The Atlas of Impunity: Methodology document

This document provides a more technical overview of our methodology in constructing the Atlas of Impunity and describes some of the statistical characteristics of the Atlas scores. A non-technical summary of our methodology, as well as a full list of sources and indicators, can be found in the 2023 Atlas report beginning on page 8.

As noted in the report, we made a series of important technical revisions this year to make the data suitable for comparison over time. These changes built upon the conceptual work done with the Atlas of Impunity's advisory board in 2021-2022 to define the most important dimensions of impunity, select relevant measures of each dimension, and devise a scoring and ranking system for the data. As such, most of the Atlas's indicators and sources and the logic of the scoring and ranking remain unchanged since the 2022 edition.

Before the publication of the 2022 report, the process of measuring impunity around the world proceeded in four phases. First, we reviewed existing literature from academics and civil society groups, assembled quantitative data on impunity, and worked with an independent advisory board to refine our definition. Second, we selected indicators in consultation with the advisory board with an eye to maximizing coverage and utilizing existing, reputable, and high-quality data. Third, we normalized and combined the data into dimension scores and overall Atlas scores, imputing missing data and assigning rankings where the actual data were sufficiently complete. Fourth, we reviewed the data with the advisory board and Eurasia Group's research platform to ensure a high level of quality.

Indicators, dimensions, and scorings

In 2022, the Atlas of Impunity utilized 67 indicators from 28 sources to gauge the degree of impunity at the country level, focusing on what we considered to be the most representative components of each of the five dimensions: unaccountable governance (UG), abuse of human rights (AHR), economic exploitation (EE), conflict and violence (CV), and environmental degradation (ED).

In the 2023 edition, substantial changes were implemented in the methodology to create a historical time series covering the years 2022 and 2023. Beyond generating comparable scores and rankings for these years, efforts were made to extend the time series back to 2012. This historical dataset enables the assessment of trends in countries' scores and rankings over time, offering insights into performance variations among regions, income levels, and political groupings.

The Global Competitiveness Index was paused in 2020 and consequently excluded from the Atlas of Impunity. The number of indicators included in the 2023 Atlas therefore fell by one, to 66. For a comprehensive list of data sources and indicators, please refer to the main report.

Indicator weightings and headline impunity scores

To determine the country-specific impunity scores, each of the 66 indicators was normalized on a 0 to 5 scale. Countries with the highest impunity level were assigned a score of 5, while those with the greatest degree of accountability received a score of 0.

Following normalization, the individual indicator scores were averaged into their respective dimension scores, with each indicator contributing equally to the dimension. The five dimension scores were then averaged to formulate an overall Atlas score. Each dimension carried an equal weight of 20%, underscoring an equal conceptual importance in the Atlas. In other words, the overall Atlas of Impunity score is an average of each of the individual indicators, the weight of which in the overall score is determined by the number of indicators included in each of the five dimensions.

One noteworthy change in the 2023 Atlas is the dynamic nature of the number of indicators within each dimension over time. With increasing data availability from multiple sources, the number of indicators expanded over the last decade. For a detailed timeline of the indicators, please consult the table below.

Stated more formally, indicators in dimension i^{th} contribute differently to the headline index according to the formula $w^{i,t} = (0.2/n_{i,t})$ which is the individual indicator weight in year t^{th} and $n_{i,t}$ is the number of indicators within the dimension i^{th} in year t^{th}. The overall impunity score for year t^{th} can then be written as follows:

$$impunity_t = \sum_{i=1}^{5} \sum_{j=1}^{n_{i,t}} \left(\frac{0.2}{n_{i,t}}\right) * indicator_j$$

While integrating time series data from multiple sources, challenges arose owing to varying data availability, ranging from differences in indices among countries to fluctuations within the time series. Two specific challenges include:

1 - Different update frequencies

Data were published at different frequencies. For instance, indices such as the Economic Freedom Index and Fragile State Index were annually updated since 2012, while the Open Budget Survey was published biennially.

2 - Incomplete and irregular updates

When data were published, not all covered countries were consistently updated. This discrepancy was observed in indices such as the Gini index and in the intentional homicide data.

To address these challenges, when calculating the Atlas score for a specific year, we utilized the most recently available data. Despite starting at different points in time, 51 out of 66 indicators had a complete time series spanning from 2012 to 2022. The remaining indicators commenced at various years. For example, the World Peace Index started in 2016, the Open Budget Survey in 2015, and the Corporate Tax Haven Index in 2019.

The main differences between the 2023 and 2022 versions of the Atlas are that (1) count data were min-max normalized based on min-max values determined from the aggregated data, and (2) dimension averages were not min-max normalized before computing the overall impunity scores to allow for comparisons within time series.

