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Understanding & managing systemic risks: lessons from the COVID-19 pandemic

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Point of departure

- Risks & losses on the rise (IPCC, 2022; UNDRR, 2022)
- Impacts of climate change, hazards & shocks are compounding & increasingly felt across sectors, systems & borders (IPCC, 2022; UNDRR, 2022)



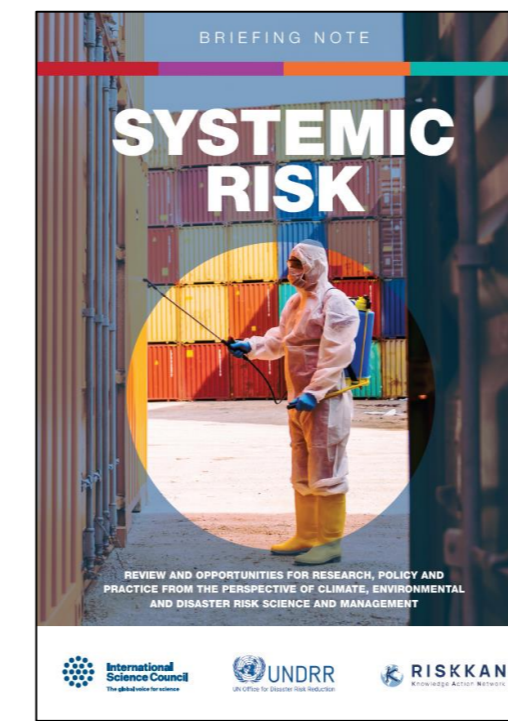
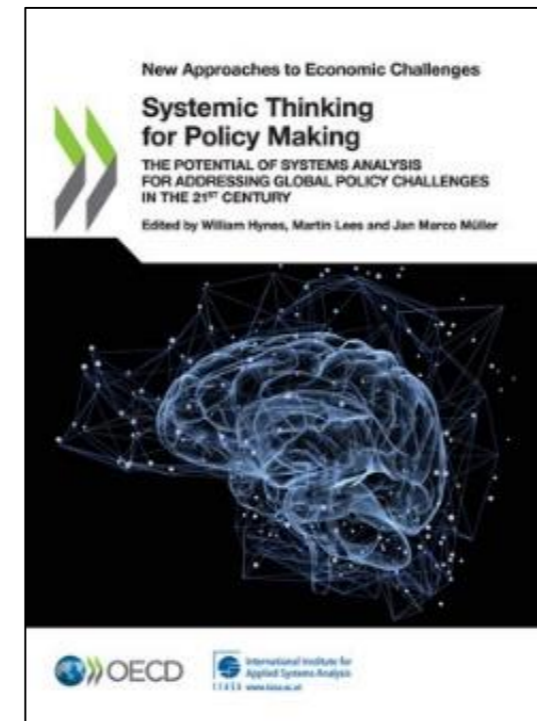
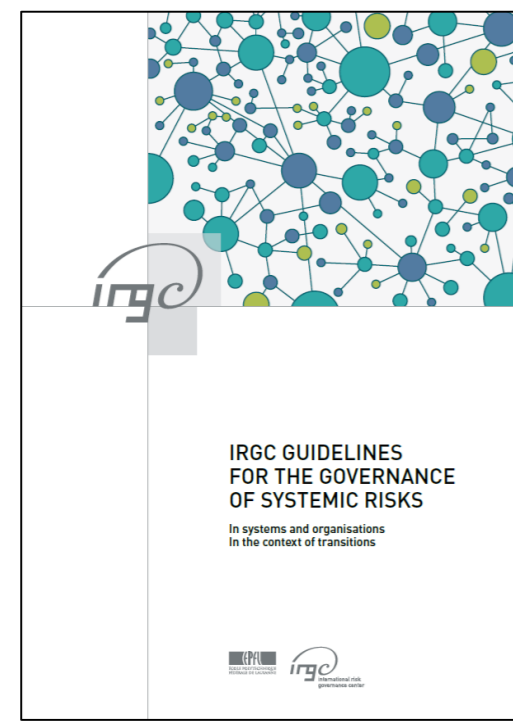
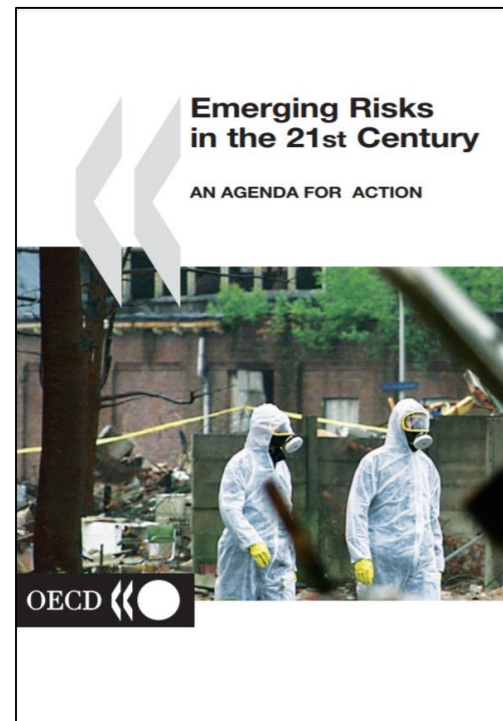
Systemic nature of risks

- Need to revisit how we look at, assess and manage risks!

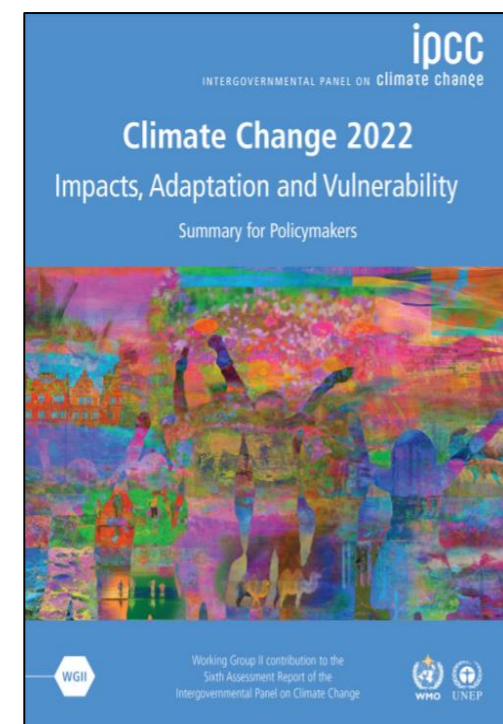
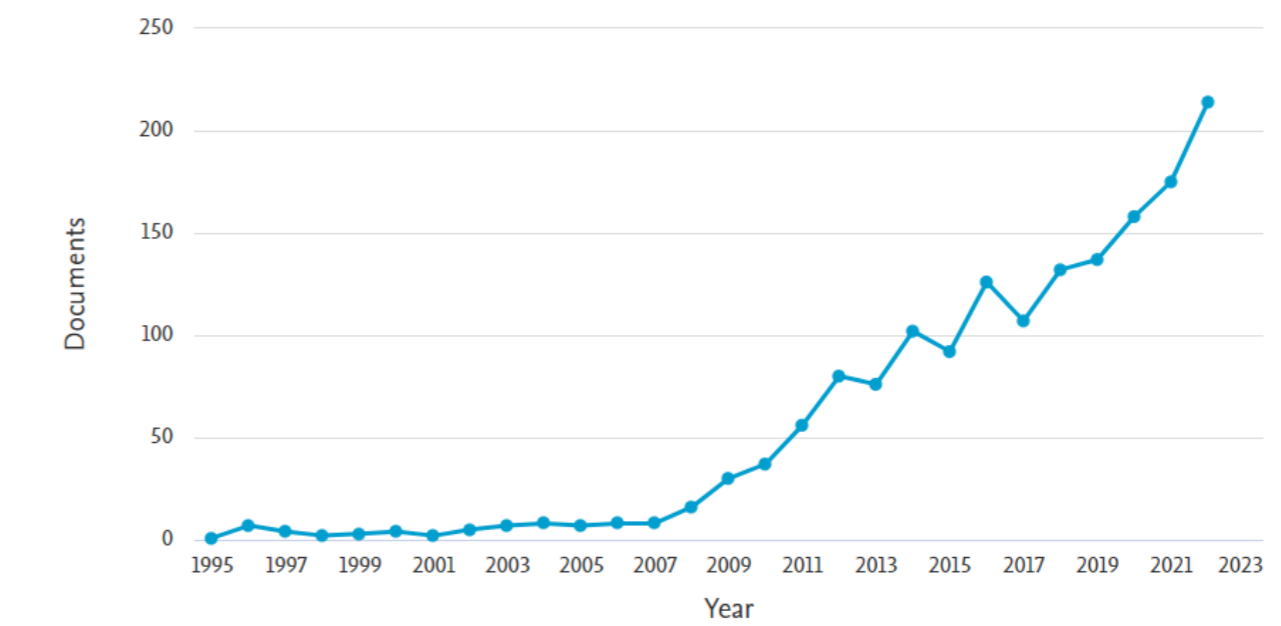


