected nature of waste

A key issue interconnected with waste management is contamination of water sources. **Water quality deterioration** is an existing trend in Asia. Wastewater, including domestic, is often discharged into water bodies without treatment, contaminating rivers, threatening food production and reducing access to clean water, thereby increasing the risks of water-borne diseases ([ADB, 2022](#)).

This intersection, and the growing projections for waste in the region, highlight that future policy development in Asia-Pacific must keep waste in mind. The cascading impacts of COVID-19 upon waste management have further emphasized that the **future of waste management needs to be shockproof and resilient** to crises of the future.

## VIII. Everything is Water

Water scarcity in both rural and urban areas is another challenge featured in the HS 2.0 signals, which particularly raised issues of unregulated groundwater extraction, mismanagement and corruption in water governance, and expansion of hydraulic infrastructure, which serves to store or move water. While the water supply is forecast to stay relatively the same between 2010 and 2050 in Asia, **demand is expected to rise from 66 percent to 86 percent by 2050**<sup>17</sup> (Burek et al., 2016).

### Water infrastructure in Asia Pacific

Corruption in the water and sanitation sectors, especially in the Asia-Pacific region, where several other factors are further escalating water shortages, have significant human, social, economic and environmental costs, halting or reversing development goals. **Corruption in water and sanitation and its cascading impacts on health, safety and well-being** of populations dependent on these services, as well as the trust of citizens in their government; and its **effects on attractiveness, sustainability, security, trade and tourism** is extensively discussed in Global Outlooks by the Water Integrity Network (2016 & 2021). The [Asian Development Outlook 2020](#) equally called for integrity and transparency, particularly budgetary, across water policies, water frameworks and institutions, since quality of governance and disaster financing are assessed based, among other things, on corruption perception.

The adverse effects of climate change and environmental degradation in the region, as explained in previous sections, negatively affects water infrastructure and provision. Meanwhile, rising urban population rates, as well as better housing and income growth, further increases the demand for water. At the same time, predicted water shortages in the region will cascade on

agricultural production and food security, as the need for irrigation is projected to strain existing water systems even more.

Additionally, non-revenue water (NRW) losses are still high in the region due to reasons that include poor piping infrastructure, lack of maintenance and active leak detection, illegal connection as and poor information management systems. (Australian Water Partnership, 2017; [Infrastructure Asia, n.d.](#)). In Indonesia, NRW is 32 percent, exceeding the 20 percent threshold, which results in almost US\$600 million worth of economic loss per year, while hindering initiatives to invest in renovating aging water infrastructure ([Infrastructure Asia, n.d.](#)).

Regardless of these negative trends, [UNESCO](#) (2022) projects more than US\$1 trillion to be spent to improve infrastructure for water and sanitation by 2030, 70 percent of which is likely to be invested in the ‘global South’, especially within rapidly urbanized areas. Considering the issue of corruption in the water sector, good governance will be vital to establish water facilities that are resilient in the face of external shocks and able to quickly recover from disruptions in all circumstances.

At any cost, investing in better quality water supply, treatment, storage and water resource management systems could better ensure equitable access to, and more financially sustainable use of water resources.

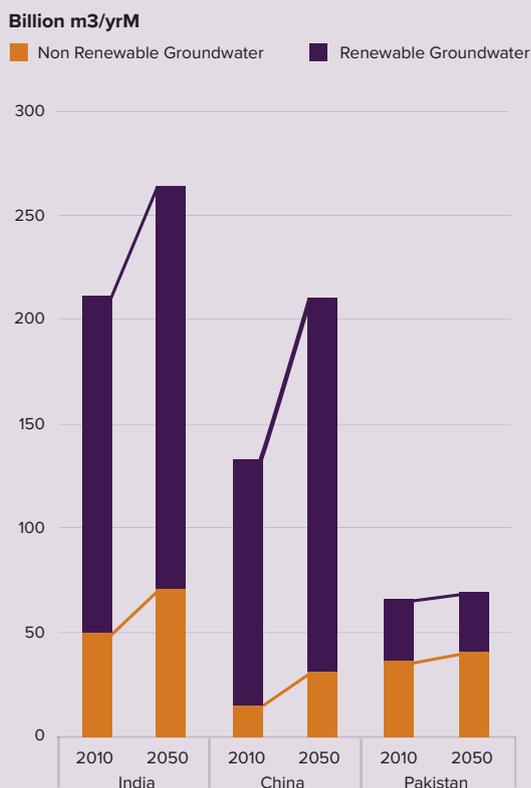
### Groundwater extraction – an urban challenge

As discussed in the [‘Save our oceans, protect our futures’](#) section, **unregulated groundwater expansion is rapidly contributing to the sinking of several highly urbanized cities** like Bangkok, Manila and Jakarta. Use of groundwater may increase by as much as 30 percent by 2050 in Asia-Pacific, with cascading impacts on energy demand, as energy is needed to pump up water (Burek et al., 2016).

<sup>17</sup> A limitation of this prediction is that it does not take into consideration changing irrigation, farming and other technological practices.

The graph “Middle of the Road” (Burek et al., 2016) shows a scenario of intermediate challenges with respect to sustainability, mitigation and adaptation, between 2010 and 2050 in India, China and Pakistan. The figure showcases a sharp increase in billion m<sup>3</sup> per year of extracted groundwater between 2010 and 2050 in these

**FIGURE 19: Piped Water Access in Asia and the Pacific**



Source: Burek et al., 2016

The other is a table taken from a World Bank (2020) publication, showing that except for China, Malaysia, Thailand, Timor-Leste, Fiji and Bhutan, less than 50 percent of the total population currently has access to piped water sources, with stark differences between rural and urban areas in some of these countries. With less than 30 percent of citizens using improved piped water, Cambodia, Mongolia, Myanmar, Papua New Guinea, Bangladesh and Pakistan display the lowest percentages among their regional peers.

three countries, with orange colour illustrating how much m<sup>3</sup> water per year extracted is non-renewable. This calls for strict regulations on groundwater use and more evaluations of its impacts on water and (urban) security in the future.

**FIGURE 20: Groundwater Abstraction in India, China, and Pakistan**

Group	Country	Proportion of population using improved water, piped (% population)		
		TOTAL	RURAL	URBAN
East Asia	Cambodia	26.13	10.87	77.28
	China	76.06	53.77	92.22
	Indonesia	18.28	13.01	22.66
	Lao PDR	49.48	32.28	82.34
	Malaysia	94.54	81.20	98.88
	Mongolia	25.13	4.98	34.45
	Myanmar	24.55	10.50	56.85
	Philippines	40.12	34.26	46.81
	Thailand	70.29	54.33	86.77
	Timor-Leste	65.55	56.71	82.67
	Vietnam	42.87	22.14	81.00
Pacific Islands	Fiji	86.97	74.32	97.01
	Papua New Guinea	18.38	12.80	55.43
	Samoa	84.90	83.73	90.07
	Solomon Islands	46.24	38.88	70.50
	Vanuatu	47.62	37.25	78.47
South Asia	Afghanistan	21.67	13.76	45.10
	Bangladesh	14.90	2.50	37.08
	Bhutan	>99.0	>99.0	>99.0
	India	43.74	31.53	67.87
	Maldives	47.80	15.00	98.30
	Nepal	47.40	45.51	55.31
	Pakistan	28.37	15.25	51.26
	Sri Lanka	38.28	30.27	73.83

Source: World Bank 2020

### Hydroelectric futures

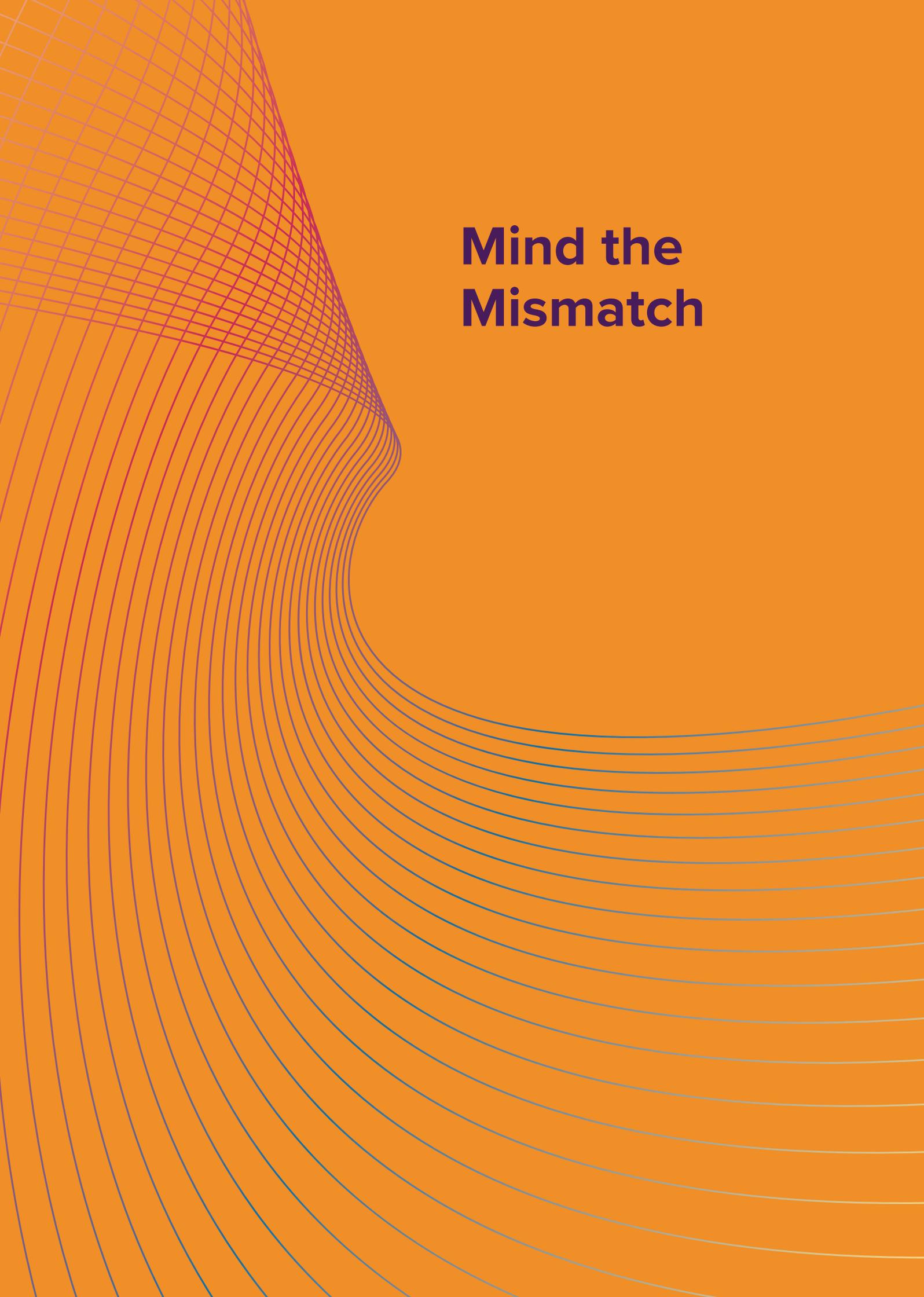
*The section ‘Green, clean and (un)sustainable: A future for renewable energy’ showcases that dependency on fossil fuels still outweigh the use of renewables in Asia and the Pacific, yet hydropower is found to be the second most important source of power after coal (Energy Monitor, 2021). As stated by the International Hydropower Association (IHA), “the untapped potential in the region is the highest in the world” (HIA, 2022).*

Large scale hydroelectricity projects to move away from heavy reliance on coal are undertaken in the Philippines, Vietnam, Myanmar and Indonesia, as well as in the Himalayan region, which consists of India, Nepal, Bhutan, Pakistan and China. Expansion of projects and strengthened agreements on hydropower are trending in Cambodia and Lao PDR as well ([COFACE 2022; HIA, 2022](#)).

Although hydropower is not always generated by dams, many are built to produce electricity for irrigation purposes or flood control, which inherently carries trade-offs for the environment. The adverse and cumulative effects of this type of hydroelectric infrastructure on biodiversity and ecosystem changes, which then indirectly have social ramifications, have been widely acknowledged ([European Investment Bank, 2019](#)). The Poyang Lake project in China, for example, intends to build a dam that cuts off the lake water from the Yangtze River during dry season, which is predicted to threaten migration patterns of birds as well as biodiversity.

Another study conducted on the impacts of Cambodia's dams in the Mekong River has highlighted that hydropower dams along the Mekong River have majorly disrupted the naturally occurring hydrological changes. These have caused, for instance, the death of some flooded forests and have blocked fish migrations ([Soukhaphon et al., 2021](#)). As communities around the river often depend on its resources, additional socioeconomic impacts relate to food, livelihood and economic insecurity as a result of fisheries losses.

Because of the complex domino chain reaction that dams can start, **sector-specific regulations when investing in hydropower** projects would benefit both the environment and the local communities that depend on its resources. Meanwhile, there is a need to better consider and evaluate the environmental, social and economic impacts prior to designing hydraulic infrastructure, in order to avoid conflicts of interest and competition over resources, especially in some of the economically fragile regions ([European Investment Bank, 2019](#)).



# Mind the Mismatch

The forward-looking development landscape of Asia and the Pacific is becoming increasingly more interconnected, complex, and increasingly uncertain. With this growing complexity also comes the risk of a *mismatch*. The theme of mismatch has emerged consistently through our signals in HS 2.0 and builds upon findings from [HS 1.0](#). The signals related to mismatches have many faces – for example, a gap between education, skills and employment; infrastructure which sees cities rise and villages stumble; or an electric vehicle revolution with no charge. Without intervention, mismatches can be the first hurdle to sustainable development, acting as a barrier to the integration of the economic, social and environmental dimensions of policy making in Asia Pacific.

Significant education challenges remain, with **high levels of illiteracy** in Pakistan and Papua New Guinea ([COFACE, 2022](#)). Sri Lanka, has taken measures to strengthen education quality, such as increased government expenditure which has allowed for the opening of additional schools, and also established a free education policy which has seen the number of students increase by 300 percent ([The Borgen Project, 2019](#)). However, **ongoing economic and political crisis**, compounded by two years of interrupted learning caused by COVID-19 is jeopardizing the school attendance of 4.8 million children, with increasing poverty and a gap in resources pushing more and more children into institutional care ([UNICEF, 2022](#)). Despite **rising enrolment rates** in the region, which have helped lower child mortality rates and reduced gender disparities, **urban-rural divides** in quality of education and available infrastructure remain, exacerbated by the interruptions caused by COVID-19.

In addition, the COVID-19 pandemic – and the consequent **hybridization** of education and labor – has accelerated the **exposure of a mismatch** between the skills taught and the skills required by economies in the region. While Vietnam, Pakistan and India have large and relatively inexpensive labor forces; Cambodia,

Thailand, Iran, Papua New Guinea, Timor-Leste and the Maldives lack a skilled workforce, face high deficits in human capital, and have high youth unemployment rates ([COFACE, 2022](#)). If the education-labor market mismatch remains unaddressed, the majority of the countries mentioned will miss out on the **economic potential** of their **demographic windows of opportunities**, and likely face significant **cascading socio-economic risks** in the medium term.

Signs of mismatch extend to **technology and infrastructure**. Despite the COVID-19 pandemic and **supply chain disruption**, electric car sales reached a record high in 2021 ([IEA, 2022](#)). With the number of electric vehicles on the road set to increase, what does this mean for the infrastructure which supports them – can energy supply meet demand? Will charging infrastructures cope?

Similar questions extend to other areas of infrastructure. **Cold chain services** are integral parts of the food section in Asia Pacific, yet projections show a mismatch between cold chain facilities and demand for perishable food ([PwC, 2019](#)).

This section captures the signals of mismatches in the future of Asia-Pacific, exploring:

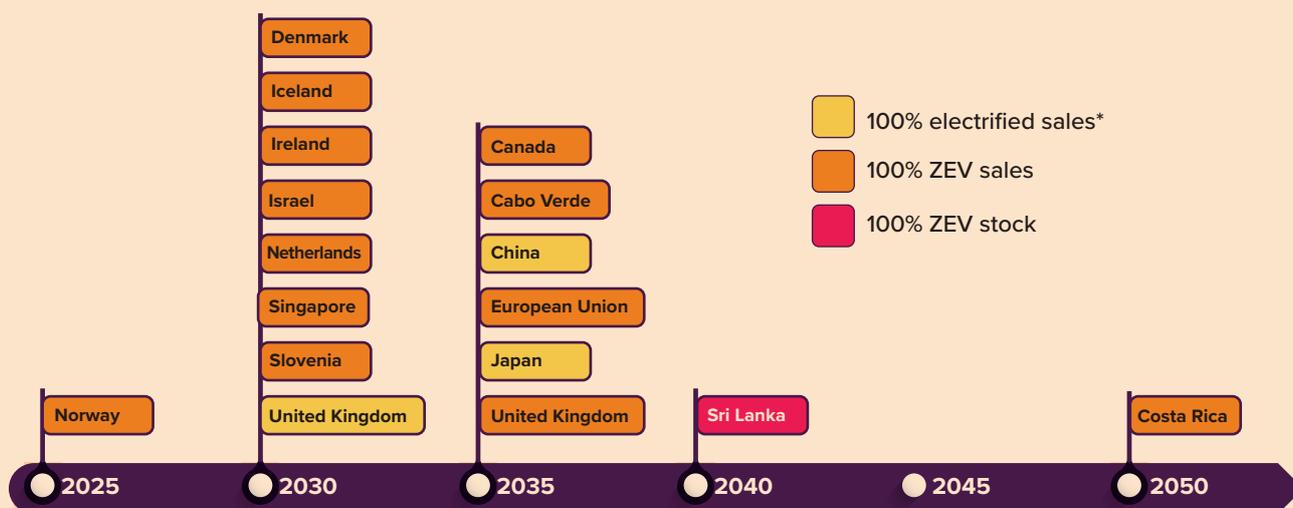
- » *Electric Vehicles (EV) and supporting infrastructure*
- » *Cold chain services – what happens when supply doesn't meet demand?*
- » *Education, skills, and the future of work: Exploring a mismatch in the labor market*
- » *Medic, medicine and medicinal shortages*

## Electric Vehicles (EV) and supporting infrastructure

Despite the COVID-19 pandemic and supply chain disruption, electric car sales reached a record high in 2021. Impressive growth meant that in 2021, China sold more EVs than the entire world did in 2020, accounting for 82 percent of new electric car sales and boasting the largest EV market worldwide (IEA, 2022; WEF, 2021).

In 2022, the EV market in China is forecast for further growth, fuelled by increasing consumer preferences, government subsidies, and increasing fossil fuel prices (IEA, 2022).

