

Potential Applications of Earth Observations

Dohyung Kim, Ph.D.
DAPM, UNICEF
NASA HAQAST Conference
6/5/2024

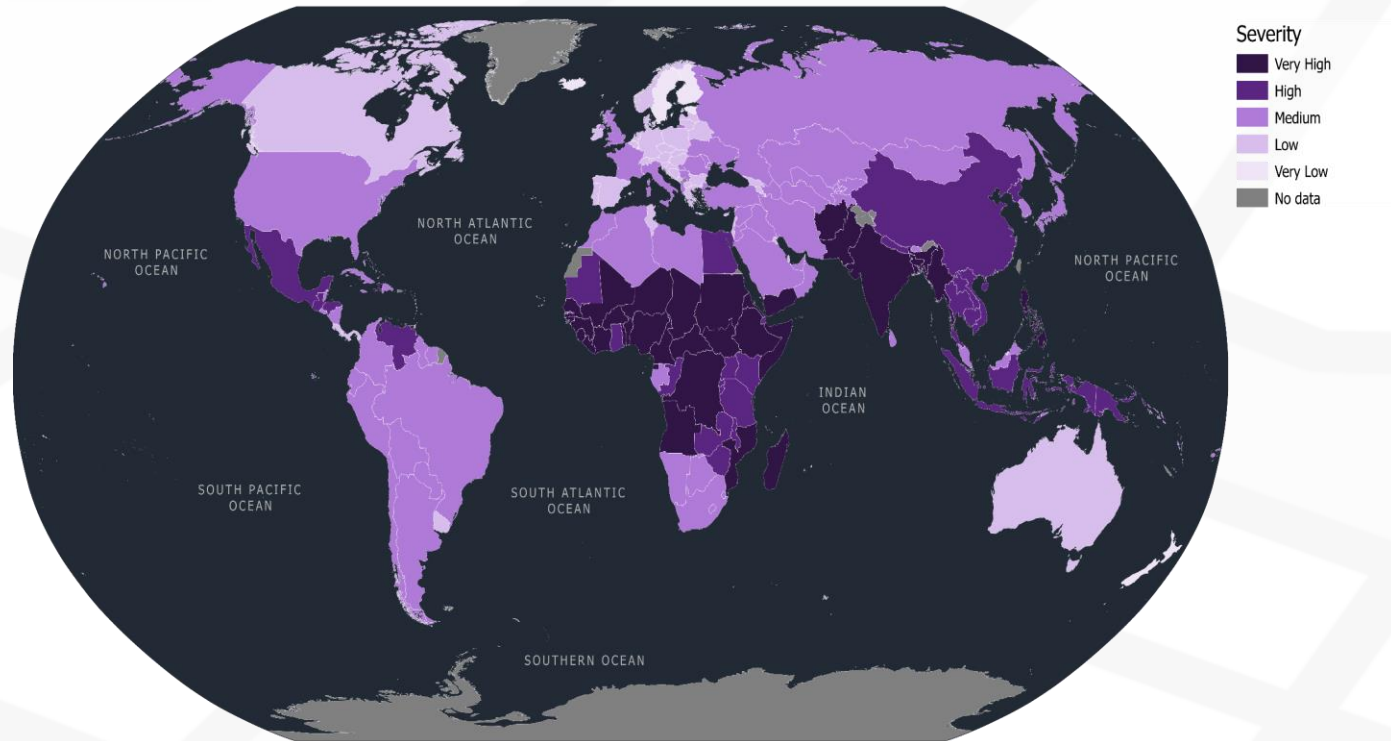


CCRI Concept

- A comprehensive index designed to assess the exposure and vulnerability of children to climate and environmental hazards.
- Model combines two pillars which are weighted equally in construction of CCRI composite score
 - Pillar 1 = Exposure to Climate and Environmental Shocks and Stresses (7 components)
 - Pillar 2 = Child Vulnerability (11 components)
- Aims to combine multiple (overlapping) climate and environmental shocks and stresses and multiple (x-sectoral) child vulnerabilities
- Countries score (0-10) for each component and pillar and then classed from 'low' to 'extremely high' risk

