Humanitarian Data Quarterly

Issue 1 — Fall 2025

Editor: Hope Hilton

Acknowledgments

Gratitude to communities whose testimonies appear in these pages. Without their witness, the data would remain numbers instead of warnings.

Data Backbone

This issue is derived from:
* Early Warning Index (EWI), v3 — 2025
* Technical report on EWI v3, “Public Data as an Early-Warning System for Social Instability (v.3) — 2025
* Public datasets on conflict, displacement, protest, prices, telecom activity
* Open methodologies with full reproducibility notes (see p. 27)

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2. Table of Contents

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3. Editor's Note

The language of data

Humanitarian crisis is not random.

However, most predictive tools, that turn random noise into reliable alarms, are **private**.

This publication begins with the hypothesis that, **if publicly available information could be collected and distributed, humanitarian crises can be mitigated**, and lives can be saved.

This publication does exactly that: It collects a broad range of **publicly available data**, Medical aid deployments, protest activity, checkpoint closures, staple food prices, displacement reports, digital broadcast spikes, to watch for indicators of irregular activity that when taken together, precede humanitarian crises. In short, the data provide **measures of events leading up to crisis**.

This report provides closer looks at the areas with the highest alarms for humanitarian crisis (measured as Early Warning Index anomalies each season). The underlying data are available at humanitariandatahub.com

Version 3 of the Early Warning Index was built to test whether publicly available data could reliably signal rising humanitarian risk early enough for communities to prepare rather than react.

— Hope Hilton, Fall 2025

4. Global Snapshot

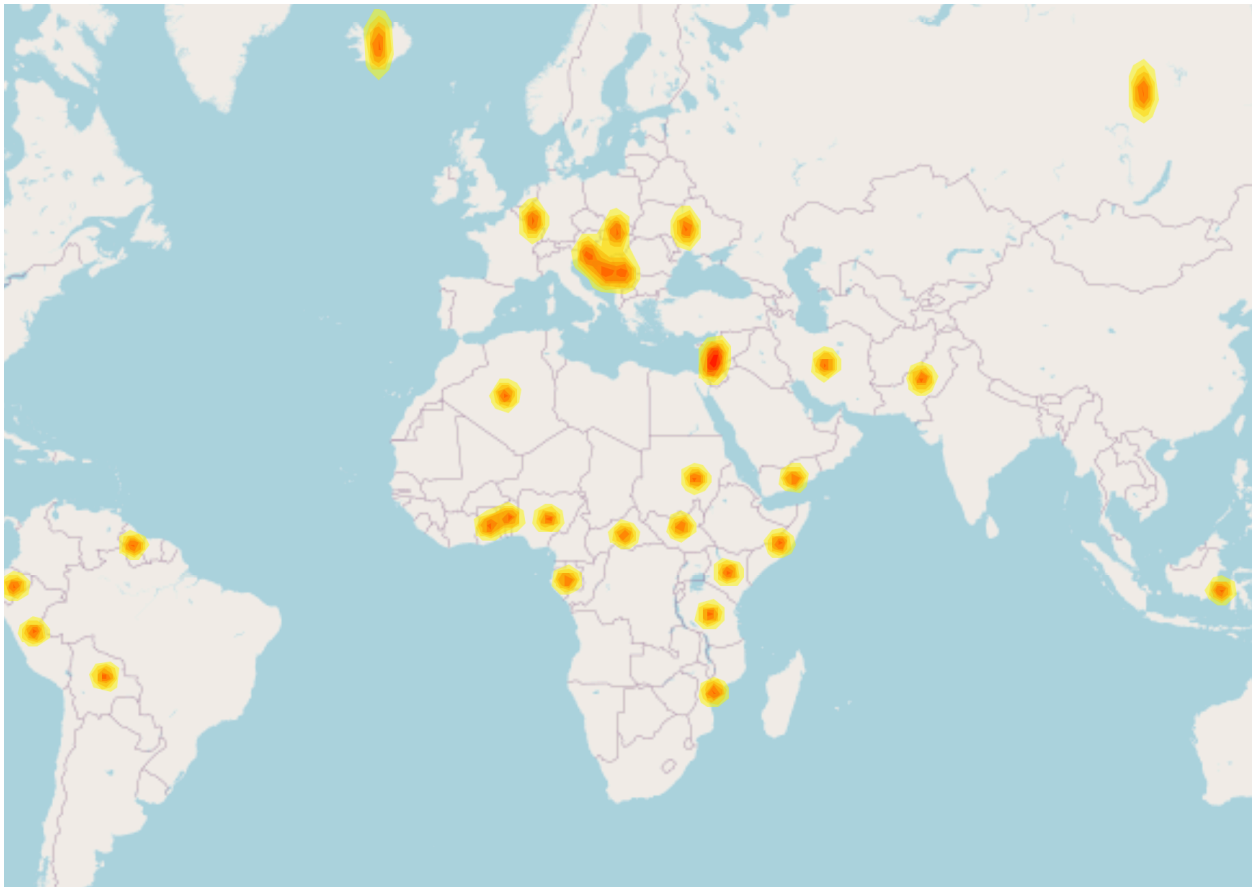
The world is restless.
Signals of instability rise and fall in many places, but some break through the noise with unusual force.

This quarter, the Early Warning Index points to three such places:
Ecuador, the West Bank/Gaza, and Sudan.
They are not chosen out of preference. They surfaced because the numbers surged past their baselines and, particularly for the latter two cases, have erupted into humanitarian crises.

Each crisis matters. But these three stand out in the data right now.