**FIGURE 21: IEA (2022). Vehicle electrification or internal combustion engine ban targets and ambition.**



Source: [Electric Vehicles – Analysis - IEA](#)

## EV growth in Asia Pacific

The Republic of Korea (ROK) has also seen significant growth in their EV sales, with EV sales doubling in 2021. However, its sales still represent a small proportion of total EV sales globally (IEA, 2022). China’s impressive growth in the EV market has been standalone, however, and has not been replicated elsewhere in Asia Pacific.

There are, however, signals of change. Transport-related behavioural changes have been identified, arising from the current fossil fuel crisis that suggest an increase in demand for EVs across the region. In Lao PDR, the fossil fuel crisis is inducing a shift to EV technology as the nation’s primary taxi firm, Loca, plans to transform all taxis into electric cars by 2030 (Vongphachanh, 2022).

However, while other nations in the region have seen sales of electric scooters and buses

expanding, the initial cost of private EVs and a lack of charging infrastructure has stalled the uptake in EVs across the region (IEA, 2022). This raises the question: what is the relationship between EV growth and charging infrastructure?

## Charging infrastructure for EVs

Research has shown the implementation of convenient and affordable charging infrastructure should occur in tandem with increases in the sale of EVs if those increases are to be sustained (IEA, 2022). An IEA report (2021) found that in most countries, the charging infrastructure does match the speed of EV growth and there are signals of this infrastructure growth across Asia Pacific.

As with EV sales, China is leading globally in the number of publicly available chargers, hosting 85 per cent of the world’s fast chargers and 55 per

cent of slow chargers (IEA, 2022). Elsewhere in Asia-Pacific, there are similar signals of charging infrastructure growth. In 2021, ROK hosted the world's highest amount of charging points per 100km of road infrastructure – however, this doesn't take into consideration the ratio of EV use to charging points (Carlier, 2022). In Lao PDR, the taxi firm mentioned above are supporting the EV transition by installing EV charging stations across the country (Vongphachanh, 2022). In Thailand, the government is offering subsidies for buyers of EVs in the country, alongside announcements to increase the number of EV charging stations (Bangkok Post, 2022).

However, despite the increased investment in charging infrastructure, there are concerns locally that there may still be a mismatch with EV demand.

### Other transport-related behavioural changes

Another signal highlighted the importance of investment in other transport infrastructure types as transport behaviour changes. In Cambodia, an increase in bicycle use has been reported and is attributed to COVID-19 (Niseiy, 2020). Provinces throughout the nation are supporting cycle infrastructure by providing more roads with bicycles lanes, a move which could increase the take up of cycling further (Kimmarita, 2022). In the first quarter of 2021, Cambodia exported \$119 million worth of bicycles, a figure which is expected to increase (Pisei, 2020). This trend could signal a reduction in fuel dependency, and opportunities for industry to develop and feed economic growth.

## Cold chain services – what happens when supply doesn't meet demand?

Cold chain services refer to the low-temperature storage, transportation and packaging of food products from harvest to table. Cold chain services are especially important in Asia and the Pacific because of the region's hot climate, as well as the increase in domestic consumption of perishable items as a result of population and economic growth (ERIA, 2019). Our signals have pointed out that underdeveloped cold chain services are resulting in high post-harvest losses and require improvements in storage, refrigeration and delivery (PwC, Rabobank, Tamasek, 2019). The Asia Food Challenge: Harvesting the Future report, supports these signals, projecting that the food and agriculture system will be struggling to keep up with rising demand not only because of inadequate cold chain facilities, but also due high operational costs, natural resources depletion and changing climate patterns.

### Geographical barriers – the urban-rural mismatch

The problem also lies in the location of fertile soils, which are often scattered across various rural areas and do not have access to adequate infrastructure to connect to distribution points. Combined with insufficient cold chain facilities, the long distance between the harvest and distribution points will result in high post-harvest loss and higher costs of keeping food products fresh, feeding into nutritional and financial impacts for both farmers and consumers (ERIA, 2019; PwC, Rabobank, Tamasek, 2019).

## Interconnecting risks

Harvest losses are also closely connected to food, energy and water demand. According to [Dong and al. \(2020\)](#), because of the insufficient cold chain infrastructure between rural and urban areas, the percentage of food loss in China is between 14 percent and 30 percent, which means that water and energy used for agricultural activities to grow the food also go to waste. This is worsened as the waste generated by food loss emits methane and contributes to GHG emissions. Consequently, problems associated with cold chain services indirectly exacerbate environmental ones as well. Furthermore, signals also explain that inefficient cooling and refrigerating practices increase the risk of food born illnesses, burdening the health care system.

### Good practices: India's Solar Cold Storage Room, Ecofrost

Indian company has developed Exozne's solar cold storage room called '[Ecofrost](#)'. The room charges within six hours and it allows farmers, even in rural areas where power supplies are not always reliable, to store food for days. Mobile phone applications connect to the system, enabling farmers to choose which crop they intend to keep cool so the software can set the ideal temperature for it. Room temperature and humidity can also be monitored through the application. Ecofrost systems are spreading in the region as a practical as well as sustainable answer for Asian farmers to increase profit and reduce post-harvest losses.

## Future solutions to growing problems

Conclusively, with updated infrastructure and well-planned food supply, post-harvest losses can be significantly reduced, also fueling economic growth through higher returns for producers and lower food costs for consumer, and improving food security, livelihoods, waste management and sustainable use of resources. In addition to this, according to the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, the focus should not only be on expanding sophisticated cold chain services for big companies, but also to invest in simple cold chain for these smallholder farmers, whose income then could also increase, and thus generate further economic growth and a more balanced system of supply and demand ([GIZ, 2021](#)). The reports states that digital applications could help smallholder farmers to coordinate with logistics providers and urban aggregators to access their resources and technology.

## Education, skills, and the future of work: Exploring a mismatch in the labor market

The Asia Pacific unemployment rate is the world's lowest at 4.1 percent, and the youth unemployment rate stands at 10.6 percent.<sup>18</sup>

There is not a compounded figure for the region on graduate unemployment - the unemployment among people with an academic degree – however, there is a growing body of research investigating the mismatch between

university education and desired skills in the job market.<sup>19</sup> Employers and businesses are facing challenges in the recruitment process, as fresh graduates lack the skills and competencies required by the working environment. Among the missing factors contributing to the spike in graduate unemployment, there are soft skills (including communication, teamwork, emotional intelligence, problem-solving, and time management), English proficiency, hard skills, technology infrastructures, and unrealistic salary.

**FIGURE 22:** [ILO, 2019].

			2012	2018	2019	2020	2021
	<b>World</b>	<b>Total</b>	<b>21.6</b>	<b>21.9</b>	<b>22.2</b>	<b>22.3</b>	<b>22.5</b>
<b>NEET rate</b>	Asia and the Pacific	Total	23.2	23.9	24.2	24.4	24.6
		Male	11.3	12.9	13.2	13.5	13.7
		Female	36.1	36.0	36.3	36.5	36.7
	<b>World</b>	<b>Total</b>	<b>13.4</b>	<b>13.5</b>	<b>13.6</b>	<b>13.7</b>	<b>13.8</b>
<b>Youth unemployment rate</b>	Asia and the Pacific	Total	12.7	13.5	13.8	14.1	14.2
		Male	13.6	14.5	14.8	15.0	15.2
		Female	10.9	11.7	11.9	12.1	12.3
	<b>World</b>	<b>Total</b>	<b>19.6</b>	<b>20.1</b>	<b>20.2</b>	<b>20.4</b>	<b>20.5</b>
<b>LU3</b>	Asia and the Pacific	Total	17.4	18.9	19.3	19.5	19.7
		Male	17.8	19.3	19.7	19.9	20.1
		Female	16.7	18.2	18.4	18.8	19.0

Note: The LU3 rate, or the combined rate of unemployment and potential labour force, represents the share of the extended labour force that are in unemployment or the potential labour force. See <https://ilostat.ilo.org/glossary/lu3/> for more details.

Source: ILO modelled estimates, November 2019.

<sup>18</sup> ILO - Facts and figures

<sup>19</sup> ILO (2020), *Global Employment Trends for Youth 2020: Asia and the Pacific*. Source: [wcms\\_737673.pdf \(ilo.org\)](https://www.ilo.org/wcmsp5/groups/public/-/media/ilo-press/publications/2020/04/wcms_737673.pdf)

In India, the India Skills Report 2021 estimated overall employability at 45.9 percent, stating that one of two graduates is not ready for the job market due to the lack of required employability skills.<sup>20</sup> In Bangladesh, in 2016, the unemployment rate among the youth male and female population who completed tertiary education were 30.1 percent and 42.5 percent respectively, showing a higher rate compared to people without a degree.<sup>21</sup> In Malaysia, the rate of youth with diplomas and degrees suffering from unemployment is three times the national average.<sup>22</sup>

The mismatch between academia and the job market is not confined to unemployment. The literature makes a further distinction between *vertical mismatch*, when graduates work in non-graduate jobs and are therefore over-qualified; and *horizontal mismatch*, when graduates, trained in a particular field, work in another field at their formal qualification level.<sup>23</sup> Research indicates that certain disciplines are more prone to a vertical mismatch, such as business, management and economic studies, whereas others to a horizontal mismatch, such as history, philosophy and sociology.<sup>24</sup> This data can guide the questions needed to rethink the future of education in light of a rapidly evolving job market.

Among the solutions to tackle the crisis, in Cambodia, Deutsche Post DHL partnered with non-profit Teach for Cambodia to promote employability through soft skills training and career awareness programs. The partnership is part of the GoTeach program and aims to provide opportunities for the youth to gain exposure in the working world.<sup>25</sup> Meanwhile, in Vietnam, vocational training EdTech is contributing to addressing the gap in skilled labor by providing technical and vocational training programs as demanded by the market, and by enabling access to the program for a vast number of trainees at distance through digital means. EdTech training particularly helps to increase access to upskilling or skilling services for women who are tied up with household work and, as a result, cannot attend physical classes. What's more, the exposure to EdTech contributes to women's empowerment through digital skill improvement.

To reduce the risks of mismatch impacting on labour markets, investments to mitigate mismatches – whether vertical or horizontal - need to be increased.

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20 The Times of India - [The Challenges of Employability: How to solve them?](#)

21 The Business Standard - [Our students are overburdened with exams and yet end up unfit for jobs. Why?](#)

22 Kadir et al - [Unemployment among Graduates - Is there a Mismatch?](#)

23 Salas-Velasco - [Mapping the \(mis\)match of university degrees in the graduate labor market](#)

24 Ibid.

25 DP DHL - [Jobless youth in ASEAN: why countries and companies are paying attention](#)

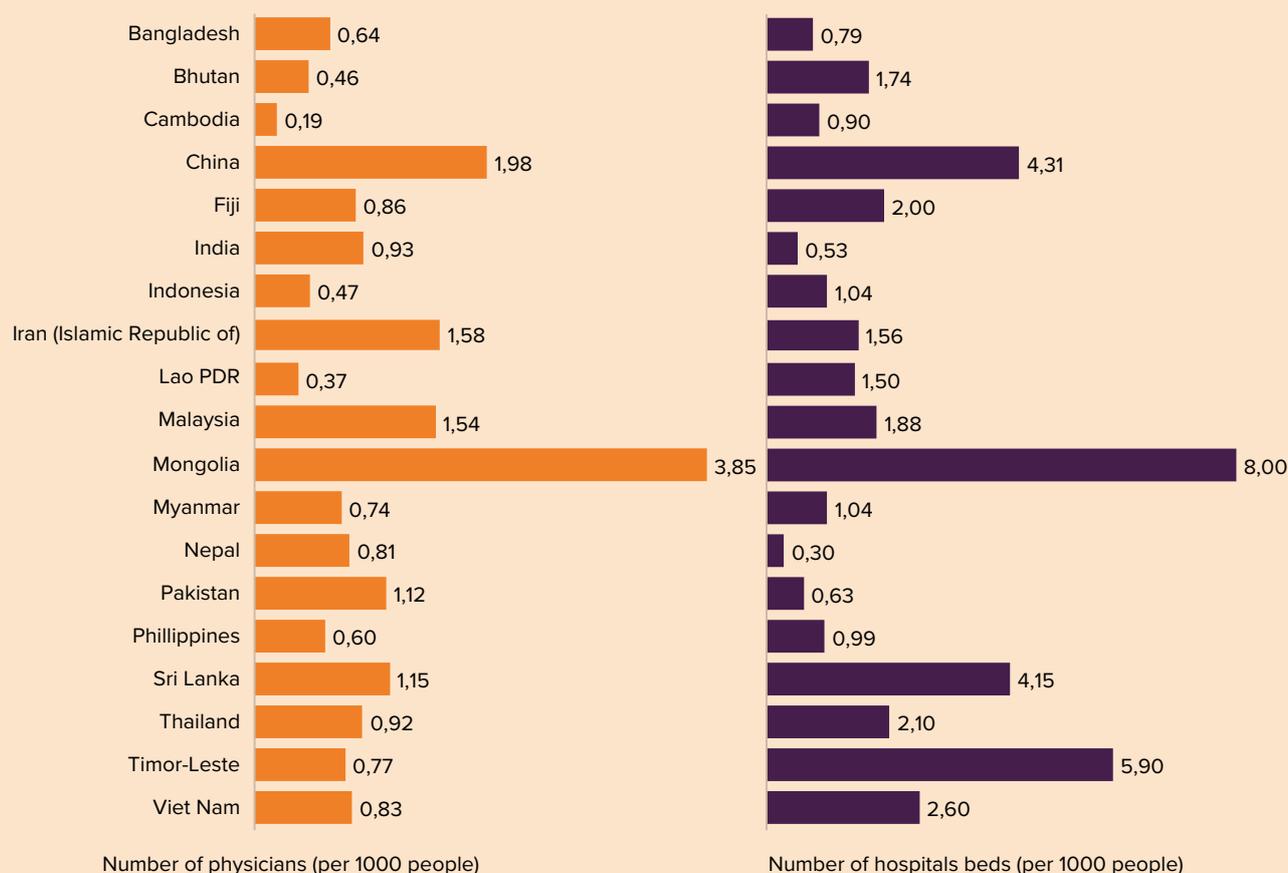
## Medic, medicine and medicinal shortages

### Not enough doctors

Asia Pacific has one of the world's lowest numbers of physicians per 1,000 people, second only to Africa ([WHO, 2022](#)). As shown in the figure below, the ratio differs widely

across countries and territories within the region, but it is generally lower than the OECD average ([OECD, 2020](#)). In total –between South Asia, East Asia, Southeast Asia and Oceania – there currently is a shortage of 3.6 million physicians, 19.8 million nurses and midwives, 2 million dentistry personnel and 1.5 million pharmaceutical personnel ([The Lancet, 2022](#)).

**FIGURE 23: Number of physicians and hospital beds in Asia Pacific**



The latest information for physicians is Cambodia (2014), China (2017), Fiji (2015), Lao PDR (2017), Malaysia (2015), Maldives (2018), Phillippines (2017), Samoa (2016), Vietnam (2016) and the rest from 2019. The latest information for hospital beds is bangladesh (2016), Bhutan (2012), Cambodia (2016), Fiji (2016), Lao PDR (2012), Nepal (2012), Phillippines (2014), Thailand (2010), Viet Nam (2014) and the rest are from 2017.

Source: World Health Organization's Global Health Workforce Statistics, OECD, supplemented by country data | World Bank Indicators

Concurrently, the United Nations Population Fund (UNFPA) has reported that Asia-Pacific is at the forefront of the global trend of aging populations. By 2050, a quarter of people in the region will be over 60 – equal to almost 1.3 billion people ([UNFPA, 2021](#)).

This trend both increases the potential demand for health services and decreases the available supply of manpower to deliver care, while placing a burden on the pension system ([McKinsey, 2021](#)).

WHO estimates that the global needs-based shortage of healthcare workers will decrease by only 17 percent in 2030 compared to 2013, for a projected shortfall of 15 million health workers, mostly in low- and lower-middle income countries ([WHO, 2022](#)).

This means that current trends of health worker production and employment are insufficient to counteract the shortage, calling for a paradigm change in the way healthcare as well as the pension system are managed across the region. At the Seventy-fifth World Health Assembly, over one hundred countries co-sponsoring the [resolution on human resources for health](#) adopted the [Working for Health 2022-2030 Action Plan](#) and the related [Global health and care worker compact](#) ([WHO, 2022](#)). The resolution aims to renovate employment initiatives in health and related sectors with the goal of creating decent work (including for women and young people), investing in transformative education, and supporting the [Working for Health Multi Partner Trust Fund](#).

### **Bullied and exploited**

Considering staff shortages in the healthcare sector, another signal indicates that bullying and hazing further complicate working conditions

for staff, leading to decreased job satisfaction, high rates of staff turnover, anxiety, depression and ultimately challenges in the recruitment and retention of medical staff.