Update frequencies for indicators

Dimension	Index	Indicator	Code	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Notes
Unaccountable Governance	Economist Intelligence Unit	Electoral process and pluralism	EIU_EP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Functioning of government	EIU_GI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Democracy and political culture	EIU_PC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Political participation	EIU_PP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	World Press Freedom	Global score	WPF_Score		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Fragile State Index	External intervention	FSI_ei		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	2012–2020: Israel/ West Bank reported together (discarded) 2021–2023: Israel and Palestine independently
		State legitimacy	FSI_sl		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Rule of Law Index	Regulatory enforcement	RLI_RE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Constraints on government power	RLI_CP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Criminal justice	RLI_CJ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
		Civil justice	RLI_CI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	Varieties of Democracy	Freedom from political killings	VOD_kill		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Clientelism Index	VOD_client		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Impartial public administration	VOD_imp		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Freedom in the World	Total score 2023	FIW_score		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Palestine/Gaza and Palestine/ West Bank: reported together (discarded)
Economic Exploitation	Economic Freedom Index	Property rights	EFI_pr		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	In 2017, the freedom from corruption component was refined, incorporating additional sub-factors and underlying data sources that are significantly more comprehensive than those formerly used, and renamed "Government Integrity"
		Government Integrity	EFI_gi		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Freedom in the World	Functioning of government	FIW_C		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Corporate Tax Haven Index	Total score	CTH_score										✓	✓			
	Labor Rights Index	Total score	LRI_score										✓		✓		
	Varieties of Democracy	Social class equality in respect to civil liberties	VOD_social		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Sustainable Development Index	Victims of modern slavery (per 1,000 population)	SDG8_slav		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Has not been updated since 2012 (for most countries) Different countries were updated at different time every ~4-5 years. Major methodology changes in 2020
		Children involved in child labor (% of population aged five to 14)	SDG16_clabor		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		SDI Goal 1: No Poverty	SDG_g1		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		SDI Goal 2: Zero Hunger	SDG_g2		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Open Budget Survey	Total score	OBS_score	✓		✓		✓		✓		✓		✓			Reports were published every two years covering data from the previous three years
	Global Corruption Index	Total score	GCRI_score		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	State of Tax Justice	Total tax loss (% tax revenue)	SOTJ_taxlossrev										✓	✓	✓	✓	Reports published four years after data collection
		Harm done to other countries (% of total harm)	SOTJ_harm										✓	✓	✓	✓	
	Gini	Normalized Gini using most recent available from 2007-2022	Gini_Norm		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		Countries were updated at different times, used most recent data

Update frequencies for indicators

Dimension	Index	Indicator	Code	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Notes
Environmental Degradation	Sustainable Development Index	Climate action goal	SDG_g13		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Life below water goal	SDG_g14		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Life on land goal	SDG_g15		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Environmental Protection Index	Climate change	EPI_climate		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	A lot of changes from year to year with addition of new indicators and major categories (be careful when comparing year to year changes)
		Air quality	EPI_air		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Waste management	EPI_waste										✓	✓	✓	✓	
		Agriculture	EPI_agr		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
		Acid rain	EPI_acidrain												✓	✓	
	Ecological Footprint of Countries	Ecological footprint	EcoF_consumption		✓	✓	✓	✓	✓	✓	✓	✓	✓				
Conflict and Violence	Armed Conflict Location & Event Data	Number of battles	ACLED_n_battles		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
		Number of riots	ACLED_n_riots		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
		Total fatalities per capita	ACLED_f_percapita		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
		Violence against civilians (by nonstate)	ACLED_v_nonstateforces		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
		External battles	ACLED_n_exbattles		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Global Peace Index	Total score	GPI_Score		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Women Peace Security Index	Community safety perception	WPS_safety						✓			✓		✓			
		Intimate partner violence	WPS_partner						✓			✓		✓			
	Intentional Homicides	No. intentional homicides per 100,000 people in 2020	HOM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Fragile States Index	Group grievance	FSI_gg														
	Rule of Law Index	(Sub) People do not resort to violence to redress personal grievances	RLI_RV			✓	✓	✓	✓	✓	✓	✓	✓	✓			
	UNHCR Refugee Data Finder	Total per capita	UNHCR_percapita	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
	SIPRI Arms Trade Importer	Total imports	SIPRI_imports	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	SIPRI Arms Trade Exporter	Total exports	SIPRI_exports	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Abuse of Human Rights	OHCHR	State's consent to be bound by the 18 human rights treaties	OHCHR_RS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Economist Intelligence Unit	Civil liberties	EIU_CL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Fragile State Index	Human rights and rule of law	FSI_hr		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Rule of Law Index	Equal treatment and no discrimination	RLI_ET			✓	✓	✓	✓	✓	✓	✓	✓	✓			
		Right to life and security	RLI_LS			✓	✓	✓	✓	✓	✓	✓	✓	✓			
		Due process of the accused	RLI_DP			✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Human Freedom Index	Politically motivated disappearances	HFI_PMD	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			Reports published two years after data collection
		Freedom from torture	HFI_FT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Political Terror Scale	Average of three main scores	PTS_AVG	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Amnesty International Executions	Recorded executions and death penalties by year	AI_exec						✓	✓	✓	✓	✓	✓			
	Freedom in the World	Ethnic cleansing	FIW_ethnic		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	Armed Conflict Location & Event Data	Violence against civilians (by state)	ACLED_v_stateforces		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
	Women Peace Security Index	Absence of legal discrimination	WPS_discrim						✓			✓		✓			

Data lags

One challenge encountered when incorporating time series data was the lag between data collection and publication. Whenever possible, efforts were made to address this temporal difference, and we extended our data collection closing date through October 2023 for all annual source indexes to incorporate as much input data as possible. The data year utilized in the Atlas of Impunity calculation corresponded to the publication year of the source indicator.