In the pages that follow, we begin wide: a map of global anomalies, the trendlines of conflict, displacement, hunger, and shutdowns.
Then we draw closer, pairing each signal with witness, each metric with the lives already pressed beneath it.

5. Global Signals — Fall 2025



The map shows where the world's risk signals rose above the ordinary.
this means that overlapping anomalies indicate an increased likelihood of humanitarian crises.

6. Reading the Signals

Conflict

- “Battle-related deaths in 2024 remained among the highest in decades, with UCDP/PRIO placing 2024 near the top of the post-Cold-War period. The number of state-based conflicts reached a record high since 1946.” (Peace Research Institute Oslo)

Displacement

- Millions continue to move along long, fragile corridors.
- Sudan alone has pushed millions into neighboring states.

Food Insecurity

- Global hunger climbed to 295 million people in acute need.
- Climate anomalies are now clear multipliers of scarcity.

Information Control

- Internet shutdowns are increasingly used to block witness.
- Dozens of national governments employed shutdowns in the last year.

Together, these indicators mark a world under strain.
The Early Warning Index does not claim certainty — only signal.
It shows where the ground is shifting, before collapse becomes headline.

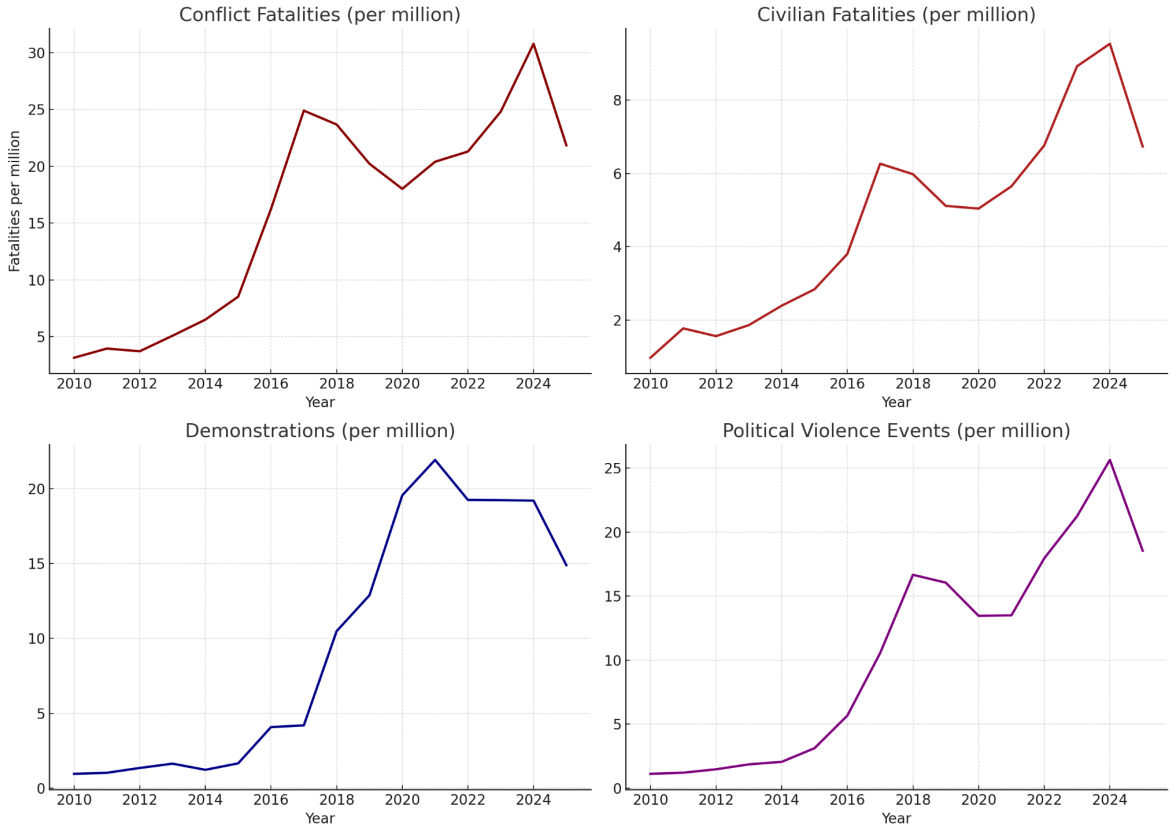
7. Charts & Trends — Rising & Declining Risks

Civilian Fatalities (per million): The steepest climb is among civilians, with a sharp rise in 2023–24. **Conflict is targeting the unarmed**.

Demonstrations (per million): A surge after 2019, remaining high. **Mobilization is historically intense** on a per-person basis.

Political Violence Events (per million): Volatile but trending upward.

Instability is expanding faster than population growth can explain.



Across the board, the graphs seem to show an increase in the anomalies that come before crisis. This has partially to do with availability of data, but also seem to represent real lived patterns. Does it stand up to scrutiny? See page 19 for a discussion on interpreting the graphs.

8. Global Snapshot and Case Studies — Fall 2025

The charts on the previous page tell a simple but hard story:

- **Conflict fatalities** are not just high in absolute numbers — even when adjusted for population growth, they are rising faster than at any time in recent decades.
- **Civilian deaths** have grown faster than overall fatalities, showing that those least armed are bearing the greatest cost.
- **Demonstrations** surged after 2019 and have stayed elevated. Protests are no longer exceptional; they are part of daily life.
- **Political violence events** fluctuate year by year, but the underlying trend points upward.

Taken together, these patterns suggest that global instability is intensifying. Some of this rise may reflect better reporting, but even smoothed with rolling averages, the direction is clear.

The Early Warning Index does not predict outcomes.

