MULTIDIMENSIONAL VULNERABILITY INDEX – CONCEPTS AND INDICATORS

VULNERABILITY INDICATORS

Table 1: Economic Vulnerability

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Exposure to fluctuations in international trade and financial flows	*1*	*Trade openness*	Countries that are open to trade are more vulnerable to suffer global economic shocks.	Share of exports plus imports over GDP (in % of GDP)	UNCTAD
	2	*Merchandise and services export concentration*	Countries with concentrated export structure are likely to suffer more harm when exposed to external shocks.	Share the three highest export categories in total exports of goods and services (in %)	UNCTAD
Exposure to fluctuations in export earnings	*3*	*Instability of export revenue*	Indirect measure of volatility of output and government revenues caused by export earning instability. Countries with unstable export earnings have a lower capacity to import goods, services, and capital, leading to higher investment risk and fiscal instability.	Defined as the standard deviation of the difference between the value of annual export earnings and its 20-year (quadratic) trend (in $)	UNDESA Statistics Division
Exposure to fluctuations in strategic import prices	*4*	*Food and fuel import dependency*	Countries that import a high percentage of their food and fuel are more vulnerable to externally generated inflationary pressures.	Share of food and fuel imports over total consumption expenditure (in % of total consumption expenditure)	UNCTAD

Table 2: Environmental Vulnerability

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Exposure to natural hazards	*5*	*Victims of natural hazards*	Indirectly provides information on human vulnerability to natural hazards.	The share of the population who have been killed or affected by natural hazards (in % of total population)	EMDAT-CRED
	6	*Damages related to natural hazard*	Indirectly provides information on public and private assets' vulnerability to natural hazards.	Share of damages over GDP (in % of GDP)	EMDAT-CRED
Exposure to extreme weather events	*7*	*Rainfall shocks*	Rainfall shocks can impact access to water and sanitation; access to food, employment, social services and social capital by blocking transportation (flooding), agricultural productivity, and through an income effect, household consumption.	The magnitude of rainfall shocks is measured as the square root of the square deviation of rainfall series from their long-term trend. Inverse level of rainfall is measured by the average level of precipitation over a long period (since 1950). Magnitude of shocks and level are combined to produce the indicator. (in millimeters)	CRU TS (University of East Anglia)

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
	8	*Temperature shocks*	Countries experiencing warmer temperatures are more likely to have extreme weather events such as hurricanes and wildfires which cause loss of life, damage to property and infrastructure, disruption of public services, displacement and loss of livelihoods. High heat lowers labor productivity, and may increase risk of conflict.	The magnitude of temperature shocks is measured as the square root of the square deviation of temperature series from their long-term trend. Level of temperature is measured by the average of temperature over a long period (since 1950). Magnitude of shocks and level are combined to produce the indicator. (in degrees Celsius)	CRU TS (University of East Anglia)
Exposure to ecosystem pressure	9	*Low elevated coastal zones*	Countries with low coastal zones are more vulnerable to harm from coastal ecosystem pressure caused by climate change, including increased exposure to sea-level rise, storm surge, ocean acidification and habitat damage such as coral bleaching.	Share of areas contiguous to the coast below five meters to total land areas of countries (in % of territory)	CoastalDEM (Climate Central)
	10	*Drylands*	Populations living in drylands are vulnerable to drought, which is increasing due to climate change. Drought reduces agricultural yields and increases food insecurity.	Share of drylands over the country's area (excluding deserts). (in % of territory)	CRU TS (University of East Anglia)