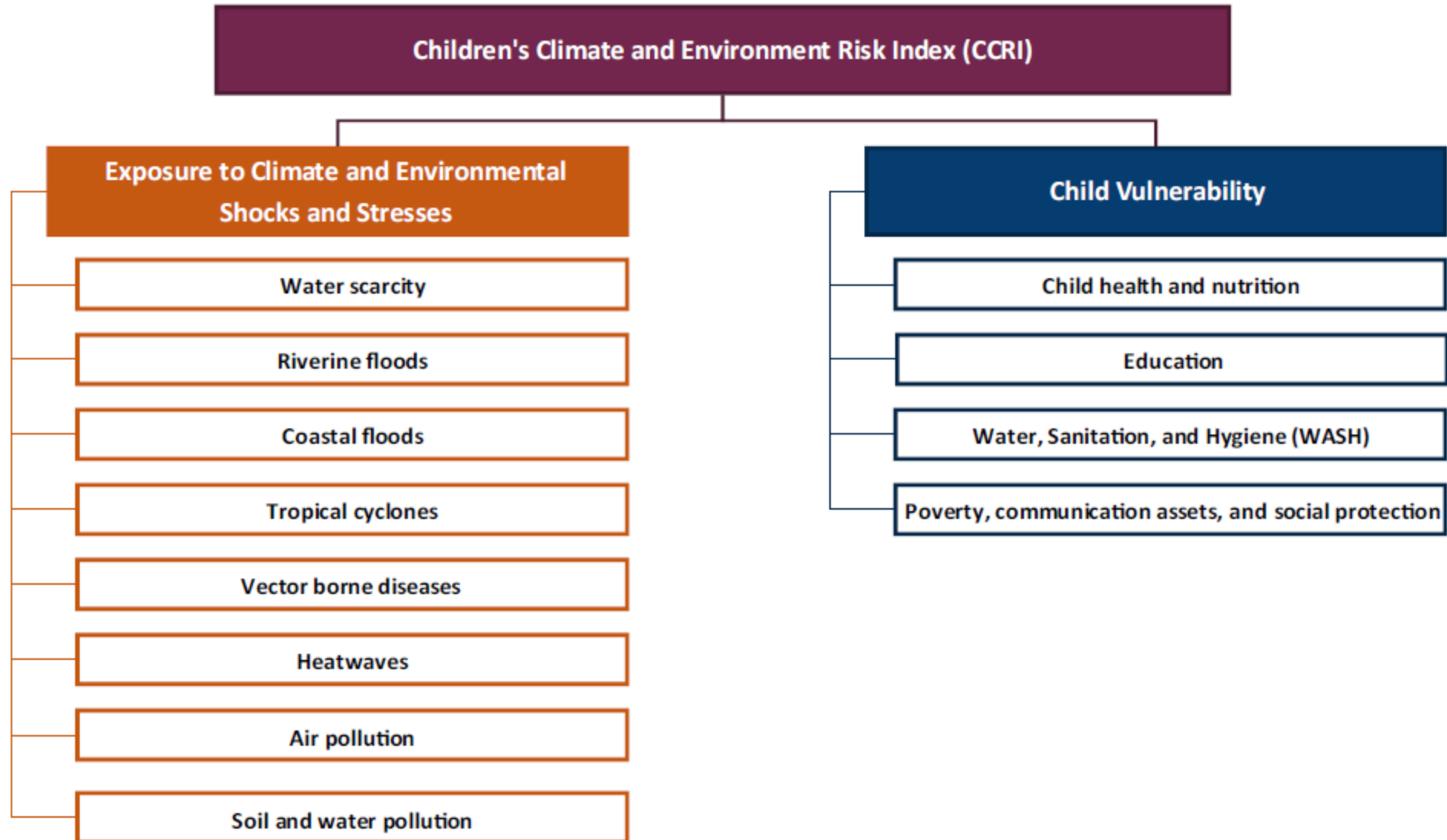
Importance of CCRI

- Provides critical insights for policymakers and organizations.
- Helps target interventions to protect children from climate-related risks.
- Supports the development of resilient communities.