Each issue of the *Humanitarian Data Quarterly* features **three case studies.** For this issue, we feature the **the highest anomaly, and two at the confluence of both anomalous indicators and major humanitarian weight**:

- **Ecuador (2025)** — the strongest anomaly in the data this year, proof that the Index surfaces risks beyond the usual headlines.
- **Palestine (2025)** — among the highest anomalies globally, and one of the most acute humanitarian crises.
- **Sudan (2025)** — a top anomaly where conflict and mass displacement converge.

[Editorial Note: This issue features Ecuador (#1 anomaly 2025), Palestine (#4), and Sudan (#6). Myanmar is acknowledged as a protracted crisis but excluded from anomaly rankings.]

9. Ecuador

> *“We never thought of Ecuador as a war zone. Now we live with gunfire every night.”*

For much of the world, Ecuador was a quiet country — no civil war, no front-page disasters. But in 2023–2024, narco-violence escalated dramatically. Armed groups fought for control of ports, prisons erupted in massacres, and in August 2023 a presidential candidate was assassinated.

Daily life changed overnight. Schools closed under curfews, businesses shuttered, families fled neighborhoods once considered safe. The perception of Ecuador as a stable democracy cracked, replaced by the feeling of living inside a siege.

The Early Warning Index picked up the shift: a sudden and unusual surge in violence and demonstrations compared to Ecuador’s own history. For residents, the “anomaly” was lived as fear in their own streets.

Data Signal Box

- **EWI anomaly score** (2025): highest globally
- **Conflict fatalities:** sharp rise in 2023–2024, driven by gang violence and state crackdowns
- **Demonstrations**: sustained protests over security, governance
- **Political violence events**: multiple high-profile assassinations, spikes in organized armed clashes

Why It Matters

Ecuador's anomaly is proof that instability doesn't always break out where the world is watching. The Index surfaced Ecuador not because of decades-long war, but because a country with a relatively stable baseline broke sharply from its own norm.

What to Watch

- Potential regional spillovers into Colombia and Peru as gangs cross borders
- Continued political instability tied to corruption and narco-economics
- Public trust in institutions eroding, with implications for democracy itself

11. Palestine

> *“We bury our children in the morning, then rebuild the house by evening. What else can we do?”*

Daily life in the West Bank and Gaza is marked by disruption: bombardments, demolitions, closures, blackouts.
Ordinary routines — school, work, family care — are repeatedly broken by extraordinary violence.

What the headlines call “flare-ups” are, for those on the ground, continuous.
There is no return to normal between each strike; only shorter or longer pauses before the next one.

This is the context in which the Early Warning Index recorded one of the highest anomalies of the quarter.

Data Signal Box

- **Conflict fatalities:** 30,402 in 2024 (per capita, among the highest worldwide)
- **Displacement:** sharp increase, corridors into Egypt and Jordan stressed
- **Information control:** repeated shutdowns, restrictions on reporting

Why It Matters

This is not a matter of political choice. The data itself converged here: fatalities, displacement, and shutdowns all surged.

What to Watch

- Regional displacement pressures: possible spillovers into Jordan and Egypt if conditions worsen.
- Information blackouts: shutdowns and restrictions on media coverage can obscure the scale of harm.
- Civilian tolls: rising proportion of civilians among casualties, especially from explosive weapons.
- Political fractures: both within Palestinian governance and in Israel's internal politics, which shape escalation patterns.
- International response: shifts in aid, diplomatic posture, or sanctions that may affect the trajectory of the crisis.

13. Sudan

> *“Every week new families arrive. We run out of food, then share less, but still they come.”*

Since the outbreak of conflict in April 2023, Sudan has become the world’s fastest-growing displacement crisis.

Fighting has spread through Khartoum, Darfur, and beyond, uprooting millions.

Refugees cross into Chad, South Sudan, and Egypt; many more are displaced within Sudan itself.

Communities in receiving areas, already fragile, struggle to absorb the new arrivals.

