



United Nations High Level Panel on the Multi-Dimensional Vulnerability Index

Technical Presentation

April 28, 2023

Please also see supplementary materials on:

<https://www.un.org/ohrlls/mvi>

Why is an MVI needed?

Wide agreement that poorer countries need and deserve assistance.

Country assistance need often measured by GNI PC, which is both narrow and a weak measure of material well-being.

Downward volatility of well-being also problem – recovery costs can be high.

External shocks are a big risk.

Stressors such as climate change that lower or eliminate prospects for future income gain also relevant to country needs.

Countries with **structural risk of lower well-being** also deserve special assistance, especially if countries **structurally lack resilience**.

Multiple use cases for an MVI depends on stakeholder

in countries, across all dimensions, at national level.

Example – long coastline, which increases risk of lower future well-being owing to climate change

to improve well-being by pinpointing their sources of vulnerability and benchmarking these across countries.

by complementing other measures of country need (especially the GNI which does not have a risk adjustment).

of vulnerability and development.



The MVI framework



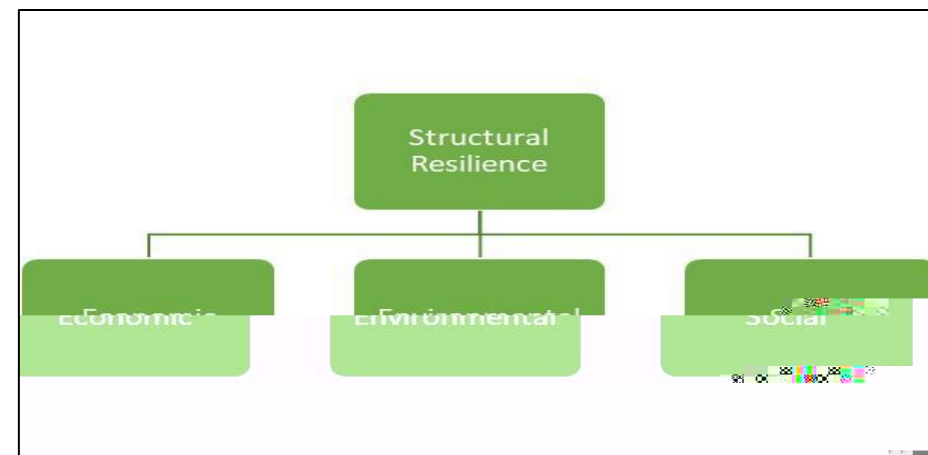
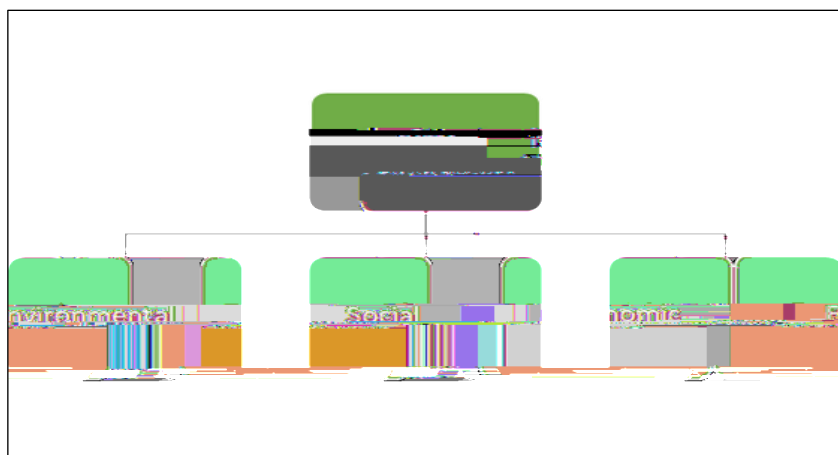
Integrates 3 dimensions of sustainable development.