The Atlas allows no qualitative score adjustments by Eurasia Group analysts, the project's sponsors, or the advisory board. Any implicit value judgments stem solely from indicator selection and any subjective criteria embedded in the source data, some of which rely on expert assessments. Following the Atlas's publication, we plan to reconvene the advisory board as we update the data for subsequent editions. This approach will enable us to contemplate necessary data revisions, incorporating diverse perspectives and a range of expertise.

Data skewness and normalization

To facilitate year-to-year comparison of the individual indicator scores, count data were normalized using ranges derived from the aggregate time series data. In cases where the data exhibited significant skewness, upper truncation was applied, assigning a maximum score of 5 to values above the truncation threshold. This adjustment aimed to mitigate the impact of extreme values, allowing for better observation of changes among the majority of data points. Specific ranges associated with all indicators can be found in the table below.

Indicator directionality, transformations, and original range

Indicator	ReverseDirectionality	min	max
AHR_mean	FALSE	0	5
CV_mean	FALSE	0	5
UG_mean	FALSE	0	5
ED_mean	FALSE	0	5
EE_mean	FALSE	0	5
ACLED_f_percapita	FALSE	0 (log-unit)	5 (log-unit)
ACLED_n_battles	FALSE	0 (log-unit)	6 (log-unit)
ACLED_n_exbattles	FALSE	0 (log-unit)	2 (log-unit)
ACLED_n_riots	FALSE	0 (log-unit)	6 (log-unit)
ACLED_v_nonstateforces	FALSE	0 (log-unit)	6.2 (log-unit)
ACLED_v_stateforces	FALSE	0 (log-unit)	4.3 (log-unit)
AI_exec	FALSE	0 (log-unit)	6 (log-unit)
CTH_score	FALSE	0	100
EcoF_consumption	FALSE	0	20
EFI_gi	TRUE	0	100
EFI_pr	TRUE	0	100
EIU_CL	TRUE	0	10
EIU_EP	TRUE	0	10
EIU_GI	TRUE	0	10
EIU_PC	TRUE	0	10
EIU_PP	TRUE	0	10
EPI_acidrain	TRUE	0	100
EPI_agr	TRUE	0	100
EPI_air	TRUE	0	100
EPI_climate	TRUE	0	100
EPI_waste	TRUE	0	100
FIW_C	TRUE	0	12
FIW_ethnic	FALSE	0	4
FIW_score	TRUE	0	100
FSI_ei	FALSE	0	10
FSI_gg	FALSE	0	10
FSI_hr	FALSE	0	10
FSI_sl	FALSE	0	10
GCI_treaties	TRUE	0	100
GCRI_score	TRUE	0	100
Gini_Norm	FALSE	0	100

Indicator	ReverseDirectionality	min	max
GPI_Score	FALSE	1	4
HFI_FT	TRUE	0	10
HFI_PMD	TRUE	0	10
HOM	FALSE	0	32
LRI_score	TRUE	0	100
OBS_score	TRUE	0	100
OHCHR_RS	TRUE	0	18
PTS_AVG	FALSE	1	5
RLI_CI	TRUE	0	1
RLI_CJ	TRUE	0	1
RLI_CP	TRUE	0	1
RLI_DP	TRUE	0	1
RLI_ET	TRUE	0	1
RLI_LS	TRUE	0	1
RLI_RE	TRUE	0	1
RLI_RV	TRUE	0	1
SDG_g1	TRUE	0	100
SDG_g13	TRUE	0	100
SDG_g14	TRUE	0	100
SDG_g15	TRUE	0	100
SDG_g2	TRUE	0	100
SDG16_clabor	TRUE	0	100
SDG8_slav	TRUE	0	100
SIPRI_exports	FALSE	0 (log-unit)	9.1 (log-unit)
SIPRI_imports	FALSE	0 (log-unit)	7.9 (log-unit)
SOTJ_harm	FALSE	0	20
SOTJ_taxlossrev	FALSE	0	100
UNHCR_percapita	FALSE	0 (log-unit)	0.1 (log-unit)
VOD_client	FALSE	0	1
VOD_imp	TRUE	0	4
VOD_kill	TRUE	0	4
VOD_social	TRUE	0	4
WPF_Score	TRUE	0	100
WPS_discrim	TRUE	0	100
WPS_partner	FALSE	0	100
WPS_safety	TRUE	0	100