Data Signal Box

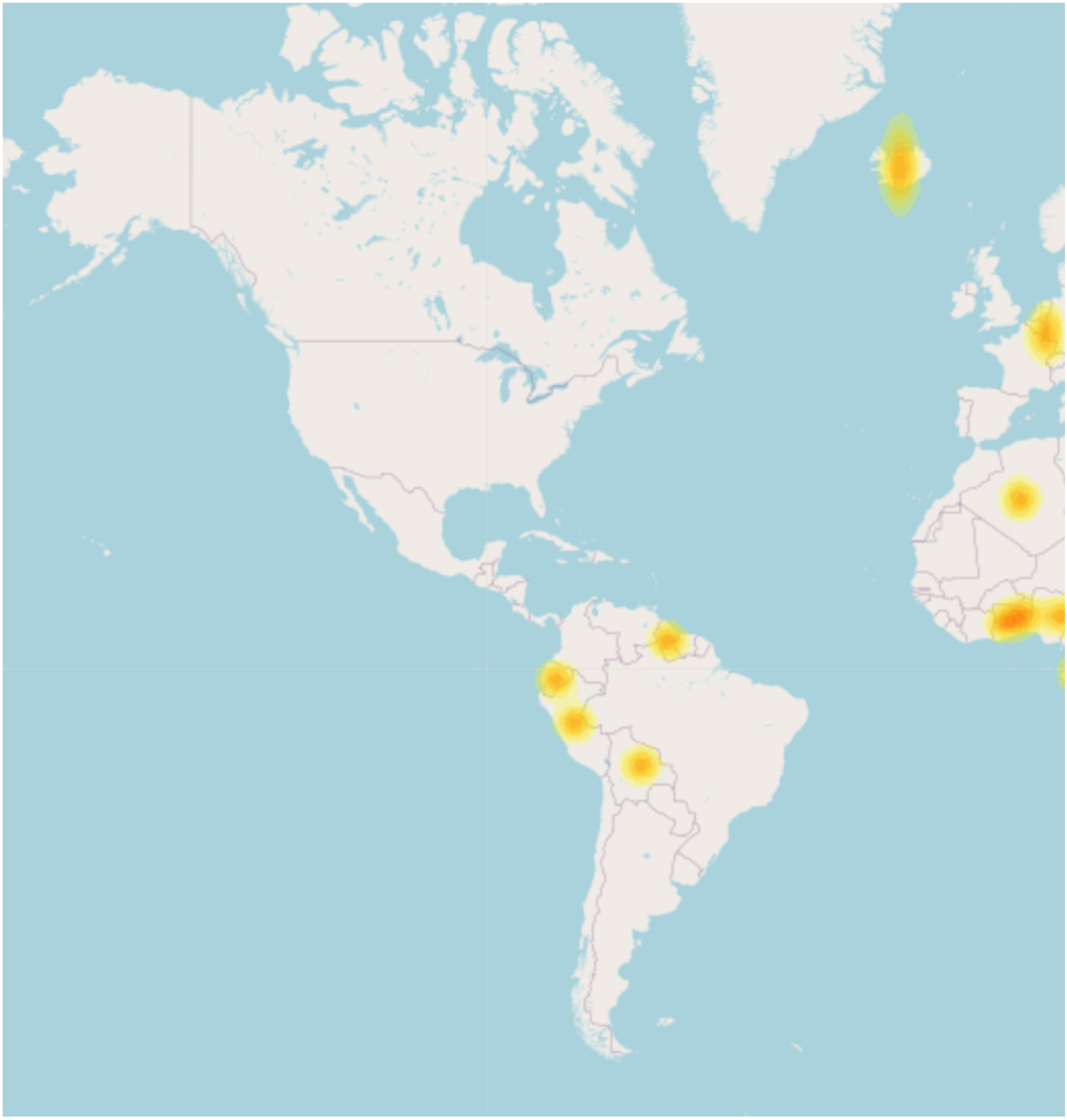
- **Conflict fatalities:** 15,779 in 2024
- **Displacement:** more than 8 million displaced since April 2023
- **Food insecurity:** rapidly worsening in displacement corridors