Point of departure

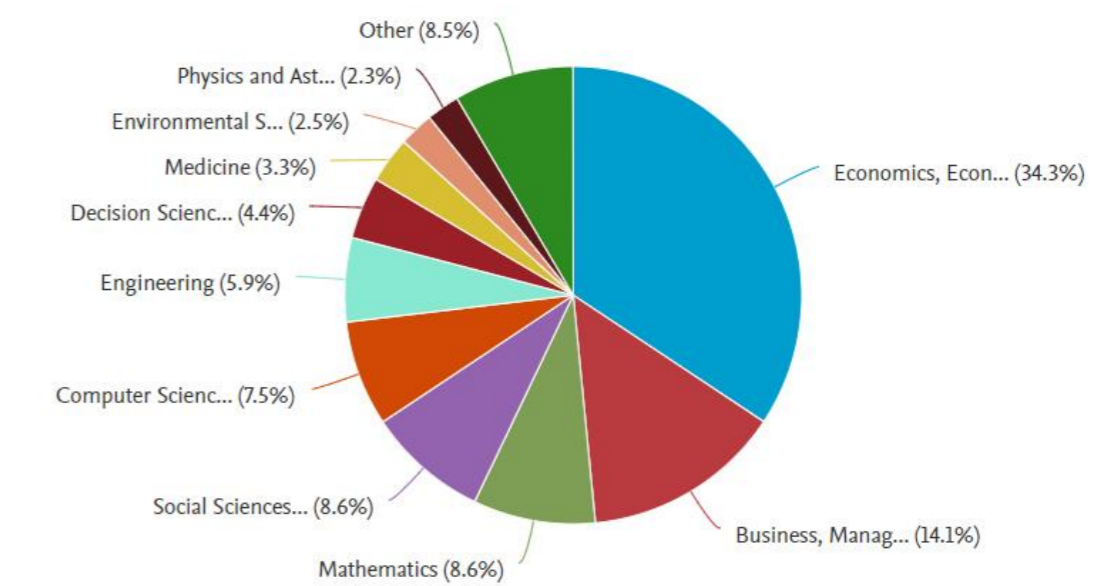
- Increasing attention to systemic risks (science, policy)



Documents by year



Documents by subject area



- **Challenges remain:** understanding systemic risks, risk assessment & implications for risk management, disciplinary siloes (economics, health, climate)

What does systemic risk mean for you?



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What does systemic risk mean for you?

30 responses

Risk that affects complex systems and is potentially catastrophic to these systems.

Risks that are not limited to sectors or regions but affect multiple scales and interact.

Interconnected dynamics that cannot be predicted

Risk that is built into the way systems work.

unexpected impacts

One Event has Impact on many other systems

Emergent threats

Interdependent and interrelated risks that may have cascading compounding effects

risks which encompasses different sectors, exploiting interconnections among them

What does systemic risk mean for you?

30 responses

Risk with feedback loops

Raising inequalities. Siloed approaches.
Disconnect between science, politics and society

Risk that affects the functionality of the system

Risk on global and intersectional levels

Risks are intersectional. Their impacts don't exist
in a vacuum.

A compound of factors that interact to create risk

Known unknowns

Risk emerging from connected systems and thus
affecting the whole system.

Unforeseen unexpected mega events which can
generate enormous losses

What does systemic risk mean for you?

30 responses

Complexity - the interconnectiveness of risks that has emergence, and adaptivity. Also the embodiment of incertitude.

Complex Risks which are pervasive across systems

A systemic risk is a risk that affects the way we are living together on a fundamental financial, moral, societal and international level.

Risk by design

Something that could lead to collapse of (world) society

Cascading effects, tipping Points low levels of controllability

Disruptions are worse and more widespread than expected

Complexity management

Risks that are intrinsic to our economic global system

What does systemic risk mean for you?

30 responses

Trickle down affects from one of event to another

Risks that have cascading impacts across scales

Hazards which arise from any system or subsystem nested at any scale can have an impact on other system's elements, or interconnections.

The systemic nature of risks: lessons from COVID-19

Recent project (2021-2022) with the UN Office for Disaster Risk Reduction (UNDRR) & partners from 5 countries

- Case studies
- Cross-cutting findings (incl. conceptual model)
- Lessons for understanding risks
- Implications for risk management

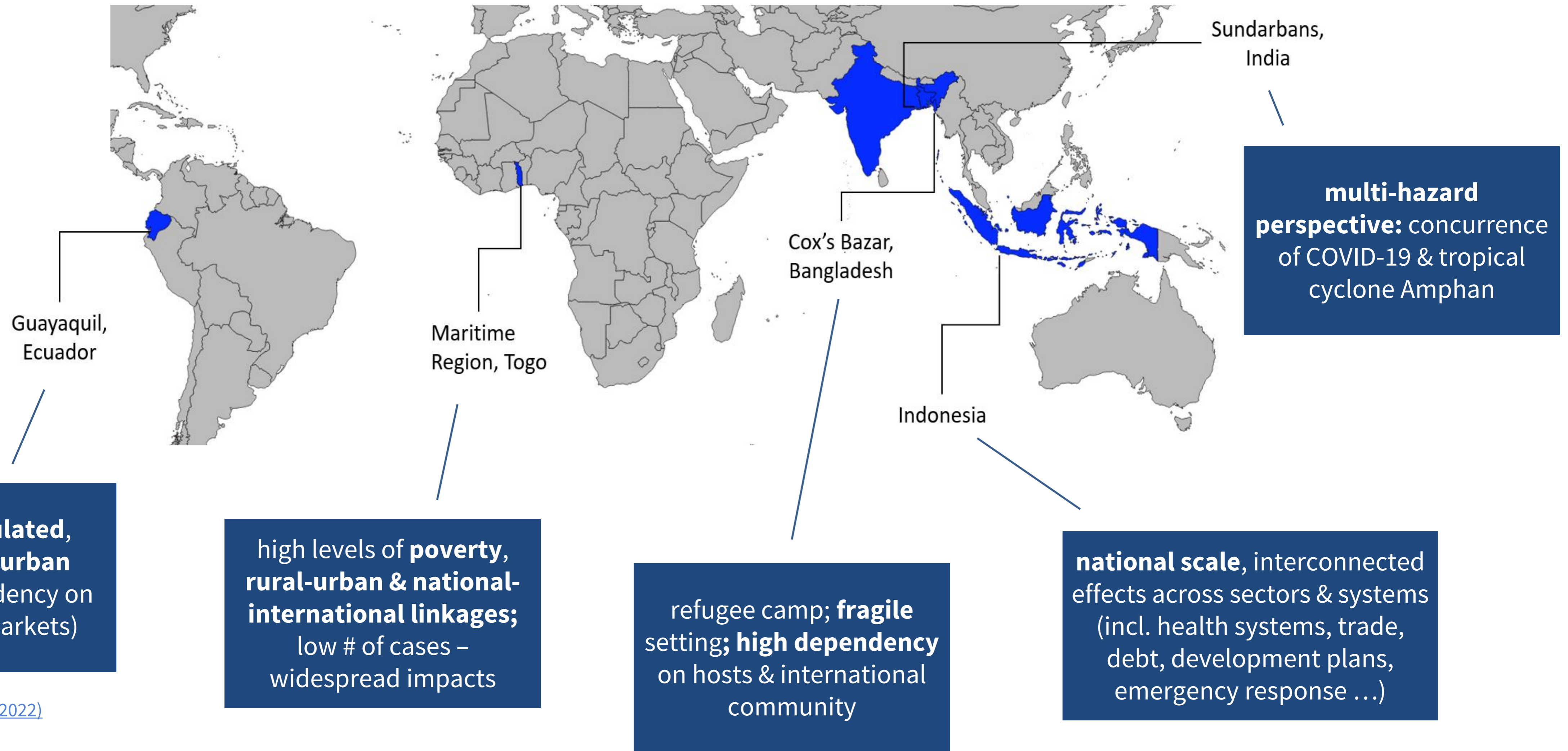


UNDRR & UNU-EHS (2022)