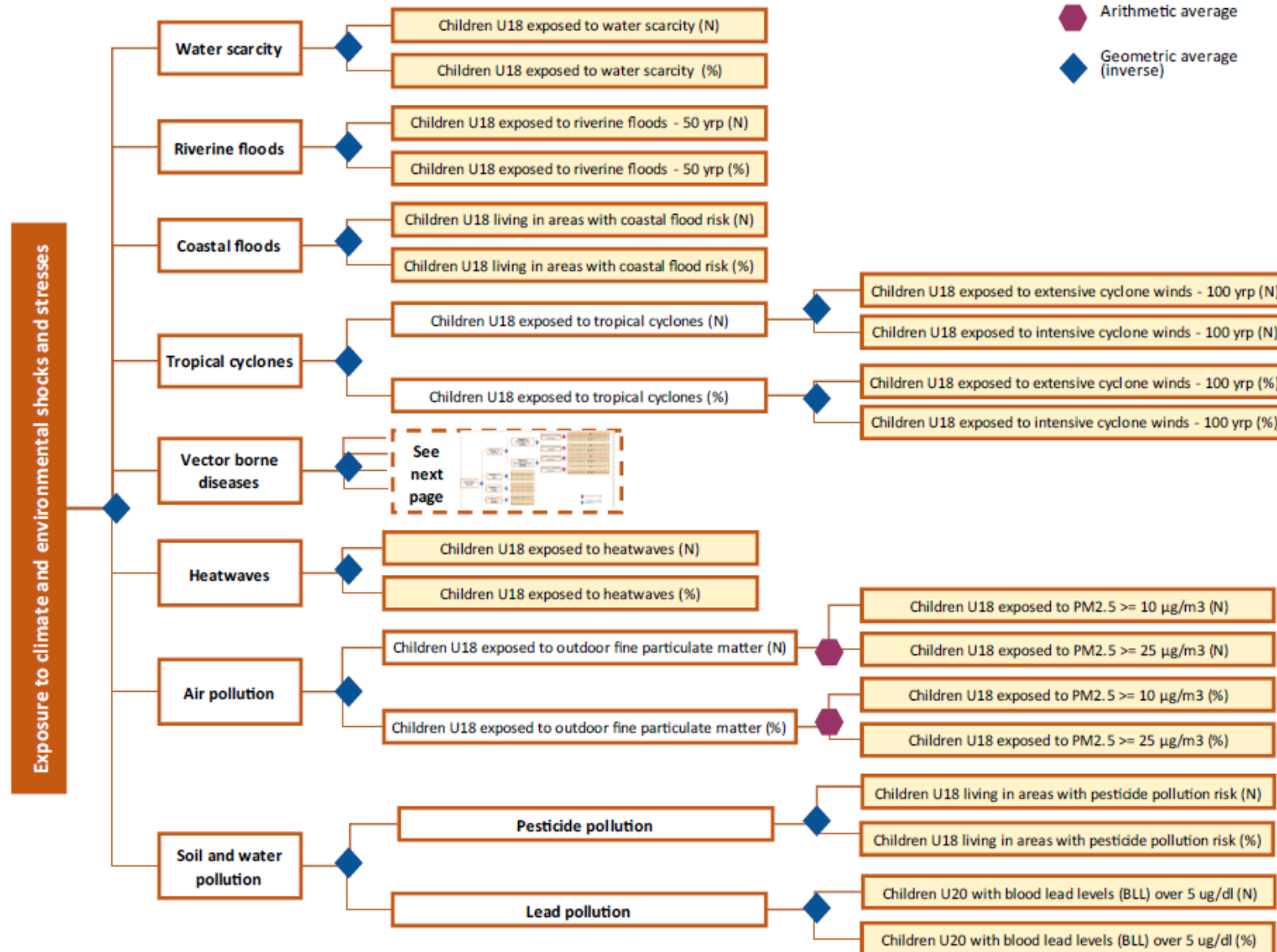
CCRI Model

Figure 1. CCRI conceptual model: Pillars and components



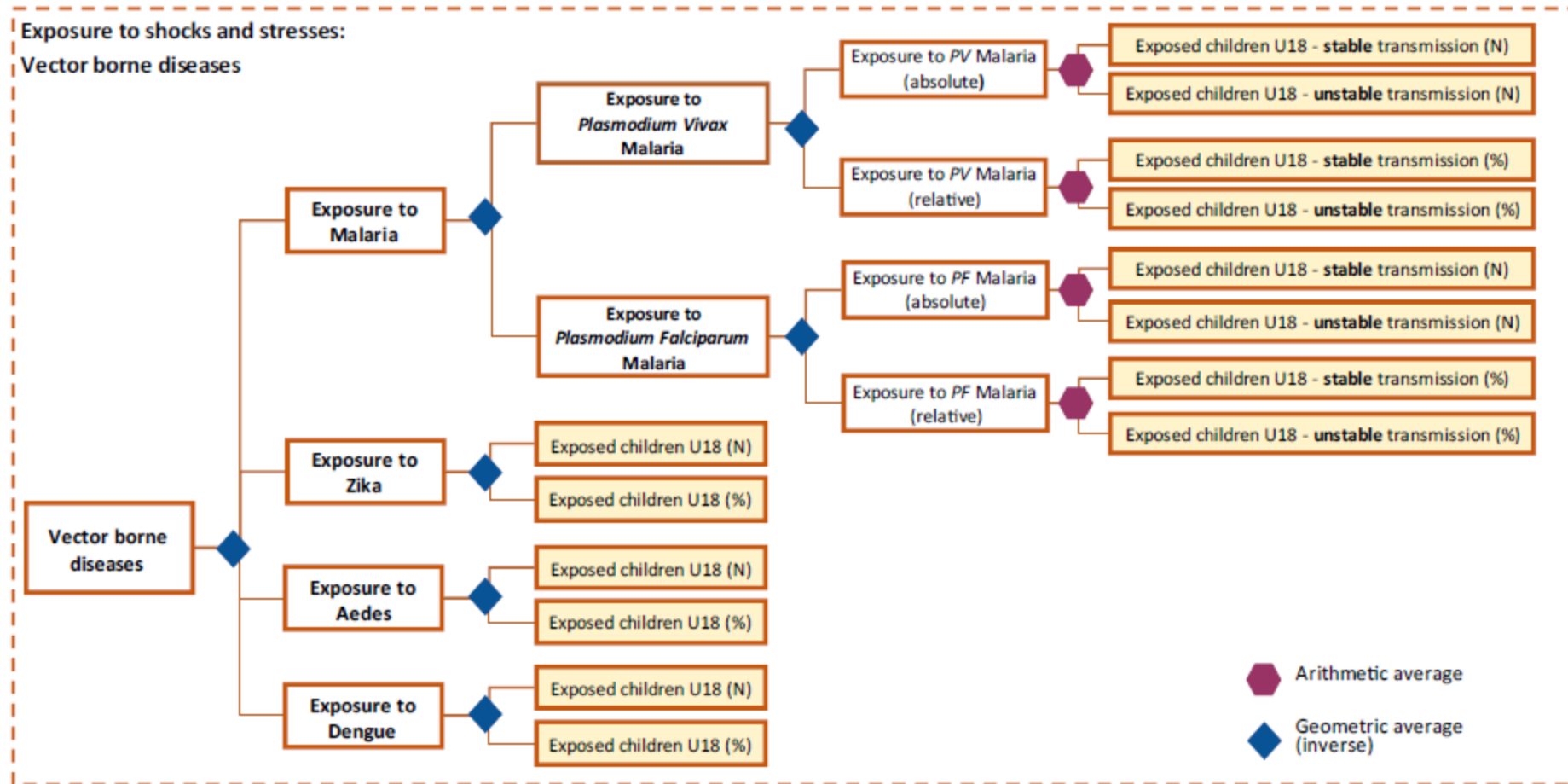
CCRI Model (Pillar 1)