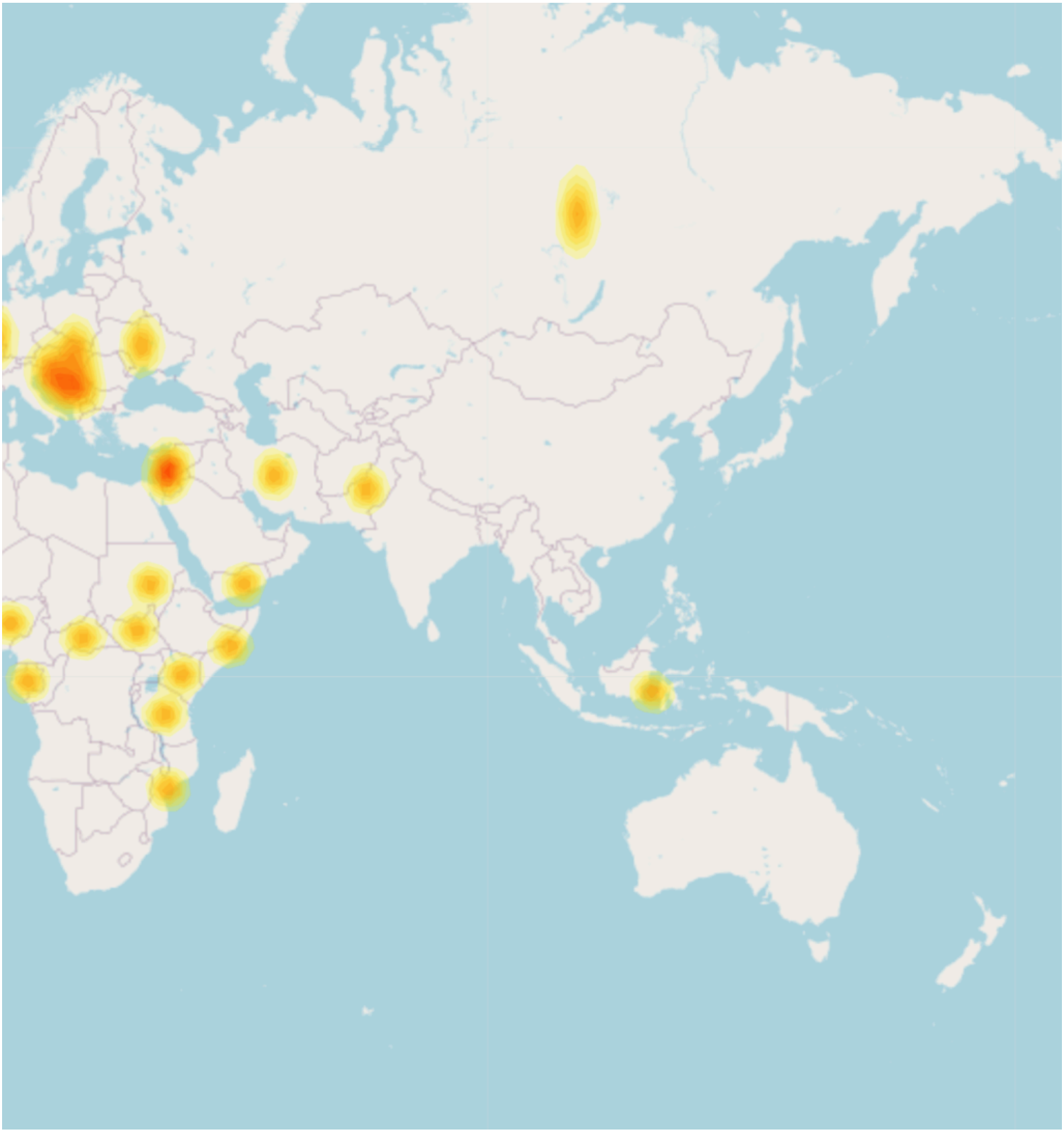
Why It Matters

Sudan's crisis is both a national collapse and a regional destabilizer. Its anomaly score reflects not just conflict fatalities but the extraordinary displacement pressure.

What to Watch

- Refugee flows into Chad and South Sudan may exceed their coping capacity.
- Famine risk in camps and host communities.
- Ongoing negotiations repeatedly break down under fire.





17. Inside the data: Introducing the Early Warning Index

The Early Warning Index (EWI) is a way to listen to the world through its signals. It does not predict outcomes. It does not choose sides. It measures where instability rises sharply against its own baseline.

How It Works: The Index draws on public datasets — conflict fatalities, displacement flows, food insecurity, demonstrations, and information controls. Each indicator is standardized and compared against historical norms. When multiple indicators spike together, the score rises.

What It Shows: The Index highlights places where stress is building faster than usual. A high score does not guarantee collapse. It signals that the risk is unusual, and that attention may buy time.

Why It Matters: Most humanitarian response begins after a crisis breaks into headlines The Index offers a chance to see patterns earlier. The possible outcomes include better preparation and faster responses to crises by humanitarian organizations and community leaders.

What It Cannot Do: The EWI cannot replace judgment, context, or testimony. It is not a prophecy. It is a compass — one among many — for those trying to prepare before it is too late.

Transparency First

- All sources are **public datasets**: conflict events, displacement records, food insecurity reports, demonstrations, telecom data.
- All methods are **open**: anomaly scores are calculated against historical baselines using transparent formulas.
- Every figure in this issue can be **reproduced** from the raw data.
- See **Methodology & Sources (p. 30)** for full details.

18. Inside the Math: From Noise to Alarm

The Early Warning Index is built step by step. Each step is transparent and reproducible.

We use **public datasets**, such as

- Conflict fatalities
- Civilian fatalities
- Displacement flows
- Political violence events
- Information controls (shutdowns, restrictions)
- Demonstrations (note: the data follow *anomalies* to predict crises, not just tragedy or harm)

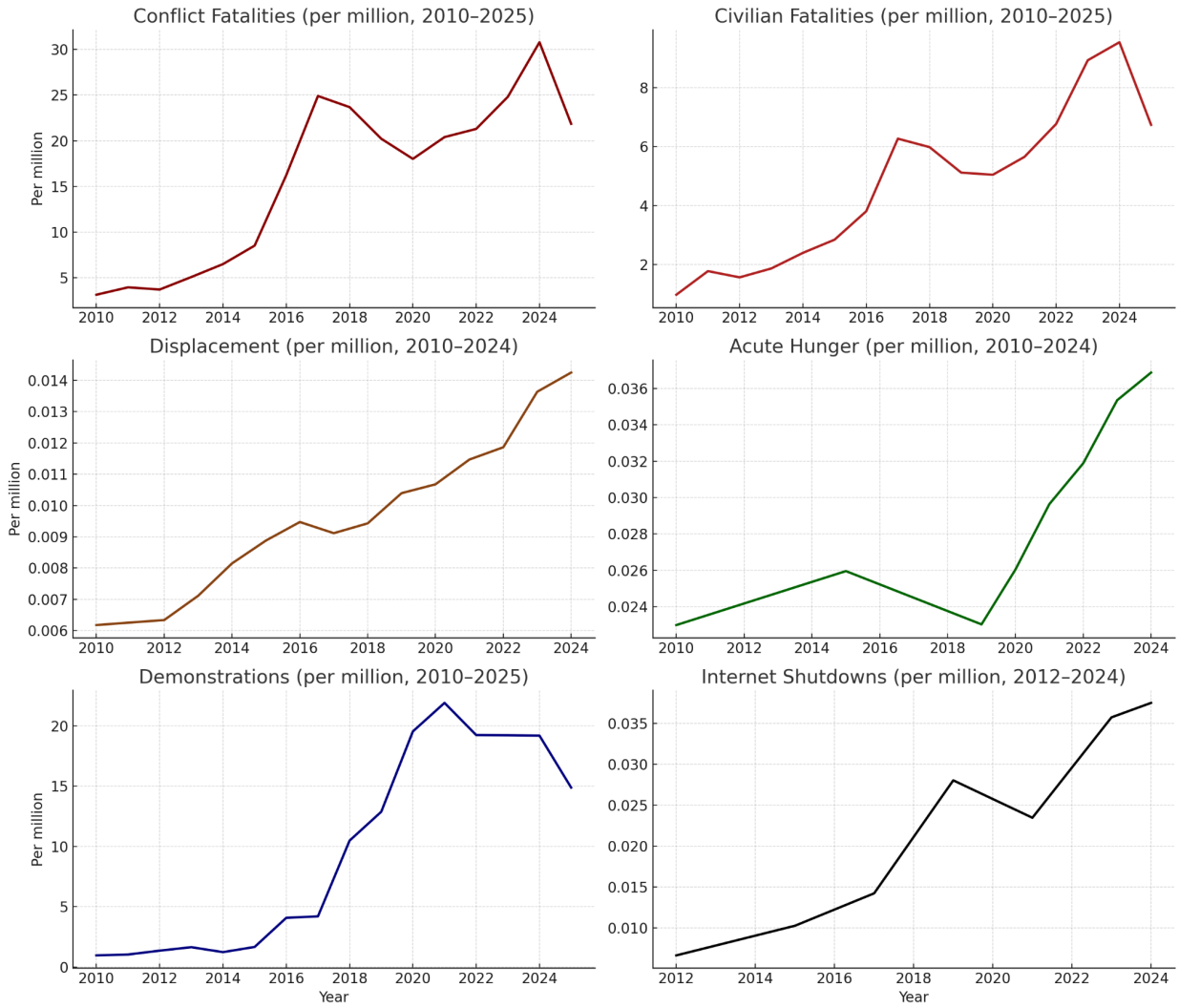
Turning datasets into data: Disparate datasets are not automatically able to be compared. Datasets are organized by country and year, standardized by Median Absolute Deviation (MAD), and averaged into a composite anomaly score for each country-year. If one indicator spikes, the score rises; if multiple spike together, the score rises.

