United Nations

High level panel on the development of a **Multidimensional Vulnerability Index**

FINAL REPORT

United Nations President of the General Assembly's High Level Panel on the Development of a Multidimensional Vulnerability Index

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Design concept and production by
Camilo Salomon @ www.cjsalomon.com

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Foreword

We were honoured to co-chair the High Level Panel on the Development of a Multidimensional Vulnerability Index (MVI).

The Panel's work seeks to respond to the call, first championed by Small Island Developing States (SIDS) over thirty years ago, for a more comprehensive assessment of a country's well-being, that moves beyond the confines of Gross National Income (GNI) per capita. The MVI establishes a recognition that a country's vulnerabilities to exogenous shocks and stressors are an impediment to its sustainable development and should be taken into account in determining its eligibility for development assistance, particularly if it also lacks inherent resilience.

In an increasingly complex development landscape, where countries face intersecting and global crises, with ever increasing resource requirements to address them, the importance of this work has never been clearer.

Over the past eighteen months, the Panel has worked to develop an evidence-based and robust quantitative benchmark designed to assess structural vulnerability and lack of resilience across multiple dimensions of sustainable development at the national level. To accompany the index, the Panel has also developed Vulnerability and Resilience Country Profiles (VRCPs) which provide granularity on a country's specific challenges related to vulnerability and resilience.

Taken together, these tools are intended to complement GNI per capita, and provide a more profound understanding of a country's development needs, including its requirements for concessional financing, thereby empowering the international community to make smarter, more effective and targeted development policy and financing decisions.

We invite you to explore the MVI results and consider its implications.

While a significant amount of work has been undertaken to get to this point, to truly enact the international community's collective commitment to leave no one behind and to support the most vulnerable countries on their path to sustainable development, we must continue to build on the Panel's work. Adoption of the MVI by the United Nations General Assembly is an important first step. In its report, the Panel has also made a series of recommendations for the MVI's ongoing governance arrangements and for the VRCPs.

Finally, we wish to thank the Panel members for their expertise and dedication to this process, and for the unwavering support of UNDESA and UN-OHRLLS in the provision of Secretariat services. We highly appreciated the diversity of perspectives and open critical discourse, mutual respect and shared commitment that underpinned this process. The Panel's work was also enriched by invaluable insights from consultations with Member States, academia, civil society and international financial institutions, for which we are grateful.

The MVI represents a milestone in our global pursuit of equitable sustainable development. Together we have the opportunity to reconceptualise how development assistance, including concessional finance is accessed and allocated, to ensure the international development financing architecture delivers for the most vulnerable countries and that no one is left behind. We ask for your support in this endeavour.

H.E. Mr. Gaston Browne
Co-Chair

H.E. Ms. Erna Solberg
Co-Chair

Acronyms and Abbreviations

ACLED	Armed Conflict Location and Event Data
ADB	Asian Development Bank
ADF	African Development Fund
AOSIS	Alliance of Small Island States
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
CDP	Committee for Development Policy
CEPII	Centre d'Études Prospectives et d'Informations Internationales
CRED	Centre for Research on the Epidemiology of Disasters
CRU TS	Climatic Research Unit Time Series
DAC	Development Assistance Committee
ECOSOC	Economic and Social Council
EM-DAT	Emergency Events Database
EVI	Economic Vulnerability Index
FAO	Food and Agricultural Organization
GDEM	Global Digital Elevation Model
GDP	Gross Domestic Product
GNI	Gross National Income
GNI pc	Gross National Income per capita
HICs	High Income Countries
HDI	Human Development Index
HDRO	Human Development Report Office
IDA	International Development Association
IHME	Institute for Health Metrics and Evaluation
IATF	Inter-Agency Task Force on Financing for Development
IFIs	International Financial Institutions
INCAF	International Network on Conflict and Fragility
INFFs	Integrated National Financing Frameworks
IPU	Inter-Parliamentary Union
IQR	Interquartile Range
LECZ	Low-Elevated Coastal Zone
LDCs	Least Developed Countries

LICs	Low Income Countries
LLDCs	Landlocked Developing Countries
LMICs	Lower Middle-Income Countries
MDBs	Multilateral Development Banks
MPI	Multidimensional Poverty Index
MVI	Multidimensional Vulnerability Index
NDPs	National Development Plans
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PGA	President of the General Assembly
RMS	Root Mean Square
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SITC	Standard International Trade Classification
TSF	Transition Support Facility
UMICs	Upper Middle-Income Countries
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHABITAT	United Nations Human Settlements Programme
UNHCR	United Nations High Commissioner for Refugees
UNODC	United Nations Office on Drugs and Crime
UNSD	United Nations Statistics Division
UN-OHRLLS	United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
VNRs	Voluntary National Reviews
VRCP	Vulnerability-Resilience Country Profiles
WHO	World Health Organization

Executive Summary

Introduction

The international community has now acknowledged vulnerability as a serious obstacle to development due to the damage caused by exogenous shocks and stressors to which countries are increasingly being exposed. These shocks span diverse domains such as terms of trade fluctuations, natural disasters, supply disruptions, conflicts, civil unrest, and unprecedented shocks such as the COVID-19 pandemic.

It is evident that low national income, often measured by Gross National Income per capita (GNI pc), is a weak measure of development, material welfare, or well-being. This is particularly true for countries facing high risks of external shocks and stressors, especially if they also lack resilience. However, there is currently no international, widely accepted, quantitative benchmark to measure structural vulnerability or lack of resilience across multiple dimensions of sustainable development at the national level.

Access to concessional financing windows generally depend on meeting lower income thresholds (GNI pc). This means that countries who do not meet this threshold but may be vulnerable often lack access to affordable development support such as concessional assistance to help them meet their sustainable development goals while coping with, and adapting to, their structural vulnerabilities. A widely accepted Multidimensional Vulnerability Index (MVI) has the potential to better guide country development and donor assistance policies, aid in the diagnosis of development challenges and in the identification of nations in need of heightened international assistance before a crisis hits.

The work of the High Level Panel on the Development of a MVI *(hereafter,* the Panel) seeks to fill this gap. The Panel, which began its work in March 2022, took a systematic approach to consultation and outreach, gathering inputs and suggestions from diverse stakeholders including potential user groups, academics, and Member States. This Report summarizes the results of the Panel's deliberations and offers recommendations.

The proposed structure of the MVI aligns with the guidance provided by the United Nations (UN) Secretary-General's Report (A/76/211, paragraphs 80-83), while incorporating an additional component the Vulnerability-Resilience Country Profiles (VRCP). This two-tiered structure provides:

- a quantitative assessment of structural vulnerability and resilience using a common methodology for all developing countries. The assessment is presented via a summary index number to rank countries and a dashboard showing individual country scores on the component parts (the MVI score); and
- a more detailed, tailored, and individualized characterization of a country's vulnerability and resilience factors, including non-structural resilience prepared by individual countries (the VRCP).

Key principles guiding MVI index construction

In developing the MVI index, the Panel followed a set of guiding principles and parameters provided by the UN Secretary-General's Report (A/76/211, paragraph 81) as follows:

- **Multidimensionality:** Indicators used should cover all three dimensions of sustainable development, i.e. economic, environmental, and social.
- **Universality:** the design of the index should capture the vulnerabilities of all developing countries to ensure credibility and comparability.

- **Exogeneity:** The index must clearly differentiate between policy-induced and exogenous (or inherited) factors to reflect the structural and inherent challenges faced by countries, independent of the political will of their governments.
- **Availability:** The index should use available, recognized, comparable, and reliable data.
- **Readability:** The design of the index should be clear and easily comprehensible.

It should be noted that the primary objective of the MVI index is not to reflect overall progress toward the Sustainable Development Goals (SDGs), but to provide a robust, acceptable, and simplified assessment of vulnerability that can be effectively operationalized by and for the benefit of vulnerable countries.

Conceptual framework for the MVI

The Panel defined a conceptual framework for the MVI which captures two pillars or domains of vulnerability: (i) structural vulnerability, linked to a country's exposure to adverse external shocks and stressors, and (ii) (lack of) structural resilience, which is associated with the (lack of) capacity of a country to withstand such shocks. The conceptual framework elaborates the three dimensions of sustainable development as they apply to each pillar. The following definitions were employed in the framework:

- **Economic vulnerability** – the risk of harm from exposure to adverse external economic shocks.
- **Environmental vulnerability** - the risk of harm from exposure to natural hazards. Natural hazards may result from structural vulnerability to climate change and anthropogenic or socio-natural shocks and stressors that are exogenous in origin.
- **Social vulnerability** – the risk of harm from exposure to social shocks.
- **Structural economic resilience** – the inherent economic capabilities and economic capital of a country that strengthen the economy's ability to withstand and recover from adverse events.
- **Structural environmental resilience** – the inherent environmental capital of a country, including the ecological resources, infrastructure, and systems that contribute to reducing vulnerability to environmental shocks and stressors.
- **Structural social resilience** – the inherent social capabilities and social capital within a country including social cohesion, social institutions, demographic structure, and human capital that enhance the capacity to withstand and adapt to shocks and stressors.

Indicator selection and index construction

To simplify index construction, indicator selection, and to bridge the gap between the broad definitions of the framework and the selection of specific indicators, the Panel defined each dimension of vulnerability and resilience using concepts. Each dimension was characterized by three concepts (18 in total). Each concept was measured through the selection of the fewest possible indicators, with each indicator acting as a proxy for their associated concept rather than representing a specific measure of vulnerability and resilience.

The Panel sought to select indicators of the highest quality, with universally available UN data, that could provide the best measure of the concept and by extension, the dimension. In instances where UN data was not available, data that had either been previously vetted by UN entities or where strong evidence of quality exists, was used. Potential indicators with missing data for more than 10 per cent of developing countries were excluded.

Once the indicators were selected, they were then combined into one single metric of vulnerability. This required the construction of a composite index, including rescaling, aggregation, and weighting.

A series of validity checks verified that the constructed index effectively represented structural vulnerability of countries. Key findings included:

- Country scores on the two pillars are moderately correlated, meaning that countries with high structural vulnerability are more likely to have low structural resilience (high lack of resilience) and vice versa. This was especially true for low income countries (LICs).
- MVI scores are not correlated with income, indicating that the MVI can be a useful complement to country income measures, such as the GNI pc. However, LICs are more likely to be found in the top 20 per cent of MVI scores.
- The MVI does not discriminate against small countries, an important point given that the MVI was originally proposed by SIDS. Indeed, 70 per cent of all SIDS have scores in the top 50 per cent of the distribution (above the median).
- While the MVI does produce a ranking of countries according to their vulnerability, the majority of countries have scores clustered around the median, meaning that most countries are moderately vulnerable. As a result, it is difficult to establish a vulnerability threshold or cutoff similar to the income cutoffs commonly used to allocate development aid.

The VRCP

Countries have the option of complementing their MVI scores with a VRCP, which provides a detailed, multi-dimensional vulnerability and resilience characterization at national level, and identifies priority, integrated, and costed interventions for resilience building. VRCPs have the potential to enhance, inform, and contribute to the formulation, implementation, and monitoring cycle of National Development Planning processes, as well as guiding donors on country needs, policies, resources, and priorities for assistance.

MVI Governance

The MVI – both the index and the VRCP – should be living tools, updated as data and methodology on vulnerability measurement and on the causes and consequences of vulnerability improve. The Panel, charged with offering recommendations on appropriate governance arrangements, recommends that two distinct bodies be constituted:

- an MVI Secretariat, with similar arrangements to those employed by the Committee for Development Policy (CDP) Secretariat UN Department of Economic and Social Affairs (UNDESA), the UN Development Programme (UNDP) Human Development Report Office (HDRO), or the Organization for Economic Cooperation and Development (OECD); and

- an Independent MVI Advisory Review Panel, mirroring the arrangements adopted by UN Conference on Trade and Development's (UNCTAD) Productive Capacities Index (PCI) High Level Advisory Body, the UNDP's Statistical Advisory Board (SAB) or the Economic and Social Council's (ECOSOC) CDP.

MVI uses and next steps

Securing broad support for the MVI framework is of critical importance, and is the first step in galvanizing action toward its use. The international community has advocated for the consideration of vulnerability in determining eligibility for development assistance, including concessional finance, Official Development Assistance (ODA), and debt relief. The MVI is a credible complement to current approaches. Next steps toward broad usage could include:

- The MVI framework proposed in this report should be adopted by the UN General Assembly as the basis of any future work, alongside a decision on the future custodian arrangements and governance.
- Donors, including international financial institutions (IFIs), should be encouraged to explore how the MVI could be incorporated into existing policies and practices, pursuing a common approach to the extent possible.
- Assessment of country external debt sustainability and the need for concessional debt restructuring could use the MVI, in addition to current, mostly income-based, assessments.

CHAPTER 1

Setting the Scene

I. The case for a new quantitative benchmark for vulnerability

1. Assessment of a country's economic development, resources for investment, and the need for international assistance is often determined by a country's national income and assets, measured by its GNI pc. The rationale is that GNI pc has proven to be a useful, readily available indicator that is often closely correlated with other nonmonetary measures of quality of life[1], making it particularly attractive for allocation of international development assistance. Simply put, higher GNI pc implies lesser assistance needs, however, the reality for many countries, particularly developing countries, is far more complex. While GNI pc is useful for examining a country's income, it has limitations including its inability to account for inflation, income disparity, poverty, wealth, or savings. GNI pc measures a country's income flow at a specific time. It it does not reflect potential income fluctuations, including those stemming from external shocks and stressors. Recovering from the negative impact(s) of shocks and stressors or simultaneous multiple shocks adversely impacts current income and potential future income, slowing the pace of development, or even reversing it, depending on the specific impacts and country situation. Countries prone to external shocks and stressors are structurally vulnerable. While in theory, wealthier countries should typically have more resources to manage the impacts of shocks and stressors, in practice, many countries exhibit much higher levels of vulnerability than their income levels would suggest.[2] Such countries deserve special assistance, particularly if they also lack inherent resilience.

2. International efforts to address increasingly complex and interrelated development needs and their associated resource requirements have led to the establishment of an international financial architecture comprising several stakeholders and numerous financing instruments, tools, or modalities. Access to or eligibility for many of these are often linked to or determined by a country's GNI pc. The system has been further complicated by the many special windows or ad hoc exceptions that have been developed or created and which are often only triggered by a major external shock[3]. Examples of this include *inter alia* the window for FCV (Fragility Violence and Conflict) at IDA, the TSF (Transition Support Facility) at ADF, and the World Bank[4] and Asian Development Bank Crisis Response Window. These windows or ad hoc exceptions often focus on post shock response, relief, and recovery rather than long term resilience building. While these approaches are useful and are a recognition of the challenges currently experienced by many developing countries in accessing sufficient development resources to meet their sustainable development needs, they have not adequately considered the intricate nature of the interactions between structural disadvantages, especially the multifaceted dimensions of vulnerability, and the pursuit of sustainable development.

3. Notably SIDS, who despite being declared by the international community as being among the most vulnerable nations worldwide, often lack access to sufficient development resources, including concessional finance or adequate mechanisms for debt relief. Relying on GNI pc as the key criterion for eligibility or as the primary proxy to evaluate a country's requirements for development support, including concessional finance, obscures a significant heterogeneity in terms of structural vulnerability across countries. Additionally, it does not effectively facilitate the targeted allocation of resources to address the specific challenges arising from structural vulnerability.

4. Currently, there is no international consensus on how to define vulnerability or how best to support countries to reduce or manage their vulnerabilities or build resilience. While there have been some efforts to improve its measurement[5] and to assess related needs in developing countries,[6] these efforts all have inherent limitations such as their choice of indicators, data availability, the metrics used, and discrepancies across metrics. As a result, there is no widely accepted, international quantitative benchmark to measure structural vulnerability or lack of resilience across multiple dimensions of sustainable development at the national level that can be used to complement GNI pc. While the international community, including the IFIs, has recognized that GNI pc fails to fully encompass the development challenges faced by developing countries, the concept of vulnerability has yet to be operationalized, due to this absence of a reliable and widely accepted metric. Achieving consensus on an appropriate metric that accurately assesses the nuances of vulnerability (i.e., multidimensional vulnerability across all developing countries), applied in a complementary manner with GNI pc, could assist both developing countries and the international community in the development and adoption of more informed policies and strategies for building and sustaining long-term resilience.

5. In 2020, motivated by pressing economic and debt challenges in the wake of the COVID-19 pandemic, Belize, then the Chair of the Alliance of Small Island States (AOSIS), wrote to the UN Secretary-General reiterating the need to advance work on a MVI. Subsequently, in paragraph 8(a) of resolution 75/215[7], the UN General Assembly requested specific recommendations from the UN Secretary-General, including on the potential development and use of such an index for SIDS. In his ensuing report,[8] the UN Secretary-General affirmed that developing such a MVI was possible, but for it to achieve consensus its development must be guided by the principles of multidimensionality, universality, exogeneity, availability, and readability[9] (see definitions in paragraph 11), and should be led and driven by Member States, in a spirit of partnership.

II. Description of the process and of the Panel

6. The guidance provided by the UN Secretary-General in his Report (A/76/211) was based on a comprehensive review of various existing indices and academic literature on vulnerability indices. Regarding finalization of the MVI, the Report stated:

> *88. Work on the index by the General Assembly should be carried forward by a high-level expert panel, supported by the Secretariat, headed by two eminent persons, one of whom from a Small Island Developing State, both appointed by the President of the General Assembly, tasked with finalizing the index. Panel members could be drawn from senior policymakers, academia, civil society and the public and private sectors, with due consideration given to geographical and gender balance. They should have relevant knowledge and experience of the development challenges facing vulnerable countries and development finance.*

7. In actioning the UN Secretary-General's recommendations, the General Assembly tasked the President of the 76th General Assembly (PGA) with the establishment of this Panel.

8. In February 2022, following a nomination period among Member States, the PGA appointed a 12-member High Level Panel as follows:

H.E. Mr. Gaston Browne, Prime Minister of Antigua & Barbuda (Co-Chair)

H.E. Ms. Erna Solberg, former Prime Minister of Norway (Co-Chair)

Ms. Natalie Cohen (Australia)

Prof. Leonard Nurse (Barbados)

H.E. Mr. José Luis Rocha (Cabo Verde)

Ms. Xiheng Jiang (China)

Prof. Edgar Gutiérrez-Espeleta (Costa Rica)

Dr. Omar El-Arini (Egypt)

Prof. Lino Briguglio (Malta)

H.E. Dr. Fatumanava Pa'olelei Luteru (Samoa)

Ms. Yee Woan Tan (Singapore)

Dr. Louise Fox (USA)

9. The Panel began its work in March 2022, guided by its Terms of Reference[10]. According to its Terms of Reference, recommendations were to be provided on two key issues:

   - a clear and coherent MVI, reflecting the guiding principles and parameters contained in paragraphs 80-83 of A/76/211 and comprising a structure, indicators, a precise methodology for weighting and aggregating the indicators, and definitions of the main concepts including vulnerability, exposure, shock and resilience; and

   - evidence-based recommendations on the most appropriate governance arrangements for the MVI, including modalities for the publication of MVI results and procedures for reviewing and/or revising the MVI and its components.

10. The Panel's recommendations on the above two issues are contained in Chapters 2 and 6 of this report respectively.

a. Principles guiding MVI development

11. The guiding principles contained in A/76/211 for the design of the MVI are worthy of specific mention, as they had a significant impact on the technical choices made in developing the metric. These are:

Multidimensionality: Indicators used in the assessment of structural vulnerability should cover all three dimensions of sustainable development, (economic, environmental social). Addressing structural vulnerability necessitates the identification of its sources and determinants, requiring conceptual clarity regarding its scope. These three domains of vulnerability align with the commonly referenced three dimensions in the global discourse on sustainable development.

Universality: Although the MVI was originally proposed by SIDS, it was recognized that to be a useful tool, the design of the index should effectively capture the vulnerabilities of all developing countries.

Exogeneity: The index must clearly differentiate between policy-induced and exogenous (or inherited) factors to reflect the structural and inherent challenges faced by countries, independent of the political will of their governments.

Availability: The index should utilize available, recognized, comparable, and reliable data.

Readability: The design of the index should be clear and easily comprehensible. The primary objective of the MVI is not to reflect overall progress toward the SDGs, but to provide a robust, acceptable, and simplified assessment of vulnerability that can be effectively operationalized by and for the benefit of vulnerable countries.

b. Challenges faced by the High Level Panel

12. The High Level Panel faced several challenges in the course of its work, including the following:

Concepts and definitions: Building a MVI for the very specific purpose of being used for access to development support, including concessional finance, requires well-defined concepts and definitions. In this regard, the MVI had to be designed in a manner that captures structural vulnerability, linked to a country's exposure to adverse external shocks and stressors, as well as lack of structural resilience, which is associated with the capacity of a country to withstand such shocks (these terms are defined in more detail in Chapter 2 of this Report).

Setting the criteria for the selection of individual indicators: The selected indicators had to be structural rather than policy-induced, to serve as criteria for accessing and allocating concessional finance.

Defining and appropriately capturing structural resilience: Resilience is generally understood as the capacity of a country to withstand, absorb, recover from, or minimize the adverse effects of shocks or stressors, and is often associated with effective public policies, regulations, and policy implementation. However, there is also a structural dimension to resilience that influences these capacities in the long term. These factors are encompassed within the second pillar of the MVI. In other words, the MVI is built on the notion that the risk of harm to a country's sustainable development does not emanate only from exposure to exogenous shocks and stressors but also from the structural capacity of the country to withstand such shocks and stressors.

Data quality: The data needed to derive the indicators had to meet the highest quality standards and be easily available with long-term time series for all developing countries. The process of identifying appropriate indicators for the MVI relied on relevant inputs from the UN system and other agencies, including the Commonwealth Secretariat and the IFIs. In several instances challenges were experienced in acquiring data that met the specified quality criteria. Consequently, some indicators were omitted on these grounds (for further elaboration, refer to chapter 4 on limitations and potential future development of the MVI).

Distinguishing between vulnerability and economic development: It was important for the Panel to first understand and clarify that the MVI was not to be considered as a general index of need or development and that its results must not be equated with income. Even in cases where countries have sufficient resources to invest in resilience building and may reach high income status, their vulnerability remains a threat to their sustainable development. Indeed, the frequency of external shocks or the occurrence of a large and unforeseen adverse events poses threats to the long-term growth and sustainable development of upper middle- and high-income countries that lack structural resilience.

III. The consultative and outreach processes

13. In the course of its work, the Panel took a systematic approach to consultation and outreach beginning with developing and adopting an Advocacy Strategy, to guide initial outreach on the MVI.

14. Consultative approaches adopted included the following:

- Gathering inputs and suggestions from diverse stakeholders through formal and informal consultative channels, including comments on the Panel's interim report, discussion papers and presentations, and engagements in private and public events to exchange views with relevant constituents[11].
- Holding technical seminars with user groups, academics and others to test proposals and address concerns.
- Convening focused technical sessions with individual Member States and smaller groups to address specific challenges faced by some groups e.g., least developed countries (LDCs) and middle income countries (MICs).
- Creating a dedicated consultative space to facilitate engagement with IFIs and multilateral development banks (MDBs).
- Utilizing various tools, such as the Panel's website and question and answer summaries, to communicate the Panel's position on major points received in writing from various stakeholders.

IV. Structure of the report

15. This report provides a detailed account of the conceptual underpinnings, approach and methodology employed in the design and construction of the index, as well as its potential uses and a proposed governance arrangement for its upkeep.

16. The MVI has two pillars: structural vulnerability and lack of structural resilience. Each of these two pillars has 3 dimensions: economic, environmental and social, representing the country's inherent and inherited factors. A lower MVI score indicates that a country is relatively less vulnerable compared to its counterparts, however, this does not imply that the country is completely shielded from or immune to the impact of external shocks. It is worth noting that while some countries may possess non-structural capabilities to mitigate their vulnerabilities, their underlying structural vulnerability persist. Therefore, the MVI should be regarded as a single measure, albeit a multidimensional one, and serve as a valuable addition to existing measures and discourse.

17. The remainder of the report is organized as follows:

Chapter 2 explains the MVI construction framework. Delving into the core concepts, it distinguishes between structural and non-structural vulnerability and resilience, outlining their respective components.

Chapter 3 presents the methodological approach used to construct the MVI index. It highlights the dimensions, concepts and characteristics of the indicators that make up the MVI. It defines the principles for combining the various data into a composite index. The standardization, aggregation and weighting processes are presented.

Chapter 4 presents some of the key results of the MVI. It examines the validity of the index, showing relationships between vulnerability and lack of resilience, how the index characterizes countries and the relationship of country MVI scores to GNI pc and population. It outlines some of the MVI's limitations. Finally, the chapter presents the MVI data visualization and exploration tool, designed to enhance understanding of the index and facilitate the communication of results.

Chapter 5 discusses the VRCPs, the second element of the MVI structure.

Chapter 6 presents proposals for the custodial arrangements for the MVI. This includes modalities for releasing MVI results and procedures for reviewing and/or revising the MVI and its components.

Chapters 7 and 8 present possible uses of the MVI, and recommendations and conclusions, respectively.

CHAPTER 2

The MVI Framework

I. The two-tiered structure of the MVI

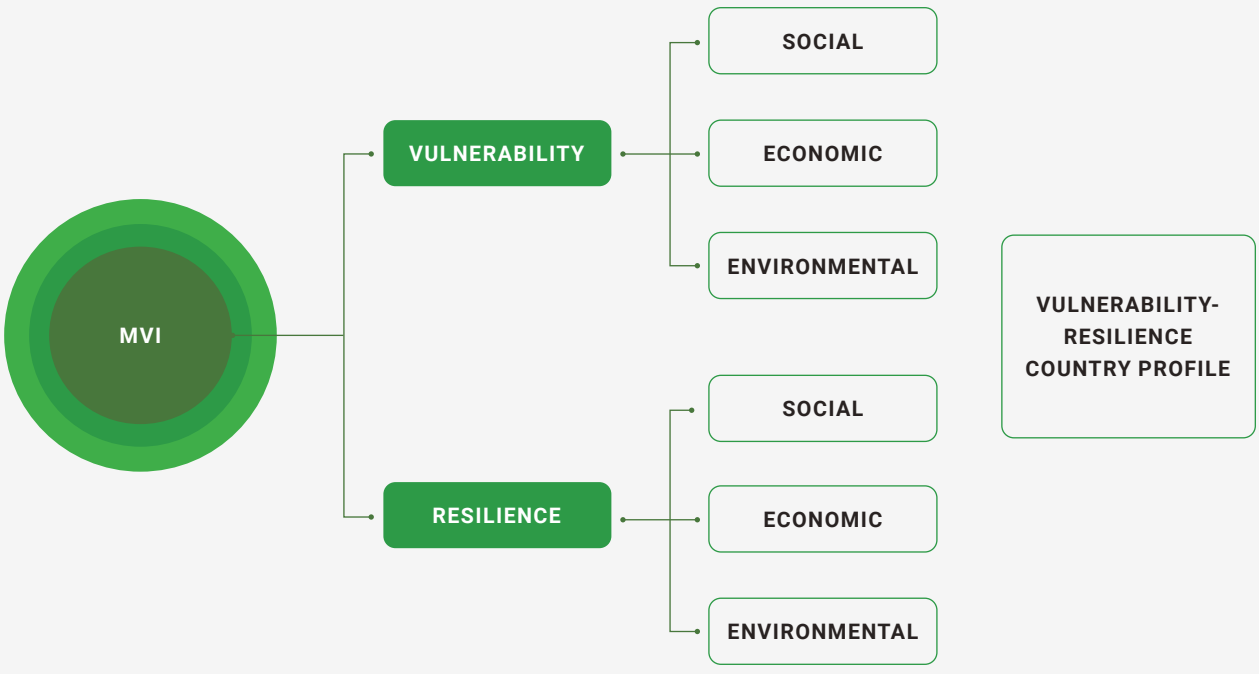
18. The proposed MVI aligns with the guiding principles detailed in Chapter 1 and incorporates an additional component - the VRCPs. The VRCPs involve the development of systematic and comprehensive national country profiles to complement the MVI assessment. The proposed structure therefore consists of two levels as follows:

    (i) **Universal level quantitative assessment** of structural vulnerability and resilience using a common methodology for all developing countries, which is presented via a summary index number to rank countries with a dashboard showing individual countries scores on component parts; and

    (ii) **VRCPs** which are a more detailed, tailored, and individualized characterization of a country's vulnerability and resilience factors, including non-structural resilience. These national profiles, prepared by individual countries, can be used to direct support and cooperation toward addressing specific vulnerabilities identified and to enhance resilience. In simple terms, a vulnerable country may prepare a VRCP as part of their national planning process, which would then be used to guide cooperation and assistance at the national level.

19. **Figure 1** depicts the tiered structure of the MVI. The quantitative assessment level contains two main components: structural vulnerability and structural resilience. Each of these components encompasses economic, environmental and social dimensions, which in turn consist of a range of indicators representing specific factors related to vulnerability and resilience. The VRCP level mirrors this framework, reflecting country-specific challenges, constraints, policies and investments.

FIGURE 1. The MVI Framework



II. Key definitions underpinning the MVI

20. The following definitions underpin the proposed MVI.

a. Structural vulnerability

The risk of a country's sustainable development being hindered by recurrent, adverse, exogenous shocks and stressors.

21. Macro-level vulnerability is the risk of national development being adversely affected by exogenous shocks (slow or rapid onset), or stressors[12], including but not limited to environmental factors (for example, droughts, tropical cyclones), economic factors (for example, worsening terms of trade), or social factors (for example, epidemics). As acknowledged in the literature[13], the impact of an exogenous shock or stressor on an economy is contingent upon:

- the magnitude of the shock, and whether it is a recurring shock or a progressive shock or stressor, such as climate change;
- the level of the country's exposure to the shock and/or stressor; and
- the country's capacity to withstand, recover from, and absorb or minimize the shock and/or stressor (resilience).

22. Structural vulnerability results from factors that are independent of current or recent policy choices. The underlying factors that determine structural vulnerability include the risk of exposure to exogenous shocks and stressors, and the extent of a country's exposure (in terms of historical persistence and intensity). Structural vulnerability indicators should be based on sustainable factors measured over significant periods of time.

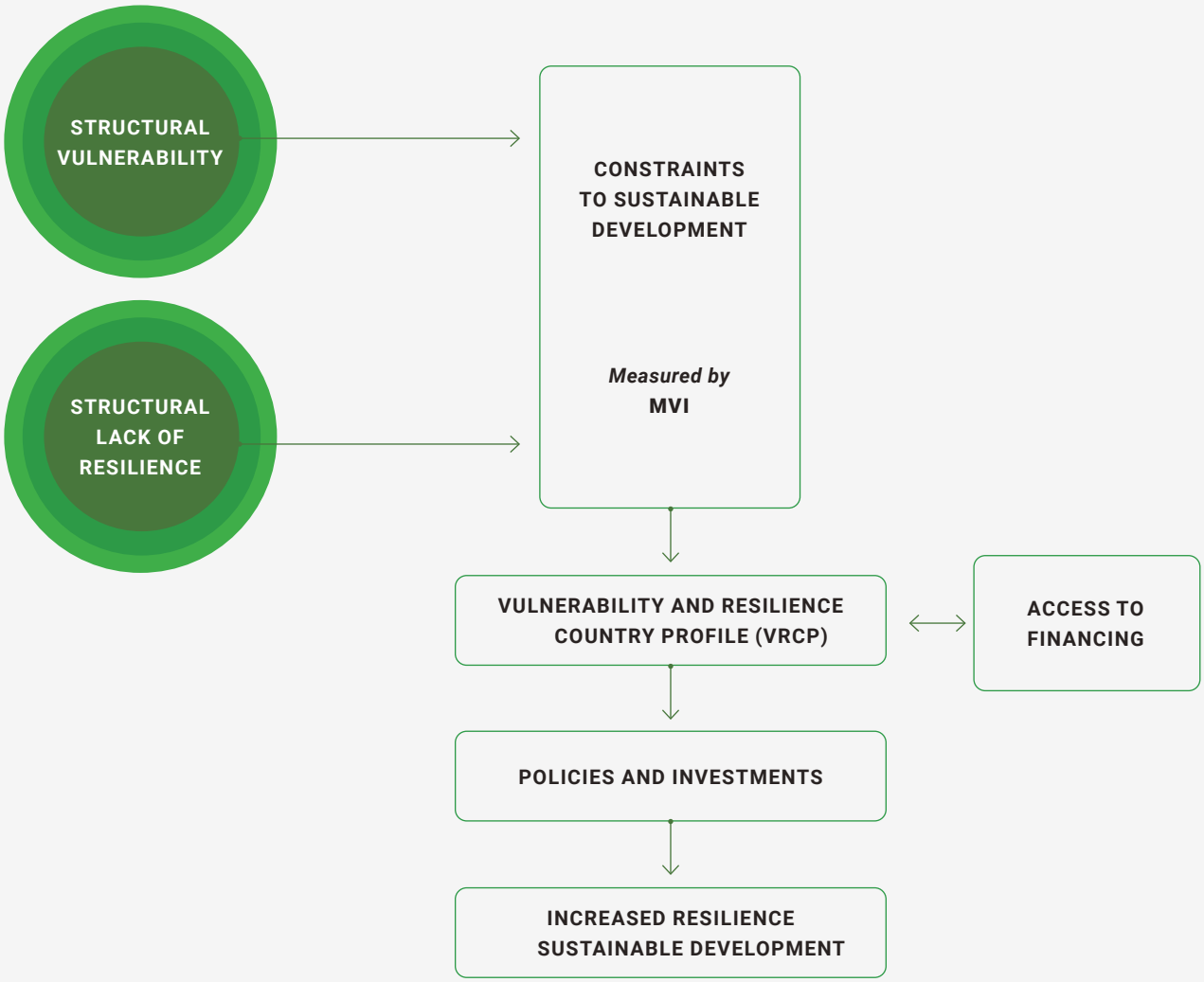
b. Structural resilience and structural lack of resilience

The inherent characteristics or inherited capacity of countries to withstand, absorb, recover from or minimize the adverse effects of shocks or stressors.

23. Resilience is a country's ability and capacity to mitigate the impact of shocks or stressors, recover swiftly from them, and adapt flexibly in response to stressors. Resilience plays a crucial role in determining the magnitude of the impact of external shocks or stressors on a country. The capacity of a country to respond effectively, or its "resilience," is affected by structural factors such as human capital, infrastructure, and natural capital. These structural factors collectively contribute to a country's structural resilience.

24. Public policies and programs can help both public and private entities to respond to a shock or stressor. However, these are non-structural factors. For example, a country vulnerable to economic shocks can implement policies and investments to diversify its economy. A country vulnerable to natural hazards can develop early warning systems and investments to limit damage to public and private assets. Accurate assessment of these factors requires detailed knowledge of the quality of country policies and their implementation. It is possible for two countries that possess equal levels of structural vulnerability and resilience to exhibit different capacities to withstand shocks or stressors, due to variations in their non-structural resilience.

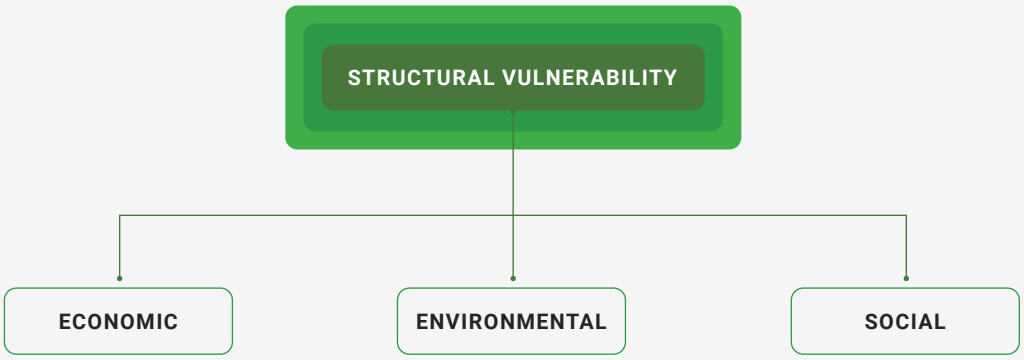
FIGURE 2. Theory of Change



25. **Figure 2** summarizes the causal logic of the MVI framework. Both structural vulnerability and lack of resilience constrain sustainable development. The level of exposure that a country faces in relation to shocks or stressors determines the potential impact of those shocks or stressors, while the structural resilience of a country interacts with its exposure to shocks or stressors, ultimately determining the extent of the final impact of that shock or stressor on the country's development.

26. While countries can, and should, implement policies and investments to counteract these factors, these interventions cost money. A low-income country will likely not have the resources to develop and implement the right policies and investments. Even a MIC may struggle to mobilize resources, especially for stressors, whose impacts are compounded over time. Vulnerable countries, whatever their income level, will face trade-offs between resilience building and financing other policies and investments needed to accelerate their sustainable development.

FIGURE 3. The structural vulnerability components of the MVI



27. It is also important to note that resilience factors do not affect the likelihood of future shocks or stressors, but rather influence the expected impact of those shocks/ stressors on sustainable development. Countries lacking structural resilience are thus more vulnerable.

28. As depicted in **Figure 2**, countries have structural vulnerabilities and structural impediments to developing resilience, which occur in 3 domains (economic, environmental and social). Investments and suitable policies can be targeted towards building resilience, with a focus on policy-driven approaches.

III. The structural vulnerability components of the MVI

29. The structural vulnerability component of the index consists of the three primary sources of macro-vulnerability: economic, environmental, and social, which also correspond to distinct categories of shocks and stressors, primarily classified based on their origin (i.e., economic, environmental, and social) rather than their multidimensional impact (see **Figure 3**). This approach facilitates the avoidance of redundant components across the three dimensions, while at the same time acknowledging their potential interconnectedness.

30. The following definitions underpin the structural vulnerability pillar of the MVI:

Economic vulnerability – the risk of harm from exposure to adverse external economic shocks[14]. Exogenous shocks and related instabilities of economic variables have detrimental effects on the economic growth of developing countries, ultimately compromising sustainable development. There are both short term and long-term effects.

Environmental vulnerability – the risk of harm from exposure to natural hazards. Natural hazards may result from structural vulnerability to climate change and anthropogenic or socio natural shocks and stressors that are exogenous in origin[15]. The threat posed by climate change, as a distinctive form of vulnerability, constitutes a significant component of environmental vulnerability. It arises

from the susceptibility to enduring alterations in geophysical conditions, rather than from a short- to medium-term growth impediment. Within this context, vulnerability to climate change refers to the susceptibility of a country to a specific global and progressive stressor that is likely to manifest through country-specific shocks and stressors.

Social vulnerability – the risk of harm from exposure to social shocks. Separating structural and nonstructural factors is more difficult, as social vulnerability is closely correlated with current policy[16]. In the last two decades, research has highlighted the connections between external factors and domestic impacts such as violence, forced displacement and negative health impacts[17].

IV. The structural resilience components of the MVI

31. The structural resilience component also comprises three categories of indicators: economic resilience, environmental resilience, and social resilience (see **Figure 4**). These categories represent the inherent and structural factors that contribute to mitigating the long-term impacts of external shocks and stressors, while also facilitating a more rapid transition out of vulnerability.

32. The following definitions underpin the structural resilience pillar of the MVI:

    Structural economic resilience relates to the inherent economic capabilities and economic capital of a country. It encompasses factors that strengthen the economy's ability to withstand and recover from adverse events.

    Structural environmental resilience focuses on the inherent environmental capital of a country. It pertains to the ecological resources, infrastructure, and systems that contribute to reducing vulnerability to environmental shocks and stressors.

    Structural social resilience encompasses the inherent social capabilities and social capital within a country. It involves factors such as social cohesion, social institutions, demographic structure and human capital that enhance the capacity to withstand and adapt to shocks and stressors.

33. It is important to note that in calculating the MVI, for technical reasons, the variable of interest is not the concept of "resilience" per se, but rather its opposite counterpart, referred to as "lack of resilience."

34. In sum, the MVI presents a two-tiered framework: a universal quantitative assessment measuring structural factors of vulnerability (the index) and a country-led profile and narrative, detailing context-specific structural and non-structural vulnerability and resilience factors. Both parts of the framework encompass three main domains of vulnerability, resilience, and sustainability: economic, environmental, and social. The index represents only structural factors, enabling it to be used as a tool to compare country need for resilience support, while the VRCP enables country-driven dialogue on the form and structure of such support.