Figure 2. Pillar 1 - Exposure to climate and environmental shocks and stresses



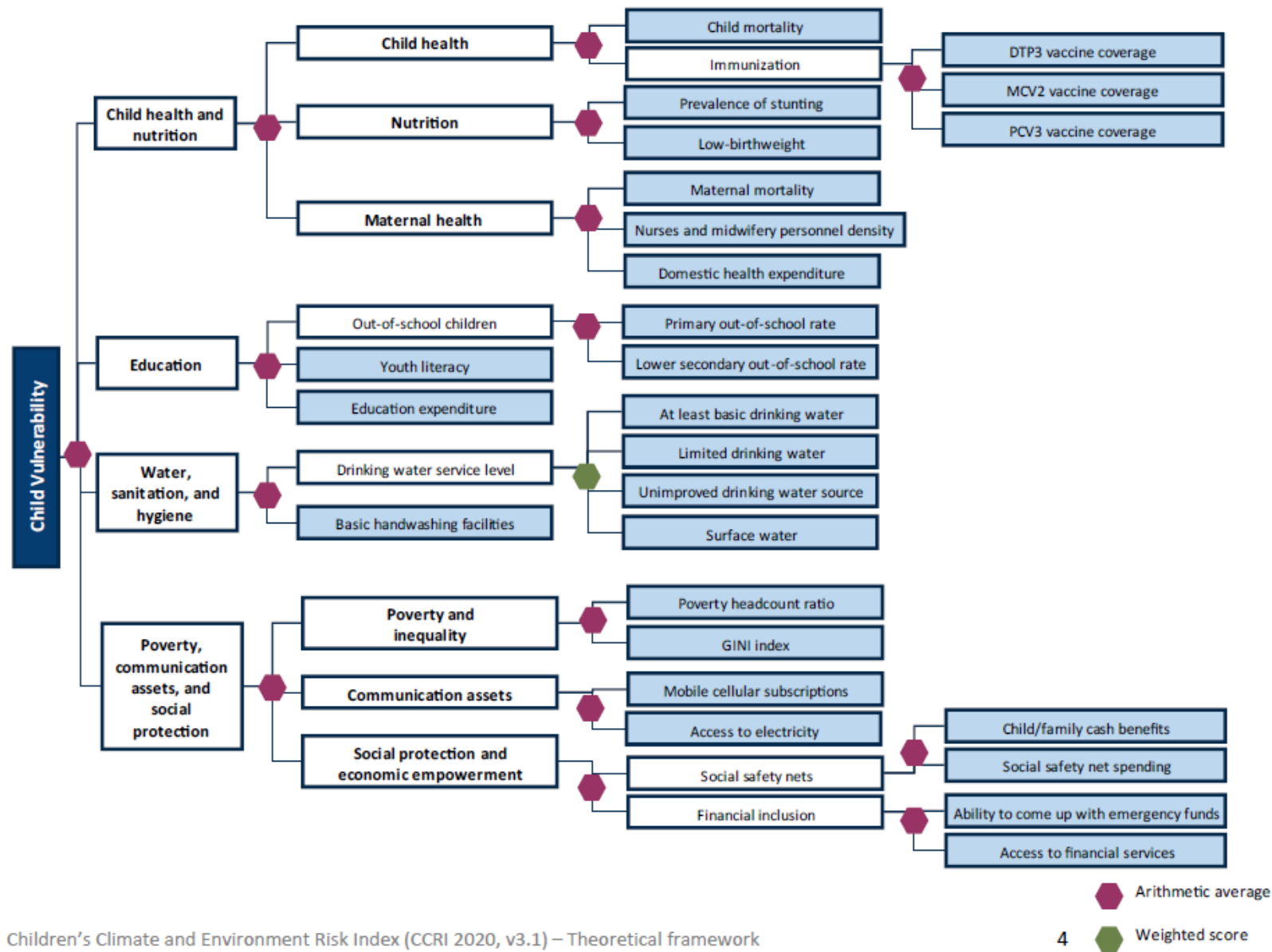
CCRI Model (Pillar 1)

Figure 2. Pillar 1 - continued



CCRI Model (Pillar 2)