## Selected data exhibiting extreme skewness
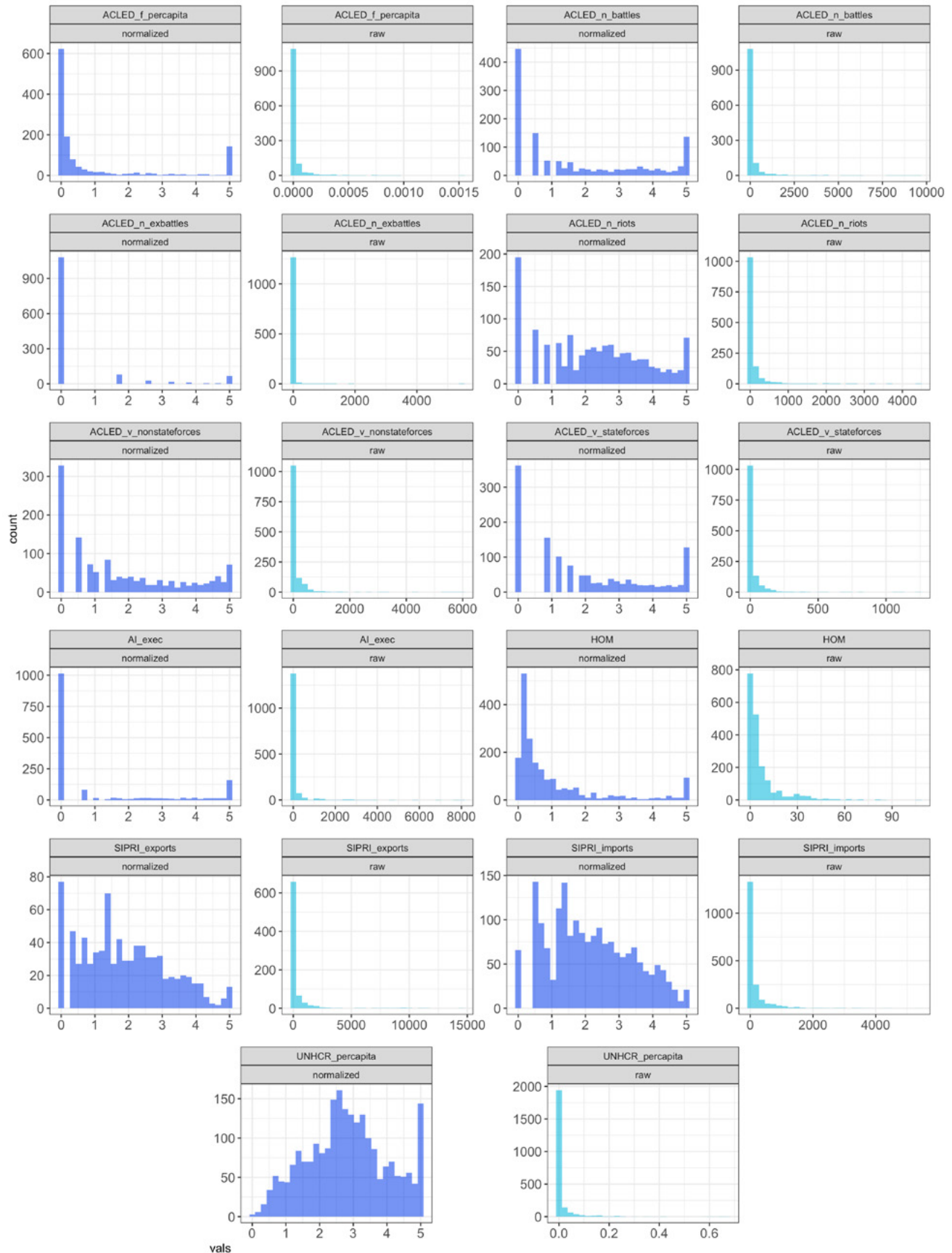
Missing data and data imputation

One of the inevitable challenges when combining data from multiple sources is that the lack of indicator coverage for some countries is non-random, with values missing for a variety of reasons. Some of these include the absence of UN recognition; disputed territory, making it difficult to determine political ownership of the data; conflicts impeding data collection; or resource prioritization of the source index publishers toward certain countries. For instance, the ACLED data did not encompass Singapore and Japan until 2019, largely because there was very little to no recorded violence in these countries.

The table below shows missing data by indicator. Each country has a number of missing data points between 0 and 12 for the 2012-2023 period. The patterns reflect individual indicators' coverage and show clearly which countries tend to be left out of each data source.