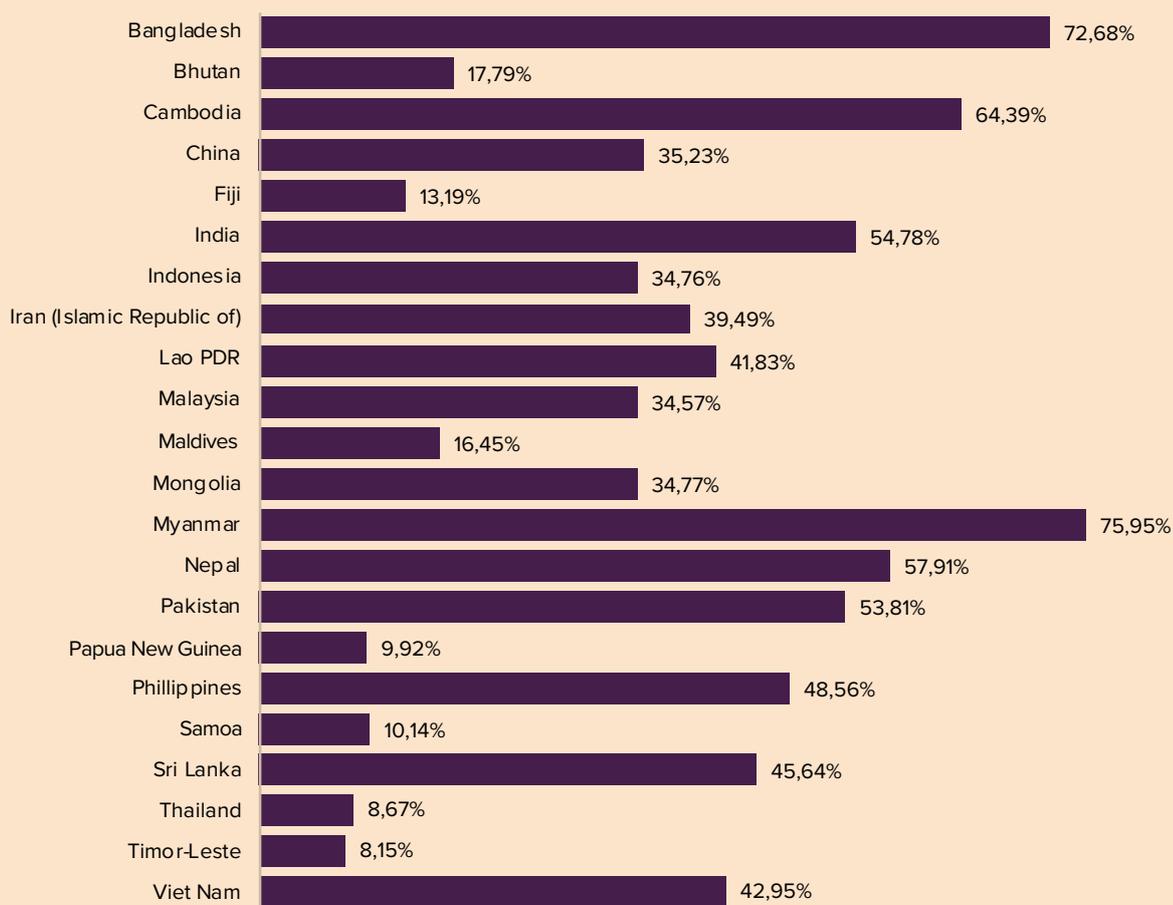
Research shows that bullying occurs more frequently in healthcare than in any other sector ([Lever et al., 2019](#)). In recent years, in concurrence with COVID-19, this phenomenon has been accentuated by long working hours, stress, burnout, delayed payments and skepticism. However, even prior to the pandemic, doctors and nurses across Asia and Pacific reported having to work brutally long hours in extremely hazardous conditions for a low pay ([Nikkei Asia, 2021](#)).

This mistreatment among colleagues, coupled with exhausting long shifts without days off, has led to an increase physical, mental and emotional stress among healthcare workers, many of whom have united in protests across the region to demand for more rights and protection ([NikkeiAsia, 2021](#)).

### **Too much out-of-pocket health expenditure**

Universal health coverage (UHC) is about ensuring all people get the quality health services they need, without experiencing financial hardship. Several countries in Asia Pacific have committed to providing universal health coverage to their populations ([World Bank, 2021](#)). Nevertheless, 234 million people across South Asia, East Asia and the Pacific have the highest proportion of out-of-pocket health expenditures (OOPE), amounting to more than 25 percent of household consumption ([World Bank, 2017](#)). As evidenced by the World Bank graph below, in some countries (i.e. Bangladesh and Myanmar), OOPE can be as high as 72 and 76 percent.

**FIGURE 24: Out-of-pocket expenditure (% of current health expenditure)**



Note: Data is from 2019.

Source: World Health Organization and World Bank 2021. Global Monitoring Report on Financial Protection in Health 2021.

This is not only related to insurance. For instance, in Vietnam, a decade ago the national health insurance coverage was only 50 percent, and citizens had to pay 49 percent of their medical bills out of pocket. Today, despite the insurance coverage increased to about 91 percent, Vietnamese still have to pay nearly half their own medical expenses out of their own pockets (43-44 percent), twice the rate recommended by the World Health Organization (Vn Express, 2021).

In 2021, ILO estimated that although three-quarters of the region’s population is legally entitled to social health protection, 1.6 billion people are still lacking access to it (ILO, 2021). This is a result of gaps in legal coverage, lack of awareness about rights and impediments to accessing services, forcing millions of people to pay to receive healthcare and often resulting in them plunging into poverty (ILO, 2021).



# Governing 'Datafication'

An already rapid and complex digital transformation in Asia Pacific was further accelerated by the COVID-19 pandemic ([UNESCAP 2022](#)). This development has positive and negative effects which have consistently been raised by signals within the RBAP Horizon Scanning Initiatives.

Among other things, signals focus on remaining challenges regarding availability, affordability and quality of digital and technological infrastructure; and inclusion and equitability allowing for participation in digital governance and economies ([CADT, 2022](#); [UNDP, 2022](#)).

The pandemic and the consequent 'digital default' saw a significant increase in pressure on existing networks, particularly those related to fixed lines and mobile communication. Signals highlight the challenges posed by a lack of digital inclusion and mobile connectivity, as well as lacking governance structures in place to advance the right to internet freedom and accurate information.

With democracies and civic space eroding in the region, the politicization, governance, policy and regulatory challenges around this technology revolution and its implications become increasingly important to monitor.

Other signals indicate the stress experienced by small businesses that impact their ability to meaningfully participate in the rapidly digital transformation of the economy. In parallel, and [despite varying attitudes towards the regulation of cryptocurrency in Asia-Pacific](#), corruption and criminality around digital currencies have spiked, with regulation and consumer protection lacking hence putting citizens at financial risk.

In the Indo-Pacific, there is equally a great need for innovation and development in the field of e-commerce platforms, cybersecurity measures, e-government services and inter-government digital cooperation, and legal frameworks reform ([CSIS 2020](#)).

This section captures the signals focusing on digital transformation and the technological revolution in the future of Asia-Pacific, exploring:

- » Informational black holes? Digital futures and the critical role of inclusion in connectivity
- » Left to their own devices
- » CTRL+: Instrumentalizing Digital Disruption

## Informational black holes? Digital futures and the critical role of inclusion in connectivity

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In Asia Pacific, connectivity is embedded in every aspect of lives, economies, and infrastructures. However, many people in the region remain ‘unconnected, unable to access wide-ranging benefits of e-learning, e-health, e-agriculture, digital government, digital trade and commerce services available today’ (ITU 2022). The importance of digital inclusion and mobile connectivity has been emphasized repeatedly by RBAP Horizon Scanning Exercise participants. Particularly, the COVID-19 pandemic highlighted existing digital inequalities as well as the extent to which the pandemic exacerbated a growing digital divide within the region (WEF, 2022).

Digital inclusion has significant room to develop in rural, remote, and other inaccessible geographic areas such as archipelagos and small islands. In Asia-Pacific, 75 per cent of urban dwellers are internet users, compared with 39 per cent of the rural population. The largest urban-rural divides are seen in Bhutan, Mongolia, and Samoa, with the disparity as high as 42 per cent in 2020 (ESCAP, 2022).

A rural-urban divide is also observed for mobile network coverage, with 93 percent of rural areas having 4G coverage compared to 99 percent in urban areas (ITU, 2021). Further, A4AI in a 2020 post raised this as one of the biggest barriers to maintain digital infrastructure and communication, especially if external shocks such as natural hazards disrupt connections.

However, there are also positive aspects of infrastructural development in terms of access to high-speed internet in rural areas. While a report issued in 2021 by ITU still shows significant differences between the urban-rural division of using the internet - urban: 75 percent, rural: 39 percent - our signals are presenting a push in more reliable internet connection in rural areas. For instance, a US\$2 million project investment

in Samoa’s rural areas has improved school internet connectivity through satellite connection (VSAT). The project also benefits remote areas, where quality broadband internet services were previously not available, through now wider access to internet connection. Another project through a loan provided by ADB is focusing on strengthening high-speed broadband internet connection in remote areas across Asia and the Pacific to promote further poverty reduction and socio-economic growth.

### Closing the gender digital divide

Digital inclusion plays a critical role in the future of Asia-Pacific, yet as digital dependency in the region increases there have been concerns the digital divide is widening and leaving the most vulnerable behind (Rinzin, 2021; Sochan, 2022; CADT, 2022). Currently in East Asia and the Pacific, 79 per cent of women use mobile internet, with 168 million women offline – amounting to a 2 per cent gender gap in mobile internet use. In South Asia, however, latest figures show a stark difference, with only 38 per cent of women using mobile internet, against 383 million women who are not – amounting to a gender gap in mobile internet use of 41 per cent (GSMA 2022).

In all parts of the world, the gender internet divide has been narrowing in recent years. Yet, unlike among men, rates of adoption among women in low- and middle-income countries have slowed during the pandemic. The 2022 Mobile Gender Gap Report shows small gender gap in mobile internet use between 2017 and 2021 in East Asia and the Pacific, but a stark divide in the South Asian sub-region (GSMA 2022).

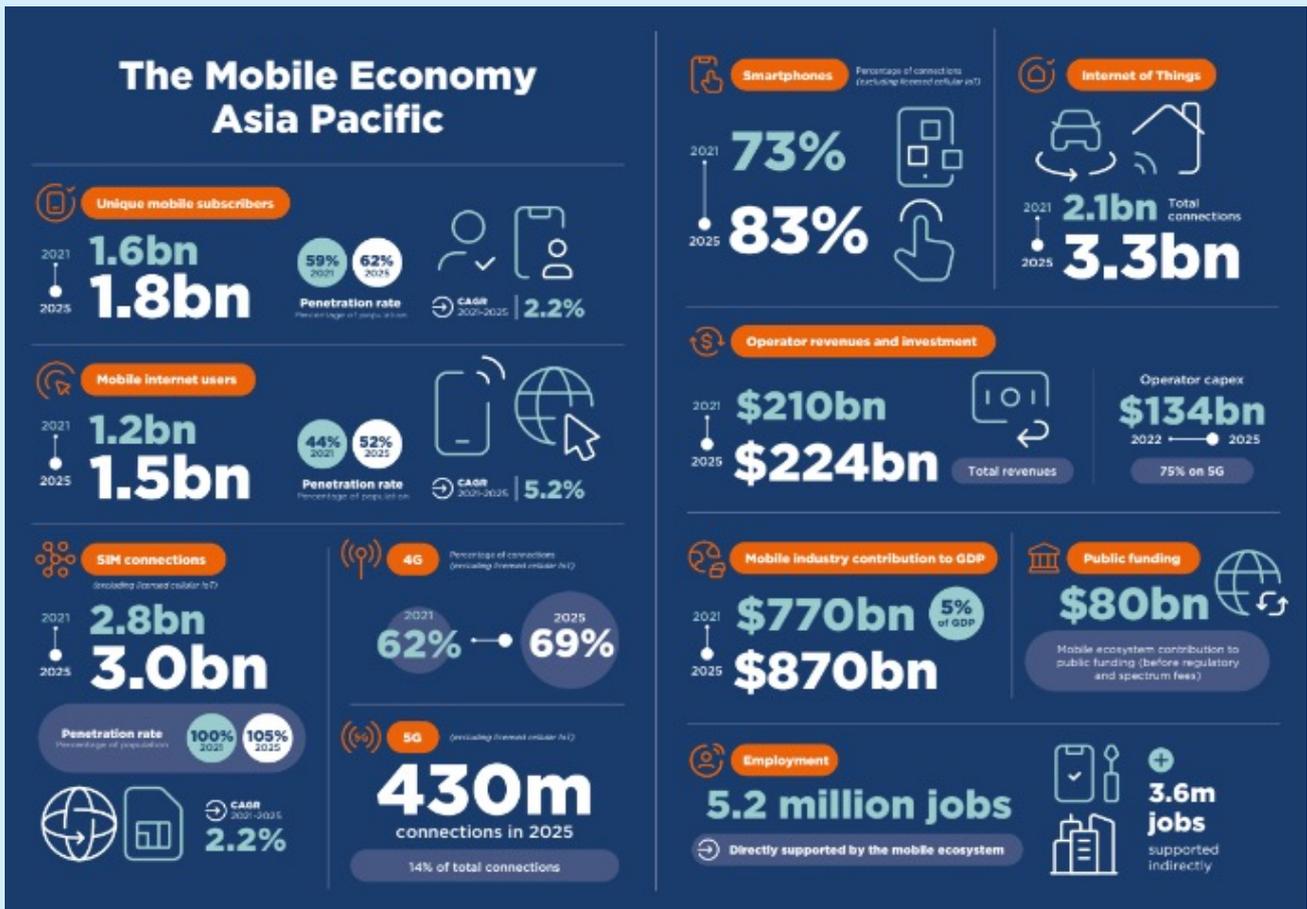
In the report section on [Education in Emergencies](#), we identified education as a fundamental human right for which equitable access is fundamental. However, equitable access to education is not always available when learning moves online. Throughout the COVID-19 pandemic, we have already witnessed signals that students are facing digital exclusion and being left behind, more so in rural areas (Rinzin, 2021). During both HS 1.0

and 2.0, signals identified the hybridization of education in parts of Asia-Pacific; as such, the importance of improving digital inclusion to support education becomes clear.

As with education, signals from the Horizon Scanning exercise also identified an increase in the digitalization of essential services (Chhoeden,

2021; Nizar, 2021; PSCP, 2021). Looking forward, this digitalization may extend to energy services, with the IMF (2022) advising the use of digital solutions to mitigate the impacts of energy price rises, as outlined in section *Energy inflation and the cost for food security*.

**FIGURE 25: The Mobile Economy Asia Pacific**



Source: GSMA 2022.

## Left to their own devices

As discussed, mobile broadband networks are quickly expanding across the Asia Pacific, with 96 per cent of the population covered. In 2021 alone, the mobile industry alone accounted for US\$770 billion in economic value, or 5 per cent of GDP, and supported 8.8 million jobs both directly and indirectly ([GSMA 2022](#)).

Mobile technology expansion is paralleled by a rapid transition of new technology adoption across the Asia Pacific in general, enabling ‘efficient delivery of government services and improving access for citizens and businesses’

([GSMA 2020](#)). Projections state that, by 2025, 430 million 5G connections will have been established. Driving digital economic growth and innovation, 5G supports ‘next generation offerings such as cloud services, AI, IoT and edge computing’ ([GSMA 2022](#)).

The digital payment industry is reliant on the rolling out and resilience of required infrastructure, including electricity, internet access, cellular network coverage, smartphone penetration and digital ID systems, throughout the Asia Pacific ([ADB 2021](#)). In particular, developing nations in the region have driven the digital payment revolution as a result of underdeveloped and inaccessible financial services. When looking at banking trends, it becomes clear that the share of populations having a bank account at a financial institution has declined by 5 percent between 2020 and 2021, with Indonesia (49 percent), the Philippines (35 percent), and Vietnam (31 percent) reporting the lowest share of banked population ([Statista/ PPRO 2021](#)).

Notably, Southeast Asian consumers are perceived to drive the digital payment revolution, and the mobile-based payment innovation more particularly. This trend was accelerated in the wake of the COVID-19 pandemic, which triggered a sharp rise in e-payment services related to food delivery and transportation, due to lockdowns and an aversion to cash exchange. As countries slowly emerge from the pandemic, the digital payments market size is not slowing down, however, with [projections](#) stating growth from US\$17.85 billion in 2021, to US\$67.42 billion by 2028. Nevertheless, significant barriers to uptake and inclusive financial participation in the digital economy remain. There is question of a wide urban-rural divide informed by varying quality or even presence of internet infrastructure, as well as cost differences of communication technologies which limit seller and buyer’s accessibility to real-time payment clearance and reimbursement of financial transactions. Furthermore, surveys indicate low acceptance and adoption rates among merchants due to poor understanding of processes and high fees within complex, competitive and therefore highly fragmented payment processing provider markets ([BCG 2020](#)).

Moreover, several signals pointed to the spike in development of Central Bank Digital Currencies (CBDC). Between April 2021 and May 2022, globally, the countries engaging in CBDC globally has increased from 71 to 109. Among those, the majority (64 percent) are in the Research and Development stage, while 23 percent of countries are in the pilot stage or have even launched CBDC. In the Asia Pacific, the status of CBDC varies ([see Figure 25](#)). While CBDC are perceived as ‘efficacious solutions to high remittance costs and financial inclusion challenges’, particularly in Southeast Asia and the Pacific, significant implementation challenges remain ([ADB 2021](#)).

**FIGURE 26: Adoption of E-Commerce Legislation in countries of HS 2.0 participating Country Offices**



**FIGURE 27: Adoption of E-Commerce Legislation in countries of HS 2.0 participating Country Offices**

Cyber Legislation in Asia Pacific				
	● No data	● Draft Legislation	● Legislation	● No Legislation
	Consumer Protection	Cybercrime	Electronic Transactions	Privacy and Data Protection
Bangladesh	●	●	●	●
Bhutan	●	●	●	●
Cambodia	●	●	●	●
China	●	●	●	●
Fiji	●	●	●	●
India	●	●	●	●
Indonesia	●	●	●	●
Iran (Islamic Republic of)	●	●	●	●
Lao PDR	●	●	●	●
Malaysia	●	●	●	●
Maldives	●	●	●	●
Mongolia	●	●	●	●
Myanmar	●	●	●	●
Nepal	●	●	●	●
Pakistan	●	●	●	●
Papue New Guinea	●	●	●	●
Phillippines	●	●	●	●
Samoa	●	●	●	●
Sri Lanka	●	●	●	●
Thailand	●	●	●	●
Timor-Leste	●	●	●	●
Viet Nam	●	●	●	●

Source: UNCTAD. Accessed September 2022

## Impeding Potential

HS 2.0 signals equally indicate that several factors could hamper the potential growth of the digital economy, as well as national economic performance and competitiveness of the region as a whole. Insufficient technological and financial literacy adds to distrust, lower demand and misunderstandings among end-users.

Paired with lacking digital infrastructure policies and regulations, these factors also risk adding to an already growing number of cybercrime incidents. Particularly the disruption the pandemic caused to traditional businesses as well as ongoing supply chain challenges have resulted in the mainstreaming of cryptocurrencies. Despite the cost of crypto malpractices and exploits, standing at US\$14 billion globally in 2021, regulations are non-existent, loose, or informally enforced, at best<sup>26</sup>.

The [UNCTAD Global Cyberlaw Tracker](#) indicates that across 60 countries in the Asia Pacific, more than half have no data available or no corresponding legislation in the field of E-transaction, Data Protection and Privacy, Cybercrime and Consumer Protection (see [Figure 27](#)). Regarding consumer protection legislation in the region, the picture is particularly bleak.<sup>27</sup> Almost 50 per cent of countries in Asia and the Pacific have no corresponding legislation nor data available.

To avoid the exacerbation of inequalities and exposure of vulnerable segments of society (particularly those related to age, gender and urban-rural divides) amid the acceleration and integration of new technologies, there is therefore a need for stronger risk assessments and corresponding governance cultures and security infrastructures to mitigate negative implications of this broader trend for the medium to long term.

## CTRL+: Instrumentalizing Digital Disruption

The pandemic contributed to a broader trend of reduced trust in governments, a broadening digital gap and media censorship ([IFEX 2020](#)). During the COVID-19 pandemic, several authoritarian or hybrid regimes in the Asia-Pacific tightened their grip on society, resulting in significant increases in online and offline anti-government protests, most often met by militarized responses.