FIGURE 4. The structural resilience components of the MVI

CHAPTER 3

Building the MVI: Approach & Methodology

I. Introduction

35. This chapter presents the technical structure of the MVI. It details how the principles outlined in Chapter 2 determined the technical choices governing the specific design of the MVI to operationalize the framework described in Chapter 2.

II. Layers: pillars, dimensions, concepts and indicators

36. As previously stated, the MVI is not a general index of lack of development, policy performance deficiencies or structural handicaps to growth. Rather, its objective is to measure the risk for developing countries of being impacted by external (exogenous) shocks and stressors, translating a complex reality into a simple, computable index. In this regard, respecting the principles of multidimensionality and universality does not necessarily mean that every possible indicator of vulnerability must be introduced individually in the MVI. At the same time, the principle of simplicity implies that the MVI need not list and then aggregate an exhaustive list of indicators related to the vulnerability and resilience of developing countries. Therefore, choices needed to be made.

37. To simplify index construction and indicator selection, bridging the gap between the broad definitions of the framework and the selection of specific indicators, the MVI defined each dimension through the use of ***concepts***. Each dimension of vulnerability and resilience was characterized by three concepts (18 in total). Each concept was measured through the selection of the fewest possible indicators, with each indicator acting as a proxy for their associated concept rather than representing a specific measure of vulnerability and resilience. The MVI was thus organized around four layers, which allowed for a simpler and more balanced aggregation leading to a clearer and more easily understandable structure: The layers are as follows:

    i. the concepts (aggregating related individual indicators);

    ii. the dimensions (aggregating the concepts forming the particular dimensions of structural vulnerability or lack of structural resilience);

    iii. the 2 pillars (formed by the aggregation of the 3 dimensions of structural vulnerability and lack of structural resilience respectively); and

    iv. the MVI (formed by the aggregation of the structural vulnerability and lack of structural resilience pillar).

III. Selecting the indicators

38. To enable to selection of the best indicators, the Panel set criteria and rules to ensure the quality of the indicators that form the MVI, as follows:

- **Data quality:** in building the index, UN data was prioritized. External data was only considered if previously used by the UN for official purposes, thus providing some evidence of quality assurance.
- **Missing data:** in the case of missing data for a particular indicator, a threshold of 10 per cent missing values was set (equivalent, approximately, to 15 missing data points out of a maximum of 142 data points). If this criterion was not satisfied, that particular indicator was excluded. Application of this criteria resulted in the exclusion of several potential indicators (see Annex 2). It was also decided that, following exhaustive attempts to select indicators with few or no missing values, if a country still had

three or more missing indicators, the MVI score for the country would not be computed. While this principle served as a fundamental guideline in the formulation of the MVI, it is worth noting that no developing country was excluded. This is due to the concerted efforts undertaken by the panel during indicator selection. The list of developing countries for which the MVI is calculated is based on the "countries in developing regions" grouping of the M49 classification from UN Statistics Division (UNSD).[18]

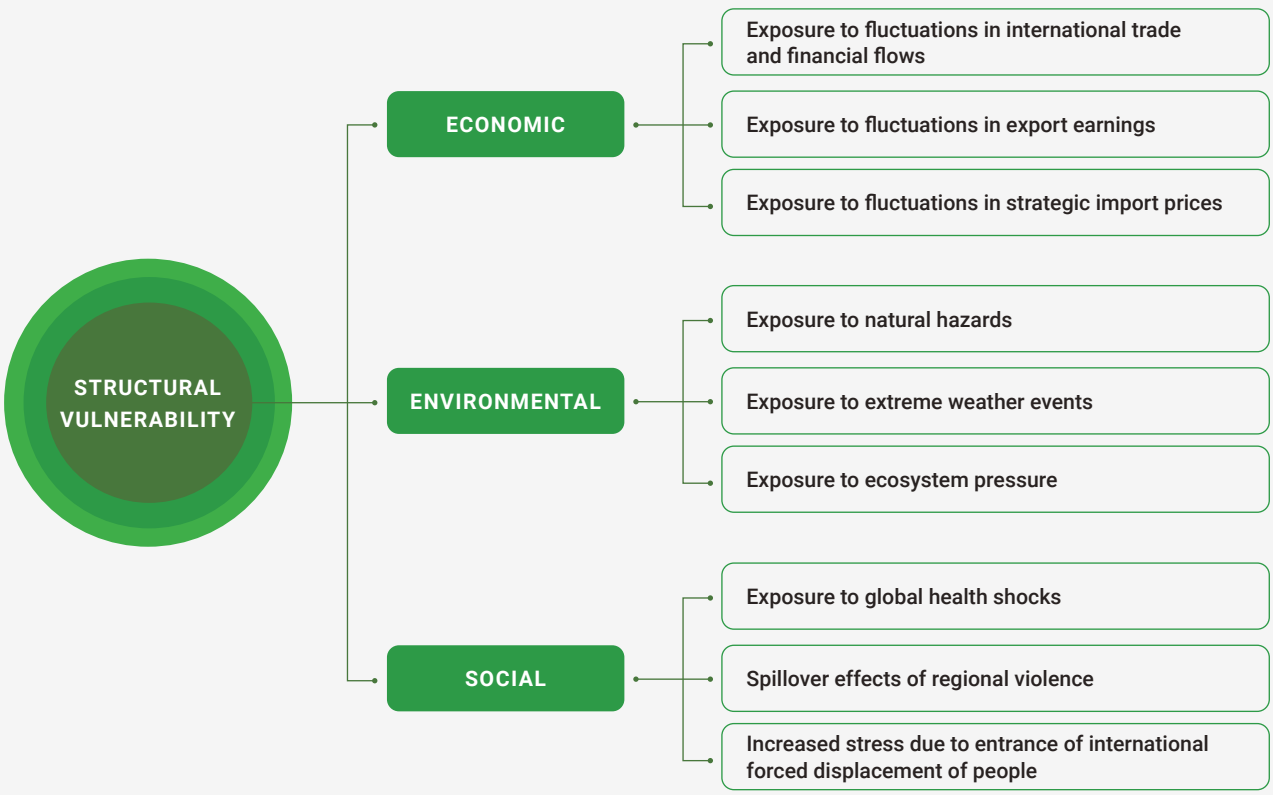
- **Transparency of the indicator selection process:** the choice of the vulnerability and resilience indicators was based on clear and detailed rationale, backed by solid evidence on causality or, at a minimum, association. The application of this criterion is discussed in Section 4 of this Chapter.

39. In identifying the indicators to be included in the MVI, the Panel explored a wide array of concepts and related indicators. **Annex 2** provides a summarized selection of indicators that were considered but ultimately not selected as part of the MVI due to data constraints, or lack of strong rationale or evidence.

IV. The MVI concepts and indicators

40. In accordance with the principles and rules presented above and following a thorough literature search, 18 concepts were identified to populate the structural vulnerability and lack of structural resilience pillars of the index, measured by 26 indicators, as shown in **Figure 5**. A summarized rationale is provided below, as well as a link to the data source.

FIGURE 5. Structural vulnerability: Structure and concepts



41. Indicators were computed by using averages over time to ensure that the indicator defines a vulnerability or resilience factor that is truly structural and not induced by current policy. Measuring factors over time ensures that they capture medium-term economic, environmental, or social vulnerability (or long-term physical vulnerability in the case of climate change and natural hazards). All level indicators are measured over a five-year average, with the exception of those that are subject to strong fluctuation (for example, Gross fixed capital formation as a percentage of GDP). Indicators measuring instability are measured over a 20-year period.

42. The following are the concepts and indicators relating to structural vulnerability:

Concept No. 1: Exposure to fluctuations in international trade and financial flows – Countries with concentrated export structure are likely to suffer more harm when exposed to external shocks.[19]

INDICATOR NO. 1: Merchandise and services export concentration

The indicator measures whether a country's export revenue relies on a small number of products and services. The higher the level of concentration in a country's export of goods and services, the greater its susceptibility to fluctuations in export demands and global prices of merchandise and services, rendering it more vulnerable.

The indicator is measured as the percentage of the three highest export categories in total exports of goods, and services (three services categories grouped under the headings of transport, travel, and other services). Data is retrieved from UNCTAD.

Concept No. 2: Exposure to fluctuations in export earnings – Countries with unstable export earnings have a lower capacity to import goods, services, and capital, leading to higher investment risk and fiscal instability.[20]

INDICATOR No. 2: Instability of export revenue

The indicator measures a country's vulnerability to fluctuations in export volume and prices caused by external economic shocks. Unstable export earnings have a large effect on private and public revenues and consumption and increase investment risk.

The indicator is measured as the standard deviation of the difference between the value of annual export revenue and its 20-year trend. The estimated trend is mixed and includes both stochastic (a one-year lagged of export revenue) and quadratic deterministic (a time variable and its square) components. Data is retrieved from UNDESA Statistics Division.

Concept No. 3: Exposure to fluctuations in strategic import prices – Countries that import a high percentage of their food and fuel are more vulnerable to externally generated inflationary pressures.[21]

INDICATOR NO. 3: Food and fuel import dependency

This indicator measures a country's vulnerability to changes in imported food and fuel prices. Higher dependence combined with price increases or shortages causes inflation, erodes household purchasing power increasing poverty, and undermines macroeconomic stability.

The indicator is measured as the 5-year average of the ratio of the sum of food and fuel imports over the final consumption expenditure. Data on food and fuel imports, as well as final consumption expenditure are available from UNCTAD. Food comprises the commodities in the Standard international Trade Classification (SITC)

sections 0 (food and live animals), 1 (beverages and tobacco), and 4 (animal and vegetable oils and fats) and SITC division 22 (oil seeds, oil nuts, and oil kernels). Fuels comprise the commodities in SITC section 3 (mineral fuels, lubricants, and related materials). Final consumption expenditure is the sum of household final consumption expenditure (private consumption) and general government final consumption expenditure (general government consumption). Data is available from UNCTAD.

Concept No. 4: Exposure to natural hazards – Mortality, injury, displacement, or material loss from hazards have a significant impact on society in terms of loss of: life or health; economic, social, and cultural assets; and access to public services and infrastructure, markets, and work.[22]

INDICATOR No. 4: Victims of natural hazards

This indicator reflects a country's human vulnerability to natural hazards which can seriously handicap a country's sustainable development.

This indicator is calculated by dividing the annual number of victims of natural hazards by the total population of the country over 20 years and then taking the simple average. Victims of natural hazards are defined as people killed or affected (i.e. people requiring immediate food, water, shelter, sanitation, or medical assistance). It covers weather and climate-related hazards (such as floods, landslides, storms, droughts, and extreme temperatures) as well as geophysical hazards (such as earthquakes or volcanoes). The calculation requires the total population data from UNDP in its World Population Prospects database and data on people killed and affected by natural hazards from the Emergency Events Database (EM-DAT) of the World Health Organization (WHO) Collaborating Centre for Research on the Epidemiology of Disasters (CRED). Data is retrieved from EMDAT-CRED.

INDICATOR No. 5: Damages related to natural hazards

This indicator reflects a country's economic vulnerability to natural hazards. Natural hazards and climate-related hazards can damage infrastructure, like roads and bridges, as well as critical sectors of the national economy, such as agriculture, causing negative effects on development, productivity, economic growth, and sources of income, particularly in rural areas. The high cost of reconstruction can inhibit investment needed for strengthening resilience and reduction of vulnerabilities, as well as for sustainable development more broadly.

This indicator measures the share of GDP lost due to natural hazards. It is calculated by dividing the annual cost of damages due to natural hazards by the GDP of the country over 20 years and then taking the simple average. The calculation requires the GDP data from UNCTAD and data on the cost of damages due to natural hazards from the Emergency Events Database (EM-DAT) of the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED). Data is retrieved from EMDAT-CRED.

Concept No. 5: Exposure to extreme weather events – extreme weather events can disrupt a country's sustainable development through several avenues. Such shocks can impact access to water and sanitation, health, food security, agricultural productivity, employment, household consumption, with indirect impacts on education, and forced migration.[23]

INDICATOR No. 6: Rainfall shocks

This indicator reflects a country's vulnerability to rainfall shocks. Rainfall shocks can have a severe impact on economic activity, access to water and food insecurity and can increase conflicts caused by resource scarcity. The indicator therefore represents risks from both flood and drought.

The indicator is measured by combining both an exposure component (the average rainfall since 1950) and a shock component (the trend in rainfall shocks since 1950). The primary objective is to ascertain if the deviations from the long-term trend demonstrate an escalating magnitude or intensity, assuming that this pattern is influenced by climate change and is likely to amplify in the future. The dataset utilized for this analysis is obtained from version 4.06 of the Climatic Research Unit, renowned for its comprehensive collection of rainfall data (CRU TS -University of East Anglia).

INDICATOR No. 7: Temperature shocks

This indicator reflects a country's vulnerability to temperature shocks. Temperature shocks negatively impact the long-run growth in the economy through their impact on labor and land productivity. Temperature shocks can also cause higher food prices contributing to food insecurity.

The indicator is measured by combining both an exposure component (the average temperature since 1950) and a shock component (the trend in temperature shocks since 1950). The trend in temperature shocks is measured by the regression of temperature deviations from the trend on the time variable. The aim is to determine whether the deviations from the long-term trend are increasing in magnitude or intensity, assuming that this trend is driven by climate change and will tend to increase in the future. Temperature data come from the version 4.06 of the Climatic Research Unit (CRU TS -University of East Anglia).

Concept No. 6: Exposure to ecosystem pressure – Countries with higher share of land exposed to pressures related to climate change are more at risk of disruption of their sustainable development.[24]

INDICATOR No. 8: Low-elevated coastal zones (LECZs)

This indicator captures the vulnerability of low-elevated coastal zones to extreme events such as flooding and storms, which impose substantial costs on coastal countries. Low-elevated coastal zones (LECZs) are highly vulnerable to marine submersions and pressures on coastal ecosystems from climate change. Threats include increased exposure to sea-level rise, storm surges, ocean acidification, and habitat damage such as coral bleaching. Sea-level rise causes flooding, coastal erosion, and the loss of coastal habitats that naturally protect the coastline from storm surges. The loss of these habitats increases the number of people at risk. The faster the rate of climate change, the greater the risk of damage will be to LECZs.

The indicator is measured as the share of low-elevated coastal zones in the country's total area. Low-elevated coastal zones are defined as areas contiguous to the coast below 5 meters. Data are collected from the version 2.1 of CoastalDEM for areas less than 60°N latitude and the version 3 of ASTER GDEM for areas greater than 60°N latitude.

INDICATOR No. 9: Drylands

Drylands are under increased stress due to increased aridity caused by climate change, leading to vulnerability for the populations living in those areas. A high share of drylands in a country is a factor of structural vulnerability hindering its sustainable development.

This indicator is measured as the part of land areas considered to be the arid, semiarid, and dry sub-humid zones (three of the world's six aridity zones), as a percent of the country's (non-desertic) total land area. Deserts, which are classified as hyper-arid areas, are excluded in both the dryland areas and the country's total land area. Arid, semiarid, and dry sub-humid areas are defined according to the UNEP definition as those having a ratio of annual precipitation to potential evapotranspiration between 0.05 and 0.65. For desert areas this ratio is less than 5 percent. Data on precipitation and potential evapotranspiration is collected from the version 4.06 of the Climatic Research Unit (CRU TS -University of East Anglia).

Concept No. 7: Exposure to global health shocks – Epidemics can cause substantial disruption to economic and social systems. Countries who experience a series of epidemics over short interval of time are less likely to have time to recover and will be in a progressively weaker situation over time.[25]

INDICATOR No. 10: Victims of epidemics

This indicator measures a country's health and social system vulnerability to the spread and lethality of a certain virus, pandemic, or disease.

The indicator measures the average share of the population who are victims of epidemics. It is calculated by dividing the annual number of victims of epidemics by the total population of the country over 20 years. Epidemics include viral disease, bacterial disease, parasitic disease, fungal disease, and prion disease. The total population data is gathered from UNDP in its World Population Prospects database and victims of epidemics data is from the Emergency Events Database (EM-DAT) of the WHO Collaborating Centre for Research on the Epidemiology of Disasters (EMDAT-CRED).

Concept No. 8: Spillover effects of regional violence – Violence in neighboring countries increases internal violence risk.[26]

INDICATOR No. 11: Regional conflict-related death (excluding own country)

The indicator reflects a country's vulnerability to the presence of conflicts among its neighbors. Through the porous nature of borders and their spillover effects that can be felt across an entire region, conflicts can have significant negative impacts on the economic growth, macroeconomic stability, debt sustainability and poverty reduction of countries.

This indicator measures the average number of deaths per 100,000 inhabitants due to conflict at the regional level, excluding internal conflicts specific to the country. The regional level is defined by the direct neighboring countries if there are contiguous borders. The regional average is computed using a quadratic mean. In the case of small islands for which there are no contiguous borders, the region is defined according to the UN regional (or sub-regional) groupings to which the country belongs. The UNSD M49 standard 3-level regional classification is used instead of the broader UN SDG regions for increased precision. Data is collected from the Armed Conflict Location and Event Data Project (ACLED) and the total number of deaths is measured over a period of 10 years since the ACLED data was established incrementally. Data for African countries were entered into the database starting in 1997, while data for other country groups were entered into the database relatively later. Taking 10 years instead of 20 ensures that the number of deaths is measured over the same period for all countries. Data is retrieved from ACLED.

INDICATOR No. 12: Regional homicide (excluding own country)

This indicator reflects the risk of violence from neighboring countries. Criminality, especially transnational crime, is an example of an external stress factor that exacerbates the risk of local violence.

The indicator measures the average homicide rate for 100,000 inhabitants over 10 years. The regional level is defined by the direct neighboring countries if there are contiguous borders. The regional average is computed using a quadratic mean. On the other hand, in the case of small islands for which there are no contiguous borders, the region is defined according to the UN regional (or sub-regional) groupings to which the country belongs. The UNSD M49 standard 3-level regional classification is used instead of the broader UN SDG regions for increased precision. Data is also acquired from UN Office of Drugs and Crime (UNODC), WHO, and the Institute for Health Metrics and Evaluation (IHME) Burden of Disease (UNODC/WH /IHME Burden of Disease).

Concept No. 9: Exposure to entrance of international forced displacement of people – Forcibly displaced persons reflect vulnerability between societal groups as well as the impact from other stresses – natural or other – on countries both within and between borders.[27]

INDICATOR No. 13: Refugees from abroad

This indicator reflects the fact that countries with a larger share of refugees suffer increasing social vulnerability, not only in the refugee population but in the host country population as well. The presence of a refugee population increases the demand for social basic services, increases the supply in labor markets, affects the prices of commodities, and can stress environmental and natural resources all of which could jeopardize a country's sustainable development.

The indicator measures the average share of refugees from abroad for 100,000 country's inhabitants. It is calculated by dividing the annual stock of refugees from abroad by the total population of the country over 10 years, multiplying this by 100,000, and then taking the simple average. Data is retrieved from UNHCR.

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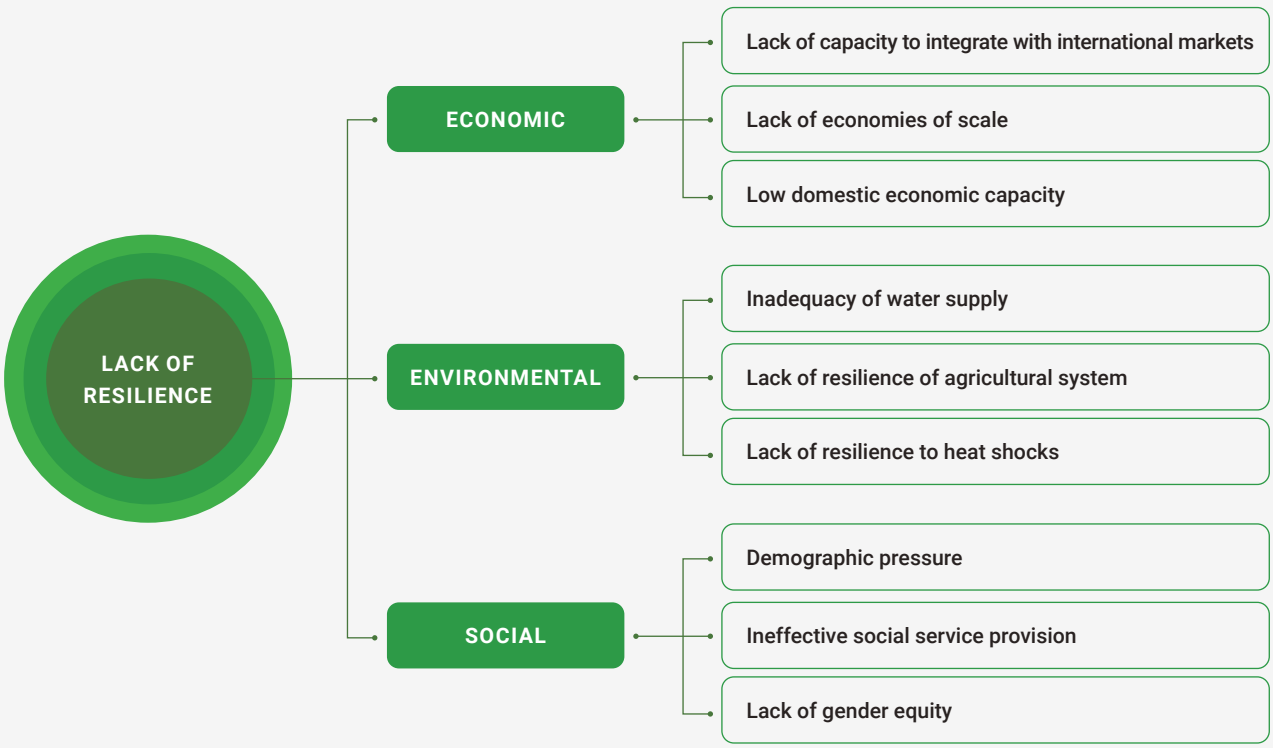
43. The following are the concepts and indicators relating to lack of structural resilience:

Concept No. 10: Low capacity to integrate with international marketse – Remoteness increases transportation costs and creates information asymmetries which can reduce competitiveness, limit access to international financial markets, and constrain economic diversification, especially tourism development. Landlockedness can also increase trade costs due to the tariff, non-tariff, and infrastructure related trade barriers of neighboring countries that are outside of the control of the landlocked country.[28]

FIGURE 6. Structural lack of resilience: Structure and concepts



INDICATOR No. 14: Low connectivity

This indicator measures a country's physical remoteness from international markets. It also reflects landlockedness, which increases average trade barriers or transport costs for a given distance.

Remoteness is measured as the trade-weighted minimum average distance to reach 50 per cent of the world markets. For each country i, partner countries j are ranked according to their distance from country i. The group of the closest countries is hence progressively selected until 50% of the World market is reached for country i (by the simple sum of partners' market shares). The trade-weighted average distance is then computed vis-à-vis this group of selected partners, using the distances between country i and selected partners j, and selected partners' market shares. To take into account the particular situation of landlocked countries, an adjustment coefficient is applied (this coefficient is set at 15 per cent applied to the distance calculated for the landlocked country). Data on bilateral distances between the capitals or major cities in the world, obtained from the Centre d'Etudes Prospectives et d'informations Internationales (CEPII) and world market shares based on exports and imports of goods and services reported annually by the UNSD in its National Accounts Main Aggregates database. Data is retrieved from CEPII/UNDESA Statistics Division.

Concept No. 11: Lack of economies of scale – Small countries have a small risk pool implying higher cost of shocks and stressors per capita (less diversification, low opportunity for risk pooling).[29]

INDICATOR No. 15: Low population size

The smaller the country, the less resilient it is to economic, trade and environmental shocks and stressors, as all shocks become covariate. The small size of the population is an indicator of the small size of the domestic market, which is unfavorable to growth due to the lack of economies of scale.

This indicator is measured by the 5-year average of the country's total population as of July. Data is retrieved from UNDESA Population Division, World Population Prospects.

Concept No. 12: Low domestic economic capacity – Higher economic capacity through diversification and asset accumulation help reduce the total macroeconomic risk.[30]

INDICATOR No. 16: Low gross fixed capital formation

This indicator indirectly reflects a country's low level of savings and weak asset accumulation. The lower the gross fixed capital formation, the less resilient the country is to shocks and stressors.

This indicator measures the 10-year average of gross fixed capital formation over GDP. Data is retrieved from UNCTAD.

INDICATOR No. 17: Production concentration index

This indicator measures how diversified a country's economic output is across different sectors. A higher index means that the country's production is more concentrated in a few sectors, reducing resilience to external shocks.

This indicator is computed using a Herfindahl-Hirschmann index[31] applied to the value-added of each production sector to GDP. The following activities are considered: i) agriculture, hunting, forestry, fishing; ii) industry; iii) mining, utilities; iv) manufacturing; v) construction; vi) wholesale, retail trade, restaurants and hotels;

vii) transport, storage, and communications; viii) other activities. This indicator is primarily lying between 0 and 1, a high level of concentration being associated with a score close to 1 (a country producing its total GDP from only one sector of activity would score 1 and less resilient). Data is retrieved from UNCTAD.

Concept No. 13: Inadequacy of water supply – The availability of renewable internal freshwater supplies (internal river flows and groundwater from rainfall) improves a country's access to freshwater supplies after experiencing shocks. It also supports resilience of agricultural systems.[32]

INDICATOR No. 18: Low renewable internal freshwater resources

Renewable internal freshwater resources such as internal river flows and groundwater are part of the natural capital of a country and constitute strategic reserves with important services. Countries with insufficient renewable internal freshwater resources per capita have less capacity to meet the water demands of their population, agriculture and industry. They are also challenged in maintaining healthy ecosystems during shocks and stressors, such as droughts, floods, that limit water supply or affect its quality.

The indicator is measured as an average over 5 years. Data is retrieved from FAO AQUASTAT.

Concept No. 14: Lack of resilience of the agricultural system – Scarcity of arable land can delay recovery from shocks by impacting food security, agricultural productivity and output. Scarcity of arable land can also have long term impacts on land degradation and can cause civil conflicts among communities (for example, pastoralists and farmers).[33]

INDICATOR No. 19: Lack of cropland

Cropland is an indirect measure of arable land.

This indicator is measured by the average share of cropland over total population (in 1,000 hectares per capita) over 5 years. Data is obtained from FAOSTAT.

Concept No. 15: Lack of resilience to heat shocks – Forests and trees contribute to increased water quality and quantity, reduce soil erosion and provide shade to mitigate heat shocks. Trees and forests absorb and store carbon dioxide and support terrestrial biodiversity).[34]

INDICATOR No. 20: Low tree cover

Forests supply water, provide livelihoods, mitigate climate change and are essential for sustainable food production. Countries with lower amounts of forest area are more susceptible to exogenous environmental shocks and stressors, such as extreme weather events. The lack of forest means absence of this natural buffer between the extreme weather and population centers.

This indicator is measured by annual tree-covered areas (in hectares) divided by the area of the country, and then the average over a period of 5-years is taken. Data is obtained from FAOSTAT.

Concept No. 16: Demographic pressure – Demographic pressure generates higher need and costs of social services. It may also increase the risk of internal conflict when shocks hit.[35]

INDICATOR No. 21: Dependency ratio

This indicator captures how demographic structure affects a country's adaptive capacity. The larger the dependency ratio is, the more substantial the economic and social burden carried by working-aged people, which inhibits recovery. A high dependency ratio indicates that the economically active population and the overall economy face a greater burden to support and provide the social services needed by children and by older persons who are often economically dependent.

The indicator measures the average ratio of dependents (people younger than 15 or older than 64) to the working-age population (15-64) over 5 years. Data is retrieved from UNDESA Population Division.

INDICATOR No. 22: Population density

High population density increases the risk of injury or death when a natural hazard occurs. It also lowers country capacity to respond to health shocks because there is limited space for social distancing and greater demand for natural resources (water supply). It may also reduce resilience to conflict when shocks hit.

The indicator measures the midyear population divided by land area in square kilometers. The population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The only exception is for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding areas under inland water bodies, national claims to continental shelf and exclusive economic zones. In most cases, the definition of inland water bodies includes major rivers and lakes. The indicator is calculated by taking the simple average of population density over 5 years. Data is retrieved from UNDESA Population Division.

Concept No. 17: Ineffective social service provision – Higher human capital allows for the development of better adaptation strategies to external shocks and stressors.[36]

INDICATOR No. 23: Low number of people using at least basic sanitation services

This indicator reflects people's inadequate access to basic sanitation services. Poor access undermines human capital development and facilitates disease transmission, including during pandemics.

The percentage of people using at least basic sanitation services (improved sanitation facilities that are not shared with other households) is calculated as an average over 5 years. Data is retrieved from WHO.

INDICATOR No. 24: Under-5 mortality

This indicator provides information on the effectiveness of the health system in a country broadly, and particularly for young children. High mortality rates of children under 5 years of age are reflected in a deterioration in quality of life, reduced human development standards, and poor human, social and cultural capital in populations, leading to a reduction in economic, social, and environmental resilience.

The indicator measures the probability per 1,000 that a newborn baby will die before reaching age five, if subject to age-specific mortality rates of the specified year. The indicator is calculated by taking the simple average of this probability over 5 years. Data is retrieved from UN Inter-agency Group for Child Mortality Estimation.[37]

INDICATOR No. 25: Low years of schooling

This indicator reflects how low levels of education act as a constraint for economic growth and social cohesion, and reduce individual and social prosperity. Less-educated populations are less able to act effectively when risks materialize, as well as develop adaptation strategies to external stressors. Moreover, educational attainment is a strong determinant of labor market outcomes in terms of access to employment, level of earnings and individual labor productivity.

Years of schooling measures the average number of completed years of education of a country's population, excluding years spent repeating individual grades. Estimates produced by the UN Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UIS) cover the population aged 25 years and older, which is the indicator used in the calculation of UNDP's Human Development Index (HDI). Data is retrieved from UNDP.

Concept No. 18: Lack of gender equity – Greater gender parity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.[38]

INDICATOR No. 26: Low proportion of seats held by women in national parliaments

This indicator captures the lack of gender equality in a society. Low gender parity can have a negative impact on economic growth through less effective use of the skills of the whole population, and when risks materialize, hinder recovery and effective adaptation to long-term stressors.

To minimize volatility, the proportion of seats held by women in national parliaments (as a percentage of the total number of seats) is measured as an average over a 10-year period. Data is retrieved from Inter-Parliamentary Union (IPU).

Box 1: Is the proportion of seats held by women in national parliaments an indicator of gender parity's contribution to resilience?

The question of how to measure the contribution of gender equality to resilience consistently emerged in the Panel's deliberations and engagements with various stakeholders. Recognizing established evidence on the importance of gender parity for economic growth, political stability, and protecting human rights, the Panel argued that gender parity should be included as a resilience indicator, recognizing that the greater the degree of gender parity within a society, the higher its capacity to withstand external and internal shocks[39]. At the outset, the concept was predominantly viewed through the lens of education. The Gender Parity Index for completion rates in upper secondary education, as established by UNESCO, was selected as an initial indicator, however, due to extensive data gaps, the indicator was excluded. Specifically, 31 developing countries, constituting 21.8 per cent of the total sample, lacked data points—surpassing the Panel's 10 per cent threshold for admissible data absence.

Consequently, alternative indicators were proposed for consideration, including gender-based violence and women's land ownership. While acknowledging their significance, the Panel also excluded them due to insufficient data coverage. Nevertheless, the Panel noted that these indicators could be considered in future iterations of the MVI if the geographic scope improves and the data gaps remain below the 10% tolerance threshold.

Ultimately, in consultation with UN Women, the proportion of seats held by women in national parliaments was selected to capture gender parity. Although not deemed the most optimal indicator by the Panel, its comprehensive data availability for all developing countries was a significant advantage. The Panel also deliberated on the structural aspect of this indicator. In this context, it was highlighted that the indicator's broad coverage across developing countries and its substantial time series permitted a measurement averaged over a decade. This approach mitigates the influence of current policies, rendering the indicator more exogenous and reflective of structural trends.

Box 2: Debt vulnerability, an ongoing issue in MVI debates

Following the external shocks of the global COVID-19 pandemic and the subsequent economic shutdown, an increasing number of developing countries now have unsustainable levels of foreign and/or domestic debt. This situation has been compounded by the effects of climate change, which have led to unforeseen exposures and negative weather events especially for SIDS. High levels of foreign debt can increase vulnerability and reduce economic resilience[40]. The Panel recognized the importance of this issue and gave careful consideration to inclusion of a debt indicator in the MVI. Ultimately, the Panel concluded that challenges related to data quality and availability could not be overcome.

The first challenge the Panel encountered was to identify an indicator that was purely exogenous in nature e.g. debt resulting from external shocks, as distinct from debt caused by non-exogenous factors, as only the former could be considered for the MVI given its focus on structural vulnerability. The Panel reviewed a set of broad debt indicators from the UN and other sources, such as total government debt, however, most of these indicators could not be considered as sufficiently structural. Indeed, the amounts of total sovereign (public guaranteed) debt, the ratio of foreign and domestic sources, and the conditions, are all policy choices. Similarly, while it is understood that debt needed for development becomes a constraint to development in the face of an external or internal shock, this is also a broader development problem, and not a specific exogenous (structural) vulnerability.

The only specific exogenous vulnerability for developing countries would be the interest rate on external debt, which is out of the control of a country. This variable can change rapidly when a financial shock occurs in developed countries and is transmitted to developing countries. This would make it an appropriate proxy for country vulnerability to external financial shocks.

However, in pursuing available data on this indicator the Panel found serious issues of data quality. Debt surveillance today depends on a patchwork of databases, managed by various organizations, with different standards and definitions and different degrees of reliability. As a result, data on the external debt of developing countries is plagued with accuracy issues ranging from incompatible definitions, heterogenous data disclosure, measurement errors, hidden debt, volatility and overall missing information, notably for SIDS. In most cases, statistics focus on central government direct debt only and omit subnational debt (required to reach general government level) and/or State Owned Enterprises (SOE) debt. These limitations to debt data in developing countries, and particularly in SIDS, are highlighted in various papers[41]. Several actors are making efforts to improve debt transparency, but significant work remains. Debt transparency is still a key commitment of the international community under the Addis Ababa Action Agenda for Financing for Development to meet the SDGs.

Numerous Member States have expressed concerns regarding the exclusion of debt from the MVI. The Panel, recognizing the importance of this issue, strongly recommends that future custodian body of the MVI revisits this issue in subsequent revisions of the index, with the hope that the challenges related to the availability and quality of debt data can be resolved. In the meantime, the Panel suggests using the VRCP, a complementary element of the MVI, to highlight the issue of debt vulnerability for countries that wish to do so.

V. Calculation of the MVI scores

44. Once the indicators populating the concepts and dimensions of vulnerability and resilience were selected, the Panel combined this information into one single metric of vulnerability. This required addressing procedures associated with the construction of a composite index, including rescaling, aggregation, and weighting. Although there are no universally acceptable standards relating to aggregation procedures, the Panel took great care to ensure that the selected methodology was reliable and built on a sound theoretical/conceptual framework.

a. Rescaling

45. Transforming the multiple units of raw variables into a common and comparable scale was the first step in indicator aggregation, as the selected indicators had different units of measurement. To do this, rescaling of the individual variables was necessary. While various rescaling methods exist in the

literature, the min-max technique is by far the most widely used method, especially for indicators aimed at providing international comparisons, for example, the HDI. It is also used by most of the organizations that have produced existing vulnerability indices, for example, UN CDP's Economic and Environmental Vulnerability Indicators (EVI).

46. The min-max technique consists of identifying the minimum and maximum value in each indicator. The minimum value is then transformed into a 0, and the maximum value into a 1, with every other value in between transformed into a positive fraction with a value depending on its distance from the minimum and maximum values. All vulnerability indicators must have a positive polarity with structural vulnerability, so that an increase in each rescaled indicator corresponds to an increase in vulnerability . All values were then multiplied by 100 to facilitate aggregation.

b. Detecting and removing the influence of outliers

47. The method adopted by the Panel to reduce the impact of extreme outliers on the distribution of index values was based on the analysis of the distribution of indicators through quartiles and interquartile ranges. The outliers were thus the values located beyond the lower and upper bounds. The procedure was as follows:

    i. Rank the raw data from lowest to highest value;

    ii. Use the minimum and maximum values of the raw series as bounds for a first rescaling;

    iii. Identify the observations and values corresponding to the first and last quartile;

    iv. Calculate the interquartile range (IQR);

    v. From there, the upper bound is set as follows: Upper bound = Q3 + 1.5 IQR and the lower bound is set as follows: Lower bound = Q1 - 1.5 IQR.

48. Observations below the lower bound or above the upper bound were considered as outliers. Extreme values were then replaced by zeroes or ones depending on their initial position on the distribution.

c. Aggregation

49. The final MVI score for a given country, is an average of the country's scores on the individual indicators, concepts, dimensions and pillars. Once rescaling and outlier detection was complete, the Panel had to decide how this average (mean) should be computed (i.e., how the indicators should be aggregated). The Panel sought to balance the criterion of simplicity with evidence on the complex reality of vulnerability. Countries differ in their vulnerability across the three dimensions of the MVI, an important fact that any aggregation method should reflect.

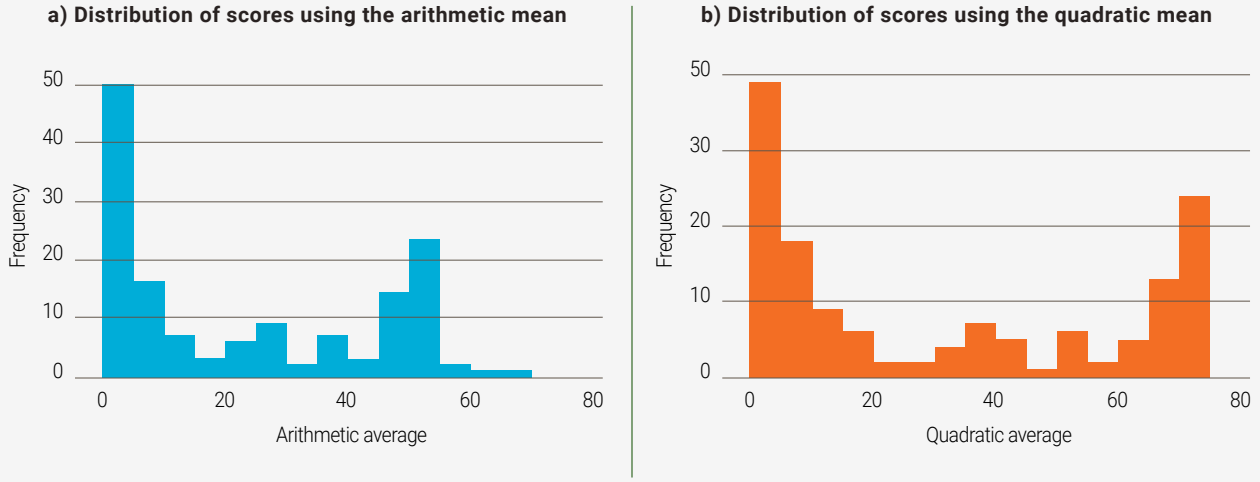
50. Most indices use linear aggregation methods based on the simple arithmetic mean of equally weighted components. This type of aggregation is easily understandable as it is computed by summing a set of observations and dividing the result by the number of observations. Importantly, this method assumes perfect substitutability between all components: a poor score in one component can be compensated by sufficiently high scores in other components. The Panel decided that the evidence was clear that this assumption does not hold in the case of vulnerability, as, for example, low social vulnerability does not correct for high vulnerability to natural hazards. The Panel therefore rejected the use of this method.

51. Other indices use a geometric mean, for example the HDI[45]. This involves multiplying a set of observations and taking the root of the product. This method does not assume substitutability. However, geometric aggregation is only possible for strictly positive data, which is a clear limitation considering that the chosen rescaling methodology (min-max) generates a value of 0 for the minimum. The panel decided that this method would therefore also not be appropriate.