Identifying Alarms Country-years are then ranked.

- A score near zero = ordinary variation.
- A score above 2–3 MADs = unusual.
- The **three highest global anomalies** are highlighted in this Quarterly.

Our method proves relative anomaly detection: a score >3 MADs means “this year looks very different from baseline for this country.” It doesn’t prove absolute severity: a small country with 500 fatalities could score higher than a big country with 10,000 if the jump is sharper relative to its own history. It also doesn’t prove causation

19. Does it Stand to Scrutiny?



Across the board, the graphs seem to show an increase in the anomalies that come before crisis. This has partially to do with availability of data, but also seem to represent real lived patterns. Does it stand up to scrutiny?

We believe the short answer is yes. Based on our data validation tools, the data and methods show high internal and external validity and solid logic. This presentation of the data is accurate and replicable, and we welcome replication. (According to Wolfram: “In short: the math in this file looks internally consistent with the published formulas and logic for v3. No sign of normalization or averaging errors—just the expected data gaps from sparse years.”

But is the data actually true to reality? Just looking at the graphs, it may seem unthinkable that anomalies have increased so quickly.

But looking closer at Conflict and Civilian **Fatalities (2010–2025),** even when we smooth the noise and adjust for population growth, the slope still climbs. 2024 really does sit higher than the years before it. as for **Displacement (2010–2024),** even with cautious eyes, we are looking at the highest displacement on record. Similarly**, Acute Hunger (2010–2024)**, some of the rise is from better surveys, but the big driver is real: climate shocks piling onto conflict.

Graph caveats:

- **Coverage bias:** Recent years often look worse because reporting is more complete, not only because reality worsened.
- **Baseline effect**: Scores are anomalies relative to each country’s own history, not absolute global severity.
- **Population** adjustment: Counts are normalized per capita where appropriate to avoid “more people = more events.”
- **Data revisions:** Numbers may shift if sources update past years; we version our runs for transparency.
- **Not causation**: Lines moving together do not mean one caused the other — only that risks tend to cluster.

Our bottom line interpretation: While the exact shape of the graphs would change with more data, the overall reality is that the increases are happening.

21. Limitations of the data and math

1. Fragile baselines. The math used in this version of the resulting data used 12-month rolling medians and MAD scores. It worked, but seasonal noise and missing months often threw off normalization, especially in countries with spotty data. Results were readable, not repeatable. → v4 replaces this with an eight-quarter IQR window — less noise, fewer false spikes.

2. Heavy compute and cloud dependence. v3 runs fine on a laptop but crawled on lower-power machines, forcing us to host most processing in the cloud. That limited who could reproduce the model and how far we could push it into the field. → v4 compresses all logic into a single SQL pipeline that a solar-powered Pi can refresh in under a minute.

3. Sparse and uneven time grids. Different indicators report on different calendars; quarterly aggregation in v3 produce missing cells that require manual patching. → v4 builds a dense country–quarter grid and handles gaps automatically.

4. Non-standard outputs. Each sub-index in v3 uses slightly different scaling, which makes cross-comparison awkward. → v4 standardizes everything on IQR-z units and clips extremes for dashboard stability.

5. Limited accessibility. Because of its compute needs and mixed codebase (Python + SQL + manual steps), v3 isn't truly open hardware. → v4 turns the model into a portable data appliance — reproducible, low-power, field-ready.

6. No local ownership loop. v3 generated useful signals but lived entirely in central servers. Communities could see their data but not own the process. → v4 introduces the node network — open design, trade-in system, and local control of both hardware and datasets.

22. The Science of Probability: Causation and Correlation

The Early Warning Index highlights **correlations** — patterns where signals move together.
It does not claim to prove **causation** — what drives what.

What Correlation Shows

- Conflict fatalities, displacement, and internet shutdowns often rise in the same quarter.
- Demonstrations and food insecurity often overlap.
- These alignments tell us where the ground is unstable.

What Correlation Does Not Prove

- That protests *cause* hunger.
- That internet shutdowns *cause* violence.
- That displacement *causes* collapse.

Causation requires controlled experiments, which are impossible in real-world crises. What we have instead are signals that point to risk.

Some exceptions: Ecuador has some notable alarms going off, but no crisis moment. By contrast, Myanmar is in a protracted crisis, but shows less alarms in the past quarter. Many communities live in a reality or one, the other, both, or neither, as is the nature of budding correlational research.