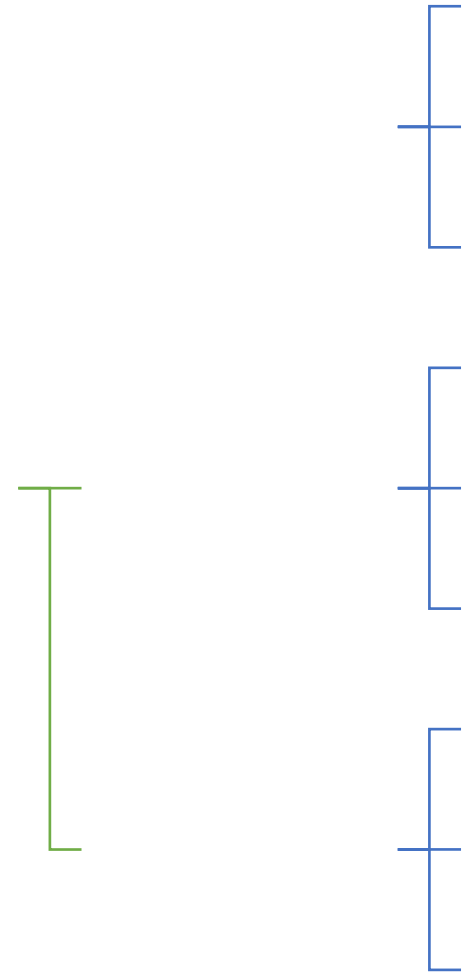
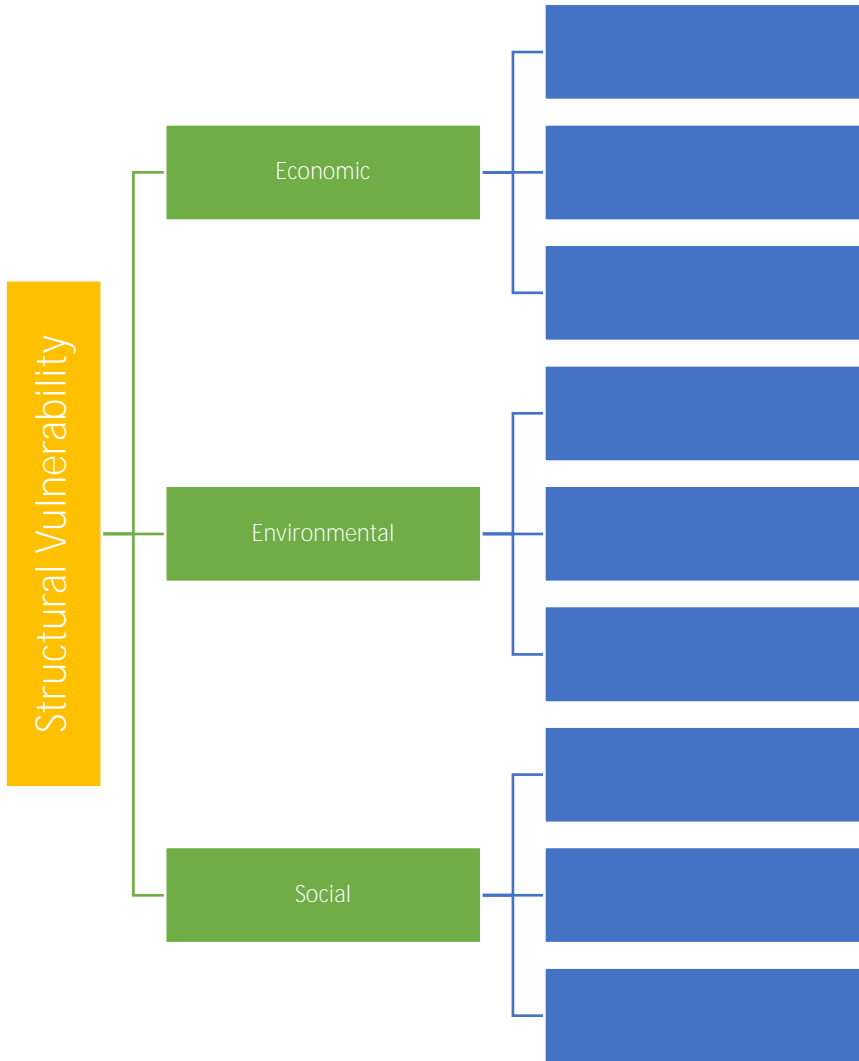
Dimensions could be used separately

Dimensions defined by concepts shown to be related to exposure to external shocks and stressors (*vulnerability*), or structural factors that reduce loss in case risk materializes (*resilience*).

Concepts measured by selected indicators.

Avoid long list of indicators





Indicators choice



Indicators choice - Rules

Rule #1:

Rule #2:

∅ Missing data will not be estimated at this stage.