52. The aggregation method chosen by the Panel was the quadratic mean or the "root mean square" (RMS), as the Panel felt that this method allowed for a good balance between simplicity and the need to highlight heterogeneous vulnerability profiles. The quadratic mean, used for each layer of aggregation, was computed in three steps: (i) each indicator was squared (to amplify the extremes); (ii) the arithmetic mean of the squared values was calculated; (iii) the square root of the result obtained in step 2 was calculated[46]. This method does not assume substitutability, although in the unlikely case where all observations are equal to the mean, the result will be the same as the arithmetic mean. It should be noted that the difference between the arithmetic and the quadratic means diminishes as the number of observations increases.

53. The example below demonstrates the benefits of using the quadratic mean for aggregation. **Figure 7** presents two possible methods of aggregating indicators of exposure to ecosystem pressure: drylands and low-elevated coastal zones. The quadratic mean has the advantage of better dealing with heterogeneous profiles by prioritizing the largest values of individual indicators (or difference between rescaled components) instead of more homogenous profiles with fewer differences between indicators. The two indicators have a very low correlation. Countries are either highly exposed to one or the other but never to both. Using a simple mean would blur their specific profiles. The quadratic mean (in orange, on the right) results in high vulnerability scores for countries with just one of the two types of vulnerabilities, compared to the arithmetic mean (in gray, on the left).

FIGURE 7. Arithmetic vs. quadratic aggregation – drylands and low-elevated coastal zones (LECZs)



d. Weighting

54. Several weighting techniques exist and have been used in the development of various international metrics. However, for simplicity's sake, and in the absence of clear theoretical justifications, equal weights are most often applied, meaning that the components of the index are given equal importance. This equal-weights approach was also applied in constructing the MVI at every layer.

CHAPTER 4

The Results

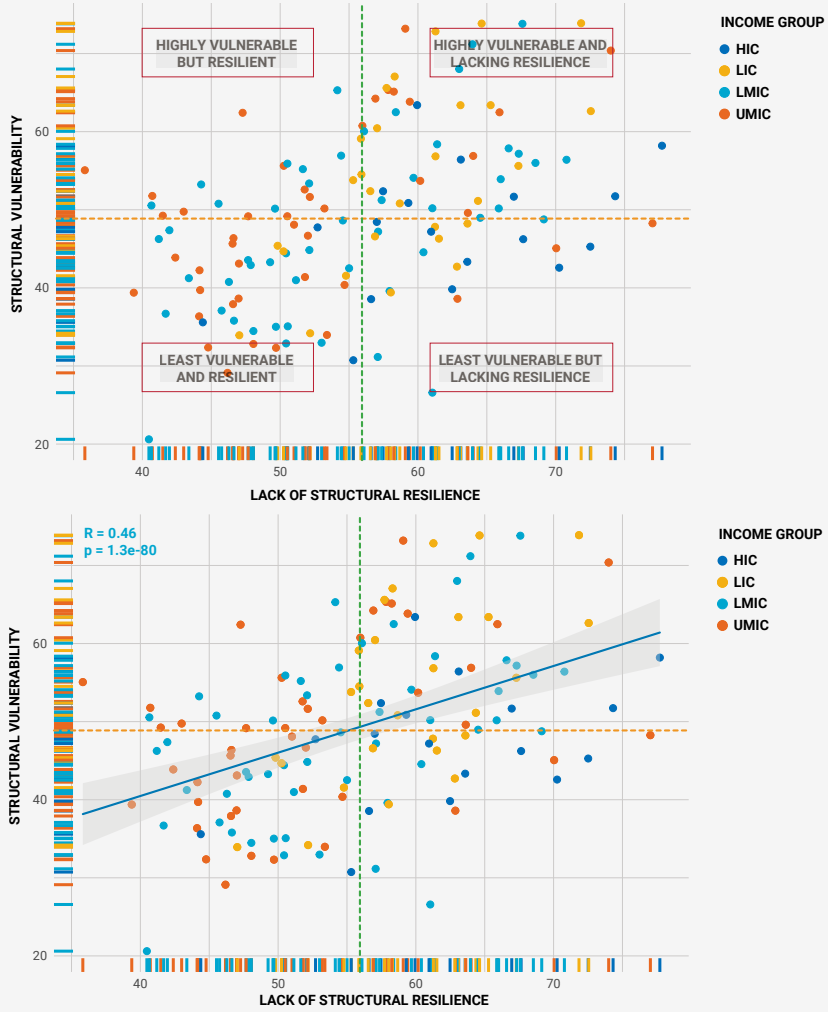
I. Validity of the Index

55. The relevance of any index depends on its intended use. Once the MVI was constructed, establishing its validity became imperative. The following criteria were considered in assessing the index's validity:

- Does the MVI generate a categorization of countries that is useful in terms of the pillars and dimensions, given country characteristics?
- Does the MVI have the capacity to effectively represent structural vulnerability and, by extension, indicate where resources could be allocated to support vulnerable countries? Recognizing that the MVI is not meant to replace useful metrics such as GNI pc, but rather act as a complementary metric, providing deeper insights into a country's developmental needs, including its financing requirements. In pursuit of this objective, any correlation with GNI pc should be avoided to prevent redundancy.
- Given that the MVI was originally proposed by the SIDS, does the index discriminate against countries based on population size?

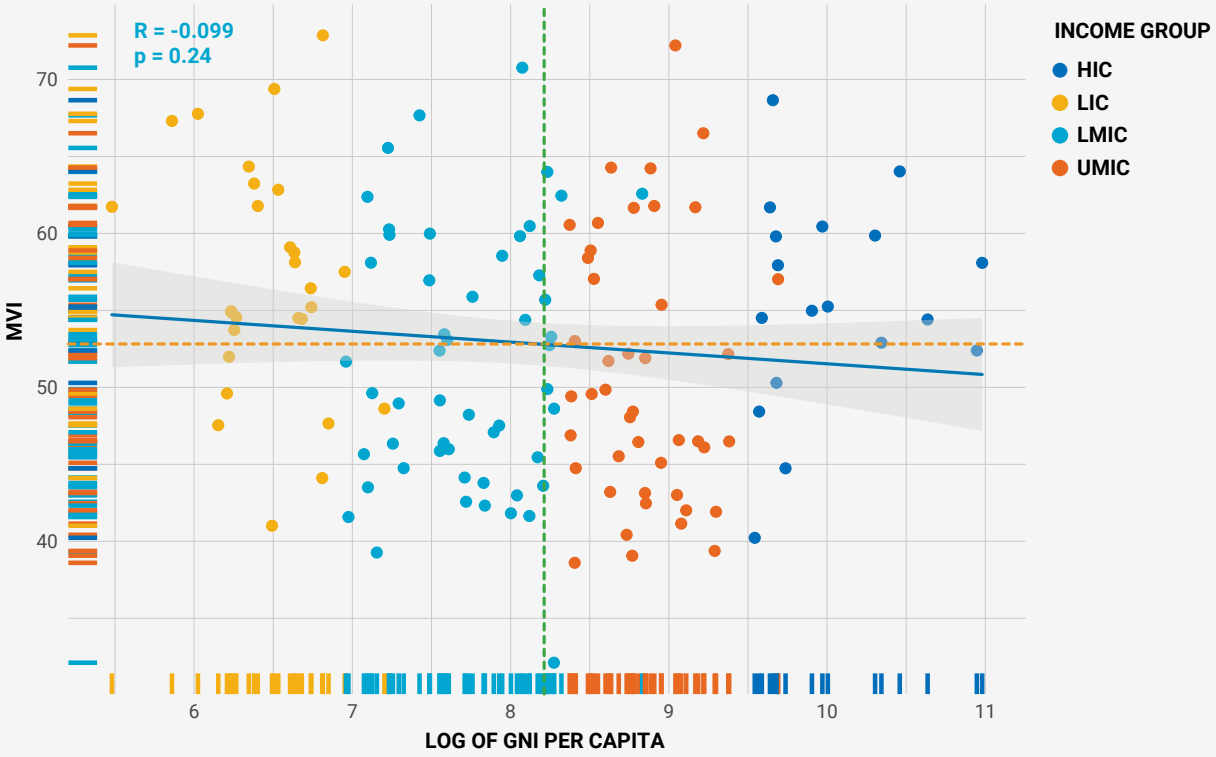
56. Results for this validity analysis are presented below in **Figure 8**.

FIGURE 8. Scatter plot of scores on vulnerability and lack of resilience



Dashed lines indicate medians for each axis.

FIGURE 9. Scatter Plot MVI / GNIpc (USD, in logarithm)[48]



Dashed lines indicate medians for each axis.

57. The scatter plots illustrate the relationship between the vulnerability and lack of resilience scores. Each quadrant in the first graph is labeled according to the magnitude of these two variables in relation to its median. The presence of distinct income groups within different quadrants suggests a weak correlation between income level and both vulnerability and lack of resilience. This is further confirmed in **Figure 9** above, where there is almost no association between income and MVI scores. The second scatter plot in **Figure 8** also shows a positive relationship (correlation) between vulnerability and lack of resilience. Countries scoring high on structural vulnerability also score high on lack of structural resilience. This is especially true for LICS as all LICs with vulnerability scores surpassing the median value also exhibit lack of resilience scores above the median. Countries in the upper right-hand quadrant, regardless of their income status, face serious constraints to development because of their vulnerability.

II. Relationship of MVI with country characteristics

58. **Table 1** in page 43 presents the MVI results classified by different country groups. Focusing on the first row, the results for all countries indicate a minimal difference between the mean and the median. This suggests that the aggregation procedures described in Chapter 3 resulted in a well-distributed MVI, despite the inclusion of a considerable number of indicators and the presence of skewness in several variables. The MVI results by country characteristics show that, on average, LDCs, LLDCs and SIDS are the most vulnerable groups, although the differences between the means of these groups are small (less than ½ of the standard deviation of the population mean).

Table 1. Summary statistics by groups

GROUPS (number of countries in parenthesis)	MVI AVERAGE BY GROUP	MVI MEDIAN BY GROUP	MVI SD BY GROUP
All developing countries	52.9	52.8	8.4
LICs (31)	56.9	55.8	7.7
LMICs (44)	51.5	49.8	8.3
UMICs (48)	50.8	48.9	8.5
HICs (19)	54.8	55.0	7.4
LDCs (46)	55.63	54.91	8.55
LLDCs (30)	53.36	52.86	7.60
SIDS (37)	56.63	57.04	6.91

59. **Table 2** further unpacks Table 1 to show how countries with above average scores are distributed by group. The bottom row of Table 2(a) shows that 63 per cent of all LDCs have above the median MVI score, while 70 per cent of all SIDS have scores above the median, indicating that these groups are more likely to be found in the upper levels of the MVI. The first column in Table 2(a) shows that the LDCs that have scores above the median have disproportionately higher scores, as 18 per cent are in the top decile of the whole distribution, and 30 per cent are in the top quintile. SIDS also show disproportionately high scores, with 13.5 per cent in the top decile and 27 per cent in the top quintile. Although MVI scores are not correlated with income, LICs are more likely to be found in the top decile as shown in Table 2(b). High income countries (HICs) are also more likely to be found in the upper ranges of the MVI scores, although not to the extent that LICs, LDCs, or SIDS are. Most of the HICs are found in the third and especially the fourth decile. Importantly, almost half of HICs with scores above the median are SIDS. This underscores the importance of measuring and addressing vulnerability even within developing countries with a relatively high national income, as this income remains consistently at risk.

Table 2. Cumulative distribution of the MVI across specific groups

	A) COUNTRY GROUPS		
	LDCS (46)	SIDS (37)	LLDC (30)
Top 10%	19.6%	13.5%	13.3%
Top 20%	30.4%	27.0%	20.0%
Top 30%	41.3%	43.2%	26.7%
Top 40%	47.8%	59.5%	36.7%
Top 50% (median)	63.0%	70.3%	50.0%

	B) INCOME GROUPS			
	LICS (28)	LMICS (52)	UMICS (44)	HICS (18)
Top 10%	17.9%	5.8%	9.1%	11.1%
Top 20%	32.1%	13.5%	20.4%	16.7%
Top 30%	42.9%	26.9%	25.0%	33.3%
Top 40%	53.6%	34.6%	31.8%	55.6%
Top 50% (median)	75.0%	42.3%	34.1%	72.2%

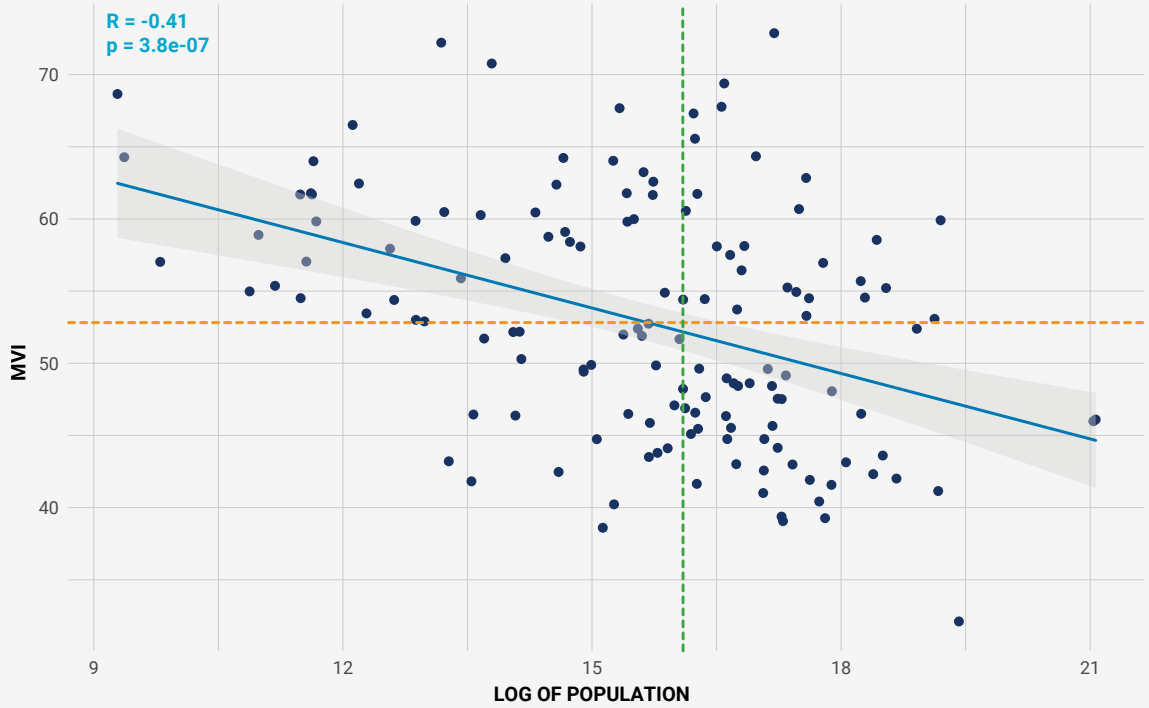
60. **Annex 3** (country scores) shows that the MVI does produce a ranking of countries according to their vulnerability. However, mirroring the results by country characteristics, the majority of countries' scores are clustered around the median, with very small (less than 5%) differences between country scores for those in the middle of the distribution. This means that most developing countries are moderately vulnerable, with important vulnerability issues to address. The MVI scores on pillars, dimensions and concepts can guide this process, as discussed in Chapter 5 below. But the bunching of scores implies that it is difficult to establish a vulnerability threshold or cutoff like the income cutoffs commonly used to allocate development aid, and probably unwise. Indeed, attempts to establish vulnerability thresholds or cutoffs could lead to the same problems encountered with the GNI pc cutoffs.

III. Relationship of MVI with population

61. **Figure 10** demonstrates the association between the MVI and the logarithm of population size. The fitted line reveals a negative correlation between the MVI and population size, indicating that smaller countries generally exhibit higher vulnerability compared to larger ones. The observed relationship between the MVI and population size aligns with the usual findings in the existing literature on vulnerability[49], thereby validating the rationale behind the special treatment often given to small states in allocating concessional finance. ***Limitations and Potential Future Development of the MVI***

62. The construction of the MVI represents an important milestone in the conceptualization and measurement of structural vulnerability. As stated, the MVI covers all developing countries, and is based on a solid, transparent methodology, with indicators drawn from reliable sources, mostly UN agencies. No data in the MVI is imputed or subjective, adding to its credibility.

FIGURE 10. Scatter Plot MVI / Population (log)[50]



Dashed lines indicate medians for each axis.

63. However, like any composite index, the MVI is not devoid of imperfections. It is important that the MVI be updated as new or more reliable data becomes available (see Chapter 6). Key issues to consider include the following.

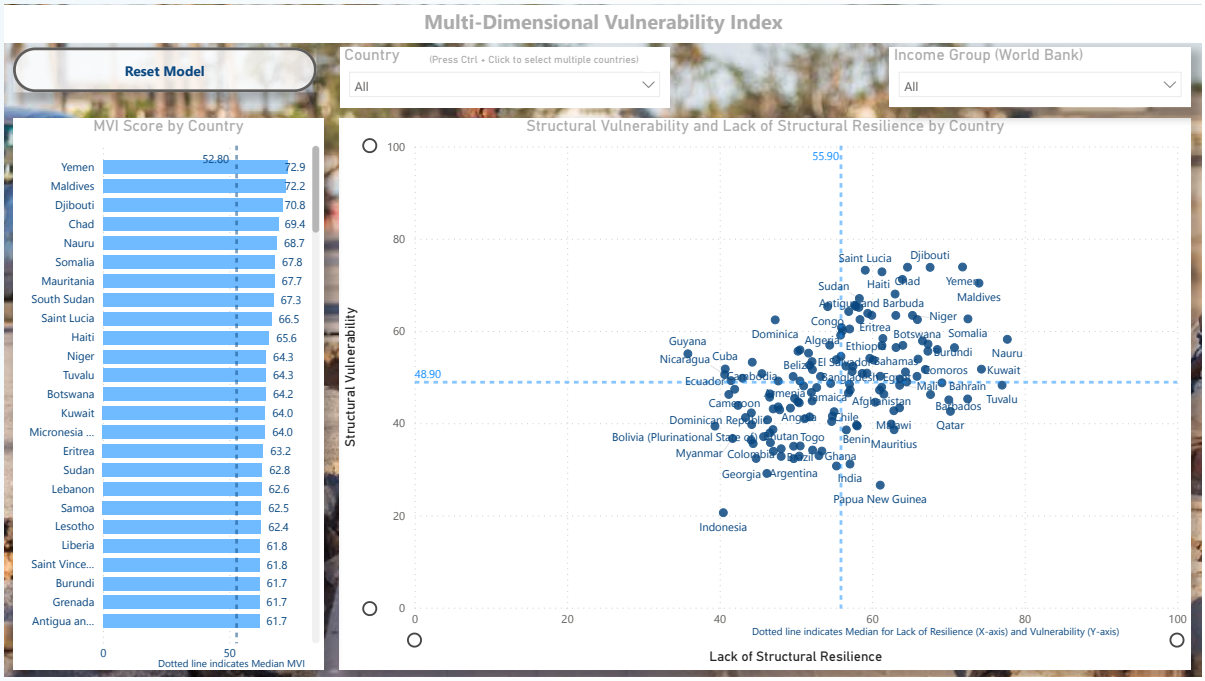
    a. MVI scores represent the past, not the future. Yet countries are becoming more vulnerable. This bias is especially strong for the measurement of environmental vulnerability. New MVI scores should be computed every year to reflect new vulnerabilities. Methodologies could be explored to reduce this source of bias.

    b. As statistical advancements occur, it is probable that new indicators will be introduced in the MVI while some existing ones may be replaced or eliminated. Three indicators were cited by the Panel for inclusion if missing data issues could be resolved: external debt service (to economic vulnerability), income inequality (to social resilience) and gender gaps in educational attainment (to social resilience). In the particular case of debt, data quality is also a challenge **(see Box 2**).

VI. MVI data visualization

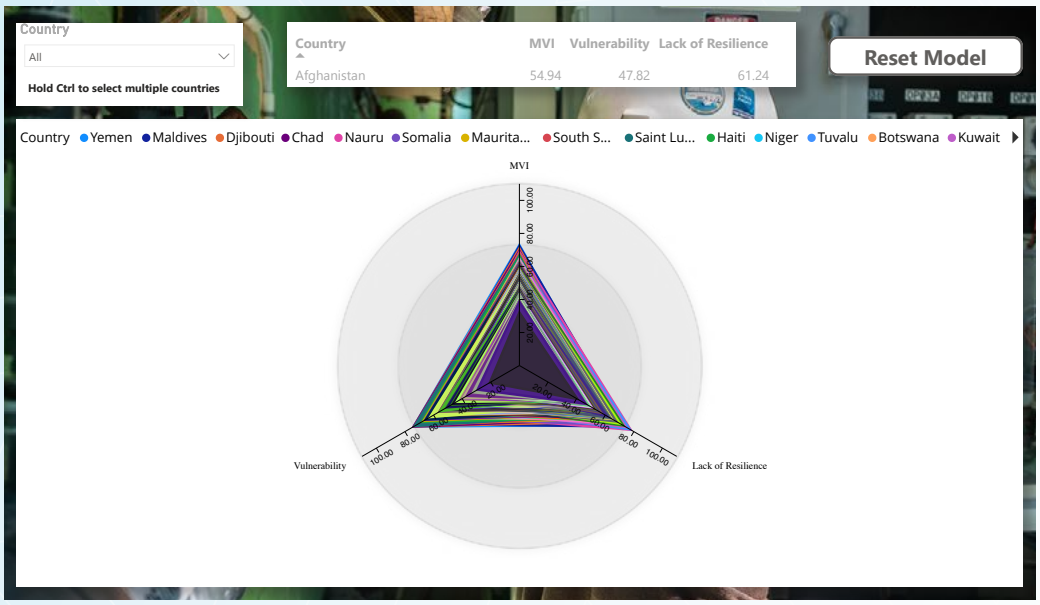
64. The MVI data visualization tool was designed to enhance understanding of the MVI data, support data exploration and analysis, aid decision-making and facilitate effective communication of the results. The tool is divided into pages, allowing users to interact with the data, manipulate variables and observe the impact on the visual representation in real-time.

65. The main landing page (**Page 1: Multi-Dimensional Vulnerability Index**) contains a bar chart showing MVI scores by country, alongside a scatter plot that charts country-by-country scores for lack of resilience (X-axis) and vulnerability (Y-axis). The bar chart displays, by default, MVI scores sorted by country from highest (most vulnerable) to lowest (least vulnerable). The scatter plot allows a visualization of the relationship between vulnerability and lack of resilience, as well as the distribution of data points between these two variables. This tool can enable data-driven decision making. For instance, in the top right-hand quadrant of the scatter plot are countries with both high vulnerability and low resilience. Countries in the lower left-hand quadrant are countries with lower vulnerability and more resilience.

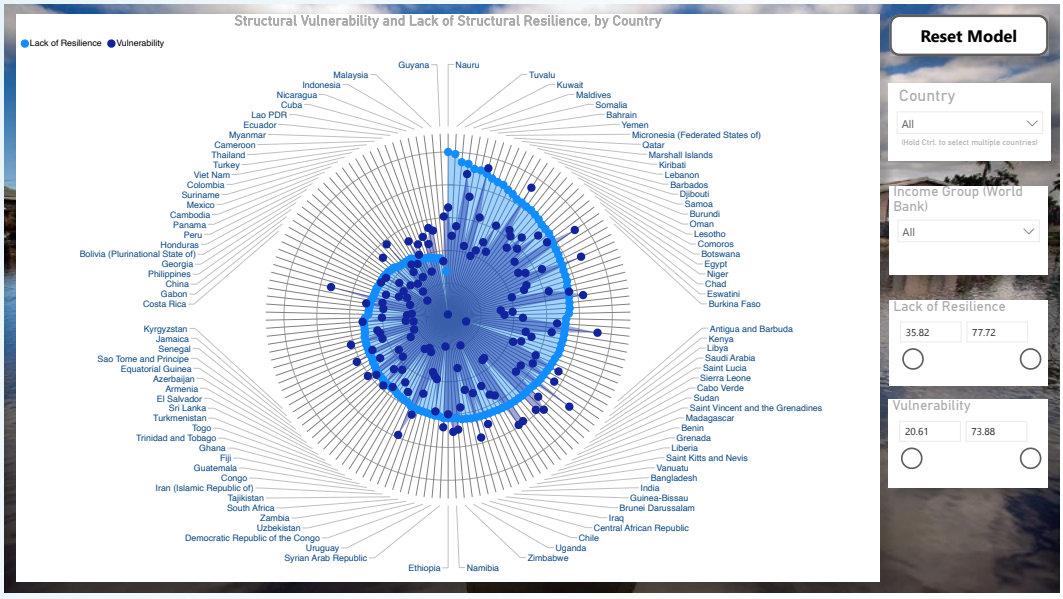


66. The scatter plot includes "zoom sliders" that enable users to examine a smaller range of data, for instance to zoom into the area of the chart where countries with the highest vulnerability and lack of resilience scores are located. Drop-down menus allow for the isolation of individual countries, groups of countries or income groups.

67. **Page 2: Individual MVI Scores by Country** provides a visualization to easily view the relationship between three variables: MVI score, structural vulnerability and lack of structural resilience. The visualization is particularly useful to quickly identify whether a country has higher structural vulnerability versus lack of structural resilience, or vice versa.

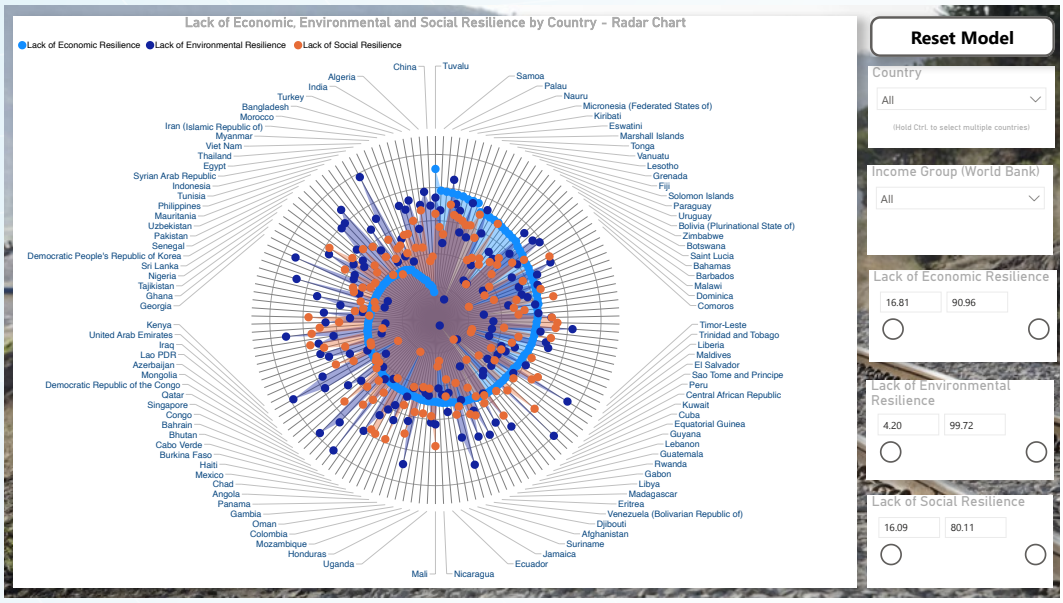


68. **Page 3: Structural Vulnerability and Lack of Structural Resilience by Country** enables an alternative visualization of the relationship between structural vulnerability and lack of structural resilience. The radar chart allows for ease of identifying countries with higher lack of structural resilience compared to structural vulnerability, such as Nauru, and vice-versa, countries with higher structural vulnerability compared to lack of structural resilience, such as Dominica.

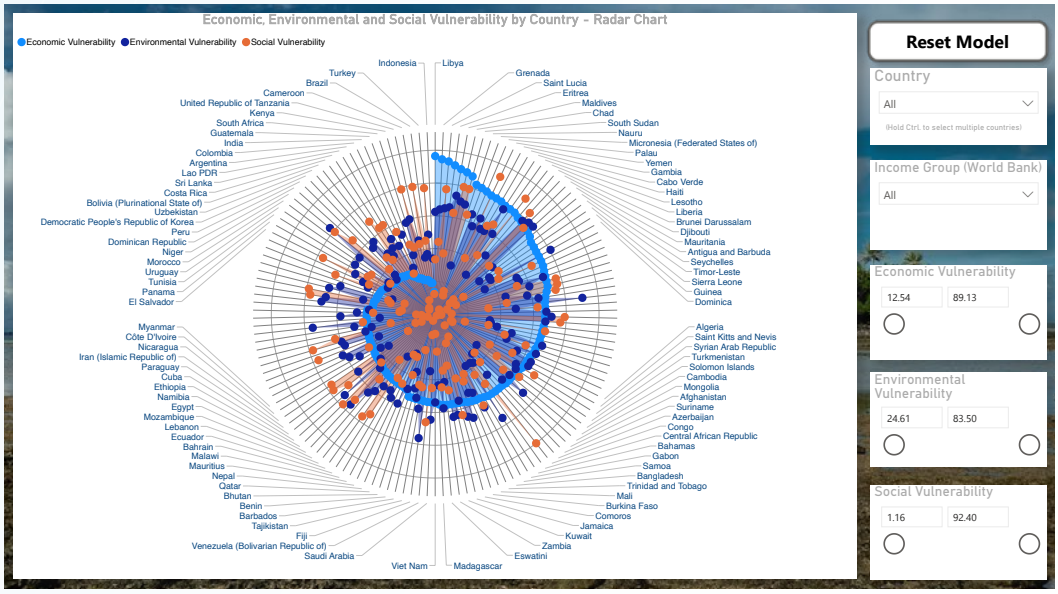


69. **Page 4: Lack of Economic, Environmental and Social Resilience by Country – Radar Chart** plots the three dimensions of structural resilience: economic resilience, environmental resilience, and social resilience. The radar chart provides the ability to visualize the relationship between the three dimensions where in some cases economic resilience is weaker than social resilience, such as Tuvalu, while in other cases, environmental resilience is weaker than economic resilience, such as in the case of Kuwait.

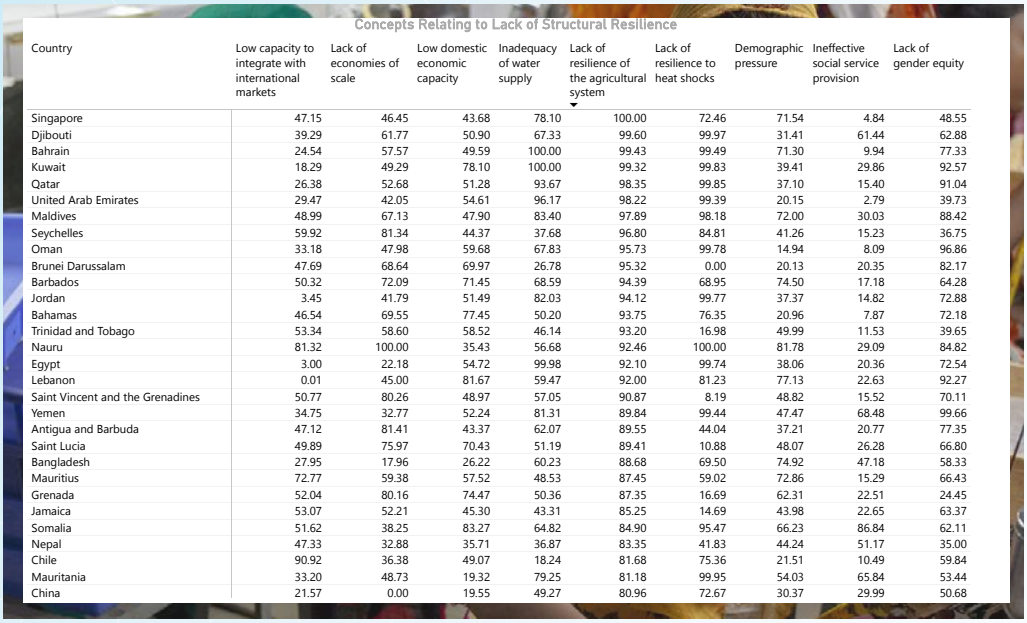
70. The visualization also enables an interpretation of the inherent strengths and capacities of countries in mitigating vulnerability and facilitating a more robust response to adverse events of an economic, environmental or social nature; or a combination of the three.



71. **Page 5: Economic, Environmental and Social Vulnerability by Country – Radar Chart** focuses on the varying relationships between the three dimensions of vulnerability: economic, environmental, and social by country. Some countries have higher economic vulnerability compared to environmental and social vulnerability, while other countries exhibit higher social vulnerability compared to their economic and environmental vulnerability.



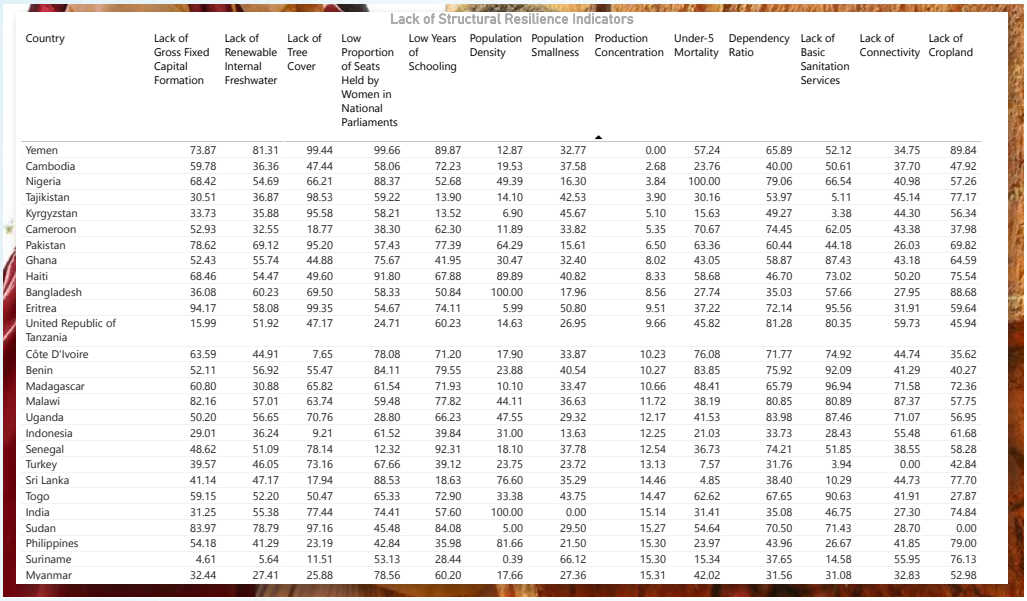
72. **Page 6: The table illustrating concepts relating to lack of structural resilience** displays the data associated with the nine concepts used to determine lack of structural resilience, ranging from low capacity to integrate with international markets, through to lack of gender equity.



Concepts Relating to Lack of Structural Resilience

Country	Low capacity to integrate with international markets	Lack of economies of scale	Low domestic economic capacity	Inadequacy of water supply	Lack of resilience of the agricultural system	Lack of resilience to heat shocks	Demographic pressure	Ineffective social service provision	Lack of gender equity
Singapore	47.15	46.45	43.68	78.10	100.00	72.46	71.54	4.84	48.55
Djibouti	39.29	61.77	50.90	67.33	99.60	99.97	31.41	61.44	62.88
Bahrain	24.54	57.57	49.59	100.00	99.43	99.49	71.30	9.94	77.33
Kuwait	18.29	49.29	78.10	100.00	99.32	99.83	39.41	29.86	92.57
Qatar	26.38	52.68	51.28	93.67	98.35	99.85	37.10	15.40	91.04
United Arab Emirates	29.47	42.05	54.61	96.17	98.22	99.39	20.15	2.79	39.73
Maldives	48.99	67.13	47.90	83.40	97.89	98.18	72.00	30.03	88.42
Seychelles	59.92	81.34	44.37	37.68	96.80	84.81	41.26	15.23	36.75
Oman	33.18	47.98	59.68	67.83	95.73	99.78	14.94	8.09	96.86
Brunei Darussalam	47.69	68.64	69.97	26.78	95.32	0.00	20.13	20.35	82.17
Barbados	50.32	72.09	71.45	68.59	94.39	68.95	74.50	17.18	64.28
Jordan	3.45	41.79	51.49	82.03	94.12	99.77	37.37	14.82	72.88
Bahamas	46.54	69.55	77.45	50.20	93.75	76.35	20.96	7.87	72.18
Trinidad and Tobago	53.34	58.60	58.52	46.14	93.20	16.98	49.99	11.53	39.65
Nauru	81.32	100.00	35.43	56.68	92.46	100.00	81.78	29.09	84.82
Egypt	3.00	22.18	54.72	99.98	92.10	99.74	38.06	20.36	72.54
Lebanon	0.01	45.00	81.67	59.47	92.00	81.23	77.13	22.63	92.27
Saint Vincent and the Grenadines	50.77	80.26	48.97	57.05	90.87	8.19	48.82	15.52	70.11
Yemen	34.75	32.77	52.24	81.31	89.84	99.44	47.47	68.48	99.66
Antigua and Barbuda	47.12	81.41	43.37	62.07	89.55	44.04	37.21	20.77	77.35
Saint Lucia	49.89	75.97	70.43	51.19	89.41	10.88	48.07	26.28	66.80
Bangladesh	27.95	17.96	26.22	60.23	88.68	69.50	74.92	47.18	58.33
Mauritius	72.77	59.38	57.52	48.53	87.45	59.02	72.86	15.29	66.43
Grenada	52.04	80.16	74.47	50.36	87.35	16.69	62.31	22.51	24.45
Jamaica	53.07	52.21	45.30	43.31	85.25	14.69	43.98	22.65	63.37
Somalia	51.62	38.25	83.27	64.82	84.90	95.47	66.23	86.84	62.11
Nepal	47.33	32.88	35.71	36.87	83.35	41.83	44.24	51.17	35.00
Chile	90.92	36.38	49.07	18.24	81.68	75.36	21.51	10.49	59.84
Mauritania	33.20	48.73	19.32	79.25	81.18	99.95	54.03	65.84	53.44
China	21.57	0.00	19.55	49.27	80.96	72.67	30.37	29.99	50.68

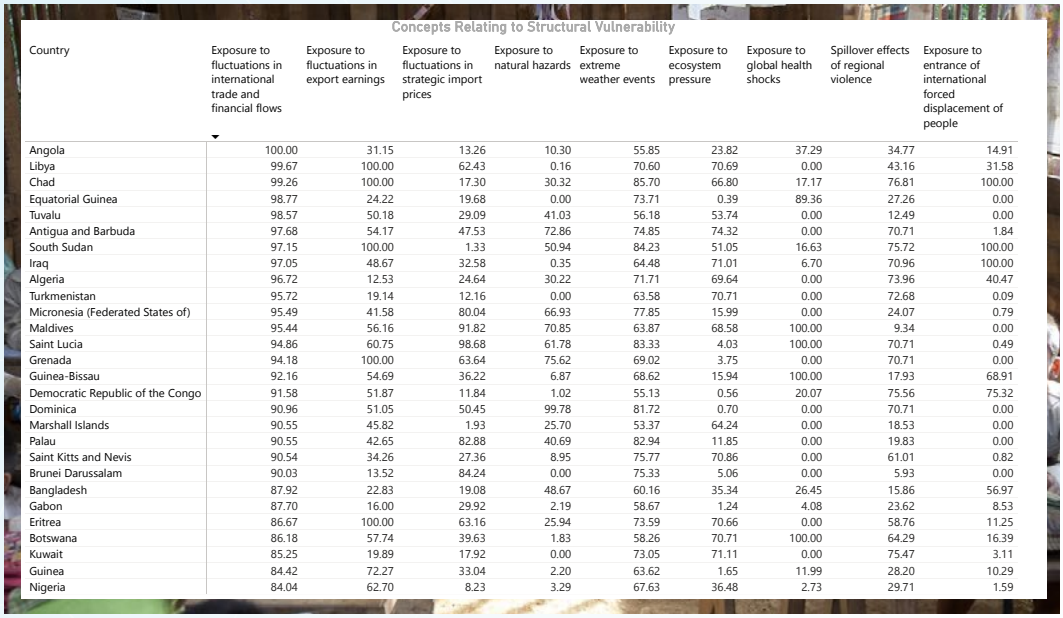
73. **Page 7: Lack of Resilience Indicators** displays the raw data for the thirteen indicators on lack of resilience, ranging from lack of gross fixed capital formation to lack of cropland. Users can sort by indicator from highest to lowest (or vice versa) to see how countries rank on the selected indicator.