In its [2021 State of Democracy in Asia and the Pacific](#) report, IDEA highlights how the pandemic added stress on existing challenges to democratic progress, including a rise in ethnonationalism as well as '*migrant movements and climate-change-induced crises such as floods and droughts*'. Digital transformation is playing a key role in this broader trend as interruption of infrastructure – (mobile) internet censorship, social media outages and severe throttling (speed reduction) in particular – is increasingly instrumentalized as a form of social control.

The [2021 Global Cost of Internet Shutdowns report](#) finds that globally, there has been a 36 percent increase of economic cost of internet shutdowns, up to US\$5.45 billion, when compared to 2020. Internet outages were most associated with additional human rights abuses ([an increase of almost 80 percent compared with 2020](#)), and include restrictions on freedom of assembly; election interference; and infringements on freedom of the press.

Asia is the region most affected by major internet shutdowns, and also has the highest related total cost: in 2021, 292 million internet users in the region were affected for 13,458 hours at a total cost of US\$3.42 billion. Five countries are represented in the top fifteen globally which are, in ranking order, Myanmar, India, Bangladesh, Iran, and Pakistan.

<sup>26</sup> For an overview of laws, reports, and civil society legal resources related to emerging technology and cybercrime, please see the International Center for Not-for-Profit Law's [Digital Legal Library - ICNL](#)

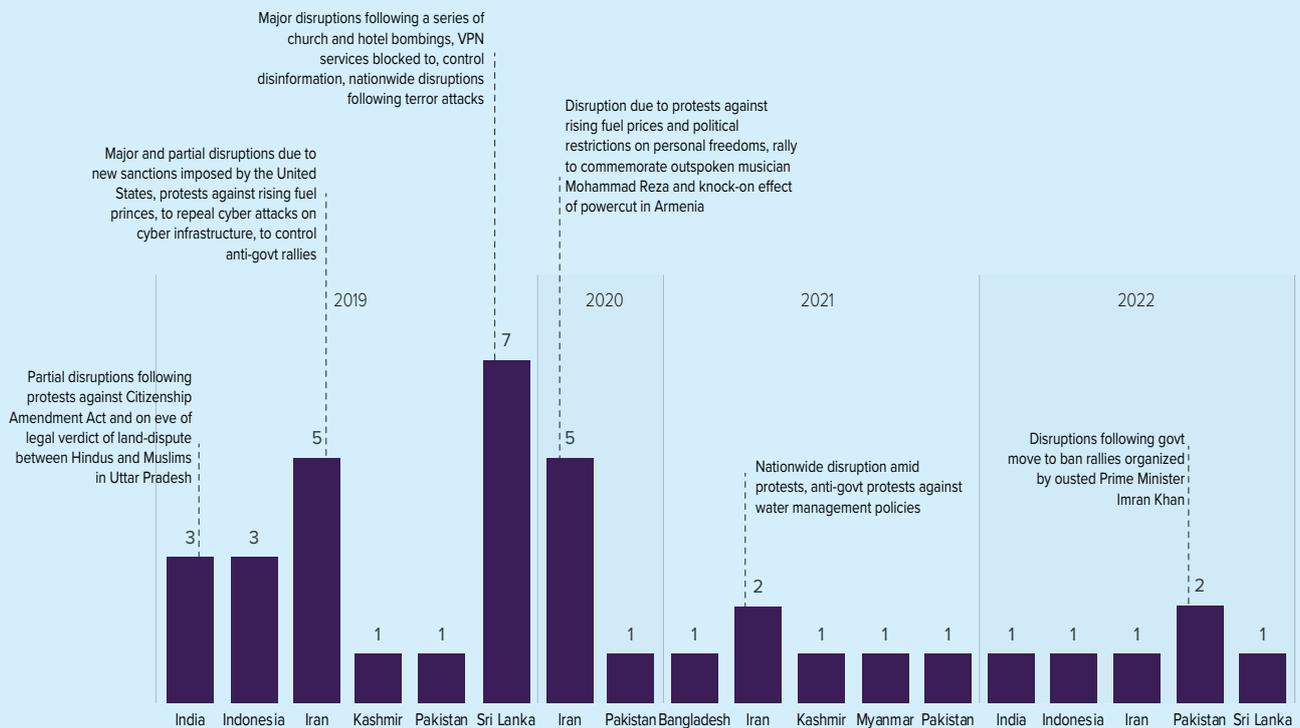
<sup>27</sup> Consumer protection policies seek to 'mitigate **information asymmetries** between providers, consumers and other factors, such as limited bargaining power and digital literacy, that impeded consumer choice, and to provide **protections for vulnerable consumers**' ([UNCDF 2022](#)).

Across all countries affected, shutdowns or access restrictions often coincide with significant political developments, including military coups, public speeches, elections, public or anti-government protests, and opposition rallies or marches (see Figure 28). Meanwhile, the cost of internet shutdowns varies per country.

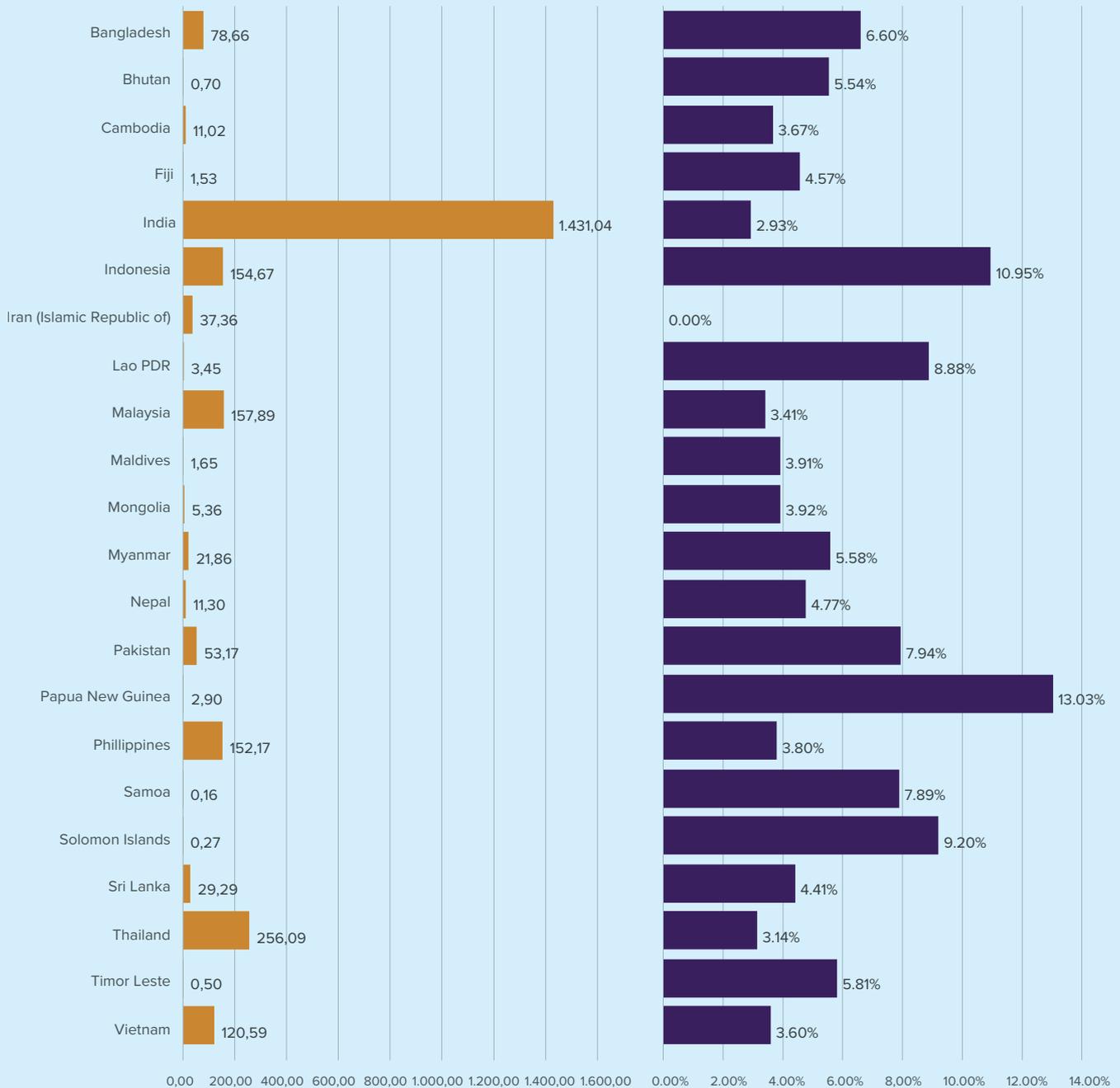
For example, on 21 August, former Prime Minister Imran Khan did a live broadcast despite a ban issued by the Pakistan Electronic Media

Regulatory Authority (PEMRA). Consequently, an access disruption of YouTube on multiple mobile and fixed-line internet providers became apparent, which was restored as soon as the speech concluded. According to the Netblocks Cost of Shutdown (COST) tool, a partial shutdown of this nature would cost the Pakistani society USD \$175,851 for an hour, or USD \$4,220,430 for a day (see Figure 29).

**FIGURE 28: Documented Internet shutdown in Asia Pacific between 2019 and 2022**



**FIGURE 29: Cost of Internet Shutdowns (US\$)**



The current outages witnessed in Iran amid popular protests, have cost its economy USD \$148 million so far. In Myanmar, long-running internet outages continue for the second year in a row, with only Russia worse affected ([Cost of Internet Shutdowns Tracker 2022](#)).

Across all countries affected, shutdowns or access restrictions often coincide with significant political developments, including military coups, public speeches, elections, public or anti-government protests, and opposition rallies or marches.

Beyond the often-discussed political and human rights implications as well as the growing anti-government resentment in response to the shrinking online and offline civic space, there are thus significant economic implications of the deliberate internet outages. Moreover, analysis of the timing of deliberate outages allows for anticipatory planning around key events.



# Changing Values, Changing Futures

Remote working remains an option for many, with possible benefits in the face of rising oil prices and CO<sub>2</sub> emissions, but trade-offs for the digital divide. Changing work patterns including ‘workations’ and the four-day workweek could have positive repercussions for wellbeing and workplace productivity (Bester, 2022), as well as stimulating weekday travel for the recovery of the tourism industry post-COVID (Tomisawa, 2022). This could be particularly beneficial for countries dependent on tourism, such as the Maldives and Sri Lanka (COFACE, 2022).

The Maldives are making strides towards improving transport infrastructure; however, inadequate infrastructure (often pronounced in rural areas) in Thailand, Nepal, Indonesia, the Philippines, Vietnam, India, Timor-Leste, Sri Lanka, Cambodia, and Papua New Guinea acts as a barrier to growth (COFACE, 2022). Traffic congestion – caused by urbanization, increased vehicle use, and poorly planned transport – is a leading cause of air pollution. The provision of bicycle lanes in several Cambodian cities and the enforcement of car free zones in Vietnam’s Ho Chi Minh City and Ha Noi are examples of inclusive and sustainable solutions to changing transport futures (ABD, 2022).

Eco-activism is rising, especially amongst youth, who will suffer the longer-term impacts of the climate crisis. In addition to youth-led activism, youth inclusion in formal politics could shape policy to address youth concerns (Nakatani, 2017) including driving climate action. The last six years has seen the lowering of voting ages in Japan, South Korea, and Malaysia, and a movement to lower the voting age in Taiwan is gaining momentum. These shifts could be met with greater voter turnout in upcoming elections such as the 2023 general election in Malaysia (Tantau, 2019).

Across Asia Pacific, declining youth dependency is projected to continue (World Bank, 2021). Young populations of Cambodia, Bangladesh, and the Philippines are regarded as favorable for economic growth (COFACE, 2022), whilst in Timor-Leste and Afghanistan, where over 60 percent of the population are under 24 years old (CIA, 2022), youth unemployment is high. Projections for elder dependency in Asia Pacific show a consistent increase, exacerbating the care burden with implications for gender equality.

This section provides an overview of signals relating to changing attitudes and societal values which indicate, or have the potential to drive, changing futures.

- » A Post-Pandemic Future of Work
- » The burden of care in developing futures
- » The future of transport – exploring the road ahead
- » Eco-activism
- » Digital Governance

## A Post-Pandemic Future of Work

COVID-19 has expedited the future of work, giving rise to a ‘new normal’. The path towards digital transformation was already carved prior to the pandemic; automation and artificial intelligence positioned to transform the labor market as we once knew it. Social distancing, lockdowns, and reduced mobility have only accelerated this transformation. For example, many restaurants and bars have adopted QR codes for ordering, changing the face of the service industry. The nature of work is changing, and as societal values change alongside this it becomes ever more apparent that the shifts experienced during the pandemic will have a lasting impact on the future of work.

Recognizing the importance of enhancing regional cooperation for sustainable human-centered pandemic recovery, in December 2022, the [17<sup>th</sup> Asia and the Pacific Regional Meeting \(APRM\) of the International Labour Organization \(ILO\)](#) will convene government ministries, organizations, and academics on the future of work, revitalizing inclusive, transformative, and decent work as a driver of COVID-19 recovery.

### The rise of the remote worker

The pandemic severely disrupted labor markets globally. In 2020, [ILO](#) estimated that 81 million jobs had already been cut since the onset of the pandemic and working hours significantly reduced, increasing the incidence of working poverty and disproportionately impacting women and youth. In tandem, mobility restrictions necessitated alternative modes of working. A rise in videoconferencing facilitated remote work for many, and without a loss of productivity, remote working is likely to stay, at least to a degree ([McKinsey Global Institute, 2021](#)).

However, telecommuting is not an option for everyone. Malaysia’s Khazanah Research Institute found that remote work favours highly skilled workers and leaves self-employed workers the most vulnerable ([Dancel, 2020](#)). In addition, remote working is highly dependent upon digital

connectivity. In 2020, [ESCAP](#) estimated that less than 14 percent of the population of Asia and the Pacific have access to reliable and affordable high-speed internet. Sustained remote working therefore threatens to widen the region’s digital divide and exacerbate inequalities in both income and opportunity.

For those who do have the option to work remotely, telecommuting could benefit the climate agenda. [IEA \(2020\)](#) found that if workers that are able to work remotely do so once a week, it would reduce global CO<sub>2</sub> emissions by 24 million tonnes (Mt) and decrease oil consumption by approximately 1 percent annually. It could also have economic benefits, especially given rising oil prices due to the conflict in Ukraine. Meanwhile, in Pakistan, it is estimated that telecommuting one day a week would save the country more money than saved by current import bans on luxury items, imposed to strengthen the country’s declining economy ([Desk, 2022](#)).

### The death of the five-day workweek

The vulnerability of the tourism industry to extrinsic shocks and stresses became alarmingly apparent during the COVID-19 pandemic. International border closures and internal mobility restrictions threatened the jobs and livelihoods of the over 19 million people employed in tourism-related industries across the region in early 2020 ([ILO, 2021](#)). To boost domestic tourism and expedite a full recovery of the tourism sector, signals point to changing work patterns. Increasing uptake of the four-day work week by companies in Japan and the United Arab Emirates allows employees more time for volunteering, leisure, and local travel ([Tomisawa, 2022](#)). Similarly, ‘workations’ combining remote work with leisure, are rising in popularity, particularly in Thailand where the Tourism Authority are offering [workation packages](#) to stimulate weekday travel. These initiatives could have positive repercussions for wellbeing (linked to SDG 3) and workplace productivity ([Bester, 2022](#)). However, ‘the emergence of workations’ was regarded as low risk and low importance in signal validation and prioritization.

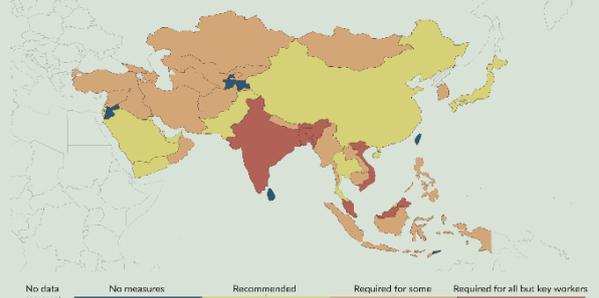
**FIGURE 30: These stills from the ‘Our World in Data’ Policy Responses to COVID-19 can be read horizontally as a 6-month transition regarding workplace closures during the COVID-19 pandemic, or vertically as a year-on-year transition from March 2020-2022 or September 2020-2022.**

Workplace closures during the COVID-19 pandemic, Mar 1, 2020  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



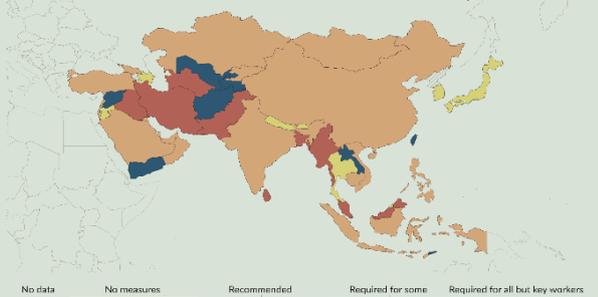
Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

Workplace closures during the COVID-19 pandemic, Sep 2, 2020  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



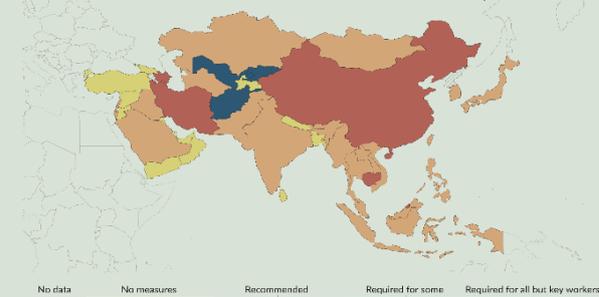
Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

Workplace closures during the COVID-19 pandemic, Mar 2, 2021  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



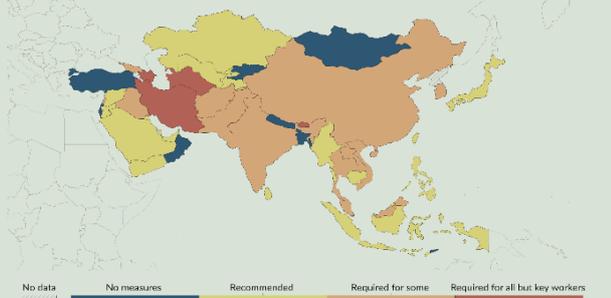
Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

Workplace closures during the COVID-19 pandemic, Sep 1, 2021  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



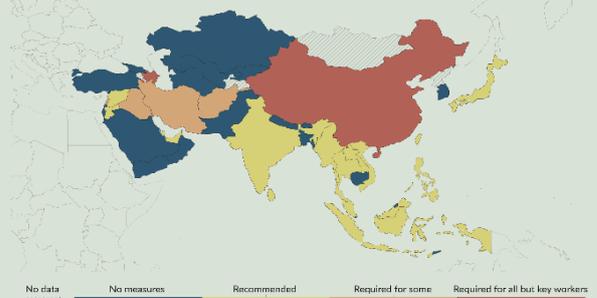
Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

Workplace closures during the COVID-19 pandemic, Mar 2, 2022  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

Workplace closures during the COVID-19 pandemic, Sep 1, 2022  
If policies vary at the subnational level, the index is shown as the response level of the strictest sub-region.