What can we learn from the pandemic to be better prepared for systemic effects of other hazards?

Case studies



[UNDRR & UNU-EHS \(2022\)](#)

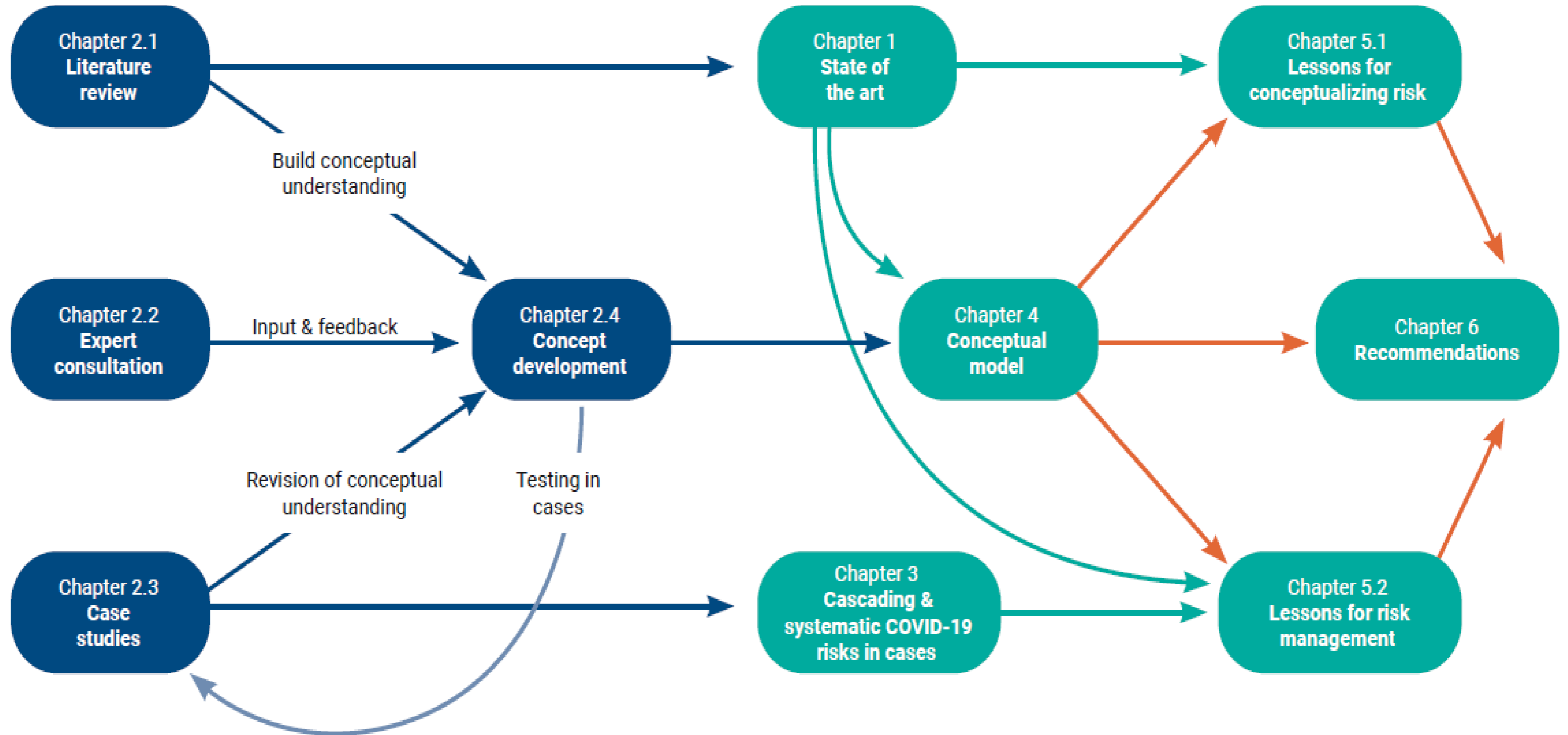
Approach



[Sparkes, Hagenlocher, Cotti et al. \(2023\)](#)

METHODOLOGY

OUTPUTS & OUTCOMES



[UNDRR & UNU-EHS \(2022\)](#)

Cross-cutting findings

COVID-19 interventions had clear and observable **cascading effects** throughout nearly all of society

1

COVID-19 has exhibited **dependency on global networks** and processes have significant impacts at the local level

3

COVID-19 interventions had **severe effects on the education system**

5

[UNDRR & UNU-EHS \(2022\)](#); [UNU-EHS & UNDRR \(2022\)](#)