Lack of Structural Resilience Indicators

Country	Lack of Gross Fixed Capital Formation	Lack of Renewable Internal Freshwater	Lack of Tree Cover	Low Proportion of Seats Held by Women in National Parliaments	Low Years of Schooling	Population Density	Population Smallness	Production Concentration	Under-5 Mortality	Dependency Ratio	Lack of Basic Sanitation Services	Lack of Connectivity	Lack of Cropland
Yemen	73.87	81.31	99.44	99.66	89.87	12.87	32.77	0.00	57.24	65.89	52.12	34.75	89.84
Cambodia	59.78	36.36	47.44	58.06	72.23	19.53	37.58	2.68	23.76	40.00	50.61	37.70	47.92
Nigeria	68.42	54.69	66.21	88.37	52.68	49.39	16.30	3.84	100.00	79.06	66.54	40.98	57.26
Tajikistan	30.51	36.87	98.53	59.22	13.90	14.10	42.53	3.90	30.16	53.97	5.11	45.14	77.17
Kyrgyzstan	33.73	35.88	95.58	58.21	13.52	6.90	45.67	5.10	15.63	49.27	3.38	44.30	56.34
Cameroon	52.93	32.55	18.77	38.30	62.30	11.89	33.82	5.35	70.67	74.45	62.05	43.38	37.98
Pakistan	78.62	69.12	95.20	57.43	77.39	64.29	15.61	6.50	63.36	60.44	44.18	26.03	69.82
Ghana	52.43	55.74	44.88	75.67	41.95	30.47	32.40	8.02	43.05	58.87	87.43	43.18	64.59
Haiti	68.46	54.47	49.60	91.80	67.88	89.89	40.82	8.33	58.68	46.70	73.02	50.20	75.54
Bangladesh	36.08	60.23	69.50	58.33	50.84	100.00	17.96	8.56	27.74	35.03	57.66	27.95	88.68
Eritrea	94.17	58.08	99.35	54.67	74.11	5.99	50.80	9.51	37.22	72.14	95.56	31.91	59.64
United Republic of Tanzania	15.99	51.92	47.17	24.71	60.23	14.63	26.95	9.66	45.82	81.28	80.35	59.73	45.94
Côte D'Ivoire	63.59	44.91	7.65	78.08	71.20	17.90	33.87	10.23	76.08	71.77	74.92	44.74	35.62
Benin	52.11	56.92	55.47	84.11	79.55	23.88	40.54	10.27	83.85	75.92	92.09	41.29	40.27
Madagascar	60.80	30.88	65.82	61.54	71.93	10.10	33.47	10.66	48.41	65.79	96.94	71.58	72.36
Malawi	82.16	57.01	63.74	59.48	77.82	44.11	36.63	11.72	38.19	80.85	80.89	87.37	57.75
Uganda	50.20	56.65	70.76	28.80	66.23	47.55	29.32	12.17	41.53	83.98	87.46	71.07	56.95
Indonesia	29.01	36.24	9.21	61.52	39.84	31.00	13.63	12.25	21.03	33.73	28.43	55.48	61.68
Senegal	48.62	51.09	78.14	12.32	92.31	18.10	37.78	12.54	36.73	74.21	51.85	38.55	58.28
Turkey	39.57	46.05	73.16	67.66	39.12	23.75	23.72	13.13	7.57	31.76	3.94	0.00	42.84
Sri Lanka	41.14	47.17	17.94	88.53	18.63	76.60	35.29	14.46	4.85	38.40	10.29	44.73	77.70
Togo	59.15	52.20	50.47	65.33	72.90	33.38	43.75	14.47	62.62	67.65	90.63	41.91	27.87
India	31.25	55.38	77.44	74.41	57.60	100.00	0.00	15.14	31.41	35.08	46.75	27.30	74.84
Sudan	83.97	78.79	97.16	45.48	84.08	5.00	29.50	15.27	54.64	70.50	71.43	28.70	0.00
Philippines	54.18	41.29	23.19	42.84	35.98	81.66	21.50	15.30	23.97	43.96	26.67	41.85	79.00
Suriname	4.61	5.64	11.51	53.13	28.44	0.39	66.12	15.30	15.34	37.65	14.58	55.95	76.13
Myanmar	32.44	27.41	25.88	78.56	60.20	17.66	27.36	15.31	42.02	31.56	31.08	32.83	52.98

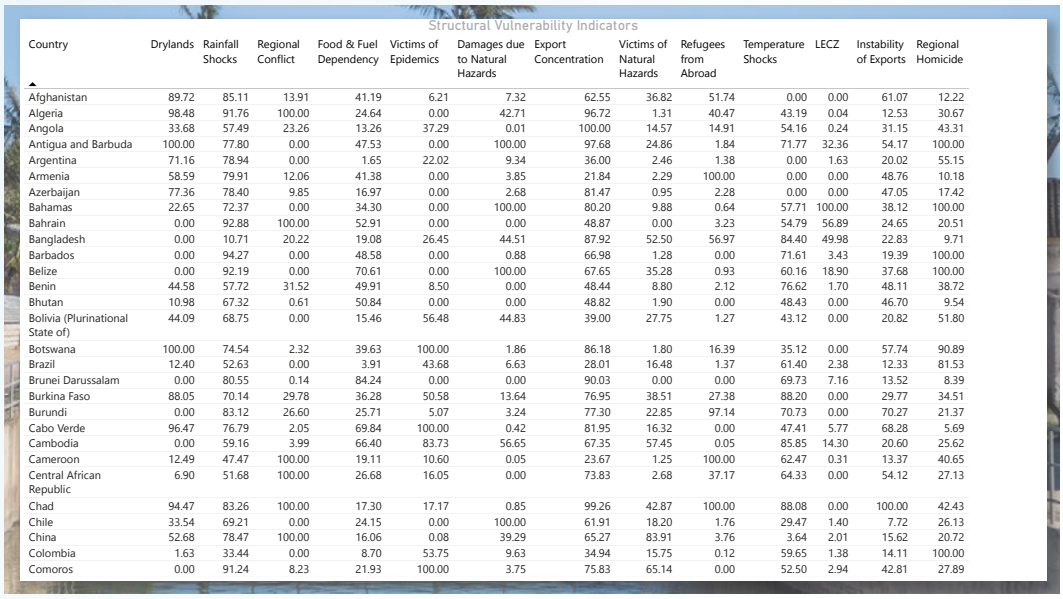
74. **Page 8: Concepts relating to structural vulnerability** displays the data related to the nine concepts used to determine structural vulnerability, ranging from exposure to fluctuations in international trade and financial flows, through to exposure to international forced displacement of people.



Concepts Relating to Structural Vulnerability

Country	Exposure to fluctuations in international trade and financial flows	Exposure to fluctuations in export earnings	Exposure to fluctuations in strategic import prices	Exposure to natural hazards	Exposure to extreme weather events	Exposure to ecosystem pressure	Exposure to global health shocks	Spillover effects of regional violence	Exposure to entrance of international forced displacement of people
Angola	100.00	31.15	13.26	10.30	55.85	23.82	37.29	34.77	14.91
Libya	99.67	100.00	62.43	0.16	70.60	70.69	0.00	43.16	31.58
Chad	99.26	100.00	17.30	30.32	85.70	66.80	17.17	76.81	100.00
Equatorial Guinea	98.77	24.22	19.68	0.00	73.71	0.39	89.36	27.26	0.00
Tuvalu	98.57	50.18	29.09	41.03	56.18	53.74	0.00	12.49	0.00
Antigua and Barbuda	97.68	54.17	47.53	72.86	74.85	74.32	0.00	70.71	1.84
South Sudan	97.15	100.00	1.33	50.94	84.23	51.05	16.63	75.72	100.00
Iraq	97.05	48.67	32.58	0.35	64.48	71.01	6.70	70.96	100.00
Algeria	96.72	12.53	24.64	30.22	71.71	69.64	0.00	73.96	40.47
Turkmenistan	95.72	19.14	12.16	0.00	63.58	70.71	0.00	72.68	0.09
Micronesia (Federated States of)	95.49	41.58	80.04	66.93	77.85	15.99	0.00	24.07	0.79
Maldives	95.44	56.16	91.82	70.85	63.87	68.58	100.00	9.34	0.00
Saint Lucia	94.86	60.75	98.68	61.78	83.33	4.03	100.00	70.71	0.49
Grenada	94.18	100.00	63.64	75.62	69.02	3.75	0.00	70.71	0.00
Guinea-Bissau	92.16	54.69	36.22	6.87	68.62	15.94	100.00	17.93	68.91
Democratic Republic of the Congo	91.58	51.87	11.84	1.02	55.13	0.56	20.07	75.56	75.32
Dominica	90.96	51.05	50.45	99.78	81.72	0.70	0.00	70.71	0.00
Marshall Islands	90.55	45.82	1.93	25.70	53.37	64.24	0.00	18.53	0.00
Palau	90.55	42.65	82.88	40.69	82.94	11.85	0.00	19.83	0.00
Saint Kitts and Nevis	90.54	34.26	27.36	8.95	75.77	70.86	0.00	61.01	0.82
Brunei Darussalam	90.03	13.52	84.24	0.00	75.33	5.06	0.00	5.93	0.00
Bangladesh	87.92	22.83	19.08	48.67	60.16	35.34	26.45	15.86	56.97
Gabon	87.70	16.00	29.92	2.19	58.67	1.24	4.08	23.62	8.53
Eritrea	86.67	100.00	63.16	25.94	73.59	70.66	0.00	58.76	11.25
Botswana	86.18	57.74	39.63	1.83	58.26	70.71	100.00	64.29	16.39
Kuwait	85.25	19.89	17.92	0.00	73.05	71.11	0.00	75.47	3.11
Guinea	84.42	72.27	33.04	2.20	63.62	1.65	11.99	28.20	10.29
Nigeria	84.04	62.70	8.23	3.29	67.63	36.48	2.73	29.71	1.59

75. **Page 9: Vulnerability indicators** displays the raw data for the thirteen indicators for vulnerability, ranging from drylands to regional homicide. Users can sort by indicator from highest to lowest (or vice versa) to see how countries rank on the selected indicator.



Structural Vulnerability Indicators

Country	Drylands	Rainfall Shocks	Regional Conflict	Food & Fuel Dependency	Victims of Epidemics	Damages due to Natural Hazards	Export Concentration	Victims of Natural Hazards	Refugees from Abroad	Temperature Shocks	LECZ	Instability of Exports	Regional Homicide
Afghanistan	89.72	85.11	13.91	41.19	6.21	7.32	62.55	36.82	51.74	0.00	0.00	61.07	12.22
Algeria	98.48	91.76	100.00	24.64	0.00	42.71	96.72	1.31	40.47	43.19	0.04	12.53	30.67
Angola	33.68	57.49	23.26	13.26	37.29	0.01	100.00	14.57	14.91	54.16	0.24	31.15	43.31
Antigua and Barbuda	100.00	77.80	0.00	47.53	0.00	100.00	97.68	24.86	1.84	71.77	32.36	54.17	100.00
Argentina	71.16	78.94	0.00	1.65	22.02	9.34	36.00	2.46	1.38	0.00	1.63	20.02	55.15
Armenia	58.59	79.91	12.06	41.38	0.00	3.85	21.84	2.29	100.00	0.00	0.00	48.76	10.18
Azerbaijan	77.36	78.40	9.85	16.97	0.00	2.68	81.47	0.95	2.28	0.00	0.00	47.05	17.42
Bahamas	22.65	72.37	0.00	34.30	0.00	100.00	80.20	9.88	0.64	57.71	100.00	38.12	100.00
Bahrain	0.00	92.88	100.00	52.91	0.00	0.00	48.87	0.00	3.23	54.79	56.89	24.65	20.51
Bangladesh	0.00	10.71	20.22	19.08	26.45	44.51	87.92	52.50	56.97	84.40	49.98	22.83	9.71
Barbados	0.00	94.27	0.00	48.58	0.00	0.88	66.98	1.28	0.00	71.61	3.43	19.39	100.00
Belize	0.00	92.19	0.00	70.61	0.00	100.00	67.65	35.28	0.93	60.16	18.90	37.68	100.00
Benin	44.58	57.72	31.52	49.91	8.50	0.00	48.44	8.80	2.12	76.62	1.70	48.11	38.72
Bhutan	10.98	67.32	0.61	50.84	0.00	0.00	48.82	1.90	0.00	48.43	0.00	46.70	9.54
Bolivia (Plurinational State of)	44.09	68.75	0.00	15.46	56.48	44.83	39.00	27.75	1.27	43.12	0.00	20.82	51.80
Botswana	100.00	74.54	2.32	39.63	100.00	1.86	86.18	1.80	16.39	35.12	0.00	57.74	90.89
Brazil	12.40	52.63	0.00	3.91	43.68	6.63	28.01	16.48	1.37	61.40	2.38	12.33	81.53
Brunei Darussalam	0.00	80.55	0.14	84.24	0.00	0.00	90.03	0.00	0.00	69.73	7.16	13.52	8.39
Burkina Faso	88.05	70.14	29.78	36.28	50.58	13.64	76.95	38.51	27.38	88.20	0.00	29.77	34.51
Burundi	0.00	83.12	26.60	25.71	5.07	3.24	77.30	22.85	97.14	70.73	0.00	70.27	21.37
Cabo Verde	96.47	76.79	2.05	69.84	100.00	0.42	81.95	16.32	0.00	47.41	5.77	68.28	5.69
Cambodia	0.00	59.16	3.99	66.40	83.73	56.65	67.35	57.45	0.05	85.85	14.30	20.60	25.62
Cameroon	12.49	47.47	100.00	19.11	10.60	0.05	23.67	1.25	100.00	62.47	0.31	13.37	40.65
Central African Republic	6.90	51.68	100.00	26.68	16.05	0.00	73.83	2.68	37.17	64.33	0.00	54.12	27.13
Chad	94.47	83.26	100.00	17.30	17.17	0.85	99.26	42.87	100.00	88.08	0.00	100.00	42.43
Chile	33.54	69.21	0.00	24.15	0.00	100.00	61.91	18.20	1.76	29.47	1.40	7.72	26.13
China	52.68	78.47	100.00	16.06	0.08	39.29	65.27	83.91	3.76	3.64	2.01	15.62	20.72
Colombia	1.63	33.44	0.00	8.70	53.75	9.63	34.94	15.75	0.12	59.65	1.38	14.11	100.00
Comoros	0.00	91.24	8.23	21.93	100.00	3.75	75.83	65.14	0.00	52.50	2.94	42.81	27.89

CHAPTER 5

The Vulnerability-Resilience Country Profiles

I. Introduction

76. The VRCP are the second element in the MVI structure, and are intended to complement the MVI assessment and can be used by vulnerable countries to provide granularity and greater characterization of country-specific vulnerability and resilience factors. Linking the VRCP to the MVI acknowledges the variety of country contexts behind similar levels of vulnerability and identifies country-specific pathways to close the vulnerability-resilience gap.

II. The VRCP and its objectives

77. The objective of the VRCP is to provide a detailed breakdown of a country's vulnerability and resilience conditions at national level, to enable the identification of priority, integrated and costed interventions for resilience building. The VRCP is not intended to be a standalone product and should enhance, inform and contribute to the formulation, implementation, and monitoring cycle of National Development Plans (NDPs), Integrated National Financing Frameworks (INFFs) and Voluntary National Reviews (VNRs). Moreover, it can also provide a framework for managing and channeling international assistance to ensure that countries can better manage their vulnerabilities and build resilience to sustain progress and achieve irreversible gains.

78. In effect, the VRCP is the means through which countries transition from quantitative assessments of their vulnerability, toward the formulation of appropriate policies. This, in turn, facilitates the selection and prioritization of investments that are required to promote development objectives while also strengthening the country's internal resilience capacity. The VRCP not only functions as an assessment tool, but a tool to deploy policies within a coherent, consistent framework that can be monitored. This provides a pathway to aligning the country's current position with its envisioned state, according to national sustainable development goals.

79. The detailed vulnerability and resilience characterization is driven by an "extended dashboard" of indicators that are based on national priorities and available data. The extended dashboard provides a platform for monitoring and analysis. It enables a country to quickly identify trends and to use them to make data-driven decisions, including on where development resources could be better targeted to build resilience and deliver results. The extended dashboard may include indicators that are structural or non-structural and may reflect both vulnerability and/or resilience conditions. To properly characterize important national vulnerability and resilience conditions, the extended dashboard could incorporate indicators taken from various sources, including but not limited to the 5 key thematic areas outlined below. While this list is not exhaustive, it covers areas that could complement the MVI indicators, by capturing issues that are not currently considered in the global MVI index but are important to further contextualize a country's particular situation.

    - **Productive capacities indicators** (for example, advancing digitalization; leveraging knowledge creation; economic diversification)
    - **Social indicators** (for example, building human resources capacity; health care; social protection; labour; gender equality)
    - **Environmental indicators** (for example, climate change adaptation; promoting sustainable energy; environmental sustainability)

- **Institutional indicators** (for example, property rights and rule-based governance; quality of public administrations and public institutions; quality of budgeting and financial management)
- **Financial indicators** (for example, diversified financing ecosystem; strong regulatory environment; debt issues)

80. By tracking these areas, and through the development of actionable road maps, the VRCP could provide entry points for IFIs and other development partners complementing national efforts towards resilience building, including through smarter and better targeted resource allocations. Further work on the identification of a broad set of possible indicators for the dashboard as well as inter alia guidance for the development of the developing the VRCPs, could be advanced by the Secretariat identified as part of the governance arrangements for the MVI.

III. Guiding principles for the development and use of the VRCP

81. The VRCPs will be of high relevance to governments if developed through an inclusive, participatory, transparent and thorough process of consultation at national and sub-national levels. If designed as a direct input to national planning and budgeting processes, VRCPs can help ensure that countries better address their vulnerabilities and build resilience to sustain progress and achieve irreversible gains aligned with national development plans.

82. The following principles should guide their development and use:

- VRCP development should be country-led and strictly voluntary.
- Development of the VRCP should reinforce, and contribute to existing national development planning processes, particularly the formulation of NDPs, INFFs and VNRs. To the extent possible, VRCP development processes should be integrated into existing national consultative and decision-making mechanisms, taking a 'whole of government' approach. This will ensure national programmatic coherence and ownership, economies of scale and the placement of vulnerability analysis and resilience building at the core of these processes. The monitoring and evaluation of the VRCP should not be a stand-alone process and should be fully embedded in the country's existing monitoring and evaluation mechanisms under the framework of the implementation of its NDPs, and the SDGs.
- The VRCP should consider different national realities, capacities, levels of development as well as policy space and priorities.
- The VRCP should maintain a medium to long term perspective, in line with long-term national development plans. It should facilitate the use of a system thinking approach to resilience building, which fosters policy coherence and allows a country to identify, in an integrated manner, entry points where investments would have the greatest impact.
- The VRCP should be based on evidence, informed by country-led evaluations and data which is of the highest-quality, available, accessible, timely, reliable and disaggregated by income, sex, age, race, ethnicity, migration status, disability, geographic location and other characteristics relevant in national contexts.
- The VRCP should allow for the consideration of structural and non-structural (including policy-induced) indicators as well as quantitative and qualitative indicators of vulnerability and resilience.

83. Guided by these principles, the VRCP should be able to facilitate actions to address national vulnerability and build resilience through: risk-informed national, bilateral and multilateral cooperation policies; evidence-based partnership development; smarter resource allocations and strategic donor alignment to national priorities; design of innovative financing mechanisms and approaches to debt restructuring.

IV. Coordination and methodology

84. To ensure the effective roll out of the VRCP, a team dedicated to supporting national efforts should be established within the MVI Secretariat. The work of the VRCP team should be guided by the Independent MVI Advisory Review Panel (see Chapter 6) and by the availability of resources, mobilized from all sources to support global coordination on the VRCP and to the extent possible/practical, national implementation.

85. Guidance for developing a VRCP should be developed into a VRCP handbook.[51] The production of a VRCP handbook could be delegated to the custodian body of the MVI as an early output. The VRCP handbook could also provide a standard structure for VRCP formulation in order to ensure consistency and comparability between VRCPs.

CHAPTER 6

Proposed Governance Arrangements for the MVI

I. Introduction

86. Presenting evidence-based recommendations on *"the most appropriate governance arrangements for the MVI, including modalities for the publication of MVI results and procedures for reviewing and/or revising the MVI and its components"* were the second deliverable articulated in the Panel's Terms of Reference.

87. To help inform their work and to assist in the formulation of recommendation(s) on the most appropriate governance arrangements for the MVI, the Panel conducted broad consultations with relevant UN organizations and other entities currently responsible for the upkeep and monitoring of existing indices, to ascertain best practices.

88. In this regard, the following entities were consulted:

- The United Nations Development Programme (UNDP), which is responsible for the Human Development Index (HDI) and Multidimensional Poverty Index (MPI);
- The ECOSOC's Committee on Development Policy (CDP) which is the custodian for LDC graduation criteria;
- The Organization for Economic Co-operation and Development (OECD), custodian for the Multi-dimensional Fragility Framework;
- World Bank on its Human Capital Index; and
- UNCTAD on its Productive Capacity Index (PCI.)

89. The Panel took note of mandates, organizational structures, numerical composition and budgetary arrangements of the entities, as well as the duration of service of their personnel, reporting channels, appointing authorities, roles and functions, including capacity support initiatives, and the nature of their relationships with Member States and with the office of the UN Secretary-General and other stakeholders.

II. Analysis and Findings

90. Several common practices were identified, which the Panel used as the basis of its recommendations on possible custodial arrangements for the MVI framework, including:

i. All Indices had *very clear objective(s) or purpose(s), with* clearly identified factors to be measured, including outcomes and results that target identified specific issue(s).

ii. Most had *very clear and well-defined organizational structure(s),* featuring a two-layered organizational arrangement: the first layer comprising a salaried secretariat responsible, *among others*, for the upkeep, maintenance and preparation of reports on the indices, and the second layer comprising an independent, non-salaried expert panel, responsible for overseeing and making strategic decisions relating to the review of the indices.

iii. All entities had *clear channels of communication* and a credible *line of reporting* between and among personnel in the respective layers of their organizational structures, including with their external stakeholders.

iv. All entities had *competent and qualified personnel* or groups of individuals tasked with *specific responsibilities* in each of the layers of their organizational structure. Some of these personnel were salaried staff members of the institutions consulted, while others served in their independent personal capacity, without remuneration.

v. All entities had *clear lines of reporting or consultation mechanisms with Member States.* Some were mandated to periodically submit reports, while others do so as part of their internal periodic reporting cycle requirements.

vi. All entities had specific *capacity development components* in their work programme.

vii. All organizations acknowledged the importance and sacredness of data, its availability, reliability and transparency in facilitating and enhancing the credibility of their index.

91. Any decision by member States, on the most appropriate governance arrangements for the MVI framework should therefore be guided by the following principles:

i. **Independence,** which relates to the independent function(s) and role(s) of the custodian body responsible for the upkeep, maintenance and preparation of reporting on the MVI.

ii. **Transparency** in the mandate(s), structure, work modalities, channels of communication and lines of reporting of the custodian body(ies) created to monitor, maintain and review the MVI. The transparency principle also applies to the sources of data used in the MVI and their validation, aggregation, reporting and review.

iii. **Functionality,** which refers to the custodian body's ability to ensure the MVI is updated and remains fit for purpose. Elements such as the ability of this custodian body to positively influence the uptake of the MVI from all stakeholders both within and outside of the UN system, should be considered by Member States in their identification of the custodian body of the MVI.

iv. **Accountability** of the custodian body and its personnel to their respective organization's mandate(s), role(s) and function(s), as well as accountability to the appointing authority and to Member States.

v. **Sustainability** refers to the need to secure the provision of adequate, predictable and reliable resources to ensure continuous support for the independent monitoring, review, maintenance ,and reporting of the MVI.

III. Recommendations

92. The following are recommended as essential to the formulation of an effective governance arrangement for the proposed MVI framework:

i. The MVI would be best governed, served and maintained if co-located (for administrative purposes), in a UN entity or department;

ii. The Governance arrangement should consist of:

a. an ***MVI Secretariat***, with similar arrangements to those employed by the CDP Secretariat (UNDESA) or the UNDP HDRO; and

b. an ***Independent MVI Advisory Review Panel***, mirroring the arrangements adopted by UNCTAD's PCI High Level Advisory Body, the UNDP's Statistical Advisory Board (SAB) and/or by the ECOSOC's CDP.

93. The functions of the ***MVI Secretariat*** could include *inter alia*: (i) *operational issues*, for example index construction and maintenance (ii) *analytical/substantive issues*, for example index revisions and improvement (iii) *Secretariat support services* and (iv) *capacity building*, including to support the development of VRCPs.

94. The functions of the **Independent MVI Advisory Review** Panel could include, *inter alia*, making technical and strategic decisions on MVI related matters such as, methods of calculation, issues surrounding variables, concepts, aggregation techniques, additional indicators to be included in the MVI and periodicity of reporting etc. The Review Panel could also consider, endorse and/or agree on any MVI results prepared by the MVI Secretariat, and on the modalities for their publication and dissemination.

95. Appointments of competent and qualified personnel to serve in the **MVI Secretariat** and their appropriate numerical composition is best left to the UN body or department decided by member States to be administratively responsible for housing the MVI Secretariat, in accordance with its recruitment policy. For example, in the case of personnel serving in the CDP Secretariat, staff members are appointed by the Under-Secretary-General for UN DESA under delegated authority from the UN Secretary-General.

96. It is recommended that members of the **Independent MVI Advisory Review Panel** are to be identified and nominated by the UN Secretary-General, in consultation with interested Member States. Appointment of nominees are to be approved by the UN General Assembly. It is further recommended that the Assembly, at the outset, determine the Panel's numerical composition, duration of service of the Panel members and other appropriate criteria for qualification, including gender and geographical representation.

97. On budgetary related matters, **the MVI Secretariat**, would be the only body attracting substantive budgetary implications. Experts serving in the **Independent MVI Review Panel** are recommended to do so in their personal capacity, without remuneration. However, it should be noted that in the case of in-person meetings, commensurate resources will be required to facilitate travel of Panel members.

98. On reporting, it is further recommended that reports on the MVI and on the work of its governing body are to be submitted to the UN General Assembly, under an appropriate agenda item and at intervals to be decided by member States. It is worth noting that all entities consulted by the Panel submit reports at prescribed intervals, some on an annual basis and others, biennial.

CHAPTER 7

Uses of the MVI

99. While the specific use of the MVI will depend on stakeholder needs, the UN Secretary-General in Para 84-85 of A/76/211 recommended several possible uses:

- To facilitate action to address vulnerability and build in-country resilience through the development of evidence-based policies and partnerships;
- To facilitate evidence-based, targeted and effective support and smarter resource allocations;
- To complement performance-based allocation models, allowing the use of a vulnerability component;
- To support and guide the design of innovative financing mechanisms and act as a vehicle for providing exemptions or wider eligibility with regard to the rules governing access to development and concessional financing;
- To serve as an advocacy tool to promote the principle of leaving no one behind;
- To serve as a tool for monitoring, evaluating and measuring vulnerability and relevant policies;
- To support and guide the formulation of country vulnerability resilience profiles;
- To be used for evidence-based decision-making and the development of smarter, risk-informed national, bilateral and multilateral cooperation policies;
- To inform UN in-country engagement and to support the preparation of country graduation strategies;
- To serve as a tool to inform approaches to debt restructuring, to act as a vehicle to extend eligibility for comprehensive debt treatment and to allow exceptional eligibility for vulnerable States.

100. The MVI's potential use for development support, including concessional finance and debt sustainability, is key. For example, the MVI could serve as a tool to inform approaches to debt restructuring, act as a vehicle to extend eligibility for comprehensive debt treatment and allow exceptional eligibility for vulnerable States. In this regard, the 2021 ECOSOC Forum on Financing for Development Follow-up, acknowledged the work of the UN General Assembly on the possible development of an index and tasked the Inter-Agency Task Force on Financing for Sustainable Development (IATF) to include in its 2022 report an analysis of the potential use of the index for debt restructuring, with the aim of building credit worthiness and expanding access to financing, including concessional financing.

101. The 2022 IATF report[52] suggested, *inter alia*, that high vulnerability affects a country's capacity to service debt, and that a country's ability to service debt may vary and fall unexpectedly following shocks. This becomes particularly crucial in an age of growing systemic risks and more frequent and severe natural hazards. The MVI, by reflecting elevated risks of future shocks and their impacts in one indicator, would present a comprehensive measure. High levels of vulnerability captured by an MVI could also play a significant role in determining the appropriate level of debt relief necessary for restoring sustainability in the context of debt restructuring.

102. Considering vulnerability as a component of eligibility for accessing development assistance, encompassing concessional finance and ODA, along with its distribution, could lead to more equitable and effective allocation, by addressing the reality that different forms of structural vulnerability hinder sustainable development. Research over the past two decades has shown that aid has a higher marginal effectiveness in situations of vulnerability, as it mitigates shocks.[53]

103. Additionally, the UN Development System (UNDS) should use the MVI to prioritize resource allocation to countries deemed most vulnerable.

CHAPTER 8

Recommendations and Conclusions

104. Securing consensus behind the MVI framework is of critical importance, as this will be the first step in galvanizing action toward its use. The international community has advocated for the inclusion of vulnerability in determining eligibility for development assistance, including concessional finance, ODA and debt relief, and the MVI is a credible complement to current approaches. It is also a relevant input to the preparatory process of the fourth International Conference on Small Island Developing States and other internationally agreed conferences, processes and meetings.

105. To advance the MVI and ensure the momentum continues, the Panel makes the following recommendations in three categories:

I. Advancing the MVI in the UN General Assembly

i. The MVI framework proposed in this report, should be adopted by the UN General Assembly and should be the basis for any possible further work to improve the framework (if needed).

ii. On the proposed custodian arrangements for the MVI framework, an *MVI Secretariat* and an *Independent MVI Advisory Review Panel* should be established, co-located for administrative purposes, in a UN entity or department. A decision on the role, function and personnel arrangements should be taken by Member States, guided, among others, by the Panel's recommended guiding principles and by any procedural guidance offered by the UN Secretary-General. It should also be informed by the examples provided and lessons learnt from the Panel's consultations with relevant UN and other entities currently responsible for the upkeep and monitoring of existing indices.

iii. While discussions on the custodian arrangements are ongoing, an interim secretariat should be appointed to take forward the work. In this regard, UNDESA and UN-OHRLLS, within their respective mandates and within existing resources, should continue as interim secretariat for the MVI.

iv. The VRCP should be pilot tested in a set of developing countries with different contexts and features.

v. The UN system should begin to mainstream vulnerability and resilience, in a more systematic manner, into UN programs at global, regional and national levels. The MVI could be used to better tailor theories of change, improve country programs and to support resilience building policies and initiatives in-country.

II. Advancing the MVI in the international community

i. Strategic planning and funding for resilience building needs to be scaled-up to support vulnerable countries. A stronger focus on ex-ante strategies is needed, as the business case for a preventive rather than curative approach is clear. Considering vulnerability in the international development cooperation frameworks of development partners is a critical aspect of their effectiveness.

ii. The MDBs should be further encouraged to pilot test the MVI. The Panel notes that on 21 June 2023, the Caribbean Development Bank's Board of Directors endorsed the formation of a technical working committee, drawn from the Bank's membership, to advance work on the MVI, with a view to reviewing the Bank's framework guiding the allocation of its concessional finance. The Panel further notes that at the Summit for a New Financing Pact, which took place on 22-23 June 2023, MDBs

committed to "…explore eligibility to concessional finance for the most vulnerable countries with a multidimensional approach to vulnerability, encompassing economic, environmental, and social dimensions. To facilitate cooperation, MDBs could explore a common definition of vulnerability, taking into account the United Nations workstream in that regard, and could develop common guidelines for the targeted use of concessional finance to address vulnerabilities."[54] The IFIs should also be encouraged to explore how the MVI could be incorporated into their existing policies and practices.

iii. The OECD DAC should be encouraged to consider how the MVI and related concepts of vulnerability and resilience could be incorporated into the governance framework for ODA eligibility and graduation, to complement World Bank income data. This could improve the sustainability of graduation and reduce the risk of reinstatement once graduation has occurred.

III. Capacity building needs

i. The magnitude of the data challenge in developing countries, in particular SIDS, is alarming. The international community should reflect further on how to address the data challenges and needs of developing countries that will be required to ensure the proper use of the MVI. There is a need for meaningful partnerships to assist with strengthening the capacities of national statistical institutions and for appropriate support to improve data collection and statistical analysis, including high-quality and disaggregated data. Improved statistical systems will also be key to the successful development and use of the VRCP, and for national planning purposes.

ii. Work should begin on the development of an appropriate debt indicator that could be considered in the MVI. However, the success of this will depend on the extent to which there are rapid improvements in the quality and reporting of debt data. The UN statistical commission could play a key role in advancing this discussion.

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Annexes 1: Indicators

Indicator #1

Merchandise and services export concentration

I. Intuitive appeal

The indicator measures the degree of a country's susceptibility to adverse impact of external economic shocks through the channels of the export volumes, prices and terms of trade. It reflects a country's exposure to trade shocks resulting from a concentrated export structure. A particular shock to a country's exporting markets is likely to cause a large swing in the country's export volume and terms of trade (i.e., the ratio of the export and import prices) if the country's exports are concentrated on a few merchandise and service sectors.

- Export revenue supports (i) import capacity (terms of trade effect), (ii) fiscal balance, because developing country governments tend to rely on export taxes (e.g., mineral rents and tourism taxes), and (iii) external debt service (because developing countries need to rely on external capital).
- The more diversified a country's export structure, the smaller the effect on the economy from an externally driven negative export price shock (caused by a fall in demand).
- Conversely, the less diversified a country's export structure, the more the country is exposed to a fall in demand for one of its exports and therefore the higher the damage to income, wealth, and living standards that an externally-driven export value fall can have.

II. Literature review

The indicator of merchandise and services export concentration measures the degree of the concentration of a country's exported products and services.[1] It indicates whether the large share of the country's exports rely on a small number of products and services. Export concentration tends to increase when the economy size decreases because the smaller the economic size is, the lesser the economic activity and production due to resource constraints. This is true for low income and small developing economies, including least developed countries (LDC) and small island developing states (SIDS).[2] An empirical analysis of 34 small states shows that the small states with less concentrated exports experience lower output volatility, but higher average economic growth. The finding is corroborated by another study that explores the potential linkages between export structure and economic growth and volatility in low-income countries and small states.[3] For example, a country's strong reliance on oil and gas exports is highly exposed to the risks of global oil price changes and thus its capacity to pay external debt services, especially when the external debt stock is high.[4]

An empirical study shows that service export diversification or less service export concentration reduces service export revenue instability.[5] This result holds true for different groups of countries including high-income countries, low-income countries and LDCs.UNCTAD finds that countries with more concentrated exports of goods and services experience more volatility in terms of trade, government revenues and GDP.[6] This finding is consistent with previous studies in the literature.[7,8]

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Indicator #2

Instability of exports of goods and services

I. Intuitive appeal

The instability of exports of goods and services indicator measures a country's vulnerability to fluctuations in export volume and prices caused by external economic shocks. The indicator reflects the fluctuations in export earnings. Highly volatile earnings generate fluctuations in production, employment and availability of foreign reserves, with negative consequences on economic growth and sustainable development.

- The more export earnings fluctuate, the larger the effect of variations in external demand and/or export prices on a country's economy.
- A large variation in export earnings causes higher macroeconomic instability – mainly defined as instability in national income and prices, which result in instability consumption and thus a loss of welfare.
- Instability of a country's export earnings leads to unstable economic growth by affecting the country's capacity to generate savings and investments and import goods and services.

II. Literature review

The instability of exports of goods and services indicator measures the degree of a country's instability of export earnings, which is driven by the dependence on a few exported products and services with high price volatility. Export fluctuations are likely to have a negative impact on overall economic stability and growth. An empirical analysis focusing on the Pakistani economy shows that the instability of exports of goods and services has an inverted U-shape relationship with economic growth, indicating that a higher level of export instability is likely to deter economic growth.[1] Several empirical investigations demonstrate the negative effect of exports instability of goods and services on economic growth.[2,3,4]

The instability in export of goods and services has a negative effect on private investment, as highlighted by numerous studies.[5,6,7] This is explained by the fact that the instability of export earnings prompts a country to increase its precautionary savings, which in turn reduces the export earnings available for financing domestic investments, leading to lower economic growth. Moreover, export instability is considered to have a negative social impact, as it reduces the impact of the economic growth rate on poverty reduction.[8]

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Indicator #3

Food and fuel import dependency

I. Intuitive appeal

The indicator measures a country's vulnerability to fluctuations in international fuel and food prices, or to supply disruptions. It reflects a country's exposure to shocks related to the availability and costs of food and fuel imports.

- Food and fuel are strategic and critical goods for a daily life and to a stable and productive economy.
- High dependence on strategic imports (such as food and fuel) means high exposure to shocks. These imports are characterized by low price and income elasticity of demand, and therefore have a significant impact on the importing country when import prices fluctuate.
- The less dependent a country is on food and fuel imports, the less exposed it is to external shocks and, by extension, the less significant the effect on the economy and social conditions of lower food and energy prices or supply shocks due to high global demand or low global supply, in conjunction with disrupted supply chains, trade and logistics.

II. Literature review

Food and fuel are two of the main pillars of wellbeing and sustainable development of countries. Their disruptions could have direct implications for the perspectives of people, companies, countries and the planet. Food and energy security for food and fuel import-dependent countries is largely driven by geopolitical factors that can increase their vulnerability.[1]

The ongoing conflict in Ukraine, combined with international sanctions against Russian cereal and fertilizer exports, has affected global food supply chains, dealing a fatal blow to global food security.[2] Net food-importing countries are more vulnerable to the effects of the Russian invasion because of their high dependency rate on cereal imports from Ukraine and Russia.[3] The impact of this war on the food security and welfare of cereal import-dependent countries has been highlighted in several studies.[4,5,6] The greatest impact is in Sub-Saharan Africa, particularly in terms of health indicators.[7,8]

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Indicator #4

Victims of Natural Hazards

I. Intuitive appeal

The indicator measures a country's vulnerability to natural hazards, in particular the human impact associated with these shocks. Mortality, injury, displacement or material loss from disasters has a significant human impact on society in terms of loss of life, health, economic, social and cultural assets, access to public services and infrastructure, commerce or work, and psychological consequences.

- Human beings have always faced risks and hazards, whether as individuals, communities or countries.
- These risks are more pronounced in the countries most exposed to natural shocks.
- Victims of natural hazards may experience loss of life, destruction of people's physical assets, population displacement, disruption of economic activity and reduced investment in food, education and health. These losses have a significant impact on human capital, increasing their vulnerability.

II. Literature review

Humans are the primary victims of natural hazards i.e., flood, cyclone, drought, earthquake etc. that can cause death, injury and illness. Increased number of victims negatively influences well-being, seriously hindering countries' progress on the path to sustainable development.[1] Mortality and economic losses associated with natural hazards are increasing, particularly in low- and middle-income countries.[2] The increase in risk from natural hazards is generally attributed to increased populations moving into urban and hazard-prone areas, and increased property exposure.[3] Natural hazards destroy human and physical capital, reducing both productive capacity and income directly, with usually disproportionate effects on the poor. Empirical evidence highlights the impacts of natural hazard on health (physical and psychological), loss of social capital and conflict in communities, and cultural assets.[4,5,6]

Natural hazards often result in large-scale loss of life, injury, and the spread of disease, as well as the displacement of populations, disruption of daily life, and welfare costs imposed by the destruction of material assets. As a negative wealth shock, the humanitarian effects of natural hazards are disproportionately experienced vulnerable people and countries. Potentially, the disruption of human capital represents an important channel for transmitting the transitory shock of a natural hazard to long-term economic development. Some natural hazards are associated with increased incidence of malaria, outbreaks of various waterborne diseases (including cholera, typhoid, and other diarrheal diseases), and rodent-borne diseases such as plague, Lyme disease. The adverse effects of these diseases on human capital accumulation are severe, including missed school days, loss of past investments due to death, and, in some cases, permanently reduced cognitive abilities.[7]

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Indicator #5

Damages due to natural hazards

I. Intuitive appeal

The indicator measures a country's vulnerability to natural hazards through the associated costs. It reflects the significant impact that loss and damage from natural hazards can have on a country's economy.