Source: Oxford COVID-19 Government Response Tracker, Blavatnik School of Government, University of Oxford – Last updated 30 September 2022  
OurWorldInData.org/coronavirus • CC BY

### Return of the rural

Ranking higher in priority to participants in the Horizon Scanning exercise were signals relating to economic migration. Labor migration is significant in Asia and the Pacific, propelled by the search for decent work (ILO, 2021). In many countries, the pandemic prompted a hiring freeze on foreign labor and in some, restrictions on migrant labor

continue to be imposed with possible impacts to economic recovery, migrant flows, and illegal migration.

In many instances, border closures, job losses, and reduced working hours resulted in reverse migration; for example, many tourism workers in the Pacific and rural-urban migrants in Thailand returned to their rural hometowns during the

pandemic. Signals indicate that migrants engaged in a process of reintegration, their values changing as a result, with potential impacts for the future of work. For example, research in the Pacific noted that former migrants adapted to rural life by regaining indigenous knowledge, diversifying their skills, and reconnecting with nature ([Movono et al., 2022](#)).

In Thailand, interactions with rural communities by UNDP colleagues revealed that since the onset of COVID-19, migrants are utilising entrepreneurial skills gained from the city to build rural livelihoods in their hometowns, valuing the social benefits that rural living brings. Depending on the scale, this could impact urban labor markets, increasing the demand for foreign labor. In Japan, the demand is already high—a shrinking and aging population necessitating a four-fold increase in foreign workers by 2040 in order to sustain economic growth ([Komiya, 2022](#)). This could prompt the legalization of undocumented migrants, as is the case in Thailand ([Sengpaseuth, 2022](#)), with possible benefits for reducing unemployment (including for youths) and boosting the economy, but with trade-offs for the rights of workers, which would see increasing violations. For example, migrants (especially young women and girls) from poor rural villages and ethnic minority groups are enticed by promises of decent work to wealthier neighbouring countries or areas such as the Golden Triangle Special Economic Zone (SEZ) in northern Laos ([RFA, 2022](#)). Here, suffocating debt forces many to experience exploitation, violence, and human trafficking.

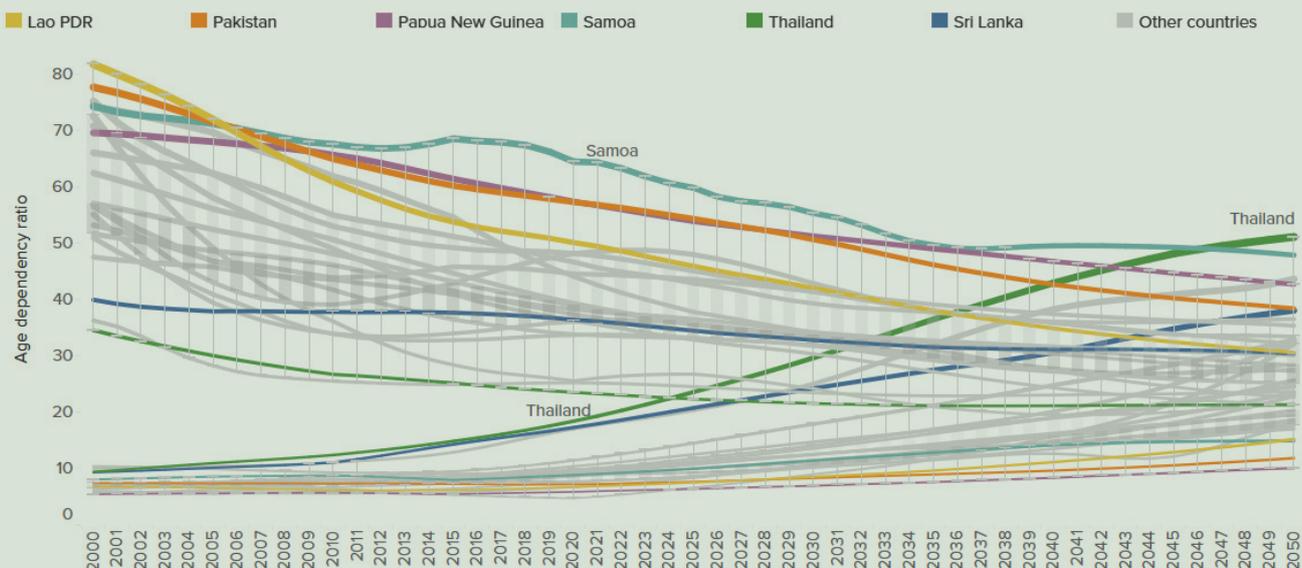
## The burden of care in development futures

Often performed by women and girls, care work remains largely unrecognized as a key variable which can support sustainable economic growth and societal well-being ([ESCAP, 2021](#)). Care work is essential for reproducing the labor force and underpins economic growth.

Dependency ratios<sup>28</sup> for youth and elderly populations, shown via Figure 31, demonstrate substantial variation between countries across Asia-Pacific. For youth dependency, a declining trend is observed in the number of young people per 100 working-age people. The number of dependent youths ranged from 35-85 in 2000, dropped to a range of 25-65 in 2022, and is projected to decrease to 15-55 in 2050. Laos is projected to see significant declines in this time, with youth dependency projected to half by 2050 compared to the 2000 level. Samoa, Pakistan, and Papua New Guinea are projected to see a lesser decline in youth dependency but will still have the highest youth dependency in the region.

28 The dependency ratio is the ratio of those older than 64 and under 15 to that of the working-age population – those ages 15-64. Our chart, adapted from [World Bank figures](#), shows the proportion of dependents per 100 working-age population. This will reflect a picture of the dependency burden that the working-age population bears in relation to children and the elderly. However, it must also be noted that dependency ratios do not show economic dependency - some children and elderly people may be part of the labor force, and some working-age people are not.

**FIGURE 31: Age Dependency Ratio, Young and Old, Past and Projected**



Source: World Bank staff estimates based on age distributions of United Nations Population Division's World Population Prospects: 2019 Revision.

Elder dependency is shown to consistently increase in projections to 2050, this is particularly evident for Thailand who are projected to see elder dependency more than double between 2022 and 2050, signalling a significantly increased elder care burden looking forward.

### The care burden on gender equality

Research by the International Labour Organization (ILO) supports this finding, stating that women in Asia Pacific spent four times longer carrying out unpaid care work each day than men, averaging up to 11 hours a day (ILO, 2018). This is further supplemented by a 2017 study in Bhutan explored by HS 1.0, which found that the economic value of women's contributions to unpaid care in the nation were equal to 11 percent of GDP (ADB, 2020).

The unequal care burden has been said to restrict women and girls' access to education, economic security, and employment (ESCAP, 2021). This challenge is reflected in the SDGs, with SDG 5.4 being to "Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate."

### Growing care needs of an aging population

The United Nations Population Fund (UNFPA) have reported that Asia-Pacific is at the forefront of the global trend of aging populations. By 2050, a quarter of people in the region will be over 60 years of age – equal to almost 1.3 billion people (UNFPA, 2021). This transition towards aging populations in Asia-Pacific will have significant social, economic, and political consequences. The elderly dependency ratio shown in our earlier chart is a useful signal of these consequences (ESCAP, 2017).

A 2014 report by Alzheimer's Disease International (ADI) has established that with an aging population also comes signals of a looming health threat caused by increasing levels of dementia. The report estimated the costs of dementia in Asia-Pacific to be almost \$185 million in 2015, a figure expected to increase as the estimated number of people in the region with dementia rises from 23 million in 2015 to 71 million by 2050. Dementia is already one of the major causes of dependency among the elderly and can present challenges to the care burden moving forward (Nichols et al., 2019). The ADI report identified these challenges as stemming from economic migration reducing the availability of nearby family support,

medical barriers to diagnosis and care, limited specialist knowledge amongst health workers, and stigmatisation of the disease.

Challenges can also arise for dementia caregivers, with a recent study identifying a significant humanistic burden placed upon carers of dementia patients ([Ohno et al., 2020](#)). Another study emphasized the role culture has in influencing caregivers' burdens when caring for family with dementia ([Chan, 2010](#)). This was supported by a study in the Philippines which assessed the financial cost of the caregiving burden, finding that the majority of care expenses (86 percent) came from the lost earnings of unpaid family caregivers ([Dominguez et al., 2021](#)).

To reduce the aforementioned socio-economic impacts of dementia on both patients and their caregivers. In their report, the ADI advocate for legislative changes, social protection measures, promoting awareness and positive attitudes, and reducing dementia risk by incorporating dementia into existing health programmes.

### The childcare burden

As aging populations bring care challenges, so too do the childcare needs of growing populations. Across Asia-Pacific, fertility rates, or the average number of births per woman, have declined over the last 60 years. However, the fluctuation in fertility rates and the degree to which they have declined varies throughout the region.

Looking ahead, in the [World Population Prospects' 2022](#) medium scenario, the majority of Asia-Pacific will see a decline in fertility rates up to 2050. Only Eastern and South-Eastern Asia is projected to see increases, rising from 1.5 births per woman in 2021 to 1.6 in 2050.

While these varying trajectories for fertility rates will signal varying impacts on the childcare burden throughout Asia-Pacific, emerging signals have also shown that the care burden itself can have its own impacts upon fertility rates. The availability and affordability of paid childcare has been tied to the demographic transition in

fertility rates in in Asia-Pacific. In Bhutan, our signals have shown that around 70 percent of adults have not had more than two children due to a lack of available domestic support. The implications of this are an expected 1.8 percent decline in the nation's fertility rate by 2030. For the Bhutanese who have accessed paid domestic support, reports have stated many have done so by illegally sourcing cheap labour from foreign migrants, highlighting the nations dependency on foreign labour. The rise in illegally sourced domestic help has also raised fears of abuse, exploitation, and ill-treatment of migrant workers, creating cascading socio-economic risks for the region ([Rai, 2021](#)). Mitigating these risks can present as an opportunity for cross-boundary co-operation and regional mechanisms to facilitate workers rights in the paid care industry. It has also been argued that formal channels to employ domestic workers, as well as care-responsive policies are needed to adapt to this changing demographic landscape ([Rai, 2021](#); [Murphy, 2017](#); [Yangdon, 2019](#)).

### The motherhood penalty and the fatherhood bonus

Even where paid domestic support is available, the responsibility for childcare often exists as unpaid care work. Due to economic, sociological, and institutional factors, the burden of childcare most often falls to women ([ILO, 2015](#)). The result of this is what the ILO refer to as the *motherhood penalty and the fatherhood bonus*, which sees the deepening of the employment gap among women and men ([Addati et al., 2018](#)).

The *motherhood penalty* sees women with young children less likely to be employed than their male counterparts. Men with young children on the other hand saw the opposite occur, showing the highest employment ratios in the world. In Asia-Pacific, the gendered employment gap among parents with young children is 36.5 percent, compared with 23percent for those without children ([ESCAP, 2019](#)).

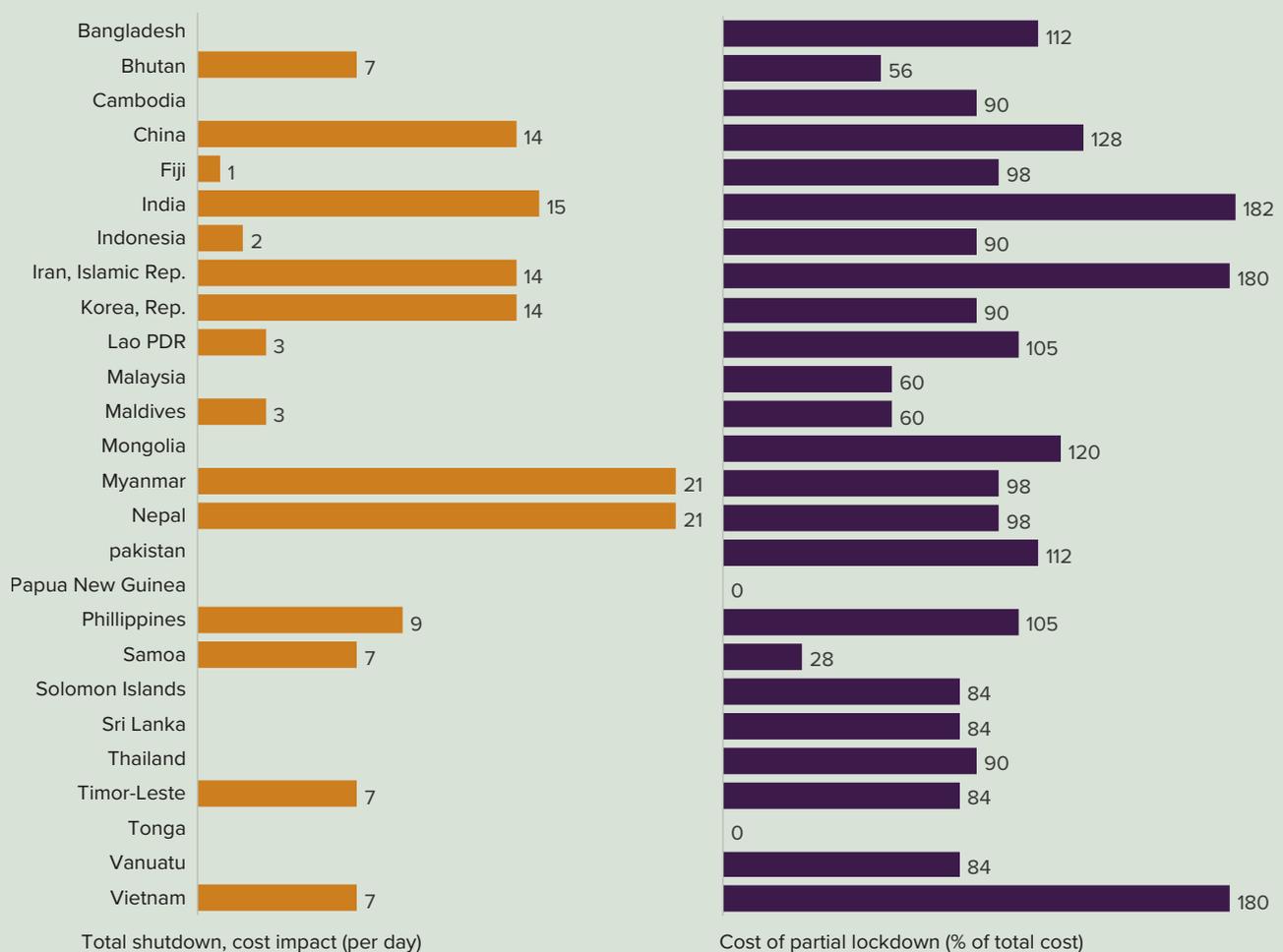
Gender responsive employment and family leave policies can shape how parents with

young children interact with the burden of unpaid childcare, and in turn how women engage with the labour market. An ESCAP (2019) report on *Unpaid Work in Asia and the Pacific* found that family leave policies offer significant physical, social, economic, and psychological benefits to not only working mothers and their children, but also fathers, familial support networks and the community.

The chart below (Figure 32), adapted from data from the World Bank (2022), shows the length of

paid maternity and paternity leave parents are legally entitled to throughout Asia-Pacific. The chart shows that the majority of nations within Asia-Pacific fail to meet the *Maternity Protection Convention, 2000 (No. 183)*, which urges nations to provide 14 weeks of paid maternity leave. This signals an area for future policy development in Asia-Pacific, as family leave policies which provide job and income security for mothers have been argued as a critical pathway to achieving gender equality at work (ESCAP, 2019).

**FIGURE 32: Comparing Maternity and Paternity leave in Asia Pacific**



Source: World Bank: UN Women, Business and the Law.

## Care policies and COVID-19

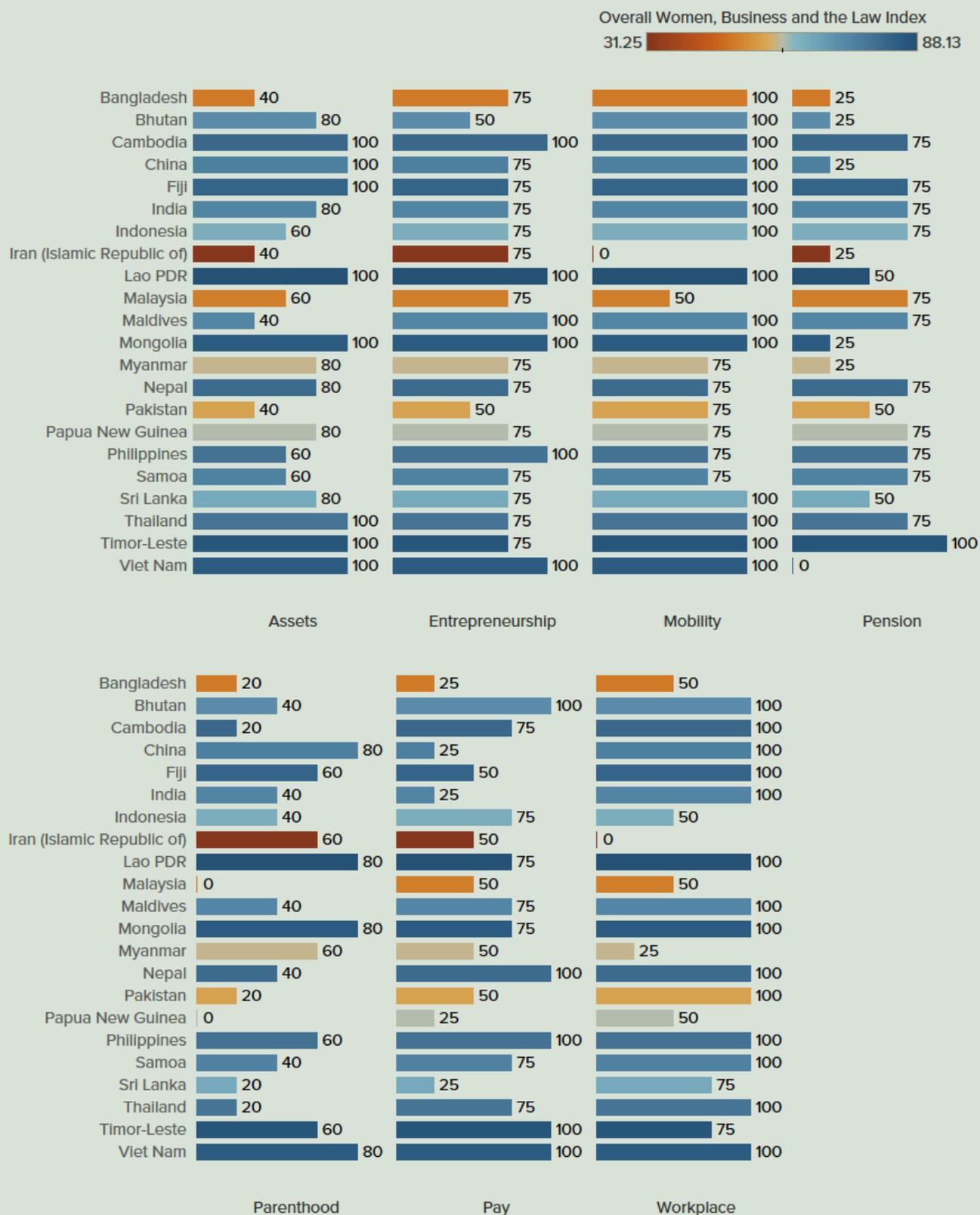
In addition to maternity and paternity policy, a case has been made for governments to invest in care-related policies for infrastructure, social protection, services, and employment ([ESCAP, 2022](#)). However, when considering care-related policies moving forward, our signals in HS 1.0 showed growing resentment towards social protection interventions in the region, presenting additional challenges for care-related policy development.