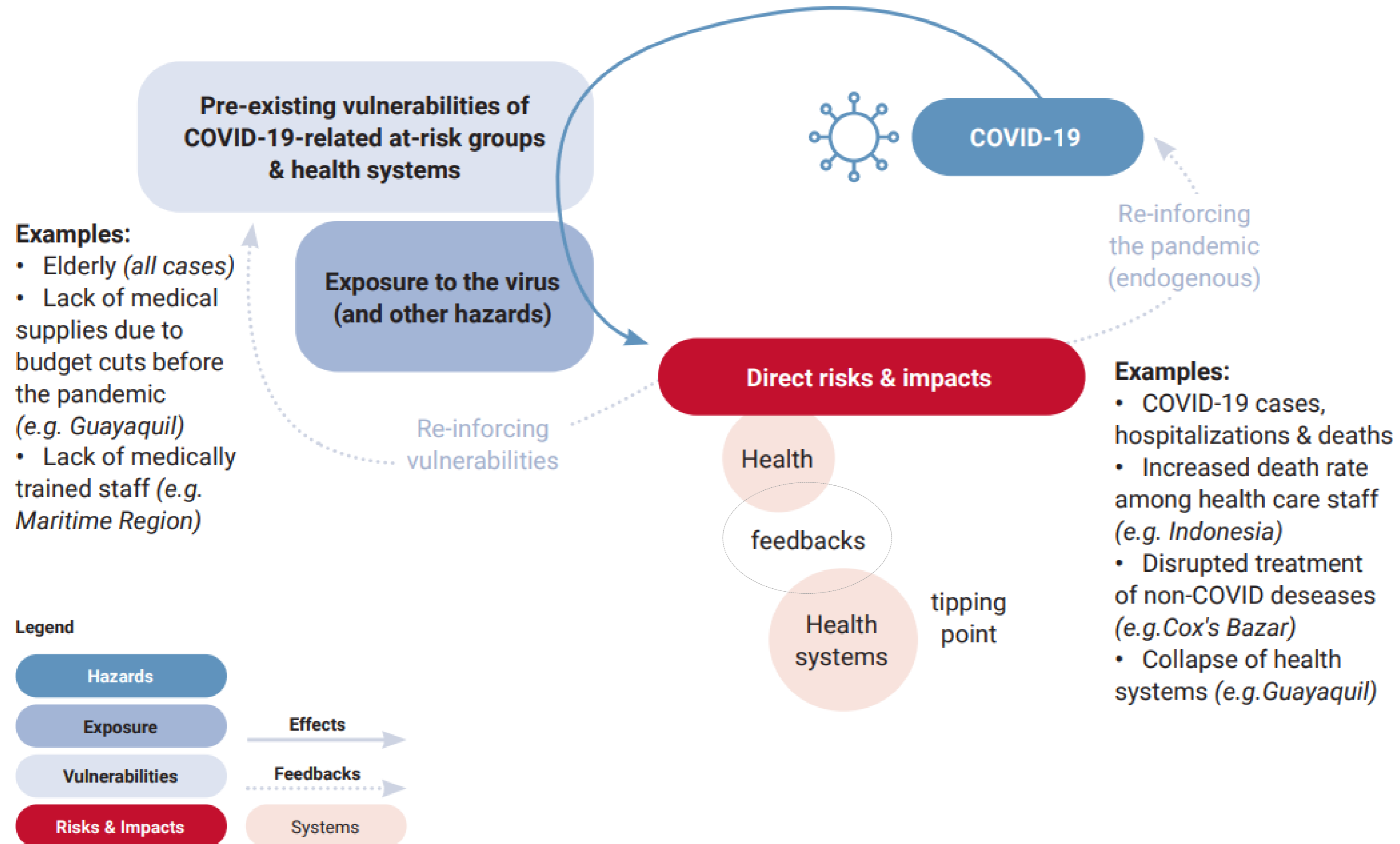
Cross-cutting findings

2 COVID-19 and accompanying interventions **reinforces pre-existing vulnerabilities**

4 COVID-19 interventions had **exacerbated impacts for women and girls**

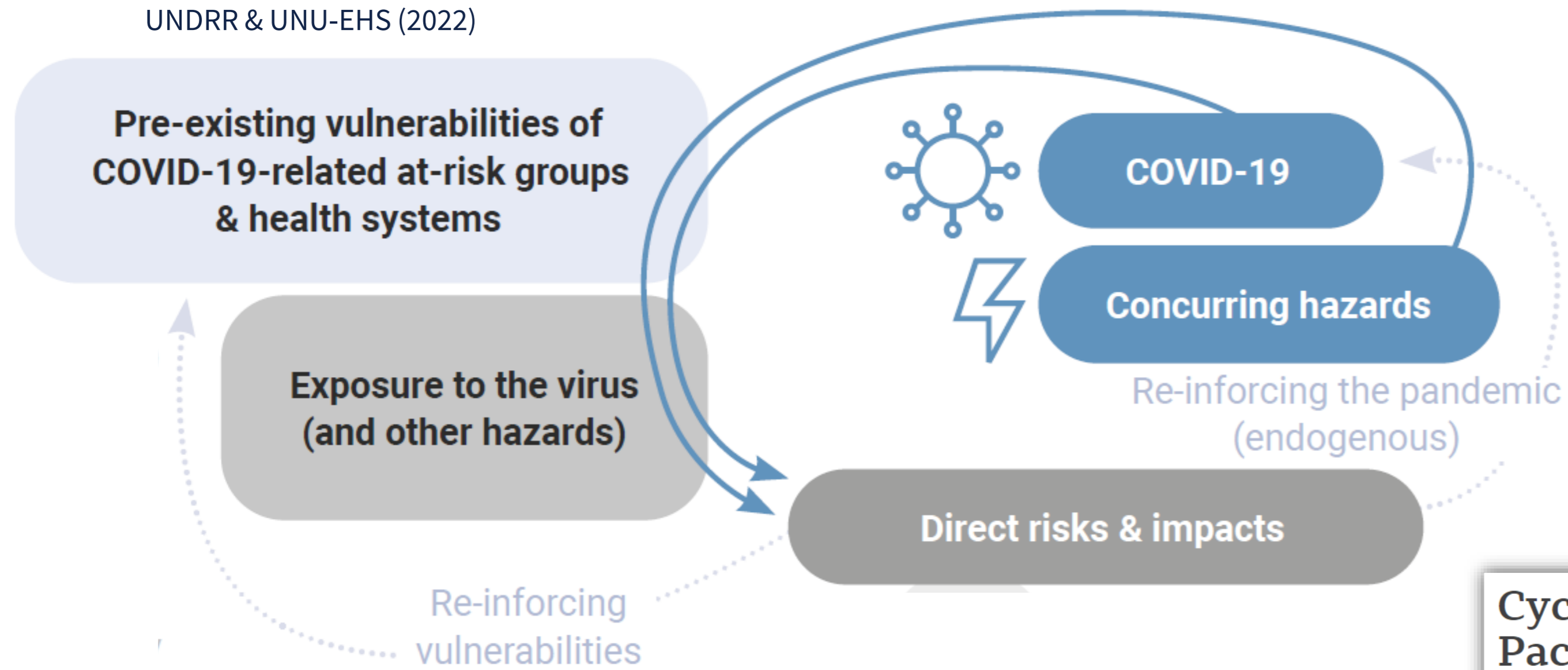
6 COVID-19 **risk communication and coordination has been a significant challenge** for actors and organisations across all scales

Direct risks & impacts



Concurring hazards

UNDRR & UNU-EHS (2022)



Examples from case studies:

- Earthquakes (e.g. Indonesia)
- Tropical cyclone (e.g. Sundarbans)
- Floods (e.g. Togo)
- Fires (e.g. Cox Bazar)
- ...



Cyclone Harold and coronavirus: Pacific Islands face battle on two fronts

By Yvette Tan
BBC News
© 15 April

Revisiting risk in a multi-hazard setting: the case of Cyclone Amphan occurring within the COVID-19 pandemic in the Indian Sundarbans

Sumana Banerjee¹, Himanshu Shekhar², Davide Cotti², Edward Sparkes², Saskia Werners², and Michael Hagenlocher²
¹School of Oceanographic Studies, Jadavpur University, 188 Raja S.C. Mullick Road, Kolkata 700 032, India
²United Nations University, Institute for Environment and Human Security (UNU-EHS), UN Campus, Platz der Vereinten Nationen 1, 53113 Bonn, Germany

Beirut explosion: Coronavirus cases rise 180 per cent in wake of devastating port blast