- Natural hazards can damage infrastructure, like roads and bridges, as well as critical sectors of the national economy, such as agriculture causing negative effects on development, productivity, economic growth, and sources of income, particularly in rural areas. The high cost of reconstruction can inhibit investment needed for strengthening resilience and reduction of vulnerabilities, as well as for sustainable development more broadly.
- The less exposed a country is to natural hazards, the fewer natural disasters it will face, and the better able it will be to protect its economy, promote social justice, encourage sustainable development and protect human rights.
- Conversely, the more a country is exposed to natural hazards, the more vulnerable it is to exogenous shocks and stressors, increasing the possibility of great distress, socially, economically and environmentally.

II. Literature review

Large sudden natural hazards such as earthquakes, tsunamis, hurricanes, and floods generate destruction on impact.[1] Loss and damage from natural hazards can have a significant impact on a country's economy, especially for small islands and less developed countries that lack effective mechanisms for early warning.[2,3] In fact, one of the main stylized facts to emerge from the academic literature on natural hazards seems to be that the poorer the country, the greater the economic and human losses associated with natural hazards.[4,5]

There is a general consensus that natural hazards induced disasters pose a threat to sustainable development. According to a report from the World Bank, the real cost of natural hazard-induced disasters to the global economy is a staggering USD 520 billion per year, with disasters pushing 26 million people into poverty every year.[6] Robust evidence from Haiti showed that the 2010 earthquake caused a significant decrease in the country's economic growth in the short term and also that such declines persisted ten years after the disaster.[7] Noy (2009) undertook another multi-country study for a panel of 109 countries for the period 1970–2003 and found that that in developing countries natural disasters have a negative impact on GDP growth of approximately 9 percent.[8] Evidence also shows that developing countries, and smaller economies, face much larger output declines following a disaster of similar relative magnitude than do developed countries or bigger economies. The (inflation corrected) economic losses of natural disasters have been increasing over the last few decades, with the number of natural disasters causing substantial losses increasing by a factor of three since the 1980s.[9]

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Indicator #6
Rainfall shocks

I. Intuitive appeal

The indicator measures a country's vulnerability to extreme weather events, through rainfall shocks. Rainfall shocks can have a severe impact on economic activity, access to water, food insecurity, and increase conflicts caused by resource scarcity. The indicator therefore represents risks from both flood and drought.

- Rainfall shocks have a negative effect on economic activity, affecting production, productivity, and unemployment, particularly in rural areas, impacting food availability and the price of food, as well as inequality and social consequences related to weather crisis and lack of resilience (displacement, migration, conflict, and violence, etc.).
- The impact is smaller in countries that are less exposed to extreme weather events and have the capacity to anticipate, react and recover from shocks.
- Conversely, the more vulnerable a country is towards rainfall shocks, the more likely to limit access to water and sanitation, health, food security, transportation, agricultural productivity, employment, household consumption, education and forced migration, therefore increasing the possibility to poverty and human rights vulnerabilities.

II. Literature review

Climate change exacerbates extreme weather events and shocks such as high intense rainfall, tropical storms, hurricanes, and flooding. These shocks not only threaten ecosystems, but also a country's social and economic development. Stefan Dercon et al. (2011)[1] state that rainfall shocks have a significant impact on population's welfare. Rainfall shocks can disrupt a country's sustainable development by impacting access to water and sanitation, health, food security, agricultural productivity, employment, household consumption, with indirect impacts on education, and forced migration.[2,3,4]

Low agricultural productivity in many sub-Saharan countries that depend on rainfed production is often attributed to rainfall shocks.[5] Rainfall variability can also affect farmers' decisions regarding the use of productivity-enhancing external inputs and impose ex ante barriers to input use, increasing the risk of crop loss, which in turn affects agricultural productivity.[6] The literature suggests that multiple pathways exist through which increases in agricultural productivity can reduce poverty, including real income changes, employment generation, rural nonfarm multiplier effects, and food price.[7,8] Rural poor and small-scale farmers particularly bear the high cost of rainfall shocks despite their limited risk-bearing capacity and high vulnerability to these risks. Rainfall shocks can also limit uptake of new farm technology.[9,10]

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Indicator #7
Temperature Shocks

I. Intuitive appeal

The indicator measures a country's vulnerability to extreme weather events, such as temperature shocks which can impact health, productivity, and sectors like agriculture, forestry, fisheries and tourism.

- Temperatures play a pivotal role in many aspects of life, both biological and physical (health, human activities such as agriculture, energy, etc.).
- Temperature shocks can have a variety of repercussions on the environment, ecosystems, human health and infrastructure, increasing the vulnerability of countries that experience them.
- Conversely, stable temperatures help to guarantee quality of life, security and environmental preservation.

II. Literature review

Empirical evidence shows that increased climate shocks correlate with increased vulnerability. *"A temperature increases of 3°C of the global climate is estimated to increase the frequency of potentially high impact natural hazard events across the world. This could render current national and local strategies for disaster risk reduction and climate change adaptation obsolete in many countries."*[1]

Temperature shocks are detrimental to economic growth through capital reduction.[2,3] These shocks can impact health and productivity, and impact sectors such as agriculture, forestry, fisheries and tourism. The negative effect of rising temperatures is felt much more strongly in poor developing countries, indicating significant future losses of wealth for these countries if nothing is done to mitigate their vulnerability. Agriculture, health and labour productivity have been frequently cited as the most important transmission channels of such impacts.[4,5]

IPCC also cites loss of species, higher food insecurity, negative health impacts and aggregate economic losses due to rising temperatures.[6] Indeed, climate change through temperature shocks will pose a real threat to food security in many countries in Africa, Asia, and Latin America. In some areas where livelihood choices are limited, decreasing crop yields threaten famines, or where loss of landmass in coastal areas is anticipated, migration might be the only solution".[7] These impacts linked to temperature shocks have, in the long term, an undeniable impact on income inequalities, on environmental degradation through the loss of biodiversity, as well as on social conflicts between different population groups competing for access to scarce resources.[8,9]

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Indicator #8

Low elevated coastal zones (LECZs)

I. Intuitive appeal

The indicator measures a country's vulnerability to marine submersions and the pressures exerted on coastal ecosystems as a result of climate change. It reflects increased exposure to sea-level rise, storm surges, ocean acidification and habitat damage such as coral bleaching.

- Climate change and rising sea levels have a variety of harmful effects in LECZs.
- Climate change will increase the risk of flooding, as well as causing other environmental damage in coastal areas.
- LECZs are highly exposed to extreme events such as flooding and storms, which impose substantial costs on coastal countries and increase their vulnerability. The faster the rate of climate change, the greater will be the risk of damage to LECZs.

II. Literature review

Climate change is very likely to affect the frequency and intensity of weather phenomena such as storms and floods, and will also lead to a rise in sea levels due to thermal expansion of the oceans and melting of mountain glaciers.[1,2,3] Sea-level rise causes flooding and coastal erosion, as well as the loss in coastal habitats that naturally protect the coastline from storm surges.[4] The loss of these habitats increases the number of people at risk.

Coastal and near-shore ecosystems, such as mangroves, are important natural barriers that protect against the increase in harmful phenomena associated with climate change.[5] Mangroves and other coastal ecosystems are not only likely to be affected by the risk of increased flooding and other hazards associated with climate change, they are also under pressure from the population expansion and coastal development that accompanies increased economic growth.[6]

The Intergovernmental Panel on Climate Change (IPCC) has estimated, with a high degree of confidence, that ecosystems and LECZs will increasingly experience adverse manifestations of climate change such as submergence, coastal flooding and coastal erosion due to sea-level rise.[7] Coastal wetland ecosystems, such as salt marshes and mangroves, are particularly at risk when they are deprived of sediment or restricted in their inland margin.[8] Their degradation removes the natural defenses of coastal communities against extreme water levels during storms.

LECZs are highly exposed to sea-level rise, which leads to saltwater intrusion and increased salinity levels in agricultural land.[9] This can reduce food production, limit access to drinking water, increase the frequency of catastrophic storms and flooding, and spread acidification.[10] LECZs are generally densely populated and economically developed, yet prone to natural hazards. Under the impact of climate change and sea level rise, LECZs which are generally densely populated and economically developed, will face serious risk issues.[11,12,13]

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Indicator #9
Drylands

I. Intuitive appeal and TOC

The indicator measures a country's vulnerability to ecosystem pressure through increased stress due to the aridity to which drylands are exposed. Drylands are regions characterized by low and variable precipitation, high evaporation rates, and often limited water availability.

- Drylands are extremely prone to drought, soil depletion and water scarcity, which endangers rural livelihoods.
- The excessive dependence of agricultural and pastoral activities on the climate: the negative effects on the productivity of these activities directly lead to food insecurity.
- The low adaptive capacity of the populations living in drylands, particularly in the least developed countries with few opportunities to benefit from technical developments such as irrigation systems.

II. Literature review

Drylands are characterized by almost permanent rainfall deficits (low and unpredictable rainfall), high insolation, high temperatures, low air humidity, and evaporation, leading to water deficits for most of the year. Due to these characteristics, those areas are low-productivity regions, where infertile soils and land degradation constrain agricultural productivity.[1,2,3]

It is now recognized that climate change will increase the vulnerability of populations in drylands. Indeed, the impacts of climate change on food production are projected to worsen after the 2050s.[4] In agriculture, the biggest crop yield declines due to climate change are likely to occur in already hot and dry regions, especially in the tropics and subtropics, as well as in the world's drylands where water scarcity is set to worsen.[5,6]

Drylands which are more sensitive to ecological threats than others, also tend to present greater vulnerability. In arid zones of Chile, Brazil and Asian countries, salinization and desertification increased, and rainfed agriculture faces higher crop losses.[7] About 10% of Ethiopia's citizens are chronically food insecure, in particular in dry areas.[8] In poor countries, rural populations have little diversification of their activities and depend for their subsistence and food security on a combination of rain-fed subsistence agriculture vulnerable to climatic conditions, pastoral livestock, and direct harvesting of natural resources.[9] Under these conditions, those living in drylands are highly exposed to food insecurity and even hunger under drought conditions. Another socioeconomic consequence is the population migration from drylands to urban areas around, with the potential to increase the high rate of urban poor.[10,11]

The intrinsic characteristics of drylands, as well as the combination of pressures coming from climate change and desertification will diminish opportunities for reducing poverty, enhancing food and nutritional security, empowering women, reducing disease burden, and improving access to water and sanitation.[12]

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Indicator #10
Victims of epidemics

I. Intuitive appeal

The indicator measures a country's vulnerability to global health shocks through the victims of epidemics. It reflects a country's susceptibility to the spread and lethality from some viruses or diseases.

- Socioeconomic characteristics such as population density, poverty, income distribution, education levels, and early childhood conditions; constitute the social determinants of health, which in turn define social vulnerability in a certain context.
- The lower the social vulnerability, the better health conditions, and health shocks such as epidemics will have less impact in a given country.
- Then, the countries with greater social vulnerability and less institutional capacity will be most affected by an epidemic or disease, represented by a greater number of victims with respect to their population; with higher social and economic costs that jeopardize their trajectory toward sustainable development.

II. Literature review

According to Mikkonen and Raphael,[1] the primary factors that shape health are living conditions. The living conditions are heterogenous between and within countries and society, shaping health inequities. Inequal distribution of income, goods, access to services, education levels, work, and leisure conditions, and homes and communities' conditions, influence health inequities and are called social determinants of health.[2]

An epidemic as a disruption on health status is also affected for these elements, O'Sullivan and Bourgoin's findings in the context of the influenza pandemic suggest that "there is a social gradient of risk based on social vulnerabilities that are likely to lead to increased exposure to the contagion, risk of basic human needs not being met, insufficient support, or inadequate treatment".[3] This relates to both socio-demographic and economic characteristics that constitute social vulnerabilities and institutional capacities.

There is important evidence about this relationship between health and social vulnerabilities in a different context and for different diseases. In Rural Liberia districts having a highest social vulnerability experienced highest levels of Ebola virus disease. Stanturf and others[4] developed a Social Vulnerability Classification considering income, ability to meet material needs, health, education, nutrition, security, and vulnerability indicators. In Indonesia, the tropical temperature, high population density in the urban area, and various geographic and biodiversity challenges due to climate change increase the country's vulnerability to the spread of Dengue fever (2012).[5] In Colombia Tropics factors such as coverage problems and surveillance in health care, demographic aspect, socio-economic problems, and lack of preventive measures were determinant in the rate of infection of the Chikunguya.[6] In Brazil, socioeconomic vulnerability[7] has affected the course of the COVID-19 epidemic rather than population age structure, health status, and prevalence of health risk factors.[8]

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Indicator #11

Regional conflict

I. Intuitive appeal

The indicator measures a country's vulnerability to spillover effects of regional violence, through conflicts. It reflects a country's exposure to the presence of conflicts among its neighbors.

- Armed conflict can have profound and devastating consequences for society (humanitarian crises, social fragmentation), the economy (loss of wealth, macroeconomic instability, destruction of infrastructure) and individuals (loss of life, forced displacement, human rights violations).
- Countries whose neighbors are experiencing conflict are more vulnerable than others, due to the porous nature of their borders. The threat of conflict regionalization makes it difficult for them to envisage stable and sustainable development.
- Conversely, countries with peaceful neighbors can look forward to regional integration and sustainable development projects with their neighbors.

II. Literature review

The impact of conflict, and civil war in particular, on development is profound. Conflict creates a development gap between countries that have experienced armed conflict and those that have not.[1] According to Collier (1999)[2], this occurs through five mechanisms: the destruction of resources, the disruption of social order, the detour of public spending, "dissaving" and the movement of assets out of the country. Several studies confirm that conflicts exacerbate poverty and hunger[3,4] are detrimental for education[5], increase child mortality[6], impede access to adequate water and sanitation facilities[7], contribute to macroeconomic instability[8].

Regional conflict related death conflates several dimensions of countries vulnerability to conflict spillover. Regional conflicts have been associated with a variety of detrimental impacts on human security and development and represent a crucial vector of societal vulnerability. Murdoch and Sandler (2002) took the important step of recognising the likely importance of spillover effects on neighbouring countries, considering directly contiguous countries (e.g. those sharing a border).[9] Several historical examples illustrate how regional conflicts can increase a country's exposure to fragility and vulnerability.

The Syrian conflict, which began in 2011, had a devastating impact on the country's economy and social fabric. It has also had repercussions on neighboring countries, notably Lebanon, Jordan and Turkey, which have had to cope with large numbers of refugees and other economic and social disruptions.[10,11] The Rwandan genocide in 1994 had repercussions on neighboring countries, notably the Democratic Republic of Congo, which experienced a major conflict and humanitarian crisis.[12,13] The civil war in Liberia, which lasted from 1989 to 2003, led to massive destruction of infrastructure, population displacement and disruption of trade and investment. The conflict also had repercussions on neighboring countries, notably Sierra Leone, which experienced a major conflict and humanitarian crisis in the 1990s.[14,15]

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Indicator #12
Regional homicide

I. Intuitive appeal

The indicator measures a country's vulnerability to the spillover effects of regional violence, through homicide. It reflects a country's exposure to transnational or cross-border criminality.

- Homicide can have far-reaching consequences for a country, affecting various aspects of social, economic and political life. They lead to loss of life, insecurity, political instability, forced displacement of populations and economic instability by discouraging investment.
- Countries whose neighbors have a high level of crime (particularly homicide) are more vulnerable than others, due to the porosity of the borders. The threat of organized crime hampers their chances of achieving stable, sustainable development.
- Conversely, countries whose neighbors have low crime rates can benefit from regional integration and sustainable development projects with their neighbors.

II. Literature review

Crime, particularly homicide, is becoming a widespread phenomenon, with direct consequences for both the society and the economy of states in this situation. The consequences and costs of crime, violence and lack of security are often impossible to quantify. In developed countries, the damage represents around 5% of GDP, while in developing countries it can reach up to 14% of GDP.[1] In countries with high homicide rates, public resources cannot be allocated to productive activities such as healthcare and education, but are instead diverted to improving security and the law and order situation.[2,3]

Some studies point to the contagion effect of neighborhoods in the rise of crime. The border between Colombia and Venezuela has played a crucial role in the Colombian armed conflict and the illegal economies that fuel the war and crime, including homicides.[4,5] Most studies on the Latin American region point to illegal border crossings, which increase homicide rates in the region.[6] Zhou et al (2023)[7] show that, in addition to political issues, a number of social (gender-based violence), economic (unemployment) and legal (forced illicit activities) problems are prevalent in this border region. Mutually effective measures and policy actions are recommended to governments to improve border security issues, strengthen economic activities and mitigate social losses with their attendant vulnerabilities.

One of the common problems facing the countries of Southern Africa is crime, both within and beyond their borders.[8] Cross-border crime is facilitated by their common borders, which are often long and open, by the affinity of their peoples, by improved road, rail, air and sea transport systems, and by the resulting intense traffic of people and goods between common borders.[9,10]

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Indicator #13

Refugees from abroad

I. Intuitive appeal

- The indicator measures a country's vulnerability to increased stress due to externally forced displacement of people. Refugees are often in a particularly vulnerable situation due to the precarious living conditions their status implies. They face inequalities and socio-economic gaps compared to the host country's population. The host communities may also be negatively affected due to increased demand on basic social services leading to problems in the delivery of such services. In addition, the presence of a refugee population increases the supply in labor markets, affects the prices of commodities, and can stress environmental and natural resources.
- These factors can also exacerbate social conflicts, discrimination, and inequalities in host communities.
- It follows that the countries with a larger share of refugees face higher negative impacts on their socioeconomic conditions, increasing their social vulnerability not only in the refugee population but in the host country population too, a condition that could jeopardize their sustainable development. The intensity of impacts depends on the duration of the stay in the host country.

II. Literature review

The refugee population often has less favorable living conditions than the average population in the host country and in some contexts present high levels of crowding households, informal tented settlements, inadequate access to basic social services, high levels of poverty, and stigma, among others[1,2,3]; characteristics related to social vulnerability.

Especially in developing countries, refugees may compete with local citizens for scarce resources such as water, food, housing, and medical services. Their presence increases the demand for education, health services, infrastructure such as water supply, sanitation, and transportation, and also in some cases, for natural resources such as grazing and firewood.[4,5,6]

These economic and social impacts can be both positive or negative, but in the short term these impacts may cause stress in the labor market, affect the price of commodities in host markets, especially food prices[7]; generate local trade, conflicts[8] due to cultural differences; and environmental impacts that can cause a health threat to both refugee population and host country population[9].

Nevertheless, studies suggest that the impacts of the refugee population on host countries are complex and context-specific. There may also be positive contributions that the refugee population can make to their host communities, such as bringing valuable skills, experiences and perspectives that can improve the social, cultural and economic tissue of their new environment.[10,11]

European Union findings[12] suggest that, to be successful, external assistance for refugees must target both refugees and host populations, and based on needs and rights, in order to reduce social vulnerability.

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Indicator #14
Low connectivity

I. Intuitive appeal

The indicator measures a country's lack of economic resilience as a result of high transport costs for the goods, services and financing needed for recovery.

- A country's proximity to world markets can have a number of advantages for its economy and growth. It gives access to a wide range of customers and suppliers, reduces transport costs, shortens delivery times, and attracts foreign investment.
- Countries close to global markets have a strong capacity to connect to the world, with huge intrinsic advantages. Farmers, manufacturers, and other producers can quickly export goods with maritime transit connections to significant markets.
- By contrast, countries far from world markets face high transport costs and information asymmetries, making investment in resilience more costly. Moreover, when an environmental or social shock occurs, it is harder and more costly for these countries to get the supplies needed to cope. As a result, recovery from shocks is delayed.

II. Literature review

Transport connectivity facilitates a nation's integration with international markets and resilience building. When transport connectivity is efficient, costs decrease and exports increase.[1,2]

Low connectivity from major markets and trading partners keeps economies relatively isolated and increases the cost of shipping intermediate inputs which generates additional cost pressures for producers, prompting them to charge higher prices to domestic consumers.[3,4] High prices for goods and services can pose major challenges to a country's economic stability and its ability to withstand adverse shocks.[5] It reduces the purchasing power of a country's currency. This means that people's savings and incomes may be lower, resulting in a lower standard of living. This erosion of purchasing power can make it harder for individuals and companies to cope with economic shocks.[6,7]

Countries far from major economic centers may find it harder to access global markets to export their products or attract foreign investment.[8] Clark, et al. (2004)[9] show that transport costs are a greater obstacle than import taxes for most Latin American countries trading with the United States. This limits their ability to stimulate their economy, and in turn their capacity to recover from external shocks.[10,11]

Many remote countries depend on global supply chains to obtain essential supplies.[12] When a shock occurs, it can disrupt supply and make it more difficult to get needed supplies into these countries, thus slowing down their recovery process.[13,14]

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Indicator #15

Small population size

I. Intuitive appeal

The indicator measures the country's inherent low capacity as a result of the small size of the domestic market and the absence of economies of scale. The smaller the country, the less resilient it is to shocks and stressors as all shocks become covariate.

II. Literature review

The small size of the population implies a narrow domestic market, which poses major economic disadvantages, notably the limited ability to exploit economies of scale.[1] This poses problems of indivisibility in terms of expenses associated with small-scale operations. Indeed, a small population increases input costs and exacerbates diseconomies of scale in the creation of public institutions and the provision of public goods and services, such as education, justice, social services and infrastructure.[2] Thus, with higher public sector running costs, there is less fiscal space to cope with a shock.[3]

Becker (2012)[4] shows that current public spending as a percentage of GDP is generally higher in microstates (where the small population is an inherent characteristic) than in all other groups of countries. For countries with small populations, this generates an unsound fiscal condition that does not provide policy-makers with the room for manoeuvre they need to ensure rapid recovery from the impact of shocks on the national economy.[5,6] Indeed, as all shocks are co-variable, there is no way to spread the costs of recovery in these countries.[7,8]

Economies with large market sizes can better withstand the adverse effects of external shocks and recover faster.[9] The absence of economies of scale, inherent to small market size, contributes to a deterioration in both efficiency and productivity, making a country less responsive and less equipped to absorb economic shocks, as it is difficult to quickly adjust production and resource allocation. Moreover, the absence of economies of scale implies a loss of resources that cannot be reinvested in building resilience, for example by creating financial reserves, improving infrastructure and strengthening social safety nets that make it easier to withstand external shocks.[10,11]

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Indicator #16

Low gross fixed capital formation

I. Intuitive appeal

The indicator measures a country's low capacity to cope with shocks, due to its low capital accumulation. It indirectly reflects a country's low level of savings and asset accumulation. The lower the gross fixed capital formation, the less resilient the country is to shocks and stressors.

- GFCF as a percentage of GDP reflects the investment made in fixed assets, including infrastructure, machinery, and technology, as well as changes in inventory levels. These investments contribute to expanding the productive capacity of a country and enhancing its resilience.
- GFCF is an indirect measure of savings, and higher savings rate provides resilience against all shocks. Countries with a high savings rate also possess the ability to rebuild and recover damaged or lost assets more rapidly.
- GFCF is an indirect measure of asset quality. Better quality assets increase economies' capacity to respond more effectively to shocks and stresses.

II. Literature review

GFCF, as a proportion of GDP, is an indirect indicator of the extent to which an economy is building up reserves that would enable it to cope with the effects of shocks. From this point of view, the indicator of low gross fixed capital formation is a source of lack of resilience.[1]

GFCF as a percentage of GDP is an essential element to resilience building within a country.[2,3] It indicates the extent to which an economy is building buffers which would enable it to cope with the effects of shocks.[4]

GFCF that reflects saving and accumulating assets help to build up emergency funds.[5,6] These funds serve as a financial cushion when unforeseen events (such as natural hazards) occur and money needs to be spent.[7,8] During economic downturns or financial difficulties, they can also be used to meet essential needs without recourse to debt, acting as a self-financing mechanism. In this way, the absence of savings and the accumulation of assets reinforce countries' inability to resist and absorb economic shocks more effectively, and contribute to financial insecurity and a lack of long-term economic resilience to uncertainties.[9,10]

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Indicator #17

Production concentration

I. Intuitive appeal

The indicator measures a country's low capacity to withstand, absorb, recover from, or minimize the adverse effects of shocks or stressors owing to fewer products or types of products produced domestically and thus more concentrated risk.

- In economics, diversifying production sources, supply chains, and product portfolios can enhance resilience by reducing dependence on a single product, sector or market.
- Lack of diversification can hinder long-term economic stability. Economic diversification is essential for risk mitigation and ensuring sustainable economic growth, as it reduces dependence on a single or a few sectors.
- A highly concentrated economy is less resilient to external shocks. If the dominant sectors face a downturn or disruption, the entire economy can be significantly affected.

II. Literature review

Production diversification is a strategy that involves expanding the range of products or services offered by a country within its existing market or entering new markets.[1] This approach aims to reduce dependency on a single product or market, spreading the risk across multiple sectors.[2] This is particularly important if the demand for a specific product or service is highly volatile or susceptible to economic downturns.[3]

Countries whose production is reliant on just a few products or sectors are less resilient to declining demand for a particular product.[4] If a product runs into difficulties, few options are open to the country. This concentration of production can contribute to more unstable income flows.[5] Such instability makes financial planning difficult, and increases the impact of market fluctuations on the country's overall financial performance.

Diversification between products or sectors can help mitigate the impact of imported economic cycles.[6,7] Sectors often have different sensitivities to economic conditions, and diversified production can offset downturns in specific sectors.[8]

Production diversification can act as a buffer, helping to mitigate the impact of a slowdown in one sector by relying on the strength of others, but more importantly by absorbing part of the shock and preventing a systemic economic crisis.[9,10] The cascading effect on the economy as a whole is limited when a shock affects a single product or sector. Lack of production diversification limits a country's capacity to respond effectively to economic disruption and minimize its impact.[11,12]

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Indicator #18

Low gross fixed capital formation

I. Intuitive appeal

The indicator measures the inadequacy of a country's internal renewable freshwater supplies (river flow and groundwater from precipitation). Countries with insufficient internal renewable freshwater resources per capita are less able to meet the water demands of their population, agriculture and industry. They also face the challenge of maintaining healthy ecosystems during shocks and stressors such as droughts and floods, which limit water supply or affect water quality.

- Renewable internal freshwater resources such as internal riverflows and groundwater are part of the natural capital of a country and constitutes strategic reserves with important services.
- Countries with higher levels of renewable internal freshwater resources per capita are better able to meet the water demands of their population, agriculture, and industry, while also maintaining healthy ecosystems, during shocks such as droughts, floods, that limits water supply or affects its quality.
- Then, countries with higher levels of renewable freshwater resource have more natural capital which enables their capacity to response better during shocks, reducing the impacts on food security, health, biodiversity, among others, key for sustainable development.

II. Literature review

Freshwater resources are natural resource assets with important provisioning functions for humans such a domestic, industrial, agricultural, hydroelectric and transport functions; and global functions related to regulatory, cultural, and supporting services.[1] Regulatory services refer to maintenance of water quality, buffering of flood flows, erosion control through water /land interactions; cultural services refer to recreation, tourism, existence values; and supporting services are the role in nutrient cycling and predatory prey relationships and ecosystem resilience.[2]

These functions and services are key to sustainable development, and if the quantity and quality of freshwater are irreversibly impacted, freshwater resources and the global functions they provide for future generations are threatened.[3] Their inadequacy therefore implies a lack of resilience for a country.

The loss of freshwater ecosystems can have significant impacts on ecosystem service related to climate mitigation[4], which represent the benefits that ecosystems provide to resist, absorb, adapt, transform, and recover from diverse shocks building resilience. Some of these important services are carbon sequestration, food security, water regulation, and climate adaptation.[5,6,7]

It states that if the freshwater cycle is manipulated, the resilience of terrestrial and aquatic ecosystems may be compromised, given the impact on biodiversity, food and health security and ecological functioning, such as habitat provision, fisheries, carbon sequestration and climate regulation.[8] Freshwater ecosystems such as wetlands store more than twice as much carbon as the world's forests[9], having a direct impact on the ability of a system at risk to absorb and recover from the damaging effects that emissions can have. On the other hand, pollution affecting freshwater ecosystems, like rivers, such as rivers, has repercussions on riparian ecosystems, leading to a loss of biodiversity and a reduction in food resources and carbon sequestration capacity.[10]

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Indicator #19

Lack of cropland

I. Intuitive appeal

The indicator measures the lack of a country's agricultural system resilience through the shortage of arable land, which can delay recovery from a shock through its impact on food security, agricultural productivity and production. A shortage of arable land can also have long-term repercussions on soil degradation and provoke civil conflict between communities (e.g., between herders and farmers). The indicator reflects an indirect measure of arable land.

- Croplands improve food security, particularly in regions facing problems in providing people with sufficient and affordable quantities of food.
- Cropland expansion, deforestation, biodiversity loss, and land degradation will be mitigated if nations implement efficient mapping of croplands and improved agricultural production techniques, such as improved cropland management, to increase yield without further depleting soil and water resources.
- Croplands can contribute to ecosystem services, including climate regulation, if nations implement crop rotation, perennial crops, Voluntary Sustainability Standards, and a Land Degradation Neutrality strategy.

II. Literature review

Agriculture and food security require cultivated land. Agricultural production must be increased and improved to ensure global food security and nutrition to meet population growth and dietary changes in many fast-growing regions of the world.[1] Improved agricultural production techniques include better cropland management to increase yields without further depleting soil and water resources, and efficient cropland mapping.[2,3] Both small- and large-scale farming are needed to increase productivity and produce sufficient food to nourish the world's poor. Interest in cropland is increasing due to rising food and fuel prices and food security concerns, among other factors; working with larger-scale farming systems is one of many tools to promote sustainable agricultural and rural development as well as being able to directly support local communities and smallholder productivity.[4]

The agricultural sector is the most important area for voluntary sustainability standards (VSS), a potentially transformative tool for governments to meet their sustainability commitments. For Africa to simultaneously achieve food security and climate stabilization, it will be particularly important to "leapfrog" conventional approaches through VSS in order to protect remaining natural ecosystems and forests. In turn, this protection may provide an incentive to increase yields on existing cropland.[5]

Permanent cropland, including perennial woody vegetation in orchards, vineyards and agroforestry systems, can store a significant amount of carbon in long-lived biomass, depending on species and cultivar type, density, growth rates and harvesting and pruning practices. Soil carbon stocks can be significant, and changes in stocks can occur in conjunction with soil properties and management practices, including crop type and rotation, tillage, drainage, residue management and organic amendments.[6] Given its multiple benefits, including improved food production, soil carbon sequestration and the conservation of existing soil carbon stocks are crucial mitigation strategies for achieving the Paris Climate Agreement's global 2°C target.[7] Improved agricultural and soil conservation practices increase resilience by improving fertility and water-holding capacity, facilitating adaptation.[8,9]

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Indicator #20

Low tree cover

I. Intuitive appeal

The indicator measures a country's lack of resilience to thermal shocks due to low forest cover. Forests and trees help improve water quality and quantity, reduce soil erosion and provide shade to mitigate thermal shocks. Trees and forests absorb and store carbon dioxide and support terrestrial biodiversity. The more forest area (both as a total and per capita) a country has, the better it will be able to withstand environmental shocks.

- Forests provide water, secure livelihoods, mitigate climate change and are essential for biodiversity, climate regulation, sustainable food production.
- Countries with less forest area lack resilience to exogenous environmental shocks and stressors, such as extreme weather events.
- The absence of forests means the absence of this natural buffer between extreme weather conditions and population centers. It weakens the natural defenses they provide against extreme weather conditions, exposing human populations to an increased risk of floods, landslides, extreme temperatures and other climate-related events. The conservation and sustainable management of forests are essential to maintain the delicate balance between ecosystems and the well-being of the environment and populations.

II. Literature review

Forests supply water, provide livelihoods, mitigate climate change and are essential for sustainable food production.[1] Tree cover (or forest area) is naturally endowed and varies across countries, geographies and regions. While 1/3 of the land area on Earth is covered by forests, just 5 countries contain over 50% of the world's forest area. Trees and forests help reduce erosion thereby helping to keep soil areas intact and providing environmental resilience in the face of extreme weather events.[2,3]

Trees and forests also absorb carbon dioxide, one of the main greenhouse gases responsible for climate change and global warming.[4,5] Consequently, more forests and trees mean more carbon is absorbed from the atmosphere, helping to mitigate the impact of GHG emissions and slow the impact of climate change. This contributes to the creation of environmental resilience. Similarly, tree cover mitigates the impact of climate change by lowering temperature levels and reducing the impact of extreme weather conditions in affected areas, thus achieving several objectives including carbon absorption and reducing the impact of extreme weather events that the higher carbon concentrations in the atmosphere generate.[6,7,8]

A study of semi-arid lands in West Africa showed that increasing tree cover in these areas to a moderate level increased groundwater recharge, creating more sustainable water resources.[9] According to a study carried out in 21 African countries, increased tree cover is associated with better nutritional quality in the diets of children under the age of 5.[10] This means that increasing tree cover can enable greater resilience to crop variations by providing more reliable food options. Tree cover also provides unique benefits and increases resilience in urban areas by decreasing stormwater runoff[11] and mitigating the urban heat island effect through reductions in surface and air temperatures at a local scale.[12]

Many of the world's poorest people depend on forests, biodiversity and ecosystem services. Consequently, the loss or reduction of tree and forest cover can reduce the well-being of poorer population groups.[13,14] Tree-planting activities can increase tree cover and contribute to a country's environmental resilience.[15]

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Indicator #21

Dependency ratio

I. Intuitive appeal

The indicator measures a country's lack of resilience due to demographic pressure, which can increase the need and cost of social services, as well as the risk of internal conflict when shocks occur. It reflects the intrinsic low capacity to cope with shocks, due to the impact of demographic structure on a country's ability to adapt.

- The dependency ratio is used to assess the level of economic support that the economically active population must provide to the dependent population.
- The higher the dependency ratio, the greater the social burden carried by people of working age, which is not conducive to the country's recovery and resilience.
- Conversely, a lower age-dependency ratio indicates that a greater proportion of the total population has the opportunity to work and earn income to support dependents. Lower dependency ratios generally mean better healthcare for aging adults, as well as higher pensions. This helps to increase the ability of these dependent people to cope with life's inherent shocks.

II. Literature review

The dynamics of demographic structure in the world, and in developing countries in particular, is an important issue, as it leads to imbalances in resources and population growth, with a significant impact on agriculture development and economic growth.[1,2,3] A dependent population, composed mainly of young and elderly people, requires significant social and economic resources, such as education, healthcare and pensions. An aging population generally leads to an increase in the need for healthcare and retirement-related services. Healthcare and pension systems can become overburdened, making it difficult to provide quality services and increasing the financial burden on the government.[4] If this burden becomes excessive, it can limit the country's ability to invest in other important areas and thus undermine its coping capabilities.[5,6]

Low-income countries generally have limited public services (healthcare, education), an inadequately trained workforce and deficient infrastructure (roads, water supply, electricity, telecommunications, etc.)[7] While governments are striving to overcome these problems, the situation is made more difficult by the rapid increase in the number of dependents to be served. A 2007 United Nations Report takes a pessimistic view, arguing that the changing age structures in the populations of member countries are likely to present major economic and social challenges to governments.[8]

When the labor force fails to absorb the growing number of young people entering the job market, high unemployment can result, particularly among young people. High unemployment, particularly among young people, can be a source of social discontent and social tension[9,10], fostering the emergence of conflicts[11] which in turn can hinder a country's ability to prepare for and respond more effectively to shocks.[12,13,14]

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Indicator #22
Population density

I. Intuitive appeal

The indicator measures a country's lack of social resilience due to demographic pressure stemming from its high population density. High population density increases the risk of injury or death in the event of a natural disaster. It also reduces the country's capacity to respond to health shocks, as the space for social distancing is limited and the demand for natural resources (water supply) is greater. It can also reduce resilience to conflict when adverse external shocks occur.

- High population density often leads to increased competition for resources such as food, water and energy. This competition can strain the environment's capacity to support the population, making the country less resilient to shocks and stressors.
- Dense populations can put a strain on infrastructure, including transportation, healthcare and sanitation systems. In a crisis or disaster, overloaded infrastructure can hamper response and recovery efforts, reducing the country's overall resilience.
- High population density can accelerate the spread of infectious diseases, as seen in overcrowded urban areas. This can represent a major challenge for public health systems and reduce the population's resilience to health-related crises.

II. Literature review

High population density can lead to increased pressure on available resources, including infrastructure, health services, education and natural resources.[1,2] When exogenous shocks occur, a dense population can make it more difficult to manage and allocate resources efficiently, undermining the ability to cope with external shocks.[3]

In densely populated areas, people live in close proximity to each other, increasing the likelihood of transmission of infectious diseases.[4] Managing epidemics, quarantines and healthcare provision can be particularly challenging in densely populated areas, making it hard to minimize, absorb the impact of shocks. The difficulty of establishing social distancing in densely populated areas delays recovery and thus compromises the resilience required when health and infectious shocks occur.[5,6,7]

Densely populated countries are often the result of rapid urbanization. They may have difficulty in adapting quickly to change, due to the complexity of their social and economic structures.[8] This lack of flexibility undermines the country's ability to recover quickly from external shocks.[9]

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Indicator #23

Low number of people using at least basic sanitation services (% of population)

I. Intuitive appeal

The indicator measures a country's lack of social resilience through inadequate access of a country's populations to basic sanitation services. Inadequate access to these services compromises human capital development and facilitates disease transmission, including during pandemics.

- Basic sanitation services play a crucial role in promoting public health, environmental sustainability and general well-being. They are important for disease prevention, the reduction of water pollution and, not least, the dignity of populations.
- Countries where all (or at least a significant proportion) of the population has access to basic sanitation services are likely to have a high level of human capital, enabling them to develop better strategies for adapting to external shocks and stressors.
- Conversely, countries whose populations lack access to basic sanitation services are less able to absorb shocks and bounce back quickly from social and health crises.

II. Literature review

The COVID-19 pandemic has highlighted significant needs for water, sanitation and hygiene services and standard infection prevention and control practices in countries.[1,2,3,4] One of the greatest risks for people living in urban areas of developing countries is their inadequate access to at least basic sanitation services.[6] Expanding access to basic health services is inextricably linked to progress on the health, nutrition, education and gender equality Sustainable Development Goals (SDGs). The SDG 6 aims to ensure universal and equitable access to safe drinking water, sanitation and hygiene for all by 2030.[6] Improving people's access to at least basic health services reduces neonatal and infant mortality and the burden of infectious diseases, and improves nutritional status, girls' education and overall quality of life.[7,8]

The lack or inadequacy of basic sanitation services increases the risk of healthcare-associated infections and decreases patient satisfaction with services, leading to delays in seeking care and hindering the provision of quality essential health services and the achievement of sustainable development goals.[9] Despite the importance of water, sanitation and hygiene, it is estimated that 51% of healthcare facilities in sub-Saharan Africa have a basic water service and 23% a basic sanitation service.[10] Universal access to water, sanitation and hygiene in healthcare facilities is the key to universal access to quality care.

Inadequate access to healthcare reflects a country's unpreparedness and low resilience to exogenous shocks. It jeopardizes population health, exacerbates the impact of crises and handicaps faster recovery from destabilizing events.[11,12]

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Indicator #24
Under-five mortality (U5MR)

I. Intuitive appeal

The indicator measures lack of social resilience through deficiency in the effectiveness of a country's healthcare system in general, and for young children in particular. It reflects a deterioration in the quality of life, a reduction in human development standards and a low level of human, social and cultural capital. The mortality rate of children under five years of age is explicitly mentioned in SDG Target 3.2 of the Sustainable Development Goals.

- Low mortality rate of children under 5 years of age results with improved human development standards.
- Furthermore, lower mortality rate of children under 5 years of age leads to higher life expectancy at birth positively affecting socioeconomic development and increased social resilience to external shocks.

II. Literature review

Several studies examine the relation between the HDI and alternative health outcomes. In Almasi-Hashiani et al. (2016)[1], the relationship between the HDI and the U5MR is investigated for 188 countries in 2014. The authors showed that there is a significant negative correlation between the HDI and the U5MR.

Under-five mortality has significant implications for a country's ability to cope with and absorb exogenous shocks.[2] Young children represent the future of a country's workforce.[3,4] They are often subjects of special concern in major sustainability initiatives and declarations.[5,6] As a result, infant and child mortality reduces the future workforce and can lead to a decline in human capital, which has negative consequences for long-term productivity[7], affecting ability to thrive and to withstand the impact of external shocks.[8,9] Also, the loss of a significant part of the young population can affect the dynamics of human development and then weaken crisis response capacities.