Research by UN Women ([2015](#)) also found that the value of unpaid care work is not being incorporated into GDP calculations, macroeconomic indicators, or economic policymaking for future development. The application of inclusive data in policymaking brings almost limitless potential for providing more efficient, effective and trustworthy outcomes, indicating a vulnerability in regional policymaking if the value of unpaid care work is not included in data driven calculations and indicators ([OECD, 2019](#)). This vulnerability became clear through the COVID-19 pandemic, after an ESCAP report found that only 30 percent of the socioeconomic policy measures for COVID-19 response in Asia Pacific were care-sensitive, and those that were are at risk of being revoked as the pandemic eases ([ESCAP, 2021](#)). In addition to this, prior to the pandemic, only 9 percent of people with severe disabilities in Asia Pacific were recipients of social protection measures for effective long-term care, showing further gaps in care-related policies in the region ([ILO, 2018](#)).

## The future of care

Our signals have shown that the future of care in Asia-Pacific will vary through the region, intertwined with population projections. As with the past and present, this section has identified that the future of care will present challenges for gender equality in Asia-Pacific, making gender responsive care-related policies essential for supporting sustainable economic growth and societal well-being. The formation of gender responsive care policies has also been identified as a wider issue in the healthcare sector by [WHO](#), stating that “*gender-transformative policies ... through all levels of health governance would help achieve gender parity and gender equality*”.

**FIGURE 33: Women, Business, and the Law Index: Performance by indicators, regions and economies (2022).**



Data from 2022. Source: World Bank: Women, Business and the Law Retrieved from: <http://wbl.worldbank.org>

## The future of transport – exploring the road ahead

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Access to reliable, affordable, and quality transport infrastructure is critical for promoting economic growth as well as social development. It is especially important for the Asia Pacific region, where the world's fastest growing and most rapidly urbanized nations are located. Finding sustainable solutions for transport infrastructure and city planning would accelerate progress to achieve SDGs related to poverty, health, water and sanitation, industry, innovation and infrastructure, inequalities, sustainable cities and communities, responsible consumption and climate action.

### Tackling congestion – a challenge for urban futures

As rapid urbanization is accompanied by an increase in the usage of vehicles, urban congestion is a daily experience for citizens across Asia Pacific. Indeed, our signals show continued traffic congestion in capital cities, a problem also raised amongst the HS 1.0 signals. Congestion has several negative consequences, starting with significant costs – between 2-5 percent of annual GDP in the region associated with time spent on roads, fuel consumption and CO<sup>2</sup> emissions ([ADB, 2022](#)). As an example, in Jakarta, a study has revealed that congestion costs an estimated 65 trillion rupiah, the equivalent of US\$4.6 billion every year for Indonesia ([Yudhistira et al., 2016](#)).

New projects are under construction to ease congestion. For example, in Cambodia's capital city Phnom Penh, where new interchanges and underground roads were built, there is a plan for a subway line as well. However, inadequate transport networks, weak infrastructure networks, and lack of infrastructure characterize most of the countries, including the Philippines, Thailand, Cambodia, Indonesia, Viet Nam, Papua New Guinea, India, Nepal, Timor-Leste and Sri Lanka ([COFACE, 2022](#)). Sustainable solutions to the

transport systems require that land-use and city planning clearly understand user needs, which is reinforced by [ADB's 2022 publication](#) on the future of transport across Asia and the Pacific, highlighting the importance of participatory approaches for planning adequate, affordable and inclusive infrastructure for all.

Additionally, signals warn that traffic congestion caused by inadequately planned transport systems remains a leading cause of air pollution - a pressing health risk to people, with damaging impacts on the environment, food and agriculture as well. A 2019 report called [Air Pollution in Asia and the Pacific: Science-based solutions](#) published by the Climate and Clean Air Coalition (CCAC) and United Nations Environmental Programme (UNEP) demonstrates that current policies, if implemented in a timely manner, can prevent continued deterioration of air quality by 2030, but will not improve it to the required international standard, and more than 50 percent of the population will remain exposed to pollution.<sup>29</sup> The report also offers 25 clean air measures for solutions that would have positive impacts on health and well-being, crop production, climate change and socio-economic developments, thereby directly contributing to achieving multiple SDGs.

Recently, there has been a strong focus on air pollution in Asia Pacific region. Recognized as an urgent matter, it was the main topic addressed this year throughout the [Air Pollution in Asia and the Pacific: Subregional Dialogue Series](#). The series were focusing on strengthening coordination, exchanging best practices, and improving policies, data, technology, and capacities to find innovative solutions.

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29 [Climate and Clean Air Coalition](#)

## Bicycle is the New Black – Changing Transport Futures

Looking forward, the COVID-19 pandemic has shifted many citizens' interests in using environmentally friendlier transport modes, with our signals indicating with a surge in bicycle use. As noted in the *Mind the Mismatch* section, several provinces in Cambodia are supporting this growing trend by building bicycle lanes, while Vietnam has implemented car free zones in Ho Chi Minh City and Ha Noi to encourage both walking and cycling (ABD, 2022). These types of inclusive approaches are important to promote road safety and affordable transportation systems for all users, while in the meantime it could reduce fuel dependency, promote public health and attract local businesses. Although ADB's guidance note on [Covid-19 and transport in Asia and the Pacific](#) projected a rapid resurgence of traffic and congestion after lifting Covid-19 restrictions on movements, [TomTom's Traffic Index](#) shows different results on congestion level in 2019, 2020 and 2021 in three major traffic hubs in Asia; Bangkok<sup>30</sup>, Jakarta<sup>31</sup> and Manila<sup>32</sup>. In fact, congestion has decreased in all three cities. This could be tracked back to the aforementioned surge in bicycle use and the rise in EVs on the road, explained in the earlier section on EV and supporting infrastructure.

Furthermore, the background paper on the [Intergovernmental 13<sup>th</sup> Regional Environmentally Sustainable Transport \(EST\) Forum in Asia](#) highlighted that the COVID-19 lockdowns had crippling effects on public transportation providers because of the sharp drop in the number of people using the services. However, lessons learnt from the pandemic in Asia-Pacific offer new opportunities to plan transport systems that are more resilient to shocks and disruptions, inclusive for all citizens, as well as sustainable for the future. The [High-Level 14th Regional Environmentally Sustainable Transport Forum in Asia](#) in 2021 further discussed strategies

on improving transport services and technologies, encouraging a shift to more sustainable transport modes, avoiding unnecessary travel duration, and developing a more accessible transport system in the region. Regional engagement in improving infrastructure is also mirrored in [The Regional Action Programme for Sustainable Transport Development in Asia and the Pacific \(2022–2026\)](#), drafted by UNESCAP with three overarching objectives that, if achieved, will feed into progress on SDGs. The objectives are (i) “efficient and resilient transport and logistics networks and mobility for economic growth, (ii) environmentally sustainable transport systems and services and (iii) safe and inclusive transport and mobility” (ESCAP, 2021).

## Road networks and the urban-rural divide

The importance of transport systems has also appeared in the context of rural-urban divisions. Our signals show dissatisfaction with the quality as well as access of roads and transport services, especially in rural settings, implying the need to invest in local development. In Lao PDR, the [Service Users Feedback Survey Round 2 \(SUFS-2\)](#) was conducted in 2021 to capture user experience of infrastructure services. Results unveil that despite scoring 99 percent for the utilization of roads and bridges, more than 50 percent of the respondents desire the need to improve access to and quality of these public services (UNDP, 2022). Another survey conducted by the Global Competitiveness Record reinforces that road quality on average is perceived as poor (World Bank, 2020). With the exception of Malaysia, China, India and Thailand, citizens from East and South Asia assigned numbers between 2 and 4 for road quality on a scale of 1 – 7 (one being the worst and 7 the best).

Problems do not only reflect on quality but access as well. In countries with high population density, including Pakistan, Indonesia, Bangladesh, and India, many citizens do not have access to paved

30 [Bangkok Traffic Index | TomTom](#)

31 [Jakarta Traffic Index | TomTom](#)

32 [Manila Traffic Index | TomTom](#)

roads within a 2km radius, while Papua New Guinea and the Solomon Islands score the lowest in access to roads. ([World Bank, 2020](#)).

### Looking forward at our transport futures

Although progress has been made on building resilient infrastructures, the region is still lacking sustainable, climate resilient practices. Our post-pandemic world will bring changing values to Asia-Pacific which will influence transport futures. Whatever the future holds for transport in Asia-Pacific, air pollution has been shown to bring major challenges to the region looking forward, while uneven access to roads remains, limiting access to education, healthcare and employment ([ABD, 2022](#)).

## Eco-activism

Eco-activism describes “a form of engagement in social and/or political campaigns with the aim of preventing damage to the environment” ([WECF, 2018](#)). With greenhouse gas concentrations, sea level rise, ocean heat, and ocean acidification all setting new records in 2021 ([WMO, 2021](#)), public awareness of environmental degradation and climate change is increasing in Asia (and globally), as is social mobilization for environmental protection ([Wu, 2020](#)). In many cases, the most impressive and influential voices are those experiencing the direct impacts of environmental degradation and climate change on a daily basis ([WECF, 2018](#)); increasingly, these voices are youths.

### Incubating change: tapping into youth potential

By the end of 2018 young Swedish activist, Greta Thunberg’s school strikes for climate had spread across the globe. Since this, youth-led activism in Asia Pacific has soared, movements tending to be anchored in local rather than global issues ([Eco-Business, 2019](#)). [Kwok \(2021\)](#) identifies a collective lack of trust amongst young people towards political, economic, and social systems and their ability to act in a timely and meaningful manner. As such, youths are increasingly mobilizing to drive social change, leading to a rise in youth-led activism for a variety of concerns. Youth-led [platforms to advance youth activism](#) across the region include the Hong Kong based [Coalition for SDG Education](#), which advocates for SDGs (particularly SDGs 4, 13 and 17) to be at the forefront of education. Another youth movement, the [Coalition for Sustainable STEM and Diversity](#), recognises a diverse STEM community as a driver of inclusive innovation and sustainable development.

Youth movements are diverse and not only linked to environmental protection and climate action – rising youth-led eco-activism was a key theme identified in this horizon scanning exercise. Increasing youth awareness of – and engagement in – sustainable practices was a signal regarded as highly important by colleagues. Comprising a significant proportion of the population in Asia-

Pacific (especially in many nations across South Asia, Southeast Asia, and the Pacific Islands which are experiencing a ‘youth bulge’), youth (people aged 15-24 years according to UN definitions, although national interpretations vary) are central to harnessing the region’s potential for inclusive and sustainable development.

Signals from the Horizon Scanning exercise outlined rising environmental consciousness (in the form of a shift away from single-use plastics and increasing uptake of plant-based foods) and greater mobilisation for climate action amongst youth, with examples from Thailand, Bangladesh, Lao PDR, Cambodia, and Fiji. However, in signal prioritization, participants highlighted ‘youth inclusion and engagement’ as an understudied area within UNDP. In fact, the [UNDP Strategic Plan 2022-2025](#) speaks to the positive value of youth movements on climate change, and explicitly outlines plans to scale up youth economic empowerment, support youth political participation and innovation, and amplify youth’s voices on climate action, suggesting that pre-existing blind spots are being addressed.

In Bangladesh, a surge in climate change activism by young people has been witnessed over the past few years, with social media platforms including Twitter and Facebook increasingly leveraged to spread information and encourage action ([Montu, 2021](#)), as will be discussed further in the social media governance section of the *All Digital Everything* chapter. Elsewhere, youth activism spreads awareness of, and campaigns against, local environmental issues including deforestation in the Philippines, coal mining in Australia, high carbon emissions in India, and use of fossil fuels in Singapore ([Eco-Business, 2019](#)).

Youth, especially in low-income countries, are among the most vulnerable to the long-term impacts of climate change. The [G20 Peoples’ Climate Vote 2021](#) – the world’s largest survey of climate change perceptions – revealed that young people under the age of 18 are, in most G20 countries, more likely than adults to consider climate change a global emergency. As a result, the survey indicated a near-term future increase in

public support for climate action as more climate-aware youth become of voting age, enter the labor force, and reach positions of power.

Whilst not identified in either HS 1.0 or 2.0 signals, several countries across the region have lowered the national voting age in recent years, and in countries such as Taiwan, movements to lower the voting age are gaining momentum ([Hale, 2022](#)). Lowering the voting age is expected to increase youth participation in formal politics in coming years as elections are held. For example, in July 2019 Malaysia lowered its voting age from 21 to 18, which could increase Malaysia’s total number of voters by nearly 8 million by the 2023 general election comparative to the last election in 2018 ([Tantau, 2019](#)). In Japan, which lowered its voting age from 20 to 18 years in 2015, the national election in 2016 saw an additional 2.4 young people vote ([Nakatani, 2017](#)). Similarly, in 2019, South Korea also lowered its voting age from 20 to 18 years. Providing youths with the right to vote gives them the opportunity to have their voices heard. If young people are politically engaged and make up a large proportion of voters, then politicians will be inclined to address policy issues that affect youths ([Nakatani, 2017](#)), which could, for example, drive climate action.

Lowering the voting age is not the only means to increase youth engagement. Ensuring the meaningful participation of youth in climate action requires youth development and empowerment, as recognised by the UNDP (2022) guidance note on [Elevating Meaningful Youth Engagement on Climate Action](#) which serves to facilitate youth-inclusive partnerships and youth-led actions under [UNDP’s Climate Promise](#).

The UNDP Bangladesh Country Office, for example, is training youth and engaging them in climate risk assessment and local climate change adaptation planning and monitoring ([Montu, 2021](#)). Beyond Bangladesh, key entry points for engaging youth need to be identified to foster links with youth innovations and environmental consultancies, advance environmental and climate change portfolios, and promote broader youth participation in decision-making.

# EXPLORING MEANING

## RPD Alignment | Where do signals correspond with the strategic plan?

### The nexus of Gender equality (SDG5) and Decent Work and Economic Growth (SDG 8)

The exploration of interconnected risks and nexus challenges is outlined in earlier sections of this report, identifying the two most strongly interconnected themes as *gender, culture & society* and *economy, employment & education*, highlighting the connection between SDG 5 and SDG 8. As the Asia-Pacific region becomes increasingly uncertain and interconnected, what does the intersect of these themes and SDGs mean for regional programme outcomes?

While these themes are prevalent in UNDP programming, signals from the Horizon Scanning exercise indicate opportunities to further focus on the links between SDG 5 and SDG 8, especially as these thematic areas are at risk of facing disruptions. Signals pertaining to the care burden, discussed in the prior section, have identified that women are disproportionately impacted by the burden of unpaid caregiving, supported by a notably gendered employment gap witnessed in the region. Looking ahead, increasing elder dependency, increasing levels of dementia, and sporadic parental leave coverage in the region raise questions of how regional programme outcomes can expect to meet their goals at the nexus of gender and employment. Signals have emphasized the need for gender responsive family leave and care-related policies for infrastructure, social protection, services, and employment. Increasing emphasis on social protection measures for domestic care workers and unpaid work (largely falling on women) could help increase protections for these vulnerable groups.

The shortcomings in care-related policies in the region may negatively impact or impede the outcomes set within the RPD, namely those indicated by the ‘number of countries with gender-responsive resilient recovery strategies, programmes or plans in crisis and post-crisis settings...’. The previous section on *The Burden of Care in Development Futures* emphasized the absence of care-sensitive socioeconomic policy measures in Asia-Pacific through COVID-19, highlighting that the outcomes of the gender-responsive plans in crisis settings are still at risk of leaving a vulnerable group that is predominantly women behind and preventing them from participating in employment.

Exploring the nexus of SDG 5 and SDG 8 further, the RPD shows ‘proportion of women in managerial positions’ as indicator of its programme outcomes. While the HS signals highlighted the changing nature of work in the post-pandemic future, there were no signals pertaining to trends in the managerial role of women in the workforce.

### Resilience: where signals align with the RPD

The Asia Pacific is the most exposed region to climate change – as such, resilience will play an important role in the strategic plan. The signals emerging from the Horizon Scanning exercise indicate that the increase in the number and complexity of challenges, while partly represented by SDG achievements, requires a more nuanced and analytical approach.

One RBAP regional programme outcome is **resilience built to respond to systemic uncertainty and risk**, in line with the outcome of the horizon scanning exercise, as several signals (e.g. “*Climate change leads to increasing natural hazards*”; “*Wildfires doubling by 2100*”, among others) indicate that the risk scape of

the region is rapidly evolving due to systemic interdependencies and accelerated patterns of change (e.g. climate change, ecosystems decline, etc.) resulting into cascading and uncertain risks. This evidence is supported by recent publications such as the [2022 IPCC Sixth Assessment Report](#), the [Global Assessment Report on Disaster Risk Reduction 2022](#), WEF's [Global Risks Report 2022](#) and ESCAP's [Asia Pacific Disaster Report 2022](#). The alignment is also supported by the distribution of signals against SDGs, showing that the RPD has emphasized the importance of resilience in achieving SDG1, SDG5, SDG11, SDG13, SDG16 and SDG17. In 2020, the world stepped into a pivotal decade of uncertainty and COVID-19 demonstrated what can happen if countries find themselves unprepared. Building resilience to respond to systemic uncertainty and risk is not only an imperative objective in itself, but an essential component in the achievement of other Strategic Plan outcomes.