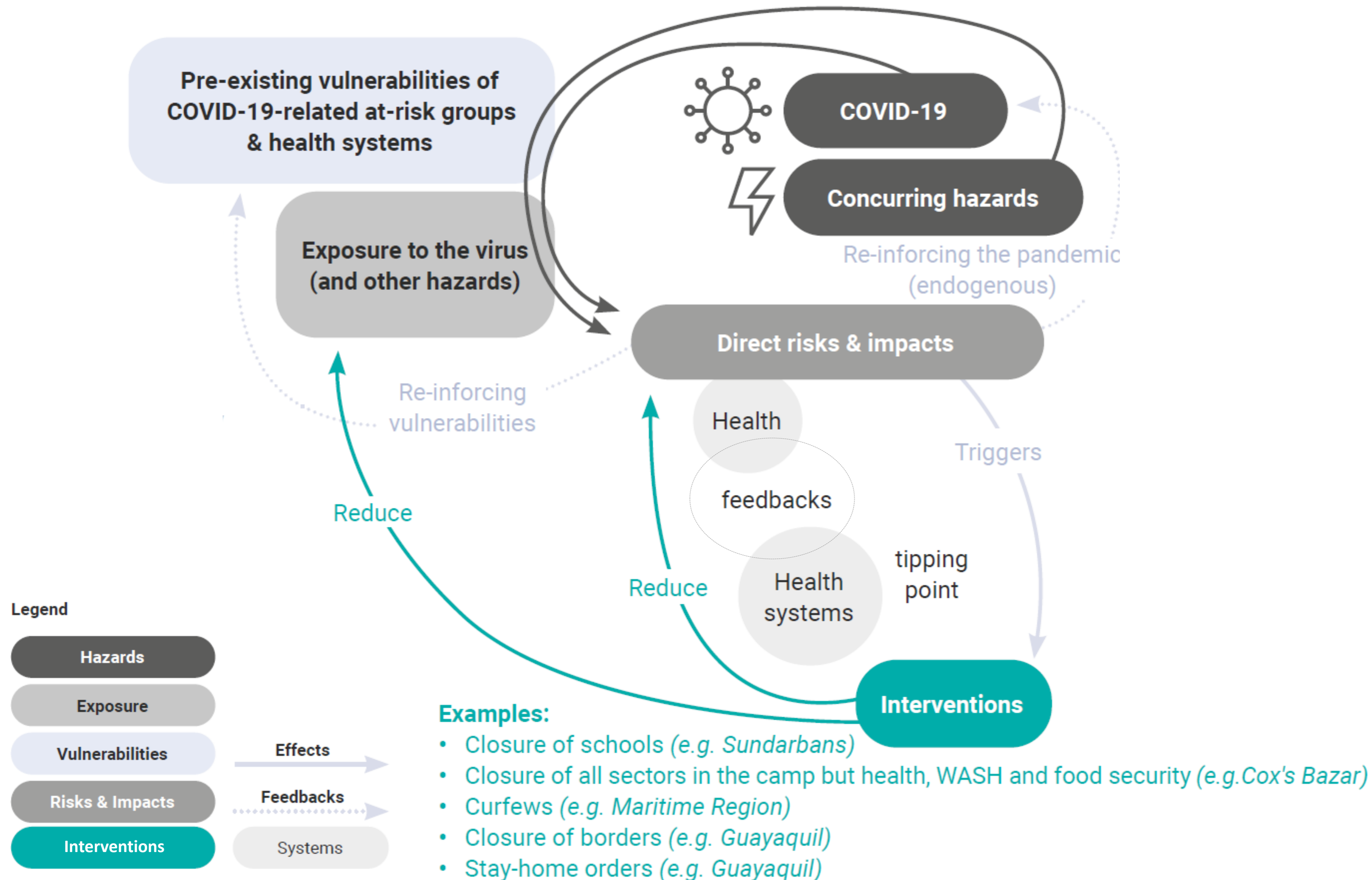
Lebanese government imposes new two-week lockdown in attempt to contain recent surge in cases

Samuel Lovett | @samueljlovett | Thursday 20 August 2020 17:39



- Damaged (health care) infrastructure → **reduced coping capacity**
- **Conflicting responses** (e.g. distancing vs shelter)
- Health protocols made **emergency response slower & more costly**

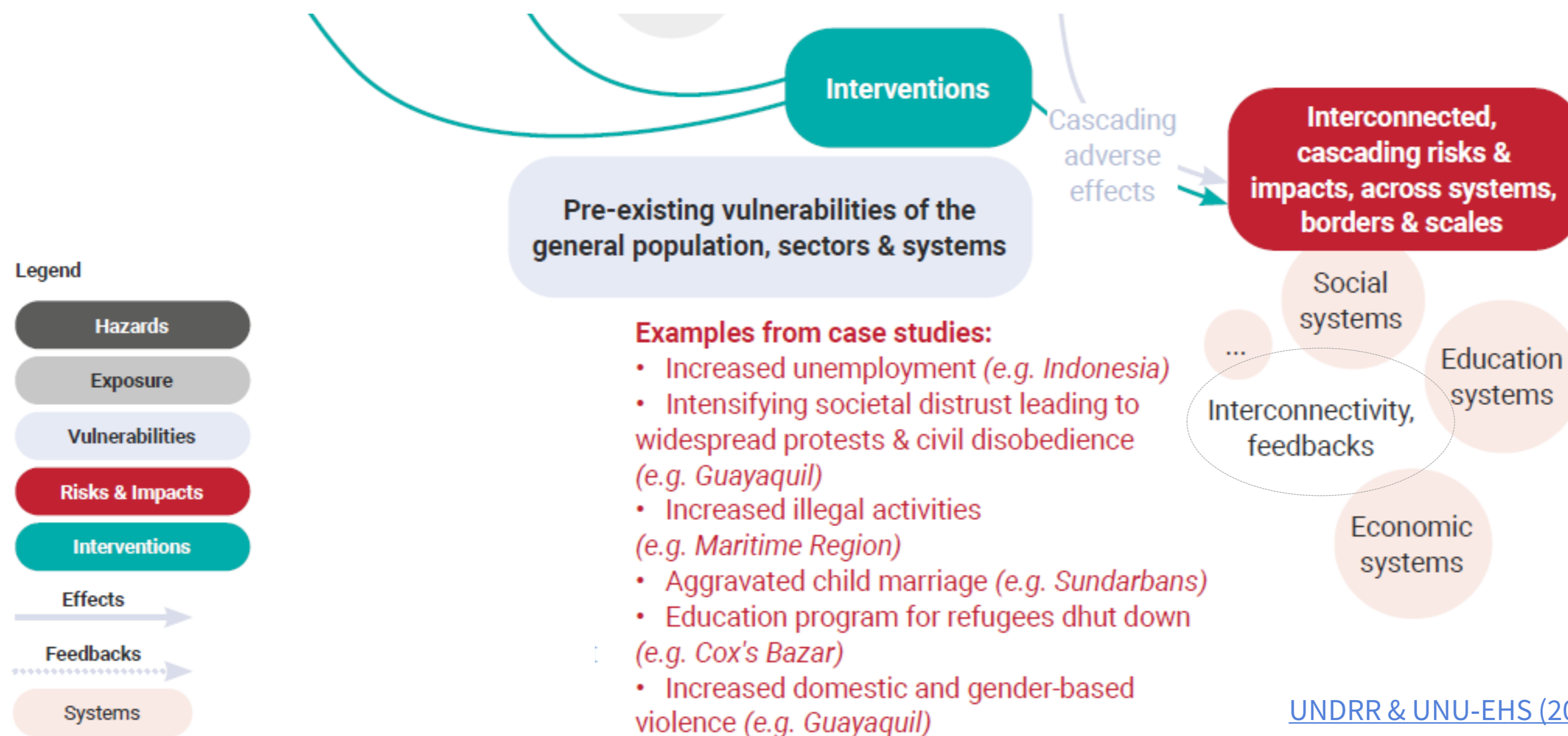
Responses



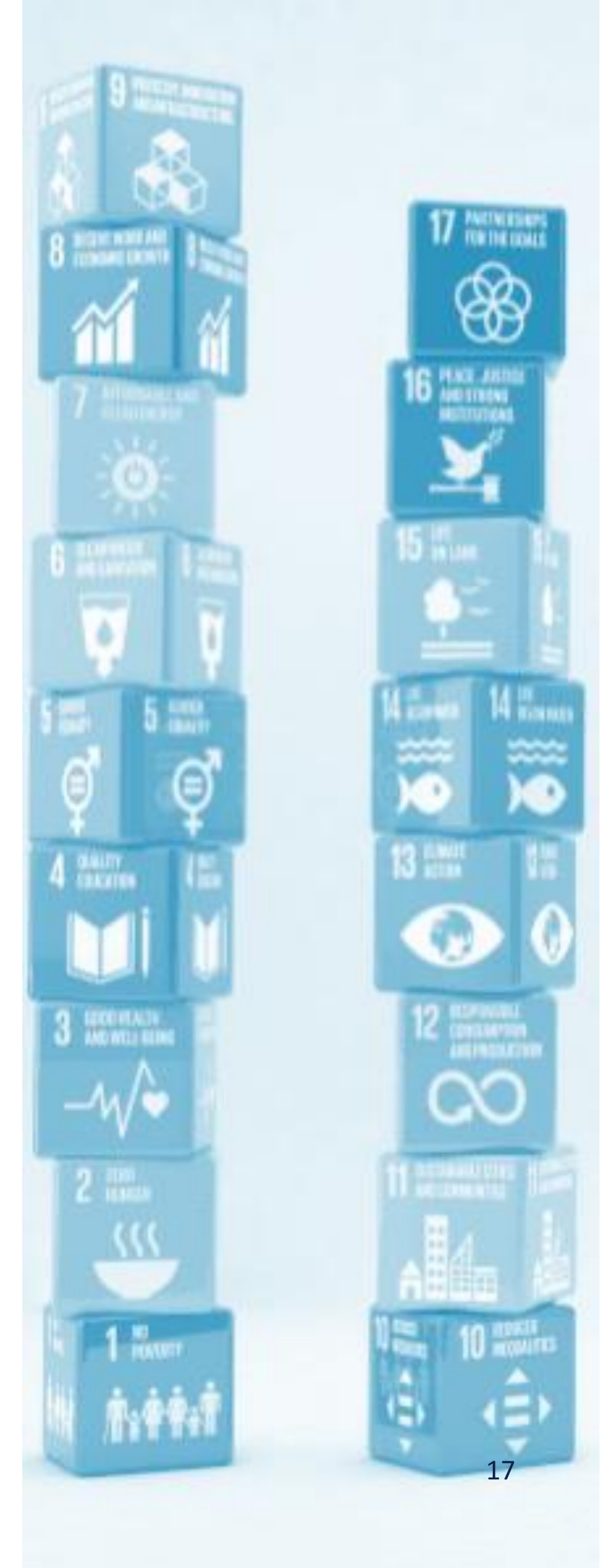
Cascading impacts & “response risks”