Children are societies' bridge to the future.[10] To ensure that practices compatible with sustainable development are perpetuated over time, children must act as a bridge to transmit their values and methods.[11] In this sense, high infant and child mortality can weaken a community's ability to respond collectively to challenges.

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Indicator #25

Low years of schooling

I. Intuitive appeal

The indicator measures weakness in educational attainment leading to low levels of human capital, contributing to the country's lack of social resilience. Persons with low level of education, are less able to develop coping strategies to external shocks and stressors than high-educated people.

- Better educated populations can act more effectively when risks materialize, as well as develop better adaptation strategies to external stressors.
- Years of schooling (YS), which is a proxy for education attainment leads to the acquisition of problem-solving skills and therefore play critical role in helping society in term of absorption of shocks and adaptation to the changing situation, hence the impact on social resilience.
- YS contributes to human capital formation. It increases both innovative capacity (the ability to generate ideas, create and implement innovations) and technological capacity (the ability to implement and use new technologies), which completely shift the limits of the productive capacity of the economy. Thus, countries with a low level of years of schooling lack resilience to cope with adverse external shocks.

II. Literature review

A low level of education among individuals and in a country as a whole can have significant implications for the ability to cope with exogenous shocks and minimize their impact. Education plays a crucial role in developing the skills and productivity of the workforce.[1,2] Low levels of education can lead to a less skilled workforce, hampering a country's ability to innovate, adopt new technologies, adapt and bounce back from major changes and shocks.[3]

Education develops problem-solving skills, critical thinking and creativity, which are essential for coping with economic and social upheaval.[4,5] Less-educated people are often less flexible in the labor market. When exogenous shocks such as economic crises occur, they may have difficulty coping with new market requirements, which can lead to increased unemployment and a deterioration in their well-being.[6,7]

Low levels of education can result in gaps in health and education systems, two areas critical to a country's preparedness and resilience in the face of exogenous shocks such as pandemics or natural disasters.[8] In fact, education is a core asset for individuals and it plays a vital role before, during, and after a disaster.[9] There is evidence that higher educational attainment increases the extent of pro environmental behavior[10] which has social repercussions. During a disaster, households need to know how to cope using their own capacities, knowledge, skills, and experience.[11,12,13] Countries which are endowed with better education in terms of both quantity and quality, recover faster from economic shocks, and their economies are more resilient in the short and medium run.[14]

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Indicator #26

Low proportion of seats held by women in national parliaments

I. Intuitive appeal

The indicator measures the lack of gender equality in a society, assuming that low gender parity hinders recovery and effective adaptation to adverse shocks and stressors.

- Women's increased participation in parliament results in an increase in the diversity of perspectives in decision-making, leading to more inclusive measures regarding social protection, and social inclusion. This in turn contributes to increased social resilience to adverse external shocks.
- Countries with low levels of women's representation in parliament generally have higher levels of inequality and conflict and are therefore less likely to rebound effectively from adverse external shocks.

II. Literature review

Women often bring different perspectives that complement those of men. Their exclusion from public life can lead to a lack of diversity in decision-making, which can limit the creativity and effectiveness of solutions to challenges. Empirical studies have shown that, when in a position to do so, women tend to work more effectively for positive change in health, education, community well-being, poverty reduction, and family well-being.[1,2,3] Initial research on leadership during the pandemic also demonstrated that while a country's outcomes during the Pandemic were complex, the gender of leaders and their gendered approach to leadership played a role in positive outcomes.[4,5] Even when accounting for institutional context and other controls, being female-led provided countries with an advantage in the COVID-19 crisis.[6]

Salamon (2023)[7] found that the impact of women's increased participation in governance goes beyond so called 'women's issues' such as sexual and reproductive health and rights, gender-based violence and paid parental leave to a much broader range of issues. When it comes to Disaster Risk Reduction, the practice of systematic analysis and mitigation of the causes of disasters (including reducing exposure to hazards, lessening the vulnerability of people and property, and improving preparedness and early warning for adverse events) is truly effective when girls and women are involved.[8]

Women's participation in local government is also essential to inform policy and deliver change. Women's engagement in leadership positions at the grassroots level has been shown to have positive correlations to a higher quality of education, health, and infrastructure projects, as well as a boost to women's empowerment and standards of living.[9] This strengthens the ability of communities to cope with stress, and facilitates the development of new and effective solutions to recover rapidly from shock.[10,11]

In contexts of conflict or peace processes, women can play a crucial role: more female lawmakers are associated with improved government accountability, more passed legislation, and increased compromise between political factions.[12] Research also shows that women's participation in resolution processes decreases the chances of peace agreements failing by 64% and increases the chances of peace agreements lasting for 15 years by 35%.[13] Peaceful societies often have greater social trust and solidarity, facilitating cooperation and community resilience during crises. Their institutions generally have more capacity to respond to crises, and governments can implement more effective social policies, coordinate emergency efforts and set up social safety nets to mitigate and recover from the effects of shocks on the population.[14,15]

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ANNEX 2: List of indicators considered but ultimately not included in the MVI prototype ordered by dimension

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Economic Vulnerability		
Trade openness (Exports plus Imports over GDP	Countries that are open to trade are more vulnerable to suffer global economic shocks.	• Empirical evidence on this indicator was not consistent. • Theory of change not supported by recent evidence. For instance, see Montalbano, (2011).
Capital account liberalization	Capital account liberalization refers to easing restrictions on capital flows across a country's borders and measures vulnerability against fluctuations in international financial flows.	• Significant data issue. Rules and regulations are non-structural.
External debt service as a share of export revenues	The vulnerability of developing countries to international financial flows primarily stems from a series of boom-and-bust phases that may render their external debt unsustainable and undermine their capacity to finance sustainable development.	• Significant data issue. • Like other available debt-related indicators, this indicator is not exempt from significant data issues related to measurement errors and lack of comparability, such as SOEs debt, non-Paris Club debt, incompatible standards and definitions, etc.
Share of agriculture, forestry, fisheries in GDP	The indicator reflects the exposure of countries caused by their economic structure because agriculture, forestry and fisheries are particularly exposed to natural shocks and international price fluctuations. (Share of agriculture, forestry, fisheries as a percentage of GDP).	• Theory of change not supported by recent evidence. For instance, see Jayne et al. (2021).
Remittances flows over GDP or volatility of remittances flows	This indicator captures the risk to which the country is subject by its dependence on external financial flows to support existing levels of consumption and investment. The sharp drop in remittances can lead to severe economic recessions and job losses in countries which °are heavily dependent on the remittances flows.	• Theory of change not supported by recent evidence. For instance, see Malpass (2022). • Difficult to assess whether remittances represent a vulnerability or a factor of resilience. Evidence points more toward the latter. • Significant data issues.
FDI stock over GDP or volatility of FDI flows	This indicator captures the risk to which the country is subject by its dependence on external financial flows to support existing levels of consumption and investment.	• Indicators are not structural. • Significant data issue.
Geographical concentration of Export of goods and services	Any changing patterns of trade, economic performance and changing preferences in major trading partners, when a large proportion of a country's exports are supplied to a limited number of trading partners, can have harmful effects.	• Simplicity: likely correlated with trade openness and export concentration.
Terms of trade instability	Countries with unstable terms of trade have higher investment risk and fiscal instability.	• Simplicity: likely highly correlated with instability of exports of goods and services. • Universality: Does not reflect service trade. • Significant data issues.
Volatility of financial flows	Volatility of financial flows can be a concern for macroeconomic and financial stability.	• Difficult to disentangle structural from non-structural factors. • Significant data issues.
Instability of real GDP growth	Instability in real GDP growth increases uncertainty that limits the ability of countries to implement investment programs and reduce poverty.	• Difficult to disentangle structural from non-structural factors. • Overlap with other instability variables.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Tourism receipts (% of GDP)	Countries that highly depend on tourism are more exposed to global shocks and downturns.	• Universality issue.
ODA (per capita)	Higher dependence on development finance makes countries vulnerable to instability.	• Already captured by the concentration index.
Instability of agricultural production	The instability of agricultural production measured by volume rather than value reflects the degree to which countries may be affected by natural shocks such as droughts and disturbances in rainfall patterns, and flooding.	• Not a structural factor.
Economic Vulnerability		
Number of natural hazards	The frequency of natural hazards is an important indicator of structural vulnerability which hinders sustainable development through compounding the loss and damage to human welfare.	• Vulnerability to natural hazard already well captured in the MVI. • Balance between concepts and simplicity considerations justified not including the indicator.
Interval between natural hazards	The higher the number of hazards within any defined time period, the higher the probability of future hazards with all the associated impacts on sustainable development.	• Simplicity: likely highly correlated with victims and damages.
Internal displacements due to natural hazards	High internal migration is both an expression of vulnerability of the concerned country/society and an adaptive response of people to certain stressors / forms of human insecurity such as food and income insecurity, absent or limited ecosystem and basic services, natural hazards, shocks, and discriminating environments.	• Simplicity: likely highly correlated with victims and damages.
Total deaths due to hydrometeorological natural hazards (drought, flood, storm, extreme temperature, landslide, wildfire) (% of population)	Mortality, injury, displacement or material loss from hazards has a significant human impact on society in terms of loss of life, health, economic, social and cultural assets, access to public services and infrastructure, commerce or work, and psychological consequences.	• Simplicity: Various kinds of shocks already included in victims and damages indicators.
Total deaths due to seismic natural hazards (earthquake, volcanic activity) (% of population)	Mortality, injury, displacement or material loss from hazards has a significant human impact on society in terms of loss of life, health, economic, social and cultural assets, access to public services and infrastructure, commerce or work, and psychological consequences.	• Simplicity: Various kinds of shocks already included in victims and damages indicators.
Share of population living in low elevated coastal zones & Share of population living in dry lands	Those indicators serve as important drivers of ecosystem pressure, and it also quantifies an important component of vulnerability to sea-level rise and other coastal hazards as well as to aridity related issues.	• For those countries for which a high share of the population is concentrated in low-elevated coastal zones due to the country's natural topography (for example a number of SIDS) the indicator would be largely structural. • For other countries, an increasing share could be argued to be due to policy choices or lack thereof. A similar reasoning could be applied to aridity. • Share of land instead of population was selected instead.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Share of population living in seismic zones	Similar to the share of population living in hazard prone zones, this indicator reflects the degree to which the population could be impacted by earthquakes.	• Vulnerability to earthquakes is already captured by victims and damages due to natural hazards.
Ratio of coastal areas over the total landmass, % of coastal areas over the total landmass	Countries with higher share of land exposed to pressures related to climate change are more at risk of disruption of their sustainable development.	• Simplicity: Not all natural hazards are related to or happened near coastal areas (earthquake, draught, etc.). This suggestion would limit the universality of the related concept. • Correlation with share of LECZ is likely.
Ratio of arable land over the total landmass, % of arable land over the total landmass	Countries with higher share of land exposed to pressures related to climate change are more at risk of disruption of their sustainable development.	• Crop land, which is a better measure than arable land according to the FAO, is already included as part of environmental resilience.
Social Vulnerability		
Number of epidemics	The number of epidemics can reflect two dimensions of vulnerability – 1/ the frequency of or propensity for epidemic events over a specified time, and 2/ the likely compounding influence of epidemic events on countries of a series of epidemics in short succession.	• The concept of "Exposure to global health shocks" is already captured by the number of victims.
Share of mortality due to non-communicable diseases	This indicator measures the proportion of total death associated with non-communicable diseases – obesity, hypertension, diabetes, etc. – and reflects the quality of a country's human capital base.	• The debate on whether NCDs are the result of nature or nurture is ongoing with evidence suggesting that they are part 'nature' and part 'nurture'. • Not a structural factor of exposure to shocks nor a shock variable per se. • General health level already considered as part of structural social resilience.
Deaths due to internal armed conflict	Internal armed conflict represents a key aspect of social instability.	• Difficult to argue it is an external shock. • More related to fragility than to vulnerability.
Forcibly displaced persons per capita	Forcibly displaced persons per capita can reflect vulnerability between societal groups as well as the impact from other stresses – natural or other – on countries both within and between borders.	• Internally displaced people (IDP) were ultimately not included because they are either displaced due to endogenous shocks (internal violence) or shocks already well captured (natural hazards).
Terrorism (number of incidents, deaths or victims) either local or regional	Terrorism is one of the main expressions of fragility in many countries.	• Non-UN data. • Acceptability concerns: Difficult to get a consensus on indicator and definition. • Local terrorism as other similar types of social shocks are mostly endogenous.
Malaria deaths, per 1,000 population at risk	Malaria is endemic in many countries around the world, especially in tropical and sub-tropical areas, and malaria incidence is considered as a permanent feature of humid and hot countries. High morbidity and mortality rates can impact quality of life and production possibilities of countries. Conversely, lower or absent rates of malaria incidence can improve the quality and quantity of life and productivity.	• Simplicity: Malaria is already included in the indicator victims of epidemics.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Economic Resilience		
Total reserves (in months of imports), long-term average	Fixed exchange rate regime countries with a low level of foreign exchange reserves are more susceptible to a speculative attack whereby investors rapidly sell domestic currency for foreign currency with the expectation that this will force a devaluation in the exchange rate. This vulnerability is also intrinsically linked to countries with high external debt levels given their obligation to service repayments in foreign currencies.	• Irrelevant for countries with established floating exchange rate regimes and prominence of non-structural factors. For example, the USA has a long-term average of only 1.5 months of import cover. • Further, given the reserve ratio is a key component of debt sustainability analysis undertaken by the IMF and IFIs, this indicator would confound allocative decisions and present contradicting incentives. • Too many missing values.
Manufacturing value added (% of GDP)	The manufacturing sector is posited to be less vulnerable to exogenous environmental shocks as the agricultural sector. Therefore, a larger manufacturing sector as a proportion of gross domestic product may reduce the overall macroeconomic effect arising from a natural hazard.	• Conflicting evidence that the relative contribution of the manufacturing sector strengthens or weakens overall economic resilience. • While the manufacturing sector may be more resilient than the agricultural sector to environmental shocks and the service sector to austerity policies, it appears to be relatively less resilient to exogenous effects from global economic slowdowns. • Replaced by an indicator of sectoral diversification.
Roads, paved (% of total roads)	Paving roads is posited to reduce economic vulnerability to exogenous environmental shocks due to their resistance to heavy rain and flooding when compared with unpaved roads. More generally, better infrastructure development is linked to more resilient infrastructures.	• Significant data issue. • Weak relationship with the overall concept of the quality of the stock of public capital. Limited empirical evidence that associates the percentage of roads paved with economic resilience and prominence of non-structural factors.
Access to electricity (% of population)	Access to electricity could be posited to support economic resilience both by supporting the implementation of recovery efforts and enabling business continuity following a natural hazard.	• Too many missing values. • Weak relationship with the overall concept of the quality of the stock of public capital. • Questionable structural indicator.
Mobile (or Fixed) broadband subscriptions per 100 inhabitants)	Mobile broadband subscriptions could be posited to support economic resilience both by supporting the implementation of recovery efforts and enabling business continuity following a natural hazard.	• Weak relationship with the overall concept of the quality of the stock of public capital. • Questionable structural indicator. • Other communication related indicators have significant missing data issues.
Ship connectivity	The more remote a country is and the less connected it is to global shipping networks, then the higher are the transport costs it is likely to incur.	• Simplicity: Remoteness is already included. • Universality: This indicator doesn't reflect issues of landlocked countries.
CIF/FOB ratio	The indicator reflects the cost associated with the remoteness from global markets.	• Simplicity: Size is already captured by population.
Land area	There are some structural dynamics of countries that are threshold questions for viability – largely relating to population size, landmass (and landmass compared to EEZ, number of land masses, etc.) that significantly impact state viability and should be accounted for.	• Simplicity: Size is already captured by population.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
(Low) External Debt (% of GNI)	The accumulation of debt as a result of frequent and significant shocks linked to the global market, climate change, pandemic, natural hazard or extreme weather events weakens the resilience of nations, especially low-income developing countries and small open economies, and further increases their vulnerability.	• Too many missing values. • In countries with an open capital account, currency and maturity mismatches are the real source of vulnerabilities. Countries which, like the United States, have a large stock of long-term domestic currency external debt are less vulnerable to financial crises than countries which have a large stock of foreign currency or short-term domestic debt. In that sense, external debt stock might not be the appropriate indicator compared to external debt service.
(Low) Central Government Debt (% of GDP)	The accumulation of debt as a result of frequent and significant shocks linked to the global market, climate change, pandemic, natural hazard or extreme weather events weakens the resilience of nations, especially low-income developing countries and small open economies, and further increases their vulnerability.	• Non-structural, if debt accumulation is the result of both endogenous and exogenous factors. • Like other available debt-related indicators, this particular indicator is not exempt from significant data issues related to measurement errors and lack of comparability, such as SOEs debt, non-Paris Club debt, incompatible standards and definitions, etc.
Credit worthiness	Indicates access to and affordability of wider finance.	• Non-structural. • Too many missing values.
Government revenue per capita	Provides alternative finance to respond to shocks. This indicator also offers a limited insight into state capacity.	• Non-structural. • Too many missing values.
Budget Execution	relates to the underlying ability of the public service to implement and deliver.	• Non-structural. • Too many missing values.
(low) Savings (% of GDP)	Households and firms with more savings and assets are resilient to shocks.	• Too many missing values.
(Low) Economic complexity index (Harvard)	Economic diversification reduces the total macroeconomic risk by pooling risks across sectors.	• Too many missing values. • Would require including a sub-index.
Environmental Resilience		
Fishery resources per capita	Environmental Resilience Fishery resources per capita. As the main source of protein for many communities, fisheries is an important sector for development especially for coastal countries and island states. As well as playing a key role in food security, nutrition and, if done sustainably, biodiversity, fisheries also provide a source of livelihood for many households and provide a source of revenue for Governments through exports, manufacturing and fishing licenses. Questions around the universality of the indicators. Too many ocean related indicators would bias the index. Sectoral specialization is already captured as part of economic resilience.	• Questions around the universality of the indicators. Too many ocean related indicators would bias the index. • Sectoral specialization is already captured as part of economic resilience.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Issues of coastal erosion, increased acidification, deoxygenation and rising ocean temperatures, loss of biodiversity on sea and land, ocean pollution (no specific variables identified)	Ocean related stressors linked to environmental degradation and climate change represent significant challenges for many SIDS.	• Too many missing values. • Concerns related to simplicity and universality criteria. • The MVI has to be universal but also has to remain simple. It implies to capture a wide range of specific concerns through the limited use of broad indicators. • Including too many highly specific components would reduce the relative significance of the information provided by each of them.
Biodiversity (stock - no specific variable identified)	Stronger biodiversity leads to higher resilience to climate change.	• Too many missing values. • Issue with the structural nature of the concept. • Possible moral hazard questions. • No available indicator approaches biodiversity resilience in a roundabout way. • Would likely require using an index within the index.
Social Resilience		
Expected years of schooling & Life expectancy at birth	Higher human capital allows for the development of better adaptation strategies to external stressors.	• Mean years of schooling and Under-5 mortality indicators were preferred. • Indicators excluded to avoid redundancies.
Health Expenditure % of GDP	The human impacts of climate change and hazards are increasingly health-related. A strong public health system is a function of structural resilience, since more of the population would have access. Robust health sectors have more adaptive capacity, since they are more likely to better-respond to hazards and the human impacts of climate change without reliance on external support.	• Correlated with income per capita. • Correlated with the sanitation indicator. • Non-structural: Budgetary allocation and priorities might be difficult to see as structural.
Number of school (per capita)	Number of schools per capita may be indicative of the quality of education.	• Limited evidence that the number of schools per capita affects resilience ceteris paribus.
Women participation in the workforce	Higher participation of women in the workforce can contribute to economic growth, a more equal and sustainable society, and greater resilience through a more efficient use of human capital.	• A better indicator was found and included. • Universality issues: Doubts whether this indicator can reflect a consistent rationale across income groups.
Unemployment (Total unemployment as percentage of total labor force)	A high unemployment rate is a factor of social pressure that can lead to socio-economic consequences.	• Not a structural factor. • Significant data issues.
Gender parity index for gross secondary school enrolment	Greater parity index for gross secondary school enrolment can contribute to economic growth, a more equal and sustainable society, and greater resilience through a more efficient use of human capital.	• Too many missing values.

INDICATOR NAME	SUGGESTED/POSSIBLE RATIONALE	REASON FOR EXCLUSION
Prevalence of lifetime physical and/or sexual intimate partner violence (IPV) or non-partner sexual violence (NPSV) or both among all women aged 15–49 years	Greater gender equity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.	• Too many missing values.
Proportion of people with ownership or secure rights over agricultural land (out of total agricultural population) », Percent (%) of individuals	Greater gender equity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.	• Too many missing values. • Reflects an institutional/policy aspect rather than a structural factor.
Maternal mortality ratio", Maternal deaths per 100,000 live births	Greater gender equity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.	• Too many missing values. • Factors reflecting general health are already captured by Under 5 mortality which should be highly correlated with maternal mortality.
Participation rate in formal and non-formal education and training, by sex	Greater gender equity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.	• Too many missing values.
Poverty rate	The poorest are the more exposed to the adverse effects of shocks and are less able to flexibly adjust to shocks and stressors.	• The MVI is not a development index and shouldn't include variables too strongly correlated with GNI pc.
Household savings in $USD per capita	Enables individuals to respond to crises.	• Too many missing values.
Access to insurance	Enables individuals to respond to crises.	• Too many missing values.
Racial and ethnic equity	Greater equity can contribute to economic growth through more effective use of the skills of the whole population, and when risks materialize, supports recovery and effective adaptation to long term stressors.	• Too many missing values.
(Low) Income inequality – GINI	Lower income inequality is crucial to resilience.	• Too many missing values.

ANNEX 2: Country-level results

MVI and its pillars

COUNTRY	ISO	MVI - SCORE	STRUCTURAL VULNERABILITY INDEX	LACK OF STRUCTURAL RESILIENCE INDEX
Afghanistan	AFG	54.9	47.8	61.2
Angola	AGO	47.5	44.4	50.4
United Arab Emirates	ARE	54.4	43.3	63.6
Argentina	ARG	41.9	32.3	49.7
Armenia	ARM	49.4	46.7	52.0
Antigua and Barbuda	ATG	61.7	63.4	59.9
Azerbaijan	AZE	46.9	41.4	51.8
Burundi	BDI	61.7	55.6	67.3
Benin	BEN	49.6	39.6	57.9
Burkina Faso	BFA	58.1	51.1	64.4
Bangladesh	BGD	52.4	47.2	57.1
Bahrain	BHR	60.4	45.3	72.5
Bahamas	BHS	59.9	56.4	63.1
Belize	BLZ	53.0	55.6	50.3
Bolivia (Plurinational State of)	BOL	41.6	37.1	45.8
Brazil	BRA	41.1	32.8	48.1
Barbados	BRB	57.9	46.2	67.6
Brunei Darussalam	BRN	52.9	48.4	57.0
Bhutan	BTN	41.8	34.5	48.1
Botswana	BWA	64.2	62.5	65.9
Central African Republic	CAF	52.0	46.6	56.9
Chile	CHL	48.4	38.6	56.6
China	CHN	46.1	45.7	46.5
Côte D'Ivoire	CIV	42.6	32.9	50.4
Cameroon	CMR	44.8	47.4	42.0
Democratic Republic of the Congo	COD	54.6	53.8	55.3
Congo	COG	60.0	65.3	54.2
Colombia	COL	40.4	36.4	44.1
Comoros	COM	60.3	53.9	66.0
Cabo Verde	CPV	60.5	62.5	58.4
Costa Rica	CRI	46.5	46.4	46.6
Cuba	CUB	46.6	51.8	40.7
Djibouti	DJI	70.8	73.8	67.6
Dominica	DMA	55.4	62.4	47.3
Dominican Republic	DOM	45.1	43.1	47.0
Algeria	DZA	53.3	55.9	50.5
Ecuador	ECU	45.5	49.2	41.5
Egypt	EGY	58.5	50.2	65.9
Eritrea	ERI	63.2	63.4	63.1

COUNTRY	ISO	MVI - SCORE	STRUCTURAL VULNERABILITY INDEX	LACK OF STRUCTURAL RESILIENCE INDEX
Ethiopia	ETH	55.2	54.5	55.9
Fiji	FJI	51.7	50.2	53.2
Micronesia (Federated States of)	FSM	64.0	56.4	70.8
Gabon	GAB	42.5	37.9	46.6
Georgia	GEO	38.6	29.1	46.2
Ghana	GHA	44.1	33.0	53.0
Guinea	GIN	47.7	45.4	49.8
Gambia	GMB	59.1	56.8	61.3
Guinea-Bissau	GNB	58.8	60.4	57.0
Equatorial Guinea	GNQ	52.2	52.6	51.8
Grenada	GRD	61.7	65.3	57.8
Guatemala	GTM	44.7	34.0	53.4
Guyana	GUY	46.4	55.1	35.8
Honduras	HND	48.2	50.8	45.5
Haiti	HTI	65.6	68.0	63.0
Indonesia	IDN	32.1	20.6	40.5
India	IND	46.0	31.2	57.1
Iran (Islamic Republic of)	IRN	55.7	56.9	54.4
Iraq	IRQ	60.7	64.2	56.9
Jamaica	JAM	49.6	48.1	51.0
Jordan	JOR	60.6	56.9	64.0
Kazakhstan	KAZ	43.0	38.6	47.0
Kenya	KEN	57.0	54.1	59.7
Kyrgyzstan	KGZ	43.5	35.1	50.6
Cambodia	KHM	49.0	53.2	44.3
Kiribati	KIR	59.8	48.8	69.1
Saint Kitts and Nevis	KNA	55.0	52.4	57.5
Kuwait	KWT	64.0	51.7	74.3
Lao PDR	LAO	43.8	46.3	41.2
Lebanon	LBN	62.6	56.0	68.5
Liberia	LBR	61.8	65.6	57.7
Libya	LBY	61.7	63.8	59.4
Saint Lucia	LCA	66.5	73.2	59.1
Sri Lanka	LKA	48.6	44.8	52.1
Lesotho	LSO	62.4	57.9	66.6
Morocco	MAR	43.0	35.0	49.7
Madagascar	MDG	49.6	39.4	58.0
Maldives	MDV	72.2	70.4	74.0
Mexico	MEX	42.0	39.7	44.2
Marshall Islands	MHL	58.9	45.1	70.0
Mali	MLI	56.4	48.2	63.6
Myanmar	MMR	39.3	36.7	41.7

COUNTRY	ISO	MVI - SCORE	STRUCTURAL VULNERABILITY INDEX	LACK OF STRUCTURAL RESILIENCE INDEX
Mongolia	MNG	49.9	50.1	49.6
Mozambique	MOZ	47.5	44.7	50.2
Mauritania	MRT	67.7	71.2	64.0
Mauritius	MUS	52.2	38.6	62.9
Malawi	MWI	53.7	42.7	62.8
Malaysia	MYS	39.4	39.4	39.4
Namibia	NAM	58.4	60.7	56.0
Niger	NER	64.3	63.4	65.3
Nigeria	NGA	53.1	44.6	60.4
Nicaragua	NIC	45.9	50.5	40.7
Nepal	NPL	45.7	43.6	47.7
Nauru	NRU	68.7	58.2	77.7
Oman	OMN	59.8	51.7	67.0
Pakistan	PAK	59.9	58.4	61.4
Panama	PAN	40.2	35.6	44.4
Peru	PER	39.1	32.4	44.8
Philippines	PHL	43.6	40.8	46.3
Palau	PLW	57.0	53.7	60.2
Papua New Guinea	PNG	47.1	26.6	61.0
Democratic People's Republic of Korea	PRK	41.0	33.9	47.0
Paraguay	PRY	49.9	49.2	50.5
Qatar	QAT	58.1	42.6	70.3
Rwanda	RWA	54.4	46.3	61.5
Saudi Arabia	SAU	55.2	50.9	59.3
Sudan	SDN	62.8	67.1	58.3
Senegal	SEN	46.3	41.0	51.1
Singapore	SGP	52.4	39.8	62.5
Solomon Islands	SLB	55.9	50.2	61.0
Sierra Leone	SLE	54.9	50.8	58.7
El Salvador	SLV	52.7	53.4	52.1
Somalia	SOM	67.8	62.6	72.5
South Sudan	SSD	67.3	72.8	61.3
Sao Tome and Principe	STP	53.5	55.2	51.6
Suriname	SUR	43.2	42.2	44.1
Eswatini	SWZ	57.3	49.0	64.5
Seychelles	SYC	54.5	47.2	61.0
Syrian Arab Republic	SYR	57.5	59.1	55.9
Chad	TCD	69.4	73.8	64.6
Togo	TGO	44.1	34.2	52.2
Thailand	THA	43.1	43.9	42.4
Tajikistan	TJK	51.7	48.6	54.5
Turkmenistan	TKM	51.9	51.6	52.2

COUNTRY	ISO	MVI - SCORE	STRUCTURAL VULNERABILITY INDEX	LACK OF STRUCTURAL RESILIENCE INDEX
Timor-Leste	TLS	46.4	43.3	49.3
Tonga	TON	57.0	49.6	63.6
Trinidad and Tobago	TTO	50.3	47.7	52.7
Tunisia	TUN	45.5	42.9	47.9
Turkey	TUR	46.5	49.8	43.0
Tuvalu	TUV	64.3	48.3	77.0
United Republic of Tanzania	TZA	41.6	35.8	46.6
Uganda	UGA	54.5	52.4	56.5
Uruguay	URY	44.7	30.7	55.3
Uzbekistan	UZB	49.2	42.5	55.0
Saint Vincent and the Grenadines	VCT	61.8	65.1	58.2
Venezuela (Bolivarian Republic of)	VEN	48.4	49.2	47.7
Viet Nam	VNM	42.3	41.2	43.4
Vanuatu	VUT	54.4	51.2	57.4
Samoa	WSM	62.5	57.2	67.3
Yemen	YEM	72.9	73.9	71.8
South Africa	ZAF	48.1	40.4	54.7
Zambia	ZMB	48.6	41.6	54.8
Zimbabwe	ZWE	58.1	60.0	56.1
	Mean	**52.9**	**49.2**	**55.8**
	Median	**52.8**	**48.9**	**55.9**
	SD	**8.4**	**10.9**	**8.9**

Structural vulnerability index: concepts and individual indicators

Country	ISO	Eco. vul.	Cpt #1	Ind #1	Cpt #2	Ind #2	Cpt #3	Ind #3	Env. vul.	Cpt #4	Ind #4	Ind #5	Cpt #5	Ind #6	Ind #7	Cpt #6	Ind #8	Ind #9	Soc. vul.	Cpt #7	Ind #10	Cpt #8	Ind #11	Ind #12	Cpt #9	Ind #13
Afghanistan	AFG	55.8	62.6	62.6	61.1	61.1	41.2	41.2	52.8	26.5	36.8	7.3	60.2	85.1	0.0	63.4	0.0	89.7	31.0	6.2	6.2	13.1	13.9	12.2	51.7	51.7
Angola	AGO	61.0	100.0	100.0	31.2	31.2	13.3	13.3	35.6	10.3	14.6	0.0	55.8	57.5	54.2	23.8	0.2	33.7	30.7	37.3	37.3	34.8	23.3	43.3	14.9	14.9
Un. Arab Em.	ARE	34.3	20.2	20.2	16.7	16.7	53.2	53.2	61.6	0.0	0.0	0.0	79.7	92.2	64.7	70.9	7.4	100.0	25.9	0.0	0.0	44.8	63.3	3.0	1.6	1.6
Argentina	ARG	23.8	36.0	36.0	20.0	20.0	1.6	1.6	43.6	6.8	2.5	9.3	55.8	78.9	0.0	50.3	1.6	71.2	25.9	22.0	22.0	39.0	0.0	55.2	1.4	1.4
Armenia	ARM	39.0	21.8	21.8	48.8	48.8	41.4	41.4	40.5	3.2	2.3	3.9	56.5	79.9	0.0	41.4	0.0	58.6	58.1	0.0	0.0	11.2	12.1	10.2	100.0	100.0
Antig. & Barb.	ATG	70.1	97.7	97.7	54.2	54.2	47.5	47.5	74.0	72.9	24.9	100.0	74.8	77.8	71.8	74.3	32.4	100.0	40.8	0.0	0.0	70.7	0.0	100.0	1.8	1.8
Azerbaijan	AZE	55.2	81.5	81.5	47.0	47.0	17.0	17.0	45.0	2.0	1.0	2.7	55.4	78.4	0.0	54.7	0.0	77.4	8.3	0.0	0.0	14.2	9.9	17.4	2.3	2.3
Burundi	BDI	62.1	77.3	77.3	70.3	70.3	25.7	25.7	45.5	16.3	22.9	3.2	77.2	83.1	70.7	0.0	0.0	0.0	57.9	5.1	5.1	24.1	26.6	21.4	97.1	97.1
Benin	BEN	48.8	48.4	48.4	48.1	48.1	49.9	49.9	43.3	6.2	8.8	0.0	67.8	57.7	76.6	31.5	1.7	44.6	21.0	8.5	8.5	35.3	31.5	38.7	2.1	2.1
Burkina Faso	BFA	52.0	77.0	77.0	29.8	29.8	36.3	36.3	60.7	28.9	38.5	13.6	79.7	70.1	88.2	62.3	0.0	88.1	38.1	50.6	50.6	32.2	29.8	34.5	27.4	27.4
Bangladesh	BGD	53.6	87.9	87.9	22.8	22.8	19.1	19.1	49.1	48.7	52.5	44.5	60.2	10.7	84.4	35.3	50.0	0.0	37.4	26.5	26.5	15.9	20.2	9.7	57.0	57.0
Bahrain	BHR	44.0	48.9	48.9	24.6	24.6	52.9	52.9	49.8	0.0	0.0	0.0	76.2	92.9	54.8	40.2	56.9	0.0	41.7	0.0	0.0	72.2	100.0	20.5	3.2	3.2
Bahamas	BHS	55.0	80.2	80.2	38.1	38.1	34.3	34.3	69.7	71.1	9.9	100.0	65.5	72.4	57.7	72.5	100.0	22.7	40.8	0.0	0.0	70.7	0.0	100.0	0.6	0.6
Belize	BLZ	60.5	67.7	67.7	37.7	37.7	70.6	70.6	62.9	75.0	35.3	100.0	77.8	92.2	60.2	13.4	18.9	0.0	40.8	0.0	0.0	70.7	0.0	100.0	0.9	0.9
Bolivia	BOL	27.0	39.0	39.0	20.8	20.8	15.5	15.5	43.4	37.3	27.8	44.8	57.4	68.8	43.1	31.2	0.0	44.1	38.9	56.5	56.5	36.6	0.0	51.8	1.3	1.3
Brazil	BRA	17.8	28.0	28.0	12.3	12.3	3.9	3.9	34.2	12.6	16.5	6.6	57.2	52.6	61.4	8.9	2.4	12.4	41.8	43.7	43.7	57.6	0.0	81.5	1.4	1.4
Barbados	BRB	49.1	67.0	67.0	19.4	19.4	48.6	48.6	48.4	1.1	1.3	0.9	83.7	94.3	71.6	2.4	3.4	0.0	40.8	0.0	0.0	70.7	0.0	100.0	0.0	0.0
Brunei Darus.	BRN	71.6	90.0	90.0	13.5	13.5	84.2	84.2	43.6	0.0	0.0	0.0	75.3	80.5	69.7	5.1	7.2	0.0	3.4	0.0	0.0	5.9	0.1	8.4	0.0	0.0
Bhutan	BTN	48.8	48.8	48.8	46.7	46.7	50.8	50.8	34.2	1.3	1.9	0.0	58.6	67.3	48.4	7.8	0.0	11.0	3.9	0.0	0.0	6.8	0.6	9.5	0.0	0.0
Botswana	BWA	64.1	86.2	86.2	57.7	57.7	39.6	39.6	52.9	1.8	1.8	1.9	58.3	74.5	35.1	70.7	0.0	100.0	69.3	100.0	100.0	64.3	2.3	90.9	16.4	16.4
Central Af. Rep.	CAF	55.1	73.8	73.8	54.1	54.1	26.7	26.7	33.8	1.9	2.7	0.0	58.4	51.7	64.3	4.9	0.0	6.9	48.3	16.1	16.1	73.3	100.0	27.1	37.2	37.2
Chile	CHL	38.6	61.9	61.9	7.7	7.7	24.2	24.2	53.4	71.9	18.2	100.0	53.2	69.2	29.5	23.7	1.4	33.5	10.7	0.0	0.0	18.5	0.0	26.1	1.8	1.8
China	CHN	39.8	65.3	65.3	15.6	15.6	16.1	16.1	54.1	65.5	83.9	39.3	55.5	78.5	3.6	37.3	2.0	52.7	41.7	0.1	0.1	72.2	100.0	20.7	3.8	3.8
Côte D'Ivoire	CIV	40.2	59.2	59.2	22.9	22.9	28.8	28.8	36.1	0.2	0.2	0.0	62.5	41.8	77.8	0.5	0.7	0.0	18.0	2.2	2.2	31.1	32.5	29.6	1.6	1.6
Cameroon	CMR	19.2	23.7	23.7	13.4	13.4	19.1	19.1	32.4	0.9	1.2	0.0	55.5	47.5	62.5	8.8	0.3	12.5	72.9	10.6	10.6	76.3	100.0	40.7	100.0	100.0
Dem. R. Congo	COD	61.2	91.6	91.6	51.9	51.9	11.8	11.8	31.8	1.0	1.1	0.9	55.1	50.2	59.6	0.6	0.0	0.8	62.7	20.1	20.1	75.6	100.0	37.7	75.3	75.3
Congo	COG	55.2	83.5	83.5	32.1	32.1	33.7	33.7	34.8	3.6	5.1	0.0	60.2	57.5	62.7	0.0	0.1	0.0	92.4	100.0	100.0	74.9	100.0	35.1	100.0	100.0
Colombia	COL	22.3	34.9	34.9	14.1	14.1	8.7	8.7	28.9	13.1	15.7	9.6	48.4	33.4	59.7	1.5	1.4	1.6	51.3	53.8	53.8	70.7	0.0	100.0	0.1	0.1
Comoros	COM	51.8	75.8	75.8	42.8	42.8	21.9	21.9	50.6	46.1	65.1	3.8	74.4	91.2	52.5	2.1	2.9	0.0	58.9	100.0	100.0	20.6	8.2	27.9	0.0	0.0
Cabo Verde	CPV	73.6	82.0	82.0	68.3	68.3	69.8	69.8	54.4	11.5	16.3	0.4	63.8	76.8	47.4	68.3	5.8	96.5	57.8	100.0	100.0	4.3	2.1	5.7	0.0	0.0
Costa Rica	CRI	27.0	40.7	40.7	13.4	13.4	18.9	18.9	40.3	9.5	11.1	7.6	69.0	82.0	52.9	3.4	4.9	0.0	64.0	100.0	100.0	29.9	0.0	42.2	37.4	37.4
Cuba	CUB	41.2	66.2	66.2	25.0	25.0	8.9	8.9	68.4	100.0	100.0	100.0	62.0	64.8	59.0	14.2	20.1	0.5	40.8	0.0	0.0	70.7	0.0	100.0	0.5	0.5
Djibouti	DJI	71.1	8.2	8.2	71.5	71.5	100.0	100.0	72.0	66.2	93.6	0.0	78.6	82.7	74.2	70.7	1.4	100.0	78.1	47.0	47.0	78.0	100.0	46.5	100.0	100.0
Dominica	DMA	66.9	91.0	91.0	51.1	51.1	50.5	50.5	74.5	99.8	99.6	100.0	81.7	91.0	71.3	0.7	1.0	0.0	40.8	0.0	0.0	70.7	0.0	100.0	0.0	0.0
Dominican Rep.	DOM	28.7	25.0	25.0	31.3	31.3	29.4	29.4	29.2	17.5	21.5	12.1	47.4	37.0	55.9	3.7	4.3	2.9	62.4	85.2	85.2	66.6	0.0	94.2	0.8	0.8
Algeria	DZA	58.1	96.7	96.7	12.5	12.5	24.6	24.6	60.3	30.2	1.3	42.7	71.7	91.8	43.2	69.6	0.0	98.5	48.7	0.0	0.0	74.0	100.0	30.7	40.5	40.5
Ecuador	ECU	43.9	71.6	71.6	11.5	11.5	23.1	23.1	28.6	18.0	10.9	23.0	45.3	40.8	49.3	8.6	3.1	11.8	67.3	23.9	23.9	54.9	0.0	77.6	100.0	100.0
Egypt	EGY	42.8	6.9	6.9	71.8	71.8	17.1	17.1	58.2	0.2	0.0	0.3	71.8	93.5	39.5	70.7	2.4	99.9	48.4	0.0	0.0	73.2	100.0	27.0	40.6	40.6
Eritrea	ERI	84.7	86.7	86.7	100.0	100.0	63.2	63.2	60.8	25.9	36.7	0.0	73.6	80.4	66.1	70.7	2.5	99.9	34.5	0.0	0.0	58.8	77.6	29.8	11.2	11.2
Ethiopia	ETH	41.8	56.0	56.0	44.3	44.3	12.0	12.0	43.5	27.9	37.0	13.8	53.7	61.7	44.4	44.7	0.0	63.2	72.7	4.1	4.1	76.4	100.0	40.7	100.0	100.0
Fiji	FJI	49.4	30.7	30.7	51.5	51.5	61.0	61.0	70.5	92.5	84.4	100.0	79.4	87.3	70.6	6.2	8.7	0.0	11.8	0.0	0.0	20.5	0.0	29.0	0.1	0.1
Micronesia FS	FSM	75.8	95.5	95.5	41.6	41.6	80.0	80.0	60.0	66.9	92.0	22.4	77.8	77.3	78.4	16.0	22.6	0.0	13.9	0.0	0.0	24.1	0.0	34.0	0.8	0.8