This overarching outcome is further detailed mainly in regional priority 3: *Resilience for crisis prevention, preparedness, response, recovery, and promoting social cohesion and stability*, offering that UNDP will support government and stakeholders to prepare for a wide range of shocks and threats. The horizon scanning exercise suggest that this will be an increasingly important role for UNDP to play, as the signals captured a looming and daunting picture of the future, indicating how sudden-onset hazards – including floods, wildfires and sand and dust storms – will increasingly interweave in unpredictable and destructive ways with slow-onset events such as sea level rise, droughts and water disruptions.

Signals referring to sea level rise, for example, not only indicate that 70 percent of the people that will be affected by rising sea levels worldwide are located in just eight Asian countries, but also that this is happening in concurrence with land subsidence which is driving coastal cities to sink at a faster rate than the sea level is rising. The cascading impact this process will have on fisheries, agriculture, tourism, health,

infrastructures and economies, though uncertain, to some extent, has been estimated (see [A boiling frog syndrome? Climate change and slow-onset cascading risks](#)). Furthermore, this process will not occur homogeneously, but it will impact countries and sub-regions in different ways. Signals suggest that a more analytical approach to resilience-building and disaster risk reduction efforts described in the RPD could help untangle some of the complexity surrounding risk and boost early action by providing a more concrete outlook of the future.

### **Strengthening resilience-building approaches**

The most relevant indicators refer to the number of people affected by and deaths attributed to disasters per 100,000 people. These indicators are critical as they are able to show that despite the number of disasters having increased by a factor of five in the past 50 years, the number of deaths decreased almost three-fold ([WMO, 2021](#)). While disaster management strategies and early warning systems have come a long way in recent decades, they fail to consider the widespread and creeping impact of slow-onset hazards, as well as the cascading and complex nature of risk the signals highlighted.

Zaidi ([2018](#)) offers a framework that expands beyond the [Sendai Framework for Disaster Risk Reduction](#) indicators and proposing a cascading risk lens for the improvement of loss data indicators, in particular for slow-onset hazards and small-scale disasters. In discussing heat waves, for instance, the paper shows a system interaction analysis, arguing for an indicators framework disaggregated by time interval capturing not only the impact on health and economy but also ecosystem services, livelihoods, governance and service disruption. While only one example, it offers a proposition of how systemic and cascading risks could be measured and monitored over time to better inform policy making and risk-informed development.

The uncertainty and/or potential risks that threaten the region are also uncertainties for the RPD.

As such, UNDP's role will need to continuously evolve to adapt to such risks and uncertainties important to consider in implementation of the RPD. Asserts that "in Asia and the Pacific region, UNDP maintains its pivotal role and strong track record of leadership in disaster risk reduction", but some of the signals indicate that such a pivotal role and leadership may be disrupted by climate change, conflict or governance challenges. Notably, it will be valuable for UNDP to increase its focus on environmental tipping points, a critical threshold that, when crossed, leads to large and often irreversible changes in the climate system. This is a major source of global uncertainty with direct implications on the region. The loss of the West Antarctic and Greenland ice sheets, the Amazon forest's die-back and the coral reef die-off, although geographically distant from APAC, could all potentially have a devastating impact on the region's development trajectory. Creating risk scenarios that consider these bleak futures, as well as so-called "climate endgames" ([Kemp et al., 2022](#)), could help minimize some of the uncertainty and help build resilience for worst-case outcomes.

### Trade-offs to Consider

The Sustainable Development Report 2022 indicates that, in East and South Asia, achievement of SDG 13 on Climate Action (SDG 13) is moderately increasing while challenges remain; while in Oceania, progress towards SDG 13 is assessed as having been achieved, and on track to maintain this status. Nevertheless, major challenges are said to remain in Mongolia, with significant challenges remaining in Iran, Malaysia and Thailand. Meanwhile, in several countries progress towards SDG 13 is stagnating, or increasing at less than 50 percent of the required rate. In Bhutan, Iran, Lao PDR, Malaysia, Maldives and Thailand progress has stagnated, while in Mongolia there is even question of a reversal in climate action progress.

Posing a prompt example of trade-offs to consider in achieving goals within the Regional Strategy, in Mongolia, the development of [vast mining resources](#) (including coal, copper and gold) are considered a positive development for the economy (SDG 8) – with investment reaching 40 percent of GDP – related industries and their environmental footprints are posing significant challenges to the achievement of SDG 13. Reversal of climate action is mostly due to an increase in CO2 emissions from fossil fuel combustion and cement production; as well as CO2 emissions embodied in imports. Meanwhile, information on CO2 emissions embodied in fossil fuel exports is lacking.

## SCENARIO-BASED APPLICATION

*What If...?* scenarios present pathways for exploring the uncertainties and potential development scenarios which can impact Asia Pacific. Through analysis of signals, *What if...?* scenarios help explore and identify trade-offs, risks, and considerations for future development planning. The *What If...?* process itself can be used as a tool by Country Office's to conceptualise signals and trends, and its scenarios can be used as a medium for engagement on applied foresight.

Below is an application of the *What if...?* scenario approach by using HS 2.0 signals to explore the nexus and trade-offs between *SDG 7 Affordable and Clean Energy*, and *SDG 12 Responsible Consumption and Production*. The scenario explores a future where we see a boom in renewable energy production – but at the cost of responsible mining practices.

### What if... a renewable energy boom does not come with responsible mining?

Renewable energy is becoming a cheaper, more efficient, and increasingly reliable way to power the homes, businesses, and infrastructure across Asia-Pacific. In the Horizon Scanning exercise, scanners identified signs of increases in renewable energy production across Asia-Pacific, and the Asia-Pacific region is forecast to become a key player in renewable energy development throughout the next decade<sup>16,17,18</sup>

However, in tandem to this, several signals were identified which raise concerns for resourcing responsible renewable energy production, both for mining on land and at sea. The International Energy Agency (IEA) supports this, recently publishing a special report, *The Role of Critical Minerals in Clean Energy Transitions*, exploring

the impacts that reaching our clean energy goals will have on supplies of critical minerals. The report identified that achieving a renewable boom will not come without challenges.

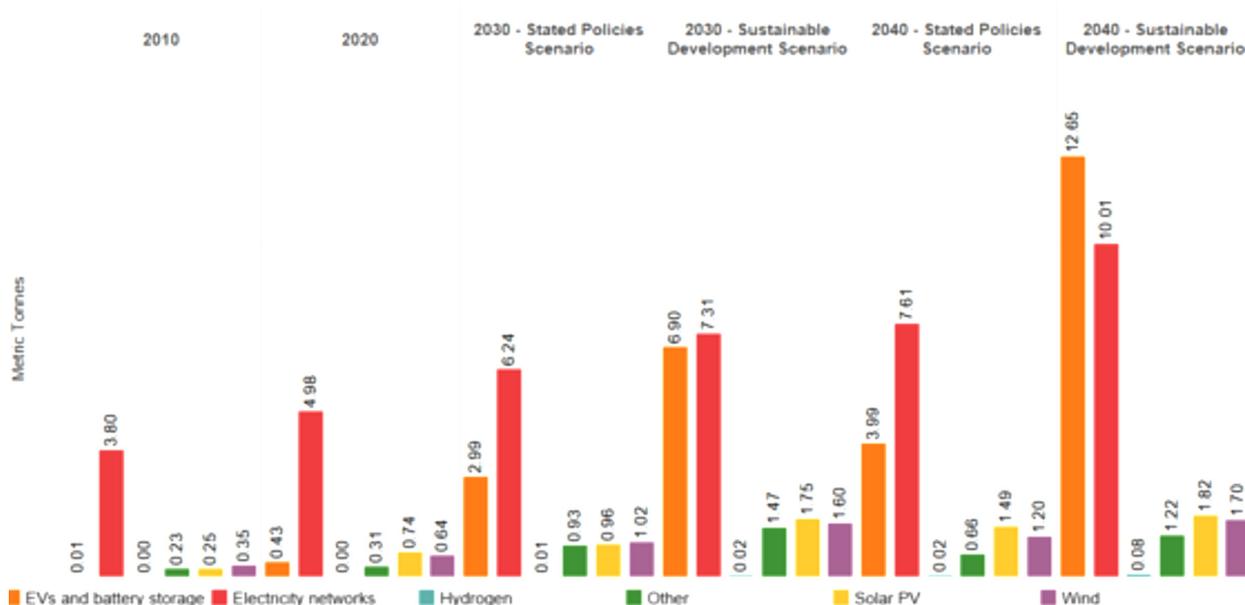
The technology and infrastructure needed to support renewable energy production will drive demand for a wide range of minerals and metals (IEA, 2021). When appropriately managed, mining for these minerals has the potential to positively contribute to all 17 Sustainable Development Goals through generating employment, technological innovation, developing infrastructure, and creating economic growth. However, if operations are mismanaged, mineral mining can damage the environment, displace local populations, further entrench inequality, and increase conflict (UNDP et al., 2016).

#### The scenario – setting the scene

A boom in renewable energy policies and investment sets the world on track to meet its climate goals. All net zero pledges are met – more developed economies reach net zero by 2050, China by 2060, and the rest of the world by 2070. Global temperature increases are limited to 1.65 °C and reduced to 1.5 °C in 2100 (IEA, 2021).

An IEA forecast for this scenario (see Figure 34) highlights that as renewable energy production becomes a major driving force for critical minerals, their demand will increase fourfold by 2040, with high growth for minerals related to the use of electric-vehicle technology. The rapid increase in demand for these minerals gives rise to employment opportunities, investment in infrastructure, and economic development. However, there is also a risk of the exploitation of mineral resources, causing far reaching social and environmental impacts:

**FIGURE 34** Total mineral demand for clean energy technologies by scenario



Source: IEA (2022)

### Increasing emissions – two steps forward, one step back?

Mineral mining is energy intensive and produces significant greenhouse gas emissions. Although the high emissions associated with mineral mining do not negate the climate advantages of renewable energy production, a World Bank report found that if aspects of mineral mining are not decarbonized, the increase in renewable energy production may hinder rather than accelerate progress on SDG 7 and SDG 13 (World Bank, 2022).

### Land-use changes

The main source of direct and immediate impacts on the local and regional environments in Asia-Pacific will be through the changes in land use brought about by increased mineral mining. Changes in land-use for mining will lead to the displacement of local populations. As demand for minerals rises, indigenous communities in Asia face massive displacement, rising poverty, and serious human rights violations due to large-scale mining projects. There is a widespread failure to protect indigenous peoples’ lands and rights to participate in decisions affecting them. This brings

continued discrimination and marginalization against indigenous peoples across the region, especially women and those with disabilities (OHCHR, 2020). The implementation of SDG 1, SDG 5, SDG 10, SDG 16 in affected regions sees trade-offs with mineral mining.

As well as displacement, forecasts show the growing demand for minerals also pushes mining activities into biodiversity-rich areas (Maus et al., 2022). These areas are impacted by unsustainable mining practices, caused by poor regulations and enforcement, bringing soil and water contamination, air pollution, and loss of habitats. A UNEP estimate that natural resource extraction and processing accounts for over 90 percent of global biodiversity losses continues as land is exploited for mining (UNEP, 2020).

Water management in these areas is affected, with the planned or accidental release of contaminated water impacting biodiversity and ecosystems greatly (Morton et al., 2014). In addition, mining operations apply water stress to these areas, with around half of copper and lithium mines used in renewable technologies located in areas of high water stress (IEA, 2021). As this scenario

manifests, our renewable future sees trade-offs with the implementation of SDG 6, SDG 14, and SDG 15.

### Mining waste

The impacts of unsustainable mining expand into waste management. Waste products from mining, known as tailings, cannot be released into the environment and should be safely stored in structures called tailings dams. In a renewable boom, if tailings dams are improperly designed or mismanaged, surrounding areas may find themselves at increasing risk of dam failure, particularly those areas already exposed to extreme weather events and natural hazards. A joint UNEP report looking at tailings dam safety found that even prior to this scenario, the number of serious failures has increased, despite advances in the engineering knowledge that can prevent them ([UNECE, 2019](#)).

As the renewable boom sees a continuation of increased tailings dam failures, habitats, communities, water sources, and farmland experience flooding and contamination. Those in natural hazard prone areas see increased risks, entrenching inequality in those areas. This scenario sees trade-offs with SDG 2, SDG 6, SDG 10, SDG 11, and SDG 15.

### Deep sea digging – looking for minerals under the Pacific

As land-based mineral mines become exhausted, mining companies will look to the resource-rich submarine Clarion-Clipperton Zone (CCZ) to fuel the increased mineral demand. Found under the Pacific Ocean, the CCZ is estimated to hold 21 billion tonnes of minerals used in renewable energy production.

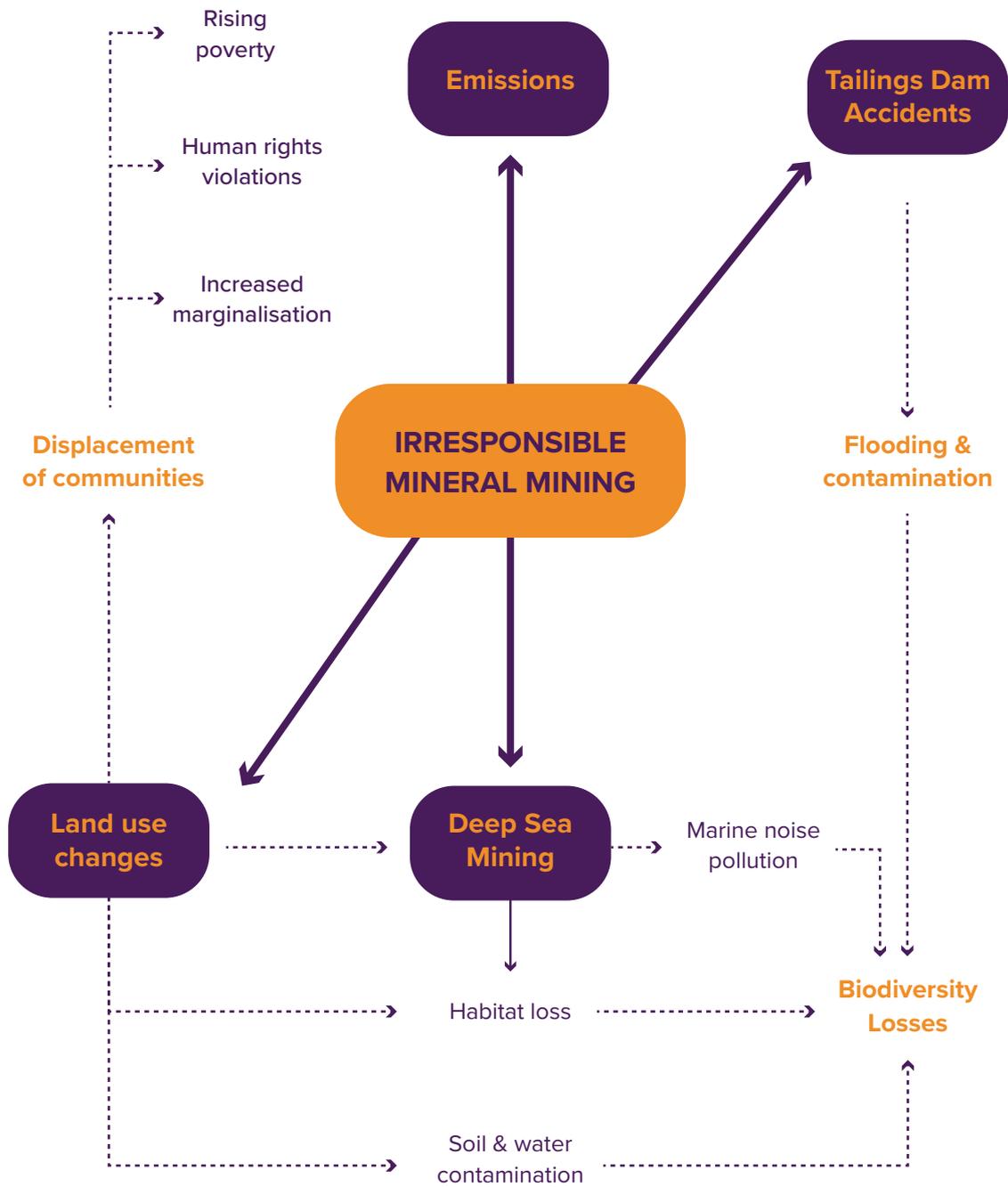
In the face of a renewable boom, Pacific Island nations within the CCZ seek to support their economic development by sponsoring mining companies for deep-sea mining, despite unknown environmental impacts<sup>21</sup>. This has been directly linked to the loss of marine life on the ocean floor, irreversible damage to habitats, and increased marine noise pollution, presenting major trade-offs with SDG 14.

### So What?

This ‘What if...’ scenario has highlighted that at the nexus of SDG 7 and SDG 12, there are significant considerations to be made for resourcing Asia-Pacific countries’ renewable futures. The diagram below summarizes the trade-offs that governments might witness if a renewable energy boom does not come with responsible mining.

Regardless of the scale of the renewable energy transition in Asia-Pacific, to avoid the trade-offs shown above, the move to clean and affordable energy must come hand in hand with responsible mining practices.