How We Use Correlation

- As an **early marker**: if indicators that often move together are spiking, watch closely.
- As a **decision aid**: correlations help direct attention and resources.
- As a **humility check**: correlation keeps us alert without overclaiming.

23. Well... Predict Something.

At its core, this project rests on one of the simplest scientific assumptions:

past and present data can be used to affect the future.

We do not claim prophecy. We claim that patterns matter — and when they break, alarms should sound.

What the Index Can Say

- Where risk is rising fastest. Ecuador, Palestine/West Bank, and Sudan lead this quarter.
- Which indicators converge. Fatalities, displacement, and information control spike together before escalation.
- Which timelines matter. Anomalies often shift months before humanitarian systems respond.

What the Index Cannot Say

- The exact timing of collapse or violence.
- Whether leaders act wisely or recklessly.
- How communities adapt in ways datasets can’t capture.

This Quarter's Outlook

- Ecuador — Top anomaly of 2025. Narco-violence and political assassinations have destabilized a country once considered stable. Risks of regional spillover into Colombia and Peru are real.

- Palestine/West Bank — Among the highest anomalies, converging with one of the most acute humanitarian crises. Displacement pressures into Jordan and Egypt remain possible.

- Sudan — A high anomaly and a high crisis: conflict continues, displacement corridors widen, and famine conditions deepen without expanded access.

Why Prediction Matters

Prediction here is modest but urgent:

- When signals rise together, history shows instability follows more often than not.

- Acting early can mean the difference between preparation and reaction.

- The point is not certainty, but clarity enough to justify readiness.

We cannot control the future. But we can use the present to bend it.

25. Indicator Focus: ‘Climate Anomalies’

Rising Temperatures: Global average surface temperatures have climbed steadily over the last two decades. Each successive five-year block has set a new record, with 2023–2024 registering among the hottest years ever recorded. The long-term trajectory remains upward, regardless of short-term variability.

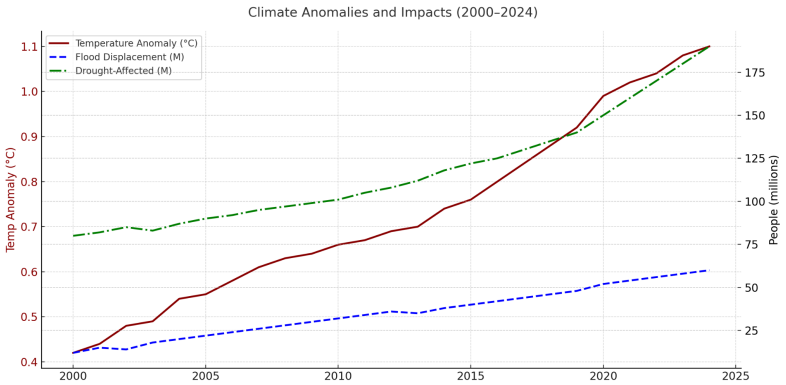
Heatwaves and Human Impact: Extreme heat events are increasing in frequency, intensity, and duration. Studies link record heatwaves to excess mortality, crop failures, and strain on energy systems. Vulnerable populations — particularly the elderly, outdoor workers, and communities without access to cooling — face disproportionate risk.

Floods and Droughts: Climate volatility manifests in both extremes of the water cycle. Floods displace millions annually, often in regions already facing conflict or economic stress. Droughts intensify food insecurity, especially in Sub-Saharan Africa, the Middle East, and South Asia. Both extremes have increased in frequency since 2000.

Links to Instability: While climate anomalies are not sole causes of crisis, they act as **multipliers:**

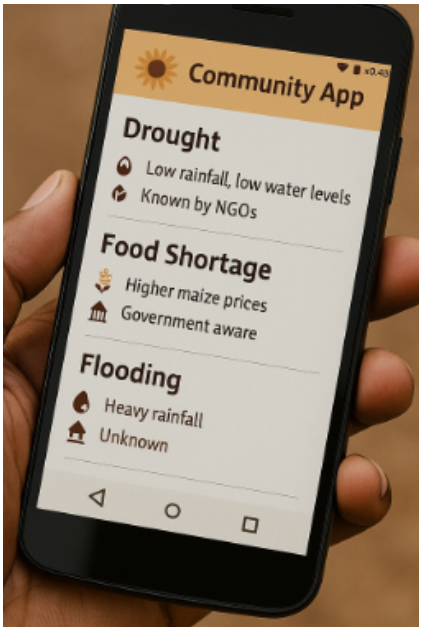
- Drought plus conflict accelerates famine.
- Floods plus weak infrastructure produce large-scale displacement.
- Heat plus political fragility fuels unrest.

2024 sits at the worst levels on record. The heat baseline keeps stepping upward, floods steadily uproot more lives, and droughts are climbing fastest of all.



26. Applied data: A Grassroots Early Warning App

The Early Warning Index began as research. This Quarterly makes it public. The next step is to put it in the hands of those who need it most. One application of the data could be a blueprint for a grassroots community crisis early warning app.



What It Could Be

- A lightweight app that shows. anomaly signals by region.
- A map that refreshes with every new dataset.
- Community-owned alerts for rising prices, closed roads, and absent aid
- Access to immediate signs: sirens, lights, etc, made equitable
- Open data, open code, privacy first. .

Why It Matters

- **Delegations** can prepare with signals that are credible and current.
- **Local councils** can point to verifiable data when demanding resources.
- **Humanitarian agencies** can align their actions from the office with the experience on the ground.
- **Communities at risk** can know what funders and policymakers know — in real time.