Country	ISO	Eco. vul.	Cpt #1	Ind #1	Cpt #2	Ind #2	Cpt #3	Ind #3	Env. vul.	Cpt #4	Ind #4	Ind #5	Cpt #5	Ind #6	Ind #7	Cpt #6	Ind #8	Ind #9	Soc. vul.	Cpt #7	Ind #10	Cpt #8	Ind #11	Ind #12	Cpt #9	Ind #13
Gabon	GAB	54.3	87.7	87.7	16.0	16.0	29.9	29.9	33.9	2.2	3.1	0.0	58.7	57.3	60.0	1.2	1.8	0.0	14.7	4.1	4.1	23.6	29.0	16.6	8.5	8.5
Georgia	GEO	38.8	19.2	19.2	42.6	42.6	48.2	48.2	31.3	32.1	3.2	45.3	43.5	61.5	0.0	4.6	2.0	6.1	7.8	0.0	0.0	11.9	13.9	9.5	6.4	6.4
Ghana	GHA	38.2	50.4	50.4	40.2	40.2	14.9	14.9	37.4	3.5	4.9	0.1	64.1	48.3	76.8	7.7	0.9	10.9	20.1	21.2	21.2	26.2	15.2	33.8	8.9	8.9
Guinea	GIN	66.9	84.4	84.4	72.3	72.3	33.0	33.0	36.8	2.2	3.1	0.0	63.6	37.4	81.8	1.7	2.0	1.1	18.7	12.0	12.0	28.2	28.2	28.2	10.3	10.3
Gambia	GMB	73.9	61.0	61.0	100.0	100.0	51.4	51.4	54.4	14.6	20.6	0.0	65.1	50.1	77.2	66.5	24.3	90.9	35.8	0.0	0.0	4.3	2.1	5.7	61.8	61.8
Guinea-Bissau	GNB	65.3	92.2	92.2	54.7	54.7	36.2	36.2	40.9	6.9	9.7	0.0	68.6	38.0	89.3	15.9	22.5	0.0	70.9	100.0	100.0	17.9	4.1	25.0	68.9	68.9
Equat. Guinea	GNQ	59.8	98.8	98.8	24.2	24.2	19.7	19.7	42.6	0.0	0.0	0.0	73.7	86.8	57.7	0.4	0.5	0.0	53.9	89.4	89.4	27.3	35.1	15.9	0.0	0.0
Grenada	GRD	87.4	94.2	94.2	100.0	100.0	63.6	63.6	59.2	75.6	37.9	100.0	69.0	67.8	70.3	3.8	5.3	0.0	40.8	0.0	0.0	70.7	0.0	100.0	0.0	0.0
Guatemala	GTM	21.4	25.4	25.4	7.6	7.6	25.9	25.9	35.5	49.4	57.5	39.7	36.6	13.5	50.0	1.4	2.0	0.0	41.7	15.1	15.1	70.7	0.0	100.0	0.3	0.3
Guyana	GUY	62.9	69.9	69.9	66.4	66.4	50.6	50.6	58.9	80.2	53.5	100.0	63.1	52.5	72.2	3.0	4.2	0.0	40.8	0.0	0.0	70.7	0.0	100.0	0.3	0.3
Honduras	HND	39.6	42.2	42.2	23.0	23.0	49.1	49.1	34.1	42.4	55.9	21.7	40.9	34.5	46.4	4.4	6.2	0.0	70.7	100.0	100.0	70.7	0.0	100.0	0.1	0.1
Haiti	HTI	72.7	76.1	76.1	93.4	93.4	36.7	36.7	70.5	90.4	79.6	100.0	81.9	100.0	58.3	4.8	3.7	5.7	60.2	100.0	100.0	29.7	0.0	42.0	0.0	0.0
Indonesia	IDN	12.5	0.1	0.1	15.2	15.2	15.5	15.5	31.4	17.3	5.2	24.0	51.0	25.0	67.7	7.5	10.7	0.0	11.4	4.7	4.7	19.2	0.1	27.2	0.5	0.5
India	IND	21.8	24.1	24.1	18.4	18.4	22.6	22.6	48.6	47.1	54.8	37.8	60.0	67.1	51.8	35.7	3.0	50.4	8.5	0.4	0.4	14.5	18.3	9.4	2.5	2.5
Iran	IRN	40.9	57.4	57.4	40.5	40.5	8.7	8.7	54.1	12.9	11.2	14.5	61.8	87.4	0.0	69.3	1.5	98.0	71.6	0.0	0.0	73.3	100.0	27.3	100.0	100.0
Iraq	IRQ	65.4	97.0	97.0	48.7	48.7	32.6	32.6	55.4	0.3	0.4	0.3	64.5	88.2	23.3	71.0	9.2	100.0	70.9	6.7	6.7	71.0	100.0	8.5	100.0	100.0
Jamaica	JAM	51.6	63.8	63.8	27.6	27.6	56.2	56.2	58.2	58.8	20.5	80.6	81.8	93.8	67.7	4.6	6.5	0.0	29.8	6.8	6.8	51.1	0.0	72.3	0.1	0.1
Jordan	JOR	39.1	32.5	32.5	23.6	23.6	54.5	54.5	55.0	0.0	0.0	0.0	63.8	90.1	5.3	70.7	0.0	100.0	71.8	0.0	0.0	74.0	100.0	30.9	100.0	100.0
Kazakhstan	KAZ	39.5	64.7	64.7	19.5	19.5	10.3	10.3	53.8	1.0	0.8	1.1	61.7	87.2	0.0	70.0	0.0	98.9	4.4	0.0	0.0	7.7	0.6	10.8	0.6	0.6
Kenya	KEN	19.8	26.5	26.5	12.0	12.0	18.3	18.3	55.4	31.8	44.6	5.9	68.1	76.4	58.8	59.6	0.5	84.3	72.9	2.7	2.7	77.0	100.0	43.2	100.0	100.0
Kyrgyzstan	KGZ	38.9	27.7	27.7	33.0	33.0	51.7	51.7	46.1	18.1	25.5	1.9	58.6	82.8	0.0	51.3	0.0	72.5	7.2	0.0	0.0	12.2	1.2	17.1	2.6	2.6
Cambodia	KHM	55.9	67.3	67.3	20.6	20.6	66.4	66.4	54.1	57.1	57.5	56.7	73.7	59.2	85.8	10.1	14.3	0.0	49.5	83.7	83.7	18.3	4.0	25.6	0.0	0.0
Kiribati	KIR	66.7	70.6	70.6	69.5	69.5	59.3	59.3	50.3	0.8	1.1	0.0	53.3	46.9	59.0	68.9	97.4	0.0	12.8	0.0	0.0	22.2	0.0	31.3	0.0	0.0
St Kitts & Nevis	KNA	58.1	90.5	90.5	34.3	34.3	27.4	27.4	60.1	8.9	0.6	12.6	75.8	78.8	72.6	70.9	6.5	100.0	35.2	0.0	0.0	61.0	0.0	86.3	0.8	0.8
Kuwait	KWT	51.6	85.3	85.3	19.9	19.9	17.9	17.9	58.9	0.0	0.0	0.0	73.1	91.1	48.6	71.1	10.6	100.0	43.6	0.0	0.0	75.5	100.0	37.3	3.1	3.1
Lao PDR	LAO	24.8	19.8	19.8	18.3	18.3	33.4	33.4	49.1	28.6	34.5	21.2	80.1	82.9	77.1	0.0	0.0	0.0	58.2	100.0	100.0	13.3	13.2	13.5	0.0	0.0
Lebanon	LBN	43.6	47.8	47.8	40.3	40.3	42.2	42.2	50.0	7.4	10.5	0.0	49.3	69.8	0.0	70.7	0.9	100.0	70.8	0.0	0.0	71.0	100.0	9.2	100.0	100.0
Liberia	LBR	72.7	75.0	75.0	100.0	100.0	14.8	14.8	28.2	0.6	0.9	0.0	48.8	4.6	68.9	0.6	0.8	0.0	82.7	100.0	100.0	22.4	6.8	30.9	100.0	100.0
Libya	LBY	89.1	99.7	99.7	100.0	100.0	62.4	62.4	57.7	0.2	0.2	0.1	70.6	93.0	36.4	70.7	0.7	100.0	30.9	0.0	0.0	43.2	57.1	21.6	31.6	31.6
Saint Lucia	LCA	86.5	94.9	94.9	60.8	60.8	98.7	98.7	59.9	61.8	85.7	16.9	83.3	92.6	72.8	4.0	5.7	0.0	70.7	100.0	100.0	70.7	0.0	100.0	0.5	0.5
Sri Lanka	LKA	26.7	37.9	37.9	14.4	14.4	22.1	22.1	44.3	49.7	53.6	45.5	58.1	35.3	74.3	5.2	7.3	0.6	58.0	100.0	100.0	9.3	0.9	13.2	0.5	0.5
Lesotho	LSO	72.7	83.2	83.2	29.5	29.5	89.9	89.9	55.5	70.7	100.0	0.0	50.4	69.3	16.4	41.4	0.0	58.6	40.9	0.0	0.0	70.8	3.8	100.0	0.6	0.6
Morocco	MAR	28.8	13.0	13.0	15.3	15.3	45.7	45.7	53.2	8.1	5.1	10.3	58.5	82.8	0.0	70.7	0.3	100.0	4.2	0.0	0.0	7.0	8.1	5.6	1.9	1.9
Madagascar	MDG	51.0	33.7	33.7	75.0	75.0	32.3	32.3	40.1	54.6	28.7	71.7	41.6	37.1	45.7	11.0	2.9	15.4	21.1	25.2	25.2	26.5	5.5	37.1	0.0	0.0
Maldives	MDV	83.1	95.4	95.4	56.2	56.2	91.8	91.8	67.8	70.9	6.3	100.0	63.9	47.8	76.7	68.6	97.0	0.0	58.0	100.0	100.0	9.3	0.9	13.2	0.0	0.0
Mexico	MEX	32.9	51.9	51.9	16.5	16.5	17.0	17.0	44.5	19.0	8.2	25.6	56.2	74.9	26.4	49.2	4.5	69.4	40.8	0.0	0.0	70.7	0.0	100.0	1.7	1.7
Marshall Islands	MHL	58.6	90.6	90.6	45.8	45.8	1.9	1.9	50.4	25.7	32.5	16.2	53.4	0.0	75.5	64.2	90.9	0.0	10.7	0.0	0.0	18.5	0.0	26.2	0.0	0.0
Mali	MLI	52.8	77.3	77.3	33.9	33.9	35.4	35.4	62.3	32.6	46.1	0.0	79.5	84.0	74.9	65.2	0.0	92.2	17.4	2.1	2.1	22.4	13.9	28.4	20.2	20.2
Myanmar	MMR	39.8	41.5	41.5	43.2	43.2	34.3	34.3	48.7	63.2	8.4	88.9	55.7	49.9	61.0	5.4	7.6	0.0	8.8	0.0	0.0	15.2	3.9	21.1	0.0	0.0
Mongolia	MNG	55.9	73.3	73.3	27.8	27.8	56.7	56.7	66.5	52.0	73.3	6.3	77.8	88.6	65.4	67.1	0.0	94.8	1.2	0.0	0.0	2.0	0.0	2.8	0.0	0.0
Mozambique	MOZ	43.4	45.8	45.8	33.0	33.0	49.6	49.6	55.1	69.7	38.8	90.6	54.7	63.6	44.1	35.3	3.6	49.8	32.7	17.5	17.5	53.8	2.1	76.0	3.0	3.0
Mauritania	MRT	70.1	82.4	82.4	55.6	55.6	69.8	69.8	73.8	70.7	100.0	0.2	79.6	90.5	67.0	70.7	1.4	100.0	69.6	58.2	58.2	33.7	39.6	26.6	100.0	100.0
Mauritius	MUS	44.6	34.5	34.5	37.1	37.1	58.2	58.2	24.6	4.3	1.6	5.9	42.1	29.3	51.8	5.4	7.6	0.0	43.3	0.0	0.0	75.1	100.0	35.6	0.2	0.2

Country	ISO	Eco. vul.	Cpt #1	Ind #1	Cpt #2	Ind #2	Cpt #3	Ind #3	Env. vul.	Cpt #4	Ind #4	Ind #5	Cpt #5	Ind #6	Ind #7	Cpt #6	Ind #8	Ind #9	Soc. vul.	Cpt #7	Ind #10	Cpt #8	Ind #11	Ind #12	Cpt #9	Ind #13
Malawi	MWI	44.3	68.2	68.2	31.8	31.8	15.2	15.2	53.3	69.6	93.5	30.6	53.1	63.0	40.8	29.5	0.0	41.8	25.8	37.3	37.3	22.8	5.7	31.8	9.7	9.7
Malaysia	MYS	38.5	33.5	33.5	16.1	16.1	55.4	55.4	44.1	6.7	7.0	6.4	75.8	82.6	68.4	6.7	9.4	0.0	35.0	0.0	0.0	11.3	4.0	15.5	59.6	59.6
Namibia	NAM	42.6	47.7	47.7	21.6	21.6	52.1	52.1	69.8	71.0	100.0	8.7	67.7	79.8	53.0	70.7	0.3	100.0	66.2	96.1	96.1	60.2	2.1	85.1	16.7	16.7
Niger	NER	28.8	36.3	36.3	29.4	29.4	17.4	17.4	76.7	72.1	100.0	19.9	86.2	87.5	84.9	70.7	0.0	100.0	73.1	19.9	19.9	75.2	100.0	36.0	100.0	100.0
Nigeria	NGA	60.7	84.0	84.0	62.7	62.7	8.2	8.2	44.4	3.3	4.5	1.3	67.6	55.8	77.7	36.5	1.2	51.6	17.2	2.7	2.7	29.7	29.5	30.0	1.6	1.6
Nicaragua	NIC	40.8	41.9	41.9	13.2	13.2	55.3	55.3	31.7	35.0	28.4	40.6	41.9	26.4	53.1	5.0	7.0	0.0	70.7	100.0	100.0	70.7	0.0	100.0	0.8	0.8
Nepal	NPL	44.9	53.6	53.6	34.8	34.8	44.4	44.4	54.7	73.2	26.8	100.0	58.8	76.9	31.7	12.2	0.0	17.2	26.1	40.2	40.2	6.8	0.6	9.5	19.6	19.6
Nauru	NRU	76.6	70.7	70.7	100.0	100.0	51.0	51.0	28.8	0.0	0.0	0.0	48.4	8.2	67.9	12.4	17.6	0.0	58.9	0.0	0.0	20.0	0.0	28.3	100.0	100.0
Oman	OMN	38.8	51.4	51.4	30.7	30.7	30.6	30.6	69.4	51.5	0.6	72.8	82.8	92.0	72.4	70.5	1.2	99.6	41.0	0.0	0.0	71.0	100.0	9.1	0.9	0.9
Pakistan	PAK	35.3	51.6	51.6	27.3	27.3	18.3	18.3	62.4	61.3	22.9	83.6	62.4	86.2	18.9	63.6	1.9	90.0	71.3	3.5	3.5	72.3	100.0	21.4	100.0	100.0
Panama	PAN	31.2	24.7	24.7	25.0	25.0	41.0	41.0	30.5	3.5	3.3	3.8	52.6	46.1	58.5	3.6	5.0	0.0	43.5	0.0	0.0	58.7	0.0	83.0	47.3	47.3
Peru	PER	28.5	41.9	41.9	19.3	19.3	17.8	17.8	31.8	21.1	25.4	15.7	48.1	53.6	41.8	16.5	0.4	23.3	36.3	39.5	39.5	48.9	0.0	69.2	1.1	1.1
Philippines	PHL	39.8	59.9	59.9	25.4	25.4	22.7	22.7	57.0	79.4	99.8	51.5	58.5	41.8	71.4	5.3	7.6	0.0	12.2	20.6	20.6	4.6	0.2	6.4	0.1	0.1
Palau	PLW	75.0	90.5	90.5	42.6	42.6	82.9	82.9	53.8	40.7	57.5	0.0	82.9	78.5	87.1	11.9	16.8	0.0	11.5	0.0	0.0	19.8	0.0	28.0	0.0	0.0
Papua N G	PNG	33.7	52.1	52.1	23.0	23.0	12.6	12.6	25.5	22.1	31.0	4.1	38.2	0.0	54.0	3.1	4.4	0.0	18.3	24.1	24.1	2.8	0.4	3.9	20.3	20.3
DPR of Korea	PRK	28.5	47.8	47.8	5.2	5.2	10.7	10.7	51.2	72.0	100.0	19.5	51.6	72.9	0.0	3.2	4.6	0.0	4.9	8.3	8.3	1.9	0.0	2.8	0.0	0.0
Paraguay	PRY	41.0	57.4	57.4	33.9	33.9	24.4	24.4	39.7	22.3	31.5	1.4	55.7	71.9	32.4	33.6	0.0	47.6	63.2	100.0	100.0	44.6	0.0	63.1	1.1	1.1
Qatar	QAT	45.6	74.0	74.0	23.3	23.3	15.1	15.1	45.0	0.0	0.0	0.0	76.4	92.6	55.6	15.2	21.4	0.0	36.6	0.0	0.0	63.4	89.5	4.0	1.0	1.0
Rwanda	RWA	33.3	33.3	33.3	41.5	41.5	22.2	22.2	40.8	6.8	8.7	4.1	70.4	71.8	68.9	0.0	0.0	0.0	60.5	4.1	4.1	30.8	33.1	28.3	100.0	100.0
Saudi Arabia	SAU	49.8	82.8	82.8	20.0	20.0	13.2	13.2	59.5	1.2	0.1	1.6	75.1	91.3	54.1	70.7	0.8	100.0	41.7	0.3	0.3	72.2	100.0	21.0	0.2	0.2
Sudan	SDN	62.0	38.7	38.7	100.0	100.0	7.2	7.2	65.6	10.5	14.7	2.4	88.4	87.0	89.7	70.7	0.2	100.0	73.0	7.8	7.8	77.1	100.0	43.4	100.0	100.0
Senegal	SEN	34.2	6.3	6.3	17.6	17.6	56.2	56.2	55.8	11.1	15.2	4.0	74.9	64.3	84.1	59.9	6.7	84.5	27.6	32.6	32.6	30.6	30.6	30.7	16.6	16.6
Singapore	SGP	61.5	34.0	34.0	14.0	14.0	100.0	100.0	31.0	0.0	0.0	0.0	52.2	5.2	73.7	12.4	17.6	0.0	3.5	3.8	3.8	4.6	0.3	6.5	0.0	0.0
Solomon Islands	SLB	56.7	73.8	73.8	45.5	45.5	46.1	46.1	29.1	24.8	32.0	14.2	43.7	0.0	61.8	4.0	5.6	0.0	59.2	100.0	100.0	22.4	0.0	31.7	0.1	0.1
Sierra Leone	SLE	67.3	57.4	57.4	100.0	100.0	16.9	16.9	36.8	2.7	0.7	3.8	63.5	41.1	79.9	4.7	6.6	0.0	43.2	72.3	72.3	18.7	4.7	26.0	3.3	3.3
El Salvador	SLV	31.7	26.2	26.2	18.7	18.7	44.5	44.5	50.4	76.5	41.3	100.0	41.9	27.8	52.3	4.1	5.8	0.0	70.7	100.0	100.0	70.7	0.0	100.0	0.1	0.1
Somalia	SOM	62.3	40.6	40.6	0.0	0.0	100.0	100.0	83.5	100.0	100.0	100.0	76.9	81.9	71.6	70.7	0.7	100.0	30.2	44.7	44.7	24.5	15.7	30.9	11.4	11.4
South Sudan	SSD	80.5	97.2	97.2	100.0	100.0	1.3	1.3	64.0	50.9	72.0	0.0	84.2	64.7	100.0	51.1	0.0	72.2	73.1	16.6	16.6	75.7	100.0	38.3	100.0	100.0
Sao Tome & Pr.	STP	66.8	83.1	83.1	56.0	56.0	57.9	57.9	31.2	0.0	0.0	0.0	54.1	53.7	54.5	1.2	1.7	0.0	60.8	100.0	100.0	33.2	36.4	29.6	0.0	0.0
Suriname	SUR	55.2	79.1	79.1	38.8	38.8	37.2	37.2	30.5	2.9	4.1	0.0	52.5	9.7	73.6	5.4	7.7	0.0	37.0	0.0	0.0	64.2	0.0	90.7	0.8	0.8
Eswatini	SWZ	51.4	63.3	63.3	40.3	40.3	47.8	47.8	53.3	70.7	100.0	0.0	43.8	57.3	23.4	40.0	0.0	56.6	41.4	0.0	0.0	70.9	7.3	100.0	11.1	11.1
Seychelles	SYC	69.0	53.4	53.4	37.7	37.7	100.0	100.0	41.8	25.4	14.2	33.1	56.5	36.2	71.2	37.4	52.9	0.0	13.2	0.0	0.0	22.9	9.4	31.0	0.0	0.0
Syria	SYR	57.6	47.8	47.8	75.4	75.4	44.6	44.6	53.5	3.9	5.6	0.0	59.6	84.4	0.0	70.7	0.1	100.0	65.6	0.0	0.0	73.4	100.0	27.6	86.8	86.8
Chad	TCD	82.0	99.3	99.3	100.0	100.0	17.3	17.3	65.1	30.3	42.9	0.8	85.7	83.3	88.1	66.8	0.0	94.5	73.5	17.2	17.2	76.8	100.0	42.4	100.0	100.0
Togo	TGO	38.9	12.5	12.5	24.7	24.7	61.5	61.5	36.6	2.7	3.8	0.0	62.9	51.3	72.7	6.8	0.8	9.6	25.6	7.1	7.1	20.6	14.0	25.6	38.5	38.5
Thailand	THA	35.4	29.7	29.7	17.8	17.8	50.6	50.6	64.5	81.2	73.8	88.0	76.6	64.4	87.2	5.0	7.1	0.0	18.9	7.6	7.6	17.2	14.4	19.6	26.9	26.9
Tajikistan	TJK	49.1	64.0	64.0	44.8	44.8	33.4	33.4	54.2	74.1	31.1	100.0	51.8	73.3	0.0	25.1	0.0	35.6	41.9	4.2	4.2	72.2	100.0	20.5	5.6	5.6
Turkmenistan	TKM	56.8	95.7	95.7	19.1	19.1	12.2	12.2	54.9	0.0	0.0	0.0	63.6	89.9	0.0	70.7	0.0	100.0	42.0	0.0	0.0	72.7	100.0	23.7	0.1	0.1
Timor-Leste	TLS	67.5	48.1	48.1	100.0	100.0	36.6	36.6	31.0	7.4	7.9	6.8	53.0	39.2	63.8	5.4	2.6	7.2	10.3	17.6	17.6	2.8	0.4	3.9	0.0	0.0
Tonga	TON	59.7	70.5	70.5	41.3	41.3	63.3	63.3	61.1	92.9	85.2	100.0	47.0	27.2	60.6	18.5	26.2	0.0	9.6	0.0	0.0	16.6	0.0	23.5	0.0	0.0
Trini. & Tob.	TTO	53.2	66.6	66.6	47.6	47.6	42.2	42.2	48.1	5.1	7.2	0.1	82.9	92.8	71.7	6.4	9.0	0.0	41.2	0.0	0.0	70.7	0.0	100.0	9.4	9.4
Tunisia	TUN	30.4	31.6	31.6	12.1	12.1	40.4	40.4	53.1	0.5	0.6	0.5	61.6	85.9	14.3	68.2	4.1	96.4	42.3	0.0	0.0	73.2	100.0	26.6	1.8	1.8
Turkey	TUR	17.6	23.1	23.1	17.4	17.4	10.0	10.0	45.0	2.9	0.9	4.0	56.4	79.7	0.0	53.8	0.7	76.1	71.3	0.1	0.1	72.6	100.0	23.2	100.0	100.0

Country	ISO	Eco. vul.	Cpt #1	Ind #1	Cpt #2	Ind #2	Cpt #3	Ind #3	Env. vul.	Cpt #4	Ind #4	Ind #5	Cpt #5	Ind #6	Ind #7	Cpt #6	Ind #8	Ind #9	Soc. vul.	Cpt #7	Ind #10	Cpt #8	Ind #11	Ind #12	Cpt #9	Ind #13
Tuvalu	TUV	66.0	98.6	98.6	50.2	50.2	29.1	29.1	50.8	41.0	58.0	0.0	56.2	0.0	79.5	53.7	76.0	0.0	7.2	0.0	0.0	12.5	0.0	17.7	0.0	0.0
Tanzania	TZA	19.8	28.2	28.2	15.0	15.0	12.4	12.4	42.6	11.0	14.5	5.5	59.3	65.7	52.0	42.5	7.9	59.5	40.5	4.3	4.3	25.1	24.4	25.9	65.4	65.4
Uganda	UGA	35.2	41.0	41.0	41.4	41.4	17.9	17.9	41.4	6.7	9.4	0.1	70.7	63.5	77.2	10.1	0.0	14.2	72.6	20.7	20.7	73.5	100.0	28.4	100.0	100.0
Uruguay	URY	29.7	46.7	46.7	17.2	17.2	12.9	12.9	31.9	5.3	4.2	6.3	54.9	77.7	0.0	1.0	1.4	0.0	30.6	0.0	0.0	53.0	0.0	74.9	1.7	1.7
Uzbekistan	UZB	28.0	25.5	25.5	40.4	40.4	8.2	8.2	53.6	0.1	0.1	0.0	62.5	88.3	0.0	68.6	0.0	97.0	42.1	0.0	0.0	72.9	100.0	24.9	0.0	0.0
St Vinc. & Gren	VCT	62.0	75.5	75.5	58.6	58.6	49.0	49.0	62.3	73.9	30.4	100.0	78.6	87.2	68.9	2.8	4.0	0.0	70.7	100.0	100.0	70.7	0.0	100.0	0.0	0.0
Venezuela	VEN	49.7	75.0	75.0	42.2	42.2	0.2	0.2	32.3	0.8	0.7	0.8	55.4	46.5	63.0	7.9	4.1	10.4	61.1	0.0	0.0	68.0	0.0	96.2	81.2	81.2
Viet Nam	VNM	50.0	65.0	65.0	7.1	7.1	56.9	56.9	49.7	57.8	26.6	77.2	61.0	51.8	69.0	19.2	27.1	0.0	11.1	11.3	11.3	15.6	1.7	22.0	0.0	0.0
Vanuatu	VUT	62.1	80.0	80.0	53.9	53.9	47.6	47.6	62.7	100.0	100.0	100.0	42.4	0.0	60.0	2.1	3.0	0.0	9.3	0.0	0.0	16.1	0.0	22.8	0.0	0.0
Samoa	WSM	53.7	77.7	77.7	9.4	9.4	50.2	50.2	59.5	70.9	6.5	100.0	74.7	65.6	82.8	2.4	3.4	0.0	58.2	100.0	100.0	12.6	0.0	17.8	0.3	0.3
Yemen	YEM	74.0	66.8	66.8	100.0	100.0	44.5	44.5	59.7	7.4	1.2	10.4	75.1	85.5	62.9	70.6	0.6	99.9	85.7	100.0	100.0	44.8	63.3	3.0	100.0	100.0
South Africa	ZAF	20.3	22.8	22.8	15.8	15.8	21.6	21.6	54.1	19.1	25.7	8.2	65.2	79.2	47.2	64.5	0.2	91.2	39.5	7.4	7.4	62.4	4.2	88.1	27.0	27.0
Zambia	ZMB	51.6	70.7	70.7	46.2	46.2	29.2	29.2	38.6	21.8	30.9	0.0	55.0	57.4	52.5	31.1	0.0	44.0	32.1	17.7	17.7	34.8	16.6	46.4	39.5	39.5
Zimbabwe	ZWE	65.7	48.2	48.2	100.0	100.0	24.7	24.7	64.3	76.1	100.0	39.9	47.4	63.1	22.5	66.0	0.0	93.3	48.7	54.9	54.9	63.5	4.7	89.6	8.8	8.8
Mean		49.8	58.9	58.9	40.1	40.1	37.3	37.3	49.5	31.1	28.8	25.5	63.1	64.0	53.4	31.8	8.6	37.7	41.4	25.4	25.4	43.4	29.4	40.9	26.0	26.0
Median		50.5	62.2	62.2	34.1	34.1	34.0	34.0	50.5	19.0	15.0	6.1	61.7	69.6	59.8	21.4	2.0	11.4	40.8	4.3	4.3	41.1	4.7	29.3	2.0	2.0
SD		17.3	25.6	25.6	26.1	26.1	23.4	23.4	12.9	30.9	32.6	36.1	12.3	25.3	26.3	28.3	18.7	42.3	22.7	36.8	36.8	26.3	40.3	31.6	38.0	38.0

Note: Eco. vul., Env. vul., Soc. vul. refer respectively to Economic vulnerability, Environmental vulnerability and Social vulnerability. Ind and Cpt refer respectively to Indicator and Concept. The number (#) associated to each concept and indicator corresponds to the description of concepts and indicators provided in Chapter 3.

Lack of structural index: concepts and individual indicators

Country	ISO	L. Eco. res.	Cpt #10	Ind #14	Cpt #11	Ind #15	Cpt #12	Ind #16	Ind #17	L. Env. res.	Cpt #13	Ind #18	Cpt #14	Ind #19	Cpt # 15	Ind #20	L. Soc. res	Cpt #16	Ind #21	Ind #22	Cpt #17	Ind #23	Ind #24	Ind #25	Cpt #18	Ind #26
Afghanistan	AFG	50.8	47.2	47.2	30.5	30.5	67.7	80.9	51.1	72.5	53.6	53.6	56.6	56.6	98.5	98.5	58.4	56.6	79.0	12.5	71.9	62.0	56.9	91.9	43.2	43.2
Angola	AGO	47.2	59.1	59.1	32.1	32.1	46.7	52.0	40.6	49.2	40.4	40.4	65.9	65.9	35.7	35.7	54.6	59.8	84.5	5.3	65.8	57.2	70.1	69.2	32.2	32.2
Un. Arab Em.	ARE	43.3	29.5	29.5	42.0	42.0	54.6	61.5	46.8	97.9	96.2	96.2	98.2	98.2	99.4	99.4	25.8	20.2	0.4	28.5	2.8	1.5	4.4	1.2	39.7	39.7
Argentina	ARG	63.5	89.1	89.1	29.0	29.0	57.6	75.0	31.5	54.0	37.6	37.6	0.0	0.0	85.6	85.6	21.6	29.5	41.6	3.1	11.0	6.5	8.8	15.6	20.4	20.4
Armenia	ARM	42.6	23.3	23.3	52.2	52.2	46.8	63.2	19.6	67.8	47.9	47.9	65.5	65.5	84.8	84.8	41.3	28.0	33.1	21.7	10.6	7.9	8.9	13.9	64.9	64.9
Antig. & Barb.	ATG	59.8	47.1	47.1	81.4	81.4	43.4	35.7	49.9	67.8	62.1	62.1	89.5	89.5	44.0	44.0	51.0	37.2	25.0	46.3	20.8	13.8	4.2	33.0	77.3	77.3
Azerbaijan	AZE	44.2	29.7	29.7	41.8	41.8	56.8	51.8	61.4	65.6	58.0	58.0	52.8	52.8	82.3	82.3	42.3	28.0	28.9	27.1	16.6	7.6	17.9	21.3	65.6	65.6
Burundi	BDI	61.5	74.9	74.9	40.8	40.8	63.9	78.7	44.4	69.9	56.8	56.8	72.0	72.0	78.9	78.9	70.1	95.6	91.1	100.0	69.4	58.5	53.1	90.5	27.9	27.9
Benin	BEN	39.8	41.3	41.3	40.5	40.5	37.6	52.1	10.3	51.4	56.9	56.9	40.3	40.3	55.5	55.5	76.4	56.3	75.9	23.9	85.3	92.1	83.8	79.5	84.1	84.1
Burkina Faso	BFA	46.7	55.4	55.4	35.9	35.9	46.6	60.9	25.0	66.4	60.3	60.3	37.2	37.2	90.6	90.6	76.4	58.7	81.4	16.6	90.5	86.8	83.9	100.0	76.6	76.6
Bangladesh	BGD	24.4	28.0	28.0	18.0	18.0	26.2	36.1	8.6	73.8	60.2	60.2	88.7	88.7	69.5	69.5	61.2	74.9	35.0	100.0	47.2	57.7	27.7	50.8	58.3	58.3
Bahrain	BHR	46.1	24.5	24.5	57.6	57.6	49.6	44.2	54.4	99.6	100.0	100.0	99.4	99.4	99.5	99.5	61.0	71.3	12.9	100.0	9.9	0.0	4.6	16.6	77.3	77.3
Bahamas	BHS	65.8	46.5	46.5	69.6	69.6	77.4	44.7	100.0	75.6	50.2	50.2	93.7	93.7	76.3	76.3	43.6	21.0	24.7	16.4	7.9	6.1	12.1	1.7	72.2	72.2
Belize	BLZ	61.7	60.7	60.7	69.6	69.6	53.7	65.9	37.8	29.3	19.9	19.9	36.0	36.0	29.8	29.8	54.0	26.7	37.7	3.3	23.6	13.9	9.8	37.1	86.4	86.4
Bolivia	BOL	68.1	99.8	99.8	40.6	40.6	48.0	63.3	24.6	28.9	23.8	23.8	16.6	16.6	40.7	40.7	28.4	31.8	44.9	2.0	37.2	46.7	34.4	28.0	4.9	4.9
Brazil	BRA	59.0	78.9	78.9	15.7	15.7	63.1	68.3	57.4	33.7	23.8	23.8	38.9	38.9	36.6	36.6	48.0	20.1	27.9	5.2	27.7	15.1	12.3	43.8	75.8	75.8
Barbados	BRB	65.4	50.3	50.3	72.1	72.1	71.5	73.2	69.7	78.3	68.6	68.6	94.4	94.4	69.0	69.0	57.7	74.5	33.2	100.0	17.2	4.1	10.0	27.7	64.3	64.3
Brunei Darus.	BRN	62.9	47.7	47.7	68.6	68.6	70.0	21.8	96.5	57.2	26.8	26.8	95.3	95.3	0.0	0.0	50.2	20.1	23.2	16.5	20.3	3.9	8.3	34.0	82.2	82.2
Bhutan	BTN	46.4	46.7	46.7	63.8	63.8	13.8	0.0	19.6	43.6	10.6	10.6	73.0	73.0	16.2	16.2	53.7	20.2	28.3	4.0	47.7	32.7	25.5	71.5	77.2	77.2
Botswana	BWA	67.8	96.6	96.6	54.5	54.5	38.7	29.7	46.0	74.8	55.3	55.3	76.6	76.6	88.7	88.7	53.3	32.1	45.4	0.5	32.4	27.8	42.9	23.2	80.3	80.3
Central Af. Rep.	CAF	54.6	63.6	63.6	48.2	48.2	50.8	68.6	21.6	17.5	22.6	22.6	18.9	18.9	6.7	6.7	80.1	68.7	97.2	1.4	90.4	90.8	100.0	79.3	79.7	79.7
Chile	CHL	63.2	90.9	90.9	36.4	36.4	49.1	54.1	43.4	65.0	18.2	18.2	81.7	81.7	75.4	75.4	37.2	21.5	30.0	5.2	10.5	1.1	4.3	17.6	59.8	59.8
China	CHN	16.8	21.6	21.6	0.0	0.0	19.5	0.0	27.6	69.0	49.3	49.3	81.0	81.0	72.7	72.7	38.3	30.4	28.0	32.6	30.0	17.0	5.5	48.8	50.7	50.7
Côte D'Ivoire	CIV	41.7	44.7	44.7	33.9	33.9	45.5	63.6	10.2	33.4	44.9	44.9	35.6	35.6	7.6	7.6	69.1	52.3	71.8	17.9	74.1	74.9	76.1	71.2	78.1	78.1
Cameroon	CMR	38.5	43.4	43.4	33.8	33.8	37.6	52.9	5.4	30.8	32.5	32.5	38.0	38.0	18.8	18.8	53.4	53.3	74.5	11.9	65.1	62.0	70.7	62.3	38.3	38.3
Dem. R. Congo	COD	44.5	53.8	53.8	23.5	23.5	49.9	59.9	37.4	42.3	32.6	32.6	63.6	63.6	16.2	16.2	73.5	64.4	90.7	8.4	75.8	89.2	79.7	54.2	79.4	79.4
Congo	COG	45.8	53.7	53.7	47.2	47.2	34.4	0.0	48.7	46.9	19.2	19.2	75.9	75.9	21.8	21.8	67.1	49.8	70.3	3.2	67.0	87.9	43.3	62.2	80.8	80.8
Colombia	COL	48.7	64.3	64.3	28.0	28.0	46.9	57.8	32.5	42.2	19.1	19.1	65.9	65.9	25.2	25.2	41.1	21.6	29.0	9.5	23.3	11.9	11.0	37.0	63.6	63.6
Comoros	COM	64.2	64.8	64.8	63.0	63.0	64.8	77.1	49.4	52.6	52.3	52.3	71.8	71.8	20.4	20.4	78.6	81.1	65.0	94.5	67.2	70.0	58.6	72.3	86.3	86.3
Cabo Verde	CPV	46.5	40.2	40.2	66.6	66.6	20.8	16.7	24.3	79.5	61.8	61.8	80.0	80.0	93.5	93.5	41.8	32.9	34.3	31.5	40.5	32.3	12.4	61.0	50.2	50.2
Costa Rica	CRI	58.8	64.2	64.2	47.7	47.7	63.0	65.8	60.1	50.6	25.5	25.5	76.8	76.8	33.5	33.5	22.5	26.3	30.2	21.7	22.0	3.2	5.6	37.5	18.7	18.7
Cuba	CUB	54.3	51.5	51.5	40.7	40.7	67.4	91.5	26.4	42.0	44.3	44.3	37.0	37.0	44.4	44.4	16.1	27.1	30.5	23.2	6.5	10.5	2.8	3.0	0.0	0.0
Djibouti	DJI	51.5	39.3	39.3	61.8	61.8	50.9	44.0	57.0	90.3	67.3	67.3	99.6	99.6	100.0	100.0	53.9	31.4	43.3	9.9	61.4	41.8	54.2	81.5	62.9	62.9
Dominica	DMA	64.2	48.8	48.8	83.9	83.9	54.4	66.4	38.9	33.6	46.1	46.1	35.3	35.3	4.0	4.0	38.1	23.9	26.6	20.8	30.2	22.2	18.0	43.7	53.6	53.6
Dominican Rep.	DOM	42.7	49.0	49.0	41.2	41.2	37.2	50.3	15.3	55.4	48.3	48.3	76.6	76.6	31.6	31.6	41.7	44.9	39.3	49.8	27.7	16.4	30.9	32.8	49.3	49.3
Algeria	DZA	19.7	0.0	0.0	29.4	29.4	17.2	13.7	20.2	77.5	68.9	68.9	59.4	59.4	98.7	98.7	35.6	30.9	43.6	3.5	29.4	14.4	20.3	44.4	44.5	44.5
Ecuador	ECU	50.1	70.0	70.0	37.2	37.2	35.4	46.2	19.0	45.2	24.1	24.1	71.3	71.3	21.3	21.3	24.7	29.2	38.5	15.1	24.0	14.8	10.8	37.4	20.0	20.0
Egypt	EGY	34.1	3.0	3.0	22.2	22.2	54.7	75.8	15.8	97.3	100.0	100.0	92.1	92.1	99.7	99.7	48.7	38.1	48.6	23.2	20.4	4.5	17.4	30.3	72.5	72.5
Eritrea	ERI	51.9	31.9	31.9	50.8	50.8	66.9	94.2	9.5	74.8	58.1	58.1	59.6	59.6	99.4	99.4	60.4	51.2	72.1	6.0	73.0	95.6	37.2	74.1	54.7	54.7
Ethiopia	ETH	40.4	61.8	61.8	21.3	21.3	24.9	22.2	27.4	66.2	54.8	54.8	67.0	67.0	75.2	75.2	58.0	51.2	68.0	25.0	82.3	100.0	47.6	89.9	26.1	26.1
Fiji	FJI	69.9	91.5	91.5	62.5	62.5	48.8	66.8	17.2	41.6	22.0	22.0	68.0	68.0	8.5	8.5	43.4	29.0	39.6	10.8	17.4	5.0	23.8	17.7	67.2	67.2