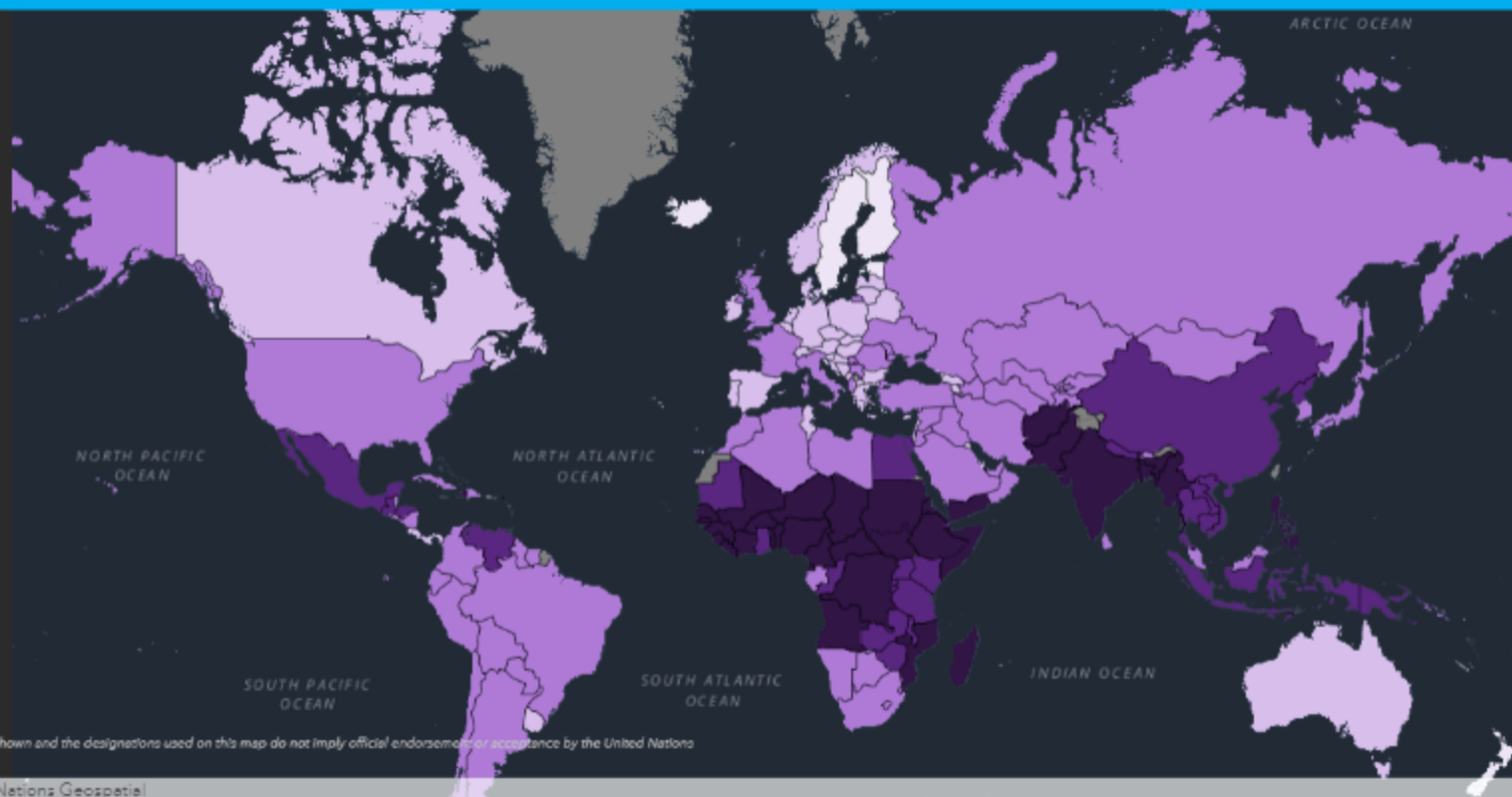
Figure 2. Pillar 2 - Child vulnerability



CCRI Outputs

unicef  for every child

The Children's Climate Risk Index (CCRI)
Interactive Atlas (beta version, Aug 2021)



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations

Produced by United Nations Geospatial

Powered by Esri

< 1 of 163 >



Afghanistan

click on a map to select a country

Severity	Range	CCRI	Pillar 1	Pillar 2
Extremely High	7.1 - 10.0	7.6	7.3	7.9
High	5.5 - 7.0			
Medium	3.8 - 5.4			
Low	2.1 - 3.7			
Very Low	0.0 - 2.0			
No data				