**FIGURE 35** Irresponsible Mineral Mining

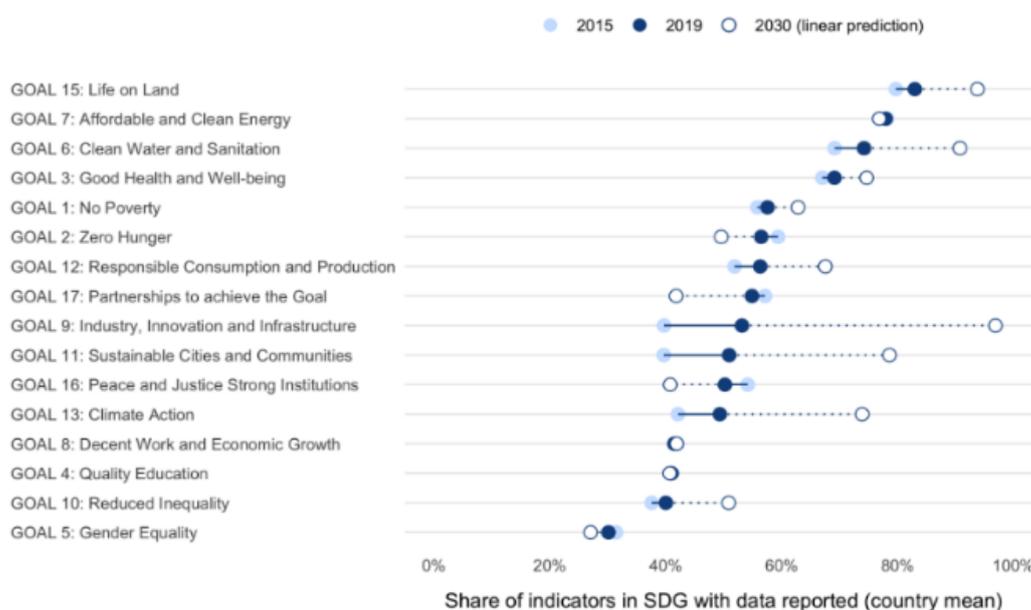


# 5. REFLECTIONS AND NEXT STEPS

## Limitations

As demonstrated throughout this report, the Asia-Pacific region is fast-changing and consistently faced with uncertainty. As such, the emergence of new signals and trends is ongoing and will soon add new complexities and dynamics to the risks and uncertainties outlined in this report.

**FIGURE 36: Progress on SDG Data Reporting (2015-2019)**

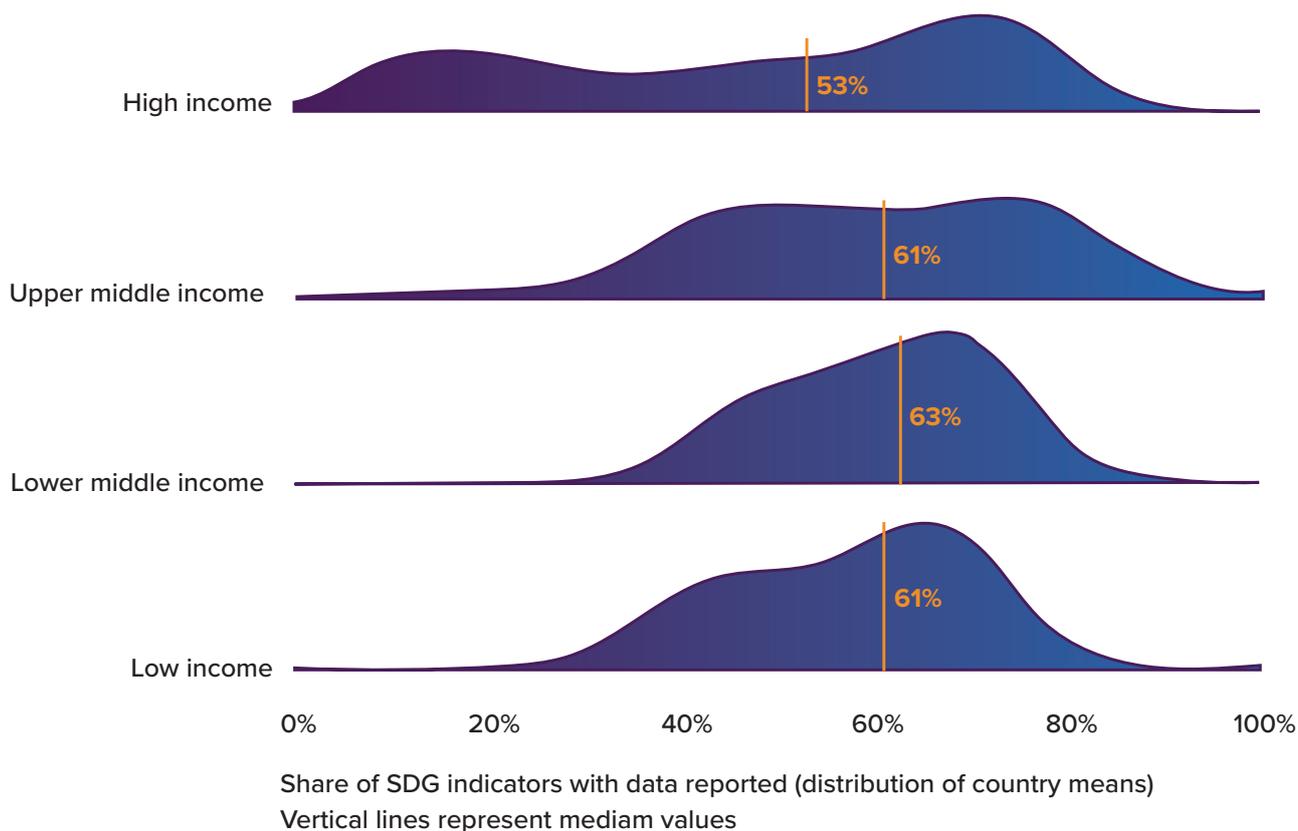


### Limitations on SDG progress reporting and data availability

A key limitation of this report derived from [data availability with regards to SDGs progress and reporting](#). The SDGs, including 231 indicators for 169 targets, challenge countries' statistical systems to collect and monitor data ([WB, 2021](#)). The figure above shows the progress on SDG Data Reporting since 2015, indicating that for

some SDGs (i.e., SDG2, SDG5, SDG16, SDG17) there has been a regression in the first four years, which is expected to widen even more in 2030. As the figure below indicates, high income countries score surprisingly low in SDG reporting compared to low and lower-middle income countries, despite the fact that – unlike MDGs – SDGs are universal and apply to all signatories ([WB, 2021](#)).

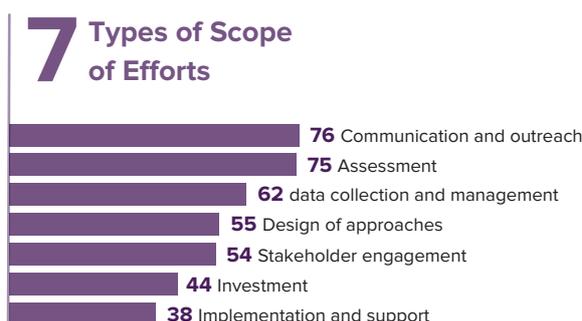
**FIGURE 37: SDG Data Reporting by Income Level (2019)**



Another limitation arises from the mismatch between information availability and evidence of its implementation. For instance, the Executive Committee of the Warsaw International Mechanism for Loss and Damage – established at COP19 – conducted a stocktaking of organizations working on slow-onset events and the scope of

their current efforts ([UNFCCC](#)). The outcome of the mapping in the following figure ([Figure 38](#)) indicates that despite over 150 organizations being analyzed, implementation and support scores much lower compared to communication and outreach, assessment and data collection and management.

**FIGURE 38: Facts and Figures**



The final drafting period of this report also saw the publication of the [Human Development Report \(HDR\) 2021-2022](#), *Exploring Uncertain Times, Unsettled Lives: Shaping our Future in a Transforming World*, and the [OECD States of Fragility 2022 Report](#). Both of these reports invite reflection on our assumptions on decision-making, challenges the trade-offs being made for progress in development, and reinforces that development is a path forward in a world of uncertainty.

Closely interconnected with the themes explored within this report, the HDR 2021/22 and States of Fragility reports should be read in tandem and explored to identify further risks and uncertainties for Asia-Pacific as we look ahead. The close proximity of the publication of both reports, as well as the connections in the themes explored, also invite opportunities for collaboration within the UN system and beyond when looking at the future of uncertainty moving forward.

## Observations

As elaborated upon in the [Methodology and Process section](#), upon receiving of the signals, signals with similar topics (e.g., several country offices shared signals referring to the risk posed by Monkey pox as a future pandemic), and categories of analysis were assigned. Interestingly, and in line with both geopolitical and in-country developments, in 2022, the focus of signals identified shifted more towards the key themes of governance, energy and resilience (see [Figure 2](#)).

During the signal prioritization exercise, the clusters of signals focusing on *natural hazards and climate change* were considered possibly most disruptive, followed by *economy, employment and education*, and, lastly, *food insecurity*. Furthermore, there was a notable number of references to political (in)stability as a disruptive factor to UNDP programming and planning, including polarization, conflict and war, ownership, and geopolitics.

As noted in previous sections, the two most strongly interconnected themes emerging from signal prioritization were *Gender, culture & society* and *Economy, employment & education*. For example, gender inequality in labor participation and economic status were highlighted as ongoing challenges. In the medium term (2025), the most pressing nexus identified was the one between *natural hazards & climate change* and *food insecurity*; while *natural hazards & climate change* and *energy, transport and infrastructure needs* were identified as being most strongly interconnected in the long term (2030).

Expanding on the signal prioritization session for HS 1.0, signal scanning participants in this second iteration were also asked what signals UNDP can best interact with based on its capacity, capabilities and expertise. Among other things, colleagues assessed that UNDP is best placed to respond to disruptions posed by signals in the area of *natural hazards and climate change*, as well as *technology and digitalization*; while more effort should be dedicated to respond to external challenges in the field of *food insecurity*, and

*energy, transport and infrastructure*. Reflecting on organizational dynamics, bureaucracy, funding irregularity or gaps, political challenges and internal management mechanisms were identified as key issues hampering effective response to challenges presented by the HS 2.0 signals. Lastly, uncertainty is understood as a state of imperfect or complete lack of information about a present or future event and is often divided into three types: foreseen uncertainties, unforeseen uncertainties and the unknown (chaos).

One way uncertainty was interpreted in this exercise was the discrepancy in risk assessment by colleagues within the signal scanning, and consequent validation and prioritization survey. To iterate, risk was assessed by scanners as likelihood x impact, while in the survey, scanners were asked to assign assessed importance of an issue from 1 (not important) to 5 (essential). Not all signals were validated in the survey, and these have therefore not been considered in this section of uncertainty analysis. Included, are select examples where the difference in signal scores across phases was considerable.

**FIGURE 39: Importance/ Risk comparison by colleagues participating in scanning , validation and prioritization phases**

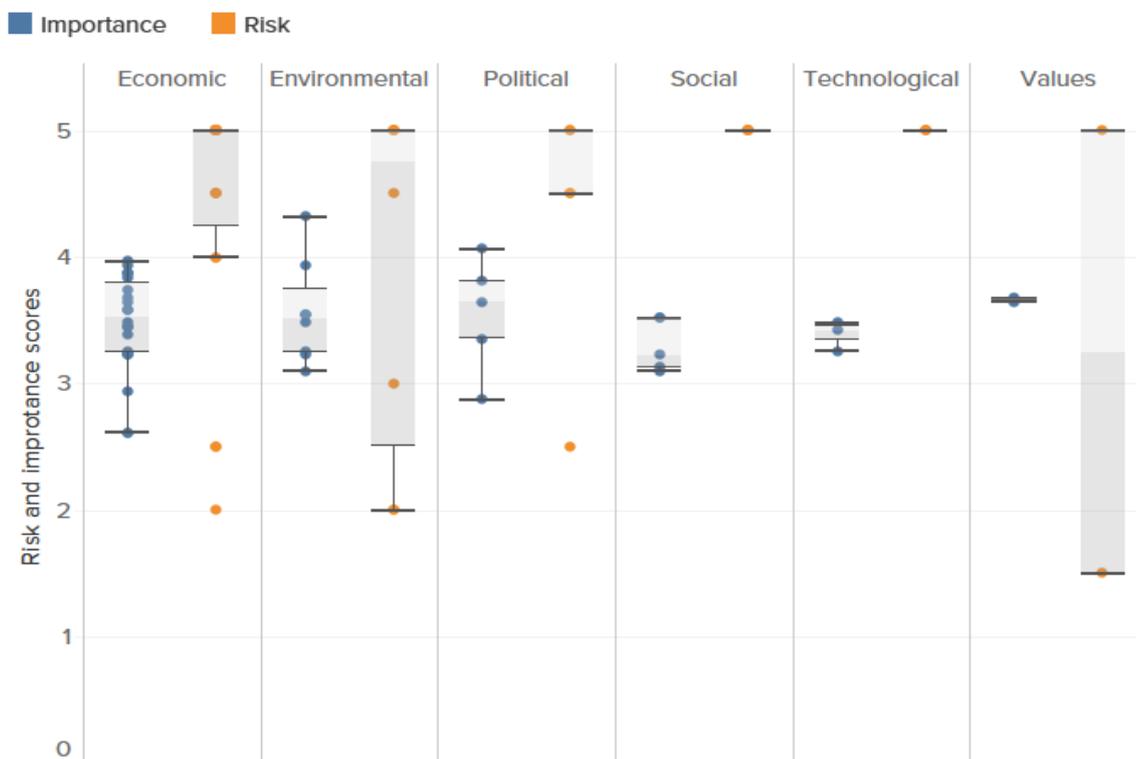


Figure 39 above demonstrates significant discrepancies between risk and importance scores for social and technological (STEEP+V) signals. For these signals, risk, in all instances, was assigned the highest value; importance was considered lesser, although remained at least moderate for all signals included. High uncertainty may reflect intra-regional variations in CPD outputs which could influence personal perceptions of the importance of these signals for individual COs. Comparatively, assigning risk may have been approached by colleagues more objectively and from the perspective of regional likelihood and impact, rather than considering the personal, organisational, or national significance of the signal.

A number of social signals implied significant uncertainty primarily related to health, education, employment, and climate, corresponding to SDGs 3, 4, 8, and 13. Comparatively few technological signals were considered uncertain, consistent with the number of signals inputted by scanners. Technological signals implying high uncertainty related to governance and digitalization and aligned with SDG 9 where, according to the Sustainable Development Report's SDG Dashboards and Trends scores for the region, challenges remain in all countries in the region in advancing towards its achievement.

The risk scores for economic signals included in this exercise ranged between 4 and 5, importance again assigned a lower score to risk in all instances. These economic signals covered themes including youth, employment, agriculture, and food (in)security, and most frequently correlated to SDGs 7 and 8. Environmental signals risk scores ranged between 2 and 5. Importance scores were below risk scores only for signals assigned a risk score of 4.5 or higher. The signal on 'insufficient climate financing' received the highest importance score of all signals included in this exercise, and among the top five importance scores for all signals in the report. These environmental signals primarily related to SDGs 11, 12, and 13.

When compared to other STEEP+V categorisations, risk and importance scores for political signals tended to be more closely aligned. Only one signal—describing leadership changes in Pacific Islands (relevant to SDG 16) had a score difference greater than 1.2. Signals related to values were also mostly aligned in their risk and importance scores, for example the signal 'popularity camping increasing' was assigned a 2.5 risk score comparative to a 2.6452 importance score. However, the two signals included in this exercise (related to SDGs 9 and 10) showed a divergence in risk and importance in both directions.

**FIGURE 40: Examples of signals with significant discrepancies between risk and importance scores, suggesting uncertainty.**

STEEP+V	SIGNAL TITLE	R	I	FINDINGS
SOCIAL	Considering long COVID a disability	5	3.1	Importance was equally distributed across low and moderate values, with slightly fewer colleagues ranking it of high importance. Few considered it essential, despite being assigned the highest risk. This signal had the greatest difference in risk and importance score of all social signals. Limited understanding of long COVID may contribute to high uncertainty, given it remains a new illness.
	The impact of heatwaves on physical and mental health	5	3.2	Colleagues considered this signal high risk, but of moderate importance. The highest proportion assigned it high importance, but responses were distributed across all values. Heatwaves may be of high risk in the region, but the impacts of heatwaves to health may vary in importance by country according to factors including climate, livelihood (e.g. a reliance on agriculture may expose more people to heatwave impacts), income, and healthcare provision.
TECHNOLOGICAL	New innovations and technologies for individual use present data and privacy concerns	5	3.4	Most colleagues considered this signal of moderate importance, followed by essential. Again, risk was scored the highest value. Over 22 percent considered this signal of no or low importance, which may relate to differing rates of digital transformation between countries in the region, or differing legislation relating to data and privacy.
ECONOMIC	Rice planting season disrupted by fuel shortages	5	3.3	The impact of inflation on fuel prices and consequently the agricultural sector scored highly during the signal scanning phase, while assessed as moderately important during the survey. There was a month time difference between the start of the signal scanning phase and the survey, which means heightened discussions of media on food security could have played a role. However, the cascading risk from inflation on fuel prices and consequently sectors dependent on fuel is likely not considered as effectively.
	Fuel shortages and rising costs of fertilizers resulting in field abandonment	5	3.6	
	China's economic development trajectory towards the NCC scenario	5	2.9	While assigned the highest risk, colleagues assessed this signal and the issue it presents of relative low importance. This signal has the highest difference between risk and importance score of any, indicating high uncertainty. This may be due to its specificity to China, meaning that whilst colleagues outside of China could recognise its risk to China, it was not considered personally important to them or their locality.

ENVIRONMENTAL	<p>Garment industry in Southeast Asia underperforming with regard to Paris Agreement standards //</p> <p>High dependence on imported raw materials reduces competitiveness of garment and textile industry</p>	5 4	3.5 // 3.0	<p>Both signals relate to the unsustainability of the garment industry and its impact on carbon emissions but were assigned different scores. The signal on high dependence on imported raw materials was assigned lower risk and importance scores than the signal on the industry underperforming with regard to the Paris Agreement. This may be a result of the signal title which does not explicitly relate to sustainability and climate impacts. The signal on the Paris Agreement does however imply greater uncertainty due to discrepancies between risk and importance scores, which may be due to its relevance to Southeast Asia specifically, meaning that colleagues outside this sub-region may have considered it less important.</p>
	<p>Youth awareness of and engagement in sustainable practices increasing</p>	2	3.9	<p>This signal has among the largest discrepancies between risk and importance scores, with a difference of nearly two points. Risk is considered low, comparative to high importance. Youth development/ the meaningful engagement of youths are strategic priorities for UNDP and may pertain to high importance amongst colleagues. Low risk may result from [...]</p>
POLITICAL	<p>Leadership change Pacific Islands Forum Secretariat causes rift</p>	4.5	2.9	<p>This was the only political signal where the risk and importance scores differed by greater than 1.2 points, suggesting general consensus and understanding. This signal was assigned high risk, but low-moderate importance. Its specificity to the Pacific Islands may have prompted colleagues outside of this locality to assign this signal no or low importance, comprising 41.9 percent of the total.</p>
VALUES	<p>Changing scripture of official documents to allow for digitalization</p>	1.5	3.7	<p>This signal had the highest difference in risk and importance score of any included. It was assigned the lowest likelihood score of 1, combining with low impact to produce a low risk score, perhaps demonstrating acknowledgement that this change would likely only have localised impact. The high importance score may reflect the cultural value of this change if it were to occur, rather than considering likelihood.</p>