“Many of our **children are getting engaged in Yaba (drug pill) transport now-a-days; what else could they do? Their schools have been closed for the last two years! We believed that this new generation would lead us in the future, but now we have doubts!** ...”

(Source: FGD from Camp #2 East, Cox Bazaar; Roy et al., 2022)

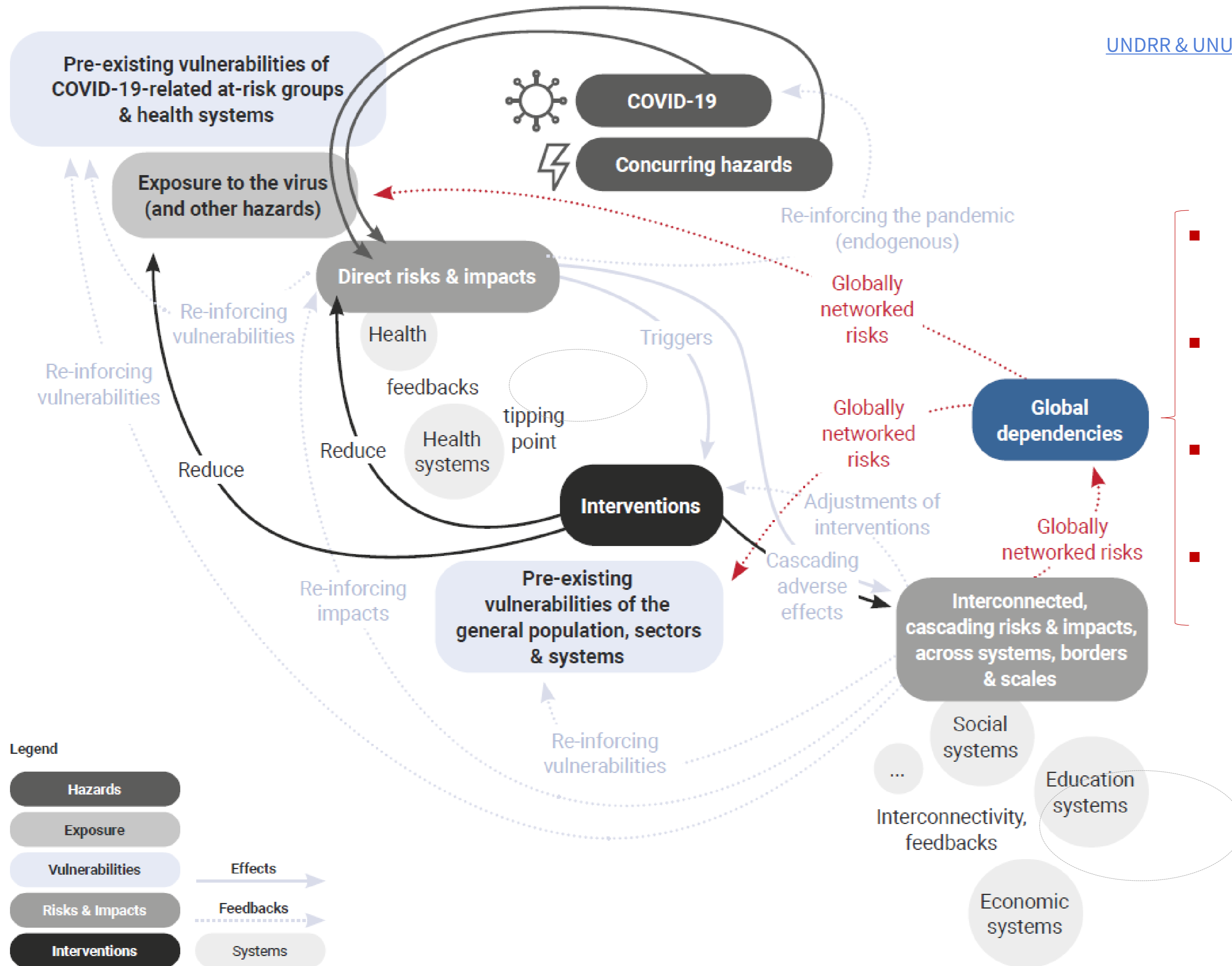


UNDRR & UNU-EHS (2022)



“Globally networked risks“

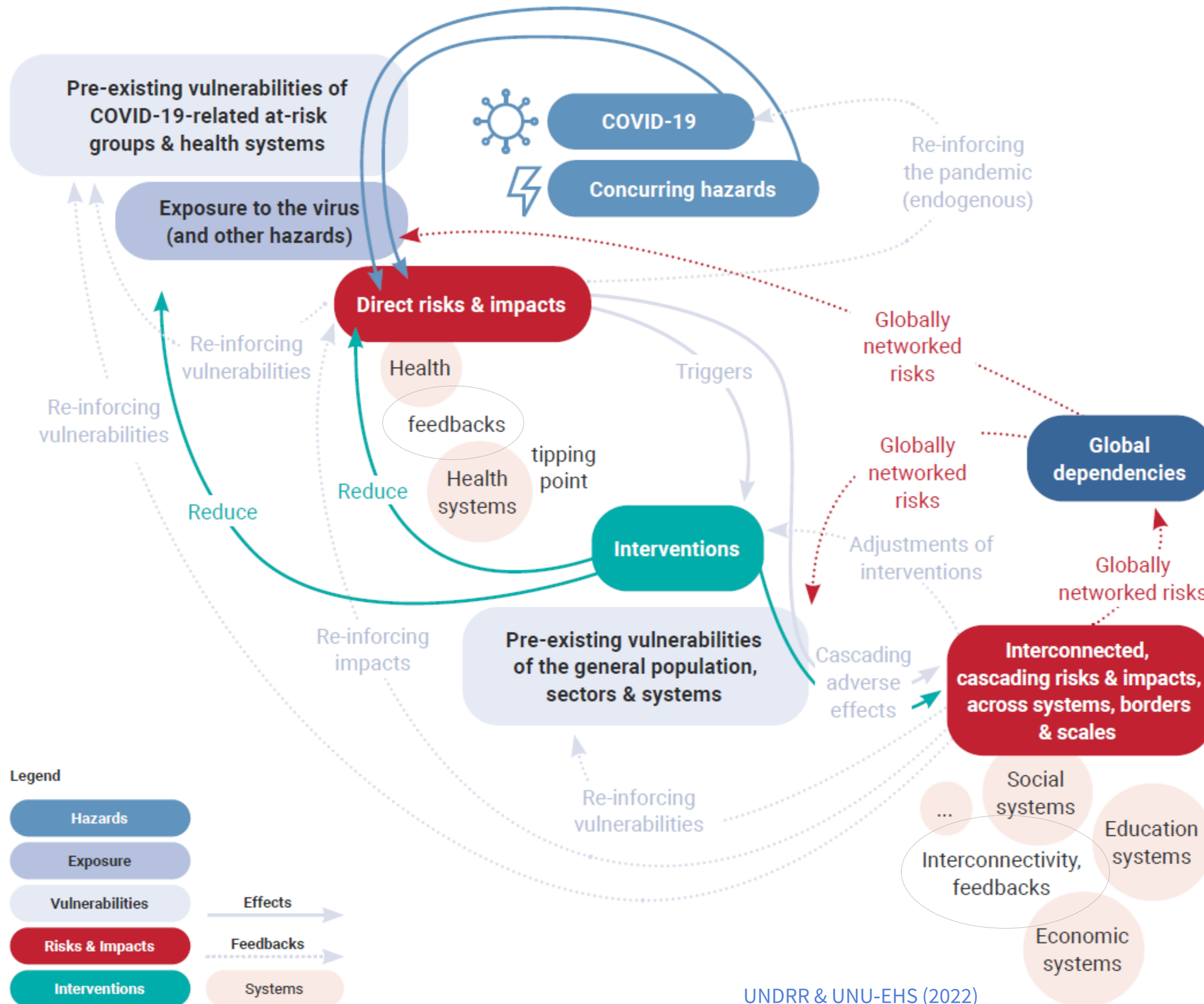
UNDRR & UNU-EHS (2022)