## Missing indicators by country
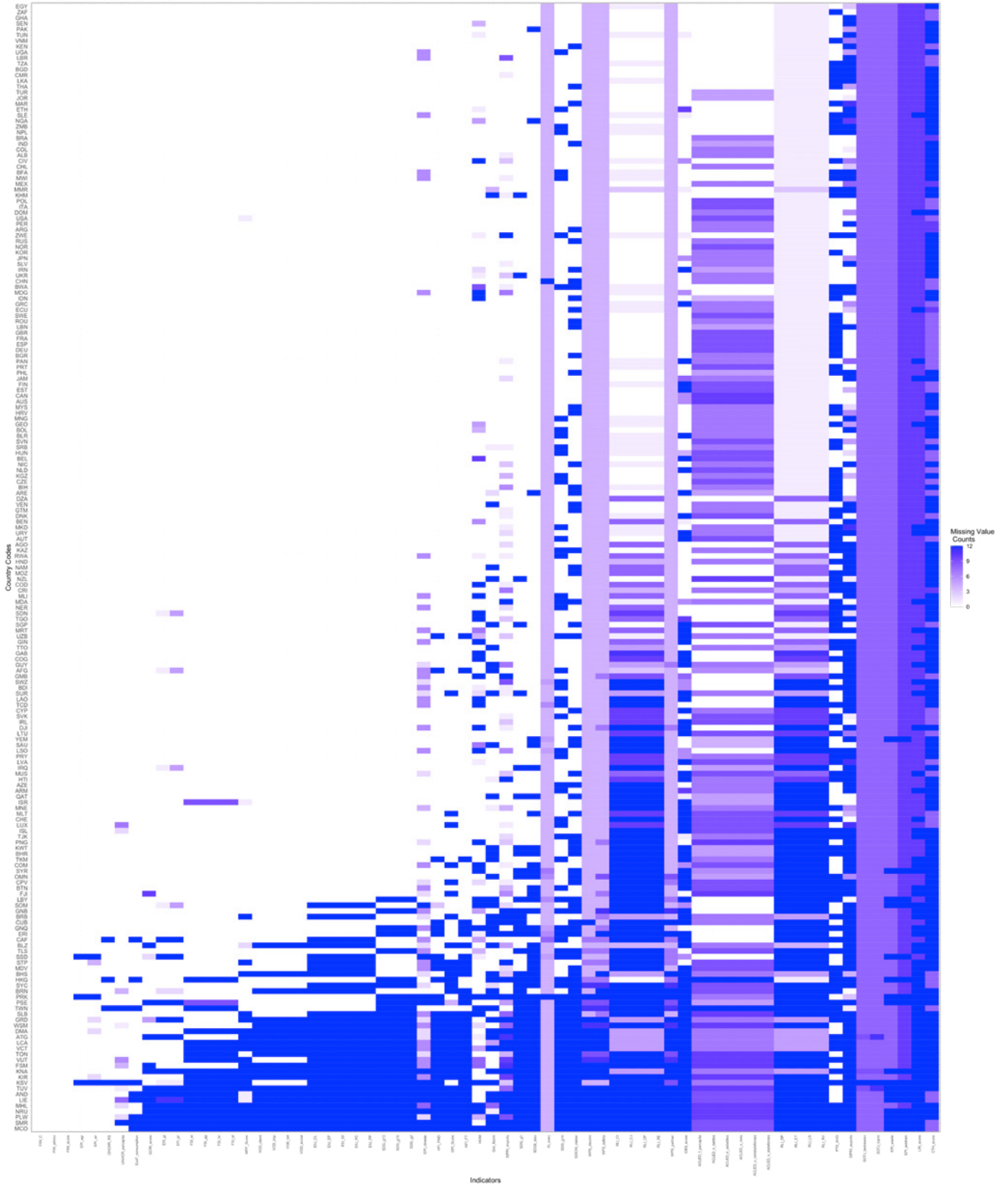
The next chart shows the number of missing data points by year for all countries.
There are 66 indicators, so the number of missing values ranges from 0 to 66.
The chart illustrates which countries and territories had poor quality time
series availability.

Missing data points by country and year
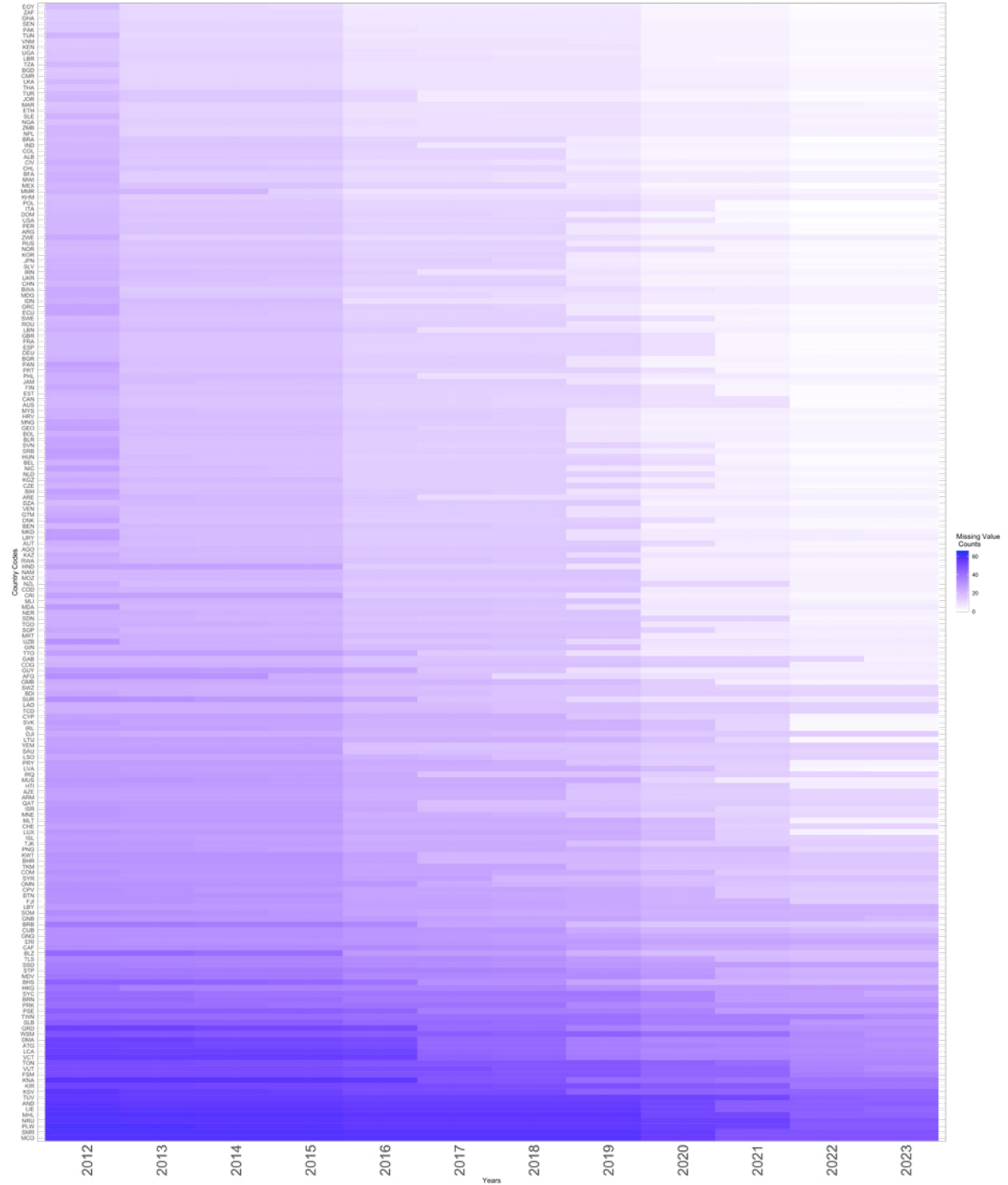
Initially, it may appear that the extent of missing data does not fluctuate significantly based on a country's income level. However, upon closer examination, it becomes evident that the prevalence of missing values correlates negatively with a country's GDP and population size. This observation appears to align with the allocation of resources in public reports, where countries with larger populations tend to receive more attention. Additionally, wealthier nations typically allocate greater resources to data collection efforts.