Country	ISO	L. Eco. res.	Cpt #10	Ind #14	Cpt #11	Ind #15	Cpt #12	Ind #16	Ind #17	L. Env. res.	Cpt #13	Ind #18	Cpt #14	Ind #19	Cpt # 15	Ind #20	L. Soc. res	Cpt #16	Ind #21	Ind #22	Cpt #17	Ind #23	Ind #24	Ind #25	Cpt #18	Ind #26
Micronesia FS	FSM	76.6	73.8	73.8	80.1	80.1	75.9	39.1	100.0	71.0	27.4	27.4	66.0	66.0	100.0	100.0	64.2	40.5	45.2	35.1	32.1	19.5	22.5	46.9	98.5	98.5
Gabon	GAB	53.0	48.1	48.1	55.0	55.0	55.6	44.1	65.1	31.6	13.3	13.3	52.8	52.8	4.6	4.6	52.0	39.9	56.4	1.5	43.4	56.3	38.3	31.6	68.0	68.0
Georgia	GEO	38.2	1.2	1.2	49.6	49.6	43.8	53.1	31.7	55.0	30.0	30.0	77.8	77.8	46.2	46.2	43.7	29.7	40.3	11.6	9.2	14.4	6.9	0.0	69.1	69.1
Ghana	GHA	38.0	43.2	43.2	32.4	32.4	37.5	52.4	8.0	55.7	55.7	55.7	64.6	64.6	44.9	44.9	62.4	46.9	58.9	30.5	61.3	87.4	43.0	42.0	75.7	75.7
Guinea	GIN	40.7	44.4	44.4	39.9	39.9	37.5	48.5	21.5	30.1	27.4	27.4	38.2	38.2	22.6	22.6	69.8	53.9	75.4	11.2	91.9	82.5	93.2	99.2	57.3	57.3
Gambia	GMB	47.7	39.8	39.8	54.4	54.4	48.0	60.2	31.3	63.0	53.1	53.1	60.6	60.6	73.5	73.5	70.8	68.2	79.2	54.9	61.9	58.0	47.8	76.4	81.1	81.1
Guinea-Bissau	GNB	60.2	41.5	41.5	56.0	56.0	77.5	100.0	44.9	34.4	34.9	34.9	40.8	40.8	26.0	26.0	70.4	50.1	69.2	15.2	84.9	92.4	75.3	86.3	71.6	71.6
Equat. Guinea	GNQ	54.3	43.8	43.8	59.1	59.1	58.6	55.5	61.6	43.9	26.5	26.5	71.3	71.3	1.3	1.3	56.3	44.3	61.6	11.9	61.7	37.2	76.7	64.5	61.0	61.0
Grenada	GRD	70.0	52.0	52.0	80.2	80.2	74.5	58.7	87.4	59.0	50.4	50.4	87.4	87.4	16.7	16.7	40.8	62.3	36.6	80.1	22.5	8.9	13.7	35.4	24.4	24.4
Guatemala	GTM	53.5	63.9	63.9	37.1	37.1	55.9	76.9	18.6	52.7	37.9	37.9	76.1	76.1	33.3	33.3	54.0	43.9	51.1	35.2	45.5	36.1	21.6	66.7	68.9	68.9
Guyana	GUY	54.0	55.9	55.9	63.5	63.5	39.6	45.1	33.2	4.2	0.0	0.0	0.0	0.0	7.3	7.3	30.3	28.3	40.0	0.4	28.8	16.2	26.2	39.3	33.7	33.7
Honduras	HND	49.1	62.5	62.5	42.1	42.1	39.6	53.8	15.6	45.7	34.0	34.0	66.6	66.6	25.8	25.8	41.4	32.9	42.0	19.9	34.6	22.8	14.3	53.5	53.6	53.6
Haiti	HTI	46.8	50.2	50.2	40.8	40.8	48.8	68.5	8.3	60.9	54.5	54.5	75.5	75.5	49.6	49.6	77.5	71.6	46.7	89.9	66.8	73.0	58.7	67.9	91.8	91.8
Indonesia	IDN	35.4	55.5	55.5	13.6	13.6	22.3	29.0	12.2	41.6	36.2	36.2	61.7	61.7	9.2	9.2	43.9	32.4	33.7	31.0	30.8	28.4	21.0	39.8	61.5	61.5
India	IND	21.2	27.3	27.3	0.0	0.0	24.6	31.2	15.1	69.9	55.4	55.4	74.8	74.8	77.4	77.4	66.6	74.9	35.1	100.0	46.5	46.8	31.4	57.6	74.4	74.4
Iran	IRN	26.9	14.7	14.7	23.8	23.8	37.3	45.9	25.9	72.1	51.6	51.6	57.6	57.6	98.1	98.1	54.4	22.3	29.5	11.4	15.2	12.8	10.8	20.4	90.3	90.3
Iraq	IRQ	43.4	9.7	9.7	30.2	30.2	68.1	60.7	74.8	78.1	56.7	56.7	72.4	72.4	99.1	99.1	41.7	46.4	62.3	20.9	30.1	8.0	23.3	45.9	46.4	46.4
Jamaica	JAM	50.3	53.1	53.1	52.2	52.2	45.3	56.7	29.7	55.9	43.3	43.3	85.2	85.2	14.7	14.7	46.4	44.0	23.5	57.6	22.6	15.4	11.4	34.3	63.4	63.4
Jordan	JOR	38.3	3.4	3.4	41.8	41.8	51.5	56.6	45.8	92.3	82.0	82.0	94.1	94.1	99.8	99.8	48.1	37.4	45.8	26.4	14.8	2.7	12.6	22.2	72.9	72.9
Kazakhstan	KAZ	41.5	44.5	44.5	36.6	36.6	43.1	55.5	25.0	62.1	43.7	43.7	0.0	0.0	98.3	98.3	32.3	31.4	44.4	1.1	5.3	2.5	7.6	4.4	45.9	45.9
Kenya	KEN	43.3	53.1	53.1	27.7	27.7	45.0	60.6	19.5	76.0	64.8	64.8	75.2	75.2	86.5	86.5	55.1	46.2	62.5	19.1	58.4	73.2	39.5	57.6	59.7	59.7
Kyrgyzstan	KGZ	39.3	44.3	44.3	45.7	45.7	24.1	33.7	5.1	67.3	35.9	35.9	56.3	56.3	95.6	95.6	39.9	35.2	49.3	6.9	12.1	3.4	15.6	13.5	58.2	58.2
Cambodia	KHM	39.3	37.7	37.7	37.6	37.6	42.3	59.8	2.7	44.2	36.4	36.4	47.9	47.9	47.4	47.4	48.8	31.5	40.0	19.5	52.7	50.6	23.8	72.2	58.1	58.1
Kiribati	KIR	76.3	81.9	81.9	79.8	79.8	66.2	43.9	82.7	67.4	44.2	44.2	40.8	40.8	100.0	100.0	63.1	46.6	53.9	37.8	51.7	61.3	47.2	45.2	84.3	84.3
St Kitts & Nevis	KNA	62.7	47.3	47.3	86.6	86.6	45.5	35.6	53.6	60.8	63.7	63.7	80.4	80.4	23.5	23.5	47.8	33.8	25.4	40.5	23.2	6.0	8.4	38.8	71.8	71.8
Kuwait	KWT	54.4	18.3	18.3	49.3	49.3	78.1	58.8	93.5	99.7	100.0	100.0	99.3	99.3	99.8	99.8	60.6	39.4	16.0	53.4	29.9	0.0	6.4	51.3	92.6	92.6
Lao PDR	LAO	43.5	52.8	52.8	44.7	44.7	30.0	35.3	23.5	36.1	23.7	23.7	56.9	56.9	9.9	9.9	43.5	30.6	42.8	6.5	50.8	33.3	42.5	69.6	46.5	46.5
Lebanon	LBN	53.8	0.0	0.0	45.0	45.0	81.7	57.8	100.0	78.7	59.5	59.5	92.0	92.0	81.2	81.2	70.7	77.1	43.6	100.0	22.6	6.7	4.7	38.3	92.3	92.3
Liberia	LBR	56.4	46.3	46.3	48.0	48.0	71.4	14.0	100.0	42.8	19.4	19.4	70.7	70.7	10.9	10.9	70.6	52.2	72.9	11.1	79.5	89.6	75.7	72.3	76.8	76.8
Libya	LBY	52.1	0.0	0.0	45.2	45.2	78.2	68.9	86.5	76.4	78.0	78.0	38.1	38.1	99.9	99.9	45.1	27.8	39.4	0.4	29.2	8.7	9.8	48.8	66.9	66.9
Saint Lucia	LCA	66.4	49.9	49.9	76.0	76.0	70.4	54.0	83.7	59.8	51.2	51.2	89.4	89.4	10.9	10.9	49.9	48.1	22.3	64.2	26.3	18.1	12.1	39.9	66.8	66.8
Sri Lanka	LKA	37.4	44.7	44.7	35.3	35.3	30.8	41.1	14.5	53.5	47.2	47.2	77.7	77.7	17.9	17.9	62.4	60.6	38.4	76.6	12.6	10.3	4.8	18.6	88.5	88.5
Lesotho	LSO	70.3	100.0	100.0	55.0	55.0	42.4	40.2	44.5	73.2	47.2	47.2	62.8	62.8	99.6	99.6	54.8	37.5	50.6	15.9	71.6	64.3	84.9	63.6	49.7	49.7
Morocco	MAR	25.3	0.0	0.0	30.8	30.8	31.1	36.6	24.3	68.8	58.1	58.1	46.9	46.9	93.0	93.0	45.1	29.6	37.9	17.7	40.0	18.8	16.6	64.5	60.2	60.2
Madagascar	MDG	52.1	71.6	71.6	33.5	33.5	43.6	60.8	10.7	59.2	30.9	30.9	72.4	72.4	65.8	65.8	62.3	47.1	65.8	10.1	75.1	96.9	48.4	71.9	61.5	61.5
Maldives	MDV	55.4	49.0	49.0	67.1	67.1	47.9	23.1	63.7	93.4	83.4	83.4	97.9	97.9	98.2	98.2	68.1	72.0	19.2	100.0	30.0	6.7	4.6	51.4	88.4	88.4
Mexico	MEX	46.8	65.4	65.4	20.1	20.1	43.5	57.7	21.6	56.7	44.5	44.5	63.3	63.3	60.6	60.6	21.2	27.6	36.5	13.8	21.7	12.0	11.5	33.6	10.8	10.8
Marshall Islands	MHL	75.2	78.6	78.6	85.7	85.7	58.8	56.6	61.0	73.9	37.1	37.1	70.7	70.7	100.0	100.0	60.0	52.6	50.1	54.9	22.1	18.4	28.3	18.1	86.9	86.9
Mali	MLI	49.2	57.9	57.9	36.2	36.2	51.0	67.2	26.3	62.8	44.6	44.6	30.6	30.6	94.4	94.4	75.9	67.0	94.6	3.3	86.3	67.8	90.0	98.2	73.2	73.2
Myanmar	MMR	28.7	32.8	32.8	27.4	27.4	25.4	32.4	15.3	37.5	27.4	27.4	53.0	53.0	25.9	25.9	54.6	25.6	31.6	17.7	46.0	31.1	42.0	60.2	78.6	78.6
Mongolia	MNG	44.3	44.4	44.4	51.5	51.5	35.5	29.3	40.8	57.7	32.5	32.5	15.1	15.1	93.3	93.3	45.8	29.9	42.3	0.0	30.9	41.0	13.4	31.7	66.6	66.6
Mozambique	MOZ	48.9	76.5	76.5	32.5	32.5	15.9	13.7	17.8	44.4	43.9	43.9	59.3	59.3	21.5	21.5	56.7	56.1	78.9	8.1	78.8	76.3	68.8	89.9	17.2	17.2

Country	ISO	L. Eco. res.	Cpt #10	Ind #14	Cpt #11	Ind #15	Cpt #12	Ind #16	Ind #17	L. Env. res.	Cpt #13	Ind #18	Cpt #14	Ind #19	Cpt # 15	Ind #20	L. Soc. res	Cpt #16	Ind #21	Ind #22	Cpt #17	Ind #23	Ind #24	Ind #25	Cpt #18	Ind #26
Mauritania	MRT	35.8	33.2	33.2	48.7	48.7	19.3	19.8	18.9	87.3	79.2	79.2	81.2	81.2	99.9	99.9	58.1	54.0	76.4	0.5	65.8	62.0	61.0	73.8	53.4	53.4
Mauritius	MUS	63.6	72.8	72.8	59.4	59.4	57.5	63.7	50.6	67.0	48.5	48.5	87.4	87.4	59.0	59.0	57.6	72.9	24.8	100.0	15.3	5.2	13.2	22.4	66.4	66.4
Malawi	MWI	64.3	87.4	87.4	36.6	36.6	58.7	82.2	11.7	59.6	57.0	57.0	57.8	57.8	63.7	63.7	64.5	65.1	80.8	44.1	68.5	80.9	38.2	77.8	59.5	59.5
Malaysia	MYS	38.9	45.2	45.2	31.9	31.9	38.4	50.0	21.0	31.5	27.5	27.5	47.0	47.0	2.6	2.6	46.4	25.4	28.5	21.8	12.2	0.7	6.0	20.3	75.2	75.2
Namibia	NAM	60.2	73.1	73.1	53.8	53.8	51.3	53.7	48.9	63.6	46.9	46.9	33.3	33.3	94.0	94.0	41.5	39.3	55.5	0.2	55.7	71.6	37.7	52.6	23.0	23.0
Niger	NER	41.6	52.3	52.3	34.8	34.8	35.2	36.9	33.4	71.7	73.9	73.9	0.0	0.0	99.9	99.9	76.9	70.8	100.0	3.7	90.9	94.5	76.6	100.0	66.7	66.7
Nigeria	NGA	37.8	41.0	41.0	16.3	16.3	48.5	68.4	3.8	59.6	54.7	54.7	57.3	57.3	66.2	66.2	77.2	65.9	79.1	49.4	75.7	66.5	100.0	52.7	88.4	88.4
Nicaragua	NIC	49.7	63.6	63.6	45.5	45.5	36.2	48.6	16.0	41.2	24.8	24.8	44.2	44.2	50.3	50.3	28.0	30.9	42.0	11.9	36.5	31.3	13.9	53.0	8.6	8.6
Nepal	NPL	39.1	47.3	47.3	32.9	32.9	35.7	40.6	30.0	57.9	36.9	36.9	83.4	83.4	41.8	41.8	44.0	44.2	45.0	43.5	51.2	44.5	26.6	71.9	35.0	35.0
Nauru	NRU	77.2	81.3	81.3	100.0	100.0	35.4	43.9	24.2	85.2	56.7	56.7	92.5	92.5	100.0	100.0	70.1	81.8	58.1	100.0	29.1	37.2	17.6		84.8	84.8
Oman	OMN	48.2	33.2	33.2	48.0	48.0	59.7	48.5	69.1	88.9	67.8	67.8	95.7	95.7	99.8	99.8	56.8	14.9	20.9	2.8	8.1	1.5	8.7	10.9	96.9	96.9
Pakistan	PAK	36.7	26.0	26.0	15.6	15.6	55.8	78.6	6.5	79.0	69.1	69.1	69.8	69.8	95.2	95.2	61.0	62.4	60.4	64.3	63.1	44.2	63.4	77.4	57.4	57.4
Panama	PAN	47.7	62.7	62.7	49.2	49.2	21.9	14.0	27.6	43.0	21.8	21.8	66.9	66.9	24.0	24.0	42.3	29.9	40.5	12.3	20.1	23.0	15.2	21.3	63.8	63.8
Peru	PER	54.7	78.6	78.6	31.8	31.8	42.2	55.3	22.3	43.5	17.4	17.4	63.9	63.9	35.9	35.9	33.7	29.1	40.9	5.2	23.1	27.0	10.7	27.4	45.0	45.0
Philippines	PHL	35.6	41.8	41.8	21.5	21.5	39.8	54.2	15.3	53.2	41.3	41.3	79.0	79.0	23.2	23.2	48.3	65.6	44.0	81.7	29.3	26.7	24.0	36.0	42.8	42.8
Palau	PLW	77.5	57.7	57.7	95.8	95.8	74.4	39.9	97.3	46.5	15.6	15.6	74.1	74.1	27.5	27.5	51.8	19.6	26.5	8.2	9.3	1.6	15.8	3.1	87.1	87.1
Papua N G	PNG	62.8	77.5	77.5	43.0	43.0	63.0	78.6	42.0	44.7	11.5	11.5	76.6	76.6	0.6	0.6	72.4	35.1	49.4	4.2	71.0	87.7	41.6	75.5	97.2	97.2
North Korea	PRK	37.4	29.4	29.4	33.7	33.7	46.7		46.7	56.5	46.6	46.6	79.9	79.9	31.9	31.9	45.3	38.8	27.8	47.3	17.4	19.9	14.6		65.9	65.9
Paraguay	PRY	68.8	100.0	100.0	44.8	44.8	46.8	63.1	19.7	29.2	28.4	28.4	0.0	0.0	41.9	41.9	45.5	29.4	41.5	3.1	24.7	13.5	16.8	37.0	68.8	68.8
Qatar	QAT	45.1	26.4	26.4	52.7	52.7	51.3	16.2	70.7	97.3	93.7	93.7	98.4	98.4	99.9	99.9	57.5	37.1	0.0	52.5	15.4	0.0	3.8	26.4	91.0	91.0
Rwanda	RWA	53.5	73.3	73.3	40.0	40.0	40.1	51.8	23.2	71.6	58.4	58.4	77.0	77.0	77.7	77.7	58.0	84.1	64.3	100.0	55.1	38.8	38.2	78.4	0.0	0.0
Saudi Arabia	SAU	38.6	23.3	23.3	31.4	31.4	54.3	51.3	57.3	87.2	81.7	81.7	78.4	78.4	99.9	99.9	38.1	17.4	24.4	3.2	8.7	0.3	5.0	14.1	63.2	63.2
Sudan	SDN	42.2	28.7	28.7	29.5	29.5	60.4	84.0	15.3	72.2	78.8	78.8	0.0	0.0	97.2	97.2	56.6	50.0	70.5	5.0	71.1	71.4	54.6	84.1	45.5	45.5
Senegal	SEN	37.3	38.5	38.5	37.8	37.8	35.5	48.6	12.5	63.5	51.1	51.1	58.3	58.3	78.1	78.1	49.2	54.0	74.2	18.1	64.7	51.8	36.7	92.3	12.3	12.3
Singapore	SGP	45.8	47.2	47.2	46.4	46.4	43.7	47.7	39.2	84.4	78.1	78.1	100.0	100.0	72.5	72.5	50.0	71.5	15.4	100.0	4.8	0.0	0.0	8.4	48.5	48.5
Solomon Islands	SLB	69.8	83.5	83.5	65.0	65.0	58.3	78.3	25.7	39.4	14.5	14.5	66.5	66.5	4.5	4.5	69.0	46.7	65.9	4.8	58.3	74.1	17.3	66.4	93.3	93.3
Sierra Leone	SLE	61.0	44.8	44.8	44.0	44.0	84.9	66.5	100.0	34.9	26.1	26.1	53.9	53.9	8.1	8.1	73.5	50.0	66.2	24.6	90.2	92.0	100.0	77.0	74.6	74.6
El Salvador	SLV	55.4	64.0	64.0	45.5	45.5	55.1	71.4	31.2	56.7	47.4	47.4	72.4	72.4	46.7	46.7	43.1	54.9	38.7	67.3	33.0	18.3	10.8	53.0	38.4	38.4
Somalia	SOM	60.7	51.6	51.6	38.2	38.2	83.3	62.2	100.0	82.7	64.8	64.8	84.9	84.9	95.5	95.5	72.5	66.2	93.5	5.2	86.8	71.3	100.0		62.1	62.1
South Sudan	SSD	63.1	64.9	64.9	40.9	40.9	77.8	80.7	74.8	54.1	47.6	47.6	53.9	53.9	60.1	60.1	66.0	61.7	87.2	3.7	86.5	95.6	94.3	66.3	42.2	42.2
Sao Tome & Pr.	STP	55.1	48.7	48.7	74.7	74.7	34.1	38.6	29.0	39.1	33.1	33.1	58.9	58.9	3.8	3.8	58.6	61.5	71.5	49.6	52.0	64.2	13.5	61.7	61.8	61.8
Suriname	SUR	50.4	56.0	56.0	66.1	66.1	11.3	4.6	15.3	44.6	5.6	5.6	76.1	76.1	11.5	11.5	36.3	26.6	37.6	0.4	20.5	14.6	15.3	28.4	53.1	53.1
Eswatini	SWZ	75.3	97.9	97.9	60.3	60.3	61.5	81.6	29.9	54.6	47.8	47.8	66.3	66.3	47.7	47.7	61.9	39.6	54.0	14.6	53.8	42.6	48.2	67.5	83.9	83.9
Seychelles	SYC	63.7	59.9	59.9	81.3	81.3	44.4	18.4	60.0	77.4	37.7	37.7	96.8	96.8	84.8	84.8	33.1	41.3	29.3	50.5	15.2	0.4	11.5	23.7	36.8	36.8
Syria	SYR	35.0	1.4	1.4	37.1	37.1	47.9	64.6	20.4	70.7	64.8	64.8	32.9	32.9	98.6	98.6	56.0	44.3	57.9	24.0	43.6	10.6	19.9	72.1	74.5	74.5
Chad	TCD	46.9	51.9	51.9	38.0	38.0	49.6	67.7	18.6	65.4	56.1	56.1	31.7	31.7	93.1	93.1	77.8	65.9	93.2	2.4	97.3	96.1	100.0	95.7	66.0	66.0
Togo	TGO	42.9	41.9	41.9	43.7	43.7	43.1	59.2	14.5	44.9	52.2	52.2	27.9	27.9	50.5	50.5	65.7	53.3	67.6	33.4	76.3	90.6	62.6	72.9	65.3	65.3
Thailand	THA	33.5	35.1	35.1	25.2	25.2	38.8	50.6	21.5	42.5	44.6	44.6	36.1	36.1	46.0	46.0	49.6	28.7	26.5	30.7	22.6	3.1	6.5	38.5	77.8	77.8
Tajikistan	TJK	37.9	45.1	45.1	42.5	42.5	21.7	30.5	3.9	75.3	36.9	36.9	77.2	77.2	98.5	98.5	42.6	39.4	54.0	14.1	19.4	5.1	30.2	13.9	59.2	59.2
Turkmenistan	TKM	39.0	41.0	41.0	46.3	46.3	27.2	0.0	38.5	72.7	69.9	69.9	31.0	31.0	100.0	100.0	36.9	29.8	42.0	2.5	24.0	2.8	38.8	14.6	51.1	51.1
Timor-Leste	TLS	57.1	65.3	65.3	59.4	59.4	44.6	11.8	61.9	46.3	37.6	37.6	69.6	69.6	13.0	13.0	43.4	45.6	61.7	18.8	55.2	52.6	40.1	69.0	23.0	23.0
Tonga	TON	75.1	93.6	93.6	80.8	80.8	40.1	47.8	30.4	53.1	37.4	37.4	39.5	39.5	74.1	74.1	60.8	49.5	60.2	35.7	10.3	7.4	9.3	13.4	92.4	92.4

Country	ISO	Eco. vul.	Cpt #1	Ind #1	Cpt #2	Ind #2	Cpt #3	Ind #3	Env. vul.	Cpt #4	Ind #4	Ind #5	Cpt #5	Ind #6	Ind #7	Cpt #6	Ind #8	Ind #9	Soc. vul.	Cpt #7	Ind #10	Cpt #8	Ind #11	Ind #12	Cpt #9	Ind #13
Trini. & Tob.	TTO	56.9	53.3	53.3	58.6	58.6	58.5	74.7	35.6	60.8	46.1	46.1	93.2	93.2	17.0	17.0	37.4	50.0	27.3	65.2	11.5	7.1	14.9	11.3	39.7	39.7
Tunisia	TUN	35.5	0.0	0.0	40.5	40.5	46.4	62.0	21.3	66.8	65.9	65.9	13.4	13.4	94.2	94.2	33.8	27.8	35.5	16.8	30.6	8.5	14.0	50.3	41.5	41.5
Turkey	TUR	21.8	0.0	0.0	23.7	23.7	29.5	39.6	13.1	55.7	46.0	46.0	42.8	42.8	73.2	73.2	44.3	28.0	31.8	23.7	23.1	3.9	7.6	39.1	67.7	67.7
Tuvalu	TUV	91.0	87.6	87.6	99.6	99.6	85.1	68.0	99.3	73.7	40.2	40.2	68.5	68.5	100.0	100.0	64.0	66.4	47.0	81.3	19.5	17.5	19.9	21.0	86.5	86.5
Tanzania	TZA	38.6	59.7	59.7	26.9	26.9	13.2	16.0	9.7	48.4	51.9	51.9	45.9	45.9	47.2	47.2	51.9	58.4	81.3	14.6	63.7	80.4	45.8	60.2	24.7	24.7
Uganda	UGA	49.1	71.1	71.1	29.3	29.3	36.5	50.2	12.2	61.8	56.6	56.6	56.9	56.9	70.8	70.8	57.9	68.2	84.0	47.5	67.7	87.5	41.5	66.2	28.8	28.8
Uruguay	URY	68.3	88.8	88.8	50.8	50.8	59.5	67.8	50.0	52.1	23.9	23.9	0.0	0.0	87.0	87.0	42.4	29.2	41.1	4.0	20.9	3.7	3.8	35.9	64.0	64.0
Uzbekistan	UZB	36.4	44.1	44.1	31.7	31.7	32.1	42.3	16.6	79.8	62.7	62.7	72.5	72.5	99.6	99.6	37.2	29.4	38.0	16.9	8.7	0.3	12.2	8.7	56.6	56.6
St Vinc. & Gren	VCT	61.7	50.8	50.8	80.3	80.3	49.0	46.2	51.6	62.1	57.1	57.1	90.9	90.9	8.2	8.2	50.1	48.8	34.8	59.6	15.5	15.3	12.0	18.6	70.1	70.1
Venezuela	VEN	51.8	55.4	55.4	32.6	32.6	62.6	67.5	57.2	50.5	23.7	23.7	77.1	77.1	34.0	34.0	39.8	30.7	42.9	6.7	13.4	5.6	15.9	16.0	60.2	60.2
Viet Nam	VNM	30.7	29.6	29.6	22.4	22.4	38.1	49.8	20.6	52.9	43.1	43.1	75.5	75.5	28.9	28.9	43.6	52.3	29.8	67.8	28.9	21.0	18.4	41.6	46.2	46.2
Vanuatu	VUT	70.4	89.6	89.6	71.9	71.9	40.6	41.9	39.2	13.4	21.3	21.3	0.0	0.0	9.4	9.4	68.9	47.4	66.8	5.1	44.5	50.3	22.8	53.8	100.0	100.0
Samoa	WSM	78.0	88.6	88.6	75.3	75.3	68.8	91.7	32.2	66.1	25.4	25.4	49.8	49.8	100.0	100.0	56.0	47.3	64.9	16.3	11.8	4.1	15.1	13.2	83.9	83.9
Yemen	YEM	40.9	34.8	34.8	32.8	32.8	52.2	73.9	0.0	90.5	81.3	81.3	89.8	89.8	99.4	99.4	75.0	47.5	65.9	12.9	68.5	52.1	57.2	89.9	99.7	99.7
South Africa	ZAF	59.7	82.7	82.7	26.7	26.7	55.9	64.9	45.0	69.9	58.5	58.5	56.7	56.7	89.7	89.7	22.7	28.6	39.1	10.2	25.0	28.3	29.9	13.5	10.5	10.5
Zambia	ZMB	57.5	88.2	88.2	37.0	37.0	27.4	28.2	26.6	42.7	40.9	40.9	55.4	55.4	27.1	27.1	62.2	53.5	75.5	5.1	63.2	76.0	58.5	52.6	69.1	69.1
Zimbabwe	ZWE	67.8	90.8	90.8	38.6	38.6	63.8	88.1	19.2	50.5	57.6	57.6	42.8	42.8	50.1	50.1	47.8	51.1	71.7	8.4	52.9	66.9	49.6	38.4	38.1	38.1
Mean		50.8	51.5	51.5	46.0	46.0	48.0	51.5	37.3	59.3	46.5	46.5	61.8	61.8	57.7	57.7	52.4	44.8	49.2	28.9	41.0	36.3	32.1	47.3	60.6	60.6
Median		49.5	50.0	50.0	42.1	42.1	46.9	53.7	29.8	59.4	46.8	46.8	66.4	66.4	60.4	60.4	52.6	44.3	43.6	17.3	30.8	24.8	21.3	45.2	63.9	63.9
SD		13.8	24.2	24.2	19.4	19.4	16.5	21.0	25.8	18.5	20.3	20.3	25.3	25.3	35.0	35.0	14.2	17.1	21.4	29.7	25.6	31.8	26.9	26.1	23.1	23.1

Note: L. Eco. res., L. Env. res., L. Soc. res. refer respectively to Lack of economic resilience, Lack of environmental resilience and Lack of social resilience. Ind and Cpt refer respectively to Indicator and Concept. The number (#) associated to each concept and indicator corresponds to the description of concepts and indicators provided in Chapter 3.

Endnotes

CHAPTER 1 →
CHAPTER 2 →
CHAPTER 3 →
CHAPTER 4 →
CHAPTER 5 →
CHAPTER 6 →
CHAPTER 7 →
CHAPTER 8 →

[1] https://datahelpdesk.worldbank.org/knowledgebase/articles/378831-why-use-gni-per-capita-to-classify-economies-into.

[2] These are mainly small island states, oil-dominated economies where major external shocks can significantly affect the country's wealth or income levels. Several studies have highlighted this, such as Briguglio et al (2009); Guillaumont (2010); Herbert (2019); and Knowledge for Development (2021).

[3] See also paragraph 60 in the following report: mvi_interim_report.pdf (un.org)

[4] https://ida.worldbank.org/en/financing/crisis-financing/crisis-response-window

[5] Various metrics exist e.g. The United Nation's Economic and Environmental Vulnerability Index (UN EVI); the Caribbean Development Bank Multidimensional Vulnerability Index (CDB VI); the UNDP Multidimensional Vulnerability Index (MVI); the Commonwealth Universal Vulnerability Index (UVI).

[6] See part one of the following report: mvi_interim_report.pdf (un.org)

[7] N2038189.pdf (un.org)

[8] A/76/211: Follow-up to and implementation of the SIDS Accelerated Modalities of Action (SAMOA) Pathway and the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States.

[9] Ibid paragraphs 81-82

[10] Available at; https://sdgs.un.org/sites/default/files/2022-07/MVI_Panel_TOR_%202021.pdf

[11] For example, the ODI event on the MVI; https://odi.org/en/events/putting-the-glasgow-climate-pact-into-action/ and, the Brookings Institution roundtable to discuss technical aspects of the MVI.

[12] Shock: Any externally generated event that has a large-scale unexpected impact on a country. Shocks may originate from economic, social or environmental sources and may have economic, social or environmental consequences. Shocks may be recurring (for example, commodity price variation, tropical cyclones), slow onset (for example, drought, 2008 financial crisis) or rapid onset (for example, the COVID-19 pandemic) in nature.

Stressor: Any factor whose influence serves to constrain, place pressure on or have a detrimental effect on a country, thereby limiting its sustainable development. Stressors are typically without defined time frames and may be of variable intensities, in that exposure could be intense but short lived (for example, influx of refugees), or a chronic exposure that does not rapidly change over time (for example, sea level rise, ecosystem degradation, desertification). Stressors may have economic, social or environmentalorigins and typically cause sustained damage overtime, necessitating significant costs to address.

[13] See UN-OHRLLS (2021) for a review as well as Adger (2006); Adger and Vincent (2005); Crichton (1999); Guillaumont (2009; 2010); and IPCC (2001).

[14] UN-OHRLLS "Possible Development and Uses of Multi-Dimensional Vulnerability Indices: Analysis and Recommendations December 2021", p. 1.

[15] UN-OHRLLS "Possible Development and Uses of Multi-Dimensional Vulnerability Indices: Analysis and Recommendations December 2021", p. 2.

[16] UN-OHRLLS (2021), p. 3.

[17] See Bankoff et al. (2004), Hilhorst (2013), Mena and Hilhorst (2021), Otto et al. (2017), Wisner (2012).

[18] https://unstats.un.org/unsd/methodology/m49/

[19] See Edo et al. (2020); Lee and Zhang (2022); UNCTAD (2022).

[20] Arshed et al. (2022); Ghirmay et al. (1999); Ghosh & Ostry (1994); Guillaumont et al. (1999).

[21] Baer-Nawrocka and Sadowski (2019); Wakeford and de Wit (2013); Wakeford et al. (2015).

[22] Alexander (2006); Raddatz (2009); Rasmussen (2004); Yoon (2012).

[23] Calvo and Dercon (2013); Conway and Schipper (2011); Feindouno et al. (2020); IPCC (2014); Leichenko and Silva (2014).

[24] IPCC (2014); Madden (2020); Mirzabaev et al. (2019); Nicholls et al. (2007); Olsson et al. (2019); Safriel et al. (2005).

[25] O'Sullivan and Bourgoin (2010) ; Rocha et al. (2021); Stanturf et al. (2015).

[26] Collier and Hoeffler (2004); Jasparro and Taylor (2008); Plotnikov (2020); Rettberg (2010).

[27] Barman (2020); Whitaker (2002).

[28] Carrere and Schiff (2005); Clark et al. (2004); Helble (2014); Wilmsmeier and Hoffmann (2008).

[29] Alesina et al. (2005); Bernal (2001); Damijan (2001).

[30] Ali (2015); Cordina (2004) ; Imbs and Wacziarg (2003); Kluge (2018).

[31] The Herfindahl-Hirschman Index (HHI) is a common measure of market concentration and is used to determine market competitiveness. The index measures the size of companies relative to the size of the industry they are in and the amount of competitiveness. The HHI is calculated by squaring the market share of each firm competing in a market and then summing the resulting numbers.

[32] Dudgeon et al. (2006); Pradinaud et al. (2019).

[33] Griffiths et al. (2019); IPCC (2006); Zomer et al. (2017).

[34] Bastin et al. (2019); Ickowitz et al. (2014); Reid and Huq (2005); Xia and McPherson (2002).

[35] Baulch and McCulloch (2002); Feng et al. (2020); Prashar et al. (2012); Vincent (2007).

[36] Alimohamadi et al. (2019); Diep et al. (2021); Giné-Garriga et al. (2021); Hanushek and Woessmann (2012); Hendren and Sprung-Keyser (2020); Sherrieb et al. (2010).

[37] https://childmortality.org/about

[38] Jha and Sarangi (2018); O'Reilly et al. (2015); Salamon (2023).

[39] Empirical evidence supports this position in the literature. Garikipati and Kambhampati (2021) show that COVID-19 outcomes, particularly deaths, were better in countries led by women. Salamon (2023) shows that increased participation of women in governance has a positive impact on a wide range of social and environmental issues, including sexual and reproductive health and rights, gender-based violence, as well as a number of sustainable development and environmental outcomes, such as combating the effects of climate change and natural disasters. Other studies (Morchain et al., 2015; Opondo et al., 2016; Smyth and Sweetman, 2015) also highlight the importance of gender equality in building community resilience and sustainable development.

[40] See for example, the Inter-Agency Task Force (IATF) on Financing for Development 2022 report. Available at https://financing.desa.un.org/sites/default/files/2023-04/FSDR_2022. pdf

[41] Including Cruces and Trebesch (2013), Kemp-Benedict et al. (2018), Robinson (2014), Trebesch and Zabel (2017)

[42] See Nardo et al. (2008).

[43] For each indicator of vulnerability, the following formula is used:

$$\textit{Rescaled vulnerability indicator} = \frac{\textit{Vulnerability indicator-minimum}}{\textit{maximum-minimum}} \times 100$$

Similarly, all indicators of structural resilience should have a positive polarity with the lack of structural resilience. To this end, the following formula is used:

$$\textit{Rescaled lack of resilience indicator} = 100 - \left(\frac{\textit{Resilience indicator-minimum}}{(\textit{maximum-minimum})} \times 100 \right)$$

[44] The bounds should be kept constant across time in order to make future MVI results comparable with the ones presented in this report.

[45] https://www.undp.org/sites/g/files/zskgke326/files/migration/tr/UNDP-TR-EN-HDR-2019-FAQS-HDI.pdf

[46] $MVI_q = \sqrt{\frac{1}{n}\sum_{i=1}^{n} V_i^2}$

The formula for this approach is shown here, where n represents the number of indicators, concepts, dimensions, pillars to be aggregated), and V denotes their values.

[47] Some weighting methods are objective, others subjective, based on expert judgement. For a review of these methods, see Booysen (2002), Esty et al. (2005), Manziotta and Pareto (2013), Munda and Nardo (2003), Nardo et al. (2008).

[48] Log of GNI pc is used to narrow the spread of data on the horizontal axis, rendering the diagram easier to interpret.

[49] See Alesina et al. (2005), Briguglio (2014), Coale and Hoover (2015), Milner and Weyman-Jones (2003), van der Velde et al. (2007).

[50] Log of population is used to narrow the spread of data on the horizontal axis, rendering the diagram easier to interpret.

[51] Currently there are a plethora of approaches to developing 'country profiles' and vulnerability assessments. These vulnerability assessments and profiles vary from regional to national ones or the more generic, to the more specific ones, for example, the WB/IMFs Financial Sector Assessment Programme (FSAP). The common thread among these assessments, is that they include a coherent approach/structure that links a baseline assessment diagnosing challenges and strengths to key strategic reforms. In most instances, a roadmap for technical assistance needs that have been agreed with the government are also included. Some vulnerability related country profile and assessment examples are available from UNCDP, UNCTAD, ADB, World Bank, European Union, WHO, UNEP, FAO, UNHABITAT. A more detailed study of the various methodologies and approaches will be important to learn any lessons, and to develop a VRCP Handbook following the set of principles outlined in this report. Work on vulnerability and resilience profiling was also carried out the Commonwealth secretariat in 2009/2010. See https://www.amazon.com/Profiling-Vulnerability-Resilience-Manual-States/dp/1849290350

[52] https://financing.desa.un.org/sites/default/files/2023-04/FSDR_2022. pdf

[53] Chauvet and Guillaumont (2005), Collier and Goderis (2009), Jain and Bardhan (2023), Savun and Tirone (2012).

[54] Multilateral Development Banks vision statement, the Summit for a New Global Financing Pact, available from https://nouveaupactefinancier.org/pdf/multilateral-development-banks-vision-statement.pdf. [Accessed 6/8/2023]

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