- Global spread of COVID-19
- Disruption of remittance flows
- Disruption of supply chains
- Disruption of international aid



The systemic nature of COVID-19 risks

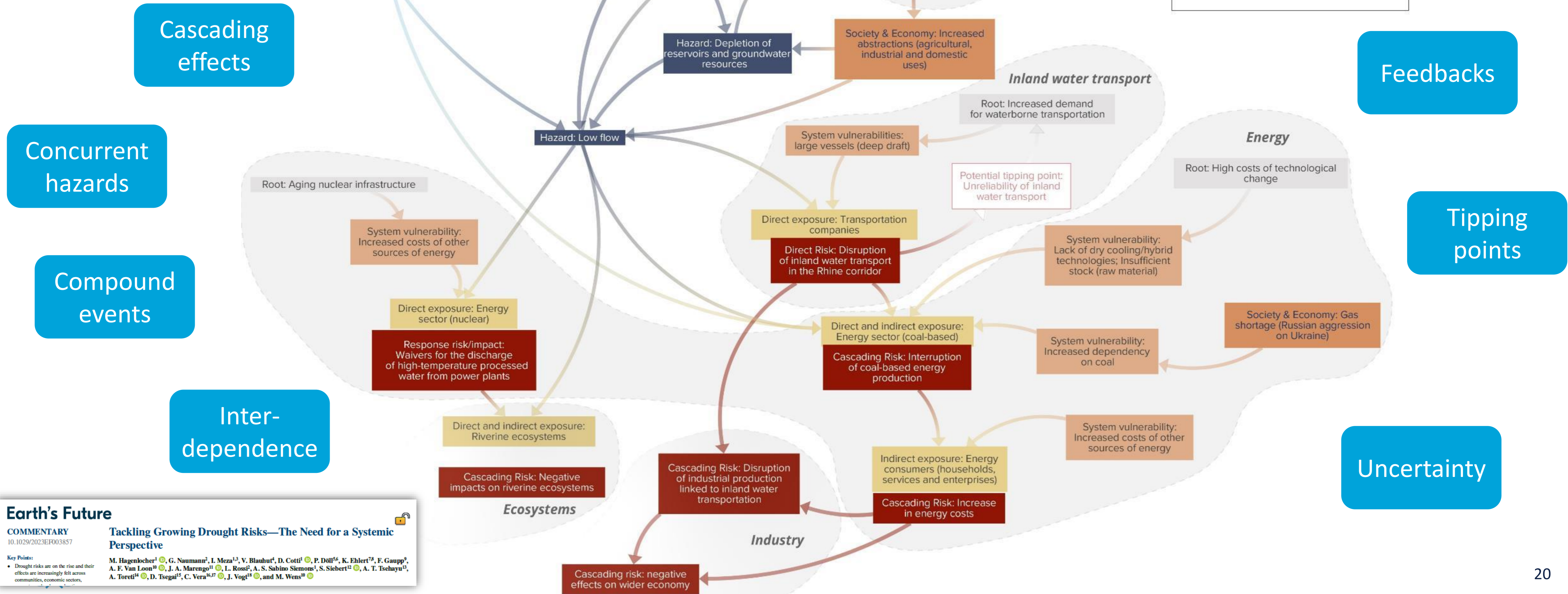


Characteristics:

- **Interdependence, interconnections & cascading effects** (across systems, borders & scales)
- **Feedback loops** (e.g. re-inforcing infections, migration dynamics, re-inforced inequalities, ...)
- **Tipping points** (e.g. collapse of health systems, ...)
- **Under the radar/unnoticed** (e.g. underpreparedness, pre-existing societal distrust)
- **Dynamics & high uncertainty**
- **Difficult to model/predict**

... and what about climate risks?

2022 drought in Europe
(Rhine corridor)



Earth's Future
COMMENTARY
10.1029/2023EF003857

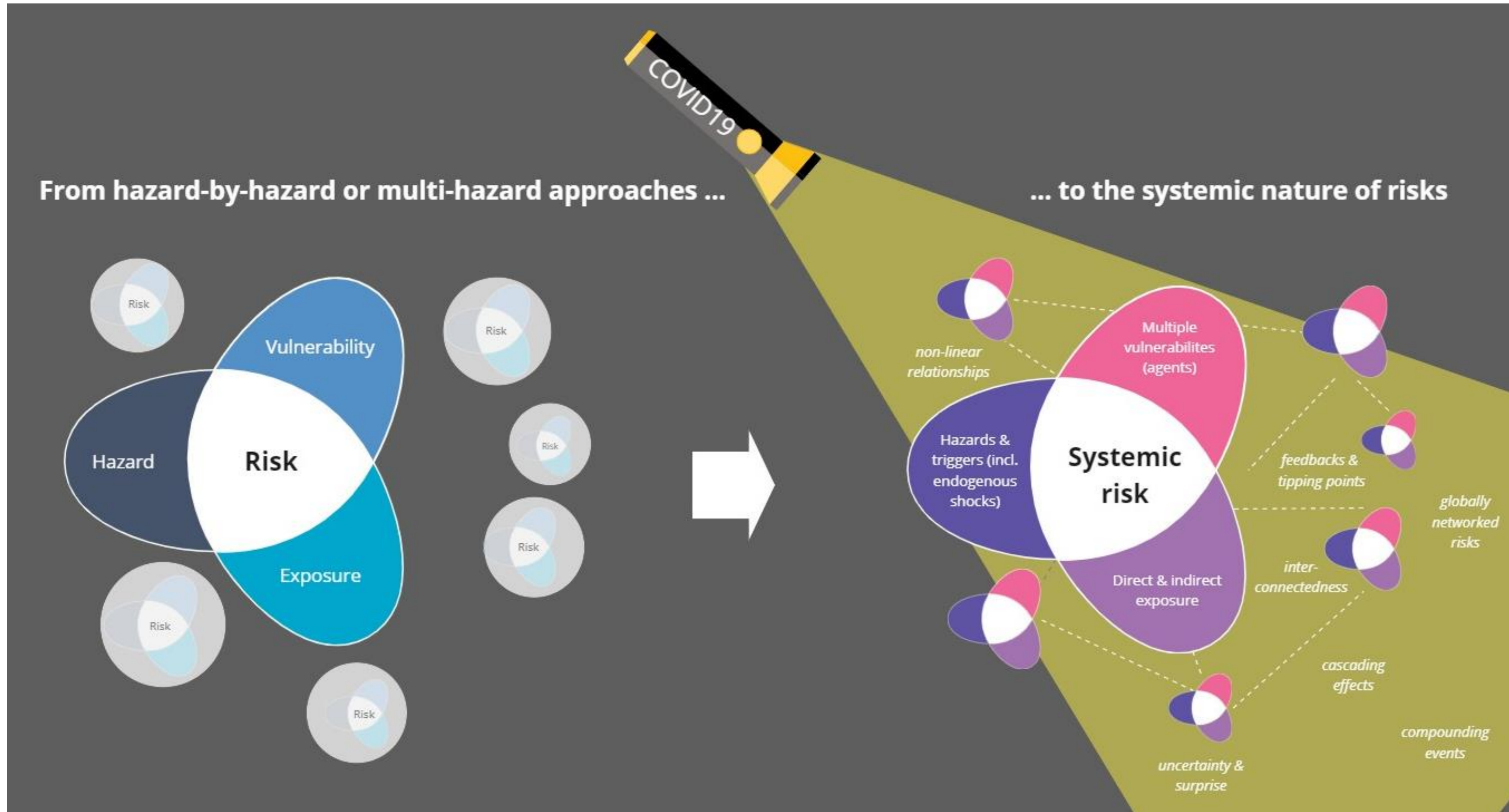
Tackling Growing Drought Risks—The Need for a Systemic Perspective