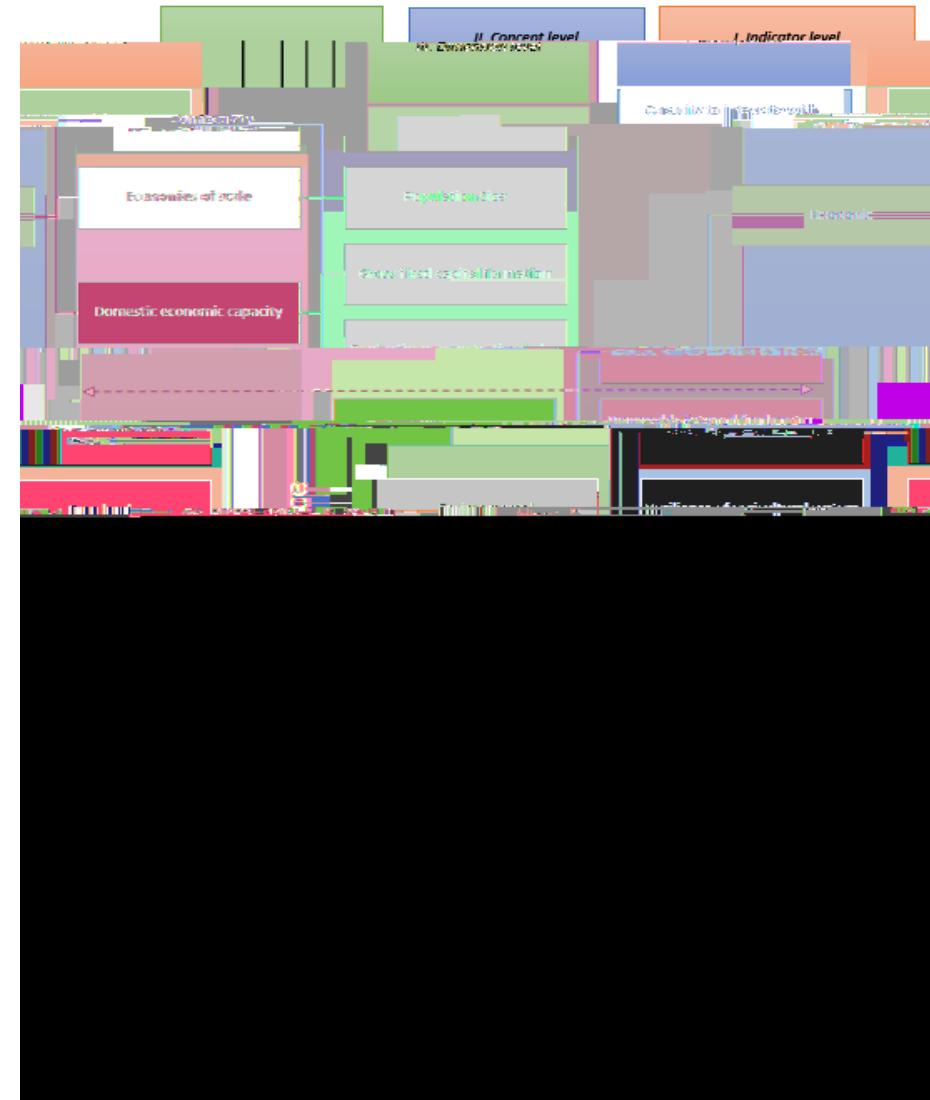
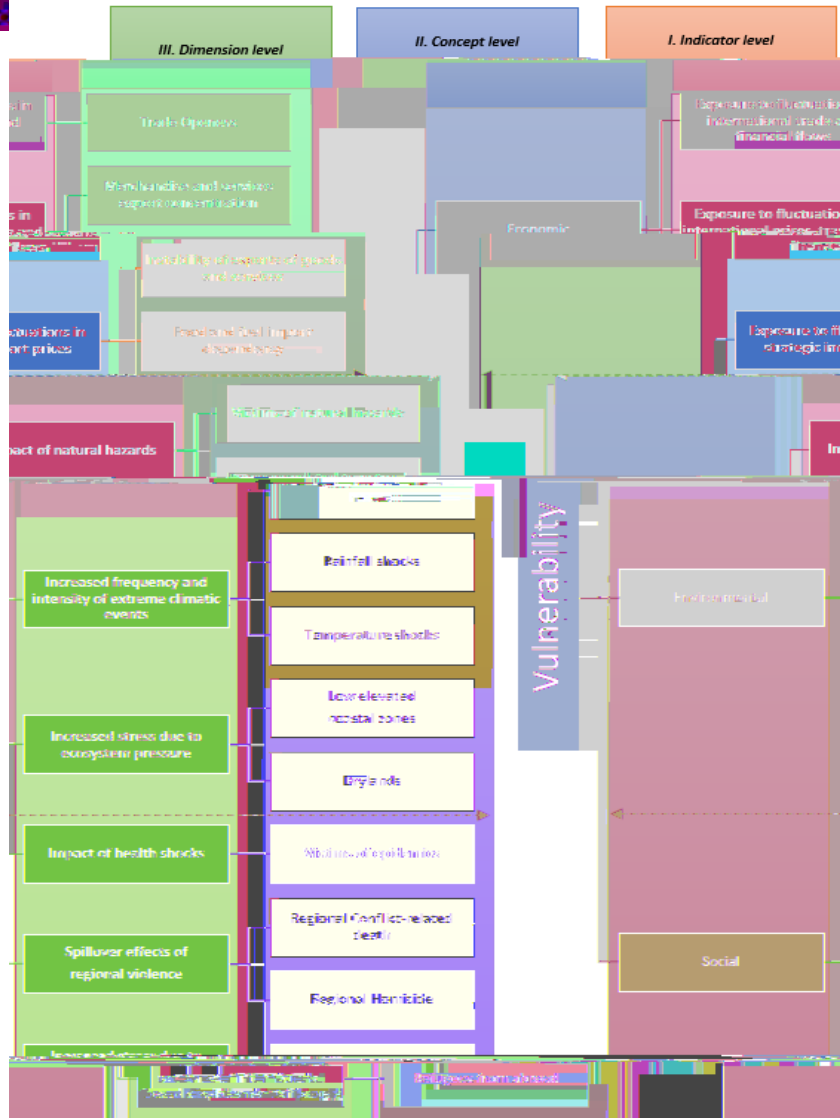
Rule #3:

Rule #4:



The MVI framework

Concepts and indicators



Creating the Index

Min-Max rescaling

Transforming the multiple units of the raw variables (e.g., people, dollars, etc.) into a common



Creating the Index - Aggregation



Countries are vulnerable in different ways.

How to aggregate the indicators in a composite index which properly reflects these differences?

Two simple options can be compared: the arithmetic and the quadratic mean.

The quadratic mean is computed in three steps as follows

Step 1: Each indicator is squared

Step 2: Calculate the arithmetic mean of the squared indicators

Step 3: Find the square root of the result obtained in step 2

The MVI panel selected the $\sqrt{\frac{1}{n} \sum_{i=1}^n x_i^2}$ as the appropriate method as it is better captures vulnerability by rewarding the largest differences in components.

Estimating exposure to ecosystem pressure:

How to combine drylands and low elevated coastal zones?



Exposure to ecosystem pressure

Figure 1: Distribution of scores using of arithmetic aggregation

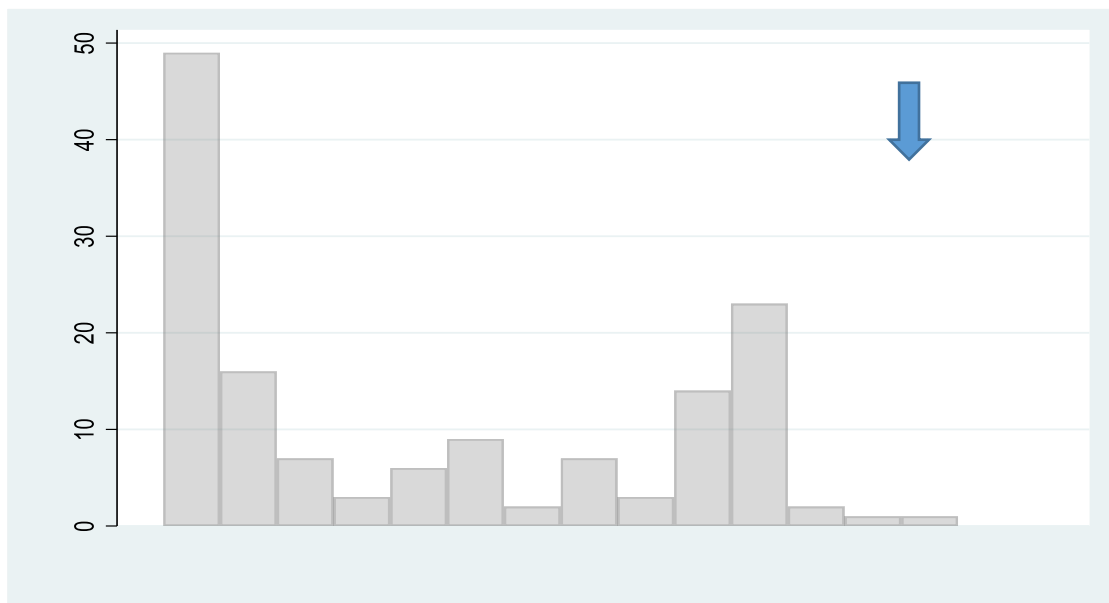
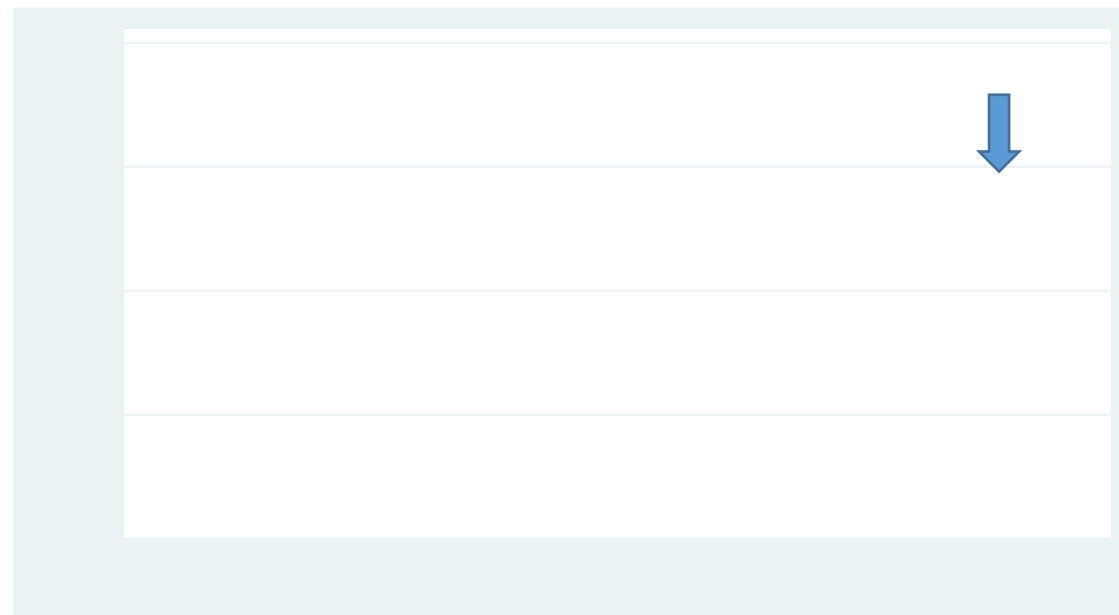