Percent missing values by income levels

Percent missing values by country GDP

Number of missing values by population size
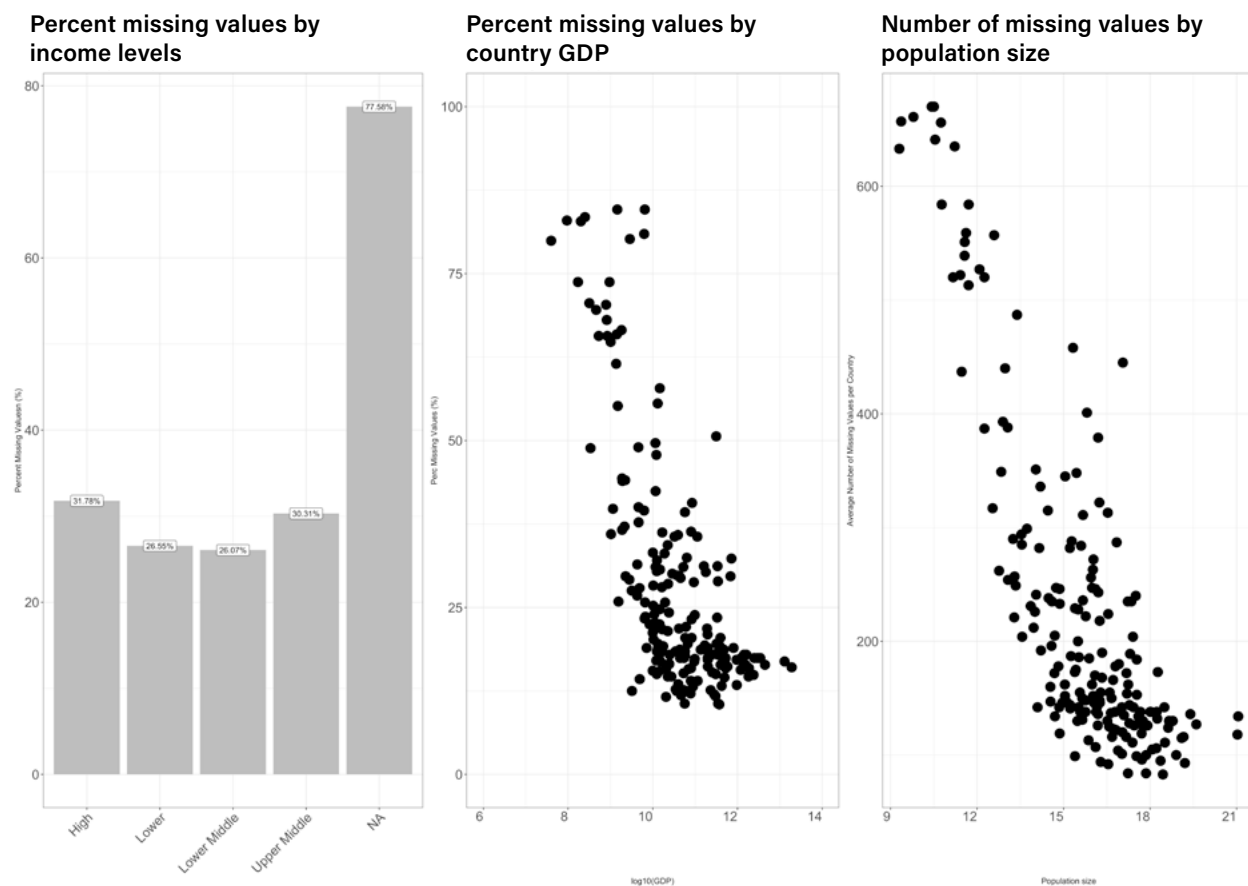
Time series imputation poses additional complexity due to autocorrelation among data points. Given the limited number of data points for each country, only a few time series were suitable for imputation. To maintain consistency and avoid disparate imputation techniques, no imputation was performed within the time series.