What Comes Next

The Quarterly shows what's possible. The app could show what's urgent. This is not a finished product. It is an invitation to partners who can help build a tool that makes foresight a commons — not a privilege.

26. Always show your work

What we measure (inputs)

Open, public indicators by **country × year**:

- Conflict fatalities (all; civilian subset)
- Political violence events (non-fatal incidents)
- Demonstrations/protests
- Displacement (refugees/IDPs)*
- Food insecurity (acute IPC counts)*
- Information control (internet shutdowns)*
  *If a public series is annual at global/regional level, we document the mapping/assumption used.

Pre-processing (standard moves)

1. **Per-capita where it makes sense**
   For count indicators, rate = value ÷ population (per million people).
2. **Monotone fixes**
   Remove obvious negative deltas where data producers mark revisions.
3. **Transform (rarely)**
   If a series is hyper-skewed, we log(1+x) before standardization.
4. **Smoothing is for charts, not scoring**
   We may show 3-year rolling averages in visuals; the **index uses unsmoothed yearly values**.

How we flag "unusual" (robust anomaly)

For each indicator (k), country (c), year (t), with series (x_{k,c,t}):
Robust spread:

$$
\mathrm{MAD}_{k,c} = \operatorname{median}\big(|x_{k,c,t} - \tilde{x}_{k,c}|\big)
\quad\text{with}\quad
\tilde{x}_{k,c} = \operatorname{median}(x_{k,c,\cdot})
$$

Robust anomaly (z-like score):

$$
z_{k,c,t} = \frac{x_{k,c,t} - \tilde{x}_{k,c}}{\mathrm{MAD}_{k,c}}
$$

Notes:We publish the **unscaled MAD** form above for reproducibility. (Some workflows multiply MAD by 1.4826 to approximate σ under normality; we don't assume normality

here.) We **winsorize** extreme (z) values to ([-6, +6]) to keep single-year shocks from overwhelming the composite. Details are available in the technical report " Public Data as an Early-Warning System for Social Instability (v.3).

Composite Early Warning Index

Equal-weight composite (default):
[
EWI_{c,t} = \frac{1}{K}\sum_{k=1}^{K} z_{k,c,t}^{,*}
]
where (z^{,*}) is the winsorized robust anomaly and (K) is the count of available indicators for ((c,t)).
If an indicator is missing for ((c,t)), we average over the indicators present and **publish the coverage fraction**.

Ranking & selection

- We **rank countries by (EWI_{c,t})** for the most recent complete year/quarter.
- Issue features = the **top anomalies**. That's why a country appears; not because we favored it.

What to do with partial years

- Mark them **YTD** and **exclude from ranking** unless we clearly state the cutoff and use the same cutoff for all countries.

Replicate, Audit, Extend

Replicate this in 10 steps

1. **Download data** you want to include (the CSV you have includes at least: YEAR, all_fatalities, civ_fatalities, demonstrations, pol_violence_events; add displacement/IPC/shutdowns where available).
2. **Join population** by country-year; compute **per-million rates** for counts.
3. For each **country × indicator**, compute the **median** and **MAD** across all available years.
4. Compute **robust anomalies** (z) using the formula above (no scaling factor).
5. **Winsorize** (z) to ([-6, +6]). Record any truncation.
6. **Average** available indicator (z)'s to get (EWI_{c,t}). Store the **coverage fraction** (e.g., 5/6 indicators present).
7. **Rank** (EWI_{c,t}) within the target period.
8. For charts, you may overlay a **3-year rolling average** (presentation only). Keep the index itself on unsmoothed values.

9. **Publish a sources/methods note** with: indicator list, years covered, missingness, transformations, and the exact formulas above.

Minimal schema you can start with
country, YEAR, all_fatalities, civ_fatalities, demonstrations, pol_violence_events, population

Known constraints (read before you over-claim)

- **Coverage bias**: later years often have better reporting → part of the rise is measurement. We say this out loud, every time.
- **Heterogeneous definitions** across producers (e.g., what counts as a "shutdown," how IPC phases are reported).
- **Partial periods**: YTD values look low; don't rank them with full years.
- **Data drift**: retroactive revisions can change historical medians/MADs. Version your runs.

Sensitivity checks we run (and invite you to run)

- **Per-capita vs. raw**: ensure your conclusions don't rest on population growth alone.
- **Leave-one-out**: drop each indicator in turn; confirm rankings are not single-indicator artifacts.
- **Robustness to log transform**: if an indicator is wildly skewed, check whether results change with log(1+x).
- **Alternate baselines**: use rolling baselines (e.g., last 10 years) vs. full history; compare.
- **Uncertainty bands**: bootstrap medians/MADs per country to visualize index uncertainty.

Ways to extend the research (low drama, high yield)

- **Sub-national resolution** where public data supports it.
- **Nowcasting** with short-lag sources (prices, nighttime lights, mobility).
- **Text-as-signal**: aggregate public incident reports for volume/valence, then treat as another indicator (same MAD framework).
- **Ablation study**: quantify each indicator's marginal contribution to top-rank selection.
- **Open notebook**: publish a reproducible run (data → figures → PDF), and tag it with a version.

Attribution & sharing Everything in this issue is built from **public data** with **open formulas**. If you use or critique this, please cite the **Early Warning Index (v3)** and link to the methods page of the issue.

What's fact, what's assumption?
What's the evidence?
What does this actually show?
How could this be tested or disproved?
Where's the weak link?
What else could explain this?
Am I overstating the claim?
What do I accept?
What can I not accept?