Table 3: Social vulnerability

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Exposure to global health shocks	11	*Victims of epidemics*	Indirect measure of health and social system vulnerability to rapid onset of a pandemic episode, which can overload health and social protection systems.	Share of victims of epidemics over the total population (in % of total population)	EMDAT-CRED
Spillover effects of regional violence	12	*Regional Conflict-related death (excluding own country's data)*	Violence in neighboring countries increases vulnerability to internal armed conflicts due to the porous nature of borders.	Quadratic mean of battle-related death deaths per 100,000 inhabitants due to internal conflicts in neighboring countries. Neighborhood is defined by contiguity for countries that are not isolated islands. However, for isolated islands, the neighborhood is defined according to UN regions. (per 100,000 populations)	ACLED
	13	*Regional Homicide (excluding own country's data)*	Violence in neighboring countries increases internal violence risk. Criminality, especially transnational crime, is an example of an external stress factor that exacerbates the risk of local violence (gang violence, cartel turf wars, etc.).	Quadratic mean of homicide rates per 100,000 inhabitants in neighboring countries. Neighborhood is defined by contiguity for countries that are not isolated islands. However, for isolated islands, the neighborhood is defined according to UN regions. (per 100,000 populations)	UNODC / WHO / IHME Burden of Disease
Exposure to entrance of international forced displacement of people	14	*Refugees from abroad*	Refugees impact the social and economic life of communities in the short to medium term though increased resource requirements.	Share of refugee population in the country over total population (per 100,000populations)	UNHCR

RESILIENCE INDICATORS

Table 4: Economic resilience

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Capacity to integrate with international markets	15	*Connectivity*	Remoteness increases transportation costs and creates information asymmetries which can reduce competitiveness, limit access to international financial markets, and constrain economic diversification.	Inverse of the weighted average distance from the nearest trading partners with a cumulative share in world trade of 50 per cent, with market shares as weights and adjusted for landlockedness (in km)	CEPII / UNDESA Statistics Division
Economies of scale	16	*Population Size*	Small countries have small risk pool implying higher cost of shocks per capita (less diversification, low opportunity for risk pooling).	Total population in logarithm (in number of individuals)	UNDESA Population Division, World Population Prospects
Domestic economic capacity	17	*Gross fixed capital formation*	Indirect measure of savings and asset accumulation. Households and firms with more savings and assets are resilient to shocks.	Gross fixed capital formation over GDP (in % of GDP)	UNCTAD
	18	*Production concentration index*	Economic diversification reduces the total macroeconomic risk by pooling risks across productive sectors.	Inverse of Herfindahl-Hirschman concentration index of sectoral GDP. (between 0 and 1)	UNCTAD

Table 5: Environmental resilience

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Adequacy of water supply	19	*Renewable internal freshwater resources*	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 that limit water availability. It also supports resilience of agricultural systems.	Ratio of renewable internal freshwater resources over total population (cubic meters per capita)	FAO AQUASTAT
Resilience of agricultural system	20	*Crop land*	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 (e.g. pastoralists and farmers).	Ratio of cropland over total population (in 1,000 hectares per capita)	FAOSTAT
Resilience to heat shocks	21	*Tree cover*	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.	Ratio of tree cover over country size (in 1,000 hectares per capita)	FAOSTAT

Table 6: Social resilience

Concept	ID #	Indicator	Summarized rationale	Measured by	Primary data source
Low demographic pressure	22	**(low) Dependency ratio**	Fewer dependents per worker creates higher household and national savings and supports higher human capital development.	Ratio of non-working age population over working age population (per hundred persons aged 15-64)	UNDESA Population Division
	23	**(low) Population density**	Low population density reduces the risk of injury or death when a natural disaster occurs. It also lowers vulnerability to health shocks because there is space for social distancing and lower demand on natural resources (water supply). It may also reduce vulnerability to conflict when shocks hit.	Inverse of total population divided by land area in square kilometers. (people per sq. km)	UNDESA Population Division
Effective social service provision	24	**People using at least basic sanitation services**	Higher access to basic sanitation services supports human capital development and creates resilience to disease transmission, including during a pandemic.	Share of population using at least basic sanitation services over total population) (in % of population)	WHO
	25	**(Low) Under-5 mortality**	Healthier populations are more resilient to the effects of external shocks, especially health shocks but also natural disasters. Under 5 mortality is a strong measure of the effectiveness of the health system.	Inverse of the probability per 1,000 that a newborn baby will die before reaching age five (deaths per 1,000 live births))	UN Inter-agency Group for Child Mortality Estimation
	26	**Years of schooling**	Education is the "great enabler" of development. More educated populations can act more effectively when risks materialize, as well as develop adaptation strategies to external stressors.	Average number of completed years of education of a country's population aged 25 years and older (in years)	UNDP
Gender equity	27	**Proportion of seats held by women in national parliaments**	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.	Proportion of seats held by women in national parliaments (% of total number of seats)	Inter-Parliamentary Union (IPU)

April 24, 2023