For cross-sectional data imputation, a methodology similar to the 2022 impunity index was adopted. Multiple imputation by chained equations (MICE) was employed to impute missing data for specific countries. MICE involves creating linear regressions for each indicator, replacing missing data points with estimates based on the relationships among observed values of the indicator and others in the dataset. The process was iterated to produce multiple "complete" datasets, and the imputed values were pooled to generate unbiased estimates of missing values. This algorithm proved advantageous given the moderate to strong correlations among indicators in the Atlas dataset.

**Atlas indicator pairwise correlations (strong to moderate)**

correlation Heatmap cut-off = 0.5 for 2024
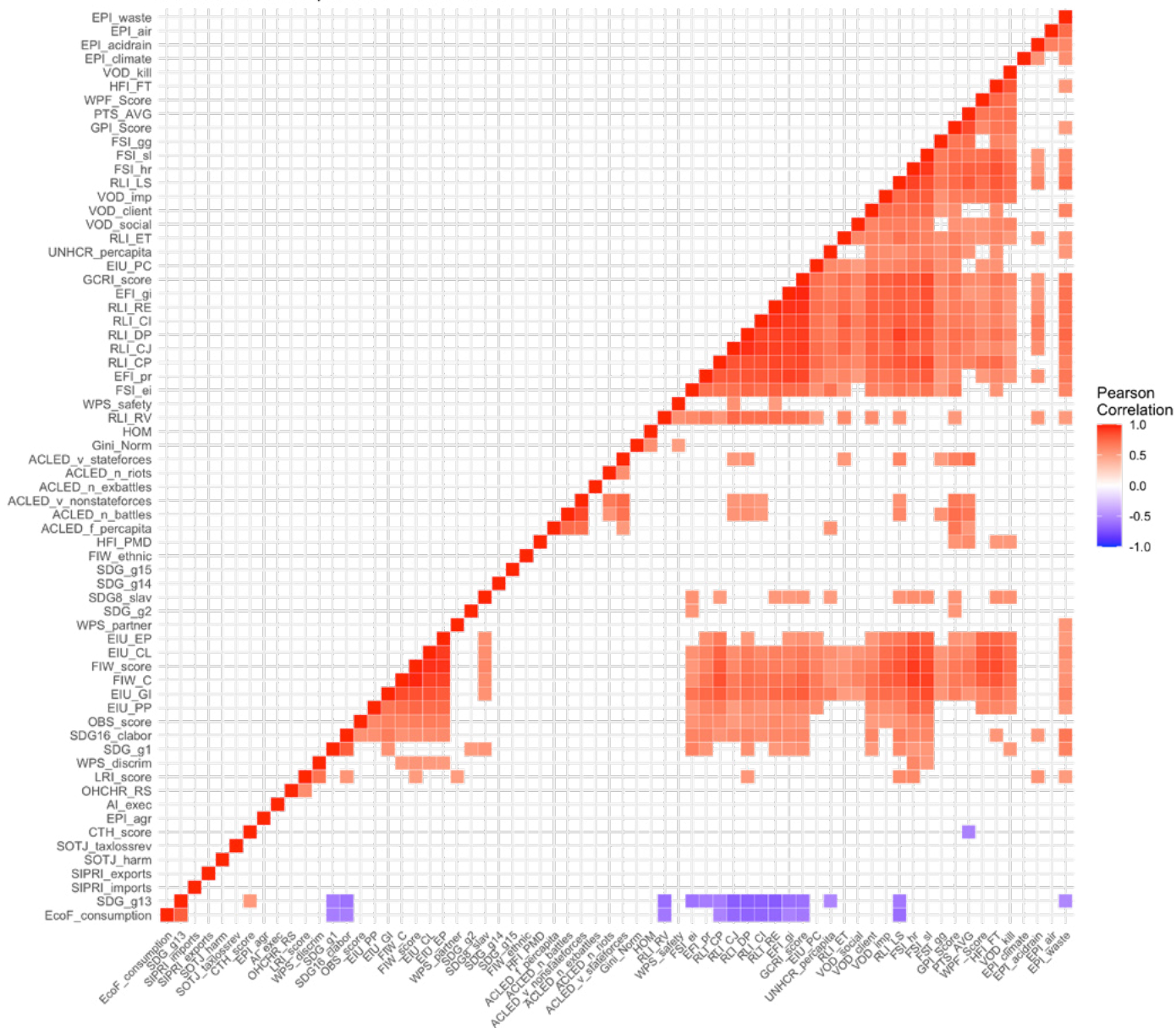
In our analysis, we imputed missing data only if a country had 60% or more actual Atlas data available. In a modification from the previous year, we also decided to include a feature only if it demonstrated moderate to strong correlations with at least two other indicators, aiming to enhance the model's performance. The chart above shows the indicators with moderate to strong Pearson correlations of at least 0.5 or -0.5.