CCRI - Children's Climate and Environment Risk Index

Pillar 1 - Climate and environmental shocks

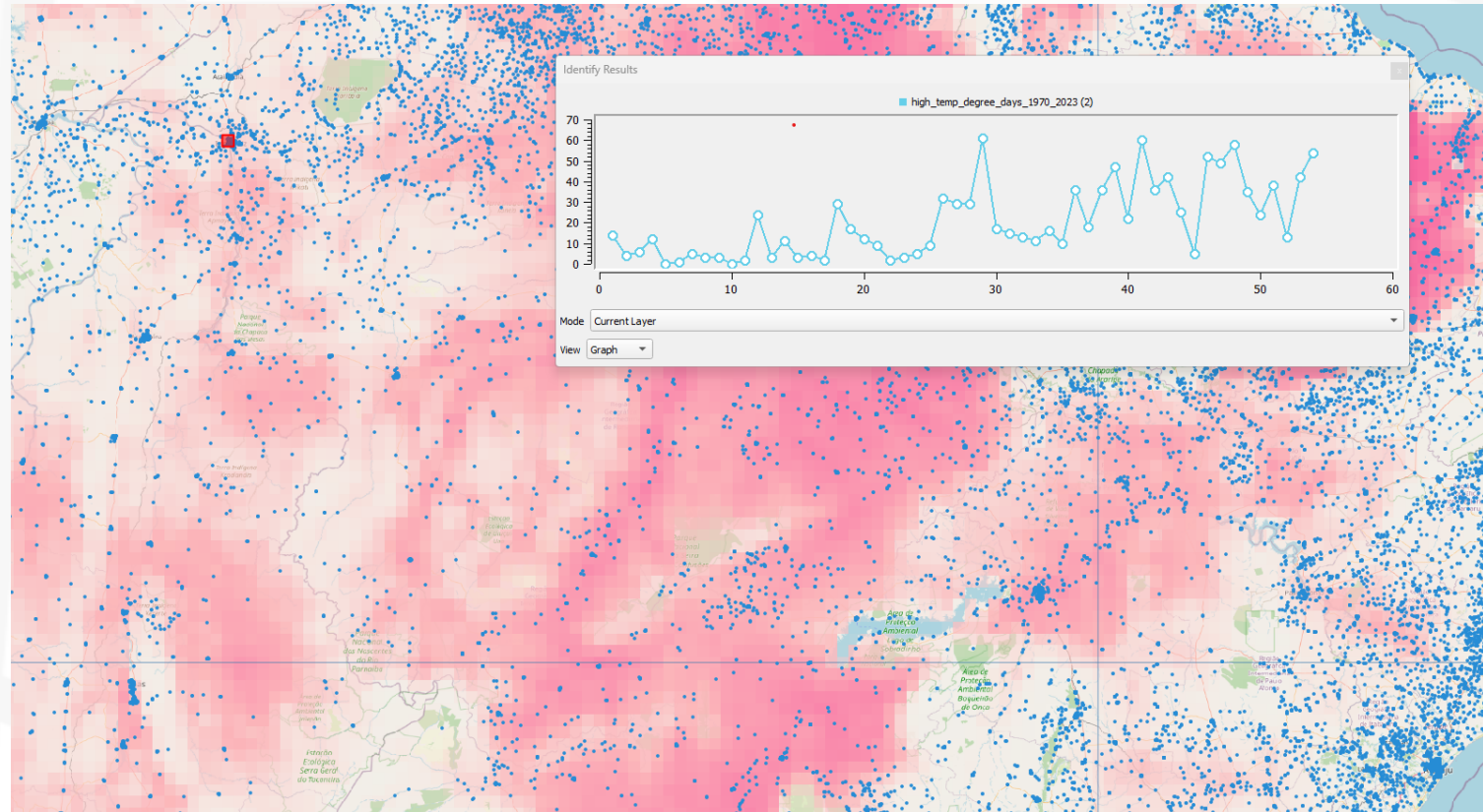
Pillar 2 - Child vulnerability

Current Limitations of CCRI

- Data Gaps: Lack of high-resolution data in certain regions.
- Limited indicators: due to lack of global data.
- Temporal Limitations: Infrequent updates lead to outdated assessments.
- Integrative Challenges: Difficulty in integrating diverse data sources.
- Actionability: Limited actionable insights for policymakers.

Role of Earth Observation

- Satellite data for monitoring environmental changes.
- Remote sensing for high-resolution climate data.
- Applications in fire risks, urban heat islands, and flood risks.



Conclusion

- CCRI provides a means to serve children vulnerable to climate change and environmental risks.
- Enhancements in terms of indicators and methods need to be made
- Earth observation data can take a critical role in enhancing and updating the index



Thank you.



CCRI Inputs (Pillar 1)

Table 1. Components and indicators of pillar 1

Component	Indicator	Data set	Source
Water scarcity exposure	Children exposed to water scarcity (absolute)	✓ Drought events	UNEP
	Children exposed to water scarcity (relative)	✓ Water stress ✓ Seasonal variability ✓ Interannual variability ✓ Groundwater table decline	WRI WRI WRI WRI
Riverine flood exposure	Children exposed to riverine floods - 50 years (absolute)	✓ Riverine flood hazards, 50 years return period	GAR 2015
	Children exposed to riverine floods - 50 years (relative)		
Coastal flood risk	Children living in areas with coastal flood risk (absolute)	✓ Coastal flood risk (high to very high)	WRI
	Children living in areas with coastal flood risk (relative)		
Tropical cyclone wind exposure	Children exposed to tropical cyclone winds - 100 years (absolute)	✓ Tropical cyclone windspeed, 100 years return period (above 119 km/h and above 178 km/h)	GAR 2015
	Children exposed to tropical cyclone winds - 100 years (relative)		
Exposure to vector borne disease	Children at risk of Malaria (absolute)	✓ Spatial limits of <i>Plasmodium Vivax</i> Malaria transmission (stable and unstable)	The Malaria Atlas Project
	Children at risk of Malaria (relative)	✓ Spatial limits of <i>Plasmodium Falciparum</i> Malaria transmission (stable and unstable)	
	Children exposed to Zika (absolute)	✓ Environmental suitability for Zika	Messina et al.
	Children exposed to Zika (relative)		
	Children at risk of Aedes (absolute)	✓ Probability of occurrence of Aedes	Kraemer et al.
	Children at risk of Aedes (relative)		
	Children exposed to Dengue (absolute)	✓ Environmental suitability for Dengue	Messina et al.
	Children exposed to Dengue (relative)		
Heatwaves	Children exposed to heatwaves (absolute)		