Figure 2: Distribution of scores using quadratic aggregation

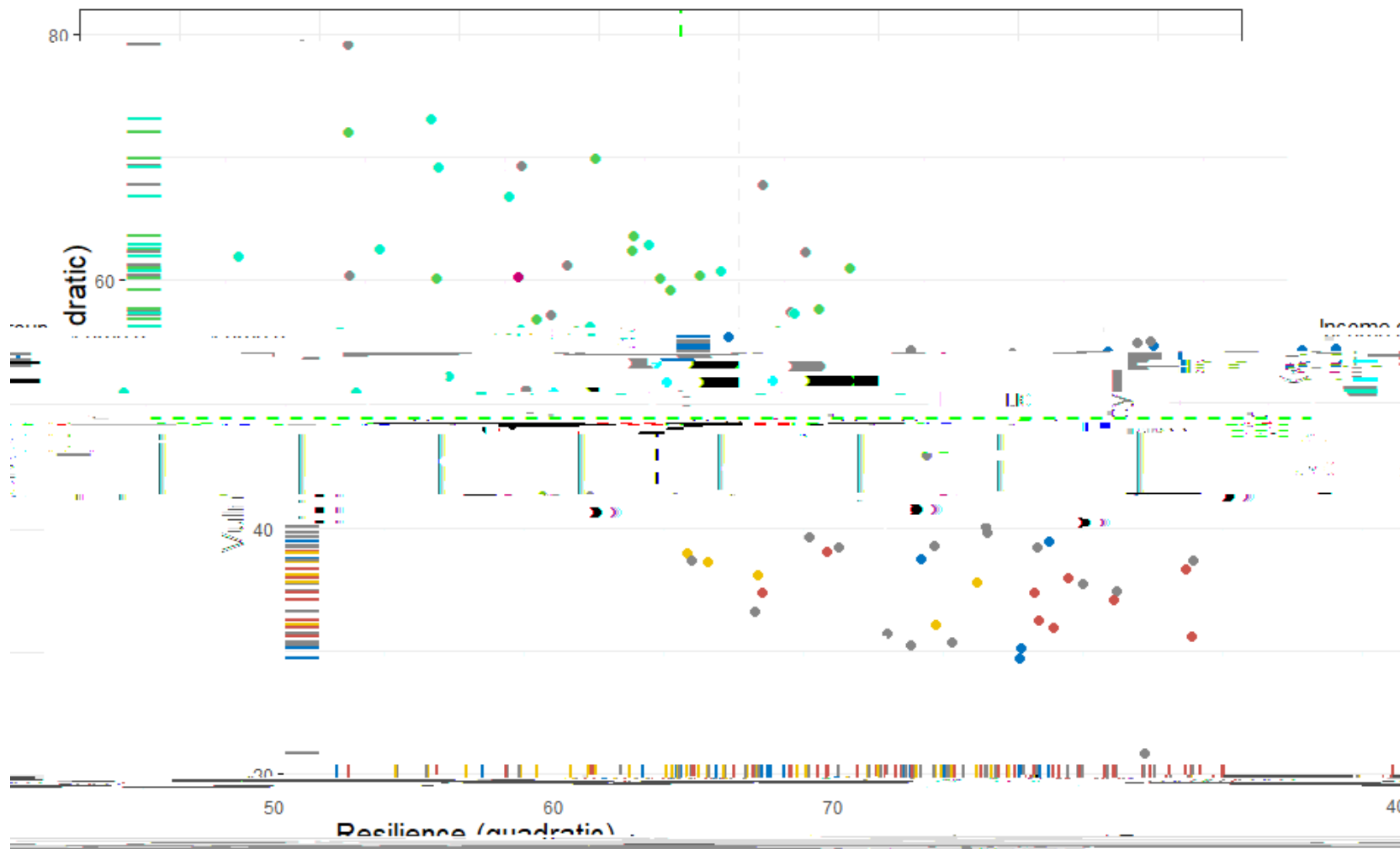


The quadratic mean (in orange, on the right) results in high vulnerability scores for countries with just one of the two types of vulnerabilities, compared to the arithmetic mean (in grey, on the left), where almost no countries are scored as vulnerable.