The imputed values from MICE were thoroughly checked for convergence, both in terms of pre- versus post-imputation indicator-wise distributions and in terms of variance across multiple imputations. The plot below shows the variable importance for each imputed variable. The horizontal axis contains the variables that were used to impute the variables on the vertical axis. The trend is consistent with the correlation plot presented above with respect to the features that are moderately or strongly correlated. This is the expected behavior of MICE.

Feature importance in MICE imputation
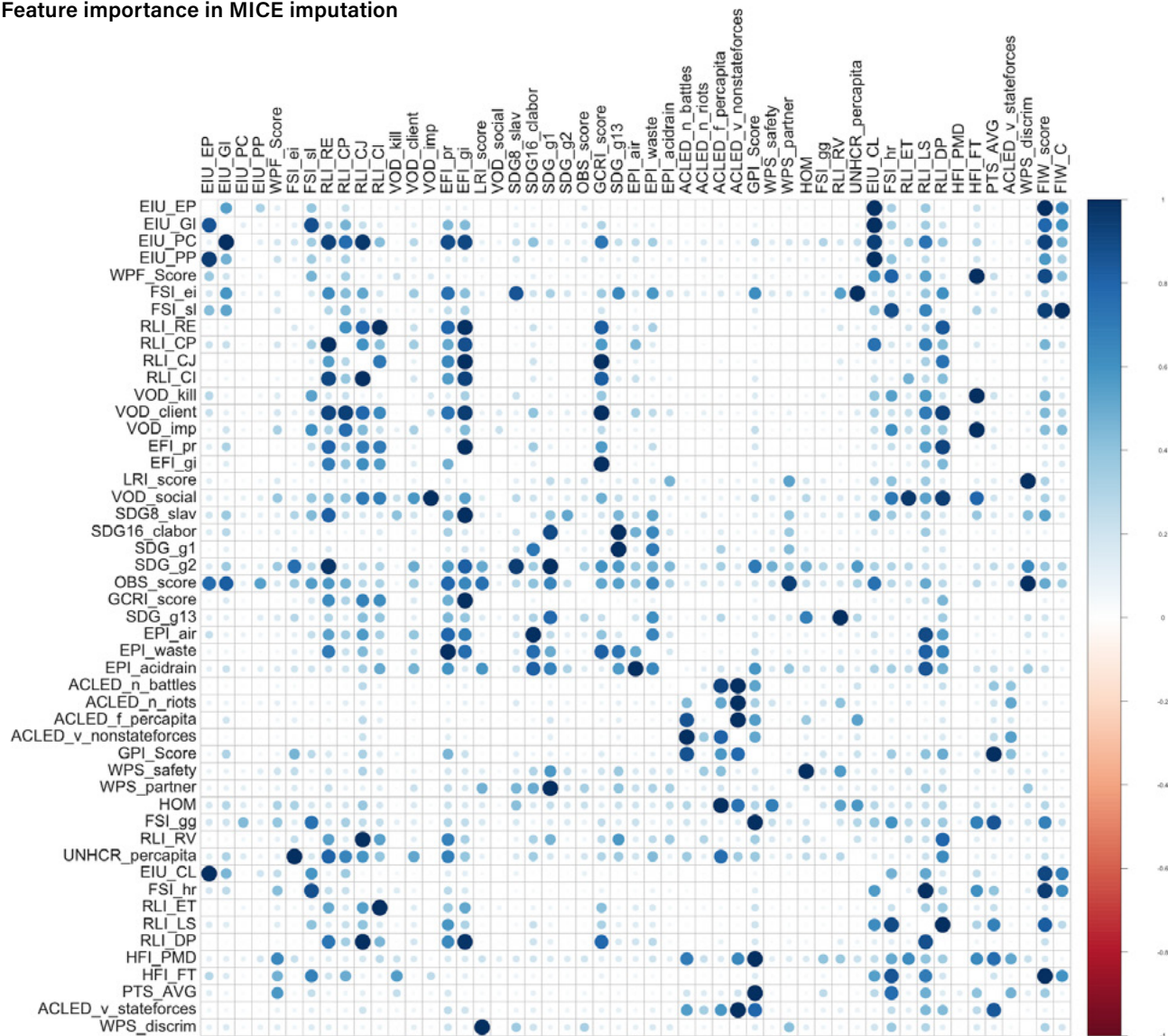
Data ranking

Overall rankings

In the Atlas, we produce rankings for countries only if they meet the 60% minimum threshold of actual data for imputation. A total of 170 countries received a ranking in the 2023 report. For countries with less than 60% of total actual indicator data available, Atlas scores are calculated only on the basis of the indicator data we have, and no imputation is performed. These countries receive no ranking in the headline Atlas, and their scores should be interpreted as indicative values in which we have less confidence than others based on more complete underlying data. Twenty-seven countries and territories are scored but not ranked in the 2023 Atlas.

Dimension rankings

For countries with less than 60% of actual data available in any given dimension of the Atlas, no dimension ranking was assigned. This is because sometimes missing data happened to cluster in just a particular dimension. For example, a few countries fall short of the 60% threshold for the total Atlas dataset, but they do have 60% of data in one dimension or more. In this case, the country does not get an overall ranking for the impunity score, but dimension rankings are still given for those that meet the cutoffs.