Key Points:

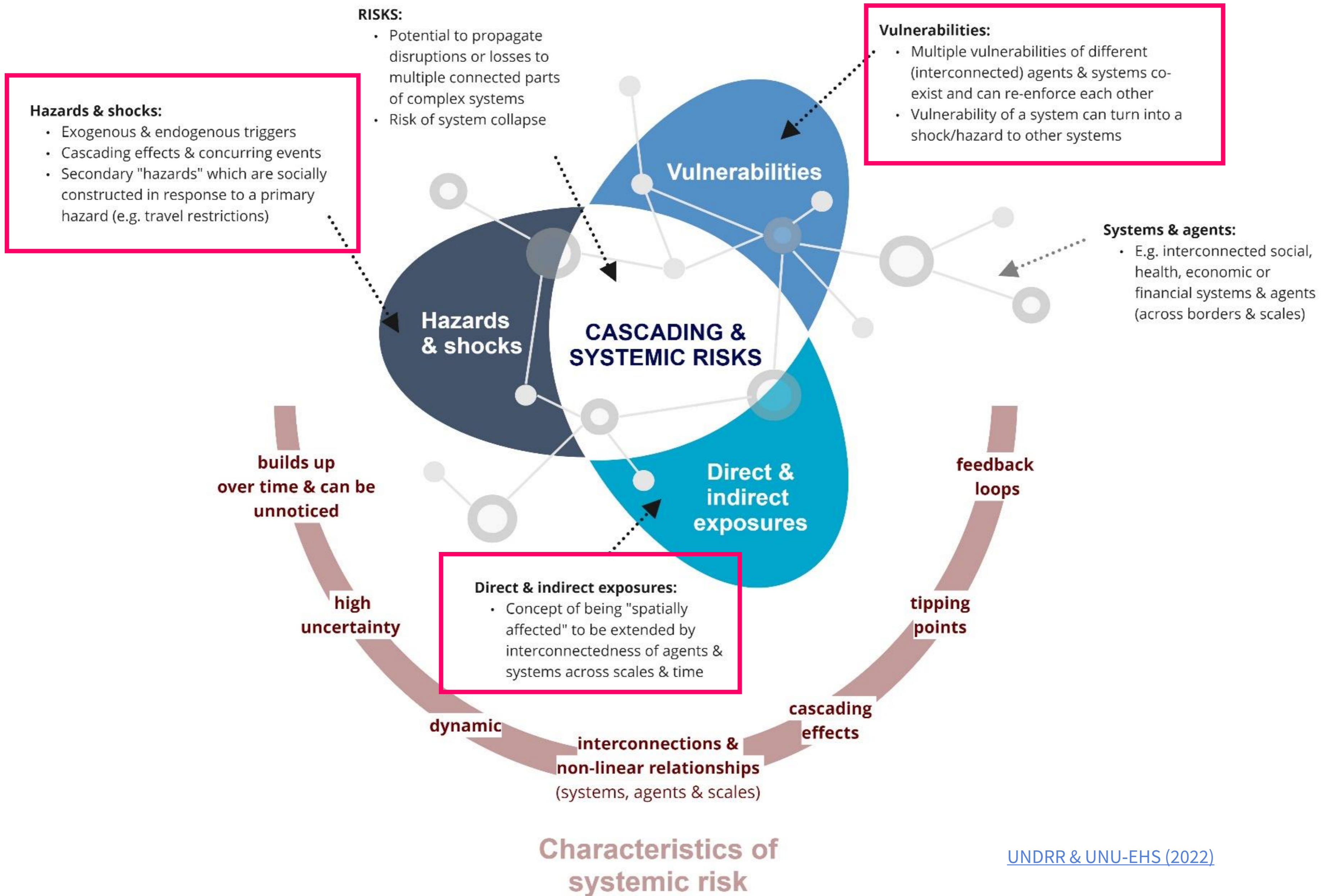
- Drought risks are on the rise and their effects are increasingly felt across communities, economic sectors,

M. Hagenlocher¹, G. Naumann², I. Meza^{1,3}, V. Blaubhut⁴, D. Cotti¹, P. Döll^{5,6}, K. Ehler^{7,8}, F. Gaupp⁹, A. F. Van Loon¹⁰, J. A. Marengo¹¹, L. Rossi², A. S. Sabino Siemons¹, S. Siebert¹², A. T. Tschayur¹³, A. Toreti¹⁴, D. Tsegai¹⁵, C. Vera^{16,17}, J. Vogt¹⁸, and M. Wens¹⁹

... need for a paradigm shift



... expanding our understanding of risks



Implications for risk management?

- High uncertainty in the “hazard” → focus on **risk mitigating agents in the system** (i.e. reduce susceptibilities, strengthen coping & adaptive capacities)
- Risk cannot be eliminated from systems, but must be **monitored & managed regularly** → risk management should engage with questions such as what **levels of risk are acceptable** for whom, what are **trade-offs** and what are **risk-transfer mechanisms**
- COVID-19 has (i) revealed gaps in **social protection** regarding coverage, comprehensiveness, adequacy and delivery mechanisms, but also (ii) showed the potential of social protection to increase resilience
- Interconnected nature of risks implies that risk management must engage with **network structure, systems vulnerability & reciprocity/redundancy** → this includes multi-level governance frameworks, which share the responsibility towards risk management across systems, actors and borders/scales
- Risk management must explicitly address the **dynamic aspects** of **risks** & of **responses** → focus should be placed on **pathways** that enable managing future risks through a process of iterative learning & adaptation → “*risk society*” → **systemic recovery (pathways)?!**

Key messages

1. COVID-19 has been much more than a health crisis & affected societies to their core
2. Effects of the pandemic – and notably of the responses to it – have also been severely felt in places that have not been significantly affected by the disease
3. Impacts of COVID-19 (and responses to it) have exacerbated existing inequalities
4. Many countries have experienced concurring events – which need to be considered in (risk management & adaptation) policies and plans
5. The pandemic has revealed clear gaps in preparedness for low-probability and unexpected events
6. Systemic risk management calls for greater emphasis on risk and intervention dynamics, risk perceptions, risk communication and managing the interconnections of system elements and agents

Questions to ponder ...

- How agile are our **planning systems, frameworks & policies to uncertainty?**
- Do we understand how our **sectors and systems are interconnected?**
- Do we **know what drives vulnerability and exposure** (direct or indirect) of interdependent sectors and systems?
- Have we started to look at, identify & address possible **cascading effects of hazards, shocks, disasters & responses?**
- Are we prepared for **unexpected & low probability but high-impact events?**
- How do we **define the system?** Do we have appropriate **concepts & tools** to **assess systemic risks** and provide **actionable knowledge?**

Thank you!

<https://unupublications.org/ehs/carico/>



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Centro Internacional del Pacífico para la Reducción del Riesgo de Desastres



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On behalf of
Federal Ministry for Economic Cooperation and Development