Aggregating vulnerability and resilience

Scatter plot of vulnerability and resilience



Aggregating vulnerability and resilience

The way structural vulnerability and resilience should be combined wasn't specified in UN resolution or TOR

?



Total Vulnerability = Vulnerability + Lack of Resilience*

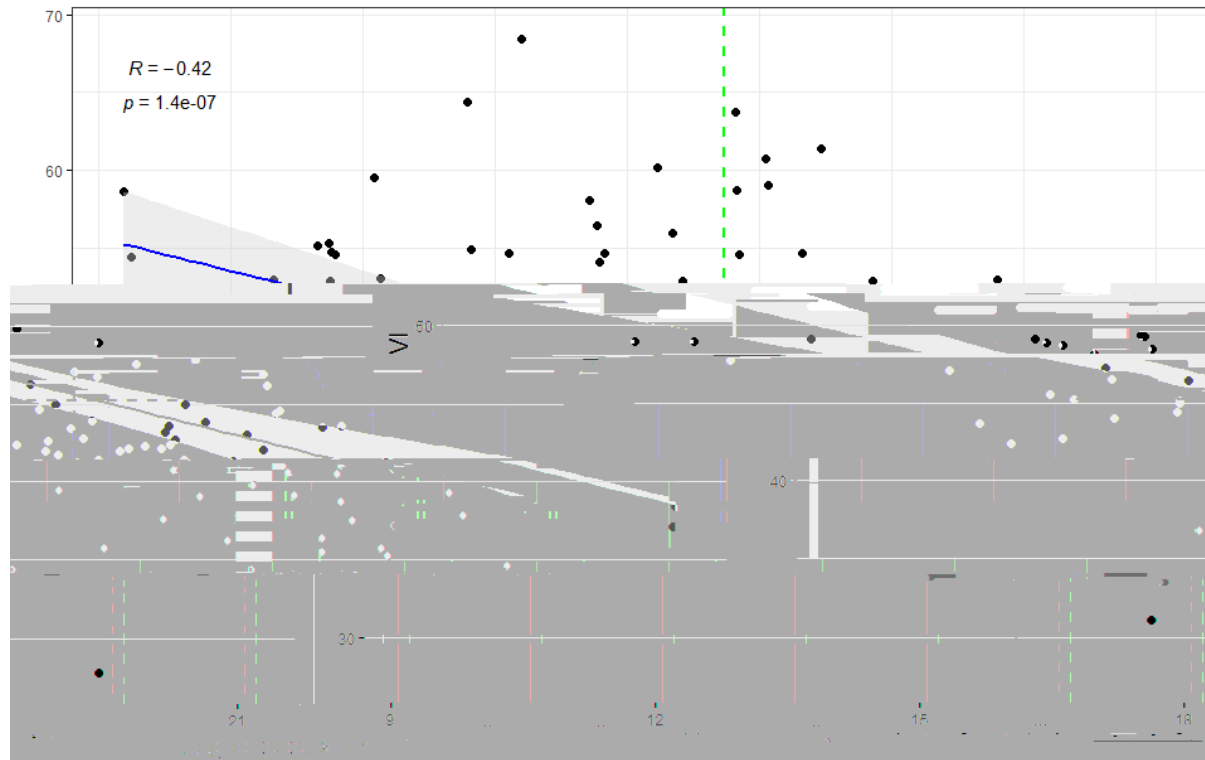
**Lack of Resilience = (100-Resilience)*