Component	Indicator	Data set	Source
	Children exposed to heatwaves (relative)	✓ Annual average number of heatwaves between 2000 and 2020	Data Collaborative for children
Air pollution	Children exposed to outdoor fine particulate matter (absolute)	✓ Exposure to ambient fine particulate matter (PM2.5)	Atmospheric Composition Analysis Group
	Children exposed to outdoor fine particulate matter (relative)		
Soil and water pollution	Children living in areas with pesticide pollution risk (absolute)	✓ Pesticide risk (high to very high)	Tang et al.
	Children living in areas with pesticide pollution risk (relative)		Tang et al.
	Children with blood lead levels (BLL) over 5 ug/dL (absolute)	✓ Number of children (under 20) with blood lead levels (BLL) over 5 ug/dL	Pure Earth, UNICEF
	Children with blood lead levels (BLL) over 5 ug/dL (relative)	✓ Percentage of total population by age group, both sexes (per 100 total population), 2019 estimate	UN WPP 2019 revision
Common	Total population count, both sexes combined	✓ Gridded population of the world v4.11 (counts), UN Adjusted, 2020 estimate	CIESIN
	Percentage of child population under 18, both sexes combined	✓ Percentage of total population by broad age group, both sexes (per 100 total population), 2020 estimate	UN WPP 2019 revision

CCRI Inputs (Pillar 2)

Table 2. Components and indicators of pillar 2

Component	Sub-component	Sub-component	Indicator (short name)	Source
Child health and nutrition	Child health		Under-five mortality	UN Inter-agency Group for Child Mortality Estimation, through World Bank WDI
		Immunization	DTP3 access	WHO, UNICEF, through SDG
			MCV2 access	WHO, UNICEF, through SDG
			PCV3 access	WHO, UNICEF, through SDG
	Child nutrition		Prevalence of stunting	UNICEF, WHO, World Bank: JME
			Low-birthweight babies	UNICEF, WHO, through World Bank WDI
	Maternal health		Maternal mortality	WHO, UNICEF, UNFPA, World Bank Group, and the United Nations Population Division, through World Bank WDI
			Nursing and midwifery personnel density	WHO, through SDG
			Health expenditure	WHO, through World Bank WDI
Education		Out-of-School	Out-of-school rate primary	UNESCO
			Out-of-school rate lower secondary	UNESCO
			Youth literacy rate, population 15-24 years, both sexes	UNESCO
			Education expenditure	UNESCO, through World Bank WDI
Water, sanitation, and hygiene		Drinking water service level	Improved drinking water source (within 30 minutes)	WHO/UNICEF JMP
			Improved drinking water source (exceeding 30 minutes)	WHO/UNICEF JMP
			Drinking water from an unprotected dug well or unprotected spring	WHO/UNICEF JMP

Component	Sub-component	Sub-component	Indicator (short name)	Source
			Drinking water from other unprotected sources	WHO/UNICEF JMP
			Basic handwashing facilities	WHO/UNICEF JMP, through World Bank WDI
Poverty, communication assets, and social protection	Poverty and inequality		Poverty headcount ratio	World Bank Global Poverty Working Group
			GINI Index	World Bank Development Research Group
	Communication assets		Mobile cellular subscriptions	ITU, ICT, through World Bank WDI
			Electricity access	World Bank, through SDG
	Social protection and economic empowerment	Social Safety Nets (SSN)	Child cash benefits	ILO, through SDG
			SSN spending	World Bank ASPIRE
		Financial inclusion	Lacking emergency funds	World Bank Findex database
			Access to money services	World Bank Findex database