* *Aggregation of two pillars by quadratic mean*

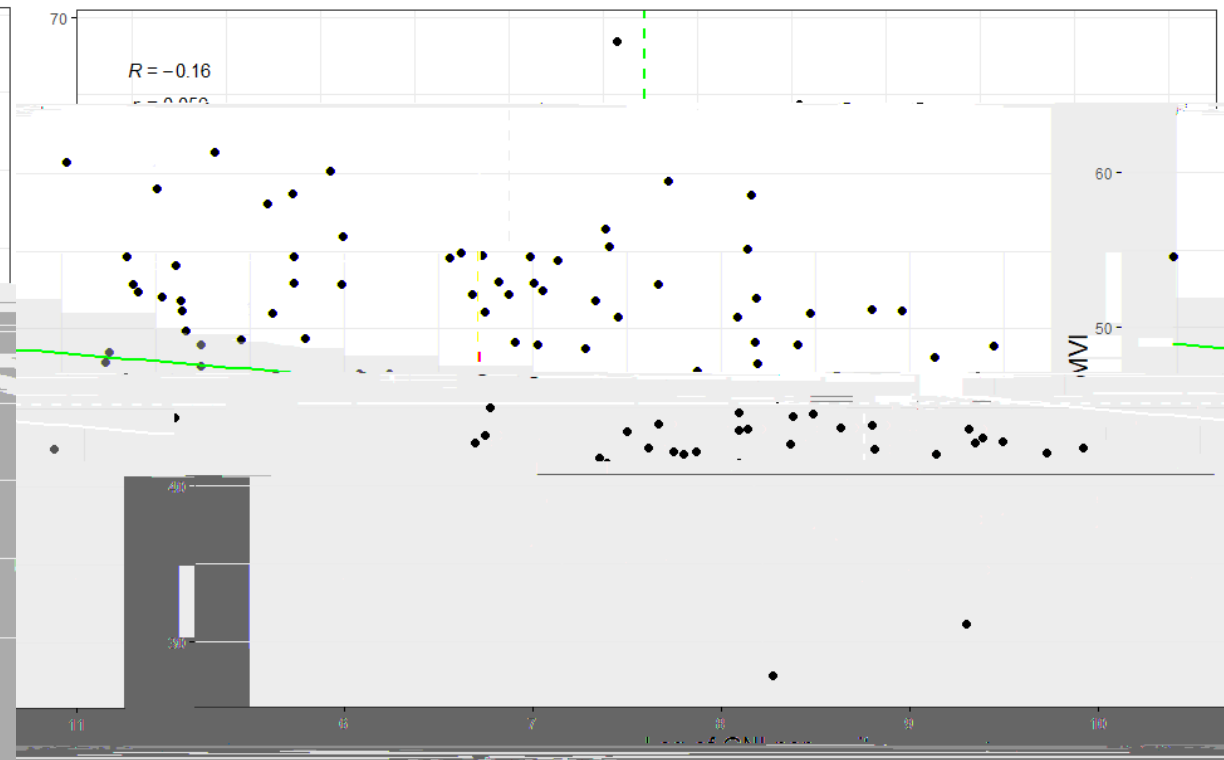


MVI SENSITIVITY ANALYSIS

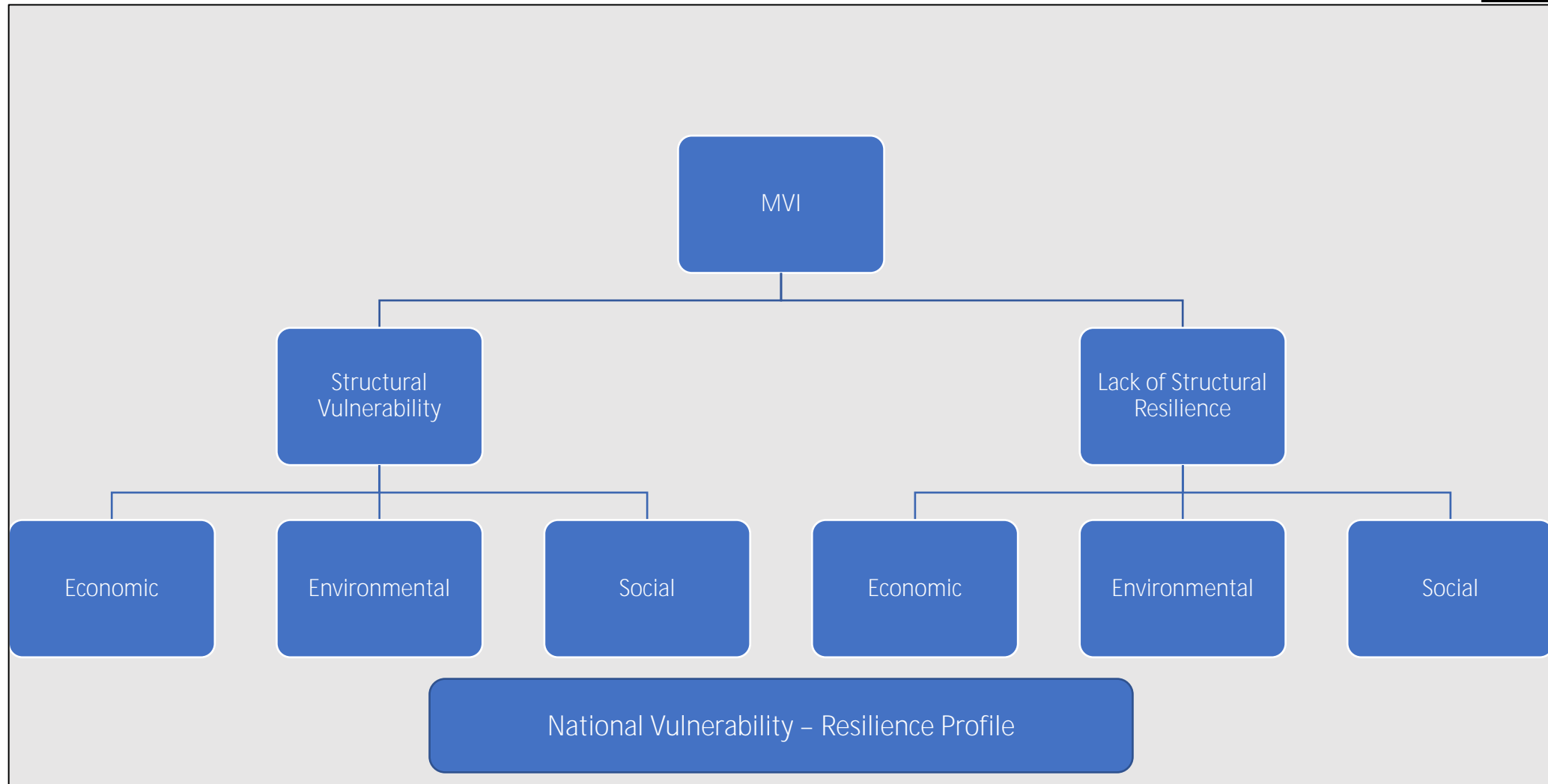
Scatter plot of MVI and population (log)



Scatter plot of MVI and GNI PC



THE FULL MVI FRAMEWORK





Thank you for your attention

Written comments may be sent to:

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